Studies on the Agricultural and Food Sector in Central and Eastern Europe

Agriculture in the Face of Changing Markets, Institutions and Policies

Challenges and Strategies

Edited by
Jarmila Curtiss, Alfons Balmann, Kirsti Dautzenberg, Kathrin Happe

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LEIBNIZ-INSTITUT FÜR AGRARENTWICKLUNG IN MITTEL- UND OSTEUROPA

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CONTENT

PREFACE

Since the late 1980s, agriculture in Central and Eastern European Countries (CEECs) has been under considerable adjustment pressure due to changing political, economic and institutional environments. These changes have been linked to the transition process, as well as the ongoing integration into the European Union and the world market. Reduced subsidies, increased environmental and food quality demands, as well as structural changes in the supply, processing and food retailing sector call for major structural adjustments and the improvement of farmers' managerial abilities. Though such changes always carry significant threats to farms, they also offer new opportunities for the farms' entrepreneurial engagement. Upcoming changes in the agricultural environment and their possible consequences for farm structures across Europe are thus still timely subjects.

The objective of the IAMO Forum 2006 is to contribute to the success of agriculture in the CEECs, as well as their neighboring countries, in today's increasingly competitive environment. Concrete questions the conference focuses on are: What are the most suitable farm organizations, cooperative arrangements and contractual forms? How to improve efficiency and productivity? Where do market niches lie and what are the new product demands?

This book contains 33 invited and selected contributions. These papers will be presented at the IAMO Forum 2006 in order to offer a platform for scientists, practitioners and policy-makers to discuss challenges and potential strategies at the farm, value chain, rural society and policy levels in order to cope with the upcoming challenges.

IAMO Forum 2006, as well as this book, would not have been possible without the engagement of many people and institutions. We thank the authors of the submitted abstracts and papers, as well as the referees, for their evaluation of the abstracts from which the papers were selected. In particular, we would like to express our thanks to OLIVER JUNGKLAUS, GABRIELE MEWES, KLAUS REINSBERG and ANGELA SCHOLZ, who significantly contributed to the organization of the Forum. Furthermore, our thanks goes to SILKE SCHARF for her work on the layout and editing support of this book, and to JIM CURTISS, JAMIE BULLOCH, and DÓNALL Ó MEARÁIN for their English proof-reading. As experience from previous years documents, the course of the IAMO Forum continues to profit from the support and engagement of the IAMO administration, which we gratefully acknowledge. Last but not least, we are very grateful to the Robert Bosch Foundation, the Federal Ministry of Nutrition, Agriculture and Consumer Protection (BMELV), the German Research Foundation (DFG), the Haniel Foundation and the Leibniz Institute of Agricultural Development in Central and Eastern Europe (IAMO) for their respective financial support.

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Jarmila Curtiss, Alfons Balmann, Kirsti Dautzenberg, Kathrin Happe

INVITED CONTRIBUTIONS

INSTITUTIONAL AND STRUCTURAL CHANGE

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THE SUCCESS OF GRADUALISM: EMPIRICAL EVIDENCE FROM CHINA'S AGRICULTURAL REFORM

JIKUN HUANG[*]*, JOHAN F. M. SWINNEN*[**]*, SCOTT ROZELLE*[***]

1 INTRODUCTION

At its most basic level the Big Bang versus Gradualism debate can be characterized by two questions. Should reforming nations lead with radical market liberalization policies? Or, should institutions that offer strong incentives to those involved with economic activity be fostered and be allowed to evolve before central planning is dismantled and markets are unleashed?

While the debate has raged for more than 10 years, there has been little progress in understanding exactly what has accounted for the success of countries that adopted gradualism and why most countries that began their reforms with market liberalization have not enjoyed rapid growth. Most explanations of the success of gradualism relative to Big Bang reform have discussed which nations have grown faster: Countries like those in East Asia that adopted gradual reform policies, or those in Europe that began with radical liberalization policies (ROLAND and VERDIER, 1999). According to most any performance criteria, East Asian gradualism is the clear winner (MACOURS and SWINNEN, 2000). In response, researchers that still believe in the necessity of Big Bang reforms argue that the comparison of East Asia and Europe is not valid because of structural differences in the economies (SACHS and WOO, 1994).

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Despite great interest among academics and policymakers, progress in settling the debate has stalled, almost certainly because few researchers have been able to empirically isolate the factors that have contributed to the performance of the different transitional economies. So, in a sense, the goal of this paper is to respond to this lack of evidence; our paper seeks to empirically substantiate that the sequencing of policies in transitional economies matters. While our study is limited to the case of China's agricultural sector and its reforms, we argue that our findings offer support for explaining why gradualism works. We also draw heavily on comparison to other transitional countries in East Asia and Europe to illustrate China's strategy.

To meet our goal, we pursue three objectives. First, we briefly delineate the record of China during the reforms. In order to put this record into a comparative perspective, we compare China's achievements to various other transition countries. Second, we examine the policy changes that China has made to achieve such an outstanding result. Although there are many factors that have affected growth in production and productivity, we focus three: Changes in price policy, property rights shifts and market liberalization reform measures. Finally, we offer estimates of the magnitudes of returns to these three policy changes.

2 THE RISE AND FALL OF PRODUCTION AND PRODUCTIVITY IN CHINA

Remarkable differences can be observed when examining the performance of agriculture between China and other transition countries during the first decade of reform (ROZELLE and SWINNEN, 2003).[1] From the start of the reforms, output increases rapidly in China (Table 1). In China output increases by 60 percent. While output in other Asian transition countries, such as Vietnam, also rises sharply (e.g., it increases by nearly 40 percent), outside of East Asia agricultural output trends follow a different set of contours. Production falls steeply in the first years of transition in almost all CEE and CIS countries.

Productivity trends tell a somewhat different story of how transition affects agricultural performance. While productivity trends evolve similarly to output in certain countries, strongly diverging patterns emerge in others.[2] In China,

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[1] The material in this section is from ROZELLE and SWINNEN, 2003.

[2] We examine three sets of productivity indicators: Labor productivity (output per unit of labor use), yields (output per unit of land), and TFP. While the most comprehensive indicator of productivity is TFP, comparative and reliable estimates of TFP are scarce, because of data and methodological problems. For some transition countries TFP measures and the data needed to calculate TFP measures are simply not available. For those countries in which TFP series are available, in some cases, comparisons have to be done carefully because of differences in methodologies, time frames, and sampling and commodity coverage. Information for the partial productivity measures is more readily

for the entire reform period, trends in agricultural labor productivity (ALP), measured as output per farm worker, parallel those of output (Table 2). The output per labor unit rises rapidly in China. Like China, ALP of farm households in Vietnam rises steadily albeit less so than the case of China. The path of ALP for Russia also mirror those of the nation's output, falling between 35 and 50 percent between 1990 and 1999. Agricultural labor productivity trends for several CEE countries, however, differ from those of output. The dramatic reduction in the use of agricultural labor drives the rise of ALP in the Central European countries. It also is partly behind the rise in China. In Vietnam and Russia, however, the transition of labor out of agricultural does not happen and so ALP does not improve.

The performance of yields parallel those of ALP (Table 3). In China yields increase rapidly from the beginning of transition, rising by 12 percent annually during the first 5 years after reform. Between 5 and 10 years after reform, yields continue to rise, although the rate of rise slows. These rises were also experienced in Vietnam (PINGALI and XUAN, 1992). In contrast, average yields fall during the first few years after reform for all CEE and Russia. Interestingly, as in the case of labor productivity, after the initial post-transition years, the paths of yields differ strongly between CEE and Russia.

Although it is possible that partial and more complete measures of productivity move in opposite directions, most of the evidence from the literature shows that, in fact, total factor productivity (TFP) trends move largely in the same direction as the partial measures (Table 4). Several series of TFP estimates have been produced for China's agriculture (MCMILLAN, WHALLEY and ZHU, 1989; FAN, 1991; LIN, 1992; WEN, 1993; HUANG and ROZELLE, 1996; FAN, 1997; JIN et al., 2002 – see rows 1 to 5 for Jin et al's estimates). The studies uniformly demonstrate that in the first years after reform (1978 to 1984), comprehensive measures of productivity (either constructed TFP indices or their regression-based equivalents) rose by 5 to 10 percent per year. Although WEN (1993) worries that TFP quit growing in the post-reform period (1985 to 1989), FAN (1997) and JIN et al. (2002) demonstrate that during the 1990s, TFP continues to rise at a rate of around 2 percent per year. These trends are much like those for Vietnam. Between 1980 and 1985, PINGALI and XUAN (1992) demonstrate that the productivity of agriculture (in this case rice, which makes up a large part of the nation's agricultural output) rises by 2 to 3 percent annually (rows 6 to 11).[3] Estimates of TFP changes in CEE and the CIS countries also show that measures of TFP generally move in a manner consistent with the partial ones (Table 4).

available, and so we start by examining indicators of partial productivity and complement the analysis with a review of estimates of TFPs from the literature.

3 Although no one has analyzed the rise in productivity between years 5 and 10 after the reforms, BENJAMIN and BRANDT (2001) estimate that between 1992 and 1997, TFP for rice and total crop output generally continues to rise in Vietnam (though in the case of total crop output, TFP growth differs between the south – positive, and the north – negative).

In summary, according to almost all indicators of development of agriculture, China performs the best. Although use of different criteria also paints different pictures of success in some countries, China performs the best or nearly the best in terms of all indicators for all time periods. It is perhaps because of this reason that the economy as a whole and the rural economy specifically has grown so rapidly and poverty has fallen so sharply. In the rest of the paper, we shall narrow the focus to China and examine three sets of the policies that were instrumental in generating these changes. There have been others – for example, agricultural R&D and trade policy. For reasons of space limitations, we ignore these in this paper.

3 DETERMINANTS OF CHINA'S SUCCESS: PRICE REFORM, PROPERTY RIGHTS CHANGES AND MARKET LIBERALIZATION

Unlike in the transitional economies in Europe, leaders in China did not move to dismantle the planned economy in the initial stages of reform in favor of liberalized markets. Policymakers only began to shift their focus to market liberalization in 1985, after decollectivization was complete. Even then, liberalization was start and stop (SICULAR, 1995). For example, in the case of fertilizer, YE and ROZELLE (1994) show that after an early attempt at market liberalization in 1986 and 1987, perceived instability in the rural economy in 1988 led to sharp retrenchments. Agricultural officials only took controls back off fertilizer marketing and began encouraging private trade in the early 1990s. LIN, CAI and LI (1996) offer a detailed analysis of reform policy. They argue that leaders were mainly afraid of the disruption that would occur if the institutions through which leaders controlled the main goods in the food economy (such as grain, fertilizer, and meat products) were eliminated without the institutions in place that work to support more efficient market exchange.

ROZELLE (1996) shows that the sequencing of agricultural reform policies followed the gradualism strategy of China's more general, economy-wide reforms that MCMILLAN and NAUGHTON (1992) describe. In the initial stages of reform, leaders consciously restricted the promotion of market-based economic activity, allowing at most the exchange of minor products (e.g., minor fruits and vegetables) in a sharply circumscribed regions. Not until 1985, after the completion of HRS, did policy makers begin to encourage market activity for more important commodities (e.g., grain), although initially market activity only occurred within the framework of China's renowned two tier price system (SICULAR, 1988). Leaders did not commit themselves to more complete market liberalization until the early 1990s, more than a decade after the initiation of HRS. From this description, it is clear that China's reforms fall into 2 distinct stages: The incentive reforms that dominate the period from 1978 to 1984; and a period of gradual market liberalization that begins in 1985 and extends through the 1990s. In the rest of this section we look in more detail at three of the main parts of China's reform strategy.

4 PRICE POLICY CHANGES

The administration of prices by the Socialist planning apparatus is one of the most distinguishing characteristics of pre-transition countries. While in some countries leaders allowed subsets of goods to be traded out of the plan, for most high priority commodities – which almost always included food and fiber-planning ministries in most nations allocated goods and services mostly on the basis of quantity-based plans. Prices mostly served accounting functions. This was the case of China, as the rest of the transition world.

In pre-reform era, China used administrative prices to impose a heavy tax on agriculture (LARDY, 1983; SICULAR, 1988a; GREEN and VOKES, 1998). Policy makers required farmers to deliver their output at artificially low prices. Although in the 1970s a policy of paying a slightly higher price for marketed output that exceeded the basic quota, most of these prices were purposely held artificially in comparison to inputs, capital equipment purchaes and other consumer goods that were bought from factories and wholesalers in the urban economy. In part of offset the high input prices, subsidized inputs were provided, although only producers could only buy limited quanitites.

Although early in the reforms China's leaders had no concrete plan to liberalize markets, they did take steps to change the incentives faced by producers that were embodied in the prices that producers received for their marketed surplus. Hence, perhaps one of the least appreciated moves of the early reformers was their bold decision to administratively increase the price of farm goods that were to be received by farmers (LARDY, 1983; SICULAR, 1988b). Between 1978 and 1983, in a number of separate actions, planners in China increased the above quota price, the payment farmers received for voluntary sales beyond the mandatory deliveries, by 41 percent for grain and by around 50 percent for cash crops (SICULAR, 1988b). According to the State Statistical Bureau's data, the relative price of grain to fertilizer rose by more than 60 percent during the first 3 years after reform. During the early reform years, the rise in above-quota price represented a higher output price at the margin to farmers, since until 1984, state-run procurement stations regularly purchased all grain sold by farmers at the above-quota price as long as they had already fulfilled their mandatory marketing delivery quota which was purchased at a state-set quota price, which for the case of rice, for example, was 50 percent below the above-quota price (SICULAR, 1995).[4]

[4] Although the statistical bureau did report a "market" price at that time (which actually was about the same level as the above quota price), such a small amount of grain (and less of fiber and oil seeds) was sold on markets, since rules still tightly controlled the

The important contribution of China's pricing policy is the timing and breadth of the policy change. The first major price rise occurred in 1979, almost at the same time when reformers were deciding to decollectivize. However, given the leadership's decision to gradually implement the Household Responsibility System (HRS – discussed below), beginning first in the poorest areas of China, the price increases immediately affected all farmers, both those in areas that had been decollectivized and those that had not. By 1981, the time of the second major price increase, according to LIN (1992), less than half of China's farmers had been allowed to dismantle their communes. Hence, as long as there was some, albeit weak, link between the output price and production, the plan-based price rise would have led to increases in China's farm output.

During the entire pre- and post-reform period, input prices – especially that of fertilizer – were still mostly controlled by the state's monopoly agricultural inputs supply corporation in China (STONE, 1988). Although in short supply, the governments in both countries controlled the price of fertilizer and other inputs (such as pesticides, diesel fuel, and electricity) as well as their distribution (SOLINGER, 1984). Communes received low-priced fertilizer from the state, but almost all of it was inframarginal. In other words, the government-supplied, subsidized fertilizer was not sufficient to meet the needs of most farmers. Producers in both the pre- and post-reform periods typically purchased additional fertilizer from the state at a higher price (YE and ROZELLE, 1994). Hence, unlike other transition and developing countries, at the margin, farmers in China were not able to purchase fertilizer prices at highly subsidized rates. In fact, according to HUANG and CHEN (1999), during the 1980s the real price of China's fertilizer was above the international price. Although China's leader administratively raised the price of fertilizer somewhat under rising foreign exchange and budgetary pressures in the mid-1980s, the rise was not large enough to eliminate the positive incentives created by higher output prices (WORLD BANK, 1997).[5]

5 PROPERTY RIGHTS REFORM

Although there were many differences among countries in the organization of their agricultural sectors prior to reform, in most cases farm production units shared several key characteristics (LARDY, 1983; PINGALI and XUAN, 1992; LERMAN, CSAKI and FEDER, 2002). Prohibiting private farming, Socialist ideals favored large, corporate organizations. In some nations state-owned farms dominated the landscape. Those that worked the land on state farms typically were paid a wage, drew a pension, and performed work assignments handed down by managers. Farms were theoretically organized on the same principals

distance of shipment and the goods that could be bought and sold, that most farmers did not consider the market price as their opportunity cost.

5 To the extent that access to fertilizer improves during the reform (STONE, 1988), the shadow prices of fertilizer would also have fallen, which would also encourage higher output.

as factory enterprises and farmers became workers. The state made investments, set planting plans, purchased inputs through planning channels and remitted profits up through the ministerial system. In other countries, farms were run as collectives. Like state farms in most respects, the main difference was that instead of drawing a wage, collective members earned work points that entitled them to a share of the harvest that was left over after deductions were made for input purchases, taxes, quota deliveries, and investment retentions.

Whatever the exact organizational form, wage- and point-earning farm workers typically faced few incentives to work hard since their compensation was at most only loosely tied to either their effort or the farm's profitability. Unlike industrial factories, however, monitoring farm workers was difficult. Logistics often compounded the problems. Planning necessities (e.g., arranging for the procurement of inputs and disposal of output) meant that farms in most countries were quite large. The large scale of farms meant that managers were often charged with trying to direct work of many individuals that on a day-to-day basis were physically spread out over a spatially-dispersed area. In almost all studies of pre-reform agriculture, farms were found to be inefficient (BRADA and KING, 1993; BROOKS, 1983; MEADE, 2000; LIN, 1992; PUTTERMAN, 1992).

Searching for ways to make their economies more productive, reformers had several options for eliminating inefficiencies. First, they could try to provide better incentives to elicit more effort. Second, leaders could try to reduce the operational size of the farming unit to improve information about on-farm production needs. Finally, they could try to facilitate the reduction or better allocation of inputs, including labor, that were being wasted. All countries, albeit with differing degrees of emphasis, tried to tap these sources of productivity gains.

In the search for ways to improve the performance of agriculture, reformers in most countries decided to make fundamental changes in property rights. Consisting of control rights (that is, who gets to decide on what to plant and what inputs to use) and income rights (that is, who gets the residual income generated by the productive activity), the final form and mix of property rights differed greatly across different countries. In some cases reformers only granted partial property rights to farmers. For example, reformers sometimes provided income rights, but few control rights. In other cases leaders provided nearly full control rights with only partial income rights. Ownership changes (that is, who received alienation rights to land and other farm assets) were often considered separately from questions of farm restructuring; likewise, restructuring sometimes occurred independently of changes in rights.

China's reformers, more than anything, have followed a strategy based on providing incentives through property rights reforms, even though the shift to private ownership is today far from complete. The reforms in China started with the Household Responsibility System (HRS), a policy of radical decollectivization that allowed farmers to keep the residual output of their farms after paying their agricultural taxes and completing their mandatory delivery quotas. Farmers also began to exercise control over much of the production process (although in the initial years, the local state shared some control rights and in some place still do today). In this way the first reforms in the agricultural sector reshuffled property rights in an attempt to increase work incentives and exploit the specific knowledge of individuals about the production process (PERKINS, 1994).

In executing the property rights reforms, leaders also fundamentally restructured farms in China. Within a few years, for example, reformers completely broke up the larger collective farms into household farms. In China today there are more than 200 million farms, the legacy of an HRS policy that gave the primary responsibilities for farming to the individual household.

The collective did not disappear, however. A companion set of reforms in the mid-1980s transformed communes into townships, the lowest level of China's formal government hierarchy. Brigade leadership committees (a sub-commune level of organization) were turned into village committees, which became the government's representative in China's villages (OI, 1999). Villages and the small groups below them (formerly production teams) retained legal ownership rights over land and are the entities that were charged with contracting land to the farmers and setting rules for land management.

6 LIBERALIZATION AND THE DEVELOPMENT OF MARKET INSTITUTIONS

In addition to property rights reform and transforming incentives, the other major task of reformers is to create more efficient institutions of exchange. Markets – whether classic competitive ones or some workable substitute – increase efficiency by facilitating transactions among agents to allow specialization and trade and by providing information through a pricing mechanism to producers and consumers about the relative scarcity of resources. But markets, in order to function efficiently, require supporting institutions to ensure competition, define and enforce property rights and contracts, ensure access to credit and finance and provide information (MCMILLAN, 1997; WORLD BANK, 2002). These institutions were either absent in the Communist countries or, if they existed, were inappropriate for a market system. For example, in most countries central planning agencies directed production and other economic transactions and their directives served to enforce contracts involving exchanges among various agents in the chain. Market liberalization requires the elimination of central planning, but to do so successively requires the process to be executed in a way that will allow producers to continue to have access to inputs and marketing channels while the necessary market-supporting institutions are emerging. In this section we show how China's leaders gradually liberalized markets. We focus, in particular, on three issues: The process of market liberalization; the enforcement of exchange contracts; and how well reformers or some alternative institutions were able to guarantee access to input and output markets during transition.

In contrast to the CEE and the CIS countries in which took a Big Bang approach to reform, leaders in China did not dismantle the planned economy in the initial stages of reform in favor of liberalized markets (ROZELLE, 1996). SICULAR (1988a; 1988b; 1995), PERKINS (1994) and LIN (1992) all discuss how China's leadership had little intention of letting the market play anything but a minor supplemental guidance role in the early reforms period in the early 1980s. In fact, the major changes to agricultural commerce in the early 1980s almost exclusively centered on increasing the purchase prices of crops (SICULAR, 1988b; WATSON, 1994). The decision to raise prices, however, should *not* be considered as a move to liberalize markets since planners in the Ministry of Commerce made the changes administratively and the price changes mostly were executed by the national network of grain procurement stations acting under direction of the State Grain Bureau.

An examination of policies and the extent of marketing activity in the early 1980s illustrate the limited extent of changes in the marketing environment of China's food economy before 1985. It is true that reformers did allow farmers increased discretion to produce and market crops in 10 planning categories, such as vegetables, fruits, and coarse grains. Moreover, by 1984, the state only claimed control over 12 commodities, including rice, wheat, maize, soybeans, peanuts, rapeseed, and several other cash crops (SICULAR, 1988b). However, while this may seem to represent a significant move towards liberalization, the crops that remained almost entirely under the planning authority of the government still accounted for more than 95 percent of sown area in 1984. Hence, by state policy and practice, the output and marketing of almost all sown area was still directly influenced by China's planners.

Reforms proceeded with equal caution when reducing restrictions on free market trade. The decision to permit the reestablishment of free markets came in 1979, but only initially allowed farmers to trade vegetables and a limited number of other crops and livestock products within the boundaries of their own county. Reformers did gradually reduce restrictions on the distance over which trade could occur from 1980 to 1984, but as SICULAR (1988b) and SKINNER (1985) point out, the predominant marketing venue during the early 1980s was mainly local rural periodic markets. Farmers also did begin to sell their produce in urban settings, but free markets in the cities only began to appear in 1982 and 1983. In addition to being small and infrequent, traders could not engage in the marketing of China's monopolized commodities that were still under strict control of the state procurement stations.

The record of the expansion of rural and urban markets confirms the hypothesis that market liberalization had not yet begun by the early 1980s. Although agricultural commodity markets were allowed to emerge during the 1980s, their number and size made them a small player in China's food economy. In 1984, the state procurement network still purchased more than 95 percent of marketed grain and more than 99 percent of the marketed cotton (SICULAR, 1995). In all of China's urban areas, there were only 2000 markets in 1980, a number that rose only to 6000 by 1984 (DEBRAUW et al., 2003). In Beijing in the early 1980s, there were only about 50 markets transacting around 1 million yuan of commerce per market per year. Each market site would have had to serve, on average, about 200,000 Beijing residents, each transacting only 5 yuan of business for the entire year. In other words, it would have been impossible for such a weak marketing infrastructure at that time to even come close to meeting the food needs of urban consumers.

After 1985, however, market liberalization began in earnest. Changes to the procurement system, further reductions in restrictions to trading of commodities, moves to commercialize the state grain trading system, and calls for the expansion of market construction in rural and urban areas led to a surge in market-oriented activity (SICULAR, 1995). For example, in 1980, there were only 241,000 private and semi-private trading enterprises registered with the State Markets Bureau; by 1990, there were more than 5.2 million (DEBRAUW et al., 003). Between 1980 and 1990, the per capita volume of transactions of commerce in Beijing urban food markets rose almost 200 times. Private traders handled more than 30 percent of China's grain by 1990, and more than half of the rest was bought and sold by commercialized state grain trading companies, many of which had begun to behave as private traders (ROZELLE et al., 2000).

China moved equally slow in its liberalization of input markets (STONE, 1988; YE and ROZELLE, 1994). During the prereform era, the state distributed all key inputs such as chemical fertilizer through the government-controlled network of agricultural input supply stations. During a time when many inputs in many regions were scarce, local officials were issued coupons that gave communes that right to purchase at least part of the inputs they needed. In the initial years of reform when decollectivization was occurring, leaders did virtually nothing to limit the role of the state in input allocation. Indeed, private sales of nitrogen fertilizer were restricted and the state continued to completely control all chemical fertilizer distribution.

Even after the start of liberalization in both output and input markets in 1985, the process was still partial and executed in a start and stop manner (SICULAR, 1995). For example, in the case of fertilizer, YE and ROZELLE (1994) show that after an early attempt at market liberalization in 1986 and 1987, perceived instability in the rural economy in 1988 led to sharp retrenchments. Agricultural officials only took controls back off fertilizer marketing and began encouraging private trade in the early 1990s. LIN, CAI and LI (1996) argue that leaders were mainly afraid of the disruption that would occur if the institutions through which leaders controlled the main goods in the food economy (such as fodder, grain, and fertilizer) were eliminated without the institutions in place to support more efficient market exchange.

However, it is only after 20 years of market liberalization that the state had largely abdicated its responsibilities for grain and inputs trade. By the mid-1990s, about 50 percent of fertilizer was sold by private traders. In 2000, according to a survey of 1200 households in six provinces, fertilizer was almost exclusively handled by the private sector. Likewise, despite the failed attempts by the government to remonopolize grain trade in the mid-1990s, by 2001, the state grain bureau commercialized its remaining grain trading divisions and tens of thousands of private traders dominate grain trade. For example, according to a survey by XIE (2002), in 2001, there were more than 2000 private rice wholesalers trading in Beijing, more than 3000 in Shanghai, and more than 5000 in Guangzhou. Nearly all rice moves through their hands, completely bypassing the state. Hence, China's markets have become more integrated, transaction costs have fallen, and there are increasingly fewer arbitrage opportunities left unexploited (PARK et al., 2002; HUANG et al., 2003).

7 THE EFFECTS OF PRICE POLICY, PROPERTY RIGHTS AND MARKET LIBERALIZING REFORMS

Previous research on the determinants of the success of transition economies has identified a number of important factors. We examine three in this section. One set of studies examines the effect of changes in incentives associated with shifting input and output prices (e.g., SICULAR, 1988a; PINGALI and XUAN, 1992; MACOURS and SWINNEN, 2002). Another set of studies focuses on the importance of reform policy, especially as they affect property rights and farm restructuring (e.g., MCMILLAN, 1997; LERMAN, CSAKI and FEDER, 2002). Finally, a third set of studies looks at how transition disrupted exchange relations and facilitated or constrained the emergence of markets (e.g., BLANCHARD, 1997; DEBRAUW et al., 2003; GOW and SWINNEN, 1998; ROLAND and VERDIER, 1999). In addition to these three sets of factors, others surely also affect the performance of different transition countries (e.g., initial level of development at the time of reform – SACHS and WOO, 1994; MACOURS and SWINNEN, 2000b; the speed of reform – MCMILLAN and NAUGHTON, 1992; political economy and regional tensions – ROLAND, 2000; and the management of public investments – HUANG and ROZELLE, 1996; CSAKI, 1998; FAN, ZHANG and ZHANG, 2002).

8 EFFECTS OF PRICE POLICY SHIFTS

Several studies show that price changes had an important influence on the performance of the agricultural sector and in part help explain observed trends in output. MACOURS and SWINNEN (2002) find a strong positive correlation (0.70) between changes in output and changes in relative prices across 15 countries during the first five years of transition. Specifically, output increases only in those countries where terms of trade increased (for example, China, Vietnam, Albania).

Empirical studies on China confirm a strong impact of these price changes on output during the first years of transition (LIN, 1992; FAN, 1991; HUANG and ROZELLE, 1996; FAN and PARDEY, 1997). LIN (1992) finds that 15 percent of output growth during the first six years of reform came from the rise in relative prices. HUANG and ROZELLE's (1996) decomposition exercise for rice demonstrates that about 10 percent of the output between 1978 and 1984 came from the price effects. In contrast, MACOURS and SWINNEN (2000) estimate that around 40 to 50 percent of the initial decline in crop output in eight Central European and Balkan countries was due to deteriorating terms of trade.

It is more difficult to measure the effect of price changes on productivity, since as in MCMILLAN, WHALEY and ZHU (1989) and JIN et al. (2002), the price effects are removed before explaining TFP changes. In LIN (1991) and HUANG and ROZELLE (1996), however, there is evidence that higher prices are associated with higher rates of technology adoption, which has contributed positively to the rise in TFP during the reform era. Hence, price changes may have an indirect effect on TFP.

9 EFFECTS OF PROPERTY RIGHTS REFORM

While the speed and nature of rights reform and restructuring has varied greatly across the reforming world, in those places that have carried out decollectivization, land restitutions, control rights transfers, and farm reorganization, a robust positive effect appears on output in some areas and productivity has risen in all of the areas that carried out these multi-dimensioned reforms. In China, the changes in incentives resulting from the property rights reforms and farm restructuring triggered strong growth in both output and productivity. In the most definitive study on the subject, LIN (1992) estimates that China's HRS accounted for 42 to 46 percent of the total rise in output during the early reform period (1978 to 1984). FAN (1991) and HUANG and ROZELLE (1996) find that even after accounting for technological change, institutional change during the late 1970s and early 1980s contributed about 30 percent of output growth.

Empirical researchers also have documented impacts that go beyond output. MCMILLAN, WHALLEY and ZHU (1989) document that the early reforms in

China also raised total factor productivity, accounting for 90 percent of the rise (23 percent) between 1978 and 1984. JIN et al. (2002) show that the reforms had a large effect on productivity, contributing greatly to a rise in TFP that exceeds 7 percent annually. In addition, a number of researchers have suggested that the rises in surplus in the agricultural sector created by HRS triggered a number of subsequent growth dynamics, providing labor for rural industry's take-off in the mid-1980s (MCKINNON, 1993), fuelling the nation's overall industrialization drive later in the reforms, and creating demand for the products of firms in other parts of the economy (QIAN and XU, 1998).

Looking inside transition regions, including China, illustrates a link between technology, policy and performance. Although gains in productivity have come both from rights reforms and organizational restructuring, the relative importance of each component differs between countries reflecting technology and policy differences (MACOURS and SWINNEN, 2000; 2002). In countries with labor-intensive technologies the shift from large-scale collective farming to small-scale individual farming caused dramatic gains in labor efficiency with relatively small losses in scale efficiency. In such countries, including China as well as other nations, such as, Vietnam, Albania, Armenia, Georgia, and Romania, the gains in labor productivity came mostly from the shift to household farming. In all these countries the man/land ratio was over 0.2 persons per hectare and TFP increased strongly during early transition (between 4 percent and 9 percent annually) when individual farming grew from 8 percent of total land use on average to 84 percent on average. In contrast, in the Czech Republic, Slovakia and Hungary, countries in which farming was more capital intensive (man/land ratio of 0.14 or less), gains in labor productivity came primarily from large farms shedding labor with privatization of the farms.

10 EFFECTS OF MARKET LIBERALIZATION

Few authors have attempted to quantify the gains from market liberalization. Part of the problem may be the short period of analyses, the inability of standard methodologies to separate efficiency gains of market reform from overall gains in the reforming economy, and the breadth of the studies. For China, WEN (1993) found total factor productivity (TFP) growth had stopped in the post-1985 period, a trend he blames on the failure of the market liberalization stage of reform. There are two shortcomings of Wen's conclusions. First his analysis ends in 1990, a period that might be too early to have allowed the liberalization reforms to take effect. Second, he is only examining the net change in TFP and does not account for other factors that could be affecting productivity. Holding the effect of technology constant and using data through 1995, JIN et al. (2002) find that TFP growth restarts in the 1990s, a finding that they claim could be linked to increased liberalization of the economy. Like Wen, however, they do not explicitly examine the improvements in efficiency that are associated with market development. FAN (1999) decomposes the efficiency gains of Jiangsu provincial rice producers in the late reform era and finds that there have been only limited gains in allocative efficiency after 1984. Unfortunately, Fan studies only one crop in one province, a fact that limits the generalization of his study.

The only truly systematic attempt at trying to measure the returns to market liberalization in China is DEBRAUW et al. (2003). This paper uses a dynamic adjustment cost model to develop a framework to estimate the return to market liberalization reforms, holding the incentive reforms and other factors constant. The authors find that because of the emergence of markets, farmers have increased their speed of adjustment to price changes between the early and late reform period for both labor and sown area. In the early reform era prior to the emergence of markets adjustments labor of producers to shifts in exogenous factors (such as prices) took 3 years. After the emergence of markets due to liberalization changes, the adjustment of labor to the long-run optimal level only took about one and half years. Adjustments in sown area to price and other shocks also speeded up (from 6 to 5 years).

The magnitude of the gains in efficiency from increased responsiveness and flexibility in the late reform period, however, is substantially less in percentage terms (less than 1 percent *per year*) than that from the incentive reforms in the early reform period (up to 7 percent per year or about 40 percent over the whole period). But, although the gains are small, they are still positive and China's gradual market reform policy appears to have avoided the collapse that was experience throughout CEE and CIS nations. Hence, relative to the gains in the incentive reforms, the gains from market liberalization not only start later (by policy choice), they are much smaller. The average annual gain to market liberalization over the entire period is 0.73 percent, which means it is roughly 10 times smaller than the annual rise in profits from the gains to incentive reforms at the end of that period. These findings suggest that reforming incentives have much higher returns than reforming markets. This conclusion is reinforced when considering the fact that our returns to market liberalization may be overstated since in some sense the returns are conditioned on the earlier reform of incentives.

Decomposing the returns to market liberalization, DEBRAUW et al. (2003) see that most of the change has come from increased responsiveness. On a year to year basis, the returns to producers being more responsive to exogenous changes to prices and other factors average more than 0.50 percent per year. The gains from responsiveness have also been fairly constant over time, ranging from 0.39 to 0.94 percent. Moreover, since producers became more responsive between the periods and the level of most of the exogenous variables, such as prices and the research and capital stock, rose, the returns to responsiveness were never negative.

In contrast to the returns from increased responsiveness, the returns to increased flexibility are smaller, more variable, and are even negative in some years. In part the small gain from increased flexibility is simply because the increase in speed of adjustment, especially for sown area, is relatively small. The variability of the returns and the appearance of negative values demonstrate that increased adjustment speed is not always a virtue, especially in an economy like China's that is experiencing year-to-year fluctuations in important factors that affect production, such as the output price. If prices soar in one period and then fall in the next, it is easy to see why slower adjustment could be beneficial. While there are lost profits in the first year when adjustment is slower, the second period adjustment made in an attempt to catch up to the rising price in the first year, might be exactly the right allocation (by accident) when prices in the second year fall. The more flexible producer is able to catch up quicker, but the new flexibility could make him chase the prices back down in the second year (versus being correct as in the case of the producer that adjusts slower).

11 Conclusions

In our paper we have traced the success of China's reforms in agriculture. We have shown that relative to almost all other transitional economies, China has been the most successful. In drawing lessons from the analysis of the determinants of success in agricultural reforms, we find that it appears from the evidence on the collective transition experiences that any reform strategy in order to be successful needs to include some essential ingredients. In other words, ultimately successful transition requires a complete package of reforms. Perhaps above all, China has shown that the reforms to pricing policy, property rights and market liberalization have all been important.

Comparing the property rights and organizational reform processes across the transition world, including China, yields several lessons. First, the lesson regarding property rights reforms is nuanced. Good rights and the incentives they created certainly contributed to and will continue to affect performance positively. Poor ones undoubtedly account, in part, for the poor performance of some agricultural systems. This is well illustrated by the difference between China and Central Europe on the one hand and Russia, Ukraine, and Central Asia on the other hand. Despite its imperfections, China's reforms allocated relatively strong property rights to individual land plots. In Central Europe land was either restituted to former owners or distributed to farm workers in delineated boundaries and leased to new farms. Although the land reforms in these countries were complex and difficult to implement, they ended up with stronger and better-defined property rights for the new landowners than in Russia, Ukraine, and many other CIS countries.

Despite the strong relationship between rights reform and performance, another important lesson is that full privatization of land is not needed to induce efficiency gains. In many countries, such as China, the introduction of private ownership and sale of agricultural land encountered strong social and political opposition and kept reformers from providing a complete complement of rights to producers. The top leadership in China did not allow private ownership of agricultural land. Today in China, farmers still cannot buy or sell land. The strong positive effect of rights reform and restructuring on output and productivity demonstrates that allocating clear and well-identified land use and income rights can by themselves enhance efficiency, investment, and growth. Farm restructuring, emerging as the appearance of household farming in China, also can be as important as rights reform.

Finally, we do not suggest that a decade of agricultural transition has created a system of full and unencumbered property rights; in fact, many major constraints remain. For example, China's leaders are still struggling to figure out a way to provide more secure tenure rights for farmers. Most pervasive, local leaders in many regions of the country continue to periodically expropriate land, shifting it among farmers for a variety of reasons (BRANDT et al., 2002). Although the impact on the investment in land and other long-term farming assets is typically found to relatively minor (JACOBY et al., 2002), poor land tenure may be undermining rental markets and keeping farm size from increasing and precluding farmers from using land as an asset for collateral and constraining investment in activities beyond the farm (BENJAMIN and BRANDT, 1999).

The importance of pricing policy also was shown to be important. However, in the early part of China's reforms this was done administratively. Gradualism in China was possible because the government, unlike in many other transitional countries, was in control. They chose to give China's agricultural producers improved terms of trade and increase their incentives even though the procurement was done mostly through the government's marketing channels and without the aid of markets.

When the government gradually liberalized markets, nearly 10 years after the start of reforms, we then find that the behavior of producers in China has been positively affected. Interestingly, the gains from market liberalization have been relatively small. Farmers have increased their speed of adjustment between the early and late reform period for both labor and sown area. According to our estimates of own-price elasticities for labor and fertilizer, producers are also becoming more responsive. The magnitude of the gains in efficiency from increased responsiveness and flexibility in the late reform period, however, is substantially less in percentage terms (less than 1 percent per year) than that from the incentive reforms in the early reform period (up to 7 percent). Given these results, we argue that gradualism has succeeded where Big Bang has not.

In its most simple version, our story is as follows. Although we find that market liberalization policies in China's agriculture have increased producer responsiveness and flexibility, the returns to the incentive reforms were much larger in terms of their impacts on farm profits, and household income, than market liberalization reforms. Since the incentive reforms came first, and occurred without the disruption that almost invariably accompanies market transition in a reform setting, the large rise in wealth that was generated by the incentive reforms almost certainly gave the economy its initial positive boost. This boost may have also helped trigger a series of positive downstream actions. While speculative, we believe that the initial surge of productivity helped raise the ability of households and groups of households to make further investment, increase the demand for goods and services across the economy, and provide regional and national governments with a larger pool of resources from which they were able to draw taxes needed to finance transition (or at least created wealth in local areas that provided local leaders with the resources that they needed to build local infrastructure and implement policies without additional fiscal subsidies from above). According to our estimates, at most only a fraction of these resources would have been generated if leaders started reforms by liberalizing markets. In fact, it is possible that liberalizing markets before agents face the right incentives and have the support of certain institutions and infrastructure leads to greater disruption and even smaller (or negative) returns that would have limited, not triggered subsequent economic activity. Put together, our paper identifies the mechanism of gradualism and measures the magnitude of its benefits to China's agriculture.

Based on our findings, we would believe that leaders in transitional countries should first work hard to increase incentives and build the institutions that agents need to operate efficiently before moving to radically free up markets. Our results need to be interpreted carefully, however. The case study was limited to the agricultural sector. In more complex sectors, reforming incentives may not lead to greater efficiency if markets are not already in place, given the need for greater coordination. We are also estimating the changes in parameters between periods with relatively few observations. It would be worth trying to replicate these results in future studies on other sectors with larger time series.

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Table 1: Growth of Gross Agricultural Output (GAO) in transition countries (Index equals 100 in first year of reform)

	Years after start reform with lowest GAO	GAO index in year of lowest GAO	GAO index after 5 years of reform	GAO index after 10 years of reform
East Asia				
China	0	100	132	166
Vietnam	0	100	128	152
Laos	2	90	109	127
Myanmar	0	100	127	155
Mongolia	4	81	84	86
Central Asia				
Kazakhstan	8	41	53	52
Kyrgyzstan	5	79	79	110
Tajikistan	9	48	61	53
Turkmenistan	6	69	106	99
Uzbekistan	6	90	98	97
Caucasus				
Armenia	3	69	82	80
Azerbaijan	5	55	55	72
Georgia	10	51	62	51
European CIS				
Belarus	9	57	61	58
Moldova	9	42	66	46
Russia	8	58	64	62
Ukraine	9	51	69	55
Baltics				
Estonia	8	41	55	42
Latvia	9	37	50	38
Lithuania	9	64	69	65
Central Europe				
Czech Republic	5	75	75	77
Hungary	6	69	70	73
Poland	5	77	77	85
Slovakia	10	68	77	68

	Years after start reform with lowest GAO	GAO index in year of lowest GAO	GAO index after 5 years of reform	GAO index after 10 years of reform
Balkans				
Albania	2	77	100	113
Bulgaria	7	57	63	62
Romania	3	75	93	93
Slovenia	3	65	81	79

Source: FAO.

Table 2: Growth of agricultural labor productivity (Output per Farm Worker – ALP) in Transition Countries (index equals 100 in first year of reform)

	Year with lowest ALP	Lowest ALP	ALP change Year 0-5	ALP change Year 5-8[a]	Average annual change Year 0-5	Average annual change Year 5-8[a]
East Asia						
China	0	100	120	138	4,0	6,0
Vietnam	0	100	102	111	0,4	3,0
Myanmar	2	96	115	120	3,0	1,7
Mongolia	10	57	61	60	-7,8	-0,3
Average			**112**	**123**	**2,5**	**3,6**
Central Asia						
Kazakhstan	6	58	60	71	-8,0	3,7
Kyrgyzstan	5	59	59	67	-8,2	2,7
Tajikistan	9	36	46	38	-10,8	-2,7
Turkmenistan	6	55	87	64	-2,6	-7,7
Uzbekistan	6	80	88	86	-2,4	-0,7
Average			**68**	**65**	**-6,4**	**-0,9**
Caucasus						
Armenia	7	38	42	38	-11,6	-1,3
Azerbaijan	9	48	57	62	-8,6	1,7
Georgia	2	67	85	NA	-3,0	NA
Average			**61**	**NA**	**-7,7**	**NA**
European CIS						
Belarus	4	69	71	87	-5,8	5,3
Moldova	8	41	58	41	-8,4	-5,7
Russia	8	63	64	63	-7,2	-0,3
Ukraine	8	52	65	52	-7,0	-4,3
Average			**65**	**61**	**-7,1**	**-1,3**
Baltics						
Estonia	3	63	139	118	7,8	-7,0
Latvia	8	54	63	54	-7,4	-3,0
Lithuania	5	61	61	67	-7,8	2,0
Average			**88**	**80**	**-2,5**	**-2,7**
Central Europe						
Czech Republic	1	97	140	170	8,0	10,0
Hungary	1	99	164	204	12,8	13,3
Poland	5	86	86	86	-2,8	0,0
Slovakia	0	100	110	132	2,0	7,3
Average			**125**	**148**	**5,0**	**7,7**
Balkans						
Albania	2	77	108	109	1,6	0,3
Bulgaria	9	62	69	63	-6,2	-2,0
Romania	3	67	79	88	-4,2	3,0
Slovenia	3	61	85	99	-3,0	4,7
Average			**85**	**90**	**-3,0**	**1,5**

Source: National statistics, ILO, World Bank, Asian Development Bank.

Note: [a] For Slovenia and Armenia, data are for 7 years after the start of reforms.

Table 3: Growth of Index of Agricultural Yields in Transition Countries (index equals 100 in first year of reform)

		Grains[a]		Sugarbeet/Cotton		Milk		Average Agric		Av Ag per year	
		5	*10*	*5*	*10*	*5*	*10*	*5*	*10*	*0-5*	*5-10*
East Asia	China	133	142	207	211	96	113	145,3	155,3	9,1	2,0
Central Asia	Kazakhstan [b]	41	59	79	55	na	na	60,1	57,4	-8,0	-0,6
	Kyrgyzstan [b]	57	93	79	96	na	na	68,0	94,9	-6,4	5,4
	Tajikistan [b]	66	85	52	51	na	na	59,4	68,3	-8,1	1,8
	Turkmenistan [b]	82	108	79	62	na	na	80,7	85,0	-3,9	0,9
	Uzbekistan [b]	100	148	95	80	na	na	97,8	114,0	-0,4	3,2
	Avg. Cent Asia [b]	**69**	**99**	**77**	**69**	na	na	**73,1**	**84,1**	**-5,4**	**2,2**
European CIS	Belarus	74	64	66	92	77	70	72,3	75,3	-5,5	0,6
	Moldova	82	90	na	na	51	54	na	na	na	na
	Russia	63	61	80	79	74	84	72,3	74,7	-5,5	0,5
	Ukraine	70	56	88	76	77	81	78,3	71,0	-4,3	-1,5
	Avg. Eur CIS	**72**	**68**	**78**	**82**	**70**	**72**	**73,3**	**74,0**	**-5,3**	**0,1**
Baltics	Estonia	69	80	103	109	86	112	86,0	100,3	-2,8	2,9
	Latvia	71	98	88	97	89	116	82,7	103,7	-3,5	4,2
	Lithuania	61	81	100	100	81	93	80,7	91,3	-3,9	2,1
	Avg. Baltics	**67**	**86**	**97**	**102**	**86**	**107**	**83,3**	**98,3**	**-3,3**	**3,0**
Central Europe	Czech Republic	87	89	102	131	100	126	96,3	115,3	-0,7	3,8
	Hungary	72	83	72	101	95	110	79,7	98,0	-4,1	3,7
	Poland	80	93	86	99	96	108	87,3	100,0	-2,5	2,5
	Slovakia	89	89	99	117	89	116	92,3	107,3	-1,5	3,0
	Avg. CE	**82**	**88**	**90**	**112**	**95**	**115**	**89,0**	**105,0**	**-2,2**	**3,2**
Balkans	Albania	85	86	72	76	125	138	94,0	100,0	-1,2	1,2
	Bulgaria	63	65	57	72	86	90	68,7	75,7	-6,3	1,4
	Romania	85	93	80	81	137	134	100,7	102,7	0,1	0,4
	Slovenia	Na	na	97	95	99	112	na	na	na	na
	Avg. Balkans	**78**	**81**	**77**	**81**	**112**	**119**	**89,0**	**93,7**	**-2,2**	**0,9**

Source: USDA for grains; sugarbeet yields are from FAO for Central Europe, Balkans and China, and from ZMP and FAO for Central Asia, Caucasus, and European CIS.; milk yields are from ZMP for Central Europe, Balkans, Central Asia, Caucasus and European CIS, and from SSB for China.

Notes: [a] Grains include wheat, rice (milled weight) and coarse grains.

[b] Central Asia: Cotton instead of Sugarbeet; Average agriculture (col. 7 and 8) is average of grains and cotton only.

Table 4: Annual growth rates of total factor productivity for agriculture in various transition countries for selected years (percent)

		1979-94	1979-84	1984-89	1989-94
East Asia					
China	Rice	3.8	9.1	0.4	2.0
	Wheat	5.6	12.8	1.2	2.6
	Maize	6.1	13.5	-1.0	5.6
	Soybean	4.8	7.7	-1.6	8.1
	Crops (Av)	5.1	10.8	-0.2	4.6
		1976-80	*1980-85*	*1993-98*	
Vietnam	Rice			3.0	
North	Rice	-3.3	5.0	2.1	
South	Rice	0.0	3.3	4.3	
Vietnam	Crops			1.0	
North	Crops			-0.7	
South	Crops			3.0	
Central Asia					
		1992-1997			
Kazakhstan	GAO	-1.0			
Kyrgyzstan	GAO	-0.4			
Tajikistan	GAO	-2.4			
Turkmenistan	GAO	-5.8			
Uzbekistan	GAO	-2.2			
Average Central Asia		**-3.5**			
Caucasus					
Armenia	GAO	4.6			
Azerbaijan	GAO	-0.8			
Georgia	GAO	6.6			
Average Caucasus		**3.5**			
Eur CIS					
Belarus	GAO	0.6			
Moldova	GAO	0.4			
Russia	GAO	1.4			
Ukraine	GAO	0.4			
Average Eur CIS		**0.7**			
Baltics					
Estonia	GAO	2.8			
Latvia	GAO	-1.2			
Lithuania	GAO	3.6			
Average Baltics		**1.7**			

Table continued:

		1989-1995		*1989-92*		*1992-95*
Central Eur.						
Czech Republic	Crops	2.7		1.1		4.3
Hungary	Crops	1.1		-4.5		6.7
Poland	Crops	-0.4		-5.1		4.3
Slovakia	Crops	1.2		-0.6		3.1
Average Cent. Eur.		**1.2**		**-2.3**		**4.6**
Balkans						
Albania	Crops	0.0		-9.3		9.2
Bulgaria	Crops	-1.8		-7.5		3.8
Romania	Crops	0.5		-7.8		8.7
Slovenia	Crops	–		-3.4		–
Average Balkans		**0.1**		**-7.0**		**7.3**

Sources: China from JIN et al. (2002); Vietnam from PINGALI and XUAN (1992) and BENJAMIN and BRANDT (2001); FSU from LERMAN et al. (2003); Central Europe and Balkans from MACOURS and SWINNEN (2000).

Agriculture in the Face of Changing Markets, Institutions and Policies: Challenges and Strategies
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LAND REFORM AND FARM RESTRUCTURING IN MOLDOVA, AZERBAIJAN AND KAZAKHSTAN: A STOCKTAKING

DAVID SEDIK[*]

ABSTRACT

This paper is a stocktaking of land reform and farm restructuring for three countries of the Europe and Central Asia region covering three issues pertinent to discussions of the effects of land reform: The overall policy environment, changes in farm performance and changes in the well-being of the rural population. It reaches the following conclusions. First, land reform was probably not responsible for the fall in agricultural production and productivity in the three countries. Land distribution followed the decline in gross agricultural output and deterioration in agricultural yields and labor productivity. Second, land reform contributed to raising yields in the three countries under review, thus potentially contributing to pro-poor growth. Third, rises in the subjective welfare of rural residents stem from a large variety of factors. Land reform can contribute to increasing subjective welfare, but can not compensate for the lack of non-farm employment opportunities and rural services.

Keywords: *Land reform, farm restructuring, agricultural policy, farm productivity.*

LAND REFORM AND FARM RESTRUCTURING IN MOLDOVA, AZERBAIJAN AND KAZAKHSTAN: A STOCKTAKING[1]

Over the past decade the rural sector in nearly all the countries of Eastern Europe and Central Asia (the ECA region) has undergone a shift from predominantly collective agriculture to more individualized agriculture. Over a ten year period,

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[1] This paper is based on a longer study completed for the World Bank (DUDWICK, FOCK and SEDIK, 2006). The core task team consisted of Nora Dudwick (World Bank task team leader), Karin Fock (World Bank), David Sedik (FAO), and Johan Swinnen (World Bank). The study received funding from the Norwegian Trust Fund, the Bank-Netherlands Partnership Program, UNIFEM, and German Consultant Trust Funds.

between 1990 and 2000, over 145 million hectares of land were transferred to private ownership. This transfer is considerably larger than other successful land reforms in recent history, including those in Mexico, Brazil, Japan, Korea and Taiwan (Table 1).

Table 1: Land reforms in recent history

Country or region	Period	Duration (years)	Land transferred (million ha)
Mexico	1917-92	75	100
Brazil	1964-94	30	11
Japan	1945-52	7	2
Korea	1945-50	5	0.5
Taiwan (Rep. of China)	1949-53	4	0.2
CEE countries*	1990-2000	10	33
CIS countries**	1990-2000	10	116

Source: DEININGER, 2003.

Notes: * The Central and Eastern European countries, the 8 new EU countries, Bulgaria, Romania and Albania.

** The countries of the Commonwealth of Independent States.

Though the dimensions of land reform are impressive and the changes many, land reform does not yet seem to have lived up to its potential in many countries of the Europe and Central Asia region.[2] There are at least two potential long-run benefits from distributive land reform and farm restructuring – an improvement in farm production *efficiency* and improved *access to land for poor rural inhabitants*. Land reform can contribute to the efficiency of farm production through establishing secure property rights over land. Secure tenure rights can improve the investment climate in rural areas, improve access to credit for rural residents with land titles, increase demand for land and widen the scope for local tax revenues. These changes should foster growth of agricultural production. Land reform can increase access to land for poor rural inhabitants if distribution or restitution of land in rural areas is widespread. Access to land provides a social safety net in rural areas allowing rural residents to ensure their own food security. Furthermore, land distribution can provide rural inhabitants with entrepreneurial skills, the wherewithal to become commercial farmers. Land reform can therefore contribute to poverty alleviation by supporting sustainable pro-poor growth in rural areas.

In many countries of the region the contrast between these widely acknowledged potential benefits of land reform and rural realities could hardly appear wider. The past decade and a half has seen the largest fall in agricultural production, yields and rural employment on record in many of the countries of the region. Poverty

2 On the promise of land reform see DEININGER (2003). For an overview of land reform in the Europe and Central Asia region see LERMAN, CSAKI and FEDER (2004).

rates in this part of the world rose greatly in 1990s, and for most of the countries rural poverty headcounts are higher in rural areas. Furthermore, the deterioration of collective and state farms was accompanied by a significant drop in rural public services. The contrast between these two pictures in many of the countries of this region have led many to question to what extent land reform itself has been responsible for these negative developments and why land reform does not appear to have fulfilled its promise of pro-poor growth in rural areas. There is therefore a great need for a critical review, a stocktaking, of land reform and farm restructuring to document what is known about its apparent effects and to understand why land reform has not lived up to its potential in many of the countries of this region.

A stocktaking of land reform and farm restructuring must be realistic as to what it can achieve. It cannot offer a comprehensive analysis of the impact of land reform policies because of the difficulties of rigorously establishing causation. It is difficult to isolate the effects of land reform and farm restructuring from the effects of other policy changes and economic trends that took place in this period. Particularly in the early 1990s, inherited distortions of the previous system may have had more to do with observed economic declines and decline in rural services than land reform and farm restructuring, which were introduced rather late in these countries. Moreover, the length and divisiveness of the political process of introducing land reform and farm restructuring and the implementation of complementary reforms also had critical consequences for the economic and social results of reforms. Lengthier reforms were more likely to be obstructed by lawmakers, local elites or farming interests. Last, agricultural reforms and their effects should not be viewed in isolation from the rest of the economy. There have been important spillover effects from the rest of the economy that have constrained or benefited the performance of agriculture in this period.

This paper presents such a stocktaking of land reform and farm restructuring for three countries of the Europe and Central Asia region that have had particular difficulties in land reform, farm restructuring, farm performance or rural poverty – Moldova in the European CIS, Azerbaijan in the Transcaucasus and Kazakhstan in Central Asia. It covers three issues that are important for any discussion of the effects of land reform: The overall agricultural policy environment, changes in the economic performance of farms and changes in the well-being of the rural population. Much of the information derives from farm and household surveys conducted by the World Bank in each of the three countries in 2003. The surveys were designed to provide information that would be comparable across countries. The household surveys covered from 500 to 700 households in each country, and the farm enterprise surveys covered 60 to 200 family and corporate farms. Surveys were supplemented by individual and focus group discussions. More information on survey methodology, terminology and the limitations of the information derived is contained in DUDWICK, FOCK and SEDIK (2006).

Some tentative conclusions can be derived from the critical comparison of land reform in these three CIS countries. First, despite clear difference in strategies of land privatization, land reform does not seem to have been responsible for the fall in agricultural production and productivity in the three countries. The distribution of land for the most part followed the decline in gross agricultural output and deterioration in agricultural yields and labor productivity. Second, land reform has clearly contributed to raising yields in the three countries under review, thus potentially contributing to pro-poor growth. In addition, in the country where there was widespread distribution of land (Azerbaijan) land reform seems to have both contributed to more robust agricultural growth and has effected a more equitable distribution of assets, another potential contribution to pro-poor growth. Third, rises in the subjective welfare of rural residents stem from a large variety of factors, including rising farm productivity, the supply of non-farm income opportunities, the state of rural services and community environment. Land reform can contribute to increasing subjective welfare, but can not compensate for the lack of non-farm employment opportunities and rural services. In order for land reform to properly contribute to bettering life in rural areas it must be accompanied by complementary actions and policies to support employment in rural areas and improve rural services.

Box 1: Agricultural producer terminology

For the purposes of this study, agricultural producers fall into three categories. The first is that of so-called *corporate farms.* These farms are either descendents of state and collective farms or farms formed after their break-up. After 1993 in Kazakhstan, 1995 in Azerbaijan and 1993 in Moldova corporate farms became a mixture of reformed state and collective farms, joint stock companies, limited liability companies, partnerships, closed or open corporations and cooperatives. The second category, "individual farms," consists of two sub-categories – family and household farms. Family farms (or "peasant farms") derive their legal basis from special laws enacted, first, in the Soviet period and then after independence was declared in each of these countries. These special laws originally designated that land for the formation of peasant farms was to be obtained either from lands of a municipality reserve fund or from collective farms. Individuals could receive or purchase such land for private ownership, were allowed to employ hired labor and were obliged to file statistical reports with the State Statistical Committee. After the beginning of agrarian reforms in these countries members of corporate farms acquired the right to withdraw their land shares in order to form family farms. The third category of farms is here referred to as household farms. Before land distribution these were the private ancillary plots and collective gardens and orchards farmed by the employees of the successors of state and collective farms. With the dissolution of corporate farms in Azerbaijan and Moldova household plots became private property. Land of dissolved corporate farms was used to form private farms or distributed to plot owners.

1 LAND REFORM AND AGRICULTURAL PRODUCTION

Land reform has been of crucial importance to the populations in the countries under review, because these countries are still quite rural with half of their populations residing in rural areas. Agriculture is quite important in these countries, employing from 20 to 50 percent of the labor force and making up 10 to 20 percent of GDP (Table 2). Despite these similarities, there are sizeable differences between these countries coming from three very different regions of the CIS – the European CIS (Russia, Ukraine, Belarus, Moldova), the Transcaucasus and Central Asia. Two of the most important differences are the available land per rural resident and GDP per capita. In both cases Kazakhstan differs from the others. The land to labor ratio in Kazakhstan (the least densely populated country in Eurasia) is far higher than in the other two countries. Kazakhstan also stands out as the richest country with the lowest poverty headcount.

Table 2: Country profiles, 2004

Indicator	Moldova	Azerbaijan	Kazakhstan
Population			
Population (mln)	4.2	8.3	15.0
Rural population (%)	54	50	44
Agriculture			
Agriculture in GDP (%)	23	13	7
Agriculture in labor force (latest year, %)	51	40	22
Agricultural land per rural resident (ha, 2003)	1.1	1.1	31.7
Poverty			
GDP per capita (2000 US$)	398	957	1,822
Poverty (headcount, 2001)	64.1	33.4	8.5

Source: WORLD BANK, 2006a; FOOD AND AGRICULTURE ORGANIZATION OF THE UN, 2006; WORLD BANK, 2006b.

Each of the countries considered here pursued a different strategy of land reform. Azerbaijan pursued the most rapid and complete land reform with dissolution of collective farms and distribution of land to their members (Figure 2). Kazakhstan and Moldova pursued more gradual strategies without the elimination of corporate farms (Figures 1 and 3). Despite these differences, the fall in both GDP and GAO in each country preceded land reform and the recovery of both followed further more robust measures in the area of land reform and farm restructuring. In Azerbaijan growth in GDP and GAO followed the beginning of land distribution directly. In Kazakhstan the recovery of GDP and GAO followed the institution of bankruptcy proceedings for and extensive restructuring of corporate farms in the late 1990s. In Moldova GAO stabilized after partial land distribution in 1998, and began to recover after GDP began to grow in 2000.

1.1 Land reform strategies

All three countries privatized Soviet collective and state farms early in the post-Soviet period, creating any number of privatized corporate farms. After this initial privatization each pursued a different land reform strategy. Kazakhstan and Moldova underwent "share privatization" in the early 1990s. Under "share privatization" members of collectives received notional claims to a share of the land and property of the corporate farm, though the corporate farm itself was maintained intact. During this period, members of these farms could theoretically withdraw from the large farm, though in practice this right was difficult to exercise.[3] The Kazakh land reform, the most conservative of the three, maintained and restructured privatized corporate farms created by share privatization, while allowing the creation of family (peasant) farms, an inheritance of the Gorbachev perestroika era. Kazakhstan did not allow private ownership of land until 2003, and today family farms (raising vegetables and fruits) predominate in southern Kazakhstan while the Northern grain growing area is populated predominantly by corporate farms, often vertically integrated with grain trading corporations. By 2004 this strategy resulted in 57 percent of land being sown by corporate farms. Moldova underwent "share privatization" as in Kazakhstan from 1991 through 1998. Then in 1998 Moldova pushed through a partial individualization of land. All members of corporate farms were allowed to withdraw their land shares either to form individual farms or to pool under the management of "leaders," often the technical personnel from the dissolved collective farm. As a result of this partial individualization, Moldovan land is split nearly evenly between individual private farms (53 percent of sown land in 2004) and newly recreated corporate farms. In contrast to Kazakhstan and Moldova, the most radical land reform of the three took place in Azerbaijan which dissolved nearly all corporate farms after 1996 and distributed their land to private individually-operated farms. In six short years between 1995 and 2001 Azerbaijan distributed 91 percent of sown land in corporate farms to individual farms. By 2004 97 percent of sown land was tilled in individual farms.

Different land reform strategies have led to large differences between these countries in the distribution of landholding. In Moldova and Kazakhstan the portion of sown land in individual farms is about half that in Azerbaijan. Differences across countries in the portion of livestock in individual farms are considerably less, because livestock was always more heavily concentrated in the household sector in each country. For instance, in 1991 55 percent of livestock was in the private sector in Azerbaijan and 29 percent in Moldova and Kazakhstan. In that same year only

[3] During this period members of corporate farms required the approval of the management and the local administration in order to withdraw their land share and form a family farm.

2 percent of land was in the private sector in Azerbaijan, less than 1 percent in Kazakhstan and 9 percent in Moldova. The portion of GAO produced in the individual sector in the three countries exceeds the portion of sown land, but is equal to or less than the portion of livestock inventories in individual farms (Table 3).

Table 3: Structure of farming in Moldova, Azerbaijan and Kazakhstan, 2004

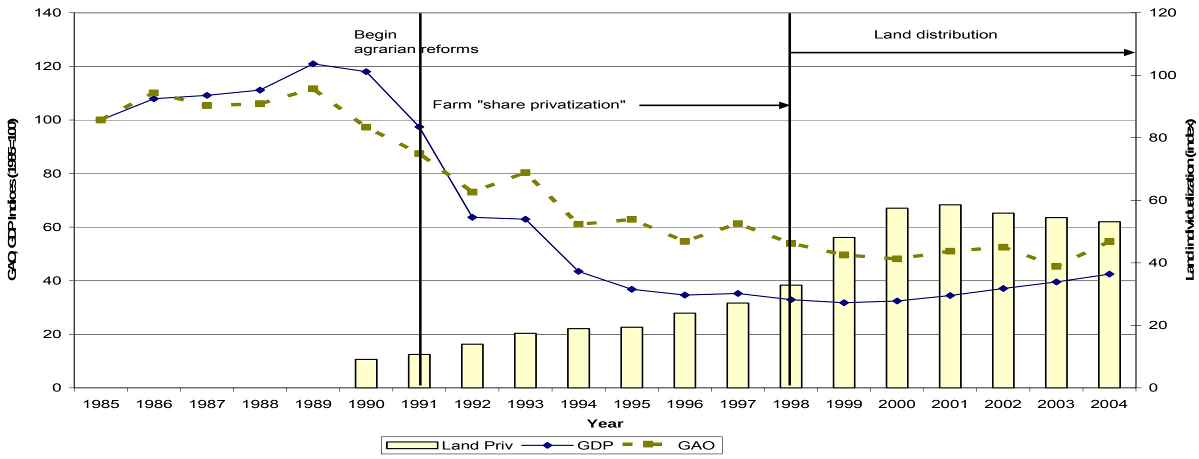
Structure of farming	Moldova	Azerbaijan	Kazakhstan
Sown land in individual farms (%)	53	97	43
GAO in individual farms (%)	71	98	78
Livestock inventories in individual farms (%)	91	97	90

Source: Statistical yearbooks.

1.2 Agricultural production

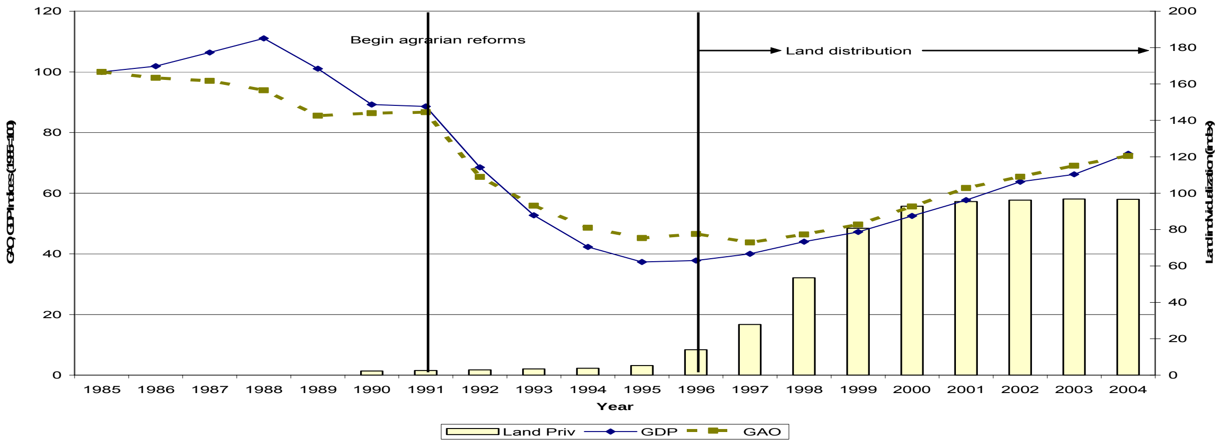
Farm production in each of the three countries considered here began to fall significantly before land reforms and continued to do so well into the years of independence (Figures 1, 2 and 3). The differences between countries appear in the length and depth of the fall in GDP and GAO and in the robustness of the recovery of GAO. Moldova and Kazakhstan saw gradual reforms without widespread dissolution of corporate farms. GAO in these countries fell for a long time before beginning to recover along with GDP. The bulk of declines in GAO and GDP occurred during farm "share privatization" when farm individualization was limited. Azerbaijan practiced a more robust land reform with dissolution of collective farms and distribution of land. The growth in GAO in Azerbaijan has been considerably more robust than in Moldova and Kazakhstan.

Figure 1: GDP, GAO and portion of land in individual farms in Moldova, 1985-2004



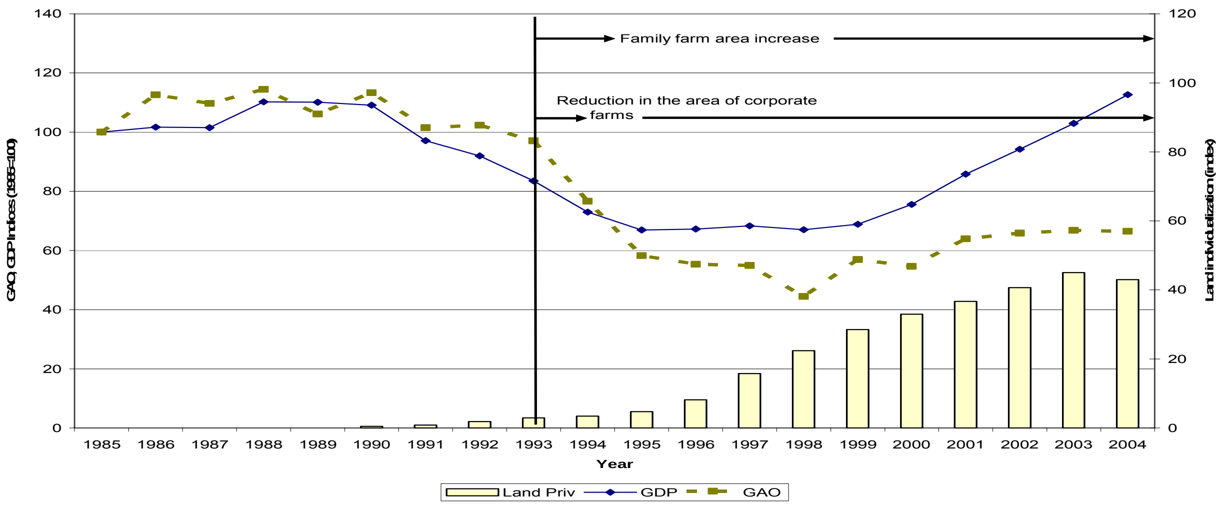
Source: Statistical yearbooks.

Figure 2: GAO, GDP and portion of land in individual farms in Azerbaijan, 1985-2004



Source: Statistical yearbooks.

Figure 3: GAO, GDP and portion of land in individual farms in Kazakhstan, 1985-2004



Source: Statistical yearbooks.

The stabilization and growth of GAO in these three countries seemed to be affected by three factors. First, land distribution seemed to have played a role. GAO in these countries began to grow only after the partial land distributions in Moldova and Kazakhstan and the more radical distribution in Azerbaijan. Second, Kazakhstan and Moldova both restructured and provided debt write-offs to corporate farms starting in 1998 in response to the farm "debt crises" there. In Kazakhstan bankruptcy proceedings were introduced in the 1998 and buyouts of large farms were encouraged by large, vertically integrated grain companies (processors). Bankruptcy (or the threat of it) sometimes brought in new management and access to capital, and the further concentration of land and property shares under management control (GRAY, 2000; ESIRKEPOV and BEISEMBAEV, 2001; CSAKI, LERMAN and SOTNIKOV, 2001). A third factor contributing to the recovery of GAO is the stabilization and growth of GDP. In sum, it is not possible to disentangle the separate effects on GAO of land distribution, debt assistance, farm restructuring and GDP growth. However, a comparison of Kazakhstan and Azerbaijan suggests that perhaps the robustness of land reform influenced the robustness of the recovery of GAO independently of other factors. In both Kazakhstan and Azerbaijan GDP grew quite briskly after 1996 and 1998. However, agriculture grew quickly only in Azerbaijan.

2 The policy environment of land reform

Land reform took place within specific general and agricultural policy environments which shaped growth in GAO in this period. Generally speaking, the macro economic environment in Azerbaijan has been better than in Moldova and Kazakhstan. Moreover, the agricultural policy environment in Azerbaijan improved considerably since 1997 compared to Kazakhstan and Moldova. However, rural households in Azerbaijan ranked the enabling environment for farming in their country poorly. The overall effects of the agricultural policy environment on GAO in these countries, then, are not clear.

2.1 Macroeconomic policy environment

The macroeconomic environment had a predominantly negative influence on agriculture in these countries through the mid to late 1990s. This is partially because depression and stagnation in the general economy had labor spillover effect into agriculture. Each of the countries saw an increase in the portion of the labor force employed in agriculture through the late 1990s which contributed to already falling labor productivity in agriculture (Table 4). It is also difficult to expect labor shifts out of agriculture or even agricultural growth without growth in other sectors. Perhaps not coincidentally, agricultural production stabilized in these countries only after GDP began to grow in 1996 in Azerbaijan, in 1999 in Kazakhstan and in 2000 in Moldova.

Table 4: Employment in agriculture, 1991-2001 (% of total employment)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Azerbaijan	32	35	32	32	31	32	29	42	42	41	40
Kazakhstan	23	24	25	22	22	21	24	22	22	–	–
Moldova	42	40	43	46	–	43	42	46	49	51	51

Source: World Bank, 2006b.

Despite the predominantly negative role of the macroeconomic environment through most of the 1990s, there is a clear difference between Azerbaijan and Moldova/Kazakhstan in the growth path of agriculture. In Azerbaijan agricultural growth has been fully as robust as general economic growth. In fact, agriculture may even be considered a "leading sector" in the growth of GDP in

Azerbaijan. In Kazakhstan and Moldova, in contrast, agricultural growth has lagged behind GDP.

2.2 Agriculture policy environment

A second important influence on agricultural growth and yields has been the general policy environment in agriculture. While the status of agricultural reforms in these countries is far below those in the EU, there has also been a distinct difference between Azerbaijan and the other two countries. In Azerbaijan the agricultural policy environment has improved considerably since 1997, while in the other two countries improvement has been much more modest. The change in agricultural reform policies in these countries can be seen in the indices compiled by the World Bank on the status of agrarian reforms. These indices measure the status of agrarian reforms in the economy in five key areas, with each index ranging from 1 (centrally planned economy) to 10 (market economy) (Table 5). The table shows the simple average of the five indices measuring the status of agricultural reforms in the areas of prices and markets, land markets, agro-processing and institutions. For a detailed explanation of ratings, see CSAKI and KRAY (2005).

Table 5: Status of agricultural reforms in Moldova, Azerbaijan, Kazakhstan and the new EU countries

	1997	2000	2004
Moldova	5.8	6.4	6.0
Azerbaijan	5.0	6.4	6.6
Kazakhstan	5.8	5.6	6.2
New EU countries*	7.8	8.6	9.2**

Source: CSAKI and KRAY, 2005.

Notes: * In Eastern and Central Europe; ** 2003.

2.3 Enabling environment for farming

A third influence on agricultural growth and yields has been the enabling environment for farming (Table 6). The policy environment may be evaluated not only by World Bank experts, but "from below" by rural households themselves. The World Bank 2003 surveys asked rural households about their own perceptions of the enabling environment for farming by requesting them to rate the ease with which a number of activities could be carried out. The results seem to indicate that status of the enabling environment in Azerbaijan is worse than in either Kazakhstan or Moldova. Azerbaijan ranks last in every category except for one. Moldova, by contrast, seems to rank the best of the three countries.

Table 6: Surveyed households rating of the enabling environment for farming

Ease to	Azerbaijan	Kazakhstan	Moldova
Market agricultural produce	*42*	**53**	43
Purchase land	*34*	37	**46**
Sell land	*41*	41	**50**
Rent in land	*39*	45	**51**
Lease out land	*43*	45	51
Access inputs (seeds, fertilizer, pesticides)	*30*	**57**	54
Access agricultural equipment	*31*	50	**53**
Access satisfactory irrigation	37	**48**	*15*
Access satisfactory advisory services	*47*	**58**	56
Access a loan for farm investments	*29*	29	**41**
Summary average	*37*	**46**	**46**

Source: DUDWICK, FOCK and SEDIK, 2006.

Note: Index between 0 and 100. 0: Very difficult; 100: Very easy. The best rank of three is indicated in bold and the worst in italics.

3 Economic performance of farms

While the difficulties of causal arguments about land reform should be recognized, this does not mean that it is impossible to evaluate land reforms. This can be done through a structured and comparative review of key performance indicators of the farm sector before and after reforms and between countries. A case can be made that important differences in outcomes over time and between countries may be a result of land reform. This line of argument is more convincing for *immediate* effects. It is less reliable in establishing longer term effects of land reform. For example, it is possible to demonstrate that the distribution of land in Azerbaijan had an immediate impact of increasing the average land holding of rural inhabitants by one hectare and caused the distribution of landholding to become significantly more equal in rural areas. However, it is more difficult to attribute the subsequent growth of crop production exclusively to land distribution, because GDP increased and the agricultural policy changed at the same time.

In the following comparisons the growth in crop and livestock yields and labor productivity is used as an overall indicator of changes in farm performance. A deeper look into the sources of productivity growth in these countries is afforded by examination of differences in farm performance between corporate and individual farms. As the portion of land and livestock in individual farms grew, overall yields grew closer to those in individual farms. Last, corporate farm performance over time can be analyzed by comparing official statistics on profitability. Each of these measures has limitations, and it may be argued that none of these measures is adequate for understanding the extent of farm restructuring. For these reasons it is best to be conservative in any interpretations of the data.

3.1 Changes in crop and livestock yields and labor productivity

Growth in GAO in the three countries has been driven predominantly by improvements in yields (output per ha or per inventory animal). Table 7 illustrates that growth in GAO in Moldova has been caused by increases in both area and yields, while Azerbaijan and Kazakhstan have falling crop area and rising yields. The increase in yields in Azerbaijan and Moldova clearly followed the watershed reforms in those countries of 1996 and 1998. Crop and livestock yields in Azerbaijan turned around in the years 1996-98. In Moldova crop yields began to grow only in 2001. In Kazakhstan crop yields have been highly erratic, though the trend since 1998 has been up. Livestock yields, however, have continued to fall over the entire period.

Table 7: Sown area, crop yields and labor productivity in Moldova, Azerbaijan and Kazakhstan, indices (1990=100)

	1990	1995	1996	1997	1998	1999	2000	2001	2002
Moldova									
Sown area	100	102	103	109	109	108	111	114	116
Crop yield	100	78	65	80	66	61	59	67	68
Livestock yield	100	59	61	66	58	65	61	54	54
Azerbaijan									
Sown area	100	83	83	74	63	57	71	79	84
Crop yield	100	77	85	80	80	90	93	102	105
Livestock yield	100	66	67	67	71	72	72	72	74
Kazakhstan									
Sown area	100	82	73	62	53	43	46	48	50
Crop yield	100	42	54	65	39	101	77	98	93
Livestock yield	100	105	122	128	122	119	113	114	109

Source: Calculated from statistical yearbooks.

Box 2: Crop and livestock meat yield indices

An index of crop yields (centners per ha) was used to track changes over time in the countries of this study. The crop yield index used weights from the latest year available (2002) derived from the distribution of cultivated area among crops. Current year weights were used because they probably better reflect the distribution of land area under market conditions. In order to make the indices more comparable, a subset of crops raised in each country was chosen for the index. The crops used in the index cover 83, 85 and 95 percent of the area of sown and permanent crops in Kazakhstan, Azerbaijan and Moldova in 2002. The index leaves out various types of animal feed crops.

To track livestock meat yield (tons of meat production per inventory animal) changes an indicator of the efficiency of meat production was used. For this purpose an index of meat production per inventory animal (using end of year stock figures) was constructed. This index can be thought of a rough indicator of gross return to the grain cost of maintaining capital stock. The numerator is a measure of meat production in kilograms, while the denominator is a measure of animal inventories in cow terms, weighted according to the relative grain consumption of each animal. For instance, if cows and horses receive a weight of 1.0, the weight for cattle is 0.6, sheep and goats, 0.1 and poultry receive a weight of 0.02. This is not a perfect indicator of efficiency by any means, but it has the advantage that it can be calculated for each of the CIS countries. The drawbacks of this indicator are evident during periods of large declines in inventories of corporate farms, indicating sizeable transfers to individual farms. During these periods meat production by corporate farms continues its slow decline, but inventories decline rapidly. Thus, it appears that corporate farm meat production efficiency jumps.[4] This is because livestock inventories in the denominator, measured at the end of the year, reflect the transfer, while meat output does not yet.

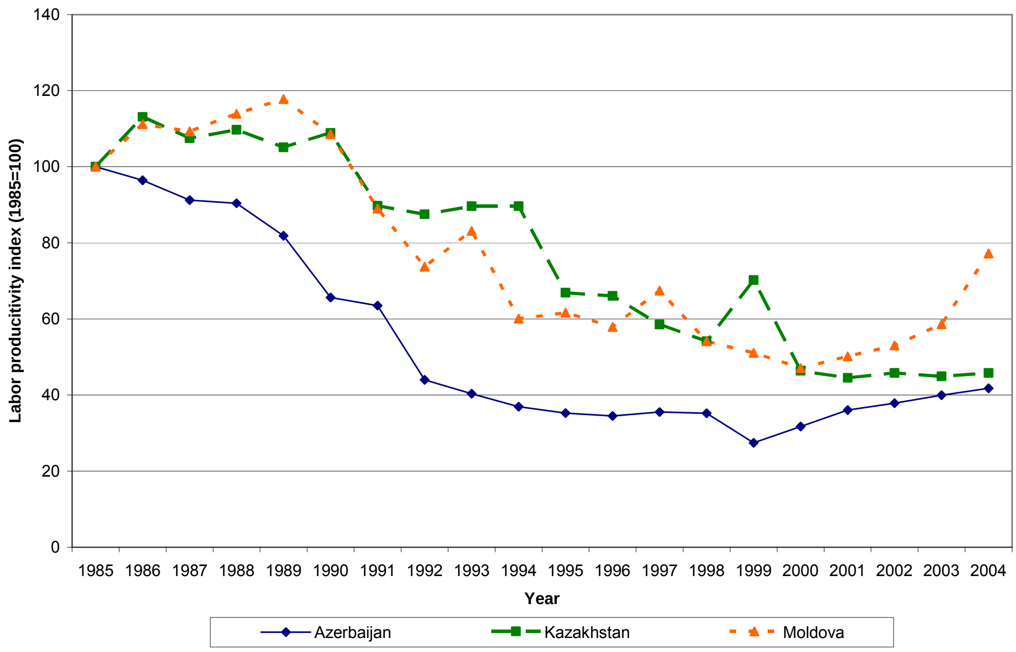
Calculations of labor productivity are made notoriously uncertain by the lack of dependable underlying labor data. In Moldova, for instance, official figures on agricultural labor indicated very little change in the number of employed in agriculture (around 700,000), between 1990 and 2002. However, the reported number of employed dropped by more than 20 percent in 2003 and another 10 percent in 2004. The size of change indicates that this fall reflects

4 Another difference between land and livestock distribution in the CIS countries is that animals could be exported. In the early 1990s corporate farms appear to have exported large quantities of livestock. The evidence for this is to be found in the large reductions in livestock inventories that were not transferred to individual farms. If this reduction in inventories signified distress slaughter, one would expect a temporary increase in meat production. However, there is no evidence of increased meat production in these periods. This phenomenon was most pronounced in Kazakhstan, where corporate farms appear to have exported the equivalent of 2 million cows per year from 1994 to 1996.

employment reclassification rather an actual diminution of employment. Thus, the labor productivity figures for Moldova after 2002 should be checked thoroughly before drawing conclusions. Labor productivity figures in Kazakhstan should also be used with great caution. The fall in labor productivity in 2000 is a result of a change in the definition of agricultural labor, so that these figures are not comparable with those that precede them (Figure 4).

Bearing in mind the limitations of such data, it should be said that calculations of labor productivity show gradual improvements in performance in Azerbaijan since 1999 and rapid improvements in Moldova between 2000 and 2002 (Figure 4). In Kazakhstan labor productivity continues to fall gradually. In Kazakhstan and Azerbaijan there is no indication of the rise in agricultural labor productivity caused by widespread labor shedding in corporate farms that can be found in Estonia, the Slovak and Czech Republics and Hungary. Agriculture seems to have absorbed rather than shed labor in these countries. In Moldova, however, there is improvement in labor productivity after 2000, though the figures for 2003 and 2004 should not be considered reliable until we have a better understanding of the meaning of official figures.

Figure 4: Labor productivity in Moldova, Azerbaijan and Kazakhstan, 1985-2004 (1985=100)



Source: Calculations from statistical yearbooks.

3.2 Differences in productivity between corporate and individual farms

There are two sources for comparison of productivity between corporate and individual farms. The first is official statistics, from which indices of yields can be derived (Table 8). Table 8 illustrates that yields in individual farms have dominated those in corporate farms since Soviet times. If overall yields have improved in these countries part of the reason is the movement of production from corporate to individual farms. A second set of productivity comparisons is derived from survey data. From these data we derived partial productivity measures such as productivity of land (value of output per hectare) and labor (value of output per average work unit), as well as total factor productivity (TFP), for which output is measured in relation to a whole bundle of inputs utilized. TFP is calculated as the ratio of the aggregated value of output to the aggregated cost of inputs. In theory TFP is the ratio of the aggregated market value of outputs to the aggregated market value of inputs. This calculation is proxied in Table 9 by using the ratio of sales to costs as reported in the farm's financial statements. The ratio of sales to costs is a TFP proxy that provides an accounting measure of productivity equivalent to the profit margin.

Table 8: Indices of crop yields for farms by type in Moldova, Azerbaijan and Kazakhstan based on official statistics

	1990	1995	2002
Moldova			
Individual farms	50	42	33
Corporate farms	46	35	33
Azerbaijan			
Individual farms	54	38	41
Corporate farms	27	15	20
Kazakhstan			
Individual farms	31	9	20
Corporate farms	13	5	10

Source: Calculations from statistical yearbooks. For an explanation of index methodology see Box 2.

Partial productivity measures provide an ambiguous picture of differences in productivity between corporate and individual farms. Survey results show that land productivity (output per ha) is higher in family farms than in corporate farms in Moldova and Azerbaijan, whereas in Kazakhstan the two are statistically indistinguishable (Table 9). On labor productivity (output per average work unit) the results are more mixed. In Moldova labor productivity seems to be higher on corporate farms while in the other two countries labor productivity is not statistically different.

The total factor productivity measure can be used to resolve the ambiguity afforded by partial productivity measures. According to this measure family farms are more productive than corporate farms in each of the three countries surveyed and the difference is significant at the 20 percent level. It should be noted that there is an important limitation on the comparison of survey figures for family and corporate farms in Moldova. In the World Bank survey in Moldova family farms were concentrated in the smaller size categories, while corporate farms were predominantly large. Thus, for this country it is difficult to derive firm conclusions from Table 9, because it is not clear whether these differences in yields result from differences in scale or organizational form. For Azerbaijan and Kazakhstan, however, the TFP comparison should be robust as an indicator of differences between farming types.

Table 9: Productivity measures for surveyed farms by type in Moldova, Azerbaijan and Kazakhstan (2003)

		TFP	Labor productivity	Land productivity
Farm type	N	Output/ total costs	Output*/AWU	Output*/ha
Moldova				
All farms	200	5.4	10.7	15.0
Family farms	176	***5.9***	***9.9***	***10.8***
Corporate farms	24	***1.7***	***16.7***	***3.3***
Azerbaijan				
All farms	80	2.1	7,032	1,589
Family farms	65	***2.3***	7,803	***1,762***
Corporate farms	15	***1.0***	3,692	***840***
Kazakhstan				
All farms	200	4.2	767	58
Family farms	178	***4.4***	683	60
Corporate farms	22	***2.7***	1,446	44

Source: DUDWICK, FOCK and SEDIK, 2006.

Note: * 1000 LCU; AWU = average work units. TFP = total factor productivity. Indicators that are statistically different at the 20 % or better level are in bold italics.

3.3 Profitability of corporate farms

A final indicator of the performance of corporate farms is the portion of these farms that are unprofitable (Table 10). Corporate farms in these three countries have had difficulties being profitable throughout much of the 1990s, peaking in 1998 when between 80 and 90 percent were unprofitable. A World Bank study on *Farm Debt in the CIS* (2001) recounted the main reason for mounting farm debts as the "lax financial discipline made possible by the persistence of soft budget constraints" (CSAKI, LERMAN and SOTNIKOV, 2001). Profitability of corporate farms improved after 1998 in each country, though in 2002 nearly half of these farms were unprofitable in Kazakhstan. The reasons for the improvement in financial performance of corporate farms after 1998 are not entirely clear. Certainly the growth of production and debt write-offs in all countries played a role.

Table 10: Portion of unprofittable corporate farms in Azerbaijan, Kazakhstan and Moldova, 1990-2002 (percent)

	1990	1995	1998	2000	2002
Azerbaijan	7.9	47.0	86.7	52.5	29.0
Kazakhstan	n.a.	78.5	78.5	51.6	48.9
Moldova	n.a.	28.0	91.0	56.0	

Sources: Statistical yearbooks.

Note: N.a. – Not available.

4 Well-being of rural households

The overall objective of land reform in all transition countries is not only to improve the productivity of the agricultural sector, but to increase the incomes and the well-being of their large rural populations which rely on agriculture for a substantial part of the family budget. Subjective perceptions of household well-being and changes in well-being gathered from World Bank household surveys in each of the three countries covered in this study were utilized for the measurement of the well-being of rural populations. Results of the World Bank household surveys related to three topics are reported here: Overall subjective well-being, access to rural services and social benefits and changes in community life. For each of these topics the current level was reported as well as a comparison with past levels.

Household perception surveys are an important source of information about subjective well-being of rural inhabitants, though they are not specifically connected with land reform. Rather, they are more a reflection of overall perceptions of the status of and changes in conditions in the countryside. Information from rural inhabitants decisively illustrates that well-being is only partly a function of improvements in productive assets and income afforded by land reform. Improvements in non-farm income opportunities, rural services and community life all seem to play a part in overall well-being of rural inhabitants. Improvements in these areas are quite independent of land reform, but rather depend on the overall economic prospects in the country and state budget allocations to rural areas. Kazakhstan scores high in both these areas, though it has consistently received lower marks on a scale of agrarian reforms and has had less impressive results related to production and yields.

Table 11: Household perceptions of well-being (2003)

Current level of well-being (%)	Azerbaijan	Kazakhstan	Moldova
High	14.1	30.8	14.4
Medium	64.6	46.3	50.2
Low	21.3	22.8	35.4
Change in perceived level of well-being over last three years (%)			
Improved	17.6	36.2	28.6
Unchanged	78.5	36.5	48.2
Deteriorated	3.8	27.3	23.2
Land allocation was fair (% of households)	92	n.a.	53

Source: DUDWICK, FOCK and SEDIK, 2006.

Note: N.a. – Not available.

Overall perceptions of well-being in Kazakhstan households seem to be higher than in either Moldova or Azerbaijan (Table 11). Perhaps more importantly, the perception of improvement in welfare over the past three years in Kazakhstan is higher as well (though a sizeable portion of Moldovan households also believed that their welfare had improved). For Azerbaijan there is an important disparity between the excellent sector performance and the mediocre subjective well-being of rural households. Though it would seem that the clear improvements in yields and growth in production would translate into the perception that things have improved, this has evidently not been the case on a wide scale in rural Azerbaijan. In this respect, the low portion of rural households believing that there has been an improvement in their well-being is particularly puzzling. It is not evident, however, that the fault lies with land reform. Land reform in Azerbaijan was widely viewed as fair.

One of the keys to understanding why Azerbaijan rural households were so dissatisfied is a drastic deterioration in rural services and social benefits. The sizeable perceived falls in provision of gas and electricity since Soviet times contrasts with the perceived improvements in Kazakhstan and Moldova (Table 12; Box 3). The deterioration in rural services provision is supported by official statistics that show a severe deterioration in gas supply per inhabitant in rural areas beginning in the late 1980s with substantial and growing differences in the level of services in urban and rural areas (SEDIK et al., 2002). The disparities in service provision per resident between rural and urban areas in Azerbaijan for gas, clean water and plumbing are on the order of ten to one.

There has also been a greater apparent deterioration in social benefits such as rural medical and child care in Azerbaijan compared to the other two countries (Table 13). Certainly, more limited access to social benefits is to be expected as part of the move toward a more monetized economy. However, access to education and health services, two social benefits that are clearly within the mandate of the state, have deteriorated significantly as well. In a survey conducted in 2002 by Transparency International Moldova, more than 80 percent of respondents considered the deteriorating quality of the education and health care systems to be one of the most severe problems in Moldova (DEANE and CATRINESCU, 2004).

Table 12: Households' level of satisfaction with provision of electricity, gas, drinking water, telephone

	Azerbaijan		Kazakhstan		Moldova	
Present level of satis-faction[1)] with service	**Before[2)]**	**Today**	**Before[2)]**	**Today**	**Before[2)]**	**Today**
Electricity	84.1	43.7*	68.1	86.2*	73.0	79.0*
Gas	18.4	3.5*	65.2	78.5*	35.7	37.7
Drinking water	68.9	66.7	70.0	72.6	42.5	38.6
Telephone	25.8	30.2*	48.2	55.0*	35.4	50.8*

Source: DUDWICK, FOCK and SEDIK, 2006.

Notes: A star behind the value in the "Today" column indicates that the satisfaction levels before and today are statistically significant at the 10 % level.

1) Level of satisfaction is expressed on a scale from 0 to 100 (0 = not available at all; 100 = always available in satisfactory quality/reliability).

2) "Before" means before the dismantling of the sovkhoz (state farm) or kolkhoz (collective farm).

Box 3: Rural services in Shemakha and Khachmaz districts of Azerbaijan

Azerbaijani villagers in Shemakha district no longer have gas, because after the breakup of the state farm, the gas pipes were cut and sold. Likewise, a kilometer's worth of pipes that brought water from the district center was stolen. The culprits were said to be known but the police were uninterested. Formerly, irrigation water was distributed from a tank to which 4 km of pipes were connected – these were also stolen. In Khachmaz district, electric cables were stolen, and villagers themselves raised money to replace them and restore service.

Source: Focus groups and interviews (2003) in DUDWICK, FOCK and SEDIK, 2006.

Table 13: Percent of households with access to social benefits before dismantling of state and collective farms and today

	Azerbaijan		Kazakhstan		Moldova	
Percentage of households benefiting from	**Access before[1)]**	**Access now**	**Access before[1)]**	**Access now**	**Access before[1)]**	**Access now**
Pension augmentation	35	63	11	34	17	29
Subsidized preschool childcare	12	2	6	2	8	4
School subsidies	41	36	6	2	6	3
Stipends for college and university students	32	30	16	4	13	7
Heating fuel	0	15	23	14	6	4
Medical care	93	53	55	46	65	46
Subsidized vacations	1	1	22	4	43	19

Source: DUDWICK, FOCK and SEDIK, 2006.

Note: [1)] "Before" means before the dismantling of the sovkhoz or kolkhoz farm.

Another reason why households in Azerbaijan may be more pessimistic about their level of well-being is that the level of risk in household income is quite a bit higher in Azerbaijan than in any other country surveyed (Table 14). Incomes in other surveyed countries are significantly more diversified than in Azerbaijan. Fully 64 percent of household income derives from farm production in Azerbaijan, but only 11 percent from wage employment and 14 percent from pensions. Compare this with Moldova, the other country with labor intensive agriculture, where 33 percent of household income derived from wage employment, 40 percent from agricultural production and 14 percent from pensions.

Table 14: Income composition of surveyed households

Percent in total income (cash and in kind)	**AZ**	**KZ**	**MD**
Total salary from wage employment	10.6	45.7	32.7
Value of farm production consumed in the family	27.4	12.9	18.5
Sales of farm products	36.3	9.2	21.7
Rent/lease payments received (for land and assets)	0.4	0.3	3.7
Total revenue from other private non-farm business	2.2	1.5	1.6
Pensions	14.1	22.9	13.6
Social assistance	1.4	2.1	1.0
Gifts and remittances	0.7	0.6	4.1
Other	6.9	5.7	3.8

Source: DUDWICK, FOCK and SEDIK, 2006.

Kazakh rural household incomes seem to be less risky than incomes in either Azerbaijan or Moldova. The key difference between Kazakhstan and the other two CIS countries lies in the significantly higher salary income of rural households (Table 14). In Kazakhstan nearly half of household income derives from salaries received from agricultural enterprises (25 percent) or non-agricultural enterprises (25 percent). Reported household well-being was highly correlated with the portion of salary income in total income. The highest portion of households reporting high well-being (50 percent) was reported in Akmola oblast whose households had the highest portion of salary income (53 percent). The lowest portion of households reporting high well-being was from Almaty oblast (10 percent) whose households had the lowest portion of salary income (39 percent). Because of the large portion of income from salaries in Kazakhstan, sales of farm products as a portion of household income were relatively low.

Table 15: Households' perceptions of community life

	Azerbaijan		Kazakhstan		Moldova	
	Level[1)] before[2)]	Level[1)] now	Level[1)] before[2)]	Level[1)] now	Level[1)] before[2)]	Level[1)] now
Alcohol use among adults	38	28	49	65	41	62
Alcohol use among youth	44	37	43	64	33	62
Level of crime	29	25	38	57	31	49
Criminal activity among youth	28	25	35	54	30	51
Domestic abuse/violence	28	26	27	39	30	45

Source: DUDWICK, FOCK and SEDIK, 2006.

Notes: 1) Level on a scale from 0 (very low) to 100 (very high).
2) "Before" means before the dismantling of the collective or state farm.

Azerbaijan stands out from the other countries in household perceptions of community life, which seem to have improved in many ways (Table 15). Rural households believe that compared with the level before land reform the levels of alcohol abuse, criminal activity and domestic abuse have all fallen. Informal interviews indicated that part of this is due to the increased importance of religion in Azerbaijan rural social life. But it is also undoubtedly due to the period of comparison, the early 1990s. In contrast to other countries, where the period preceding land reform might be characterized as "developed socialism", in Azerbaijan the early 1990s were years of war, political turmoil and a deteriorating socialist economy.

Moldovan and Kazakh households both believe that community life has deteriorated, as indicated by a rise in alcohol use, crime and domestic violence (Table 15).

In Moldova respondents noted the proliferation of bars in villages and concerns with increasing alcohol abuse by women and children as young as 12. Children of parents who had migrated were likelier to drop out of school. Informal interviews found that in the face of a perceived increase in crime, villagers either failed to report the crime or took the law into their own hands because they saw the police as ineffective.

5 Conclusions

This stocktaking has offered a structured and comparative description of much of what is known about the effects of land reform and farm restructuring in three countries of the Eastern Europe and Central Asian region. It has not offered an impact analysis of land reform policies in recognition of the difficulties of rigorously establishing causation. However, even assembled facts and comparisons suggest a number of conclusions with implications for policy.

The extensive fall in gross agricultural production in these three countries seemed to convince both radical (Azerbaijan) and gradual (Kazakhstan) reformers alike that the "changing the sign on the door" variety of farm reform ("share privatization") was not sufficient for creation of viable farms. The fall in agricultural production recorded in the CIS countries in the early 1990s seems to have been the result of a breakdown in the collective farm system of the previous era compounded by delayed introduction of viable farm governance and falling GDP. The fall in agricultural production before land reform contrasts with the situation of growth in production and productivity (in nearly all the countries surveyed) after land distribution. For most indicators and for most countries performance after land reform began was considerably better than before. In Azerbaijan, there was positive growth in every indicator after land reform began in 1996.

These two facts – that agricultural production began to deteriorate before land reform and that production began to grow only after land reform – seem to indicate that land reform is more likely a part of the solution than a part of the problem in these countries. In the absence of land reform the deterioration in output that characterized the early 1990s may well have continued, because much of the root of the problem was a deteriorating collective farm system. The choice governments faced in Moldova (1998), Azerbaijan (1996) and Kazakhstan (1998) was not one of rural "developed socialism" of the Brezhnev era vs. land distribution and farm restructuring. It was one of a deteriorating agricultural sector under half-way reforms vs. land distribution and farm restructuring. Thus, the counterfactual of no land distribution and farm restructuring was continued deterioration. It is not surprising that governments chose reform under these circumstances.

This survey has illustrated that an immediate effect of the transfer of agricultural production from corporate to individual farms in the three CIS countries was an improvement in sector performance, because yields in individual farms were higher than those in corporate farms. But land reform by itself is not sufficient to ensure better farm performance. None of the governments of the countries covered in this survey have met the challenge of ensuring a truly good and sustainable enabling environment for agriculture to ensure that farms will be competitive in world markets. In each of the countries a number of complementary policies were identified that negatively shaped the enabling environment for agriculture. Macroeconomic instability in the early 1990s led to a fall in GDP in each of the countries. For most of the 1990s in Moldova and Azerbaijan agricultural producer prices were significantly below export prices, providing a production disincentive. These price differences seem to be a result of government restrictions on trade in agricultural commodities. Falling GDP and low producer prices created a poor environment for growth in agricultural yields or production. The macroeconomic and enabling environment for agriculture in the countries considered here improved by the mid- to late 1990s. Inflation rates fell and GDP began to grow. Internal and external agricultural prices grew closer. In Moldova the macroeconomic record improved after 2000, but the enabling environment for agriculture is still poor. In Azerbaijan the macroeconomic environment improved after 1996, though the enabling environment for agriculture remains poor. In Kazakhstan the macroeconomic environment improved after 1996, but the enabling environment for agriculture has improved mostly for large farms.

In addition to ensuring an enabling environment for private agriculture, an important service the government can offer rural inhabitants is assistance in the transition from high employment, low wage agriculture to low employment, high wage agriculture. Not only will this improve the performance of agriculture, but it will raise the well-being of rural inhabitants. This can be done through rural development, rural pensions, social support for those shed from corporate farms, other social services and by assisting young people in acquiring skills for alternative employment. Azerbaijan is a good example of a country where land reform, for all its important benefits, requires a great number of complementary reform measures in order to improve the livelihoods of rural inhabitants. Azerbaijan had the best sector performance of any of the countries considered. Yields improved, production increased and rural poverty fell. However, households were quite pessimistic (compared to other countries) as to changes in their well-being with only 18 percent of them believing that well-being had improved over the past three years. One key to this disparity is the substantial deterioration in rural services in Azerbaijan compared to urban areas. Another apparent reason is that fully two thirds of incomes in Azeri households derived from farming and only 11 percent from wage employment. This portion of income from farming is a considerably higher portion than that found in the other countries. This risk aversion may explain why households prefer to maintain employment in large farms, instead of becoming commercial farmers themselves. It is also why the creation of non-farm employment in rural areas is so important.

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LAND MARKET DEVELOPMENTS, IMPERFECTIONS, AND EFFECTS IN TRANSITION COUNTRIES

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1 INTRODUCTION

Land markets are active, relatively transparent, and well developed in some transition countries while embryonic, informal or opaque in others. In general, households and farms in Central Europe have much less difficulties in accessing land than in some of the CIS countries. These variations reflect the different stages of reforms and economic development, and the regional environments these countries operate in. For example, in several new EU member states land prices and market activities have grown rapidly with the combination of increased demand due to higher subsidies, prices and productivity, the inflow of foreign investment, and new land legislation. The development is slower in most countries further east.

The main form of land exchange in transition is through renting of land. Buying and selling of land is more difficult than renting everywhere. However, the share of land rented in total land used varies enormously: From more than 90 % (e.g. Slovakia) to 10 % or less (e.g. Albania).

Theoretically, sale of land is often considered the superior form compared to land rental. The arguments supporting the optimality of land sales are that (a) land sales transfer full rights to the new user, (b) they are more likely to increase access to credit as owned land can be used for collateral purposes, and (c) they provide optimal incentives for investment by providing permanent security of rights (BINSWANGER et al., 1995; DEININGER and JIN, 2003; DEININGER and FEDER, 2002).

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However, these conclusions rely on a number of simplifying assumptions which are not always consistent with reality, and especially not with reality in transition countries (SWINNEN and VRANKEN, 2006)[1]. In transition countries, which are typically characterized by huge uncertainties and imperfections in input, product, credit and insurance markets, the actual performance of land sales markets may be far from the theoretical ideal (DEININGER, 2003).

Various pieces of empirical evidence confirm that, in transition countries, sales of land have been limited, in some cases because government regulations prohibit them, but often because many new land owners were unwilling to sell their newly acquired assets. Moreover, limited information about the sales price and the expected increase in land prices upon accession to the European Union resulted in very limited sales in all Central and East European Countries. This increased the importance of land rental markets in transferring land to more productive users and in circumventing the huge fragmentation in land ownership (VRANKEN et al., 2004). Land rental markets have a huge potential in increasing efficiency in the allocation of land.

In addition to efficiency effects, rental markets may also have positive equity impacts as they allow poorer individuals to climb the agricultural ladder because less capital is required initially to start up their production (ESWARAN and KOTWELL, 1986; DE JANVRY et al., 2001; SADOULET et al., 2001).

The objective of this paper is to analyse the status of the development of land markets in transition countries, to identify which constraints faced by rural households are affecting its development and to analyse the implications for efficiency, equity, land prices and the impact of agricultural policies.

The first section of the paper discusses some stylized facts about the structure of rural land ownership and use of land by farms and the development of land markets in transition countries. The next sections analyse the land transaction costs and other constraints faced by farming households and the implications of the land market development for efficiency and equity. Section 5 identifies patterns of land market development. The last section analyses how a combination of imperfect competition due to the domination of large corporate farms and transaction costs are affecting land prices and the impact of agricultural policies.

[1] For a review of the theoretical arguments on land sales and rental markets, see SWINNEN and VRANKEN, 2006.

2 KEY FINDINGS ON LAND SALES AND LAND RENTAL MARKETS

Using data from fifteen surveys implemented between 1997 and 2004 in eleven different transition countries by the World Bank and by European research institutions[2], SWINNEN and VRANKEN (2006) identified a number of stylized facts about the development of land markets in transition countries.

1. Land sales markets are thin and almost everywhere less developed than land rental markets.

On the supply side, many more households and farms are renting out land than have sold land. Very little land is sold by rural households or family farms in transition countries. Less than 5 % of the rural households and family farms, both registered and unregistered, had sold land in all countries, and in many cases the share was below 2 %. In countries where many households or farms are providing land to others, the vast majority is through renting out. In countries where little land is rented out, even less is sold. Few rural households have been willing to sell land and if they allocated land to others they did it through rental arrangements.

On the demand side, much more land is transferred trough rental than through purchase because the large scale farming organisations are renting in the vast majority of the large amount of land they use while only small plots are purchased, mainly by some of the registered farms.

2. There are major differences in how much land is being exchanged, and in particular in the importance of land rental markets.

Figure 1 presents aggregate indicators of the importance of renting as a share of total land used, indicates that here are large country differences between the role of rental markets in land allocation In for example Slovakia and the Czech Republic more than 90 % of the cultivated land area is rented. In Bulgaria, Hungary, Moldova and Kazakhstan, between 50 % and 60 % of the cultivated area is rented. In Azerbaijan, this number decreases to 35 % and even to 10 % in Albania.

3. Corporate farms own very little land and rely almost entirely on rented land for cultivation.

In Hungary, Bulgaria, Moldova, the Czech Republic, Slovakia, and Azerbaijan, corporate farms own less than 15 % of the land they operate and 85 % or more of the land used by them is rented. Corporate farms

[2] The World Bank surveys include Azerbaijan 2004; Bulgaria 2004; Moldova 2004; Kazakhstan 2004; Romania 1996; Tajikistan 1999; and Poland 2000. Surveys implemented by European research institutions, coordinated by the University of Leuven, include Albania 1999; Albania 2003; Bulgaria 1997; Bulgaria 2003; Czech Republic 1999; Hungary 1997; Romania 1998; Slovakia 1999.

rent in from three sources: Members[3], non-members and the state. In Azerbaijan, the vast majority of corporate farms are using land that is owned by the municipality or the state, while in Czech Republic, Slovakia, Hungary, Bulgaria, Moldova and Kazakhstan, corporate farms are using much land which is owned by their members.

4. Almost all family farms own some land. Registered family farms rely on a mixture of rented land and owned land for cultivation. They got land not only through the land reform process but often also through land purchases.

In most countries, more than 85 % of the (registered) family farms own land and a significant share purchased land, albeit relatively modest amounts. Land purchases by registered family farms were for example common in Bulgaria and Moldova where 30 % and 23 % of them had purchased land. On the other hand, a large share of registered family farms are also renting in (often large amounts of) land and they rent almost only from other households. Figure 2 makes it rather obvious that, in transition countries, just as in the US and in Western Europe, commercial farms see renting and buying of land as complementary and this complementarity of renting and buying of land increases by farm size (SWINNEN, 2002).

5. Unregistered family farms mostly own a small amount of land and rely almost entirely on this land for their cultivation. Unregistered family farms are not active in renting in land, while they are quite likely to rent out, mostly to corporate farms and in the second place to family farms. Almost all unregistered family farms own land, but only very few purchased land, indicating that they mainly operate owned land which they got through the land reform process or which they owned already prior to the start of the land reforms.

6. The main cause of the large country differences in the share of rented land is the importance of corporate farms. While corporate farms own little land, they use a lot of land in some countries, most of it rented. In the Czech and Slovak Republic 75 % of the total agricultural land area or more is used by corporate farms (see Figure 3).[4] Also in Hungary,

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3 Expert interviews indicated that regarding rental payment or contract types, members/partners, employees and households which are not related to the CF are generally treated in a similar way.

4 Since the start of transition the importance of family farms in land use increased in all countries. However, both the magnitude and the speed of the change differed strongly. By 2004, in Albania and Azerbaijan, the vast majority of the land is used by family farms. In Albania, this was already the case 5 years after the start of the reforms. At the other end of the spectrum we find Slovakia were after more than ten years of reforms still only 11 % is used by family farms. In Bulgaria, Kazakhstan

Bulgaria, Kazakhstan or Moldova, corporate farms still use around half of all land. In contrast, corporate farms have virtually disappeared in countries such as Albania and Azerbaijan, where more than 95 % of the land is used by family farms.

The strong correlation between the share of corporate farms in land use and the importance of land renting is demonstrated in Figure 4. There is almost a perfect linear relation, as illustrated by the fitted trend line and the high R^2 of more than 90 percent. Therefore, to explain differences in the share of rented land, we need to determine why the share of corporate farms differs so strongly between countries.

7. In summary, *corporate farms rent most of their land. Larger family farms operate on both owned land and rented land.* They have typically enlarged their farm by both purchasing and renting land. *Small family farms and subsistence farms operate mostly on owned land,* and rent in small plots of additional land at most. *They are more likely to rent out land than to rent in land.*

8. Rental contracts differ in length, formality, type of payment, etc. both across countries and across farm types. In general, corporate farms tend to have longer contracts, more formal contracts, and are more likely to pay in kind and to pay lower prices than family farms. Renting to family farms is more likely to be paid in cash, with more informal contracts and for shorter contract lengths (Figure 5).

9. Rental prices for land rented by corporate farms is often much lower than that rented by individual farms due to the combination of imperfect competition and transaction costs. In the Czech Republic and Slovakia land rents paid by corporate farms are generally much lower: Most vary between 50 % and 20 % of the rents paid by family farms (see Table 1). In Hungary land rental prices were significantly lower in regions where corporate farms dominate (VRANKEN and SWINNEN, 2006).

10. Corporate farms are more likely to pay in kind, a less transparent payment system. A study by IME (2000) also found that in Bulgaria, family farms generally paid cash or mixed cash/in-kind, while corporate farms were much more likely to pay their rents in kind. These in kind payments generally depend on yields, which are difficult to control by the land owners, and result in lower effective rent payment, a problem particularly prevalent in countries where land is under land share ownership.

and Moldova, around half of the land is used by family farms. This change in land use occurred faster in Bulgaria compared to Moldova or Kazakhstan, reflecting differences in land reform. Also the share of family farms in output increased. (Their share in livestock herd increased even more due to the labour intensity of animal breeding).

3 LAND TRANSACTION COSTS AND OTHER CONSTRAINTS

3.1 Transaction costs

The efficiency of land markets is measured by their ability to transfer land from less productive to more productive users. Transaction costs that complicate or impede these transfers decrease efficiency. Several studies document that land markets in the transition countries, even the most advanced such as in Central Europe, are still characterized by the existence of significant transaction costs in the rural land markets, constraining access to land for rural households willing to start up or enlarge their farm (DALE and BALDWIN, 2000; LERMAN et al., 2004) and reinforcing the persistence and dominance of large scale corporate farms.

First, transaction costs rise when the by new owners of the land want to withdrawal and reallocate their land from the corporate farms who are the historical users of the land and make impede emergence of individual farms (RIZOV et al., 2001; ROZELLE and SWINNEN, 2004). These transaction costs include: Bargaining costs, costs of enforcement of withdrawal rights, costs related to asymmetric information, to co-ownership and unknown owners, unclear boundary definitions, etc (MATHIJS and SWINNEN, 1998). The difficulty to withdraw land, and hence the magnitude of the transaction costs, is highly dependant on the location of the plot. Withdrawal of a plot that is located in a consolidated field makes the process more difficult and more costly. Furthermore, corporate farm managers typically have more information than landowners about the economic situation of the farm and about regulations governing local land transactions, putting these new land owners even more at a disadvantage.[5] This is especially the case for landowners who have not been involved in agriculture, or who are living outside the village where their land is located, or for pensioners (SWAIN, 1999).[6]

Second, other transaction costs follow from co-ownership of land, unclear boundary definition, and the problem of unknown owners. In many Central and Eastern European Countries (CEECs), land ownership registrations were poorly maintained, if at all, and in many areas land consolidation was implemented, wiping out old boundaries and relocating natural identification points (such as old roads and small rivers). The loss of

[5] For example, SWAIN (1999) describes how pensioner-members of co-operatives in Slovakia were "forced" to rent the land to the co-operative by being threatened of losing their pension.

[6] In Hungary "passive owners" (this include village-based pensioners, landowners that are not active in the co-operatives and those living outside of the village where their land is located) received around 71 % of agricultural land (SWAIN, 1999).

information on registration and boundaries produced a large number of unknown owners in some transition countries (DALE and BALDWIN, 2000).

Finally, other costs related to land transfers include notary fees, taxes and other administrative charges. For instance, the studies on Poland, Bulgaria, Lithuania and Romania, estimate these costs between 10 % and 30 % of the value of the land transaction (OECD, 2000; PROSTERMAN and ROLFES, 2000; WORLD BANK, 2001).

3.2 Co-ownership

Problems with property rights imperfections may remain after full titling and after cadastres and information systems have been introduced. One example is the existence of co-ownership of land in e.g. Bulgaria and Slovakia.

Unsettled land inheritance within families during the socialist regime caused a strong land ownership fragmentation and a large number of co-owners per a plot of land. In addition, unsettled land inheritance within families during the socialist regime caused a strong land ownership fragmentation and a large number of co-owners per a plot of land. For example, according to OECD (1997), in 1993 approximately 9.6 million plots were registered in Slovakia, which is 0.45 hectares per plot, and each plot was owned by on average 12 to 15 people. As Dale and Baldwin put it, "a single field of twenty hectares may have hundreds of co-owners". In the Czech Republic, there were 4 million ownership papers registered in 1998 for 13 million parcels, with an average parcel size of 0.4 hectares. In Bulgaria, a recent study found that 50 % of the plots were co-owned, often by several people (VRANKEN, NOEV and SWINNEN, 2004). The average number of co-owners was more than two (excluding husband and wife co-ownership). Some co-owners may be unknown, or may not be in the country, or may be scattered all over the country. This raises the costs of land withdrawal as land withdrawal from the CF normally requires agreement from co-owners. The study indeed finds that co-owned plots of land in Bulgaria are more likely to be used by corporate farms (Figure 6). This raises the costs of land withdrawal as land withdrawal from the corporate farms normally requires agreement from co-owners.

3.3 Credit constraints

Access to capital is an important constraint for many farms in the land market, not only for buying land but also for renting land. The accession to the EU with increased demand, prices, productivity and subsidies has seriously reduced this constrained in the new EU member states and stimulated land renting and prices. The financial constraints of farms remain important constraints in less developed transition countries, including in South and Eastern Europe.

4 EFFECTS ON EQUITY AND EFFICIENCY[7]

Micro-empirical evidence indicates that the effect of land markets on incomes, poverty, and efficiency is conditional and depends in part on the players involved in the market.

Land renting between households has a positive effect on equity and efficiency. First, households with more human capital access land through a combination of buying and renting land, and rental markets contribute to increased returns to labor on family farms. Second, older and less educated households rent out land to get additional incomes, and those who can rent out their land if they wish, have higher welfare. Third, rental markets reduce inequality of access to land by transferring land from households with high land endowments to those with low land endowments. In contrast, sales markets seem to contribute to inequality of land ownership. Fourth, larger family farms combine renting and buying of land to enlarge their farm operation (as farms do in the US and EU).

However, where corporate farms dominate the land rental market these effects can be very different. While corporate farms may be efficient farming organizations in some regions and for some farming activities, transaction costs and regional monopoly power of corporate farms in the land market are causing negative equity and efficiency effects in several countries (MATHIJS and SWINNEN, 2001; MATHIJS and VRANKEN, 2001; SEDIK; 1999). In several countries, corporate farms are using more land (than efficient), pay lower rental prices than family farms, are more likely to pay rents in kind than family farms (who pay cash), have rental contracts of longer duration (locking in land), and often use their political powers/relationships to influence policies that shift effective land property rights in their favor.

The problems are more serious (a) where land is owned as shares than where households have physical plots; (b) where land is initially allocated in the middle of large consolidated plots, (c) where the costs of withdrawal is expensive, either because there is considerably uncertainty on the (co-) owners of the land or because ownership is highly fragmented through the combination of restitution and an egalitarian historical rural land ownership structure (eg Bulgaria and Slovakia) or because the registration costs are

[7] This section draws on evidence from farm and household surveys in Hungary, Slovakia, Bulgaria, Azerbaijan, Moldova, Albania, Romania, Czech Republic, and Kazakhstan (SWINNEN and VRANKEN, 2006).

high and/or corporate farms consider the land as quasi-property of the farm (eg Ukraine and Russia).

Government policies may not directly favor corporate farms, but the implementation may be biased towards corporate farm interests, because of technical requirements related to land exchanges and withdrawal procedures, because complex and expensive land registration procedures, and because of established relations between farm (managers) and officials. In extreme cases, such as Kazakhstan, government policies have reallocated land rights from (small) owners to (large) farms.

5 PATTERNS OF RENTAL MARKET DEVELOPMENT

In SWINNEN and VRANKEN (2006), we identify several "patterns" of land rental development across transition countries. These "patterns" are extreme versions of land rental market development. Several countries may not fit a single pattern but have hybrid characteristics.

Pattern A is that of labor intensive agricultural economies where land was distributed in kind to rural households and where small scale family farms dominate. Examples of this pattern are Albania, (post 1996) Azerbaijan, Kyrgyz Republic and large parts of Romania and southern Kazakhstan. In these countries and regions, there is **relatively little land renting, all of it household to household and mostly informal**. Key constraints in the rental market are due to constraints in other markets such as the credit and input markets, product market (output marketing), and labor market constraints – which is partly resolved through migration.

Pattern B is that of capital intensive agricultural economies where land was restituted to former owners and where large scale corporate farms dominate. Examples of this pattern are Slovakia, the Czech Republic, and large parts of Hungary. In these systems, there is **very extensive renting of land going on, mostly from households to large scale corporate farms, often based on formal contracts**. Land rental markets are well developed and prices increasing, especially in those countries which have acceded to the EU. Constraints in these markets are transaction costs in the rental market due to fragmented, unidentified, or joint land ownership.

Pattern C is that of land intensive agricultural economies where land was distributed as shares and where large scale corporate farms dominate. Examples of this pattern are pre-2003 North Kazakhstan, parts of Russia, and pre-2000 Ukraine. **Corporate farms either rent large amounts of land from households, often under the form of shares, or rent very little as they have been able to acquire ownership of vast areas of land**. Where corporate farm renting is dominant, constraints are poor identification and weak enforcement of ownership rights and major problems in accessing output and input markets for smaller farms. In several regions, corporate farms, or large agro-holdings, acquired vast amounts of land either through bankruptcy proceedings (e.g. vertically integrated grain companies in Northern Kazakhstan and agro-holdings in Russia), or through government policy which transferred property rights from households to farms using the land (in current Kazakhstan). In these systems a large share of the land is owned by large corporate farms, and very little renting is taking place.

6 LAND MARKET IMPERFECTIONS AND POLICY EFFECTS

The combination of imperfect competition due to the domination of large corporate farms and transaction costs has a strong effect on land prices and on the impact of agricultural policies. In this section we draw on CIAIAN and SWINNEN (2006) to show this and summarizes some of the key insights.

To model transaction costs, one needs to distinguish between transaction costs which are specific to the plot, to the owner, and to the user. Transaction costs will depend on the distribution of land among households and farms, on individual characteristics of landowners, and on the fragmentation of the land. Here we assume that transaction costs per unit of land are constant – this considerably simplifies the analysis but does not substantially affect the key results discussed here.

The land decision-making problem of a profit-maximizing individual farm (IF) is:

(1) Max $\Pi^I = pf^I(A^I) - (r+t)A^I$

where p is output price, A^I is amount of land rented by the IF, $f^I(.)$ is production function for which $\frac{\partial f^I(A^I)}{\partial A^I} > 0$ and $\frac{\partial^2 f^I(A^I)}{\partial A^{I\,2}} < 0$. The FOC for optimal land use is:

(2) $p\frac{\partial f^I(A^I)}{\partial A^I} = (r+t)$.

The optimal level of land rented is where the marginal value product of land, represented by the left hand side of (2), equals the IF's marginal cost of land, r + t. The marginal cost is the rental rate an IF has to pay to a landowner, and which equals the corporate farm rental rate (r) plus the transaction costs per unit of land (t). Condition (2) defines the demand for land of the individual farm. Aggregating this over all (potential) IFs yields the total demand for land by individual farms, D^I. Total IF demand for land is represented in Figure 7 by D^I for zero transaction costs (t = 0) and $D_{t1}{}^I$ and $D_{t2}{}^I$ for transaction costs, t_1 and t_2, respectively, with $t_2 > t_1 > 0$. The horizontal axis in Figure 8 represents amount of land, with $A^I = A^T - A^C$. The vertical axis measures the rental price.

Corporate farms may have important market power. To model this, assume that there is one (representative) CF which recognizes that its land rental decisions will influence the land rental price. The CF is not a monopolist since there is a group of (potential) individual farms who are price takers in the rental market. The IFs will rent land up to the point where their demand equals their rental price (ie. r+t). The CF will take the rental actions of IFs into account: It will adjust its land renting to maximize profit subject to the behavior of the IFs.

In this situation, the objective function of the corporate farm is the following:

(3) Max $\Pi^C = pf^C(A^C) - r(A^C)A^C$

where Π^C are CF profits, A^C is land rented by the CF, $r(A^C)$ is the rental rate as a function of A^C, with $\frac{\partial r}{\partial A^C} > 0$. $f^C(.)$ is the CF's production function for which $\frac{\partial f^C}{\partial A^C} > 0$ and $\frac{\partial^2 f^C}{\partial A^{C2}} < 0$.

The first order condition is as follows:

(4) $p\frac{\partial f^C}{\partial A^C} = r + A^M \frac{\partial r}{\partial A^C}$

where A^M is the optimal land allocation of the CF. The left hand side of condition (6) represents the marginal benefits, i.e. the marginal value product of land, and the right hand side is the marginal cost of land for the CF. The marginal cost of land includes both the rental rate and changes in the rental rate when the CF rents in more or less land. The CF chooses its land rent where the marginal cost equals the marginal benefits. Graphically, this can be represented as in Figure 9. For simplicity, we assume for a moment that there are no transaction costs (t = 0). MC^C represents the marginal cost function of land renting for the CF.[8] The equilibrium land use by the corporate farm is where MC^C equals D^C, ie at A^M. The resulting CF rental price is r^M.

Compared to the competitive market equilibrium (A^*, r^*), the domination of the market by the CF leads to a reduction of land use by the CF ($A^M < A^*$), and a corresponding increase of land use by the individual farms. The

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8 The shape of the marginal cost function is determined by the elasticity of IF land demand. The more inelastic IF land demand, the steeper the MCC.

land rental price is lower for all farms ($r^M < r^*$). The surplus gains of the CF are area A – C (>0). The IFs also gain, by area EGL. The losses are for the landowners who lose rental income equal to area ADEGL. The effect on rural households depends to what extent they are employed by the CF, or are IFs, or landowner. For rural households who are both landowner and individual farmer, the losses in rental income may outweigh the gains in farm profits from lower rental prices. Finally, the total welfare effects are negative. Social costs due to the market power of the CF equals area CD.

Figure 8 also shows the situation of imperfect competition with transaction costs t. In this case, the equilibrium is at (A_t^M, r_t^M). The CF rental price falls further to $r_t^M < r^M < r^*$: Both the transaction costs and the market power of CF push the CF rental price down.

The combination of imperfect competition and transaction costs results in extra benefits for the CF. Relative to the competitive equilibrium without transaction costs (A^*, r^*), the surplus gains of the CF equals area ABDE. Landowners lose twice as both factors put a downward pressure on rental prices. Their combined loss equals area ABDEGHLN. For individual farms the two market imperfections have opposite effects. IFs gain from lower rental prices and more land with imperfect competition, but lose from higher rental prices and less land with transaction costs. The net effect depends on the relative size of the transaction costs. With low transaction costs, the benefits from CF market power will dominate. With high transaction costs (as is the case in Figure 8), the losses due to transaction cost will dominate. The net loss for IFs is equal to area FK.[9] The total welfare effects are negative. Compared to the competitive market equilibrium (A^*, r^*), (A_t^M, r_t^M) implies losses equivalent to – KLN –FGH, where KLN represents the total transaction costs incurred and FGH the market distortions.

6.1 Impact of CAP payments

Since the 1992 MacSharry reform and the Agenda 2000 reforms, the vast majority of CAP subsidies are direct payments (DPs). They make up around two-thirds of the CAP budget and include both per hectare payments for crops and payments per animal for livestock activities.

Define s as the subsidy (area payment) per unit of land, and assume that all land in the analysis qualifies for the subsidies. The objective function of the IF then changes to

(5) $$\Pi^I = pf^I(A^I) - (r + t - s)A^I .$$

[9] If transaction costs are such that MCtC goes through point (A^*, r^*) both effects exactly offset each other and the combined impact on IF welfare is zero.

The subsidy s shifts the value marginal product of land curve by s:

$$(6) \qquad p\frac{\partial f^{I}(A^{I})}{\partial A^{I}} = r + t - s\,.$$

The objective function for the CF changes analogously.

Result 1: *Area payments benefit only landowners, with and without transaction costs and perfect competition in the land market.* [10]

Figure 9 illustrates the result. The IF land demand function with subsidies is D_s^I. The subsidy shifts the marginal cost function from MC_t^C to MC_{ts}^C and causes the equilibrium to shift from (A_t^M, r_t^M) to (A_{ts}^M, r_{ts}^M). The land allocation does not change: $A_t^M = A_{ts}^M$. Rental prices increase from r_t^M to r_{ts}^M for corporate farms and from r_t^M+t to r_{ts}^M+t for individual farms. The increase equals the subsidy ($s = r_{ts}^M - r_t^M$). Subsidies get fully captured by land price increases. The surplus of neither CF nor IF is affected. All the gains go to landowners, equal to the sum of areas F + G, which equals the subsidy per unit of land times the amount of land used ($sA^T = (r_{ts}^M - r_t^M)A^T$).

An important assumption behind these results is that both corporate farms and individual farms get the same subsidies per hectare. In reality access to CAP subsidies may be complicated for small individual farmers because of administrative constraints and problems in satisfying additional requirements. If so, some of the individual farms may not get access to the payments.

Result 2: *With unequal subsidies, area payments benefit landowners and CF, while IF lose on average.*

In this case, a large part of the subsidies still end up with landowners through an increase in land rental prices. However, on average, individual farmers lose because the land rental price increases more than the subsidies they get. Corporate farms gain because the increase in rental prices is lower than the subsidies they receive. As subsidies now induce distortions in the allocation of land, there are deadweight costs. Obviously, the relative sizes of these effects depend on the elasticity of the demand curves and on the difference in the subsidies.

6.2 Impact of decoupled CAP subsidies

In 2003 the EU decided to decouple CAP subsidies starting from 2005. This means, in terms of our model, that subsidies will be given as a fixed set of payments per farm, so-called single farm payments (SFP). The SFP for a specific farm equals the support the farm received in the previous "reference" period. The SFP is an entitlement, but future SFP payments

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[10] For proofs: See CIAIAN and SWINNEN, 2006.

depend on the farm operating an amount of "eligible hectares" equivalent to the size of the entitlement.

The policy reform has important impacts on the distribution of policy rents. The first implication is that policy rents shift from landowners to farms with the new CAP support system.

Result 3: *Decoupled SFP benefit only farms, with and without land market imperfections*.

With SFP, the CF and IFs do not receive payments for land that they rent above the eligible area. Compared to the area payments, the land allocation is the same, but the rental price is lower. Farmers gain all the subsidies.

However, this result is conditional upon how potential new entrants in farming are treated. With support now linked to current farms, new farmers (who are potentially more dynamic and productive and therefore a source of growth) are excluded from the support system. These problems are particularly problematic in the NEMS where major farm restructuring continues to take place, and is required for productivity growth. To address these concerns, it was decided to create a "reserve" for subsidy entitlements to new entrants. It turns out that these reserve entitlements can have an important impact on the total distribution of policy rents.

Result 4: *Benefits of SFP will shift to landowners when new entrants are eligible for SFP entitlements.*

If new entrants are eligible for SFP, their marginal benefit of cultivating land equals the marginal value product of land plus per hectare payments. So, new entrants can bid up the price. Reserve entitlements for entrants makes the effects of the new CAP system very similar to the effects of the old CAP system. Depending on the time-schedule for the reserve for new entitlements, this could cause intertemporal effects.

When the entitlements stop, the effects shift dramatically. In reality, farmers and owners will have some expectation on when the reserve runs out and this will affect the dynamics of the rental price.

6.3 EU accession, CAP reform, transaction costs, and productivity

Accession to the EU will not only affect the benefits which the NEMS farms will receive, but also the market imperfections themselves. In particular, one should expect transaction costs in the factor markets, including the land market, to reduce. Such reduction in transaction costs will come from a combination of factors, such as legal and institutional requirements for EU accession which improve the legal and institutional framework in which land transactions occur. Enhanced productivity of the farms and subsidies will also stimulate land transactions and thereby improve experience, transparency, and understanding of the market.

Such reductions in transaction costs will stimulate farm restructuring, transferring land use from less efficient to more efficient farms. In terms of our model, this implies a shift of land use from the corporate farm to individual farms.[11] To see this consider Figure 7.[12] The equilibrium in the land market with transaction costs equal to t_2 is (A_{t2}^*, r_{t2}^*). With transaction costs reducing to t_1, the equilibrium shifts to (A_{t1}^*, r_{t1}^*), or when transaction costs fall to zero, the equilibrium becomes (A^*, r^*). It is clear that this implies that land is moved from less productive use by the corporate farm to more productive use by individual farms – the difference in marginal productivity at (A_{t2}^*, r_{t2}^*) equals t_2 – up to the point where the marginal productivity in both types of farms is equal. Furthermore, with increased marginal productivity of land at the equilibrium, land rents have increased with falling transaction costs. These results hold without subsidies. How do CAP subsidies affect this efficiency enhancing effect of EU accession?

Result 5:

a. Area payments have no effect on productivity enhancing restructuring in NEMS.

b. Reform to SFP constrains restructuring.

c. Making SFP available to new farms will stimulate restructuring, but cause a transfer of policy rents from farms to landowners.

While some restructuring may take place, this is less with SFP than with area payments. In other words, CAP reform reduces farm restructuring

[11] Notice that we do not assume that all individual farms are more efficient than all corporate farms. We assume that some individual farms can use (some) land more efficiently than some of the corporate farms, as is reflected in the two demand functions. Without imperfections, the rental market will transfer land up to the point where land productivity is equal in corporate farms and individual farms, at the margin. As can be seen from the graphs, we assume an "interior solution", meaning that in this equilibrium, corporate farms will still use some of the land. These assumptions are consistent with the empirical literature. Studies measuring relative farm efficiencies in CEECs typically find (a) that the relative efficiency depends on various factors, including the types of activities (e.g. grain, livestock, vegetables, …), institutions, infrastructure and economic conditions, (b) that at least part of the new individual farms are more efficient than the corporate farms they replaced, and (c) that the variations in farm efficiency within the "corporate farm" group and within the "individual farm" group is often larger than between the groups (see e.g. MATHIJS and SWINNEN, 2001).

[12] Since the argument is about the reduction in transaction costs, we only discuss the perfect competition model – the imperfect competition analysis is in CIAIAN and SWINNEN (2006).

and restricts productivity gains associated with it. The old CAP system would yield the largest change in land allocation from IF to CF. The SFP may even lead to a total freeze of farm structures if subsidies are large compared to the reduction of transaction costs.

Finally, attempts to address this problem by making new individual farms eligible for SFPs will stimulate farm restructuring but simultaneously induce a shift of policy rents from farms to landowners. The logic is analogous to that of proposition 4. The introduction of additional subsidies for new entrants effectively transforms the SFP situation into an area payments effect at the margin, stimulating more restructuring, but pushing up rental prices as well, shifting CAP benefits to landowners.

In summary, while CAP reform will shift CAP benefits from landowners to farms there is an important trade-off. Restructuring, needed to increase the competitiveness of the NEMS farm system, will be constrained. Granting the SFP to new entrants mitigates this problem, but will simultaneously induce a transfer of policy rents to landowners.

6.4 Concluding comment

We should caution about simplistic interpretations of our results. The effects on rural households depend on whether the households are landowners or farmers, or both, and on the importance of corporate farms. These structural conditions differ strongly between NEMS (Table 2). For example, farming in countries like Slovakia and the Czech Republic is concentrated on large-scale corporate farms, who rent most of their land. Land ownership is fragmented and many landowners are living in urban areas. In contrast, in countries such as Poland and Slovenia, farming is dominated by small family farms (IFs), owning most of their land. Most other countries, such as Hungary and Bulgaria, have a mixed structure. In Hungary, IFs use 59 % of farm land and CF use 41 %. CF rent most of the land they use, while IFs use both owned and rented land. The share of rented land typically increases with the size of the IF (VRANKEN and SWINNEN, 2006).

Obviously, the implications of our analysis are different for these countries, with such different structures. Leakages of policy rents to land owners through increased rental rates is a major issue in countries like Slovakia and Hungary, while less of a problem in Poland since most farms are IFs who themselves own the land. However, also in Poland this analysis is relevant since (a) the most dynamic farmers are typically younger and land ownership is typically concentrated in older rural households, and (b) there are important regional variations: In the north and western regions of Poland, many larger farms operate on rented land (CSAKI and LERMAN, 1997).

Interestingly, there was a persistent view in the 1990s in NEMS that "land markets are not working" and "prices are very low". All this changed dramatically since 2002. The anticipation and the implemen-tation of CAP payments strongly pushed up land prices and rental rates in many NEMS.

Finally, an important issue which needs further analysis is the interaction of the land market imperfections and the subsidy systems with other market imperfections. In particular labor and credit market imperfections have an important impact on land allocation and farm structures in NEMS (RIZOV and SWINNEN, 2004; WORLD BANK, 2001). There are interactions between these imperfections and the subsidy effects. For example, subsidies that increase land values may reduce credit constraints by improving collateral options. Also, labor market constraint will affect the farm restructuring impact of the various subsidies. These interactions between various factor market imperfections and the subsidy effects are complex and beyond the scope of analysis in this article. This is the topic of our future research.

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Table 1: Land rents in the Czech Republic and Slovakia by farm type (in local currencies)

	Individual farms A	Corporate farms B	Ratio (A/B)
Czech Republic			
1999	718	346	2.1
Slovakia			
2001	795	242	3.3
2002	816	333	2.4

Source: Czech Ministry of Agriculture; Research Institute of Agricultural Economics, Farm Accountancy Data Network, Bratislava, Various years.

Table 2: Farm structures in CEECs

Country	Family farms		Corporate farms	
	Share in total agricultural area (%)	Average size (ha)	Share in total agricultural area (%)	Average size (ha)
Bulgaria	52	1	48	536
Czech Republic	28	20	72	937
Estonia	63	2	37	327
Hungary	59	4	41	312
Latvia	90	12	10	297
Lithuania	89	4	11	483
Poland	87	8	13	n.a.
Romania	55	2	45	274
Slovakia	12	42	88	1185

Sources: European Commission and national statistics.

Figure 1: Share of rented land in total land used (%)

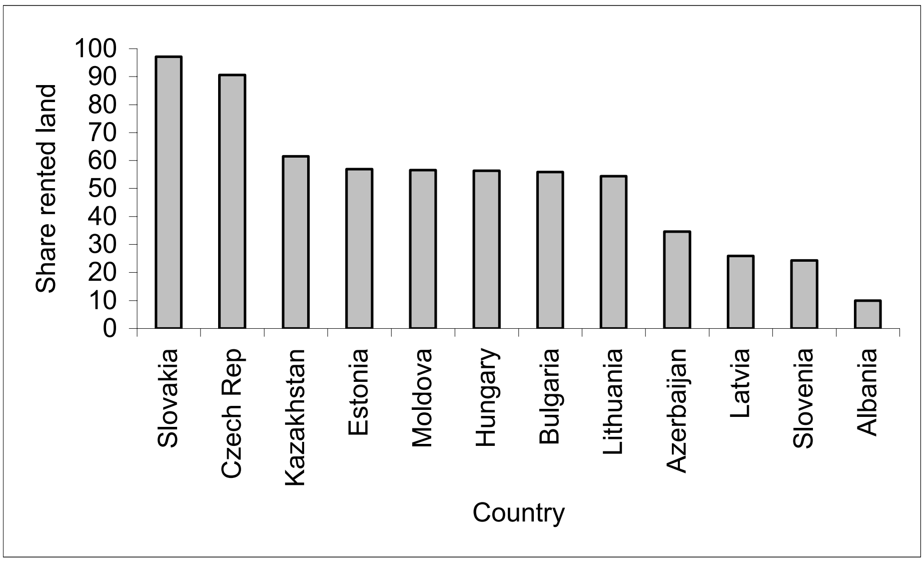
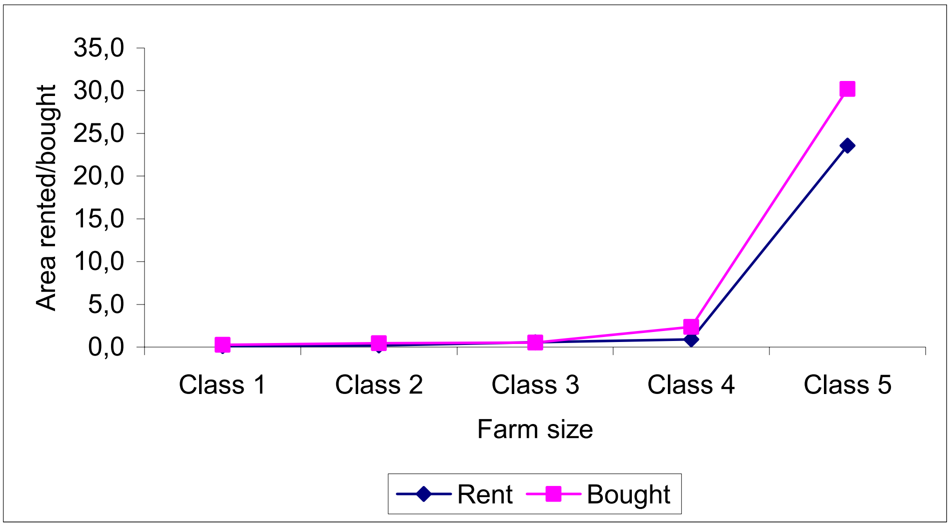


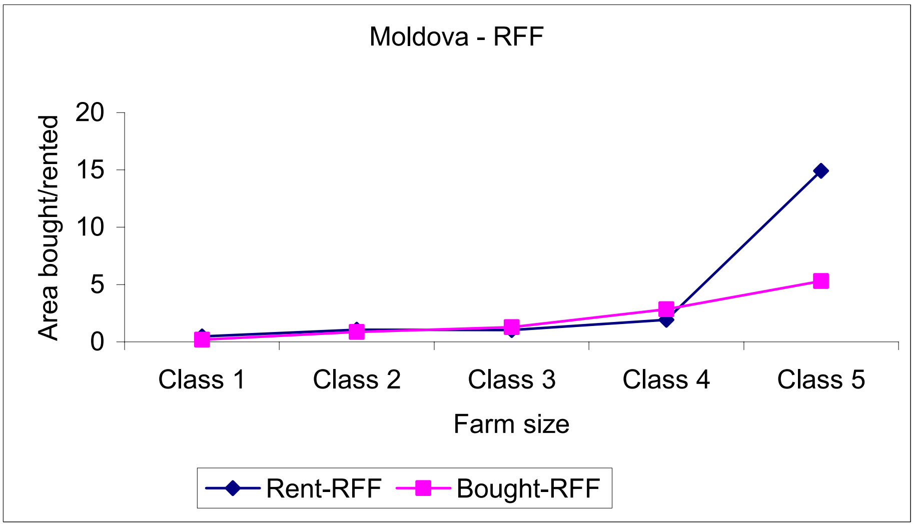
Figure 2: Land renting and purchasing by farm size

A. Hungarian family farms



Class 1: 0-0.1ha; Class 2: 0.1-0.3; Class 3: 0.3-1; Class 4: 1-3; Class 5: 3<

B. Moldovan registered family farms



Class 1: 0-1.8; Class 2: 1.8-2.9; Class 3: 2.9-3.7; Class 4: 3.7-6.6; Class 5: 6.6<

Figure 3: Share of corporate farms in land use (%)

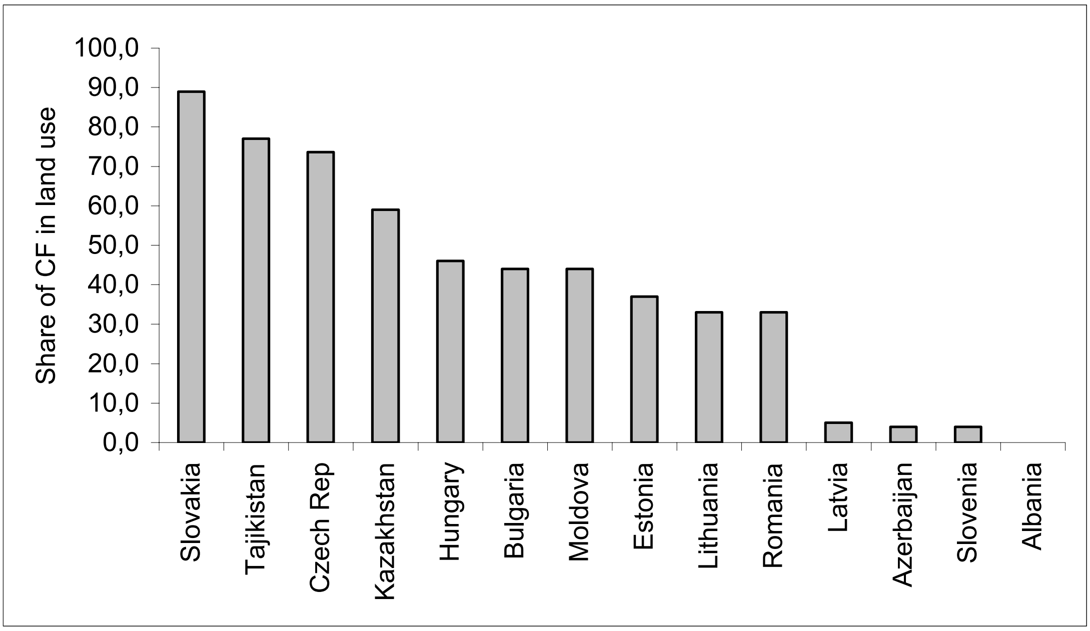


Figure 4: Correlation between land renting and the importance of corporate farms

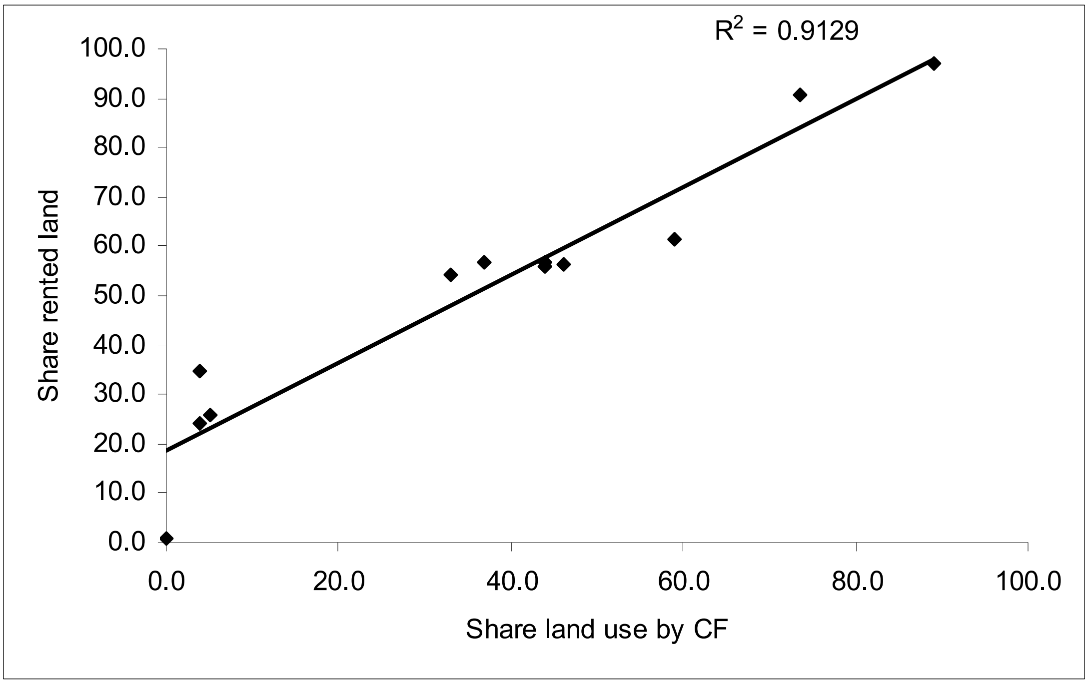


Figure 5: Percentage of transactions with (total or partial) cash payments for unregistered family farms in Azerbaijan, Bulgaria, Kazakhstan, Moldova

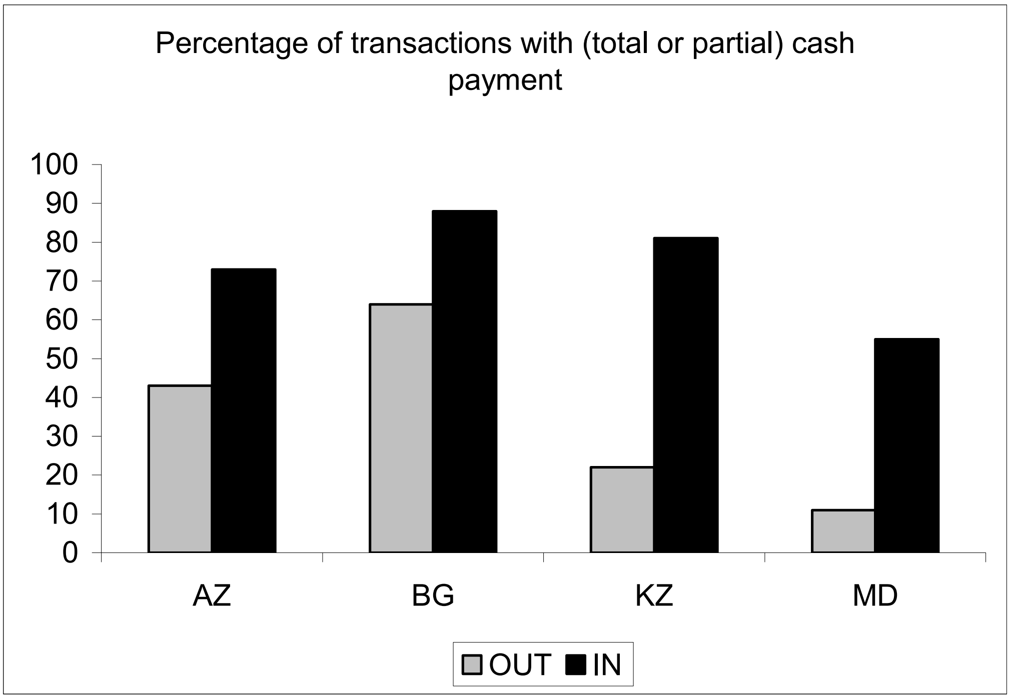


Figure 6: Effect of co-ownership on allocation of land in Bulgaria

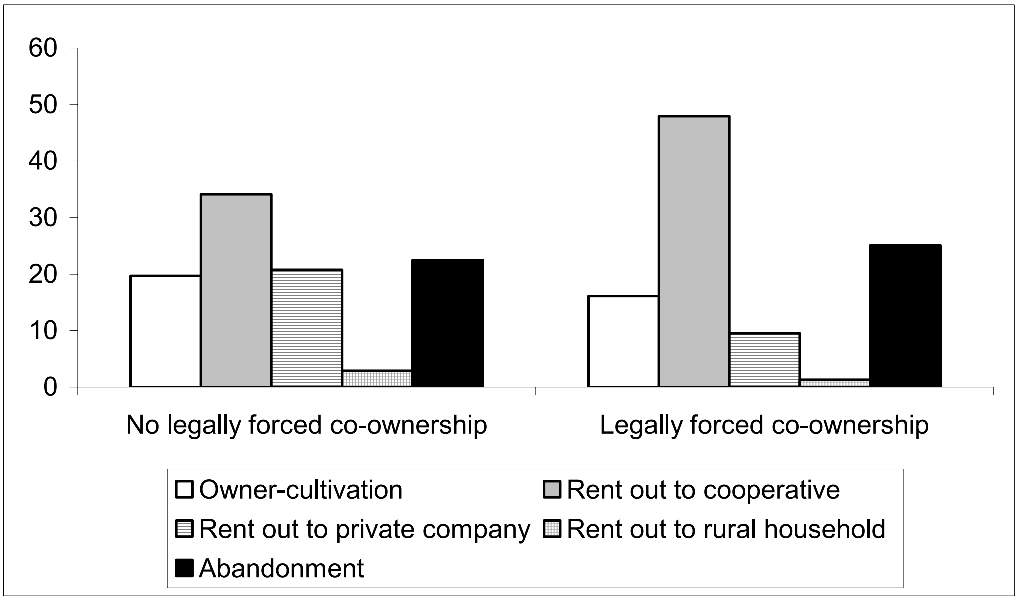


Figure 7: Equilibria in the land market with transaction costs

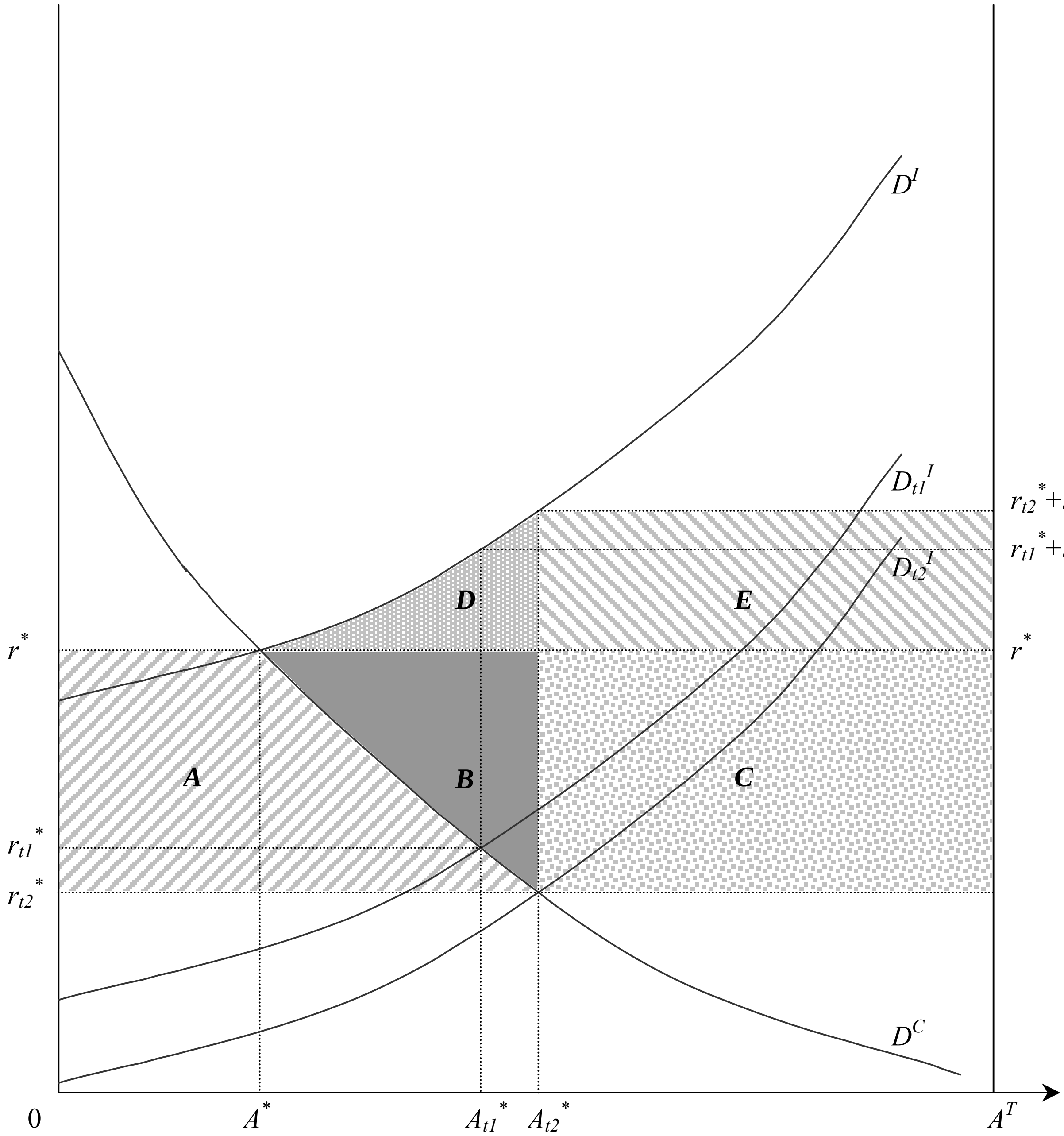


Figure 8: Effect of imperfect competition and transaction costs in the land market

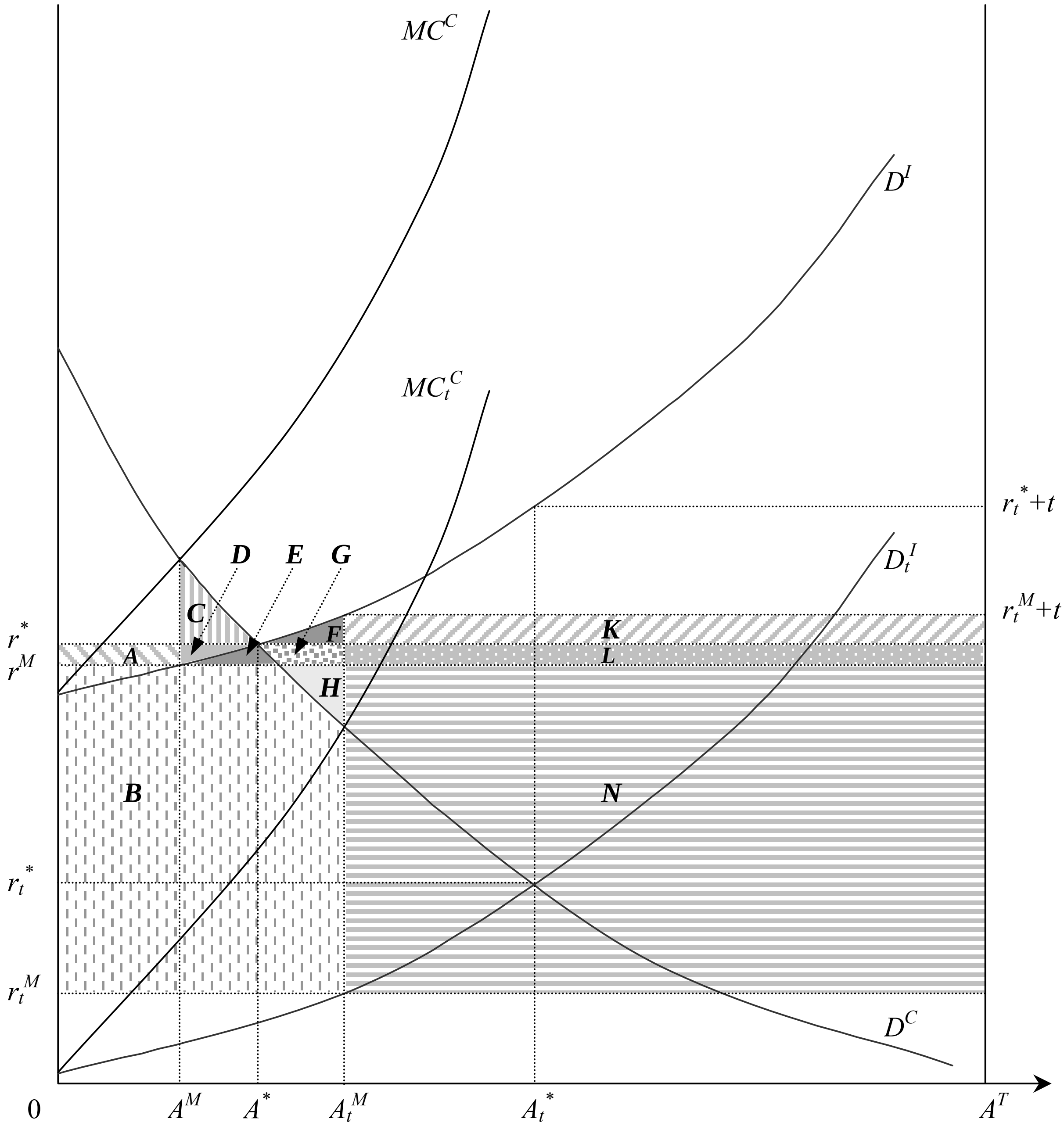
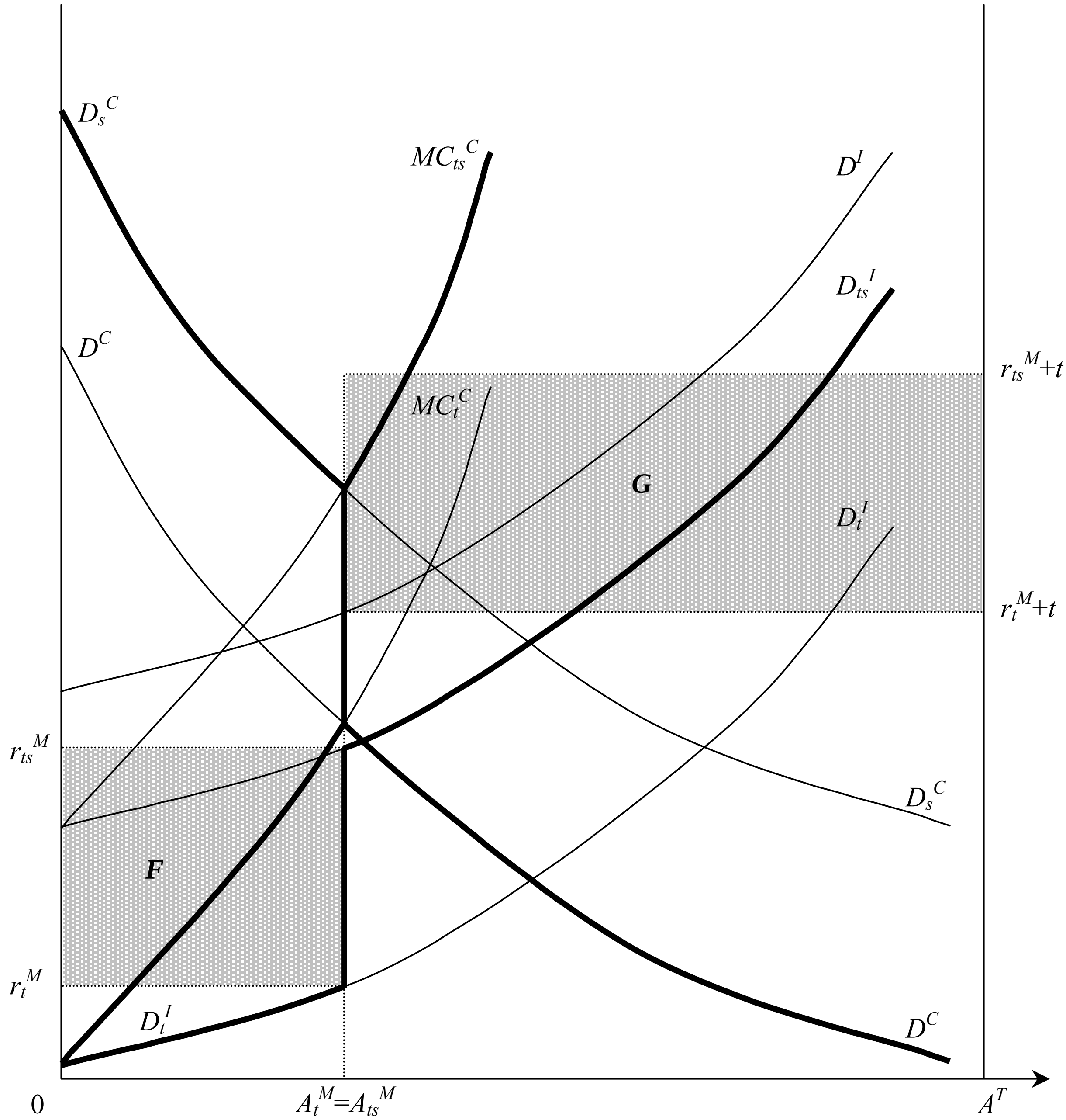


Figure 9: Effect of subsidies with imperfect competition and transaction costs in the land market



Agriculture in the Face of Changing Markets, Institutions and Policies: Challenges and Strategies
JARMILA CURTISS, ALFONS BALMANN, KIRSTI DAUTZENBERG, KATHRIN HAPPE (eds., 2006)
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FARMLAND MARKETS, BOOM/BUST CYCLES, AND FARM SIZE

CHARLES B. MOSS, ANDREW SCHMITZ[*]

ABSTRACT

This paper reexamines the role of farmland and the equity embodied in farmland within the agricultural policy debate. We also examine land markets in the context of U.S. and Canadian agricultural policy, and the impact of the farmland market on possible changes in farm size. The debate over the role of farmland as a fixed factor of production is steeped in the lore of economics. An early proponent of land reform, John Stuart Mills, supported the imposition of a confiscatory tax on increases in land values (STIGLER, 1969). This position was echoed by Henry George who saw rental payments as a natural tax on production.

1 EMPIRICAL SITUATION

Total agricultural assets, agricultural equity, and farm real estate values typically increased between 1960 and 2004 (Figure 1). The only exception involves the period of financial stress the sector experienced in the mid 1980s. While the movement of each series appears highly correlated, the correlation is not perfect. In fact, the series fail to cointegrate over time. This lack of perfect correlation is due to two factors. First, the aggregate debt-to-asset ratio varies significantly over time, starting at around 12 percent in 1960 and reaching a high of around 22 percent at the height of the financial crisis of the mid 1980s, before declining to 14 percent. Analyzing the data somewhat differently, Figure 2 presents the share of real estate in the overall portfolio of agricultural assets. In 1960, agricultural real estate accounted for 70 percent of all agricultural assets. This percentage increased to 80 percent in 2004 following the decline in farmland values during the financial crisis of the mid 1980s.

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Turning to the farmland values per acre, Figure 3 depicts the rapid increase in farmland values over the past century, focusing on farmland values in California, Florida, and the Corn Belt states of Illinois, Indiana, and Ohio. Farmland values were relatively stable, starting with farmland prices per acre of \$8/acre in Illinois, \$11/acre in Indiana, and \$20/acre in Ohio in 1850. These values had risen to \$54/acre in Illinois, \$39/acre in Indiana, and \$69/acre in Ohio by 1900. At the same time, farmland values in California largely caught up with values in the Corn Belt. Farmland values in California started out at \$1/acre in 1850, but had increased to \$25/acre in 1900. Farmland values in Florida were still much lower than the other states in this group, rising only to \$9/acre by 1900. Higher farmland values in the Corn Belt than in California and Florida persisted until 1922 when farmland prices in California surpassed those in Indiana and Ohio. Farmland values in California persistently exceeded those in Illinois beginning in 1983. In 2005, Californian farmland values were 43 percent higher than those in Illinois. Similarly, Florida's farmland values exceeded those of Illinois in 1985 and were 27 percent higher than those in Illinois in 2005.

Accompanying the rapid rise in farmland values during the closing years of the twentieth century was a dramatic change in the structure of U.S. agriculture. Specifically, the share of agricultural output being produced by smaller farmers decreased significantly from 1969 to 1982 (Figure 4). In 1969, sixty-seven percent of farmland in the Corn Belt marketed less than \$40,000 of agricultural output a year. This declined to thirty-eight percent in 1982. Production in these sales classes was largely offset by gains in farms producing from \$100,000 to \$500,000 of sales per year. Thus, the data support the farm size increase from 1969 to 1982.

2 DESCRIBING FARMLAND MARKETS

The market for farmland in the United States can be broken down into three general periods: A period of expansion with the distribution of free or low cost land, a period of agricultural intensification, and a period of increasing alternative uses for farmland. The first two periods are discussed in Cochrane's book *The Development of American Agriculture: A Historical Analysis* (COCHRANE, 1993).

One resource the United States possessed early in its history was abundant farmland:

> Abundant land – cheap or free, distributed with or without corruption – served as an important stimulus to the overall development of this nation [the United States]. Land was the magnet that drew the first settlers to English colonies, once the bubble of instant riches had been pricked. It was the magnet that continued to draw them to these shores for almost three centuries…. To the landless and land-hungry people of Western Europe the pull of cheap or free land in North America was overwhelming. They came in droves and they suffered untold misery to make that land their own. (COCHRANE, 1993, p. 173).

During the period of settlement, the United States disposed of over one billion acres of public domain land to support settlement, reward military service, build roads and other transportation infrastructure, and even to support education (e.g., the establishment of the Land Grant University system). In this period, land was distributed cheap, but not free. Cochrane states that the amount of farmland given away free under the Homestead law and other provisions was about 147 million acres. Most of the land was purchased at between one and ten dollars an acre. In 1847, California entered the United States following the close of the Mexican-American War; it was admitted to the Union in 1850. Thus, the $1/acre price corresponds to the distribution of farmland under the Land Ordinance of 1785.

The period of agricultural expansion ended in the 1890s with the land-runs in Oklahoma. The end of free or cheap land marked the end of the extensive phase of agricultural development and the beginning of the intensification phase. The intensification phase of the farmland market was marked by increasing mechanization and demand for capital. The demand for capital led to the establishment of new institutions such as the Federal Land Banks, which was established under the Farm Loan Act of 1916, and the Production Credit Association, which was established as an independent agency under the Farm Credit Act of 1953. The emergence of agricultural credit markets, the intensification phase of agricultural expansion following the end of cheap land, and the simultaneous increase in farmland values point to a complex ultimately production-oriented farmland market that would exist through the twentieth century. In this market, farmland values would be largely determined by the Ricardian rents accruing to production. Increases in the productivity in the sector would imply increased future Ricardian rents and, hence, increased farmland values. Increased wealth from increased farmland values could be used to collateralize increased debt to purchase new technologies.

Cracks in the circular flow of Ricardian rents, technology, and the capital market began to appear in the late 1960s (MOSS and KATCHOVA, 2006). CHRYST (1965) observed that farm incomes appeared to be relatively stable while farmland values continued to increase. Several alternative hypotheses were suggested to explain this empirical anomaly. HAYAMI and RUTTAN (1970) hypothesized that technological changes introduced a factor bias that favored larger farms. Along these lines, HARRIS and NEHRING (1976) found that large production farmers were able to pay relatively more for farmland than were small production farmers (a conclusion that is consistent with the farm size results presented in Figure 4). MELICHAR (1979) provided a competing hypothesis to explain the divergence whereby anticipated future increases in returns to agricultural assets put downward pressure on current returns. Also there is the inflationary hypothesis suggested by FELDSTIEN (1980).

The divergence between the price of farmland and the cash flow from the cultivation of farmland continued through the end of the twentieth century and the beginning of the twenty-first century. However, regional differences in the growth of farmland values bring into play the increasing importance of non-agricultural factors such as differences in urban pressure (LIVANIS et al., 2006). The effect of urban pressure is demonstrated in part by the changes in relative land values (Figure 3). Although specialty agricultures in California and Florida imply different levels of profitability than those in the Corn Belt, the emerging farmland values in California and Florida during the closing years of the twentieth century and the initial years of the twenty-first century support the conjecture that urban pressure now significantly affects farmland values. California and Florida now have the largest and fourth largest number of residents in the United States. Looking at population growth, Florida was the ninth largest U.S. state in 1970, and is expected to replace New York as the third largest U.S. state in 2010. Over the same time period, agricultural returns in each state have been largely static.

The emergence of a significant component of farmland values not directly related to the value of agricultural production through the Ricardian framework raises several significant policy issues. MOSS, MISHRA and ERICKSON (2006a) demonstrate the decomposition of agricultural returns to the factors of production using the standard Euler theorem results. They demonstrate the standard contention that paying each factor of production its value of marginal product exactly exhausts the value of the product produced. Building on this model, any additional cost introduced by increased farmland values above the Ricardian rents to production implies at least a short-run disequilibrium.

While divergence is a relatively recent phenomenon in the United States, the topic was at the center of the land tenure debate in England during the eighteenth century. Elements of the debate crossed the Atlantic to the Americas in the work of HENRY GEORGE (1912) who saw rents to farmland as a leakage or unnecessary cost that distorted the efficient allocation of resources. GEORGE (1912) started his discussion of rents by differentiating between the common usage of rents and the economic definition of rents. He notes that rents, as commonly defined, typically include payments to both natural resources (such as farmland) and manufactured capital (such as buildings and machinery) while economic rent focuses primarily on payments only to natural resources. In addition, the economic definition of rents applies both to transactions between individuals and implicit transactions (such as opportunity costs). However, George's most striking criticisms involve the role of scarcity in determining both the common usage of rents and the economic definition of rents. George conjectures that the market definition of rents implies scarcity while the traditional Ricardian definition of rent does not. For example, if an abundance of productive land is available for use in agriculture, landowners may be unable to charge for the use of their farmland, and farmland will have no value. Once land becomes scarce, the landowner can charge for its use, and it will have a positive value. George then conjectures that the ability to charge a positive price is a result of monopolistic behavior. Based on these assumptions, he then turns to "Ricardo's law of rent" – "the rent of land is determined by the excess of its produce over that which the same application can secure from the least productive land in use" (George Book III, Chapter II, p. 7). Algebraically, George defines rent implicitly with the equation

$$Produce = Rent + Wages + Interest \tag{1}$$

Given this equality, he then resolves the equation to yield

$$Produce - Rent = Wages + Interest \tag{2}$$

Thereby George concludes, "Thus wages and interest do not depend upon the produce of labor and capital, but upon what is left after rent is taken out; or upon the produce which they could obtain without paying rent – that is, from the poorest land in use" (George Book III, Chapter II, p. 13). Under this formulation, the value of the output and rents paid determine the amount that can be paid to laborers and providers of other capital inputs. Put slightly differently, in George's paradigm the rental rate determined in a monopolistic market determines the wages and interest that can be paid.

George's work drew a significant response from ALFRED MARSHALL (1969) who in a series of public lectures took many of George's conjectures to task. Marshall's response to George is a victory for marginal analysis. Marshall contends that the reason labor returns in less sparsely settled areas of the in the Western United States (at the time of the debate) were higher than in areas that had been previously settled, such as the Midwestern area, had less to do with rents to farmland and farmland values and more to do with the marginal product of labor. Given that the marginal product of any input declines as the level of the input expands, the value of marginal product for labor in previously settled areas will be lower than the value of the marginal product in areas that are more sparsely populated. Thus, the availability of labor and its implied marginal productivity, along with the productivity and scarcity of farmland, jointly determine the Ricardian rents to farmland and, hence, the value of farmland.

Thus we are forced to reject George's major contention that monopolistic power of landlords allows the extraction of economic rents from producers through land rents. However, certain facets of George's leakage framework need closer examination in the current context of urban pressure on the land market. Specifically, the model estimated by LIVANIS et al. (2006) allows urban pressure to affect farmland through two mechanisms. The first mechanism is the increased possibility of conversion of farmland into urban uses. With the population growth in Florida at the start of the twenty-first century, producers refer to the effect as the "effect of planting condominiums". However, a second mechanism involves changes in agricultural production that may result from proximity to urban areas.

Specifically, reduced transportation costs to urban areas may increase the relative demand for ornamental plants and fresh (self-picked, organic, or specialty) fruits and vegetables. Thus urban growth may have a productivity footprint (or region of farmland affected by the opportunity to export to an urban market) as farmers switch from traditional commodity-oriented production to higher-valued produce. LIVANIS et al. find evidence of a productivity footprint largely in the Northeastern United States. They attribute the lack of such in California and Florida to the fact that both of these regions would specialize in higher-valued fruits and vegetables even in the absence of urban growth. However, the production of fruits and vegetables in areas like New Jersey may be largely attributed to proximity to urban centers instead of agronomic considerations.

In addition to the effect of urban pressure on access to markets, LIVANIS and MOSS (2006) contend that urban pressure leads to a portfolio effect where farmers are forced out of lower-valued, commodity-oriented agriculture. Specifically, as urban pressures increase the opportunity cost of farmland, growers producing lower-valued crops are the first to leave agriculture. Thus, urban pressures may increase the productivity of farmland through two mechanisms. Farmers may shift production into higher-valued crops to exploit a growing urban market for higher-valued crops, or farmers who continue to produce lower-valued commodities may be the first to sell their farmlands for conversion because of increased opportunity costs. These effects can be viewed as opposite sides of the same coin.

SCHMITZ and JUST (2003) examine the role of development pressures in the market for farmland, focusing specifically on farmland in Dade County, Florida (U.S.). They analyze a scenario where a farmer in Dade County grows tomatoes for the winter vegetable market (a fairly high-valued crop). Such a producer would be willing to pay a rent of $450 per acre (well above other rental rates in the state). At the same time, the market price for farmland in Dade County was $11,507. Assuming a 5 percent rate of return on capital, this would imply a rental price of $575 per acre, which is well above the rental rate that the producer would be willing to pay. In fact, the rental price paid by the producer represents an implicit rate of return of 3.9 percent. Unfortunately the story does not end there. Tomato production in the region may occur on farmland less than five miles from a major U.S. city (Miami, Florida). In 2001, such bare farmland was worth $40,000 per acre for development purposes. Using a 5 percent discount rate, this would imply a rental price of $2,000 an acre, or 4.44 times the amount a producer would be willing to pay.

3 BOOM/BUST CYCLES IN FARMLAND PRICES

Apart from the historical regimes (i.e., extensive development, intensive development, and period of urban pressure), farmland markets in the United States have exhibited significant boom/bust cycles (SCHMITZ, 1995).

Specifically, SCHMITZ (1995) demonstrates that farmland values were appropriately priced in the long run (i.e., changes in farmland values could be explained by changes in the returns to agricultural assets) while price deviations were correlated in the short run. Thus, in the short run, markets were inefficient because purchases or sales could yield a systematic profit. Further support for the long-run equilibrium in farmland values is demonstrated by ERICKSON, MISHRA and MOSS (2003), but FEATHERSTONE and MOSS (2003) support Schmitz's conjecture of boom/bust cycles using a stochastic trend model for farmland values. Their results for Illinois indicate that the predicted value of farmland from 1976 to 1982 persistently exceeded the actual value of farmland (Figure 5). Farmland values overreacted to the onset of financial difficulties in the sector in 1985.

The possibility of boom/bust cycles in farmland prices is important for a variety of reasons. First, given that farmland values are the dominant source of agricultural equity, the sector's solvency could be adversely affected by each cycle. In boom periods, farm households may be encouraged to expand yielding overcapacity in the sector, since their increased wealth reduces the relative interest rate paid. On the other side, in periods of bust, reduced levels of solvency would increase the relative interest rate or reduce their access to credit markets at reasonable terms. Such reduction in credit resources could exacerbate a contraction in the sector both in terms of productive assets and numbers of farmers. Second, reductions in agricultural wealth have dramatic consequences for rural communities (SCHMITZ, 1995). Reductions in agricultural wealth caused problems for local merchants and banks. These multiplier effects then cause reductions in local tax bases, leading to the demise of local communities.

The policy question is then: What factors contribute to the boom/bust behavior of farmland values, and what steps can be taken to minimize their effect? The literature suggests several factors that may contribute to boom/bust cycles, including imperfections in the capital markets (SHALIT and SCHMITZ, 1982), transaction costs (CHAVAS, 2003; LENCE, 2003; MILLER, 2003), and hysteresis (TURVEY, 2003).

The models of imperfect capital markets highlight the possible effect of imperfect information and credit rationing in the agricultural credit market. The advent of the intensive phase of agricultural production in the United States was facilitated by the introduction of a variety of new credit providers. Prior to the introduction of the Farm Credit System, capital structure requirements limited the ability of local banks to fund the purchase of farmland. Certain characteristics of land loans made it difficult for small rural banks to enter this market. First, any significant land purchase may exceed the regulatory amount a bank could lend on an individual loan (i.e., the limit could be set to ten percent of the bank's owner equity plus retained earnings). Second, the term required on a land loan typically exceeded the local bank's commitment period (i.e., land loans are typically made for periods exceeding 10 years and up to 30 years). The cooperative lending system established under the Federal Land Banks provided a mechanism for meeting these requirements. However, the characteristics that made land loans untenable for commercial banks also imposed significant constraints on the operation of cooperative lending institutions. For example, prior to the financial crisis of the mid-1980s, most the Federal Land Banks lent money based on collateral considerations as opposed to the ability of the loan to cash-flow. Given the size of most land purchases, these collateral practices meant that farmers had to possess money to access the capital market to purchase additional farmland. Thus, holding farmland increased your ability to acquire additional farmland through access to the credit market (SHALIT and SCHMITZ, 1984). In this formulation, farmland would only be liquidated in periods of excess stress since any reduction in holdings would limit a producer's future access to the credit market. Thus, imperfections in the debt market exacerbate other elements of farmland markets.

A similar model involves the significance of transaction costs in the farmland market. Anyone who has entered into a real estate transaction recognizes the proliferation of costs related to the transaction. Governments require a host of deed and mortgage stamps. Given the size of the typical transaction, there are often significant costs associated with obtaining credit, such as guaranteeing that mortgaged property conforms to its legal description and insuring the loan's repayment. Finally, there may be other fees, such as realtor's fees associated with finding the property and arranging the transaction. In summation, these transaction costs create a stickiness or rigidity in the market for farmland. They increase the change in price required to make it worthwhile for the buyer or seller to enter into a market agreement. The increased rigidity undoubtedly increases the overall volatility of the market price of farmland. Obviously, market corrections for small fluctuations in farmland prices do not occur within the band created by transaction costs. However, the extent to which these transaction costs contribute to boom/bust cycles is unclear. Once a price movement exceeds the transaction costs, incentives for the market to force the market price back into equilibrium are consistent with any other market.

A third factor that may contribute to the existence of boom/bust cycles in farmland prices is the possibility of hysteresis. The hysteresis model builds on the investment under irreversibility and uncertainty model proposed by DIXIT and PINDYCK (1994) who developed a real option value model of investing. In this case, the question of when to sell farmland is not simply whether current market price of farmland exceeds the present value of continuing agricultural production, but must include the option value of continuing farm production for an additional year and selling the farmland next year. In the second scenario, the farmer maintains the option to sell the farmland in the future. This option to sell in the future may cause farmers to continue to hold farmland during periods of escalating farmland values. If all farmers factor in an option value of selling farmland in the future, the result could be an investment hysteresis (or a rational bubble).

4 CAPITAL MARKETS, OPTIMAL DEBT, AND MODELS OF FARM FAILURE

Taken together, the significance of farmland values in the portfolio of agricultural assets and the possibility of boom/bust cycles could lead to increased probability of a farm financial crisis. Specifically, RAMIREZ, MOSS and BOGGESS (1997) formulate a model of optimal farm debt that can be used to develop the effect of boom/bust cycles on the probability of farm failure. They start by hypothesizing

$$\begin{aligned}&\max_{\delta(t),C(t)} E\left[\int_0^\infty e^{-rt}\frac{\left[C(t)\right]^b}{b}dt\right]\\ s.t.\,dW(t)&=\left[W(t)\frac{\left(\mu_A(t)-K(t)\delta(t)\right)}{\left(1-\delta(t)\right)}-C(t)\right]dt+\frac{W(t)\sigma_A(t)}{\left(1-\delta(t)\right)}dz(t)\end{aligned}\tag{3}$$

where r is the discount rate for future farm consumption, $C(t)$ is the level of farm consumption, b is the constant relative risk aversion coefficient, $W(t)$ is the level of farm wealth, $\mu_A(t)$ is the mean rate of return on agricultural assets, $K(t)$ is the cost of capital, $\delta(t)$ is the debt-to-asset position, $\sigma_A(t)$ is the standard deviation of the rate of return on agricultural assets, dt is the change in time, and $dz(t)$ is a standard normal random increment. Given this formulation, RAMIREZ, MOSS and BOGGESS solve the stochastic optimal control problem for a farmer who chooses the optimal debt-to-asset ratio and level of consumption

$$\begin{aligned}C^*(t)&=W(t)\left\{\frac{r-K(t)b}{(1-b)}-\frac{b\left[K(t)-\mu_A(t)\right]^2}{2\sigma_A^2(t)(1-b)^2}\right\}\\ \delta^*(t)&=1-\frac{(1-b)\sigma_A^2(t)}{\mu_A(t)-K(t)}.\end{aligned}\tag{4}$$

Substituting these optimal values back into the equation of motion for farm wealth in equation 4 yields

$$\begin{aligned}dW(t)=W(t)&\left[\frac{\left(\mu_A(t)-K(t)\delta(t)\right)}{\left(1-\delta(t)\right)}-\frac{r-K(t)b}{(1-b)}+\frac{b\left[K(t)-\mu_A(t)\right]^2}{2\sigma_A^2(t)(1-b)^2}\right]dt\\ &+\frac{W(t)\sigma_A(t)}{\left(1-\delta(t)\right)}dz(t).\end{aligned}\tag{5}$$

In this formulation, debt and the percent of wealth consumed are increasing functions of the expected rate of return on assets and decreasing functions of the standard deviation of the rate of return on assets. Substituting both of these results into the change in wealth expression in Equation 5, the expected change in wealth is an increasing function of the expected rate of return on assets and a decreasing function of the standard deviation of the rate of return on assets.

Building on these general results, the stages of the farmland market in the development of agriculture in the United States has dramatic implications for optimal debt, consumption, and changes in equity over time. The rate of return on agricultural assets in the above model can be decomposed into the rate of return from operations and the return from capital gains. Thus, the expected rate of return and variance of the rate of return on agricultural assets can be expressed as

$$\begin{aligned} \mu_A(t) &= \alpha\mu_O(t) + \beta\mu_L(t) \\ \sigma_A^2(t) &= \alpha^2\sigma_O^2(t) + \beta^2\sigma_L^2(t) + 2\alpha\beta\sigma_O(t)\sigma_L(t)\rho_{OL}(t) \end{aligned} \tag{6}$$

where $\mu_O(t)$ and $\mu_L(t)$ are the expected rate of return from operations and capital gains, respectively; $\sigma_O^2(t)$ and $\sigma_L^2(t)$ are the variance of rate of return from operations and capital gains, respectively; $\rho_{OL}(t)$ is the correlation between operating returns and capital gains; and α and β are parameters used to weight the asset portfolio components. During the early phases of agricultural development in the United States, the abundance of farmland reduced the significance of capital gains on farmland. Thus, either $\beta \to 0$ and $\alpha \to 1$, or $\mu_L(t), \sigma_L^2(t) \to 0$. Thus, the optimal debt, consumption, and changes in wealth were largely determined by operating returns. With the end of free land in the United States in 1890, farmland started to become more valuable while farmland prices were largely determined by the Ricardian rents from agricultural production. Hence during the intensification of agriculture in the United States $\beta \neq 0$, $\mu_L(t) > 0$ and $\rho_{OL}(t) \to 1$. However, following the timeline developed above, since 1985, other factors, such as urban pressure in many areas, have reduced the correlation between operating returns and farmland values (i.e., Ricardian rents from agricultural production are not the only factors driving farmland values). Thus $\beta \neq 0$, $\mu_L(t) > 0$, but $\rho_{OL}(t) \ll 1$ which implies changes in the optimal debt, consumption, and expected changes in wealth.

To demonstrate these effects, we use data from the Agricultural Resource Management Survey for 2003 for very large farmers. The average level of farm wealth for these farms was \$2,158,755. Their debt level was \$505,934 and they paid \$33,023 in interest. On average they earned \$246,070 from farming. The standard deviation of the income from farming was \$18,470 and the average level of consumption was \$44,887. We combine with this scenario the observed capital gain rate for farmland in California from 1985 to 2005 of 0.04076 with a standard deviation of 0.05223. We start by assuming a correlation coefficient between operating returns and capital gains of 0.75 and take $\alpha = 1$ and $\beta = 0.70$ to model the aggregate balance sheet in California. Next, since the aggregation procedure used to generate the ARMS dataset reduces the overall variance (i.e., the procedure yields the variance of an average), we increase the standard deviation of income by 75 percent. To parameterize the model, we begin by solving for the relative risk aversion coefficient equating the observed debt-to-asset ratio to the optimal debt-to-asset ratio. This yields an estimate of $b = -0.0708$ which is consistent with risk aversion and relatively close to a logarithmic utility function. Substituting the estimate for the risk aversion coefficient into the consumption expression in Equation 4 yields an estimate of an individual's discount rate (r) of 0.0613 which appears reasonable (i.e., somewhat higher than the interest rate on government bonds). At the point of approximation a 1 percent increase in the rate of return on assets yields a 75.73 percent increase in the debt-to-asset ratio, a 2.09 percent increase in the percent of wealth consumed, and a 21.38 percent increase in the expected change in wealth. Similarly, a 1 percent increase in the standard deviation on the rate of return on assets yields a 40.13 decrease in the debt-to-asset ratio, a 1.10 percent decrease in the percent of wealth consumed, and a 5.59 percent decrease in the expected change in wealth. Given the conservative nature of the aggregate solution, the probability of bankruptcy given at the point of approximation is 0.037 percent.

To analyze the impact of the reduced correlation between farmland values and Ricardian rents, we reduce correlation coefficient from 0.75 to 0.50. This results in an increase in the optimum debt-to-asset ratio from 0.1899 to 0.4325 and an increase in the percent of wealth consumed in each period from 0.0208 to 0.0218. In absolute terms, consumption increases from $44,887 to $47,126. However, the reduction in relative risk causes the sector to become less risky. The aggregate probability of bankruptcy falls from 0.037 percent to 0.005 percent.

5 AGRICULTURAL POLICY, WEALTH, AND LAND MARKETS

Starting with the Uruguay Round Agreement on Agriculture of the World Trade Organization, the focus shifted to the design of agricultural policies that were decoupled from production or non-distortionary. The argument was that support payments that did not encourage overproduction of agricultural commodities represented pure rent transfers from taxpayers to producers while at the same time trade flows were not affected. The Federal Agricultural Improvement and Reform (FAIR) Act of 1996 included several provisions that attempted to decouple farm program payments from production, notably Agricultural Market Transition Act Payments (AMTAPs) that were based on traditional program payments and did not depend on current production levels. The decoupling goals in the FAIR Act were soon modified with the onset of lower agricultural prices in 1998. The Federal Security and Rural Investment (FSRI) Act of 2002 returned to several of the same policies that were included in farm legislation prior to the FAIR Act (e.g., higher loan rates and the return to the target price/deficiency payment program in the guise of countercyclical payments).

GOODWIN, MISHRA and ORTALO-MAGNÉ (2003) analyze whether the AMPTAPs affected farmland values by testing whether these payments were decoupled from production. They regressed AMPTAPs on farmland prices. Their results suggest that the AMPTAPs had a small positive effect on farmland prices, which varied by year and location. They concluded that the payments were in fact coupled to land values. These empirical results raise several questions about the design of agricultural policy. Specifically, given that AMPTAPs were fixed and did not depend on production levels, why did farmland prices react to these payments? One possibility involves the capital structure of agriculture. Historically, agriculture in the United States has relied on debt markets to raise capital (as discussed above). Thus, one possibility is that AMPTAPs provide a source of capital for farmers that are credit constrained because of imperfections in the credit market. Recent work on cotton policy indicates that cotton policy is not totally decoupled (ROSSI, SCHMITZ and SCHMITZ, 2005). Also, land values are affected by water subsidies. Their work shows that if farmers respond to the target price rather than the loan rate, Ricardian rents increase by roughly 50 percent. (There is a much higher degree of coupling at the target price).

Agriculture in the United States has been highly dependent on government payments. WOMACK (2006) notes that a large percentage of net farm income is made up of farm payments. Figure 6 presents the total farm payments as well as the specific payments under certain program categories. In total, agricultural payments reached a maximum of $23 billion in 2005, split rather equally between direct payments to farmers, loan deficiency payments, and countercyclical payments.

In addition to direct payments under commodity programs, government support for the farm sector in the United States and other developed countries often includes research and development expenditures ostensively conducted to increase the competitiveness of agriculture. In the United States, investment in agricultural research is typically split between the federal government and the state. One question that arises is whether these expenditures affect farmland values. For example, some contend that technological gains resulting from these expenditures on agricultural research are simply bid into farmland values (i.e., the increase in Ricardian rents arising from the increased productivity simply result in higher land values and, thus, do not benefit farmers). MOSS (2006) estimates that agricultural productivity is affected by investments in agricultural research and development, but that these benefits are largely captured by consumers (this result is supported by MUNDLAK, 2005). There is no evidence that increased productivity affects either net cash income or farmland values.

Agricultural policy, technology, and urban pressures combined significantly affect the farmland market. Figure 7 shows the effect of agricultural policy on the debt-to-asset position in the United States and Canada for 1981 through 2004. The debt-to-asset position in each country is relatively similar until 1995 when

Canada dramatically reduced its support for agriculture. Beginning in 1996, the overall debt level for Canada began to decline relative to that of the United States. At the current time, government payments to grain and oilseed producers in the United States far exceed those in Canada. This partly explains the growth in land values in both countries. In the United States the real price of agricultural land has not fallen, but in Canada it has fallen steadily over time (PAINTER, 2002). It is likely that in the United States, investment in farmland has done as well as an equivalent investment in the stock market, which has not been the case in Canada (PAINTER, 2002).

6 FARM SIZE

One fact that economists agree upon is that over the last two decades, farm numbers in North America have steadily declined. According to MUNDLAK (2005), during the twentieth century, the number of farms declined over fifty percent. Along with this decrease in farm numbers has been the steady growth of the percentage of rented land that makes up an individual farm unit, at least in parts of the United States. Traditionally, California, for example, experienced very early in its history a significant percentage of a farm unit being made up of rented land. This is still true. Also, in Missouri, for example, data on sample farms suggest that the ratio of owned to leased land has been relatively stable and remains near forty percent (WOMACK, 2004). However, in states such as Montana and South Dakota there has been a significant increase in land rented by farmers. In the prairie region of Canada, only ten to fifteen percent of the farm land was rented twenty years ago. Now, the range is about fifty to fifty-five percent.

There are many determinants of farm size, including the age of the farm operator, composition of family members, location, size and quality of the labor pool, and available technology. A major determinant that has driven farm size is the availability of technology, especially the introduction of the four-wheel drive tractor. This enabled an individual family unit to farm much more land than prior to its introduction. For example, in the 1950s in the wheat growing area of North America, a large two-wheel drive tractor was capable of pulling a discer between eighteen and twenty feet for planting. However, it is not uncommon now to pull sixty feet of seeding equipment with a four-wheel drive unit. Accompanying the four-wheel drive tractor were large sprayers for applying chemicals. In addition, hydraulic systems allow equipment to be moved more easily from field to field, enabling farmers to farm land large distances apart. Behind all this was the development of larger threshing combines, the capacity of which has increased by at least fifty percent since the 1950s. (One of the largest combines in that era was the Super 92 Massey, which was considerably smaller than any large John Deere, International, or New Holland combine currently on the market.) It is easy to see why fewer and fewer people were needed to produce commodities such as corn or wheat. It seems natural that if the size of the equipment doubles, then farm size will also double.

There has been considerable discussion on the role of farm labor in North American and European agriculture (MUNDLAK, 2005; SCHMITT, 1991). Technology replaced a large percentage of the labor force in agriculture at the same time farm size was increasing. In this connection, it may be instructive to consider three categories of farms: (1) small farms where part of the family members work off-farm jobs; (2) farms that are owner operated with or without help from family members; and (3) large farm units that are operated and managed by the owner but require additional hired labor. Farms in category one have always had trouble staying in business. They are unable to take advantage of modern technology nor add significantly to their land holdings. In the second category are farms that are large enough to take advantage of modern technology but not duplicate the technology (i.e., the farm families operate the equipment themselves using one combine, one tractor, etc.). Then there is category three where farms are much larger than can be farmed by the farm family and employ hired farm labor. There has been a significant increase in category three farms over the last two decades, which has been facilitated by the ease at which farm land can be rented. Not only do these units employ hired labor, they also are of a sufficient size to use duplicate technology. In Saskatchewan, for example, it is not uncommon to see grain operations that are owner-managed that have a land base that utilizes three to four grain combines, four-wheel drive seeding units, and the like. These farms are four times larger than the category two farm described above. In this regard, wage rates for farm workers are an important determinant of farm size and profitability. These farm units must compete for skilled labor that is also in demand by other sectors of the economy, including the oil industry (in Canada, a considerable amount of the work force from agricultural regions is attracted to the oil fields in Alberta at very high wages).

Unfortunately, we know little about the economies of scale of agricultural production. PAUL et al. (2004) argue that family farms in the United States are both scale and technically inefficient. "Potential for the exploitation of significant scale and scope economies, and some greater technical efficiency, seem to be driving trends toward increased farm size and dwindling competitiveness of the small family farm" (PAUL et al., 2004, p. 185). But how efficient are the farms in category two above compared to those in category three? Do per unit costs keep falling for farms larger than those managed and operated by the farm family? We have no evidence to suggest that per unit costs rise as farm size increases.

The economic notions of economies of scale can be examined through the long-run average cost curve as presented in Figure 8. The long-run average cost curve is an envelope relationship for short-run average cost of production based on a given machinery complement. In q^* is that quantity; that is, where the scale of production is feasible in the long-run. This would be the point where the operator would be operating a four-wheel drive tractor under the current equipment paradigm. While the exact shape of the long-run average cost curve is the subject of some debate, the standard contention is that the curve is relatively flat over a wide range of quantities but begins to slope upward at some point. Given that the long-run average cost curve slopes upward, we could hypothesize some output level $\tilde{q}$ which bounds the long-run feasible size of the firm.

In the discussion on farm size and economies of scale, an often neglected element is the economies of scale in marketing. Generally, the larger the farm is, the larger the volume of output and the greater the tendency for management to hire marketing expertise that includes services for optimal selective hedging. In addition, larger farms because of volume can experience a reputation effect. This is especially true in the marketing of feeder cattle where operators with large herds establish a reputation for having "good cattle" with better conditioning or feed conversion (SCHMITZ, SCHMITZ and MOSS, 2005; SCHMITZ, MOSS and SCHMITZ, 2003). In addition, these farms may also obtain price advantages when purchasing inputs. These price advantages would be depicted in Figure 8 by an upward shift in the long-run price of output from p to p^* and an outward shift in the long-run average cost curve from $LRAC(w)$ to $LRAC(w^*)$. Taken together, these price advantages shift the long-run feasible production region from $\tilde{q}$ to $\tilde{q}^*$.

Another factor affecting farm size is specialization. Some farmers are willing to hire other farmers to spray, combine, bail hay, and other activities. This specialization could reduce the level of capital inputs required, allow for the development of specialized skills, and potentially increase the timeliness of certain field operations.

None of these considerations were taken into account by ALLEN and LUECK (1998) who analyzed whether the family farm was an optimal form of legal organization for the farm. They contend that the family farm will remain the basic production unit in the United States. Their analysis focuses mostly on the seasonality of farm production. Specifically, most crop farms face a cyclical demand for labor within the year dictated by agronomic considerations. In the Corn Belt, corn and soybeans are planted in early or mid spring. Depending on the technology, certain field operations, such as spraying, are then required throughout the summer months, followed by a harvest period beginning in October or November. Given this annual cycle, the family farm is prone to periods of excess labor that are inconsistent with other legal forms of organization (i.e., limited partnerships or corporations with a standing hired labor force). More work is needed using Allen and Lueck's formulation to answer the more complex questions related to land markets, farm size, and economies of scale.

The adjustment of farm size to the optimum or satisfactory scale is a complex process. Changes in farm size and numbers are dynamic in nature. Some farms are sold because of financial pressures and because of the lack of sons to inherit the farms. The landscape is ever changing. Unfortunately, some farmers who tried to expand their units to match the available technology got trapped on the wrong side of the land market and went bankrupt in the process. This was especially true in the 1980s.

What does this discussion have to do with agriculture in Europe? Clearly, Eastern Europe had huge state and collective farms. There is little information on how the efficiency of these farms compared with those in North America. Now that these farms are becoming privatized, it will be interesting to see what type of farm units emerge. It is our prediction that farm size will follow that in the United States with the emergence of some ten to fifteen thousand hectare farms under a one owner-management unit accompanied by a significant amount of hired farm labor.

In this regard, one can also draw observations from Brazil where there has been a rapid rise in the increase of farm size, so that now many farms are very large. Case studies on sugar and soybean as examples should be done to detail the prevailing farm structure. We hypothesize that most of this production occurs on the largest farms (those large enough to take advantage of both the economies of scale in production and the benefits of increased output prices from reputation effects or integrated marketing as well as reduced input prices from market power).

7 CONCLUSIONS

Technological changes in agriculture radically changed the optimal size of the farm firm during the twentieth century. Regardless of the factors determining the boundaries of feasible farm sizes, the price of farmland and access to credit markets determine the ability of producers to reach an efficient farm size. Various factors, such as boom/bust cycles and urban pressure, complicate in different ways obtaining these feasible sizes. The boom/bust cycle increases the collateral risk facing lenders and, hence, increases the interest rate that must be charged on real estate debt. Thus, boom/bust cycles are an impediment to obtaining an efficient farm size. The effect of urban pressure is more complex. On one hand, urban pressure tends to increase land prices beyond that which can be justified (and paid) from residual rents to farmland. From this perspective, urban pressure hinders the attainment of a feasible farm size. On the other hand, urban pressure increases a farmer’s equity, reducing the effective interest rate on credit. This reduces the price of obtaining an efficient operational size, but also implies a higher opportunity cost.

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WOMACK, A. (2004): Agricultural policy and competitiveness under globalization, paper presented at North Dakota State University, Fargo, ND.

Figure 1: U.S. Total assets, farm equity, and real estate values

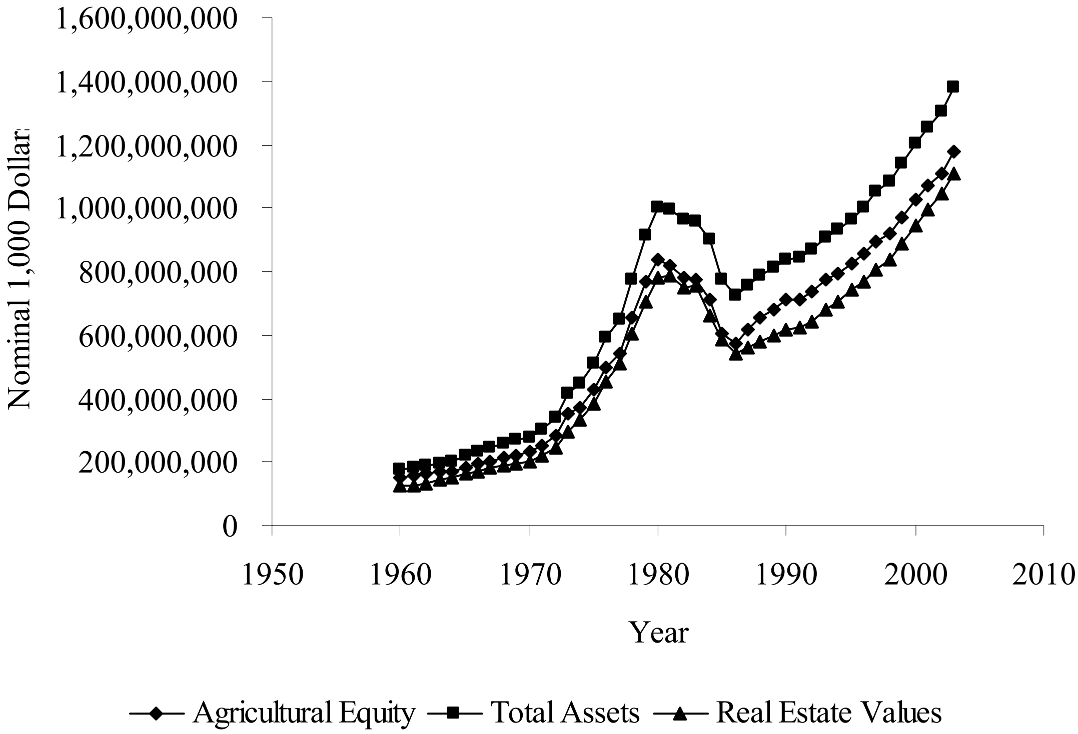


Figure 2: U.S. real estate as a share of total assets

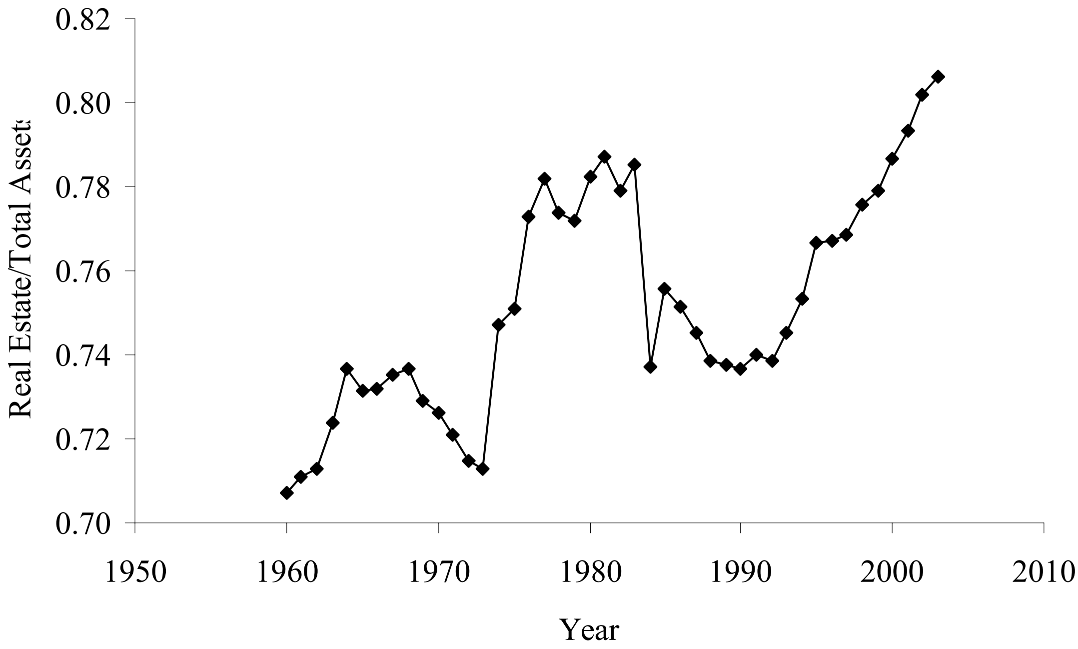


Figure 3: Farmland values selected U.S. States 1850-2005

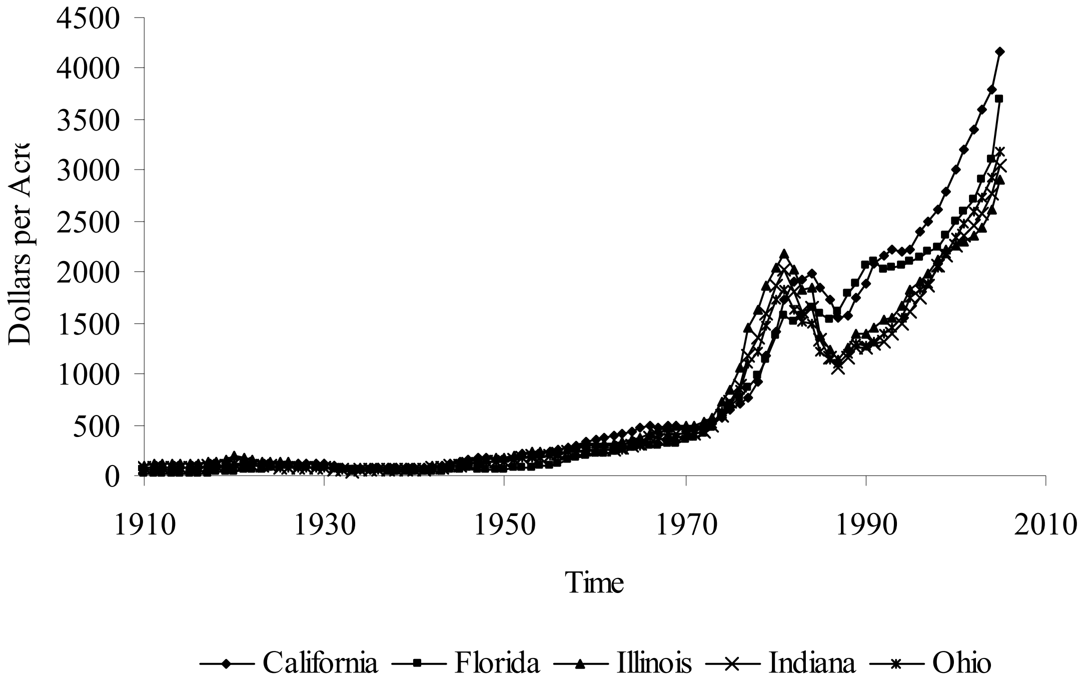


Figure 4: U.S. changes in farm size by sales class 1969-1982

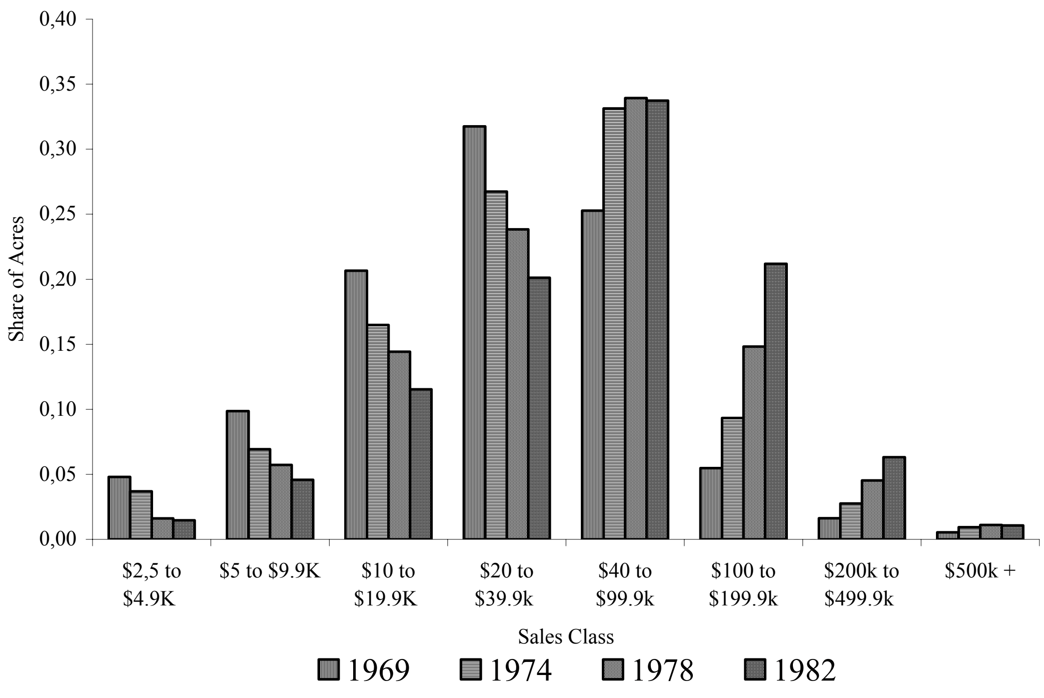


Figure 5: Actual and predicted farmland values for Illinois from 1965 to 1995

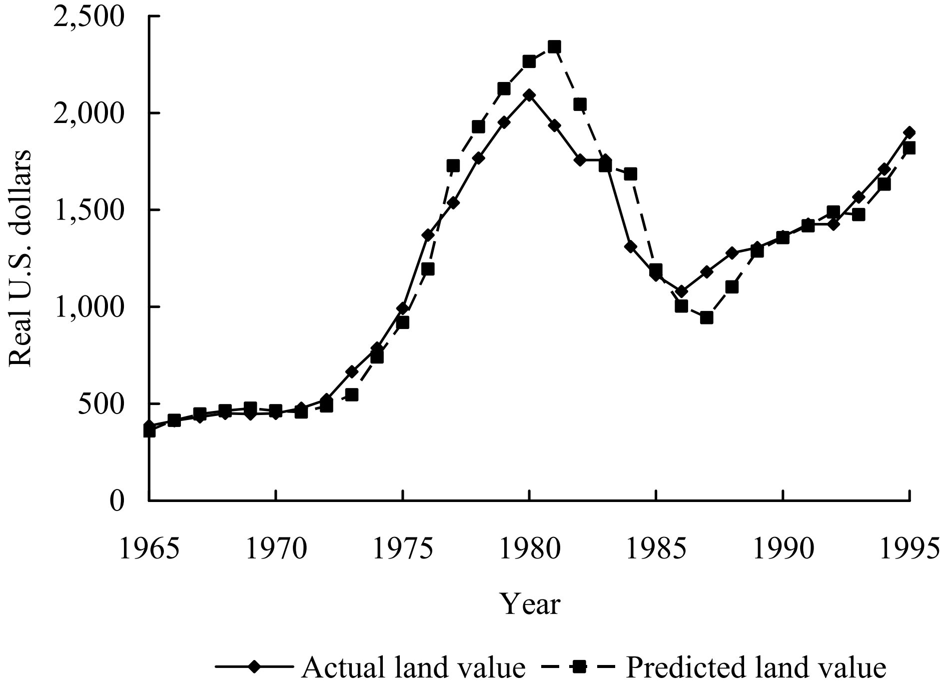


Figure 6: U.S. Total program payments to farmers

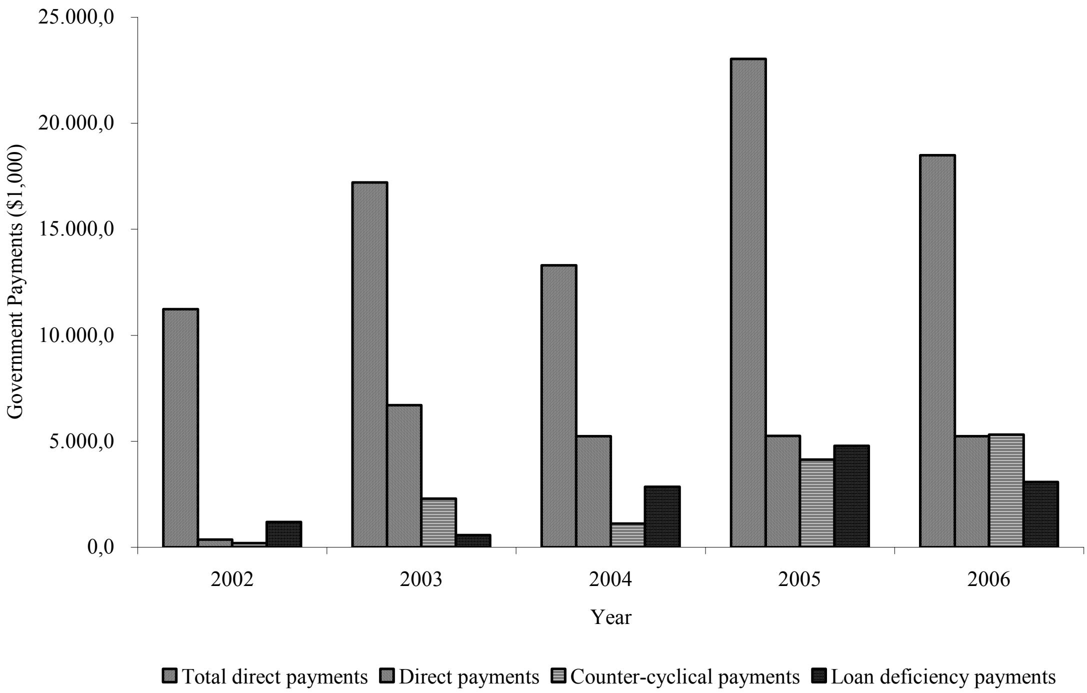
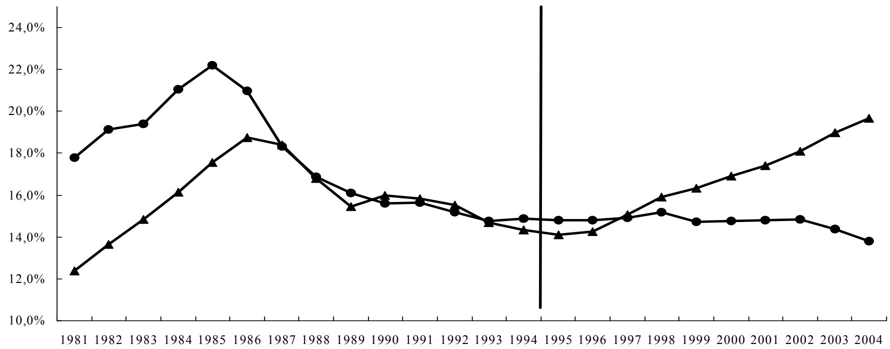
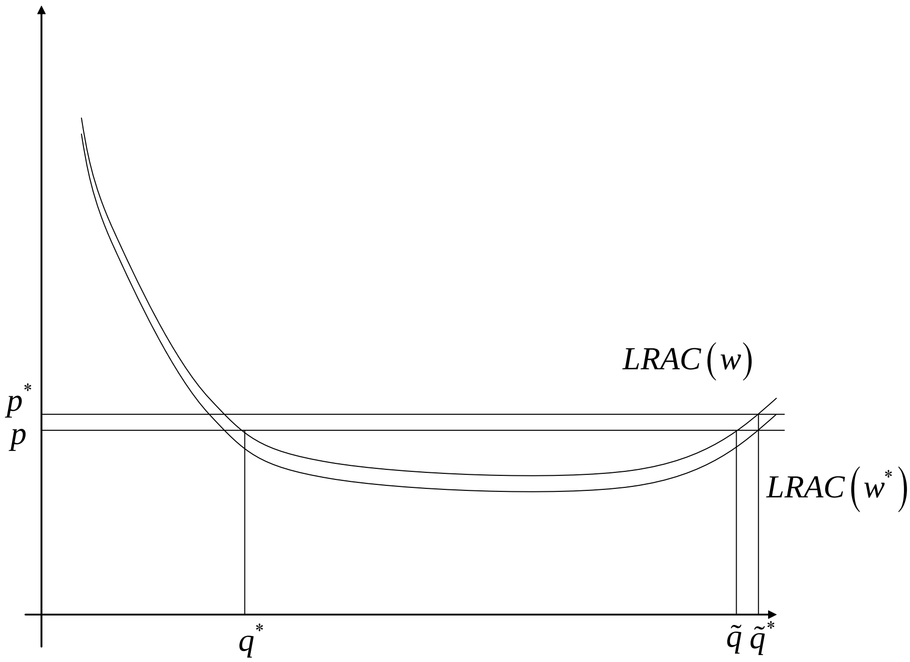


Figure 7: Debt-to-assets ratio – Canada and US 1981-2004



Sources: Statistics Canada, USDA.

Figure 8: Defining the farm size by the long-run average cost curve



FARM STRUCTURE AND GOVERNANCE

Agriculture in the Face of Changing Markets, Institutions and Policies: Challenges and Strategies
JARMILA CURTISS, ALFONS BALMANN, KIRSTI DAUTZENBERG, KATHRIN HAPPE (eds., 2006)
Studies on the Agricultural and Food Sector in Central and Eastern Europe, Vol. 33, Halle (Saale), IAMO, pp. 105-119.

DUALITY OF FARM STRUCTURE IN TRANSITION AGRICULTURE: THE CASE OF MOLDOVA

ZVI LERMAN, DRAGOS CIMPOIES***

ABSTRACT

The duality of Moldovan farm structure is manifested by the relatively small number of large corporate farms at one extreme, and a large number of small and very small family farms at the other. "Medium-sized" family farms, the backbone of any market agriculture, virtually do not exist in Moldova. Moldovan agriculture is characterized by a much greater concentration of land in large farms than agriculture in market economies. Small individual farms on the whole are more productive and more efficient than large corporate farms, producing higher incomes for rural families than corporate farms. The main conclusion of the paper is that land should be allowed to flow from large corporate farms to small family farms through land markets until an equilibrium is established between the two farm sectors at a new level closer to that observed in market economies.

Keywords: *Farm structure, efficiency, productivity, land fragmentation, land concentration, farm size, Moldova.*

1 INTRODUCTION

The privatization of agricultural land and assets, followed by the restructuring of collective and state farms, were among the primary goals of Moldova's transition to a market-oriented economy in the post-Soviet era (LERMAN et al., 1998). During the first phase of land reform, between 1992 and 1998, state-owned land was privatized through the distribution of land ownership certificates to more than one million rural residents (30 % of Moldova's population). The second phase of land reform began in 1998 and led to a sweeping conversion of the paper

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certificates to physical plots, which averaged less than 1.5 hectares. The share of agricultural land in state ownership dropped from 100 % in 1990 to less than one-third in 2003, much of it held in state reserve for future reallocation to individuals.

Progress with land privatization did not produce a commensurate shift to individual or family farming. Less than half the landowners who received physical plots as a result of land reform decided to farm their land independently (DSS, 2004a). The rest (57 %) leased their land to operators, including so-called "leaders" or "managers", i.e., enterprising individuals who founded new corporate farms by consolidating the dispersed small plots of passive landowners. Today there are about 1,500 corporate farms – limited liability companies, joint stock companies, agricultural production cooperatives – with an average size of 400-800 hectares. These new corporate farms use private, not state-owned land, and are substantially smaller than the traditional collective and state farms, which averaged 2,000-3,000 hectares in 1990.

The distribution of land to the rural population led to dramatic changes in the structure of land use by farms of various organizational forms (Table 1). Particularly notable is the shrinking share of former state and collective farms and a corresponding increase in land used by the individual sector. Thus, in 1990, more than 90 % of the 2.5 million hectares of agricultural land in Moldova was managed by corporate farms (about 30 % by state farms and 60 % by collective farms). In 1990, the individual sector (household plots at that time) cultivated less than 9 % of the land, but as of 2003, the individual sector (which now consists of household plots and peasant farms) controls 40 % of the agricultural land. Approximately the same land area is operated by large-scale corporate farms, mostly new organizational forms with private ownership of land and assets. These new corporate farms are basically corporate shareholder structures with joint land cultivation. The traditional collective farms practically disappeared during the last decade, as many of them have been privatized or liquidated, while others have registered as new legal forms. State farms still persist, but they operate in highly specialized areas that can be legitimately regarded as a public good (seed selection, livestock selection, experimental stations, agricultural education and research).

Table 1: Structure of agricultural land use in 1990 and 2003*

	1990	**2003**
State sector (state farms and reserve land)	32.1	27.4
Corporate forms (private sector)	59.5	32.5
Individual sector	8.5	40.1
Total agricultural land	100.0	100.0
'000 ha	2562.2	2528.3

Source: State Cadastre Agency, land balance tables; transposed to end of year.

Note: * End of year data, percent of agricultural land, including Transnistria.

While corporate farms average 400-800 hectares, the individual farms (household plots and peasant farms) are much smaller. Thus, the average peasant farm has 1.9 hectares and only 342 peasant farms (out of some 300,000 in total) are larger than 50 hectares (DSS, 2004b). Half the agricultural land in Moldova (excluding Transnistria) is in units smaller than 10 hectares (WORLD BANK, 2005).

The existence of a relatively small number of large corporate farms at one extreme and a large number of small and very small family farms at the other is manifested in the duality of farm structure. "Medium-sized" family farms, the pillar of any market agriculture, almost do not exist in Moldova. Yet the relationship between organizational form and farm size is not always single-valued. Family farms are typically small, but some of them fall in the category of large farms. A similar picture is observed with corporate farms, which are typically large, but not always. Therefore, the duality of farm structure will be examined in two dimensions: The organizational form dimension and the farm size dimension.

2 THE ORGANIZATIONAL FORM DIMENSION: CORPORATE FARMS VS. INDIVIDUAL FARMS

Two conflicting scenarios were envisaged in the early 1990s regarding the outcome of land reform and farm restructuring in transition countries. According to one scenario, the removal of socialist state controls would result in the collapse of the chronically-inefficient collective and state farms and produce a complete shift to family farming. According to the second scenario, corporate farms would persist because rural families did not have the required human capital and managerial skills to start independent farming. In reality, none of these scenarios has materialized and a large variety of farm structures have emerged during transition, spanning the whole spectrum of individual and corporate farms (LERMAN et al., 2004; SWINNEN, 2006).

Individual or family farms include very small household plots operated virtually by every rural family and somewhat larger peasant farms established by relatively enterprising individuals. Individual farms are managed by the head of the household and rely mainly on family labor and family-owned land. They are typically small or very small, ranging in size from less than a hectare to about 5-10 hectares. In contrast, corporate farms are owned by shareholders and managed by hired professional managers. In Moldova and other transition countries, the shareholders are typically the local village residents who were formerly members of the local collective farm and received shares in its land and assets. Corporate farms typically use land leased from their shareholders and rely on hired labor.

The emergence of two well-defined categories of organizational forms as a result of the post-socialist land and farm structure reforms has triggered ongoing debate among policy-makers and economists concerning the efficiency and performance advantages of corporate farms versus individual farms in transition countries. Traditional socialist thinking believed in economies of scale and thus gave preference to large corporate farms. Western market-oriented thinking attaches more importance to individual incentives and thus emphasizes the advantages of smaller family farms. GORTON and DAVIDOVA (2004) note that, contrary to prior expectations, there is no clear-cut empirical evidence in transition economies that family farms are more efficient than corporate farms in all farming activities. While significant differences have been found in favor of family farms against the average corporate farm, the best corporate farms still tend to perform as well as the best family farms. Yet these findings clearly support the previous conclusion (LERMAN et al., 2004) that, contrary to the economies-of-scale school of thought, large corporate farms do not have a significant performance advantage over individual farms. We use national statistics and survey data to examine the comparative performance of individual and corporate farms in Moldova.

Table 2: Land, output, and labor by farm type 1990-2003 (end of year data for selected years)

	Agricultural land used by farms			Gross Agricultural Output			Employed in agriculture		
	'000 ha	Corpo-rate, %	Indivi-dual, %	Million lei, 2000 prices	Corpo-rate, %	Indivi-dual, %	'000 workers	Corpo-rate, %	Indivi-dual, %
1990	2301.8	90.7	9.3	16189	77.8	22.2	610	83.2	16.8
1995	2196.4	82.7	17.3	10293	59.9	40.1	771	69.2	30.8
2000	2146.7	56.1	43.9	7917	26.9	73.1	766	23.1	76.9
2001	2076.0	44.6	55.4	8427	28.4	71.6	764	20.7	79.3
2002	2069.2	44.1	55.9	8717	29.0	71.0	747	20.6	79.4
2003	2059.8	46.9	53.1	7535	24.7	75.3	583	23.9	76.1

Source: DSS (2004b): Statistical yearbooks of Moldova for various years.

Note: Land used by farms is agricultural land, excluding the areas not allocated to agricultural producers (state reserves, miscellaneous state and municipal lands).

The shift of agricultural land from corporate to individual farms noted in Table 1 has led to significant changes in the production structure of Moldovan agriculture: The output of the corporate farm sector has decreased, while the output of the individual sector shows steady growth. At the beginning of agricultural reforms in the early 1990s, the individual farms sector was producing 20 % of agricultural output on less than 10 % of agricultural land; in 2003 individual farms produced three-quarters of agricultural output on half the agricultural land (Table 2). The discrepant shares of the two farm sectors in land and output clearly show that individual farms use their land more productively than corporate farms. This phenomenon has persisted since 1990, as the share of individual output has always been greater than the share of land in individual tenure (Table 2).

Labor is another basic factor affecting the performance of agriculture. Agricultural labor in corporate farms decreased sharply over time, while in individual farms it increased. In farms of both types, the changes in labor use are strongly correlated with the changes in land use (the coefficient of correlation is greater than 0.95 for 1990-2003). The increase in labor in individual farms, especially after 1998, is thus linked with the land distribution efforts during the second-phase reforms, which focused on the conversion of land share certificates into physical plots. The opposite employment trends in corporate and individual farms have resulted in a sharp increase of the share of agricultural labor in the individual sector – from about 25 % in the early 1990s to more than 75 % in 2000-2004 (Table 2).

The full time series underlying Table 2 was used to calculate the partial productivity of land and labor in absolute terms. The partial productivities of land and labor decreased over time in both corporate and individual farms, and the results are summarized in Table 3 as averages for the entire period 1990-2003 and for two sub-periods. Despite the declining trend, the land productivity of individual farms was higher than that of corporate farms (the differences are statistically significant for the entire period and for both sub-periods). The difference in labor productivity, on the other hand, is not statistically significant for the entire period 1990-2003 and for the latter sub-period 1997-2003. Moreover, the direction of the difference in labor productivity does not always match the findings in other transition countries, where labor productivity, unlike land productivity, is observed to be lower for individual than for corporate farms (a manifestation of the "labor sink" effect of individual farms). Thus, the two partial productivity measures for land and labor do not provide a consistent picture: While land productivity is definitely higher for individual farms, the results for labor productivity are ambiguous.

Table 3: Land and labor productivity for corporate and individual farms 1990-2003 (averages for selected sub-periods)

Years	Productivity of land, '000 lei/ha		Productivity of labor, '000 lei/worker	
	Corporate	Individual	Corporate	Individual
1990-2003	3.4*	10.1*	14.7	17.4
1990-1996	4.3*	13.8*	16.2*	22.6*
1997-2003	2.4*	6.3*	13.1	12.2

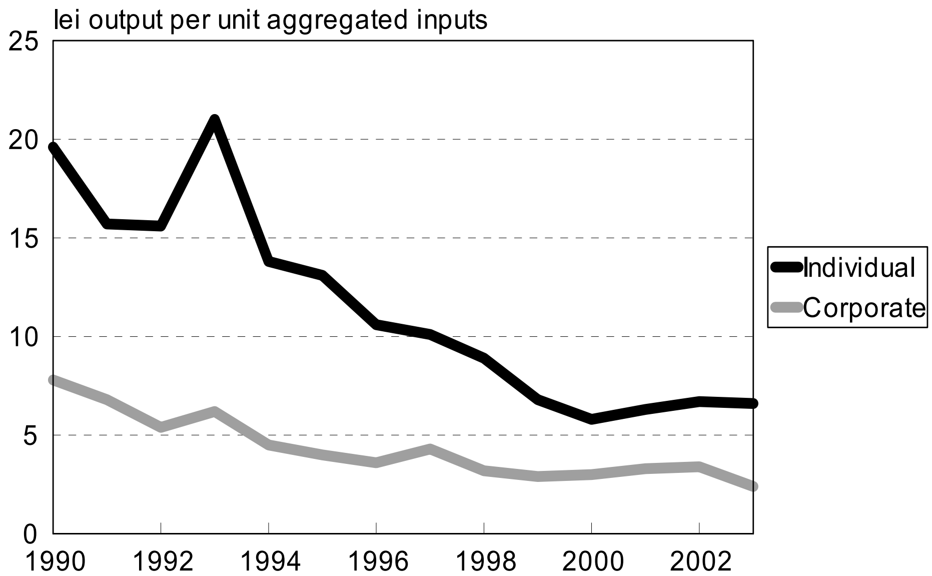
Source: Calculated from full time series underlying Table 2.

Note: * The differences between corporate and individual farms are significant at $p < 0.1$ by both parametric and non-parametric tests.

To resolve the ambiguity, we have to switch from one-factor partial productivities to Total Factor Productivity (TFP), which is calculated as the ratio of the value of output to the aggregated cost of all inputs used. In the absence of market prices for valuing the cost of inputs (such as the price of land), TFP is usually determined by estimating a production function and then using the estimated input coefficients as the weights to calculate the value of the bundle of inputs. Due to considerations of data reliability, we have decided to calculate production functions using two inputs only: Land and labor.

A qualitative picture of TFP changes over time was obtained from national statistics by assuming a conventional Cobb-Douglas production function with stylized factor shares of 0.7 for land and 0.3 for labor (these are the factor shares that we consistently obtained in production functions estimated using various farm surveys in Moldova). Figure 1 presents the TFP results calculated with these land and labor weights using the full time series underlying Table 2. The TFP for individual farms is higher than for corporate farms over the entire period 1990-2003. The respective means for 1990-2003 are 11.5 for individual farms and 4.4 for corporate farms (the difference is statistically significant).

Figure 1: Total factor productivity for individual and corporate farms 1990-2003



Notes: Inputs from national statistics (see Table 2) aggregated using hypothetical factor shares of 0.7 to land and 0.3 to labor.

The TFP results in Figure 1 are derived by production-function methodology using national statistics, and they reflect Total Factor Productivity in a sectoral perspective. A different methodology can be used to estimate the efficiency of specific farms from survey data (at a point in time). The efficiency of input use for a particular farm is measured in relation to the production frontier, which is the locus of "best attainable" points, i.e., points where the maximum output is achieved for every given bundle of inputs. Once the production frontier has been constructed, we can calculate the technical efficiency of each farm by measuring its relative distance from the frontier. Points on the frontier are technically efficient; their distance from the frontier is 0, and their technical efficiency (TE) score is 1. As the distance of a particular point from the frontier increases, its TE score decreases. Each TE score is the fraction of the "best performer" output that a given farm achieves with the same bundle of inputs.

Table 4 presents the mean TE scores obtained for farms of different types in two samples from 2003 surveys in Moldova.[1] While all farms surveyed are relatively inefficient (compared to the efficiency benchmark of TE = 1), individual farms achieve higher TE scores than corporate farms (the difference is statistically significant in both samples). This indicates that the individual farms, on average, utilize the two inputs (land and labor) more efficiently than the corporate farms: For any given bundle of inputs they produce, on average, more than the corporate farms. These results are consistent with the TFP results: Individual farms are more productive and more efficient than corporate farms.

Table 4: TE scores obtained by Stochastic Frontier Analysis (SFA)

	WB 2003 survey (n = 198)	WB 2003 survey pooled with PFAP 2003 corporate farm survey (n = 719)
Corporate	0.46[a] (n = 22)	0.67[b] (n = 543)
Individual	0.64[a] (n = 176)	0.70[b] (n = 176)

Source: Authors' calculations based on DUDWICK et al. (2005) for WB 2003 survey; MURAVSCHI and BUCATA (2005) for PFAP 2003 survey.

Notes: [a] Difference statistically significant at p = 0.10 by parametric and nonparametric tests.
[b] Difference statistically significant at p = 0.10 by nonparametric test only.

3 THE FARM SIZE DIMENSION: LARGE FARMS VS. SMALL FARMS

The second dimension of farm-structure duality involves farm sizes – large versus small. The optimum farm size is difficult to define because opinions about the farmers' objective function differ and because the same determinants can affect farm size in different ways across different farms or countries (KOESTER, 2003). The optimality of farm size for a given country is largely an empirical question (SWINNEN, 2006). In general, the optimal farm size is a relative notion that depends on local conditions such as the share of rural population and land endowment.

In the absence of a universal optimum, average farm sizes can be meaningfully compared only for countries with similar natural conditions. It makes no sense to compare the farm sizes in densely populated Moldova to those in Russia or Ukraine (both sparsely populated, land-rich countries). While farm sizes in

[1] The TE scores were derived by Stochastic Frontier Analysis (SFA), an econometric production frontier technique that is conceptually close to production function estimation. For details see COELLI et al. (1998).

Russia and Ukraine may be compared to the United States and Canada, an appropriate benchmark for Moldova is provided by the relatively densely populated and land-poor European countries such as Portugal, Greece, and Italy. These three countries actually have the smallest family farms among the EU-15 – 5-10 hectares, compared with an average farm size of around 20 hectares for the EU-15 as a group (Eurostat data from EUROPEAN COMMISSION, 2005). Family farms in Portugal, Greece, and Italy are thus not dramatically larger than the average peasant farm in Moldova (2 hectares national average, 4-5 hectares in various surveys – see Table 5), but they are certainly much smaller than the average corporate farm in Moldova (400-800 hectares as mentioned in the Introduction).

Table 5 presents size characteristics and partial productivity measures for small and large farms in four recent surveys in Moldova. While the large farms as a group are substantially larger than the small farms by all measures – output, land, and labor, the partial productivities show a mixed picture:

- The partial productivity of land (output per hectare) is higher for small farms.
- The partial productivity of labor (output per worker) is lower for small farms.
- The number of workers per hectare is much higher in small individual farms than in large corporate farms (the "labor sink" effect of individual farms).

Table 5: Size characteristics and productivity measures for small and large farms in Moldova: Survey data

	WB 2003 survey		PFAP 2003 surveys		WB 2000 baseline survey	
	Small farms	**Large farms**	**Small farms**	**Large farms**	**Small farms**	**Large farms**
Number of observations	176	22	1,166	521	170	180
Ag. land (ha)	4.48	971	4.02	918	5.7	533
Workers	4.51	332	6.27	150	1.6	43.7
Ag. output ('000 lei)	25.8	3,230	25.3	2,038	75.4	1,642
Output/ha (lei)	6,765	2,745	9,535	2,085	6,414	3,145
Output/worker (lei)	6,857	17,135	5,145	17,824	55,304	54,393
Workers/ha	1.42	0.26	3.25	0.19		

Source: DUDWICK et al. (2005) for WB 2003 survey; MURAVSCHI and BUCATA (2005) for PFAP 2003 surveys; LERMAN (2001) for WB 2000 survey.

Note: All differences between small and large farms are statistically significant at $p = 0.1$ (except the differences in productivity of labor – output/worker – in the WB 2000 survey).

The ambiguity in partial productivity measures is resolved by calculating total factor productivity (TFP) in the production function paradigm. First, the sum of the coefficients in a Cobb-Douglas production function sheds light on the behavior of the returns to scale: The returns are constant to scale if the coefficients sum to 1; the returns are increasing to scale (i.e., larger is more productive) when the sum of the coefficients is greater than 1; and finally the returns are decreasing to scale (i.e., smaller is more productive) when the sum of the coefficients is less than 1. Second, differences in TFP between categories of farms can be captured by estimating appropriate production functions with a dummy variable for different farm types. If the dummy coefficient for type A farms is found to be greater than for type B farms, this implies that type A farms produce a greater value of output at any given bundle of inputs and essentially means that type A farms have higher TFP than type B farms. This procedure enables us to assess *differences* in TFP without actually calculating the TFP in *absolute values*.

Simple two-input Cobb-Douglas production functions relating the aggregated value of output to land and labor were estimated for the 2003 WB survey with 198 farms classified into large and small. The two-input production function was first estimated without dummy variables (Model 1 in Table 6). In this model, the coefficients of the two factors of production (land and labor) summed to less than 1, and the difference from 1 was statistically significant at $p = 0.10$. The production function thus shows *decreasing* returns to scale: Large farms produce less per unit of inputs in the margin than small farms.

Table 6: Estimation of Cobb-Douglas production function for large and small farms

Dependent variable: Value of output (lei)	**Model 1 coefficients**	**Model 2 coefficients**
Explanatory variables:		
Land (ha)	0.60	0.69
Labor (workers)	0.30	0.31
Farm type (dummy): Large farms relative to small farms	–	-0.58
Sum of input coefficients	0.90	n.a.
R^2	0.770	0.773

Source: Authors' estimations based on 2003 WB survey from DUDWICK et al. (2005).

This conclusion is strengthened and quantified by estimating the same two-input production function with a dummy variable for large and small farms (Model 2 in Table 6). The intercept for large farms (relative to small farms) is negative, which means that at each level of inputs (land and labor) large corporate farms attain lower output than small individual farms (the negative coefficient was statistically significant at $p = 0.10$). The mathematics of the Cobb-Douglas production function translates the negative dummy variable coefficient of -0.58

into a difference of 45 % in output between corporate and individual farms for each bundle of inputs.

4 DISENTANGLING THE EFFECTS OF ORGANIZATIONAL FORM AND FARM SIZE

We have shown that individual farms in Moldova are more productive than corporate farms and that small farms are more productive than large farms. Typically, individual farms are small, while corporate farms are large, and there is a fairly sharp size gap between the farms of two organizational forms (WORLD BANK, 2005). It could therefore be argued that the farm-size effect observed in our analysis is simply a result of the organizational form effect, or vice versa. To try and disentangle the two effects, we have looked at two homogeneous samples: A sample of corporate farms (without any individual farms) and a sample of peasant farms (without any corporate farms).

The homogeneous sample of 521 corporate farms from the 2003 PFAP survey (MURAVSCHI and BUCATCA, 2005) was grouped into three size categories (Table 7). The productivity of land clearly increases with farm size, whereas the productivity of labor does not. Most importantly for our purposes, total factor productivity calculated by aggregating land and labor with appropriate weights from the production function shows a definite increase with farm size in the homogeneous sample of corporate farms.

Table 7: TFP of corporate farms by land size categories: PFAP 2003 survey

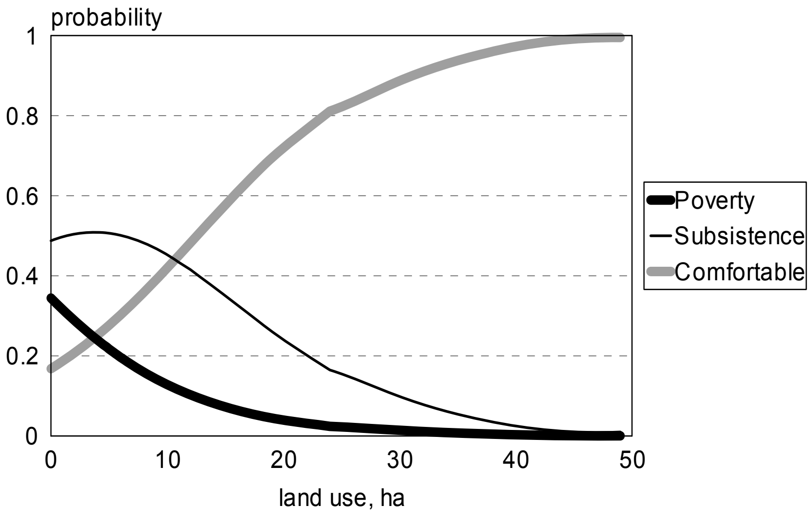
	<500 ha (1)	**500-2000 ha (2)**	**>2000 ha (3)**
Number of farms	238	225	58
Land productivity (output/ha, lei)	1,927	2,162	2,430
Labor productivity (output/worker, lei)	18,660	16,580	19,219
TFP (lei per unit of aggregated inputs)	3,162	3,603	4,167

Source: Authors' calculations from MURAVSCHI and BUCATCA, 2005.

In a homogeneous sample of peasant farms from the 2005 WB survey (WORLD BANK, 2005), the standard of living of rural families was observed to increase with farm size. Here, a qualitative variable characterizing different levels of family well-being ("comfortable", "subsistence", "poverty") was used as a proxy for farm performance in the absence of TFP estimates for this sample. Among peasant farms, a comfortable standard of living is associated with much larger family farms than lower standards of living. Peasant farmers reporting a comfortable standard of living had 11 hectares on average, compared with less than 5 hectares for farms in the two lower categories: Poverty, when family income is not sufficient to buy food, and subsistence, when family income is sufficient to buy food and daily necessities (the difference between farm sizes is statistically significant at $p < 0.01$). Peasant farmers' standard of living is thus an increasing function of farm size, as is commonly observed in farm surveys in CIS and other transition countries.

A different view of the relationship between standard of living and farm size for peasant farmers is presented in Figure 2, which plots the probability of being in one of the three standard-of-living levels as a function of farm size. The probability of being in the highest standard of living (gray curve) increases with farm size, while the probability of being on the lowest "poverty" level (thick black curve), sharply decreases with farm size.[2] These results provide support for increasing the average size of the individual farms through land market development and land consolidation policies.

Figure 2: Probability of achieving a given standard of living as a function of farm size for peasant farmers



Source: Authors' calculations based on WB 2005 survey (WORLD BANK, 2005).

Notes: Definition of standard of living levels: "Poverty" – family income not sufficient to buy food; "Subsistence" – family income just sufficient to buy food and daily necessities; "Comfortable" – family income sufficient to buy food, daily necessities, and durables.

These results demonstrate that farm performance actually improves with increasing farm size for farms of the same organizational form. The inverse productivity-farm size relationship is observed for mixed samples that include farms of different organizational forms (both individual and corporate). This suggests that the decrease of productivity with farm size is primarily an organizational form effect, and not a farm size effect: Individual farms are more

[2] The probabilities of achieving a given standard of living were obtained in a multinomial logistic regression with the three-level standard of living as the discrete dependent variable and farm size as the continuous covariate.

productive than corporate farms, and the size effect observed in our analysis appears to be simply a proxy for the organizational form effect.

5 LAND CONCENTRATION

The pronounced difference in average sizes between individual and corporate farms in Moldova is reflected in a strong concentration of land in a small number of very large farms – a feature inherited from the sharply dual farm structure of the Soviet period. The Lorenz curve provides a standard tool for visualizing the inequality of land distribution between large and small farms. Plotting the cumulative percent of the number of farms (from smallest to largest) on the horizontal axis and the cumulative percent of agricultural land used by farms on the vertical axis, we obtain a curve whose downward bulge below the diagonal provides a measure of inequality or concentration. In the absence of a country-wide size distribution for all farms in Moldova, we produced a "sample" Lorenz curve, ordering by size the 1,885 farms included in three 2003 surveys (DUDWICK et al., 2005; MURAVSCHI and BUCATCA, 2005).

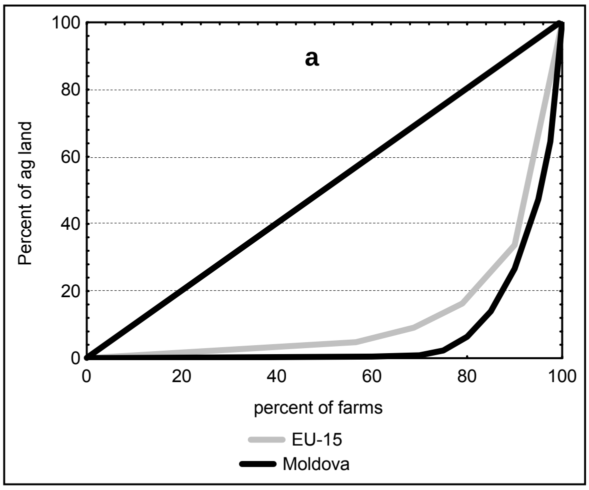
The Lorenz curve for Moldova (Figure 3a, black curve) shows that about 70 % of farms (mostly small individual farms) account for just 1 % of agricultural land while the remaining 30 % of large farms (basically corporate farms) account for 99 % of land holdings. At the top end of the distribution, just 5 % of the largest farms control 53 % of the land.

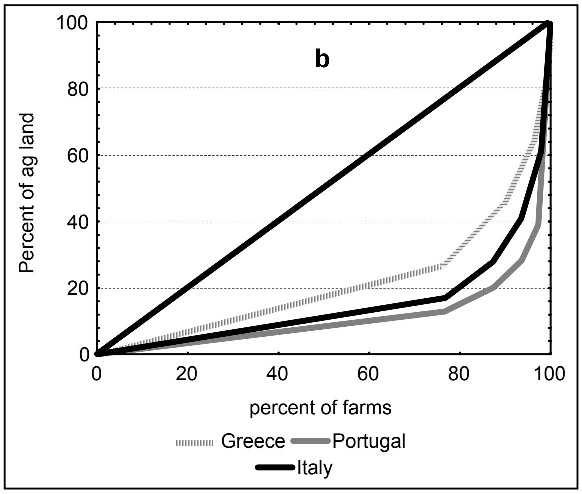
Although it is not entirely appropriate to compare the somewhat ad hoc sample results for Moldova with the systematic Eurostat data for the EU countries, we have nevertheless superimposed the aggregated land concentration curve for EU-15 on Figure 3a (grey curve). In the 15 countries of the EU combined, 10 % of the largest farms control 64 % of agricultural land compared with as much as 73 % in Moldova (Table 8). On the other hand, the small-farm tail in EU-15 is much thicker than in Moldova, with 80 % of the smallest farms controlling 16.5 % of agricultural land compared with only 6.4 % in Moldova.[3]

Figure 3b presents the corresponding graphs for Italy, Greece, and Portugal – the three EU-15 countries that in our view are the most appropriate for comparison with Moldova. In Greece, 11 % of the largest farms control 54 % of the land, in Italy 7 % of the largest farms control 59 % of the land, and in Portugal 6 % of farms control more than 70 % of agricultural land. Portugal is the country with the highest land concentration in the EU-15, but even here 80 % of the smaller farms control 14 % of agricultural land, compared to less than 7 % for the same percentage of small farms in Moldova. As a result, 20 % of the largest farms control 93 % of the land in Moldova and 86 % of the land in Portugal.

[3] Land concentration in the EU-15 is increasing over time. In Table 8 both the number and the area decreased between 1995-2003 for small- and medium-sized farms and increased for large farms.

Figure 3: Land concentration curves





Sources: European countries based on Eurostat harmonized national data and EC surveys of the structure of agricultural holdings for 2003 (EUROPEAN COMMISSION, 2005); Moldova from WORLD BANK (2005).

Contrary to the established market economies of the EU-15, Bulgaria and Romania, two East European transition countries that are now candidates for EU accession, are close to Moldova by their levels of land concentration: 5 % of the largest farms control more than 80 % of agricultural land in Bulgaria and about 60 % of the land in Romania (EUROPEAN COMMISSION, 2005). In these two countries, as in Moldova, the post-Soviet land reform led to extreme fragmentation of land ownership, which on the one hand produced large numbers of very small farms, while on the other hand encouraged many small landowners to entrust their land to large corporate farms.

Table 8: Agricultural land distribution by farm size in the EU-15

Farm size class (ha UAA)	Holdings, %				Used agricultural land (UAA), %			
	1995	1997	2000	2003	1995	1997	2000	2003
0-5	56.9	55.8	57.6	56.6	5.7	5.4	5.2	4.8
5-10	13.0	13.3	12.3	12.2	5.2	5.1	4.6	4.3
10-20	10.6	10.8	10.2	10.2	8.6	8.3	7.7	7.2
20-50	11.5	11.5	10.9	11.0	20.9	19.8	18.6	17.4
Over 50	8.0	8.6	8.9	9.9	59.6	61.4	63.8	66.3

Sources: Eurostat harmonized national data and EC surveys of the structure of agricultural holdings for 2003 (EUROPEAN COMMISSION, 2005).

The observed results for Moldova fall somewhere between the market model and the former Soviet model: The land concentration is not as extreme as in Russia and Ukraine, which are still very close to the former Soviet model characterized by sharply dual farm structure, but it is substantially more pronounced than in the EU (and also in the US and Canada). To move closer to the market pattern, Moldova has to undergo further farm size adjustment.

6 CONCLUSIONS AND RECOMMENDATIONS

Analysis based on national statistics and survey data shows that individual farms are more efficient than corporate farms. This conclusion does not necessarily mean that corporate farms should be eliminated and replaced with family farms. Corporate farms do exist in market economies, which proves that they are able to compete with individual farms. The small number of corporate farms that do exist in market economies appear to be even more efficient than individual farms as a group: In the United States, corporate farms control 2 % of agricultural land and generate 20 % of output (in Moldova, the relationship is reversed: Corporate farms control 50 % of land and generate less than 30 % of output). The market economies have achieved an equilibrium farm structure, which includes a mix of individual farms (the dominant majority) and corporate farms (a small minority) determined by resource availability, managerial capacity, and personal preferences of farmers and investors. A similar process can unfold in Moldova, but the development of corporate farms must be left to market forces, free from government intervention and programming.

Analyzing the dichotomy between small and large farms, we conclude, based on several surveys, that small farms are more productive and more efficient than large farms. This result is based on a mixed sample of both individual and corporate farms, which overall show decreasing returns to scale. On the other hand, a homogeneous sample comprising only corporate farms shows increasing returns to scale, i.e., among farms of the same type size has a beneficial effect on performance. Similarly, in a homogeneous sample comprising only individual farms, family well-being increases with farm size. Based on these findings we tend to believe that the different behavior is determined primarily by organizational form: Small farms do better than large farm not because of a size effect, but because individual farms (which happen to be small) outperform corporate farms (which happen to be large). In this context, the Government of Moldova should abandon its preference for large-scale corporate farms and concentrate on improving the operating conditions for small individual farms.

The farm structure in Moldova reveals a much greater concentration of land in large farms compared to established market economies. In the EU countries closest to Moldova such as Italy, Greece, and Portugal, and even in EU-candidate countries such as Bulgaria and Romania, large farms control a substantially smaller proportion of land. Therefore, to move closer to the farm-structure pattern typical of market economies, Moldova should allow land to flow from large corporate farms to small individual farms. This can be accomplished by emphasizing the development of a land market mechanism, which will simultaneously act to increase the average size and to reduce the number of small individual farms (284,000 farms is too much for a small country with a population of less than 4 million). These processes will reduce the concentration of land in large farms, while alleviating land fragmentation and thus will bring Moldova in closer conformity with the farm-structure patterns observed in market economies.

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ORGANIZATIONAL RESTRUCTURING OF THE AGRARIAN SECTOR IN BULGARIA DURING THE PRE-ACCESSION PERIOD

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ABSTRACT

The purpose of the paper is to show and assess the changes in the organizational structures in Bulgaria during the period 1998-2004 and to analyze the problems of the market-oriented structures in Bulgarian agriculture in the period leading to EU accession.

The evaluation of the changes in the distribution and characteristics of the productive structures is based on the census of agricultural holdings carried out in Bulgaria in 2003 and the results of two scientific projects done by the authors.

The paper encompasses the following parts:

- Results of organizational restructuring during the period 1998-2004;
- Agricultural producers' problems in adapting to agricultural policy requirements;
- Expected changes in the characteristics of organizational structures.

The paper defends the thesis that the organizational restructuring of the agricultural sector is not yet completed although the changes initiated after 2000 are similar to those in the EU. Gradually, in the pre-accession period, the characteristics of the organizational structures will come to resemble those of the developed EU countries.

Keywords: *Single area payment scheme, agrarian producers, organizational structures.*

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1 INTRODUCTION

During the last couple of years, constant changes have taken place in the productive structures of Bulgarian agriculture. Until 1998-1999 they were mainly due to the consequences of the process of agricultural land restoration and, after that period, due to the gradual application of stimuli similar to those applied in the EU countries.

The accession of Bulgaria to the EU will introduce a new working environment for our agricultural producers. This working environment will have new rules and requirements which a considerable number of Bulgarian farmers will find difficult to implement. This is acknowledged not only by the farmers but by all Bulgarian citizens. According to data from Euro-barometer, the greatest fears of all Bulgarians are linked with the difficulties for agricultural producers and the danger that the country will have to pay more and more to the EU, fears which are shared by 55 % of the population. These concerns outstrip even those linked with international organized crime and the increase in drug trafficking (53 %), economic crisis (44 %), and power loss in the small municipalities (42 %), which in practice affect all Bulgarian communities.

The purpose of the paper is to assess the organizational restructuring in the agrarian sector and to assess the problems agrarian structures face, which are linked with Common Agricultural Policy (CAP) implementation and the expected changes in their behavior and characteristics.

The thesis of the paper is that, despite the dynamic changes in the number and significance of the main market-oriented agricultural holdings in the last five years due to the gradual implementation of some CAP elements, our accession to the EU will be the start of a new period for the organizational restructuring of the sector. Moreover, the initial implementation of single area payments (probably up to 2010-2012), followed by the implementation of single holding payments, will create mixed signals for agricultural producers and is a precondition for inconsistency in agrarian policy.

2 RESULTS OF ORGANIZATIONAL RESTRUCTURING DURING THE PERIOD 1998-2004

During the last decades, the significance of the agricultural sector has been considerably higher in Bulgaria than in the rest of Europe. In the last couple of years there has been a trend towards some decrease in the significance of the agricultural sector. However, according to Eurostat data, in Bulgaria (2004) the relative share of agriculture in the Gross Added Value is 5.1 times higher than the EU-25 average and even 1.57 times higher than in Greece (the country with the highest level in the EU). This shows the great influence that CAP implementation will have on Bulgaria, not only in the agricultural sector but in the economy as a whole, compared to last ten new EU members.

Labor occupancy in agriculture in Bulgaria is higher than the EU average. In 2004 this indicator was 10.7 % in Bulgaria, whereas the average EU level was 5 %. Only Poland, Lithuania, Latvia, Greece, and Portugal had levels of agricultural labor occupancy higher than in Bulgaria. Expressed in Annual Working Units (AWUs) per holding, the figure is 1.19 for Bulgaria, compared to 0.92 for the EU-25 and 0.9 for the EU-15.

In Bulgaria 0.57 AWUs corresponds to 1 worker, whereas in the EU it is 0.45, in the Czech Republic 0.78, and in Malta 0.24. According to this indicator, our country is close to the levels for Denmark (0.62 AWUs) and Ireland (0.63 AWUs) which shows the relatively efficient labor usage in agricultural holdings.

For average size of Used Agricultural Area (UAA), Bulgaria takes one of the last places, ahead of only Malta and Cyprus. Moreover, our 4.4 ha of UAA are similar only to the average size of Used Agricultural Area in Greece (4.8 ha) and Hungary (5.6 ha). Far ahead are the agricultural holdings in the Czech Republic with 79.4 ha UAA, the UK with 57.4 ha UAA, Denmark with 54.7 ha UAA, and others. As a whole the average size of the Used Agricultural Area is 3.6 times lower than that in the EU-25 (15.8 ha in 2004). Although some regions in Bulgaria have most of the characteristics of the South European Agricultural Model, the above-mentioned size indicates the unfavorable situation in Bulgarian agriculture after a 15-year transition period.

Bulgarian agriculture has a noticeably dualistic structure compared to the average situation in the EU (Table 1). Only in the Czech Republic and Germany do large agricultural holdings have higher relative shares of the Used Agricultural Area, whereas small agricultural holdings have a higher relative share only in Malta. In Bulgaria 96.8 % of the agricultural holdings cultivate only 15 % of the Used Agricultural Area and 75.8 % of the UAA is used by only 0.8 % of producers (Table 1).

The situation with livestock is analogical. The average size of herds in Bulgaria is 10 times lower than in the EU. In practice, it is difficult to make comparisons with the leading EU countries such as France and the UK. In Bulgaria, where 57.6 % of milking cows are bred in holdings with up to 2 cows, agricultural holdings with very small numbers of animals are predominant. They cannot secure the appropriate conditions for breeding or reach the required veterinary, sanitary, and ergonomic norms and standards.

Although the Bulgarian Parliament and Ministry of Agriculture and Forestry have adopted several legislative norms for area required per animal, for breeding conditions and other aspects, in practice the prevailing number of holdings do not meet these requirements.

Table 1: Structures of holdings by number and used agricultural land in the EU-25 and Bulgaria

Farm size (ha)	Percentage of agricultural holdings	Percentage of used agricultural land	Percentage of agri-cultural holdings	Percentage of used agricultural land
	EU-25		Bulgaria	
Up to 5	61.9	6.2	96.8	15.0
5-10	13.1	5.9	1.5	2.2
10-20	9.9	8.8	0.6	1.8
20-50	8.3	16.6	0.4	2.6
Above 50	6.8	62.5	0.8	78.5

Source: EUROPEAN COMMISSION; FAO;UNSO; MINISTRY OF AGRICULTURE AND FORESTRY, 2003.

The low farm size combined with the poor technological level of production leads to unsatisfactory yields and productivity. This is the basis of the considerable differences between the economic sizes of the agricultural holdings, reflecting to a great extent income differences between agricultural producers. Whereas this size is € 68,000 in the EU-15[1], in Bulgaria it is only € 1,940.

The distribution of agricultural holdings by economic size indicates that in the EU-15 small holdings produce only 4.8 % of agricultural output, whereas in Bulgaria this value is 46.31 % (Table 2).

On the basis of the agricultural holdings by economic size and other indicators, we can say in summary that Bulgarian agriculture and its organizational structures differ substantially from those in the EU-25 countries. These differences are preconditions for the specific difficulties which our producers face.

During the 7-8 years since the start of Bulgaria’s negotiations for EU accession, a start has been made in gradually implementing some elements of policy similar to those applied in the EU. The funds available to agricultural producers from the State Agriculture Fund, SAPARD, and other funds have contributed in varying degrees to the development of organizational structures. Some types of structure have become predominant in certain regions, at the expense of other forms.

[1] As per 20.03.2006. There are no data for this indicator for the EU-25.

Table 2: Distribution by economic size of holding in the EU-15 and Bulgaria

Farm size	Percentage of agricultural holdings	Percentage of agricultural outputs	Percentage of agricultural holdings	Percentage of agricultural outputs
	EU-15		Bulgaria	
Small (up tol 8 ESU)	32.35	4.8	98.69	46.31
Medium small (8-16 ESU)	18.88	6.2	0.51	3.47
Medium large (16-40 ESU)	23.34	14.7	0.35	5.37
Large (41-100 ESU)	17.03	27.7	0.25	9.89
Very large (above 100 ESU)	8.5	44.6	0.2	34.96
Total	100.0	100.0	100.0	100.0

Source: EUROPEAN COMMISSION; FAO;UNSO; MINISTRY OF AGRICULTURE AND FORESTRY, 2003.

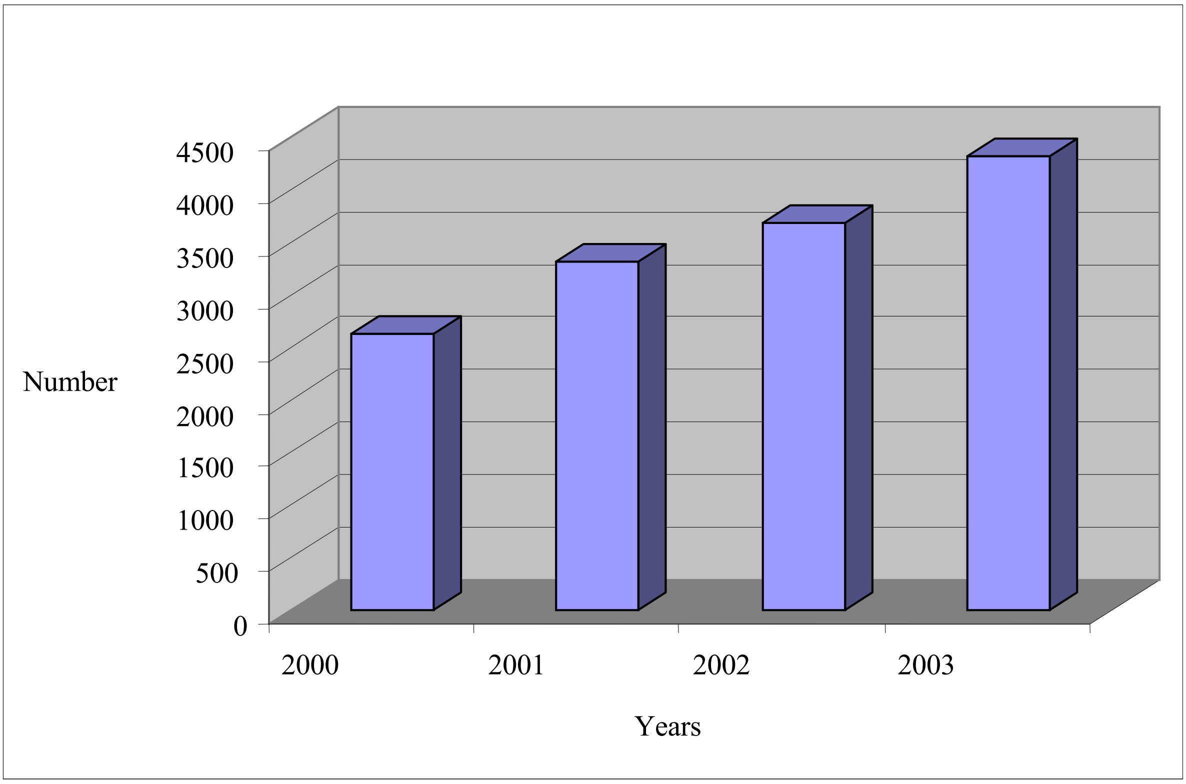
Although no stable trends can be elucidated from such a short period, in the years since the start of Bulgaria's negotiations for EU accession the following organizational structural changes can be seen:

- An increase in the relative share of the Used Agricultural Area of agricultural holdings which belong to legal entities, together with a decrease in the average size of the holdings (from 432 ha in 2000 to 346.4 ha in 2003).
- An increase in the number and significance of the structures registered under the Trade Law (Figure 1) on account of the decrease in the number of those registered under the Law on Cooperatives (Table 3). Thus, there is a continuing transition from collective structures to structures with one or more (most often fewer than seven) owners and with differentiated managerial rights.

The preliminary data from the census of agricultural holdings held in 2003 showed that 63.75 % of those registered under the Trade Law in Bulgaria preferred the status of sole trader. The average area of the agricultural land used by them was 114.4 ha.

- Diversification in sole traders' productive specializations and an increase in the number of those specializing in livestock, as well as of those using different forms of productive integration on the land-end product chain.
- An increase in the relative share of agricultural land in the so-called land-leased holdings, which have long-term periods of functioning, which in turn favors stabilization.

Figure 1: Number of agricultural enterprises (2000-2003)



Source: MINISTRY OF AGRICULTURE AND FORESTRY IN BULGARIA, 2003.

Table 3: Changes in the number and size of agricultural cooperatives

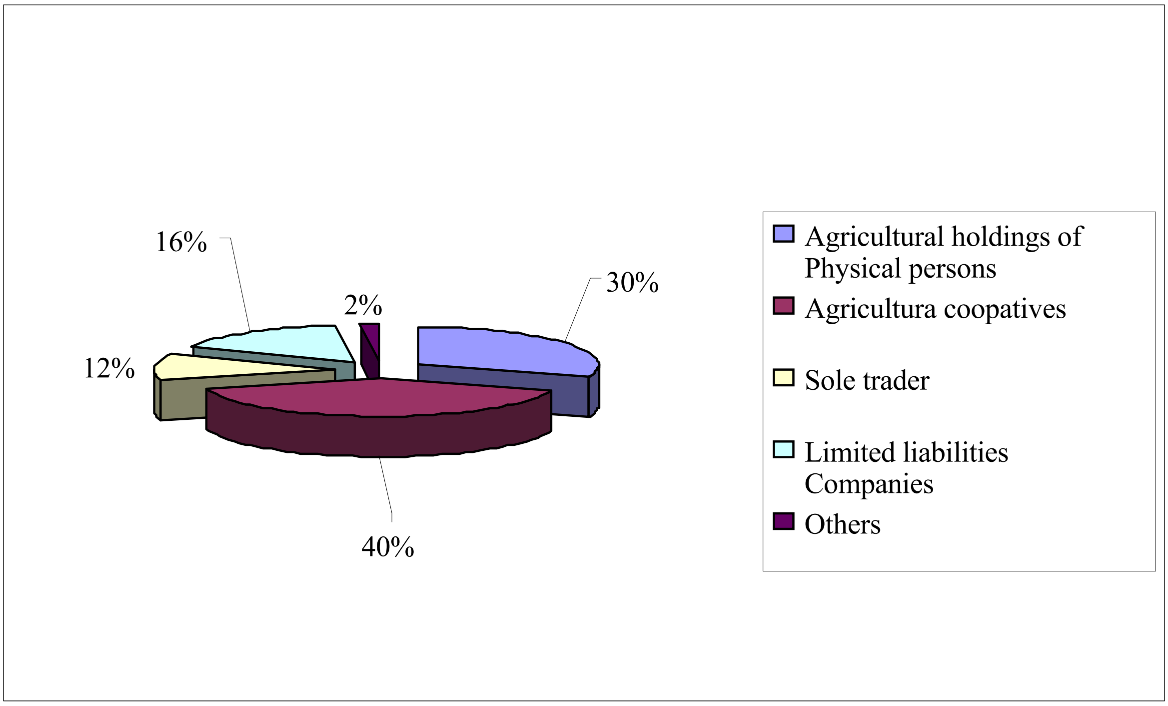
Year	Number of cooperatives	Used agricultural land (million of ha)	Average size (ha)	Share of used agricultural land (%)
1998	3,269	2.427	760.1	40.3
2000	2,405	1.738	722.9	51.0
2003	1,963	1.169	587.0	40.0

Source: MINISTRY OF AGRICULTURE AND FORESTRY IN BULGARIA, 2003.

The continuing establishment of various partnerships, cooperatives and other structures for facilitating access to credit, products, and services. The speed of development of these processes is not satisfactory, despite the favorable preconditions.

As a result of the changes which have taken place in the country in the last couple of years, agricultural cooperatives have the highest relative share of UAA. Figure 2 shows that, at 40 %, they rank first followed by the holdings of physical persons – 30 %, holdings registered under the Trade Law (LLC), sole traders, and others.

Figure 2: Ownership structure of used agricultural land, 2003



There are substantial regional variations in the distribution and significance of the organizational forms (Table 4). In four of the regions, the largest amount of agricultural land is cultivated by agricultural cooperatives; in two of them, physical persons' holdings predominate. In the southeastern region, units registered under the Cooperative Law and under Trade Law cultivate the same amount of land.

Agriculture in the southeastern and south central planning regions bears similarities to the North European Model of agriculture, whereas the southwestern region and some parts of the south central region could be defined as typical of the South European Model.

Table 4: Distribution of used agricultural land by holdings in planning regions

Regions of planning (NUTS-2)	Holdings of physical persons (%)	Agricultural cooperatives (%)	Sole traders (%)	Limited liabilities companies (%)	Others (%)
Northwestern region	37	33	14	15	2
North-central region	24	48	11	16	1
Northeastern region	26	37	17	20	1
Southeastern region	31	43	6	17	3
South central region	37	41	8	12	2
Southwestern region	58	27	4	8	3
Bulgaria	30	40	12	16	2

Sources: MINISTRY OF AGRICULTURE AND FORESTRY, 2003.

Substantial regional differences can also be seen in the average size of holdings in general and of those holdings which are of prime importance to those belonging to agricultural cooperatives and to physical persons. Table 5 shows that the average size of holding varies more than six fold among the regions.

Table 5: Average size of used agricultural land by all types of holdings, 2003

Regions	All types of holdings (ha)	As percentage of national average	Cooperatives (ha)	Holdings of physical persons (ha)
Northwestern region	4.2	95.45	503.7	1.6
North central region	6.1	138.63	748.7	1.5
Northeastern region	8.2	186.36	724.6	2.1
Southeastern region	5.8	131.82	731.9	1.8
South central region	2.6	59.10	445.5	1.0
Southwestern region	1.3	29.54	190.9	0.7
Bulgaria	4.4	100.0	592.7	1.4

Source: MINISTRY OF AGRICULTURE AND FORESTRY, 2003.

3 AGRICULTURAL PRODUCERS' PROBLEMS IN ADAPTING TO AGRICULTURAL POLICY REQUIREMENTS

Although there are several months to go before Bulgaria's accession to the EU and the overall value of direct payments, market support, and regional support have already been set, the majority of the agricultural producers are not yet prepared to function in a market environment. Moreover, most owners of agricultural holdings are still postponing their decisions regarding registration as agricultural producers. This is due to the late definition of the minimum area eligible for direct payments, as well as the lack of opportunity for agricultural producers to define the amount of the single area payment before registration.

The minimum size of holding eligible for support via single area payments is 1 ha for the majority of crops or 0.5 ha for vineyards, perennials, and tobacco, was fixed only in February, 2006. The second condition for obtaining such payments is that the size of the land parcels be not less than 0.1 ha. With this decision, Bulgaria adopted the minimum size of holding eligible for support prevailing in the majority of the new EU members: 1 ha; and, like Hungary, set a different lower limit for holdings specializing in the cultivation of labor-intensive crops.

The lower limit can be assessed from two points of view: In terms of the criteria used up to the moment for agricultural producers and in terms of the data from the census of agricultural producers. In comparison with the criteria applied from 1999 to 2005, those for 2006 are two times higher for mass crops and 5 times higher for special crops. Although official data on the agricultural producers have not been published, officials say most holdings are occupied by physical persons and are close in size to the minimum eligibility requirements. Moreover, in all probability some of the already-registered holdings will not meet the new criteria.

It must be underlined that stimuli applied by the State Agriculture Fund, SAPARD, and other agencies have not had enough effect on producers activity, and that only an insignificant number of producers have registered. Data from agrarian reports from recent years show that the number of registered agricultural producers is increasing, but that in 2004 they totaled only 10 % of all holdings (Table 6).

The low relative share of registered agricultural producers in the total number of holdings reflects the majority of Bulgarian farmers' lack of experience in accountancy. Keeping accounts is a precondition for obtaining the direct area payment and requires Bulgarian farmers to be educated in this respect.

Table 6: Number of registered agricultural producers and tobacco growers, 2001-2005

Year	Total number of registered agricultural producers	Registered producers as percentage of all holdings	Total number of registered tobacco growers	Registered tobacco growers as percentage of all holdings
2001	29,059	3.8	47,784	6.2
2002	37,836	4.9	60,076	7.8
2003	43,930	6.6	62,789	9.4
2004	66,772	10.0	61,917	9.3
09.2005	64,127	9.6	65,965	9.9

Source: MINISTRY OF AGRICULTURE AND FORESTRY, 2004, 2005.

Based on census data from 2003 and the lower size limits for eligibility for subsidies, we can say that 49.4 % of holdings are eligible to register. This means that it is possible to register at the maximum another 323,000 holdings.

At the same time, the size of the direct area payment is critical to the owners of small holdings in deciding whether to register. For those of them who do not plan to avail of other subsidies, it is extremely important that the direct area payment be higher than their social and health insurance payments. For 2006, when the minimal monthly insurance income is € 112.50[2] (220 Leva) and there is a preference for agricultural producers to be insured at € 56.24 or € 28.12 (for those active only in agriculture), this gives, respectively, figures of € 195.71 and € 97.86. Assuming that a single area payment of € 47.50 per ha, the average for the other new EU member countries, will be made, this gives us a figure of 2 ha of UAA. Even more unfavorable would be the situation if we accepted a payment level close to Latvia's, in which case one would need 5 ha in order to receive enough money to cover social and health insurance.

The experts' expectations are that in Bulgaria the single payment per hectare will be around € 75.

[2] 1 € = 1,9558 Leva.

Table 7: Minimal size of Used Agricultural Area and value of single payment per ha in the new EU members

States	Minimal size of UAA (ha)	Value of single payment per ha in Euro	National differences in the size of the single payment in %
Cyprus	0.3	80.8	168
Czech Republic	1.0	57.3	120.6
Estonia	1.0	26.8	56.6
Hungary	1.0/0.3	70.2	147.7
Latvia	1.0	20.7	44.8
Lithuania	1.0	35.9	75.6
Poland	1.0	44.5	93.6
Slovakia	1.0	43.8	92.0
Average		47.5	100.0

Source: EU, 2005.

The adaptation of the single payment per hectare creates different stimuli for the agricultural producers with different specializations. Expenses for growing different crops vary from € 150-200/ha to € 1,000-1,500/ha, which means that the value of the subsidy in relation to production costs will vary eightfold to tenfold.

Even more unfavorable is the situation of agricultural producers specialized in animal breeding who do not produce own fodder and do not cultivate agricultural land. They will not receive single payments under this scheme.

At the same time, only relatively large producers will be able to reach the approved minimum intervention quantity (other than for hard wheat) because in Bulgaria this would require a holding of 20-40 ha.

The approved milk quota and payments at 25 % of EU levels, coupled with the small size of Bulgarian holdings, will put them in an extremely unfavorable position. The envisaged three-year period after our accession after which it will be impossible to buy milk from small producers requires substantial restructuring of the sector towards increasing the number and significance of large holdings.

When assessing the position of Bulgarian milk-producers, it should not be underestimated that they will receive only 25 % of EU-15 levels of help for 2007 and 30 % for 2008; only in 2016 they will receive the same amount of help. This means that during the whole decade 2007-2016 the situation of our farmers will be affected by the low size of holdings and by low levels of subsidies.

The situation for the producers of fresh fruit and vegetables could also be seen as unfavorable. For the moment the European practice of offering the subsidies to organizations of such producers cannot be applied in Bulgaria. The contracted three-year period during which the subsidy will be in the form of single-area payments for individual producers will require great efforts from the Bulgarian authorities to convince agricultural producers to establish their own organizations.

Although measures to encourage their establishment were introduced with SAPARD measure 1.5, "Establishment of groups of producers", and criteria for their recognition were defined in Regulation N24 of the Bulgarian Ministry of Agriculture and Forestry, such organizations in practice do not exist. Mainly for these reasons, it has been decided to decrease the minimum requirements for membership (form 30 to 5 agricultural producers) and volume of sales (from € 150,000 to € 100,000), but even these limits are too high for current conditions in the sector. Taking into consideration the average prices of vegetables for the last couple of years, this would mean that members of one group would have to achieve around 200-400 tons of production.

The agreed measures for helping the development of rural regions will create opportunities for rural households to receive additional income. In this respect, the organizational restructuring will be improved by the measures entitled "market-oriented holdings in process of restructuring", "standards of community", "food quality", and others. Farmers' voluntary participation in these measures will help them to develop their holdings and their characteristics to become more similar to holdings in developed EU countries.

On the basis of the above-mentioned and other approved measures, the conclusion can be drawn that Bulgarian agricultural holdings will face the competitive environment of EU agriculture where farm size and levels of subsidies differ substantially, being roughly four times higher in the EU. This means that in the coming years, as levels of subsidies are gradually equalized, major changes will occur in the distribution and significance of the various organizational forms of farming and in specialization.

4 EXPECTED CHANGES IN ORGANIZATIONAL STRUCTURES

The application of single payment per ha as an instrument directed at agricultural producers will be the basis of the next organizational restructuring. It will be directed towards:

- Increasing demand for agricultural land for lease and/or purchase;
- Expanding production in the favorable regions combined with an increase in the UAA;
- Increasing the number of agricultural holdings which produce some or all of their own fodder;
- Establishment of producers' organizations in tobacco, vegetable, and fruit growing, and in other areas;
- Increasing the number of livestock per holding;
- Decreasing the overall number of agricultural holdings.

The plans for implementation of single area payments in Bulgaria is already influencing the lease-purchase market in land there. There is an increase in the activity of both the leaseholders and the landowners. The first are motivated by the opportunities for receiving higher amounts of money for land-lease payments and landowners are in a process of re-thinking their decisions for establishing their own holdings or for long-term provision of agricultural lands for lease to production cooperatives or agro-business companies.

At the same time the single payment per ha will influence landowners to seek higher levels of lease payments. This will impose a substantial increase in the levels of payments for land-lease in the main productive areas due to the more developed land-lease market there. Probably this will cause a reduction in the size of some cooperatives because some of the landowners will prefer to create their own holdings or to offer their land to other companies.

By the end of 2006, agricultural producers have to register with the System for Identification of Land Plots. This is a prerequisite for them to be able to receive European subsidies under the scheme for single area payments after Bulgaria joins the EU. Owners will be required to declare any changes in the amount of land under cultivation.

As a result of the implementation of the direct payments, the size of several holdings will increase, particularly in the southeastern and Northeast planning regions.

Changes in the characteristics of some agricultural holdings which specialize in livestock will be encouraged by the support based on UAA. When there is enough agricultural land for lease and purchase, in all probability a considerable number of producers will direct their efforts towards independent fodder production. Thus, apart from the market support for milk and other animal products, they will add the direct area payments for the Used Agricultural Area. This will lead to a decrease in the amount of land offered for "personal use" or "productive service", which in some regions reaches between 11 and 13 % of the UAA of production cooperatives.

On the whole, a decrease in the overall number of agricultural holdings is expected. Most affected will be the so-called semi- market-oriented holdings and the smaller market-oriented holdings. Their continued existence will be possible only via some form of cooperation on a contract basis with other producers and processors of agricultural produce or via their participation in organizations of producers of fresh fruit and vegetables, tobacco, etc.

Due to the short period of operation of the scheme for single payment per hectare, Bulgarian agriculture will in only a few years begin its transformation, which will create new conditions for income support for agricultural producers.

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GOVERNANCE OF BULGARIAN FARMING – MODES, EFFICIENCY, IMPACT OF EU ACCESSION

*HRABRIN BACHEV**

ABSTRACT

This paper employs New Institutional and Transaction Costs Economics to analyze Bulgarian agriculture. It evaluates the efficiency of dominant governing forms on the eve of EU accession, and assesses the likely impact of Common Agricultural Policy CAP implementation on farming structures. Firstly, assessment is made on the comparative efficiency, complementarily, and sustainability of major farm structures such as agro-firms, cooperatives, unregistered and subsistence farms. Next, principal modes of land, labor, service, inputs and financial supplies, in addition to marketing in different types of commercial farms, are identified and evaluated. Finally, a feasible pace for CAP implementation in the Bulgarian condition is projected, and the likely impact on farm structures is estimated.

Keywords: *Farm structures, efficiency, sustainability, impact of CAP, Bulgaria.*

1 INTRODUCTION

Since the beginning of transition, a specific governing structure has evolved and dominates Bulgarian farming: It consists of a huge number of subsistence and small farms, the widespread use of (over) integrated and cooperative modes, a big reliance on large scale "personal relations", the domination of "grey" structures, and poorly functioning formal institutions, etc. (BACHEV, 2005).

The broadly applied "traditional approach" for assessing farm efficiency and sustainability focuses on productivity, financial independence, and correspondence to the EU farming model (KANEVA et al., 2005). However, this "institution-neutral" and "transaction costs-free" framework fails to explain the high efficiency and sustainability of dominant, low-productive subsistence and part-time farming, over-integrated forms and production cooperatives. Moreover, it entirely ignores some of the typical forms of governing agrarian and rural activity

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such as integral modes, interlinked arrangements, and the great variety of informal forms. Finally, it contributes little towards understanding the feasible pace and impact of CAP implementation in the Bulgarian condition.

This paper employs New Institutional and Transaction Costs Economics to analyze Bulgarian agriculture, evaluates the efficiency of dominant governing forms on the eve of EU accession, and assesses the likely impact of CAP implementation on farming structures.

2 THE NEW INSTITUTIONAL ECONOMICS APPROACH

We adapt the *New Institutional (Transaction Costs) Economics* framework (FURUBOTN and RICHTER, 1998; NORTH, 1990; WILLIAMSON, 1996) to assess the efficiency and sustainability of governing structures in Bulgarian farming (BACHEV, 2004; BACHEV, 2005). Following this "new" logic, the *institutional framework* and *transactions costs* are considered as crucial factors that affect agent behavior, and organizational and contractual choice. An individual agrarian transaction is turned into a *basic unit* of analysis. Various *market* (spotlight/classical contract), *special contractual* (private ordering, alliances), *internal* (one person farm/firm, cooperation, partnerships), and *hybrid* forms, are all considered as *alternative modes* of governing transactions. Selection or invention of a particular arrangement for governing resources and carrying out activities is regarded as a (transaction) *costs minimizing* undertaking.

We analyze the *specific factors* of transaction costs – *institutional* (structure of formal and informal rights/restrictions, and systems for their enforcement); *behavioral* (agents' bounded rationality, tendency for opportunism, risk aversion, trust, experiences, preferences); *dimensional* (frequency of transactions between partners, uncertainty surrounding transactions, assets specificity/dependency, and appropriability); and *technological* (modernization of production, storage, transportation, communication, and enforcement technologies).

We apply *the discrete structural analysis* and assess the *comparative* advantages and disadvantages of available/feasible forms in terms of *capacity to:* Increase transaction benefits; comply with and take advantage of various institutional restrictions/opportunities; decrease bounded rationality and uncertainty; improve coordination and incentives; control transactions; protect dependent investments and (absolute/contracted) rights from possible opportunism; resolve disputes; overcome risk; and save current and long-term transacting costs.

In this paper we take a particular look at two issues. Firstly, we evaluate the efficiency of the dominant forms of farm organization – agro-firms, cooperatives and unregistered and subsistence farms. Major modes for governing *land* supply, *labor* supply, *service* supply, *inputs* supply and *finance* supply, and *marketing* of farm products and services in different type farms are identified and assessed. Effective horizontal and vertical farm boundaries are determined by assessing their potential to explore technological possibilities (economies of size/scale on specific and specialized capital) *and* maximize benefits of/economize costs on transacting.

Next, we assess farm *sustainability*[1] though analyzing their *potential* (incentives, ability) *for adaptation* to an evolving market, institutional, and natural environment. A feasible pace and extent of CAP implementation in Bulgarian conditions, overall development of the "rules of the game", and likely prospects for organizational modernization are all taken into account.

This study is based on official and original data collected from the managers of 2.8 % of all cooperatives, 1.2 % of agro-firms, and 0.3 % of unregistered commercial farms, respectively. All farms were selected as representative of the main regions of the country.

3 MODES OF FARM ORGANIZATION

3.1 Business organizations (Agro-firms)

According to official data, there are 665,548 farms in Bulgaria, mostly (98.4 %) designated as utilized agricultural area (UAA) (MFA 2004). Agro-firms are registered as Sole traders, Companies, or Partnerships and account for a tiny portion of all farms, but concentrate a significant part of total UAA (Table 1). These organizations govern a good part of cereals, industrial crops, orchards, chickens and pigs and are also a major employer of hired labor in the sector.

Table 1: Share of different type of farms in total number of holdings, major agrarian resources and productions in Bulgaria

Indicators	Physical persons	Coopera-tives	Sole traders	Companies	Partner-ships
Number of holdings with UAA (%)	99.0	0.3	0.4	0.2	0.05
Utilized agricultural area (%)	30.3	40.3	11.7	16.1	1.6
Average size (ha)	1.4	592.6	118.8	352.5	126.2
Number of breeders without UAA (%)	96.1	0.2	1.9	1.7	0.1
Workforce (%)	95.5	1.2	0.8	1.4	0.3
Labor input (%)	91.1	4.1	1.4	2.8	0.6
Cereals (%)	26.6	41.8	13.0	17.3	1.3
Industrial crops (%)	20.5	45.1	14.2	18.6	1.6
Fresh vegetables (%)	86.4	4.4	4.2	4.6	0.4
Orchards and vineyards (%)	52.3	29.5	2.9	10.7	4.6
Cattle (%)	90.2	5.1	1.5	2.5	0.7
Sheep (%)	96.0	1.4	0.8	1.0	0.8
Pigs (%)	60.3	1.4	7.0	30.5	0.8
Poultry (%)	56.5	0.2	13.3	29.3	0.7

Source: MAF, Agricultural Holdings Census in Bulgaria, 2003.

[1] Sustainability of a farm characterizes its *ability to maintain (continue) over time*.

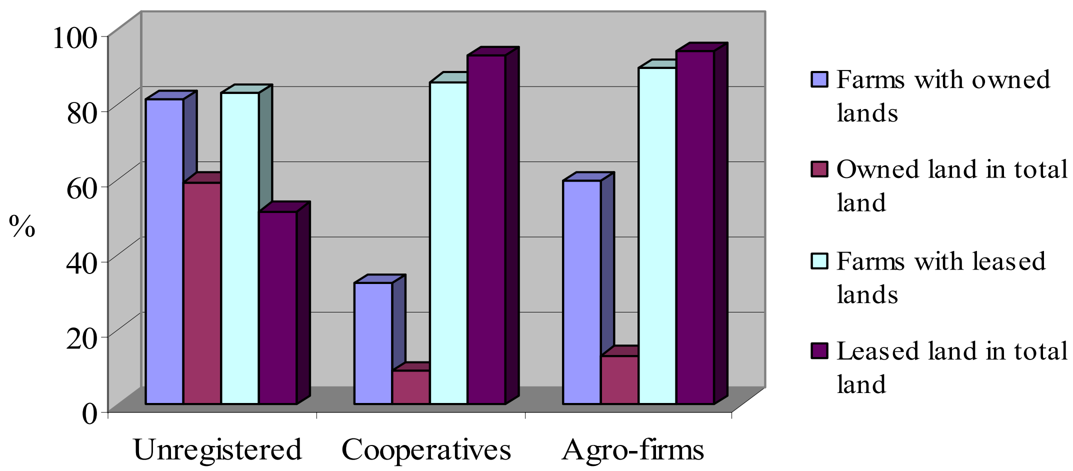
Agro-firms are commonly large, specialized enterprises averaging 187.6 ha, breeding more than 100,000 poultry or 1,000 pigs. Most of these firms were set up as family/partnership businesses during the first years of transition by younger generation entrepreneurs. Specific management skills and "social" status, and a combination of partnership assets (technological knowledge, business and other ties, available resources) led to the rapid extension of farms through an enormous concentration of (management, ownership) of resources, exploration of economy of scale/size, and modernization of enterprises (BACHEV, 2000). Institutional uncertainty, unsettled rights on assets, personal relations and "quasi"/entirely integrated modes were extensively used to overcome transaction difficulties. Some state companies were taken over by managers and registered as shareholdings. Joint ventures with non-agrarian and foreign capital started to appear as well. The number of agro-firms has doubled since 2000, and the share of UAA has been augmented; they increasingly have incorporate new types of activities and organizational schemes, including integration into processing, marketing, etc.

Business farms are profit-oriented organizations, and farmer(s) have great incentives to invest in farm-specific (human, material, intangible) capital because they are the sole owners of residual rights (benefits) of the farm. Owners are family members or close partners, and internal transaction costs for coordination, decision-making, and motivation are not high. The organizational style of a firm is preferred since it provides the opportunity to overcome coalition difficulties (e.g. forming joint ventures with outside capital, disputed ownership rights through the court system); to diversify into farm related/independent businesses (trade, agro-tourism, processing); to develop firm-specific intangible capital (advertisement, brand names, public confidence) and its extension into a daughter company, trade (sell, licensing), and transfer through generations (inheriting); to overcome existing institutional restrictions (e.g. for direct foreign investments in farmland and engaging in trade with cereals/vine/dairy); to provide explicit rights for taking part in particular types of transactions (export licensing, privatization deals, assistance programs).

Their large size and reputation make business farms preferable partners in inputs supply and marketing deals. The recurrence of transactions with "the same partners" is high, which restricts information asymmetry and opportunistic behavior, and develops mutual trust and other mechanisms for facilitating (lowing costs of) relationships – planning, adjustment and payment modes, guarantee schemes, dispute resolution devices, etc. Besides, agro-firms have giant negotiating power and effective economic and political mechanisms to enforce contracts. They also possess great potential to collect market information, search for the best partners, use experts and innovation, meet special (collateral) requirements and bear the risk and costs of failures. In addition, they could explore economy of scale/scope on production and management (e.g. "package" arrangement of credits for many projects and interlinking inputs supply with know-how supply/crediting/marketing). They are also able to invest considerable relation-specific capital (information, expertise, reputation, lobbying, bribing) for dealing with funding institutions, agrarian bureaucracy, and market agents at national or even international scale.

Under the conditions of non-working court and contract enforcement systems, all critical farm transactions are governed (controlled/protected) through internal modes. Farm-specific assets such as critical machinery, vineyards, orchards, animals, processing facilities, and adjoining land, are all safeguarded by ownership. Low cost standard (one-season, share rent) lease-in contracts are widely used to govern land supply from tens/hundreds of proprietors (Figure 1). Critical transactions are integrated through extensive labor employment (Figure 2). Besides, core labor (specialists, mechanists) is hired on a permanent basis and special forms such as output-based compensation, interlinking (housing, services), social disbursements, paid holidays, etc., are further used to enhance motivation.

Figure 1: Governing land supply in Bulgarian farms

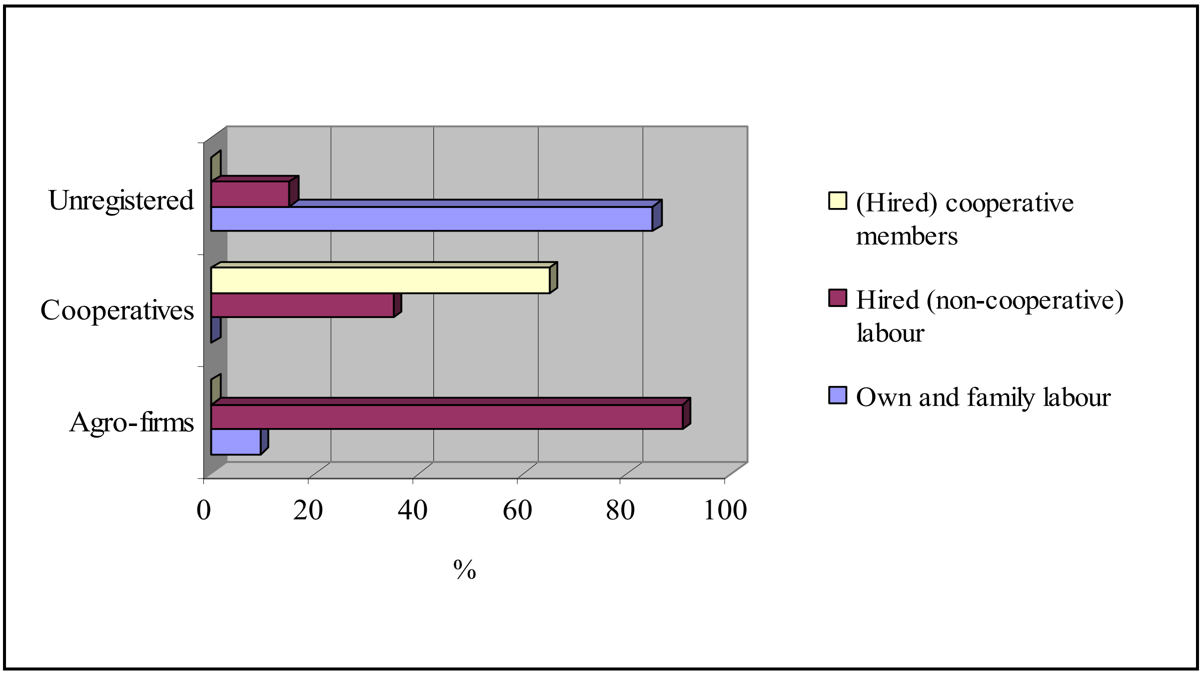


Source: Personal interviews with farm managers.

Own supply (making) rather than outside procurement is typical for essential services and inputs (Table 2, Table 3) which prevents risk from unilateral dependency (opportunism of supplier) or missing market situation. In the case of high asset interdependency (product specificity; quality/quantity dependency) with a downstream partner's reciprocal supply of inputs against, marketing is applied.

Funding is secured through an effective combination of equity, debt, public and hybrid modes (Table 4). Standard activities/assets are financed by bank credit since it is easy to arrange a loan. Alternatively, farm-specific investments are financed through private modes – own sources, "personal" loans and co-invest-ment. Also, special contract modes are used to mitigate funding difficulties (e.g. shortage of working capital) or to facilitate mutually-dependent relations with buyers/suppliers, such as delayed payments for inputs supply (zero interest, "loans in kind"), interlinking credit with inputs supply and marketing, leasing or accepting outside investment ("hostage taking", joint ownership) of long-term assets.

Figure 2: Modes of labor supply in Bulgarian farms



Source: Personal interviews with farm managers.

Table 2: Governing of service supply in Bulgarian farms (% of farms)

Service type	Modes	Unregistered	Cooperatives	Agro-firms
Technological knowledge and advises	Own supply	24	49	65
	Own cooperative	5	7	15
	Market supplier	13	10	25
Mechanization services	Own supply	18	85	60
	Own cooperative	22	0	18
	Market supplier	15	15	28
Spreading chemicals and pesticides	Own supply	40	65	60
	Own cooperative	15	7	12
	Market supplier	12	25	28
Veterinary services	Own supply	20	60	40
	Own cooperative	5	0	0
	Market supplier	40	40	60

Source: Personal interviews with farm managers.

In recent years, new opportunities have appeared which stem from preferential public programs for agriculture (SAPARD, STA). Agro-firms are especially quite successful in developing good proposals, meeting formal requirements, dealing with complicated paper work, "arranging" the selection of projects for purchasing machinery, building orchards/vineyards/processing facilities, improving ecological performance, etc. As much as 64 % of the projects funded by the SAPARD Measure "Investments in agricultural holdings", were won by agro-firms (MINISTRY OF AGRICULTURE AND FORESTRY BULGARIA, 2004).

Table 3: Governing of inputs supply in Bulgarian farms (% of farms)

Inputs type	Supplier	Unregistered	Cooperatives	Agro-firms
Chemicals	Own production	17	0	0
	Own cooperative	10	5	15
	Market supplier	55	95	90
	Buyer of farm output	24	13	33
Seeds and seedlings (crop farms)	Own production	47	53	33
	Own cooperative	3	15	23
	Market supplier	50	32	45
	Buyer of farm output	4	41	44
Forage (livestock farms)	Own production	55	65	50
	Own cooperative	0	0	35
	Market supplier	45	35	15
	Buyer of farm output	9	6	53
Machinery	Own production	12	13	0
	Own cooperative	20	17	46
	Market supplier	68	70	54
	Buyer of farm output	15	0	19
Livestock	Own production	37	50	28
	Own cooperative	21	31	33
	Market supplier	42	19	39
	Buyer of farm output	40	17	13

Source: Personal interviews with farm managers.

In marketing farm output and services, classical trade across the market (wholesale market; business with market agents) dominates (Table 5). Since the main part of a farm's product has a standardized (commodity) character, market prices/competition effectively govern relations with partners. However, when specificity of output to a particular buyer (processor, retailer) is high (technology, quality, packaging, time of delivery, origin, site-specificity) then delivery contracts with a respective partner are employed to tailor or protect transactions.

Table 4: Governing of finance supply in Bulgarian farms (% of farms)

Supplier	Type of funding	Unregistered	Cooperatives	Agro-firms
Own financing	Short-term	91	81	79
	Long-term	49	48	55
Relatives and friends	Short-term	31	7	10
	Long-term	20	0	23
Inputs supplier	Short-term	22	27	28
	Long-term	31	23	34
Outside investor	Short-term	0	11	13
	Long-term	0	0	17
Farm organization	Short-term	13	16	7
	Long-term	14	4	14
Commercial bank	Short-term	6	18	38
	Long-term	3	11	23
Public program	Short-term	11	56	62
	Long-term	7	19	22

Source: Personal interviews with farm managers.

Table 5: Governing of marketing in Bulgarian farms (% of farms)

Output	Modes	Unregistered	Cooperatives	Agro-firms
Grain	Own cooperative	9	7	9
	Another farm/firm	50	85	75
	Processor	25	39	37
	Retail	6	7	16
Vegetables	Own processing	0	0	15
	Another farm/firm	24	24	35
	Wholesale market	6	5	15
	Processor	38	66	30
	Retail	12	0	6
Fruits and grape	Own processing	15	7	19
	Own cooperative	24	7	9
	Another farm/firm	48	39	32
	Wholesale market	0	22	22
	Processor	15	36	25
	Retail	6	0	0
Meat	Own processing	0	10	15
	Another farm/firm	65	71	80
	Processor	29	43	30
	Retail	15	36	20
Milk	Own processing	0	10	15
	Another farm/firm	42	43	40
	Processor	51	64	45
	Retail	19	0	15

Source: Personal interviews with farm managers.

Intra-firm processing and retailing is practiced by some farms. Larger operational size and frequency of transacting provide an economic opportunity for the internal exploration of interdependent assets (farming-processing-retailing). Vertical integration helps protect dependent investments and payoffs from marketing processed/retail products, i.e., getting full profit (final products), brand name trade, lessened market dependency (easy storage/transportation), etc.

3.2 Agricultural cooperatives

Cooperatives are the biggest farms in terms of land and labor management (Table 1). They concentrate a major part of cereals, oil and forage crops, orchards and vineyards, and they are key service providers for their members and for rural agents.

More than 3,000 new-type production cooperatives emerged during and after the liquidation of old "cooperative" structures between 1992 and 1995. BACHEV (2000) has demonstrated that the cooperative was the single most effective form of organization in the absence of settled rights for main agrarian resources and/or inherited high interdependence of available assets (restituted farmland, acquired individual shares in the actives of old cooperatives, narrow specialization of labor). Moreover, most cooperatives developed along with small-scale and subsistent farming. Namely, the "not-for-profit" character and strong membership (rather than market) orientation attracted many households. As for production, the co-op was perceived as an effective (cheap, stable) form of supplying highly specific individual farm inputs and services (feed for animals; mechanization; storage, processing, and marketing of output) and food for households. The cooperative, rather than other formal collective (firm) forms, has been mostly preferred. Co-ops were initiated by older generation entrepreneurs and tradition has played a role. Besides, this mode allows individuals an easy, low cost entrance and exit, thus keeping control over a major resource (land), and "democratic" participation in/control over management. In addition, the cooperative form provides some important tax advantages (exemption from sale transactions with members, and received rent in kind) and possibilities for organizing transactions that are not legitimate for other modes (e.g. credit supply, marketing, and lobbying nation-wide).

A larger operational size gives cooperatives a great opportunity for the efficient use of labor (teamwork, division and specialization of work), farmland (cultivation in big consolidated plots, effective crop rotation), and material assets (exploration of economy of scale/scope of large machinery). In addition, they have superior potential to minimize market uncertainty ("risk pooling", advertisement, storing, integration into processing and marketing), to organize critical transactions (accessing credit; negotiating positions in input supply/marketing; facilitating land consolidation through lease-in and lease-out deals; technological innovations), and to invest in intangible capital (reputation, labels, brand names).

Cooperative activities are not difficult to manage since internal (members) demand for output/services is known and "marketing" secured. In addition, co-ops concentrate on a few highly standardized (mass) products with a stable market and profitability; all this assists financing, as advance funding of activities commissioned by members is commonly practiced, while producing universal commodities is more easily financed by public programs or commercial credit (Table 4). Furthermore, co-ops offer low-cost, long-term leasing of land (Figure 1). That is often coupled with simultaneous lease-out deals as a specific mode for cashing co-ops output or facilitating relations between landlord-private farms. The integral organization of critical "services" and inputs supply is broadly practiced (Table 2, Table 3). Output-based payment of labor is common, which restricts opportunism and minimizes internal transaction costs. Besides, cooperatives provide employment for members who otherwise would have no other job opportunities – housewives, pre- and retired persons. They are prefered employers since they offer higher job security, social payments, paid holidays, etc. Marketing risky output is governed by effective delivery contracts or integrated into own processing (Table 5). In a situation of "missing markets" in rural areas, the cooperative mode is also the single form for organizing certain transactions such as bakeries, retail trade, etc. Given the considerable transacting benefits, most of the coop members accept lower than market returns on their resources – lower wages, inferior or no rent for land and dividends for shares.

There have been some adjustments in the size of co-ops, memberships, and production structure. A number of them have moved toward corporate ("new generation") type governance, applying profit-making goals, closed-membership policies and joint-ventures with other organizations. At the same time, cooperatives show certain disadvantages as a form for farm organization. A large coalition makes individual/collective management control very difficult (costly), thus providing the possibility of mismanagement (on-the-job consumption, unprofitable members' deals). Besides, there are differences in investment preferences of the diverse members (old-younger; working-non-working; large-small shareholders) due to the non-tradable character of cooperative shares ("horizon problem"). Given the fact that most members are older, small shareholders, and non-permanent employees, the incentives for long-term investment have been very low. Finally, many co-ops fall short when adapting to diversified (service) needs of members and exploring potential of inter-cooperative modes. Accordingly, co-operatives' long-term efficiency diminishes considerably in relation to the market, contract and partnership modes, and almost 40 % of existing co-ops have gone bankrupt/ceased to exist in the last 5 years.

3.3 Small-scale and subsistent farming

According to various data, subsistent farms comprise 0.64-1.5 million farms, accounting for 15 % of farmland. More than 97 % of livestock holdings are also miniature "unprofessional farms" breeding 96 % of the country's goats, 86 % of its sheep, 78 % of the cattle, and 60 % of its pigs (MAF, 2004). Consequently, a significant portion of the entire output of vegetables, fruits, vine and livestock is for "self consumption". According to the Agricultural Holdings Census, less than 39 % of unregistered farms reportedly sold products, and in more than 50 % of the cases, those were surplus, not to be consumed by households (MINISTRY OF AGRICULTURE AND FORESTRY BULGARIA, 2003). Almost 1 million Bulgarians are involved in part-time farming, and use it as a "supplementary" income source (MINISTRY OF AGRICULTURE AND FORESTRY BULGARIA, 2004).

Post-communist agrarian reform has turned most households into owners of farmland, livestock, equipment, etc. The internal organization of available family resources in one's own farm was an effective way to overcome great institutional, market, and economic uncertainty and insecurity, and minimize transaction costs (BACHEV, 2000). During transition, market/contract trade of household capital (land, labor) was either impossible or very expensive due to "missing" markets, high uncertainty, risk, asymmetry of information, opportunism in time of hardship, little job opportunities and security. Low payoff from outside trade (high inflation; non- or delayed payment of pensions, wages, rents) was combined with an increased share of households' food costs. Therefore, internal organization was the most effective way of protecting and getting a return on resources and securing a stable income. The long-term tradition of "personal plots" and insignificant costs for acquiring specific knowledge (information, learning by doing experience) has made developmental costs for one's own farm accessible to everybody. In addition, there has been great uncertainty associated with the market supply of basic foods and for many consumers, own production has been an effective mode of guaranteeing cheap, stable, safe, and high quality products. Internal organization (own farm) is also a preferred/secure mode for providing full- or part-time employment for family members. Also, for many, farming happened to be a favorable full-time or free-time occupation.

Unregistered farms are not a unified group and there are highly-commercialized small/middle-size enterprises. The latter are mainly specialized in labor-intensive productions (vegetables, tobacco, vineyards, berries, melons, flowers, livestock).

Unregistered farms are predominately individual or family holdings, and farm size is exclusively determined by the available household resources – farmland, labor and finance. Internal governing costs are insignificant because transactions are between family members (common goals, high confidence, and no cheating behavior dominates) or non-existent (one-person farm). A small collective organization for some activities is also practiced, which allows the partial exploration of economies of scale or makes part-time farming possible (e.g. group pasture of animals, common guarding of yields). This form is cost-effective since transactions are not complicated, easily controlled, and between close friends and relatives (here mutual trust and self-restriction of opportunism govern relations).

Farmers have strong incentives to adapt to market demand and increase productivity (intensification of work, investments in human/material assets) since they own whole residuals (income). The extension of farms through outside supply of labor/services is restricted since directing, monitoring, and disputing costs are extremely high in labor-intensive and spatially-dispersed productions. External financing of farming via debt, equity sell-off, or public programs have been out of reach because of the high costs for preparing project proposals; meeting formal (paper, ownership, co-financing) requirements; arranging funding. Thus, the possibility of effective farm enlargement and growth in productivity through mechanization, application of chemicals and innovation is limited by small internal investment capacities (savings, profit). In general, primitive technologies and poor environmental and animal welfare standards prevail. As much as 40 % of surveyed farms report not using essential services at all. Low cost, outside land supply (leasing) is practiced by commercial farms to explore economies of scale on existing assets. The outside supply of indispensable inputs/services (seeds, chemicals, veterinary) is not connected with significant costs since they have an occasional and standardized character (low specificity, many suppliers). In contrast, highly-specific feed supplies for animals and mechanization services are effectively secured through joint ownership modes such as cooperative/group farming.

"Marketing" of output is not associated with considerable costs for commodity and locally-demanded produces – short distance, low volume, high frequency, and personal character of transactions. When symmetrical capacity, quality, time of delivery, etc. dependency with a buyer (middlemen, processors, retailer, exporters) is in place. then tight marketing or an interlinked arrangement are applied (marketing against credit/inputs/extension supply). However, a great number of small farms face marketing difficulties – they are not preferable partners for big buyers because of their small volume and less-standardized character of output, as well as the impossibility (unaffordable costs) of verifying the quality of products though tests, certificates, etc. On the other hand, official wholesale markets are inaccessible due to great distances, high fees, requirements for volume, special preparation, certification. Besides, small farms frequently experience problems with meeting contractual terms (none or delayed payment), huge market price fluctuation, (quasi-) monopolistic situations, missing markets, etc. The development of effective collective organizations for risk sharing, price negotiation, marketing, or lobbying for public support have been difficult because of high transaction costs (the free-riding problem), diversified interests of individual farmers (old/young; larger or smaller size; specialized/diversified), and the mismanagement of emerging organizations. Only tobacco producers, which have significant political representation, are an exception. The majority of small commercial farms are vulnerable and have poor mechanisms to protect from outside institutional, market and natural disturbances. Most of them have little ability to meet institutional and market restrictions, bear risks, and safeguard against natural/market hazard (buying insurance, diversifying, or cooperating). All these result in significant income variation for individual farms, (sub)sectors, and different years.

4 Likely impact of EU accession and CAP implementation

Almost two-thirds of surveyed farms indicate they "intend to enlarge their farm in future" (91 % of firms, 59 % of unregistered farms, 46 % of cooperatives). According to managers, the highest transaction costs are associated with credit supply, marketing, and contract enforcement. Thus, problems with governing later transactions are major factors that restrict farm enlargement. For most managers, the "main factors for farm development" relate to improving the institutional environment – guaranteed marketing, enforcement of laws and private contracts, macro-economic stability, legislation framework, and access to free markets.

EU accession will introduce and enforce a "new order" (regulations, quality and safety standards, protection against market instability, export support) which will eventually intensify and increase the efficiency of agrarian transactions. Market access will enhance competition and let local farms explore their comparative advantages (low costs, high quality, specific produces). Furthermore, EU funding, which agriculture will receive from 2007 on, will be 5.1 times higher than the overall level of present support for farming. Hence, CAP implementation would improve funding opportunities, and facilitate farm extension and modernization.

The impact of implementing a "common" policy in Bulgaria would not be like other countries because of the specific local priorities (weights), asymmetric implementation and enforcement, the additional support of CAP aspects, and dissimilar farmers' involvement and compliance. There will also be "practical" difficulties in introducing CAP in the public and private sector – information and technical deficiencies, lack of administrative staff experience, enormous initial costs (registrations, formalizing relations with landlords, preparing projects), widespread corruption, etc. Thus, there will be some time lag until "full" CAP implementation, with great regional variation that will depend on the pace of building effective capacity, and also training administrative staff, farmers, and other rural agents.

A significant portion of Bulgarian farms will start receiving direct payments[2]. Based on the currently low state of support, the direct payments will augment the level of farm efficiency (increasing/preventing reduction of income). They could even induce usage of abandoned lands (eco-conditionality) and provide new income in less-favorable regions. However, public support will unevenly benefit different farm types, as 3 % of farms will touch more than 85 % of the subsidies. Many effective small-scale operators will receive no or only a tiny fraction of the direct payments. Besides, livestock farms will not be eligible for support under that scheme. That will foster disparity in income and efficiency among different farms and sub-sectors. On the other hand, this mode will support less productive structures (small-scale, part-time, cooperative farms) and non-market forms (subsistence, cooperative farming). As a result, sustainability of these farms will increase – small-scale operations will become viable; cooperatives will be able to pay rent; subsistence farming will be more profitable. Direct payments will increase farmland price/rent, and thus enlarge costs for land supply in the largest farms. Small-scale operators will retain entire subsidies and see their income increased. Subsequently, the transformation of land management to the most effective forms and restructuring of farms will be delayed. Moreover, EU funds will be used effectively to subsidize food self-supply of a large part of the population.

Significant EU funds for rural development will be also available, and will exceed 4.7 times the current level. These funds will allow more and smaller farms to gain access to public support. New measures will finance essential activities such as commercialization/diversification of farming, organic farming, maintaining productivity/biodiversity on abandoned farmland, revitalizing mountainous agriculture, etc. That will provide new opportunities to extend farms though more labor, inputs/service supply, and marketing of new products/ services. Some cooperatives, group farms, and firms would specialize in new functions (environmental preservation, maintenance of farmland) and see their size expanded.

The CAP will modernize farms structures through widening the variety of contractual and organizational innovations – specific sort of contracts, new types of producers associations, spreading vertically-integrated modes, etc. Special forms will also emerge, allowing agents to take advantage of large public programs that will specialize in project preparation, management, and execution; investing in "relations capital" or "negative" entrepreneurship; modes for lobbying and representation; coalitions for complying with formal criteria

[2] Farms will get a single payment according to the amount of UAA: 69-74.20 €/ha in 2007, 82.8-89.10 €/ha in 2008, and 96.80-104.10 €/ha in 2009. Exact figures will depend on the governmental decision on the minimum size of farm eligible for support (between 0.3-1 ha). National top-ups could be also added. Thus, 153,640 up to 668,000 farms would benefit from support.

(e.g. minimum size of UAA for direct payments, membership requirements for producers' organizations), etc.

The actual system of governance (management, control, assessment) for public programs is not likely to change overnight. Therefore, funds will continue to benefit the largest structures, more abuses will take place, and CAP support will not contribute to diminishing divergence between farms and regions.

Some of the terms of specific contracts for the environment and biodiversity preservation, respecting animal welfare, keeping tradition, etc., are very difficult/ expensive to enforce and dispute. In Bulgaria, the rate of compliance with these standards will be even lower because of the lack of readiness/awareness, insufficient control, ineffective court system, domination of "personal" relations and bribes. Correspondingly, more farms than otherwise would enroll will participate in such schemes (including the biggest polluters and offenders). Besides, costs for respecting requirements of agri-environmental programs (expenses/lost income) will vary considerably between farms. Keeping in mind the voluntary character of most CAP instruments, the biggest polluters and those non-compliant with quality, agronomic, biodiversity and animal welfare standards will simply not participate in them. Moreover, government is less likely to set up high performance standards because of the strong internal political pressure and possible outside problems with EU control (and sanctions) on compliance. Therefore, outcomes from the implementation of such instruments would be less than in other countries.

The CAP will foster the restructuring of commercial farms according to modern market, technological, and institutional standards. A large part of agrarian inputs, technologies, and outputs will have a "mass" (standardized) character, and market transacting will dominate at the farm gates. There will also be a parallel tendency toward specialization into productions for "niche markets" and products with special quality (specific origins, special technologies). All that will require investments with higher specificity to a particular buyer(s), and "integrated" management of transactions in farming, processing, retailing and exporting. Besides, some diversification of enterprises into related activities (trade with origins, agro-tourism) for dealing with market risk should be expected. All this would bring new, special modes for private governance such as long-term contracts, collective agreements (codes of professional behavior), trilateral modes (independent third-party certification/control), "quasi" or complete integration.

Farming will be increasingly characterized by the domination of larger and highly competitive business enterprises, which will concentrate activities in all sub-sectors. Large agro-firms will maintain comparative advantages in terms of adaptability, governance, and productivity by having greater access to EU markets and opportunities to benefit from public support and rural development programs.

Most cooperatives will keep/extend their advantages to a large number of petite landowners, rural labor, and smaller farms. Besides, they will have greater potential to explore economies of scale/scope on institutionally-determined investment, adapt to formal requirements for support and use expertise/finance to execute projects. That will extend/intensify transactions governed by co-ops. EU support will also provide an opportunity to mitigate the cooperative funding problem. Direct payments will allow the extension of activities and offer attractive rent, while access to investment subsidies will modernize farms. Besides, some environmental and rural development projects requiring large collective actions would be effectively initiated, coordinated, and carried out by cooperatives or mixed modes.

New institutional restrictions and competition will be connected with decreasing the number of small commercial farms (joint ventures, failures, non-market orientation). Most livestock farms will hardly meet the EU (hygiene, quality, veterinary, phito-sanitary, environmental, animal welfare) standards and will have to cease commercial activity. At the same time, restructuring a large portion of smaller-scale and subsistent farms will not have a positive effect. Changing the sustainability of these farms is mostly determined by the overall development of the economy, but it is less likely to have immediate progress in non-farm employment/income. Most subsistent farms have no intention of increasing their size because of other major occupations, limits of household demands/resources or the advanced age of farmers. Transaction costs to enlarge farms through the outside supply of additional land, labor, finance and marketing would be extremely high (no entrepreneurial capital). Vast costs for studying and respecting new institutional restrictions and establishing "relations" with agrarian bureaucracy (registrations, certifications, paper works) will also be restrictive. Besides, more than 40 % of farm managers are older than 65 and more than half of those employed are in pre-retirement or retirement age. That puts serious restrictions on effective farm adjustment and enlargement (low investment activity and entrepreneurship, limited training capacities, no alternative employment opportunities). For the government, it will be practically impossible to enforce official standards in such a huge informal sector of the economy. Moreover, there will be strong political pressure to relax the application of EU rules for non-market farm transactions (respect voters interests). Thus, massive (semi-)subsistence farming will continue to exist in years to come.

5 CONCLUSION

The comparative institutional and transaction costs analysis provides insights on the evolution, efficiency, and complementarities of farming structures in Bulgaria. Responding to the specific market, economic, and institutional conditions, agrarian agents develop a great variety of effective governing modes – formal, informal; market, private, hybrid; simple, complex; uni-, bi-, multilateral; subsistent, member-oriented, commercial, business, etc. Specific boundaries (size) of farms cannot be understood with technological determinants but necessitate analyses of governance features. Furthermore, the actual efficiency of a particular mode for land, labor and input supply, financing, marketing, etc., can be properly estimated only by taking into account the total costs for governing a farm and household economy. This approach requires giving up traditional "production costs" models, uni-sectorality, and uni-diciplinarity; analyzing structure and enforcement of de-facto rights; identifying the spectrum of agrarian and rural transacting, and modes for their organization. It also calls for new types of microeconomic data and a system of direct/quasi indicators for costs, critical attributes, and specific modes of transaction. Finally, this approach lets us make more realistic assessments about the prospects of farming development and the likely impact of CAP implementation in Bulgarian conditions. Not least important is that the Bulgarian model of governance (market-driven, unsupported, over-integrated) could even provide insight on the future of European agriculture in the course of the global orientation toward liberalization, specification, and diversification.

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LEADERSHIP MAY HAVE A DECISIVE INFLUENCE ON THE SUCCESSFUL TRANSITION OF PRODUCTION COOPERATIVES[1] – A SOCIAL CAPITAL APPROACH –

CSABA FORGÁCS[*]

ABSTRACT

In Hungary an increasing number of cooperatives have gone bankrupt or broken up because of not being competitive under market conditions in the aftermath of radical reforms. Others, however, have been able to maintain or even improve on previous levels of success. Individual farmers have also established new cooperatives.

The paper discusses the importance of the leadership of cooperatives during transition, a topic which is not well addressed in the literature. Production co-ops were not only economic units but also social networks. Two successful cooperatives, one old and one new, have been used and comparisons of their development and leadership structure have been made. The findings show that, in the traditional agricultural co-op, a more social- (member-) oriented leadership has helped to overcome economic, social, and psychological barriers raised during transition, while, in the case of the new co-op, improving cooperation has depended mainly on the increased level of social capital after radical reforms.

Keywords: *Social capital, transformation of coops, leadership, producing co-ops.*

1 INTRODUCTION AND PROBLEM STATEMENT

Most Central East-European countries (CEECs) had a system of large-scale farms which had to be restructured on the road to a market system. Prior to the radical reforms in Hungary, agricultural co-ops had a 48-50 % share in Gross Agricultural Output (GAO) and another 33-35 % came from household production integrated with co-ops. After the end of Communism, members of

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cooperatives had to choose whether to continue farming cooperatively or to leave the co-op. Two major lines of cooperation will be evaluated.

At the beginning of the 90s, not many co-ops within the agricultural sub-sector were broken up, but more were in the following years. 7-10 % of co-op members decided to leave their co-ops in the early 90s. The average size of new individual farmers' holdings was 2-3 ha. Some decided to join newly-established cooperatives later on.

The case study is based on research in literature and interviews. Field work was carried out in a traditional cooperative, BÉKE, and in a newly-established Purchasing and Marketing Cooperative, HAJDÚ GAZDÁK (PMCHG).

The research gives an insight into the motivations of private farmers as well as those of co-op members and underlines those factors pushing private farmers to join cooperatives on the one hand, and, on the other, pushing members of traditional co-ops to maintain their membership.

Besides the directors of PMCHG and of the BÉKE Co-op, another key person from PMCHG was also interviewed. In addition, based on a standardized questionnaire, five members of each co-op were asked to answer questions. Relevant documents and observations were also used to complete the case study.

The paper is structured in the following way. In the second part, the objective of the case study and the hypotheses will be described. In the third section, an insight will be given into the establishment and performance of both co-ops. The fourth section deals with methodology and the analytical framework, including the role of leadership in cooperation. In the next section, the visual presentation of the actors and their interactions will be focused on. Section six discusses how people have tried to improve social capital under different institutional backgrounds. Finally, findings on social capital in the two co-ops will be summarized.

2 OBJECTIVE OF THE CASE STUDY AND HYPOTHESES

The objective of the case study was to compare the development of a traditional and a new type of cooperative after radical reforms and to underline key factors affecting cooperation.

2.1 Radical reforms

The political changes which took place in the early 90s greatly changed the political and economic environment of farming. The major pillars of the new agricultural policy were: "a) the country must have internationally competitive agriculture, b) subsidies should be reduced to a much lower level, and c) as in the EU, the family farm must be supported in becoming the prevailing structure."[2]

Only in the case of land was there an opportunity to claim back in physical terms property owned by individuals up to 1949. Due to the four laws[3] on compensation, an additional approximately 1.3-1.5 million landowners with an average of 1.5-2.0 hectares besides the existing approximately 1 million landowners have appeared, resulting in fragmented land ownership (VARGA, 2000).

2.2 New institutional framework for marketing products

Concerning institutions, the loss of the old regime's role in helping small farmers to access markets has created the following problems: a) local markets existed and accepted limited supply; but b) the earlier General Consumer and Marketing Cooperatives (GCMCs), which functioned well, mostly disappeared; c) a number of inexperienced new middlemen appeared and started business in the vertical chains; d) producers' co-ops no longer felt an ethical responsibility for the marketing of products from small individual farmers; e) former procurement and processing companies were no longer obliged to purchase agricultural products; f) social capital was destroyed before the building up of a new competitive distribution system; and g) to establish a new system starting from the bottom up needed more time and resources.

There have been several new institutions dealing with establishing a new environment for coordinating market performance under the Ministry of Agriculture and Rural Development, including: a) Office of Agricultural Market Regime, b) Center for Agricultural Intervention, later named Office of Agriculture and Rural Development (paying institution), c) Product Councils (PCs) established by producers, processors, traders and consumers of selected products or groups of products, d) Producers' Organizations (POs).

In addition, some other institutions have also represented the interests of agricultural producers, e.g. the Agricultural Chamber, the National Federation of Agricultural Producers and Co-operators (NFAPC), and the National Federation of Farmers (NFF).

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2 Ministry of Agriculture (1992): New Agricultural Policy, Manuscript.

3 The Parliament passed a law on partial restitution (XXVth Law (1991) covering all kinds of assets destroyed, partially destroyed, or taken over by the state. This law was followed by four others (XXIVth Law of 1992, XXXIInd Law of 1992, IInd Law of 1994 and XXXIIIrd Law of 1997) all dealing with compensation. People whose ownership was damaged by the laws released after May 1, 1939 and listed in the annex and ownership damaged by the laws released after June 8th, 1948 and listed in the annex of the law (XXVth Law (1991) had to be compensated. The amount of the compensation was determined on a regressive scale.

2.3 Transformation of production co-ops

In 1992 a law was passed dealing with how cooperatives could be transformed to meet new requirements and allowing members to leave their cooperative. In transformed co-ops three major groups of landowners have appeared: First, people who are really engaged in agricultural production. Second, retired people who are still co-op members. Third, "outsiders" new landowners not interested in private farming. Besides the land itself, means of production (machines, other tools, etc.) have also had to be distributed among landowners in the form of co-op shares and business shares. An increasing number of business shares are in the hands of pensioners, resulting in conflicts of interest. Success in restructuring agricultural co-ops has very much depended on the expertise of leaders on the one hand and members' trust in leaders and institutions on the other.

2.4 Research hypotheses

The following research hypotheses were formulated and tested:

Hypothesis 1: Where trust in formal institutions is low, high transaction costs are experienced in dealing with the State and actors will rely on informal institutions to solve their problems of collective action.

Hypothesis 2: The more frequent and complete the communication between agents, the greater the cooperation.

Hypothesis 3: Reducing transaction costs generates changes in governance structure.

Hypotheses 4: Prior to reforms, social capital in CEE countries was low.

Hypotheses 5: Although the market is based on competitive forces, a network of cooperation is nevertheless required for its sustenance.

3 UNIT OF ANALYSIS

In this section, the historical development of two cooperatives will be discussed. It will be shown how social capital, after the destruction of the old distribution system, has been able to contribute to improving or maintaining cooperation.

3.1 A brief history of and the challenges facing the BÉKE Co-op, Hajdúböszörmény

The BÉKE Co-op was founded on June 27, 1955, by the poorest peasants in the town. The founders had a total of 73 ha of agricultural land. Both the number of co-op members and the area under cultivation were increased significantly in 1960 (MÓNUS, 1999). Specialists came and worked for the co-op and huge investments were made over the years. Since 1967, farms have been interested in producing profits. Because of the enlarged size of production, the corporate governance of the BÉKE Co-op was changed in 1978. In the following years, the co-op won the "Cooperative of Excellence" award several times.

During the transition to a market system, many agricultural cooperatives broke up and disappeared. In the BÉKE Cooperative, the president was replaced by a new one in 1990 after 27 years of service. The new leadership decided to go on the offensive and distributed part of the land and assets among members and employees as permitted by law. At the same time, the president held face-to-face negotiations with all members. Finally, 64 out of 960 members (some 7 %, below the national average) left the cooperative.

Over the years, BÉKE has carried out a total 100 % leverage buy-out of the Zelemér agricultural co-op. In addition, a turkey plant has been bought and two more beef and one pig production units have also come into BÉKE ownership. Finally, the co-op merged with the Agro-Balmaz Agricultural Coop in 2000. Nearly 600 people work for the co-op in 26 different units running business cooperation with more than 100 entrepreneurs and cultivating a land area of 7,000 ha owned by 4,000 landowners.

Although the co-op has faced real challenges over the years, it has still managed to achieve significant economic growth and results. The cooperative has followed an expansive development policy by making new investments to become more stable but these have not always been tested by market needs and have required more and more loans.

Some 50 % of business shares in the cooperative were bought by the government in the late 90s, which, under a new law on cooperatives passed in December, 2005, will be given back to cooperatives but can be used only under conditions of joint ownership.

3.2 The establishment and development of the Hajdú Gazdák Purchasing and Marketing Cooperative (PMCHG)

The Hajdú Gazdák Agricultural Association was established at the beginning of the twentieth century but was suspended under the Communist regime. After 1990, individual farmers wanted to bring this association back into operation. First, the Farmers' Club was established in 1993 with the objective of "representing the interests of the members, improving the skills of producers, increasing both the output and the quality of production…." (MÓNUS, 1999). The Farmers' Club was succeeded by the HAJDÚ Purchasing and Marketing Cooperative (PMCH) in July, 1996, focusing on gathering and spreading information, joint purchasing of inputs, and marketing of products. In 1999 PMCH decided to establish a new producers' organization (PO) called the "HAJDÚ GAZDÁK Purchasing and Marketing Cooperative" (PMCHG) to access additional government support. Justification for such an action was underlined by MURRAY (2004), saying "Cooperation between people requires networks of association, and can be distinguished as situations where there is visible action on a collective level for a predetermined goal or social dilemma." Shortly after the establishment of PMCHG, the new and old cooperative, with the same members, merged under the name PMC HAJDÚ GAZDÁK (PMCHG).

The cooperative is managed by the Board of Directors consisting of five members, supervised by a board of three members. The Members' Council meeting is the top-level decision-making body, with one member one vote. Payment for departing members is based on an equity ratio, and new members have to pay the same amount that departing members take out.

4 METHODOLOGY AND ANALYTICAL FRAMEWORK

More recently, social capital has been focused on by researchers pointing out that it is one of the key elements of economic growth measured by the level of trust. However, the level of "social capital depends on a person's connections (whom they know, but also connections through common group membership), the strength of these connections and resources to their connections." (MURRAY and BECKMANN, 2004). The latter demands that the issue of social capital and its strength be discussed and evaluated in the given socio-economic context. The IDARI Project WP3 dealt with social capital, governance, and institutional innovations by analyzing processes of achieving cooperation and by seeking to understand the failure of cooperative strategies. To understand the concept of trust, communication and social learning are focused on in case studies. MURRAY (2004) underlined that the extent of networks of relationship is determined by the prevailing social norms of the group, the necessity for interaction, and individuals' motivations for interacting.

4.1 Social capital under the socialist system

CHLOUPKOVA et al. (2003) have made a comparison of social capital development in cooperatives in Denmark and Poland and concluded that, although levels were similar before World War II, the level of social capital was now higher in Denmark than in Poland, suggesting that under the Communist regime social capital was destroyed in Poland. However, one has to be careful in making general statements on the social capital situation in former socialist countries. First, socialist countries had strong national characteristics. Second, in contrast to other former Communist countries, in Poland small farms dominated agriculture under the socialist system. Third, small farmers in Poland have accumulated sufficient experience concerning their trust towards each other and market players as well as towards government.

In Hungary private farming had a marginal role in GAO after collectivization (1961), but small-scale (household) farming was an important source of income for cooperative members. Cooperative members' trust in their leaders also increased. Vertical cooperation between producers, buyers, manufacturers and traders was deepened and transaction costs decreased.

4.2 The decline of social capital after radical reforms

Agrarian reform in CEECs has been seen from such different points of view as political economy, property rights theory, transaction cost economics, etc. VALENTINOV (2004) points out that in all these approaches social capital has played a decisive role concerning the outcomes of reform. Each approach was shown to reveal some specific aspects of the social capital concept which led to additional findings. It is a fact that social capital substantially declined in CEECs following radical reforms. What was the reason(s) for this?

First, land ownership has been changed substantially with different attitudes among new landowners to farming and a low level of social capital in the case of new landowners. Second, for a time people have not been sure to what extent the new agricultural policy will be changed. Third, the level of social capital and the cohesion among cooperative members prior to political change were in many cases high. Trust in leadership has become a decisive factor in the case of many cooperatives in Hungary. Fourth, social capital, social norms, and levels of trust were affected very much by radical reforms. Fifth, the economic environment has not been transparent for years, more people and businesses have broken rules and the value of norms has declined.

4.3 The leadership issue

After the introduction of the new agricultural policy in 1990, it was a real challenge for co-ops to adjust. The question of how high was the level of people's trust in the cooperative as such and in its leaders became a decisive factor. In Hungary only 127 out of 1,441 cooperatives were not able to meet new legal requirements by the deadline and disappeared. Some 10 % of members decided to leave their cooperatives. The rest decided to continue their membership. The vast majority of members did not think of leaving the cooperative and farming on their own. This was evidence that people's trust in cooperative leaders and in the cooperative as an organization was, in general, high.

What were the main reasons that certain cooperatives have been able to survive and how have they done it? It has turned out that leadership and the members' trust in leaders played key role in adjustment. MURRAY (2004) emphasizes that leaders and leadership may have a decisive role in improving and maintaining a high level of social capital. Relationships between leaders and members cannot be explained by economic arguments only. Working together and helping each other for years only to cease all these forms of mutual support would have demanded changes in human behavior which could not be accepted by the leaders of many cooperatives. Findings from both the experimental study and the cross-sectional survey by CREMER and KNIPPENBERG (2005) showed that self-sacrifice on the part of the leader has a positive effect on cooperation and that perceptions of trust in the leader and feelings of collective identification mediated the effects of this self-sacrifice. Focusing on different group aspects of leadership in social dilemmas, VUGHT (2002) concluded that the effectiveness of leaders' solutions to social dilemmas depends upon the correspondence between leader's characteristics and members' expectations.

5 VISUAL PRESENTATION OF ACTORS AND THEIR INTERACTIONS

This section deals with actors from both case studies at the beginning of transition. he width of arrows in Figures 1 and 2 reflect the weight of a given link.

5.1 The BÉKE Cooperative – A traditional production cooperative

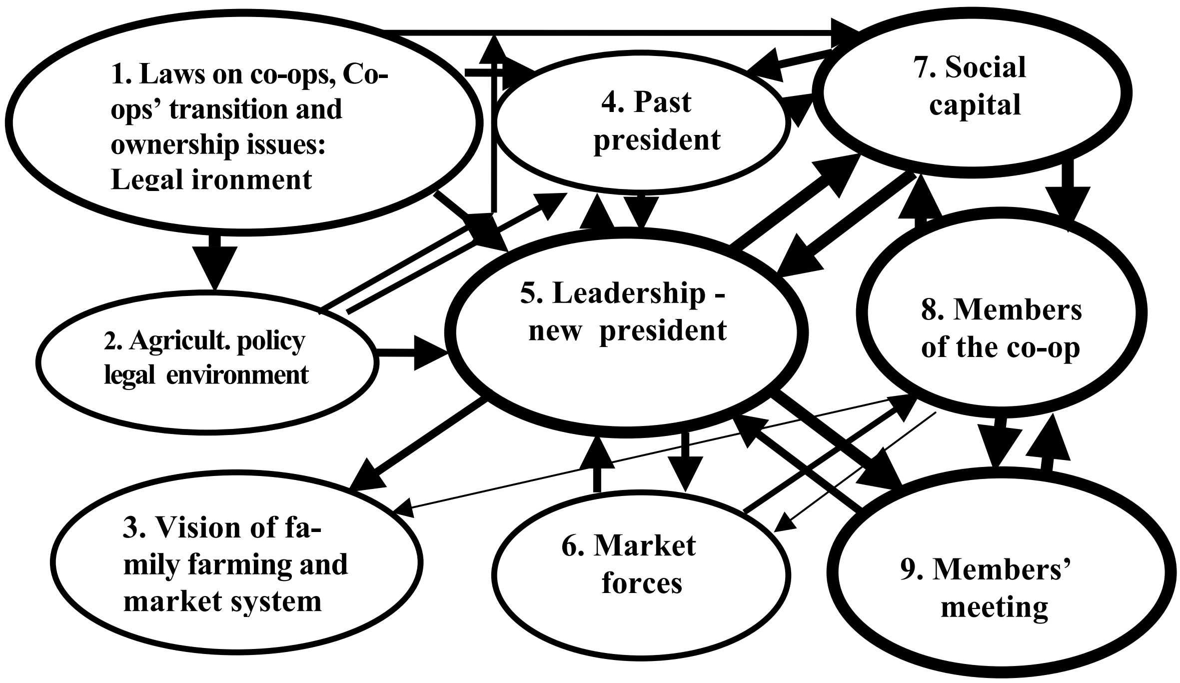
The laws on compensation, on (new) cooperatives, and on the transformation of traditional agricultural cooperatives have created a new legal environment. By law, cooperatives' equity, such as animals, machines, buildings, etc., had to be distributed among their members.

In 1990, a new president (director) was elected. There was a high level of trust between the former and the new president and between them and most of the members. So the internal factors of social capital were at a high level and cooperative members did not want to break up the cooperative community that they had built up together over the years. Others mainly focused on the possible advantages of individual farming and somehow neglected the disadvantages. Relations and interactions between actors in the BÉKE Cooperative before the decision on transformation of the cooperative can be seen in Figure 1. Finally, only 7-8 % of members left.

5.2 The HAJDÚ GAZDÁK Purchasing and Marketing Cooperative (PMCHG)

Government policy in the early nineties encouraged family farming. Those who left cooperatives were sure they would be more successful as individual farmers. For them, some individual farmers in the region were successful pioneers. Their level of social capital was not high in relation to co-ops and co-op leaders.

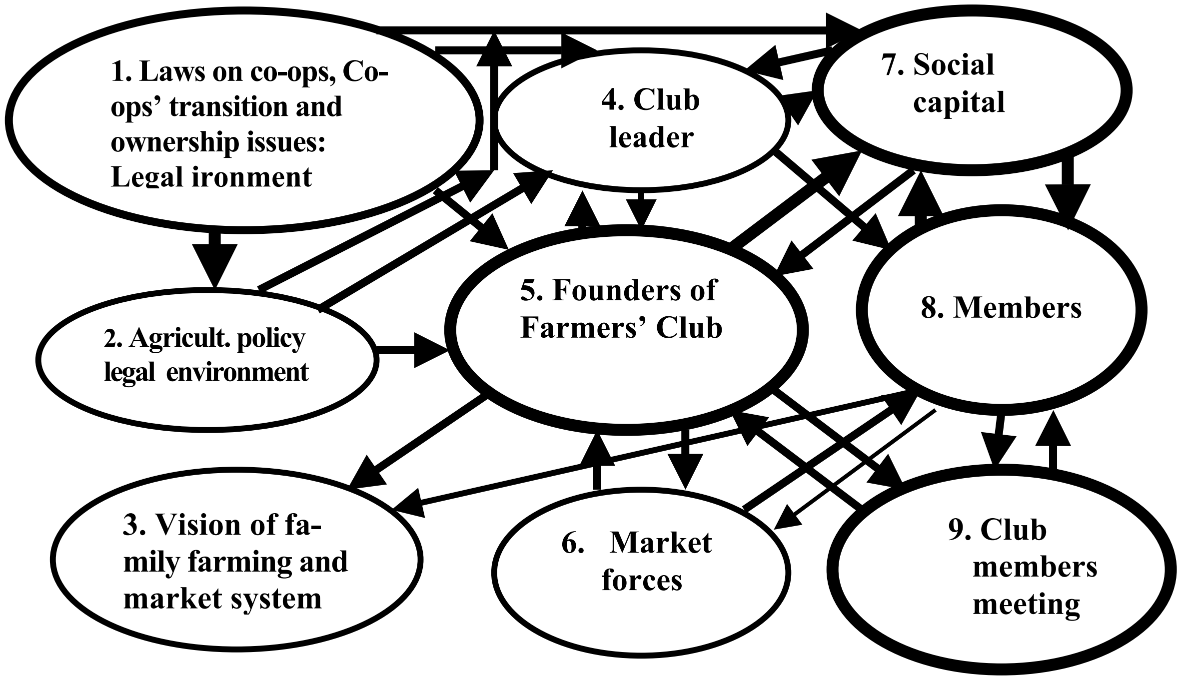
Figure 1: Actors and their interactions in the BÉKE Cooperative before the decisions on future development.



As a first step towards cooperation, individuals established the Farmers' Club in 1993. Key players had strong influence in setting conditions for the further development of cooperation. The leader of PMCHG took only necessary administrative jobs but did not have such strong influence on governance as the BÉKE president did. Social capital among members was above average. Internally, part of this was connected with the founders having sufficient experience in family farming and former cooperative members being well informed about agricultural policy issues. Concerning external factors, people trusted very much in the new government and also in the institutional environment.

Linkages and interactions between different actors can be seen in Figure 2.

Figure 2: Actors and the interactions between individual farmers before joining the Farmers' Club.



5.3 A brief comparison between the BÉKE Cooperative and the Farmers' Club

At the beginning of the nineties, social capital in general was somewhat stronger among BÉKE members than in the Farmers' Club, due to their history of successful collective achievements. However, in some areas the picture was the opposite. The previous president of the BÉKE Cooperative had enjoyed a high level of trust among members. The atmosphere between leaders and members had been sufficiently good, and the legal environment had been transparent and stable. The level of trust in leaders remained high after the election of the new president in 1990. However, after radical reforms, trust in state institutions, in the legal environment, and in agricultural policy declined as the government favored family farms over cooperatives.

The Farmers' Club focused only on sharing information in the early stages of cooperation. Later on members raised the need to make joint purchasing inputs to reduce transaction costs and, later again, the need for joint marketing. At the end of the nineties the need for joint investment was raised and agreed on.

6 DETERMINANTS, EFFECTS, AND PROCESSES OF COOPERATION AND RURAL INSTITUTIONAL INNOVATION

In this section, a parallel evaluation of interviews, five interviews from each co-op and those with the two managing directors will be analyzed.

6.1 The role of trust/mistrust and opportunism

Social capital, trust, and cooperation involve people always looking at the possibility of working together in a smaller or larger community in order to benefit from such cooperation.

Eight out of ten interviewees said they were not formal members of any local or regional group or association. One person from BÉKE was a member of the regional federation of cooperatives and one worked for local government.

Members of PMCHG emphasized explicitly the economic advantages of joining in decreasing transaction costs. "From an economic viewpoint, social capital recognizes *value* in social relationships, which can have market benefits, and as such should be considered akin to physical capital" (GLAESER et al., 2002, after MURRAY, 2004). The duration of personal relationships was an important factor but it was less significant than in the case of the BÉKE Cooperative. Among the benefits of trust members emphasized the following: That people were helpful, that trust is the basis of common interests, that mutual trust is the greatest treasure, and that the benefits depend on the people themselves. Members of PMCHG said: S*olving problems* raised by the group should be mainly managed by the cooperative rather than by national or local government agencies.

Members of the BÉKE Cooperative found it important to mention that their parents were also members and that three of them had already been employees of the cooperative. For two of the respondents the town and the neighborhood meant their community, one defined the family and working colleagues as such, and one emphasized the importance of the whole county. Most of them had joined the cooperative many years previously. According to them, cooperation and integration had brought advantages to members. Others who joined later had been attracted by the cooperative's reputation. Although they were more cautious or more critical about trust BÉKE members displayed a higher level of trust in EU institutions and in both national and local government officials. They also found mutual trust advantageous but stronger emphasis was given to more efficient work and a good working atmosphere. BÉKE members were more cautious, admitting that conflicts could come up everywhere, although it is not typical in the co-op. Economic problems should be solved by the national government, but the co-op must also do its best to solve problems. Members were more informed on historical aspects of farming and had information based on deeper analysis of economic issues in comparison with PMCHG members.

The reasons given for joining the cooperative were rather different in the two cases. In both co-ops, interviewees underlined the importance of the duration of personal relationships among members. Discussing trust in more general terms, members of PCMHG had higher levels of trust with business partners even without any documentation. Their levels of trust had changed based on their own experience gained over the years. BÉKE members were more pessimistic as a result of negative experience after 1990.

Members in both co-ops regarded trust and reciprocity as important element of social capital. However, their approach to the issue reflects different standpoints.

Trust towards formal institutions differed in the two co-ops. Members of PMCHG had low levels of trust in current government officials and EU institutions. In contrast, BÉKE members had more trust in national government their trust in EU institutions was also above average. However, where trust levels in state institutions were low, to reduce transaction costs people looked for informal institutions to solve their problems. Hypothesis 1 was justified**.**

6.2 The role of communication and learning

People in communities always change their views on different issues based on information gained through different communication channels. How intensively these channels are used affects the level of social capital.

Concerning *government and EU issues,* local markets and shops, government agencies, political parties, and internet communication channels are not used at all in either group.

Members of PMCHG tried to find more channels to gain information and used them more frequently, while BÉKE members mostly relied on national media but less on local community leaders. Information from cooperative leaders was backed up by obtaining and analyzing information from various governmental and other sources of information.

Collecting information on *community issues* was done rather differently in both groups. The frequency with which information was gathered was significantly lower in BÉKE. All PCMHG members got information mainly from community leaders as well as from community and local newspapers.

The extent to which people *were satisfied with the information* they had was a key point. Based on the Ostrom approach (after MURRAY, 2004) that during the communication process social capital is enhanced or eroded through the establishment of trust, reputation and reciprocity, we can see a positive outcome in both co-ops as the general picture was excellent. PMCHG members found decisions on investments to be a weak point in communication. Blockage or withholding of information within the cooperative was not indicated as a serious problem.

The high level of satisfaction with the supply of necessary information was supported by the fact that in both cooperatives there was a continuous discussion among members on important business issues. The dialogue is quite intensive and new information is shared as soon as possible. PMCHG members were more optimistic concerning members' capacity for problem-solving.

As regards *external contacts* with relevant people from similar organizations, members in both cooperatives thought that such tasks were mostly the job of leaders. It is true that external relationships are not very strong in either case.

People emphasized that, whether working for the cooperative for a shorter or a longer period, one always gains something from it. The members of the younger cooperative put a high value on joint efforts and collective action while members of BÉKE indicated the value of being well informed.

All ten interviewees said they were satisfied with the information they had been provided. When not, then additional efforts made had proved sufficient to acquire the missing information.

In both cases, people have used different channels at different intensities to obtain sufficient information. Communication has not been used as a source of power by central actors, but as a bridge through which more help could be given to members. Hypothesis 2 was justified.

6.3 Transaction costs and governance structure

PMCHG members regarded as most important the incentives (economy, environmental protection) which most affected transaction costs and, to reduce transaction costs, they were willing to cooperate and open to extending cooperation with non-members. To reduce transaction costs, BÉKE members appreciated very much the historical background of relationships and education.

Most of the interviewees had not calculated any costs of attending internal meeting but more of them calculated costs related to attending external meetings.

Membership was seen as a benefit, especially in the PMCHG Cooperative. The benefits they indicated included market access, the reduction of input costs, joint use of machinery, and getting farm gate prices based on quality. In the case of BÉKE, people listed those benefits which they had had for years but were at risk of losing.

To improve efficiency and enhance cooperation, BÉKE changed its governance structure in the late seventies.

PMCHG changed its governance structure in 1996 as well as in 1999 in order to reduce transaction costs or to become eligible for additional resources and to improve cooperation.

It was shown that cooperatives, in order to reduce transaction costs, have decided to change governance structure and have adjusted to new economic conditions and market situations. Hypothesis 3 was justified**.**

6.4 The role of the state and formal institutional environment in cooperation

Members of both cooperatives agreed that cooperatives had been efficient and in good economic shape in socialist times. Besides the coming into force of a new economic mechanism in 1967, there were two more factors which improved cooperation.

First*,* cooperatives were allowed to engage in so-called non-agricultural activities (construction work, producing spare parts, etc.) which produced more profits than animal husbandry or crop production. Taking advantage of subsidization policy, they developed the infrastructure on the farms, bought the latest technology and new machines, produced more profits, and paid more to members and employees. Second*,* cooperatives could do the latter because farm gate prices were gradually increased to approaching market prices. Agriculture achieved a high growth rate in the first half of the seventies and a still reasonable level in the second half of the decade, but growth slowed down thereafter. An experiment showed that if cooperatives got more freedom they would be able to increase efficiency and to generate more profits.

People's attitude towards cooperation has changed significantly since the introduction of radical reforms. Mainstream views have become more negative, making people more reserved and less likely to engage in cooperative activity. Compensation on land was not well prepared and managed. The level of trust among people has declined and members were cautious when asked about additional steps in cooperation.

The majority of responses made clear that trust towards central and local government has deteriorated. This decline was more pronounced among PMCHG members and only one person out of ten responded that trust in government had increased since the beginning of the transition. It was also mentioned that the declining level of trust was due to the ruling government.

Members of the BÉKE Cooperative have been mostly unsatisfied with the performance of the state while PMCHG members were more positive. In general, people were disappointed with the agricultural policy preparations for EU membership.

After the introduction of a new economic mechanism in agriculture in 1967, social capital started to increase and developed as the economic environment became a mixture of a centrally planned and a market economy. Social capital was not low in Hungary during the seventies and eighties. Hypotheses 4 was rejected.

6.5 The role of communities, social networks and informal institutions

The motivation of helping the community has been strong in both cooperatives, even if only other members of the local community could benefit from it. The general attitude of cooperative members has been highly community-oriented. People feel motivated to help if this involved only giving their time. If, in addition, money was required for community development, fewer people were ready to contribute. All PMCHG members interviewed were willing to sacrifice more and would be willing even to pay money as well. Members of the BÉKE Cooperative were also in favor of improving cooperation but they expected to get direct benefits if a financial contribution were required.

The majority of PMCHG members mentioned that conflicts should be openly discussed. For major issues the cooperative's by-laws must be used. BÉKE members said that both formalized and informal mechanisms could be used to find solutions. On recognizing a problem, people in both cooperatives would take action to clarify it with the initiator (BÉKE) or to address it to the cooperative leader or have a meeting for the entire group (PMCHG).

People in PMCHG did not perceive a clique to exist in the group. In the case of BÉKE, two members mentioned that such cliques existed.

Cooperation is affected by several factors. All investigated factors (8) were found very important or somewhat important in both cooperatives, but on average stronger support was given by members of the BÉKE Cooperative. All nine members who responded underlined the factor of keeping well informed, and having sufficient information to make decisions was the number one factor. Besides that, a high level of trust and market-driven incentives for cooperation were also mentioned.

It can be emphasized that informal institutions were not seen as a necessary determinant for achieving cooperation. People could efficiently make use of formal institutions and only very seldom tried to find solutions by informal means.

6.6 The role of the market and competition in fostering/hindering cooperation

Members of PMCHG took a practical approach, saying that agriculture is sustainable until it is profitable. Most interviewees from the BÉKE Cooperative also thought agriculture could not be sustainable because of not profitable. Sustainability much depends on subsidies available for the sector, they said. Concerning environment-friendly agriculture, people found different areas worth underlining, but organic farming was the leading one.

The competitiveness of the cooperative was evaluated at different levels. In the case of PMCHG, one member found the cooperative competitive, two thought the coop was moderately competitive, and two people gave no answer. People from the BÉKE Cooperative used the argument that, as the cooperative had been operating for 50 years, it should be competitive. It was also added that, nowadays, neither the cooperative's foreign nor its domestic market could be regarded as stable. Tourism was not seen as an activity which might be a solution to regional or local problems.

Hypotheses 5 was justified *as people found market forces important and under-lined the need for cooperation to become competitive and to meet market requirements.*

7 Conclusions

People in both cooperatives have had different experiences since the end of the socialist era and have followed different paths of development since the introduction of radical reforms.

Members of the PMCHG Cooperative started to increase cooperation with the benefit of experience gained from individual farming and justified by reducing transaction costs. Members of the BÉKE Co-op achieved successful development from the mid-sixties to the late eighties; they strongly believed in cooperation and had a high level of trust in their leader going back many years.

In the case of both co-ops, it turned out that a high level of trust is an effective way of reducing transaction costs, even where this level of trust is based only on one's own or on one's parents' experience. The latter has been proved a stronger factor for members of the BÉKE Co-op and indicates that co-op members had high levels of social capital under the socialist system.

The role of leadership was partly different in the two cooperatives. In the BÉKE Co-op, the major goal of leaders was to avoid breaking up the cooperative community, while at PMCHG the main job for key persons was to persuade individual farmers to start and deepen cooperation in order to build up a new cooperative community. Trusts in leaders of both co-ops indicated that leadership plays an important role in cooperatives.

Based on different experiences from history, trust towards formal institutions differs in the two co-ops. It was justified that the level of communication affects the level of cooperation. The latter has not been handicapped by a shortage of information in either co-op and communication has not been used as a source of power by central actors in either co-op. In order to reduce transaction costs, changes in governance structures took place in both co-ops.

People could find their own way of solving problems relying on formal institutions. However, if the latter did not work, they used informal institutions. For members of the PMCHG Cooperative, informal methods played a more important role at the very beginning of cooperation.

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CONTRACTS AND INSTITUTIONS IN AGRICULTURE

Agriculture in the Face of Changing Markets, Institutions and Policies: Challenges and Strategies
JARMILA CURTISS, ALFONS BALMANN, KIRSTI DAUTZENBERG, KATHRIN HAPPE (eds., 2006)
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CONTRACTUAL ARRANGEMENT AND ENFORCEMENT IN TRANSITION AGRICULTURE: THEORY AND EVIDENCE FROM CHINA

HONGDONG GUO *

ABSTRACT

The paper investigates empirically the relationship between contractual arrangement and its enforcement in Chinese agriculture. An analysis of surveys of 116 agribusiness firms in Zhejiang province of China indicates that the contract arrangements such as contract format, floor pricing, and specific investments required for smallholders in facilitating self-enforcement can have a significant effect on enforcement in a business environment characterized by the absence of effective public enforcement institutions.

Keywords: *Contract enforcement, transition agriculture, China.*

1 INTRODUCTION

The enforcement of contract has long been recognized as an important pre-condition for efficient exchange and investment in economic activities in general and agri-food business in specific. Contracts can be enforced through a variety of mechanisms, either public, private or a combination of both. In many developing and transitional countries public institutions such as legal system are either absent or ineffective at ensuring contract enforcement. Under such conditions, private enforcement mechanisms may provide a suitable replacement for public enforcement institutions (GREIF and KANDEL, 1995; HAY and SHLEIFER, 1998; MCMILLAN, 1997; GOW et al., 2000, 2001; BECKMANN and BOGER, 2004; TAO and ZHU, 2001).

Transitional economies typically do not have an effective legal system for contract enforcement. Given weak enforcement, one should expect that transacting parties would not rely heavily on formal contracts, and if they do sign formal contracts, they do not rely on third parties for enforcement. China is no exception. As an American lawyer observed, "contracts in China have more

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of a sense of moral obligation than absolute rights. There is no concept that they are binding" (McMillan, 1997).

In fact, the formal contract law of the People's Republic of China did not come into being until July 1, 1982, almost 4 years after the start of the economic reform in 1978, and quickly became outdated. It was written at a time when China was basically a planned economy, and one major objective of the law was to "ensure the implementation of the states' plans" (Article 1). Therefore, many of the articles in the law did not fit with the reality which was increasingly moving toward a market economy. It was not until 1993 that the National People's Congress passed a revision of the old Contract Law. Of 57 articles in the original law, 10 were retracted and 25 were revised. However, the revised contract law still could not keep pace with the ever-changing economic reality. There were also many other laws governing contracts. Numerous fragmented, incomplete, and sometimes conflicting laws hampered enforcement. In 1998, a unified, comprehensive draft contract law with more than 400 articles was put before the Congress' legal affairs committee for review (Xinhua News Agency, August 24, 1998); and it was eventually passed in March 1999 taking effect in October that year. The more serious problem with China's legal system, however, is not the lack of good laws but the lack of enforcement of the laws. Administrative interventions, corruption, incompetence, shortages of professional, and poor incentives have all hampered enforcement (Tao and Zhu, 2001).

Despite the weakness of its legal system, contract farming has been able to sustain an impressive growth for the past fifteen years. In the process of agricultural industrialization in China since 1990, contract farming has been supported by the Chinese government for the sake of making agricultural production more profitable and competitive. According to a survey of national agricultural industrialization development by the Ministry of Agriculture in 2001, the number of agribusiness firms involved in contract farming had almost quadrupled between 1996 to 2000, and the number of smallholders who signed contract with firms increased twofold over the same period (Niu, 2002). In a survey of 116 agribusiness firms conducted in the Zhejiang province of China in 2004, 100 firms were involved in contract farming. Experience with contract farming varies from firm to firm. Out of total 65 firms which have engaged in contracting for more than 3 years, 31 firms are between 1 and 3 years and only 4 firms have less than 1 year experience. Among 100 agribusiness firms involved in contract farming, over 75 % signed smallholders can enforce their contracts well. Most of the contracts with smallholders had not been breached. According to the survey, only 7 % of 100 agribusiness firms involved in contract farming believed they could enforce the contracts through the courts when the smallholders breach contracts. The investigation shows that the courts play a smaller role in contract enforcement in the Zhejiang province.

Effective, formal contract enforcement mechanisms are often regarded as necessary to prevent opportunistic behaviour in most arms-length market transactions. Chinas' recent contract farming development in the absence of effective formal contract enforcement mechanisms, however, appears to contradict well-accepted doctrine (CHOW, 1997). This paper attempts to explain why most of the contracts with the smallholders were not breached under the condition of inefficiencies in the legal system. This papers' main objective is to identify the relationship between contract arrangement and enforcement. What kinds of contract arrangement reduce the likelihood of contract breach?

The paper is organized as follows: The literature with regards to the relationship is reviewed in Section 2. In the section 3, we develop a simple contract enforcement game model to make theoretical hypotheses about the relationship between contract arrangements and its enforcement. In the section 4, we examine the data by means of regression analysis and discuss the results in relation to theoretical propositions. And finally, we draw some conclusions.

2 CONTRACT ARRANGEMENTENT AND ENFORCEMENT: A REVIEW

Contract arrangement is a multi-criterion decision problem. BOGETOFT and OLESEN (2002) identify three main objectives. First, a contract aims to ensure that the right products are produced at the right time and place. Second, a contract is to ensure that the parties have individual incentives to make coordinated decisions. Third, a contract is to ensure that coordination and motivation are provided at the lowest possible cost. There are many specific means and instruments in the contract arrangement to realize these objectives.

In practice, contracts vary significantly in terms of type, form and specifications. For example, a contract can be informal (i.e., oral) or formal (i.e., written). With informal contracts the agreed norms of coordination can take the form of implicit conventions established by repeated interaction. Even formal contract are naturally incomplete as agents find it difficult and expensive to foresee all possible contingencies and to enforce these contracts, especially when outcomes are unobservable or non-verifiable by a third party (HART, 1995). Contractual incompleteness often results in parties exposing themselves to ex post costs and hazards related to the sunken investments in relationship-specific assets, that is the occurrence of delay; If "hold-up" in an industry term then use it, otherwise it sounds quite colloquial. "A hold-up" can also mean a robbery. Consider revising.

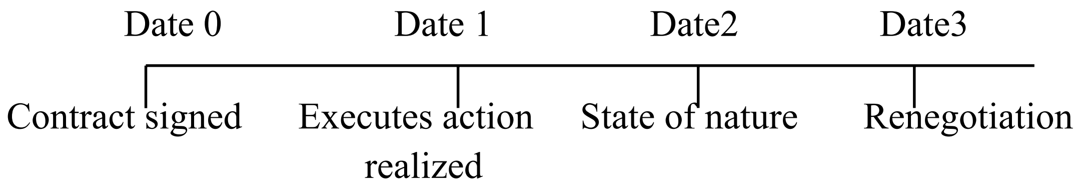
Economic literature on contract enforcement shows two mechanisms to reduce the likelihood of a hold-up including public (legal) enforcement and private enforcement (self-enforcement). The public enforcement assumes that agreements and contracts can be best, and cheaply enforced within the legal system. The self-enforcement implicitly or explicitly assumes that contracts between two parties can be enforced by private sanctions not by courts (e.g. TELSER, 1980; KLEIN and LEFFLER, 1981; KLEIN, 1996). Private sanctions include both the losses that result from termination or non-renewal of the contract or relationships and the damage of the reputation in business or social networks (ELLICCKSON, 1991, 1994). In particular, WILLIAMSON (1979, 1985, 1991, 1996) emphasized that specific investments, which create valuable relationships, make both court ordering and self-enforcement very costly and give way to different ways of private ordering.

Traditional contract theory usually considers court enforcement and private enforcement as alternatives. KLEIN (1996) emphasizes fundamental complementarities between court enforcement and private enforcement. In fact, empirical evidence shows that legal enforcement is often possible, but prohibitively costly. Especially in many transitional countries the legal and judicial system are in their embryonic stages of development, hence court decisions are highly uncertain and non-transparent. It is sometimes not viable to use legal dispute mechanisms due to combination of litigation costs, ineffective contract law, poor third party verifiability (GOW et al., 2000). Therefore, when actors choose a viable enforcement mechanism, it is necessary to consider the cost and benefits resulting from contract breach under different enforcement mechanism. The compensation for losses resulting from contract breach depends on contract arrangement to adequately determine the magnitude of damages and enforce claims resulting from contract breach.

3 A THEORETICAL ANALYSIS OF CONTRACT ARRANGEMENT AND ENFORCEMENT

Most of the contracts between agribusiness firms and smallholders are future contract (see figure 1). Before the smallholders produce, the agribusiness firms sign the contract with them at date 0. The smallholders invest in production facilities to produce the product according to the request of the agribusiness firms at date 1. During the harvest time, the agribusiness firms buy the product from the smallholders according to the signed contract at date 2. Hold-ups occur when unanticipated changes in the external environment at the enforcement date 1 affect the cost/benefit ratio sufficiently to make contractual breach optimal for one party.

Figure 1: Time line for contract enforcement



In China, most contract breaches occur when the expected market price differs greatly from the contract fixed price (CHEN, 2004). So we can regard the contract enforcement problem as a game between agribusiness firms with smallholders when the expected market price changes. Now we assume smallholder A, producer of agricultural product X, needs to invest in production facilities for a delivery to agribusiness firm B which processes product X into product Y. In order to process the product X, the agribusiness firm B also needs relationship-specific investments. To prevent a hold-up by agribusiness firm B or by smallholder A, both parties agree on a contract which specifies product characteristics ("quality"), quantity and a fixed price. Assume the price is set at the expect market price P_{fixed}.

Once the contract has been agreed upon, the actual market price, P, may deviate from the contracted price P_{fixed}. If $P \geq P_{fixed}$, we assume the actual market price as P_{good}. Under such higher actual market price condition, the contract provide unanticipated rents to agribusiness firm B and the benefits of contract breach increase for smallholder A, since it could get higher price by selling its product on the market. The smallholder A's benefits of contract breach depend on the gap between the actual market price and the contracted price as well as the contracted quantity Q, which can be devoted by $Q(P_{good} - P_{fixed})$. The cost of the smallholder A's breaching the contract is determined by different enforcement mechanisms. When smallholder A breaches the contract, agribusiness firm B can apply two enforcement mechanisms: (1) self-enforcement (termination) and/or (2) court enforcement. Both of these mechanisms are connected with different costs for smallholder A. Under the self-enforcement agreement assumption, if smallholder A breaches contract, agribusiness firm B will accept the financial loss, but never trade with smallholder A again in the future. The cost to smallholder A includes both the value W_h of losses that result from termination or non-renewal of the contract or relationship and the damage to the smallholder's reputation in business or social networks. $W_h = \sum_i^n W_{hi} / (1+\delta)^i$, δ for the discount rate, W_{hi} for the value of losses in the future i year, n for the duration of the smallholder dealing in.

Under the court enforcement mechanism, if the smallholder A breaches the contract, agribusiness firm B would immediately take legal action to force smallholder A to compensate the losses resulting from contract breach. This depends on the value of compensation D for losses resulting from contract breach and the ability ρ of the courts to adequately determine the magnitude of damages and enforce claims resulting from contract breath. The possibility ρ of compensation for losses resulting from contract breach is determined by costs of contract enforcement. Although the extreme assumes that the agreements and contracts can be best enforced within the legal system at little or no cost, in fact, empirical evidence shows that legal enforcement is often possible, but quite costly. The costs of contract enforcement are time, effort and money that must be spent to take legal action. These are affected by (1) efficiency of the legal system, (2) contract arrangement, (3) characteristics of the firm or smallholder.

If $P \geq P_{fixed}$, smallholder A will weigh the costs and benefits of contract breach. A hold-up will occur only when the benefits $Q(P_{good} - P_{fixed})$ were greater than the costs $(W_h + \rho D)$ to agribusiness firm A, which can be defined by $Q(P_{good} - P_{fixed}) \geq W_h + \rho D$.

On the other hand, If $P \leq P_{fixed}$, we assume the actual market price as P_{bad}, under such market condition, it becomes optimal for agribusiness firm B to breach contract and to purchase supplies on spot markets. In the same way, agribusiness firm B will breach contract only when the benefits $Q(P_{fixed} - P_{bad})$ are greater than the costs $(W_f + \rho D)$ to smallholder A, which can be defined by $Q(P_{fixed} - P_{bad}) \geq W_f + \rho D$. W_f for the value of losses that result from termination or non-renewal of the contract or relationship. $W_f = \sum_i^n W_{fi} / (1+\delta)^i$, δ for the discount rate, W_{fi} for the value of losses in the future i year, n for the duration of agribusiness firm B dealing in.

According to the above discussion, we can devise a game model between the smallholder and agribusiness firm, as illustrated in Table 1 and Table 2.

From Table 1, we can see that when the market price is good, the dominant strategies for the agribusiness firm is to enforce the contract. For the smallholder, the strategic choice depends on the benefits and costs of different strategies. Only if $Q(P_{good} - P_{fixed}) \geq W_h + \rho D$, will smallholders choose to breach contract.

Table 1: When the market price is good, smallholder and agribusiness firm's payoff

	Agribusiness firm enforce	**Agribusiness firm breach**
Smallholder enforce	$QP_{fixed}, Q(P_{good} - P_{fixed})$	$\rho D, Q(P_{fixed} - P_{good}) - W_f - \rho D$
Smallholder breach	$QP_{good} - \rho D - W_h, Q(P_{fixed} - P_{good}) + \rho D$	$QP_{good}, Q(P_{fixed} - P_{good})$

From Table 2, we can see that when market the price is bad, the dominant strategies for smallholder is to enforce the contract. For agribusiness firms, the strategic choice depends on the benefits and costs of different strategies. Only if $Q(P_{fixed} - P_{bad}) \geq W_f + \rho D$, will agribusiness firms choose to breach the contract.

Table 2: When the market price is bad, smallholder and agribusiness firm's payoff

	Agribusiness enforce	Agribusiness breach
Smallholder enforce	$QP_{fixed}, Q(P_{bad} - P_{fixed})$	$\rho D, Q(P_{fixed} - P_{bad}) - W_f - \rho D$
Smallholder breach	$QP_{bad} - \rho D - W_h, Q(P_{fixed} - P_{bad}) + \rho D$	$QP_{bad}\ , Q(P_{fixed} - P_{bad})$

From the above discussion, we can determine that ρ, W_f, W_h, D and the gap among $P_{fixed}, P_{good}, P_{bad}$ will affect contract enforcement. But these values are determined by the contract arrangement such as contract type, contract terms and so on. So we can provide the following propositions about contract arrangement and enforcement.

Proposition 1: The organization type of contract arrangement between the agribusiness firm and smallholder will affect contract enforcement, a contract signed directly is less likely to be enforced, everything else remaining constant.

Above, we can determine that the damages D of breaching the contract is greater and the possibility ρ of acquiring indemnification of compensation for losses is higher, the contract is more likely to be enforced. If D is very big and $\rho = 1$, agribusiness firms or smallholders will certainly enforce contract. But the damage D in reality is not very high, otherwise agribusiness firms or smallholders face very high risk, and would not like to sign contract. But ρ is determined by the cost of the court enforcement and the negotiability of the other party. Seen from the organized type of contract in China, there are two broad models. One is a centralized model, which involves a centralized processor and/or packer buying from a large number of smallholders, with agribusiness firm and smallholder signing contracts directly, this type is also named "firm + smallholder" in China. Another broad model is intermediary model, which involves agribusiness firms in subcontracting linkages with smallholders to intermediaries such as farmer cooperative. This kind of type is named "firm + intermediaries + smallholder" in China. Because in China most of smallholders live in dispersion, the quantity is numerous and the scale is very small. Under the centralized model, the agribusiness firm deals with thousands of smallholders, if the smallholders broke contract, the cost of the court enforcement would be very high. The possibility ρ of the agribusiness receiving indemnification would be very low, so when smallholders break contract, the agribusiness firm's reasonable choice usually is "silent". If the agribusiness firm breaks the contract, the smallholders must compare the cost and the income of the court enforcement. For a solitary smallholder whose trade amount is small, the possible income which would be gained by compensation for losses resulting from a breach of contract is also small, but the court fees would be prohibitively high for a single smallholder. So when the agribusiness firms break the contract, smallholders usually have no choice but to give up the trade. Therefore, the contract which agribusiness firms and smallholders sign directly is more likely to be broken.

Proposition 2: The format of contract arrangement between the agribusiness firm and the smallholder will affect contract enforcement, the formal agreement (written agreement) is more likely to be enforced than informal agreement (verbal agreement), everything else remaining constant.

The various formats that a contract may take are formal agreement (written contract) or verbal agreement (unwritten). Formal agreement is explicit, legally endorsed contract formats, which closely detail the conditions and obligations of each party. The informal agreements (verbal agreement) are commonly used by informal individual developers and sometimes by corporate sponsor. A major problem of verbal agreements is the interpretation of responsibilities and specifications. Confusion and misunderstanding can easily occur if the agreements are not clearly explained by management to the smallholders and their representatives. If the agribusiness firm or the smallholder breaches contract, it is very difficulty for the court to determine responsibility. But under the formal agreement (written agreement), if the agribusiness firm or the smallholder break the contract, it is easy for the court to obtain evidence and establish responsibility and to improve the possibility ρ of acquiring indemnification. So the formal agreement (written agreement) is more likely to be enforced.

Proposition 3: The pricing arrangements of the contract between the agribusiness firm and smallholder will affect contract enforcement, the minimum floor pricing agreement is more likely to be enforced than other price arrangement, everything else remaining constant.

In the above discussion, we can see that the gap between fixed price and the market price will affect contract enforcement. If the gap is wide, the agribusiness firm or smallholder may take default action; in turn, if smaller, the likelihood of the agribusiness firm or smallholder breaching contract will be very small. Pricing arrangement is the most frequently discussed and challenging components of all farming contracts. There are several ways prices are offered to smallholders by agribusiness firms in China, with minimum floor pricing being the most common. The practice is usually to offer smallholders a minimum price at the beginning of each season. If the market price is higher than minimum price, the agribusiness will calculate the price at the market price. If the market price is lower than the minimum price, the agribusiness will calculate the price at minimum price. Such an arrangement provides income guarantees for smallholders but the agribusiness firms take all the risk of market price fluctuations. Under this kind of price structure, the likelihood of the smallholders breaching the contract will be very small, because of all the risk of market price fluctuations being mainly undertaken by agribusiness firms. For agribusiness firms, the possibility of contract breach mainly rests on the gap between minimum price P_{fixed} and P_{bad}. If the gap is very wide, the agribusiness will take great loss to enforce the contract. When the agribusiness firms cannot bear huge market risk, they may take default behavior. Because P_{fixed} is provided by the agribusiness firms, such situations seldom occur. Price calculated on spot-market values is another important method in China. In such an arrangement, payment based on spot market price, the smallholders have to take all the market price risk. The main problem with this approach is that the agribusiness firms and smallholders must arrive at a common understanding of what constitutes a market price that is relevant to higher quality that contracted smallholders could to be expected to produce. In most cases the open market pricing system is unsatisfactory, as the smallholders do not have control over the price they receive or knowledge of how it is calculated.

Proposition 4: Specifications of contract arrangement such as duration of contract, payment arrangement, and safeguards arrangement will affect contract enforcement. The longer the contract duration, advanced payment and greater the specific investments required for smallholders, the more likely a contract to be enforced.

From above discussion, we can tell that agribusiness firms or smallholders compare the short term gains they can achieve by not performing consistently with the contractual understanding with the discounted expected future profit stream they will lose if the relationship is terminated for non-enforcement. If the duration of the contract is longer, the year of the discounted is also longer, the discounted expected future profit stream will be bigger. So the longer duration of contract, the more likely enforcement of the contract will occur. If the agribusiness firms provide advanced payment to the smallholders, the agribusiness firms will be more likely to enforce contract. If agribusiness firms breach contract, they will lose the payment directly. So an advanced payment contract is more likely to be enforced. Seen from safeguards arrangement, if the agribusiness firms require the smallholders to make specific investments to produce the product for the agribusiness firms, the contract is more likely to be enforced. If the smallholders breach contract, their specific investments will become sunk cost and they will lose much in future trade. So the more specific the investments required for the smallholders, more likely a contract to be enforced. If the agribusiness firms have bonuses for the smallholders who enforce the contract well and provide some services such as provisions of input and production services, the contract is more likely to be enforced. If the smallholders breach contract, they will have no chance to get the service and the bonus in future.

4 DATA AND METHOD

4.1 The study area

The Zhejiang Province is located in the southeast coast of China. Since the 1980s, the "People's Commune" system has been dismantled and replaced by individual family farms based on the "Household Responsibility" System. It encourages smallholders’ creativity, investment and efficiency. The output of agricultural product increased significantly in the 1980s. Meanwhile with a leap increase in agricultural production, the market of agricultural products has shifted from shortage to relative surplus since the 1990s. With the development of market-oriented economy, more and more economic crops have been planted replacing grain crops, the grain crops planting area was 1454.53 thousand hectare in 2004, down 57.5 % compared with 1980. The area of vegetable was 661.02 thousand hectares in 2004, increased 5.11 times compared with 1980. The area proportion of cash crop increased 26 % of total sown acreage in 1980 to 48 % in 2004. With changes in agricultural commercialization and market conditions, marketing of surplus agricultural products has become more important task for the smallholders. Most of the smallholders scale is very small. From 1985 to 2004 the total number of rural households increased by nearly 33.8 %, at the same time, total cultivated areas shrank by 11.3 % with the rural industrialization development, the average cultivated areas of each rural household was only 0.133 hectares, down 33.2 % compared with 1985. Moreover, the smallholders are loosely organized. It is difficult for such smallholders to access the market directly. Since the middle 1980s, the government has taken many policies to help smallholders to access to market. One of the most important measures was to foster vertical coordination among stages in supply chain to help the smallholders access the market. Contract arrangements between smallholders and processing or distribution firms are the main types of vertical coordination in Zhejiang, which started in the middle 1980s. In the late 1990s, especially after China’s entry into WTO, the development of contract farming has accelerated remarkably.

4.2 Data

Data was collected in three phases between February and August 2004. First, exploratory interviews were conducted with some agribusiness firm managers, government officials and smallholders to understand fully the context in which contract farming operated. Second, a questionnaire was designed to explore the basis of the relationship between contract arrangements and enforcement. In the third stage, we identified the sample of agribusiness firms. There are hundreds of agribusiness firms in the Zhejiang province. It would be impossible for us to survey all the agribusiness. According to the geographic coverage of agribusiness firms in dealing with smallholders, most of them are classified into four types such as national, provincial, municipal and county agribusiness according to the scale. In the provincial government administration office, there is database that contains the names and addresses of 116 national and provincial agribusiness firms, most of these firms have contracts with smallholders. The provincial government office helped to send questionnaires to the 116 the national, provincial agribusiness firms in return for a small administrative fee. A total of 80 usable copies of questionnaires were returned. During the same period, we interviewed an additional 36 municipal and county agribusiness firms all over the province. In total, 116 questionnaires were valid.

4.3 Methods

In order to examine the relationships between contract arrangements and contract enforcement, we choose to use a maximum likelihood estimator, MLE, to conduct a qualitative analysis. The information on contract arrangements and enforcement between agribusiness firms and smallholders, as well as a description of variable is available in Table 3. We used SPSS 11.5 software to run the binominal logit regression. For the purpose of interpretation, we choose backward selection to eliminate the variables with smallest t value until significance of all variables was achieved.

Table3: Definition and descriptive statistics of variables

Name	Description and Measurement	Unit	Mean	Std. Deviation
CE: Contract enforcement rate	Agribusiness firm states that the rate of contracted smallholder enforcement contract over 75 %=1, else=0	Dummy	0.72	0.451
CT_1: Firm+smallholder	Agribusiness firm signs contract or agreement with the smallholder directly =1, else=0	Dummy	0.50	0.503
CT_2: Firm+intermediaries	Agribusiness firm signs contract or agreement with the smallholder by intermediaries=1, else=0	Dummy	0.21	0.409
CF: Oral contract	Contract form is oral=1, else=0	Dummy	0.15	0.359
CP_1: Flexible price	Delivery price is flexible price=1, else=0	Dummy	0.33	0.473
CP_2: Floor pricing	Delivery price is floor pricing=1, else=0	Dummy	0.53	0.502
CD: Duration of contract	length of the contract duration	Number	2.12	1.076
CC: Advanced payment	Agribusiness firm pays cash in advance =1, else=0	Dummy	0.11	0.314
CI: Specific investment	Agribusiness firm requests contract smallholder to invest specific investment=1, else=0	Dummy	0.74	0.441
CS: Provision service	Agribusiness firm provide specialized input (machinery, chemical inputs, seeds, etc) to smallholders =1, else=0	Dummy	0.85	0.359
CB: Bonus	Agribusiness firm gives bonuses to smallholder who enforces contract well=1, else=0	Dummy	0.73	0.446

Source: Surveys of 116 agribusiness firms in Zhejiang province in 2004.

5 RESULTS AND DISCUSSION

Table 4 presents all MLE results of the binominal logit model.

The regression results show contract type variables, CT1 and CT2 have limited impact on contract enforcement. Agribusiness firm signs contract with smallholder directly variable, CT1, has the expected negative but insignificant in six of seven model specifications. The agribusiness firm signs contract with smallholder by intermediaries, variable, also CT2 has the expected positive but not significant in four of seven model specifications.

The variable CF for oral contract shows a significant positive unexpected negative impact on the likelihood in all model specifications at the 1 or 5 % level. If the agribusiness firm agrees to contract with smallholder in oral form, the likelihood that contract would be enforced by smallholder is increased. This result is not supported by some empirical research such as LYONS (1996, p. 27) statement: "The arrangement need not to be written, but it is obviously difficult to enforce it if it is not written or witnessed by a third party". Written contracts increase the verifiability of the agreement by a third party and reduce the cost of enforcing them through courts. The reason might lie with the fact that the social capital plays an important role in contract enforcement in China. Social capital can help economize transactions costs by speeding up search, increase trust, and facilitating the circulation of information (FAFCHAMPS and MINTEN, 2001; KNACK and KEEFER, 1997). In China, trust plays an important role in trade, especially in rural areas. Smallholders often do business based on trust. When they trust the traders, it is not necessary for them to sign contract, they will simply enforce the contract. However, when people do not know each other, written contracts are often used.

Among the price arrangement variables, the flexible price, CP1, has the expected negative but is insignificant in three of seven specifications. The floor pricing, CP2, is significantly positive at 1 or 5 % level in all specifications. This results supports theoretical considerations that the price floor will benefit contract enforcement. When a price floor is used more, smallholders are more likely to enforce the contract.

The duration of contract and payment of variable CD and CC prove to be of limited importance in contract enforcement. Duration of contract variable, CD, has the expected positive but is insignificant in two of seven model specifications. Payment variable, CC also has the expected positive but is insignificant in five of seven model specifications.

The specific investment variable, CI, consistently shows a significant positive impact on the likelihood that a contract can be enforcement in all model specifications at the 1 % level. This result supports theoretical considerations that when the agribusiness firm requests the smallholder to make specific investments when they sign contract, it increases the chance that the contract will be enforced.

The more the specific investment required to input by the agribusiness firm, the more likely smallholders are to enforce the contract.

Bonus variable, CB, also consistently shows a significant positive impact on the likelihood that a contract can be enforcement in all model specifications at the 1 % level. This clearly supports the view that the Agribusiness firm provide bonus to smallholders who enforce contract well improves the likelihood of contract enforcement.

Finally, the results show service variable, CS as an unexpected positive sign but is significant in only one of seven model specifications.

Table 4: Estimated logit coefficients: Contract arrangement and enforcement

Dependent variable $P(CE=1)$	**MLE-1**	**MLE-2**	**MLE-3**	**MLE-4**	**MLE-5**	**MLE-6**	**MLE-7**
Constant	-5.492***	-5.602***	-5.083***	-5.518***	-5.469***	-5.072***	-5.487***
CT_1: Firm+smallholder	-0.720	-0.785	-0.726	-0.834	-1.077	-1.065	
CT_2: Firm+intermediaries	1.058	1.040	1.066	0.871			
CF: Oral contract	4.808**	4.811**	4.638**	4.683**	4.965**	4.778**	4.519***
CP_1: Flexible price	-0.581	-0.564	-0.685				
CP_2: Price floor	3.247***	3.265***	3.086**	3.567***	3.627***	3.454***	3.408***
CD: Duration of contract	0.203	0.198					
CC: Advanced payment	1.201	1.166	1.304	1.372	1.381		
CI: Specific investment	4.238***	4.250***	4.194***	4.277***	4.392***	4.223***	4.217***
CS: Provision service	-0.193						
CB: Bonus	3.385***	3.376***	3.417***	3.403***	3.531***	3.365***	3.211***
-2 Log likelihood	45.255	45.293	45.553	45.986	46.365	47.476	49.402
Nagelkerke R Square	0.748	0.748	0.746	0.743	0.741	0.733	0.719
Sample size	100	100	100	100	100	100	100

Notes: * Level of significance 10 %, ** level of significance 5 %, *** level of significance 1 %.

6 CONCLUSIONS

The aim of the paper is to identify contract arrangements that determine the extent of contract enforcement. The most important results of our study in contributing to theory and empirics of contract enforcement are that it is sometimes not viable to use legal dispute mechanisms due to a combination of litigation costs, ineffective contract law, poor third party verifiability, etc. Furthermore, transacting parties may prefer to use private contract enforcement mechanisms as opposed to courts. The implication is that private contract enforcement is not just a temporarily important issue, but will continue to play an important role in transition economics, and elsewhere, even as public institutions become more effective (GOW and SWINNEN, 2001). The role of private contract enforcement mechanism in safeguarding contract enforcement depends on the introduction of innovations in contracting with smallholders. Contract arrangement such as floor pricing, specific investment, bonuses, and so on will reduce the likelihood of contract breach.

However, our research has some weaknesses. Our study only focused on the relationship between contract arrangement and enforcement; in fact, the characteristics of agribusiness firms and smallholders will also affect contract enforcement. In this study, our survey was focused on hold-ups by smallholders. In fact agribusiness firms also breached contracts. A widespread example is that when the market price is lower than contracted price, the agribusiness firms tend to reduce contract buying or lower their service quality standard. These factors should be taken into account in future empirical research.

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CONTRACTUAL RELATIONSHIPS IN THE HUNGARIAN HORTICULTURAL SECTOR

IMRE FERTŐ[*]

ABSTRACT

We present an empirical analysis of farmers' contract choice in various supply channels in the Hungarian vegetable sector during the 2000-2001 seasons by employing transaction cost economics. Data from a survey of Hungarian horticultural producers were drawn from one Hungarian region – Csongrád County. The main results of the empirical analyses are: (1) the use of formal contracts is found to be positively associated with specific investments, (2) a good reputation decreases the probability of a contract, (3) the frequency of transactions has a negative influence on the presence of a contract. In terms of contract content, the results suggest that once trust is established between both parties, the necessity of providing producers with special treatment is negated.

Keywords: *Transaction cost, contracts, horticultural products, Hungary.*

1 INTRODUCTION

The amount of literature on the role of contracts in agri-food chain is ever increasing. However, most theoretical and empirical research focuses on developed countries' agriculture (e.g. HUETH et al., 1999; GOODHUE, 2000; BOGETOFT and OLESEN, 2002; GOODHUE et al., 2004; FRASER, 2005). Recently, some studies have focused on various agricultural governance structures in transition countries employing various frameworks (e.g. RUDOLPH, 1999; GOW et al., 2000; ZAHARIEVA et al., 2002; FERTŐ and SZABÓ, 2002), but studies concentrating on the role of contracts in transition agriculture are limited (BOGER, 2001; BOGER and BECKMANN, 2004).

In transition countries, where public institutions are ineffective when it comes to ensuring contract enforcement, price systems are generally still inefficient. The

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absence of enforceable contracts to set up any kind of relationships between farmers and food processors or retailers has become extremely difficult. Therefore, finding new partners for long run, relation-specific investments has been associated with high transaction costs for market players. In addition, this creates severe barriers for price discovery, involving high transaction costs to when coordinating market exchanges. In those sub-sectors where any type of production contracts do exist, agricultural producers face hold-up problems (e.g. delayed payment for delivered products, or *ex post* price reduction by retailers), which are stressed by GOW and SWINNEN (2000). Although food processors and retailers have significant market power, they also struggle with establishing long-term relationships with farmers.

The aim of this paper is to identify and explain farmers' contract choice and contract design among various supply channels in transition agriculture by examining the Hungarian horticultural sector. We present an empirical analysis of the key determinants based on transaction cost economics (TCE): The analysis is based on a survey among vegetable producers in one Hungarian County (Csongrád) with respect to the choice of marketing channels. The resulting data are applied to a probit model to test the theoretical prediction.

The remainder of the study is organized as follows. The second Section briefly reviews the literature on transaction cost economics and its implications on contracts, while Section 3 provides an overview on the Hungarian horticultural sector. Survey design and the variables are described in Section 4, while results are presented in Section 5. The last section summarizes and offers some conclusions on the implications for the market mechanisms of Hungary's beef sector.

2 TRANSACTION COSTS THEORY AND CONTRACTS

Transaction costs economics (TCE) claims that a firm's vertical boundary decisions are determined by characteristics associated with the efficiency of the chosen form of organization. It is assumed that efficiency is inversely related to the extent of the costs of organizing the exchange, which include the costs of negotiating and writing contracts and the costs of monitoring and enforcing contractual performance (WILLIAMSON, 1985). The theory focuses on identifying the characteristics of transactions that are best suited to market and firm organization. TCE asserts that all contracts are incomplete and subject to re-negotiations and the possibility of opportunistic behavior due to the presence of bounded rationality of agents, asymmetric information and inability to completely specify behavior in the existence of multiply contingencies. Thus, the problem of opportunistic behavior is more severe when an exchange requires one or both parties to make considerable transaction-specific investments, since such investments create quasi-rent that may be subject to hold up.

TCE provides several empirically-testable hypotheses on the various aspects of contracts, including decision, duration and design (LYONS, 1996; MASTEN and SAUSSIER, 2000). The vertical integration, or make-or-buy, decision has been the most extensively studied question in the empirical transaction cost literature (SHELANSKI and KLEIN, 1995; and CROCKER and MASTEN, 1996). The structure of contractual agreements may vary with the objectives of the contracting parties, underlying production relations, and the nature and size of informational and strategic impediments to contract formation and enforcement. As a consequence, the theory provides no unifying structure for the specification and testing of contract design hypotheses (MASTEN and SAUSSIER, 2000). Joskow's study provided evidence that contract duration varies with the benefits of contracting (JOSKOW, 1987), whilst FRASER (2005) presents an empirical analysis of specific aspects of wine grape supply contract design and implementation. FRANK and HENDERSON (1992) claim that transaction costs are the determinants of vertical coordination in the food industry, and according to BASH and DAVIES (1998) foreign direct investments influence factors in the agribusiness contract choice.

In this paper we focus on the following specific hypotheses:

H1: *Asset specificity*. Contracts contain the costs of writing, enforcement, and potential inflexibility, and in the absence of sufficient advantages, these costs may be a deterrent to formal contracting. The main insight of TCE is that the benefits of writing a contract should depend positively on each trading partners' vulnerability to opportunistic behavior. This should be closely related to investment in specific assets. The likelihood of contractual agreements increases with the value of relationship-specific investments.

H2: *Complexity*. Product complexity and product diversification make a contract lengthy, leaky and expensive. Thus, formal contracts are less likely to be written.

H3: *Size*. The size of firms will be positively associated with the propensity to write formal contracts, LYONS (1994). Large firms can more easily shoulder the costs of writing a formal contract, because they can spread the overhead of retaining legal specialists.

H4: *Reputation*. The greater the expectation that trade will continue in the future, the less reliant a contractual relationship will be on legal enforcement. Non-legal enforcement requires the incentive of expected future profits.

H5: *Frequency*. Contracts will increase along with the frequency with which exchange takes place and the extent to which the transaction needs specific investments.

Therefore, the theoretical model we test is:

Prob(Write formal contract)=f(Asset specificity, Complexity, Frequency, Size, Reputation).

The expected signs of the variables are as follows:

f1>0, f2<0, f3>0, f4<0 and f5>0.

3 MAIN CHARACTERISTICS OF THE HUNGARIAN HORTICULTURAL SECTOR

Horticultural plays a relatively important role in Hungarian agriculture, accounting for 12 percent of total production; also, its share of total agri-food exports during the 1990s varied between 17 and 23 percent. In addition, recent studies suggest that the Hungarian horticultural sector has retained comparative advantage in the last decade (FERTŐ and HUBBARD, 2003).

The share of private farmers is relatively high in Hungary, accounting for above 85 percent of total horticultural production and above 70 percent of the total area used in horticultural production. Most of the farms are relatively small, sometimes with only a household plot. It is very important, therefore, for the farmers to use marketing channels that could provide them the strengths of more concentrated organizations. Thus, it is indispensable for them to know the possibilities of the different forms of vertical coordination and integration in their sector.

According to quality requirements there are alternative quality measurements in Hungary, so it is difficult to compare individual cases. Basically, Hungary applies the standards of European Union; however, ensuring that producers, traders and other actors in the horticultural market are using them is taking place only in the case of exports. The increasing influence of retail chains also lifts standards to a higher level, since consumers can see the origin, price and class of the product in the retail shops, e.g. hyper- and supermarkets.

A variety of channels and markets exist for agricultural producers from spot markets to retailers. It must, however, be underscored that spot markets and different types of contracts (including, in some cases, contract production) are common forms of coordination. Different retail chains are gaining bigger and bigger shares from the fresh horticultural market. However, marketing cooperatives and producers' organizations can also solve the marketing problems of horticultural producers.

4 THE SAMPLE AND KEY VARIABLES

This study investigates contractual relationships between farmers among various supply channels in the Hungarian horticultural sector during the 2000-2001 seasons. The hypothesis that producers' decision among various marketing channels is influenced by transaction costs and asset specificity is tested employing data collection from a survey of Hungarian horticultural producers, taken in one Hungarian region – Csongrád County. The questionnaire was prepared in consultation with members of local agricultural extension services. Due to financial constraints, postal surveys were used: 720 surveys were mailed to vegetable producers asking them their perceptions of four different supply channels. A total of 74 useable surveys returned, but we reduced this number in the final model to 70 due to missing values. It should be emphasized that the sample is not random. The survey targeted larger, market-oriented farmers in a traditional horticultural grower region of Hungary.

Dependent variables. The majority of respondents claim to have formal contracts. Thus, the main distinguishing characteristic between various arrangements is the duration of contract. The dependent variable in our model is CONTRACT, where CONTRACT = 1 if the contract does exist, and zero otherwise. We also examine some specific aspects of contracts such as the bonus/penalty payment. The PRICEINC takes the value of one if the farmer's partners apply a bonus or penalty payment as a safeguard of quality, and zero otherwise. The INPFIN takes the value of one if trading partners offer special input finance credits for producers, and zero otherwise. The final contract content variable is SERVICES, where SERVICES = 1 if partners provide extension services for farmers, and zero otherwise.

Asset Specificity. Horticultural production's physical asset specificity is captured by two variables: 1) investment in production in the last business year (INVPAST); 2) specificity of investment (INVSPEC).

Complexity and diversification. Production diversity is measured by two variables: 1) number of main production activities, e.g. horticultural, crops and livestock production (DIVPROD); number of products in horticultural production (HORTDIV).

The size of firm. The size of the operation is measured by the number of employees (SIZE).

Reputation. It is difficult to quantify reputation in a postal questionnaire; we used two proxies for measuring reputation. We asked about the reasons for purchasing beef from a particular producer. The respondents evaluated the importance of specific factors, including trust (TRUST) and personal contact (PCONT) on a Likert-scale.

Frequency. We classify transaction frequency into the following groups: FREQ = 1 if daily transactions exist; FREQ = 2 if transactions occur every 2-3 days; FREQ = 3 in the presence of weekly transaction; FREQ = 4 if transaction frequency is more than one week.

5 RESULTS

Given the nature of the data collected and the various relationships to be examined, we estimate several probit models. All models and specification tests are estimated using STATA. We begin by presenting results that investigate the existence of a contract. We used different specifications to test the sensitivity of our results on a particular choice of diversification (DIVPROD/HORTDIV) and reputation (TRUST/PCONT) variables.

5.1 Contracts

The estimated coefficients of probit contracting models are presented in Table 1. The results are quite similar for each specification, with the majority of explanatory variables being statistically significant. The estimations indicate that asset specificity variables have the expected signs, and that they are significant for all specifications. The results provide clear support for the hypothesis that fear of opportunism is a genuine concern and encourages the use of contracts. Both complexity variables have unexpected signs, but they are not significant. Surprisingly, the coefficients of SIZE are significant with unexpected signs for three specifications. We may argue that larger farms have more bargaining power; therefore, they are less vulnerable to buyers' opportunistic behavior. Both reputation variables also have the expected signs, significant for all estimations. This indicates that a good reputation decreases the probability of a contract. The FREQ variables are significant for all specifications with the expected signs. This suggests that the frequency of transactions has a negative effect on the existence of contracts.

Table 1: Probit models: Contract existence

	Contract			
INVSPEC	0.240^{**}	0.211^{**}	0.236^{**}	0.227^{**}
DIVPROD	0.124		0.011	
HORTDIV		0.065		0.025
SIZE	-0.387^{**}	-0.321^{*}	-0.298	-0.291^{*}
TRUST			-0.378^{*}	-0.374^{*}
PCONT	-0.359^{*}	-0.348^{*}		
FREQ	0.204^{**}	0.224^{**}	0.213^{**}	0.217^{**}
Cons	0.370	0.220	0.127	0.047
McFadden's R^2	0.170	0.168	0.176	0.176
Loglikelihood	-39.10	-39.17	-38.82	-38.79
N	70	70	70	70

Notes: * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

5.2 Contract contents

We examine three specific aspects of contract content: The presence of bonus/ penalty payments, the input credit, and extension services. Estimations for price incentives are presented in Table 2; the results are similar for each specification. The asset specificity variables have positive signs and are significant for two specifications, which indicates that investing in relation-specific assets more likely induces the need of price incentives. We find that complexity is negatively related to bonus/penalty payments, but they are significant for the HORTDIV models. Both reputation variables are significant with negative signs. The negative relationship between price incentive and reputation would suggest that once trust is established between both parties, this negates the need of a bonus/penalty payment system in a contract. The frequency of transactions (FREQ) is negatively related to contract content, but they are not significant. The SIZE coefficients are not significant, with negative signs for all specifications.

Table 2: Probit models: Price incentives

	Price incentive			
INVSPEC	0.122	0.203**	0.139	0.224**
DIVPROD	-0.024		-0.255	
HORTDIV		-0.216*		-0.247**
SIZE	-0.205	-0.246	-0.061	-0.210
TRUST			-1.215***	-1.204***
PCONT	-0.758***	-0.785***		
FREQ	-0.023	-0.039	-0.006	-0.054
Cons	1.730*	2.423**	1.749**	2.383**
McFadden's R^2	0.207	0.243	0.246	0.278
Loglikelihood	-35.66	-34.03	-33.93	-32.48
N	70	70	70	70

Notes: * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

The second aspect of contracting we consider is whether or not buyers offer special input finance credits for producers. Asset specificity, size of farms and frequency of transaction have no significant effect on the input financing. We find a negative relationship between input finance and complexity; the results indicate that risk-averse farmers who diversify their output are less likely to have an input finance clause in their contract with buyers. Both reputation variables have negative and significant effects on input finance. Again, we may argue that the negative relationship between input credits and reputation suggests that the presence of trust negates the necessity of having input credits in a contract.

Table 3: Probit models: Input finance

	Input finance			
INVSPEC	0.132	0.189	0.070	0.128
DIVPROD	-0.647**		-0.624**	
HORTDIV		-0.188		-0.157
SIZE	0.152	-0.139	0.130	-0.149
TRUST			-0.459*	-0.253
PCONT	-0.866***	-0.735**		
FREQ	0.057	-0.038	0.023	-0.078
Cons	0.702	0.858	0.078	0.099
McFadden's R^2	0.278	0.205	0.147	0.065
Loglikelihood	-16.41	-18.08	-19.39	-21.26
N	70	70	70	70

Notes. * p<0.1; ** p<0.05; *** p<0.01.

Finally, we consider whether or not extension services are included in the contract. The asset specificity variables have positive signs and are significant for all specifications. This suggests that farmers who invested in relation-specific assets required buyers to provide extension services. Similarly, there is a negative relationship between extension services and reputation. Other explanatory variables such as complexity, size and frequency are not significant.

Table 4: Probit models: Extension services

	Services			
INVSPEC	0.277***	0.261**	0.285***	0.293***
DIVPROD	0.114		-0.075	
HORTDIV		0.033		-0.022
SIZE	-0.254	-0.192	-0.110	-0.150
TRUST			-0.706***	-0.690***
PCONT	-0.627***	-0.612***		
FREQ	0.120	0.137	0.132	0.119
Cons	0.577	0.487	0.199	0.223
McFadden's R^2	0.199	0.195	0.210	0.209
Loglikelihood	-38.66	-38.82	-38.08	-38.16

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Finally, it is important to note that our results are not sensitive for alternative specifications for either contracting or contract contents estimations.

6 CONCLUSIONS

We have analyzed contractual arrangements between various supply channels and horticultural producers in Hungary by employing a transaction cost economics framework. The results add to a small but growing body of literature on contract design and implementation in transition agriculture. Our results provide some support to TCE predictions on contracting: (1) the use of formal contracts is found to be positively associated with specific investments, (2) a good reputation decreases the probability of a contract, (3) frequency of transactions has a negative influence on the presence of contract.

In terms of specific aspects of contract design, we find that investing in relation-specific assets positively influences the need for price incentives and extension services. The most striking findings are that we find negative relationships between reputation and various contract clauses such as price incentives, input financing and extension services. These results suggest that once trust is established between both parties, the necessity of providing producers with special treatment is negated. Finally, sensitivity analyses show that our results are fairly robust to alternative specifications.

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CONTRACT FARMING IN CHINA: PERSPECTIVES OF SMALLHOLDERS

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ABSTRACT

This paper explores the current status of contract farming in China by examining data from a survey of Chinese householders. The survey indicates that the actual proportion of householders engaged in contract farming is relatively low and significantly less than the proportion of householders willing to produce under contract. The primary reason for householders not participating in contract farming is the absence of opportunities, particularly for small size farms. Householders identify price stability and market access as the key motivations to participate in contract farming. Middleman and agribusiness firms were the most important organizations for householders to contract with.

Keywords: *Contract farming, China, smallholders.*

1 INTRODUCTION

As part of the on-going processes of "agri-industrialization", the use of contracts is increasingly common across a range of agricultural commodities in both industrialized and developing countries. In addition to individual case studies, there have been cross country reviews (see e.g DORWARD et al., 1998; LITTLE and WATTS, 1994) and formal analyses (e.g. GOODHUE, 1999). From the producer's perspective, the motivation to participate in contract production varies, for example, according to prevailing agrarian and market structures or policy frameworks. It may also be a response to imperfections in markets for credit, insurance, information, factors of production, and raw product, or imperfections in transaction costs associated with search, screening, transfer of goods, bargaining and enforcement (KEY and RUNSTEN, 1999; KEY, SADOULET and DE JANVRY, 2000). Much of the literature assumes that producers predominantly

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contract to earn additional income. Although a subset of studies do acknowledge, or at least imply, that individual farmers may contract for differing reasons (e.g. DELGADO, 1999). Some studies exploring the motivations for smallholders in developing countries to participate in contract farming vary even among producers in a relatively small geographical area. Further, these motivations reflect local economic, social, and institutional conditions and as a result, will vary from one context to another and over time in light of changing circumstances (MASAKURE and HENSON, 2005).

The existing literature provides a rich and varied analysis of many salient issues relating to the motivations for small-scale producers to participate in contract production in different countries (LITTLE and WATTS, 1994; KEY and RUNSTEN, 1999; SINGH, 2002; MASAKURE and HENSON, 2005). But there are few papers about contract farming in China. It is necessary to research the smallholders' motivation to participate in contract farming in China.

This paper's main objective is to explore those motivations and factors, taken from a survey of small-scale producers in China, which influence smallholders in China to participate in contract farming. The paper is organized as follows: In Section 2, we examine the data by statistical analysis and discuss the results. In Section 3, we draw our conclusions.

2 STUDY AREA AND SURVEY DATA DESCRIPTION

2.1 The study area

Over the past 25 years, the Chinese agricultural sector has undergone fundamental restructuring. Agricultural production and farm householder income has grown rapidly, largely due to agrarian reforms undertaken by the government. Beginning in 1978, a series of institutional reforms significantly transformed a collectivized, planned agricultural sector into something resembling a capitalist structure. Crucial milestones have been the abolition of the communal property base, the introduction of the household contract responsibility and the price and market liberalization systems, respectively, the revision of the Land Administration Law in 1998, and, most recently, China's admission to the World Trade Organization (WTO). Correspondingly, the farm householder has become an active agent in the marketplace in contrast to the passive production unit of the planned economy. Farm householders at the village level have certain rights to decide, subject to some minimum production requirements from local government, what they wish to produce and how to market their products. However, Chinese farmers face a number of challenges – among them low agricultural prices due to large stocks of products, lagging incomes and excess labor in the agricultural sector. Externally, Chinese agriculture faces increasing competition from foreign products due to its recent entry into the WTO and the continuing globalization of agriculture. Domestically, as consequences of urbanization and rising incomes, Chinese agriculture has moved into a new developmental stage characterized by significant increases in production levels and shifts in food demand. Under these circumstances, millions of small-scale farm householders in China are unable to compete – to respond to changes in domestic demand and to withstand pressure from international markets. For many smallholders, market access has become increasingly difficult and their incomes continue to lag behind the rest of the economy.

Since 1990, contract farming has been supported by the Chinese government for the sake of making agricultural production more profitable and competitive. Thus, contract farming in China has made considerable progress in the past ten years. Four characteristics can be safely generalized from its growth so far. First of all, the number of agricultural commodities produced under contract has increased steadily. Agricultural products produced or marketed under contract have grown from small-quantity, locally-specialized products, such as food oil and vegetables, to bulk commodities such as corn, beans, rice and wheat. Second, the geographic distribution of contract farming has also expanded significantly. Initially, contract farming developed in the economically-advanced coastal provinces. Now contract farming is spreading rapidly into the under-developed areas of central and western China. Most firms sign contracts not only with local farmers, but also with farmers in other provinces. Third, the scale of products produced under contract – the planted areas, volume of cash receipts and number of farmers – has also increased. According to the Chinese Department of Agriculture, the planted area involved in all types of contracts reached 18.6 million hectares in 2001, which is approximately 40 % higher than in 2000. Finally, the number of smallholders and firms involved has also increased. According to the most recent survey from the Chinese Department of Agriculture, the number of smallholders who signed contracts with firms increased twofold over the same period. Correspondingly, the proportion of smallholders involved in contract farming went up from 10 percent to 25 percent (NIU, 2002).

2.2 Data

Smallholder data were obtained through a survey conducted by more than 60 rural-area undergraduate students from Zhejiang University when they returned to their home villages during winter break, February 2004. The survey contained questions on the farm householder, farm production status and involvement in contract farming. Student survey enumerators were carefully trained before they returned home. Each student randomly selected 30 householders in their home village to survey. The students returned 1,820 surveys, of which 1,036 were complete and usable. Because many of the student volunteers came from the Zhejiang, Jiangxi and Shangdong provinces, more data were collected from these three provinces. In total, the farmer householders included in the survey represent over 13 provinces and 47 counties. The descriptive statistics of surveyed householders are described in Table 1.

Table 1: Descriptive statistics of surveyed householders

Householder characteristics	Minimum	Maximum	Mean	Std. Deviation
Land operated (hectares)	0.00	30.00	0.53	1.40
Family members	1	15	4.29	1.411
Commercial rate (%)	0.00	100	65	33

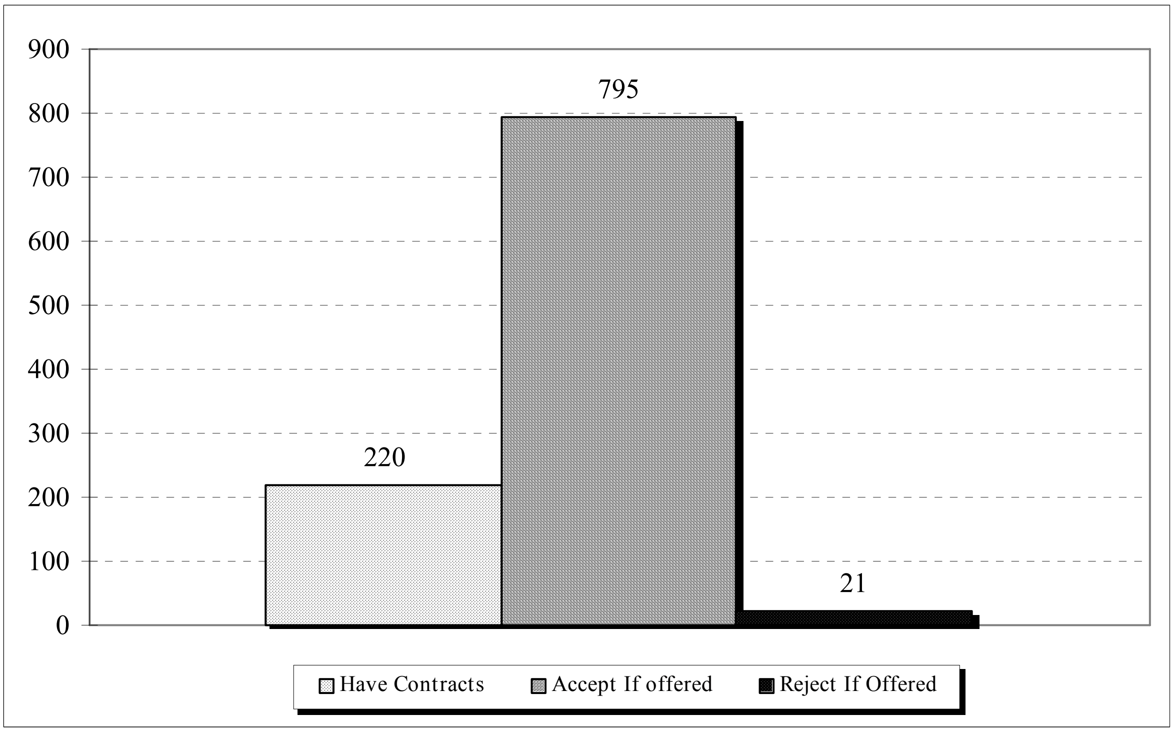
Source: Primary survey.

3 RESULTS AND DISCUSSION

3.1 Overall Situation

Out of 1,036 farmer householders included in the survey, only 220 house holders, or 21.2 percent, ever participated in contract farming. However, when householders without contracts are asked whether they would be willing to engage in contract farming, 97.9 percent answered positively. Only the remaining 2.1 percent indicated they would not consider a contract if offered (Figure 1). The results suggest that most householders have a favorable view toward contract production and would choose to be involved in if they were offered the opportunity.

Figure 1: Householders having contracts and those willing-to-accept



From Table 2 we can see that the primary reason for householders not participating in contract farming is the absence of opportunities. An absence of perceived benefit, presumably due to small-scale production and contractors showing no interest, account for other reasons. This implies that the existence of many small-scale operations influences the growth of contract farming in China.

Table 2: Reasons why householders do not participate in contract farming

A variety of reasons	**No opportunities**	**No obvious benefits**	**Process too complicated**	**Owing to small scale**	**Total**
No. of householders	426	169	21	200	816
Percent	52.2	20.7	2.6	24.5	100

Source: Primary survey.

3.2 Motivations for participating in contract farming

Table 3 illustrates several potential incentives identified by current contract producers that would encourage them to engage in contract farming. Farmers strongly identify price stability and market access as the key motivations to participate in contract farming. However, credit and technology provided by contracting firms were also identified by some householders.

Table 3: Motivations to participate in contract farming

Motivations to participate in	**Market access**	**Price stability**	**Credit support**	**Technology support**	**Total**
No. of householders	124	73	17	6	220
Percent	56.4	33.2	7.7	2.7	100

Source: Primary survey.

3.3 Organizational types of contracting farming

In Table 4 we present information on householders' existing organization types and willingness to accept organization types. Agri-businesses firms, cooperatives and middlemen use contracts with farmers, with middleman and agribusiness firms being the most important organizations for householders to contract with. Nearly 70 percent of householders contract with middlemen or agribusiness firms, and only 0.5 percent of householders contract with farmer cooperatives. Since cooperatives are not well developed in China, householders have fewer opportunities to contract with them, but about 18.7 percent of householders would like to contact with farmer cooperatives. The apparent preference of Chinese householders for cooperatives deserves further investigation.

Table 4: Actual organization types and householders' willingness to accept organization types

Organi-zational types	Middle men	Agri-business firms	Village com-munity	Farmer coopera-tive	Local govern-ment	Others	Total
Real situation	34.1 %	34.1 %	12.7 %	0.5 %	5.9 %	12.7 %	100 %
Willingness -to-accept	18.0 %	32.7 %	8.8 %	18.7 %	14.4 %	7.5 %	100 %

Source: Primary survey.

3.4 Types of contracts

From Table 5, we can easily see that marketing and product contracts are the dominant types in China (a sample contract is provided in Appendix A). Marketing contracts have been used widely in fruit, vegetables and so on. Negotiated before delivery or production, contracts typically specify grade and price (or formula for price)[1]. Commodity ownership usually remains with the producer until the product is delivered to the buyer. Product contracts have been widely used in livestock, e.g. broilers and hogs, in recently years. Arrangements differ widely, but the contracts typically furnish baby pigs or chicks, feed, veterinary supplies, and organizational management, e.g. appropriate practices, and number and timing of placements. The grower or producer does not own the animals but supplies equipment, building, labor, and day-to-day management for a fee per animal and an incentive bonus or penalty.

Table 5: Types of contract

Types of contract	Marketing contract	Product contract	Others	Total
No. of householders	149	61	10	220
Percent	67.7	27.7	4.6	100

Source: Primary survey.

3.5 Forms of contracts

Approximately 51 percent of all contracts are written, with the rest being oral contracts between agents. But the choice of contract form is highly correlated with contractor type. Oral contracts are used primarily by middlemen, and written contracts are used by firms. The underlying reason for this comes from the reputation and familiarity associated with middlemen who are from the same village as the contracting farmers. Social norms make oral contracts perform very well. But outside firms would prefer written contracts that clearly specify rights and responsibilities for both parties.

[1] For example, the formula may be based on the future market or on a specific premium above the spot or cash market; alternatively, well in advance of product delivery to market, a price may be negotiated by buyers and sellers.

Table 6: Forms of contracts

Organization	Forms of contract		Total
	Oral contract	Written contract	
Middleman	64.0 %	36.0 %	100 %
Agribusiness firms	14.7 %	85.3 %	100 %
Village community	75.0 %	25.0 %	100 %
Local government	61.5 %	38.5 %	100 %
Total percent	49.1 %	50.9 %	100 %

Source: Primary survey.

3.6 Contract specifications

Householders with contracts were asked to provide information on contract specification: Long-term contracts, i.e., more than one year, account only for 17.7 percent, while the remaining 82.3 percent were short-term contracts, i.e., less than one year.

Approximately 44 percent of the actual contracts reported in Table 7 specified a flexible delivery price that fluctuated with the local market. The second most common provision, at 27.3 percent, is specified as floor price. When householders were asked about preferred pricing mechanisms, 68.6 percent of farmers selected a floor price and only 20.9 percent would shift to a flexible delivery price. Since price specification is usually provided by contractors, we can see that its use does not fully reflect farmers' preference.

Table 7: Price specification and householders' willingness-to-accept

Price specification	Flexible price	Floor price	Fixed price	Others	Total
Real situation	44.1 %	27.3 %	22.7 %	5.9 %	100 %
Willingness-to-accept	20.9 %	68.6 %	9.1 %	1.4 %	100 %

Source: Primary survey.

The delivery payment method is another critical contract specification that directly affects farmers' intent to engage in contract farming. Table 8 showed that cash payment at delivery was used in half of all real transactions. Payment after delivery accounts for another 22.3 percent. Most farmers would prefer immediate cash payment.

Table 8: Payment method and contracts

Payment method Select	Cash payment	Advanced payment	Pay after delivery	Total
Real situation	50.0 %	27.7 %	22.3 %	100 %
Willingness-to-accept	66.4 %	27.3 %	6.3 %	100 %

Source: Primary survey.

3.7 Enforcement and violation of contracts

Information presented in Table 9 indicates 60 percent of farmers with contracts did not have a conflict with the other party. About 35.9 percent of farmers reported infrequent conflict, and 4.1 percent often had a problem with their contractor. The overall enforcement of contracts is relatively high.

Table 9: Contract performance

Do conflicts happen a lot?	Never	Seldom	Often	Total
No. of householders	132	79	9	220
Percent	60.0	35.9	4.1	100

Source: Primary survey.

As shown in Table 10, 86.4 percent of farmers think the main reason for conflicts is price. In addition, householders reported that most of the conflicts were resolved by negotiation between householders and contractors, and only 2.3 percent were resolved in court.

Table 10: Main reasons that contract conflict happen

Reasons	Price term	Quality term	Quantity term	Delivery time
No. of householders	76	64	6	16
Percent	86.4	72.7	6.8	18.2

Source: Primary survey.

3.8 Benefits for participating in householders

Householders with contracts were asked to rank, using a Likert scale, a number of potential benefits. From Table 11, we can see that 38.6 percent of participating householders believed that contract farming had played an important role in stabilizing the sale price, while 31.4 percent thought contract farming had played an important role in improving product quality. However, householders did not perceive any benefits in reducing production costs and increasing sale price.

Table 11: Benefits for participating householders

Benefits	No	A little	Normal	A lot	Greater	Total
Reducing production cost	31.8 %	30.0 %	24.1 %	13.6 %	0.5 %	100 %
Improving production quality	7.3 %	15.5 %	43.2 %	31.4 %	2.6 %	100 %
Improving sale price	22.3 %	36.8 %	28.6 %	11.8 %	0.5 %	100 %
Stabilizing sale price	10.5 %	15.0 %	30.9 %	38.6 %	5.0 %	100 %
Reducing marketing cost	21.3 %	25 %	19.1 %	27.3 %	7.3 %	100 %

Source: Primary survey.

4 CONCLUSION AND POLICY IMPLICATIONS

This study examined the current status of contract farming from the perspective of Chinese householders. The survey indicates that the actual proportion of householders engaged in contract farming is relatively low and significantly less than the proportion of householders willing to produce under contract. A lack of contract opportunities is the primary reason, particularly for small-sized farms. Householders identify price stability and market access as the key as the key motivations to participate in contract farming. Middleman and agri-business firms were the most important organizations for householders to contract with. Although householder cooperatives are not well developed in China, most householders are willing to have contact with farmer cooperatives. Marketing contracts are more common than production contracts, with oral contracts being most widely used by middlemen due to the strong social capital and networks in rural areas. The floor price provision is favored by most householders due to its lower risk and cash payment on delivery is the preferred payment method. In China, most contracts can be carried out. The most important role contract farming can play for householders is to stabilize sale prices.

Our results also showed that the degree of commercialization is associated with a higher likelihood of contract farming. Public policies that encourage the adjustment of agricultural structure so as to improve farmers' specialization and commercialization should be made right now. Developing farmer cooperatives is another critical public policy consideration. Firms have to incur increased contracting monitoring costs when confronted with a fragmented farm structure. Bargaining associations or other types of cooperatives might reduce transaction costs and generate better performance.

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APPENDIX

AGREEMENT ON PLANTING WATER RADISH

CONTRACTOR: ZHONGSU LIMITED COMPANY, CITY OF LANXI
CONTRACTEE: THE GOVERNMENT OF YONGCHANG TOWN

In order to encourage farmers to develop contract farming and optimize agricultural structure, and thus ensure that they receive substantial economic benefits, both contractor and contractee, through friendly consultation, have reached the following agreement on the water-radish planting acreage of the farmers and the purchase of the yields:

1. Contractor will entrust contractee with the responsibility of planting techniques and acreage in some villages. Contractee will provide the planting families and the planting acreage, which should be over 3,000 mu.
2. Contractee should be in charge of examining and supervising the farmers and for marketing to the contractor the entire planted radish crop.
3. The quality standard of the water radish sold by the farmers should meet the demands determined by the contractor.
4. Contractor offers a favorable price for the delivered goods: Higher, by 3 percent, than the local market price at delivery time.
5. Upon expiration of the contract, contractor takes priority of renewing it if desired.
6. This agreement will be valid for 2 years.
7. This agreement is a duplicate and each side has one copy, which becomes effective on the date of signing.

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ARE MACRO POLICIES ADJUSTED TO INSTITUTIONAL ARRANGEMENTS AT THE MICRO LEVEL? SOME EVIDENCE FROM POLISH AGRICULTURE DURING TRANSITION

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ABSTRACT

Tremendous changes have taken place during the transition process in agricultural sectors throughout Central and Eastern Europe. There is a general recognition that the undertaken reforms often lacked appropriate adjustments to local needs and capabilities. This paper focuses on the potential causes of discrepancies between pursued policies and the way they have been perceived by farmers in Poland. It also investigates institutional arrangements which evolved in response to such "disequilibrium" and factors that determine the scope and direction of this evolution.

Keywords: *Agricultural policy, institutional arrangements, Poland.*

1 INTRODUCTION

Much attention has been paid in recent years to the inadequacies of policies which came to be called the "Washington Consensus" (e.g. STIGLITZ, 1998). Empirical evidence has indicated that these policies failed to provide a universal remedy for economic stagnation and backwardness. Many researchers have presented different views with regard to factors accounting for this failure (WILLIAMSON, 2004; STIGLITZ, 2005). Nevertheless, a great majority agrees that if a certain policy is to become a successful developmental strategy, it must pay adequate attention to the pre-existing institutional capabilities of a particular country. Therefore, a condition that needs to be fulfilled in order to promote development is that macro policies must be adjusted to institutional arrangements functioning at the micro level (RODRIK, 2000; PLATTEAU, 2000).

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Tremendous changes have taken place during the transition process in Central and Eastern European countries. In most of them, the appropriateness of development strategies was particularly important in food and agricultural sectors. Key factors that stimulated changes in agricultural policies throughout the whole region were: The need to improve efficiency (in order to recover from the decline in production after the collapse of the socialist system, as well as to face stiff international competition) and to prepare for EU accession. Nowadays, the first group of post-socialist countries is already in the EU and all of them, at least partially, have recovered from the shock following privatization and liberalization. Therefore, it is interesting to see how policies pursued in these countries corresponded to the expectations and capabilities of agents operating at the micro level. This paper aims to examine this issue using the example of the Polish agricultural sector.

In Section 2, we briefly present a new approach to economic reforms which has evolved from the "Washington Consensus". This part also provides some insights to Polish farmers' perception of post-1989 reforms. In addition, examples of the inappropriate adjustment of macro policies to capabilities of agents operating at the micro level are presented[1]. In Section 3, we focus on potential causes of this lack of adjustment. Section 4 uses the black currant and dairy sectors to illustrate what institutional arrangements evolved in response to this "disequilibrium". This part also investigates what factors were responsible for these institutional innovations. Section 5 concludes.

2 TRANSITION PROCESS IN AGRICULTURAL SECTOR FROM AN INSTITUTIONAL AND MICRO PERSPECTIVES

At the beginning of the 1990s, research on the transition process in Central and Eastern European Countries (CEECs) and Newly Independent States (NIS) concentrated on analyzing stabilization policies and their influence on economic performance. Recent research on the transition process has examined economic and political institutions, which have been recognized as important determinants of successful economic transition[2]. Theoretical and empirical literature has used New Institutional and Political Economy tools to analyze political and economic spheres, as well as the relationship between them. It has been shown that results of economic reforms influenced the situation of economic agents (e.g. households), through which political institutions (e.g. voting mechanism) could influence

1 In our paper, we focus only on discrepancies between introduced policies and expectations of farmers (directly affected by these policies). We do realize that this should be treated in a broader context, taking into account welfare of the whole society. However, this goes beyond the scope of this paper.

2 See for example: DĄBROWSKI and GORTAT (2002); FIDRMUC (2001) or HAVRYLYSHYN and VAN ROODEN (2003).

policy change. This in turn led to changes in economic institutions, economic performance, and the agents' situation (MILCZAREK, 2002).

Experience from CEECs and NIS with respect to the transition process, debate on the "Washington Consensus"[3], as well as the development of institutional research have led to the need of developing a new approach to reforms. Many authors emphasize the importance of the institutional dimension, which shows that changes in policies are ineffective until they are embedded in institutional reforms. For example, RODRIK (2004) calls for "second-generation reforms"[4], which are meant to overcome the inefficacy of the earlier wave of reforms, which relied too heavily on liberalization, stabilization, and privatization policies. Often, this inefficacy is related to the so-called institutional disequilibrium caused by the conflict between formal and informal institutions (NORTH, 1990). This is especially true in the case of CEECs and NIS where new institutions were imported from the West and implemented in societies with no democratic and capitalistic traditions. In these countries, a communist legacy embodied in peoples' behavior and mentality played an important role in determining the scope and speed of the transformation process (BALCEROWICZ, 1995).

Economic and institutional reforms have heavily influenced agricultural sectors' performance in CEECs and NIS[5]. Privatization, as well as price and trade liberalization, have created an entirely new environment for all actors from the agri-food chain.

In Poland, total agricultural production from 1997-1999 was 8 % lower in comparison to the average from 1986-1990 (LIEFERT and SWINNEN, 2002). Moreover, unfavorable terms of trade for agricultural products[6] resulted in the drastic deterioration of farmers' incomes in relation to incomes of those employed outside agriculture (WILKIN, 2000). Given this context, it is not surprising that Polish farmers have been disappointed with changes that emerged after the collapse of the communist regime. According to findings presented in CZAPIŃSKI and PANEK (2004) in 2003, as much as 75 % of rural inhabitants evaluated these changes as very or rather unfavorable. It is also worth noting that this share was higher than that observed for various groups of urban inhabitants.

[3] The term "Washington Consensus" was invented by Williamson and included policy propositions such as: Fiscal discipline; interest rate liberalization; a competitive exchange rate; trade liberalization; liberalization of inflows of foreign direct investment; privatization; deregulation, etc. (WILLIAMSON, 1990).

[4] These reforms include, for example: Controlling corruption, rendering monetary and fiscal institutions independent, strengthening corporate governance, enhancing the functioning of the judiciary, etc. (RODRIK, 2004).

[5] It is important to notice that changes in the agricultural sector's performance differed significantly over countries. For a review of the evidence, see ROZELLE and SWINNEN (2004).

[6] In comparison with the beginning of transformation (1990 = 100), the index of price relations of sold agricultural products to goods and services purchased by private farms has been gradually decreasing and reached, in 2003, the level of 63.9 (GUS, 2004).

The above statistics help explain farmers' very critical attitude towards the agricultural policies of subsequent governments. In 1992, 72 % of farmers were of the opinion that governmental policies were not in interest of rural areas (ROSNER, 1993). In 1999, this share was even higher and amounted to 85 % (WILKIN, 2000).

These figures leave no doubt that policies which were pursued in Poland at the beginning of transformation failed to meet the farmers' expectations. This problem is even more interesting since disappointment with the state's policies towards agriculture goes with farmers' belief that it is the government and not themselves who can improve the agricultural sector's performance. When asked about the main factors determining the situation of Polish agriculture, 76 % of the farmers mentioned "agricultural policy of the government", whereas only 16 % indicated "farmers' activity" (WILKIN, 2002).

To illustrate the discrepancy between undertaken measures and the way they were perceived by farmers, one may recall two examples: The first deals with the privatization of state farms, and the second concerns the issue of creating producer's groups.

Privatizing the state sector has caused dramatic changes in the employment structure in the majority of rural areas. By the end of 1990s, around 50 %[7] of state farms' employees were dismissed. Restructuring the state farms was one of the important reasons behind the very high unemployment rate in western and northern Poland (where the share of state-owned land was much higher than average). Such a high rate of dismissals illustrates, among others, the clash between the interest of new owners and the mentality of former state farm employees, who could not adapt to the more demanding requirements with regard to their performance (MILCZAREK, 2002).

Another example of "institutional disequilibrium" was an attempt by the Polish government to create producer groups by supporting cooperation. However, a very small number of producer groups was established. HARDT (2006) explains this by the low level of social capital: Low trust between farmers and the fear of being cheated by partners. "Therefore, the government's attempt to establish large producer groups resulted in failure, as there was a mismatch between the intention of the formal law and farmers' social practices" (HARDT, 2006, p. 5).

Combined with the statistics presented above, these examples build a very interesting picture of Polish agriculture, which indicates that notwithstanding some farmers contesting the post-1989 reforms, breaking the habits of *homo sovieticus* is progressing very slowly[8].

[7] In 1989, state farms employed around 435,000 people, while in 1998 farms based on state farm land (leased and administered by the state agency responsible for privatization) employed around 212,000 people (MILCZAREK, 2002).

[8] As such, this observation supports North's opinion that informal institutions may change only gradually (NORTH, 1990).

3 POTENTIAL CAUSES OF CONFLICT BETWEEN THE MACRO AND MICRO LEVEL IN POLISH AGRICULTURE DURING TRANSITION

Section 2 provided evidence that measures implemented by the state in order to facilitate changes in agriculture during transition were inappropriately adjusted to local needs. As already mentioned, the reasons for this "disequilibrium" can be found in the communist legacy embodied in farmers' behavior and mentality. It seems, however, that there are other factors which contribute to this state of affairs[9]. Below we attempt to identify them.

To start with, it is worth noting that although Polish agriculture suffered under the well-known shortcomings of the socialist system, it entered a period of transformation with a heritage different from that observed in other countries in the region. The most important facet to notice is that the production sector, notwithstanding the state's efforts to pursue collectivization, has always remained primarily in the hands of family farms. Therefore, in comparison with other post-soviet countries, the local agrarian structure has been highly fragmented. This, in turn, has not only had a prominent impact on the sector's efficiency, but has strongly confined farmers' bargaining power when conducting negotiations with agents acting at other stages of the food chain. In effect, farmers, especially smaller ones, have expected support from the state. This has placed the government in a very difficult situation as regards launching any policy towards the sector. This is because, given the Polish agrarian structure, satisfying many (often poorly-organized) individual claimants must have led to the dispersion of already limited funds, thus confining their efficacy.

In addition, while deciding for a certain measure to be undertaken, the government must have taken into account the process of gradually ongoing farm polarization (PSR, 2003). This, in consequence, led to a situation where the government was required to address the needs of not only numerous, but also highly differentiated agents. This has made the occurrence of social conflict over public fund allocation much more probable. Simultaneously, the probability of "disequilibrium" between macro policies and micro expectations has become more likely.

Third, one needs to take into account another point closely related to the problem of fragmented agrarian structure – agrarian overpopulation. Registered and hidden rural unemployment, estimated at approximately two million people (KOLARSKA-BOBIŃSKA et al., 2001) and a share of inefficient farms[10] assessed at roughly 50 % (ZIĘTARA, 2001) are a clear illustration of the magnitude of this problem. Nonetheless, given the low employment opportunities in both rural and

[9] In our opinion, they could be also seen as factors that slow down changes in farmers' mentality.

[10] Not fit to survive from economic considerations.

urban areas, the government could have been very reluctant to solve it. This is because in these circumstances, the agricultural sector might have been seen as buffering the effects of a lack of job opportunities. Agrarian overpopulation, however, has been one of the most critical bottlenecks in moving towards more efficient farming. Therefore, such a situation must have led to discontent for the farmers and thus increased the number of claimants; these claimants have comprised, on the one hand, more efficient farmers who expect policies that radically facilitate resource reallocation, and on the other hand, those who have great difficulties in making ends meet.

Fourth, while looking at the correspondence between "macro policies" and expectations at the micro level in Polish agriculture, one needs to keep in mind that due to agrarian overpopulation, this sector, directly or indirectly, concerns a very large group of people, with roughly 2.9 million agricultural holdings[11]. Additionally, about 460,000 people are employed in the processing industry (GUS, 2004). As a result, agricultural policies have always been strongly influenced by political and social issues rather than economic analysis alone[12]. From 1989-2005 there were 14 Ministers of Agriculture; thus, one is inclined towards the statement that visions for the agricultural sector, if anything, changed even more often than with every election. This resulted in the lack of a transparent, coherent and long-term strategy for agricultural development. Thus, any policies that were invented and administered from the macro perspective have had great problems in gaining credence at the micro level.

Fifth, the discrepancy between pursued policies and the way they were perceived by farmers may have resulted from the fact that during transformation, Polish agriculture was hardly included in a broader rural development framework (WILKIN, 2003). Further, much too little attention has been paid to the relationship between agriculture and the rest of economy (TRACY, 1997). Instead of an integrated, overall policy framework, agricultural policy was implemented in isolation from the other sectors' policies, not taking into account the fact that performance of the former is closely linked to results achieved by the latter. In justification of the above failures, one has to say that similar problems concerned other new member states as well as the EU itself. This lack of a complex and comprehensive approach to rural development and agriculture could have influenced farmers' perception of macro policies in the following ways: First, it resulted in the poor coordination of instruments aimed at improving the performance of agents operating in rural areas. As a consequence, there were many measures which overlapped with each other. This not only gave the impression that rural policies were chaotic, but also strongly affected the

[11] The great majority are of a semi-subsistence nature. In 2002, only slightly more than 800,000 farms maintained extended relations with the market (FDPA, 2004).

[12] On the relationship between economic reform and politics see, for example, SWINNEN and HEINEGG (2002) and citations therein or METELSKA-SZANIAWSKA and MILCZAREK (2005).

efficiency of resources being used. Second, it resulted in the lack of efficacious policies providing alternative options/safety-net schemes for those leaving agriculture. That between 1999-2002, the share of farmers who were afraid of becoming unemployed rose from 34 % to 37 % supports this supposition. This is the more symptomatic, since earlier, those who were afraid of unemployment were rather those working outside of agriculture (FEDYSZAK-RADZIEJOWSKA, 2002).

Finally, one should also mention that since the beginning of transformation, measures supporting rural development in Poland have always been organized in a very centralized manner. Regions in particular have had very limited, if any, autonomy in deciding what policies should be implemented. Territorial reform from 1999, which aimed to change this state of affairs, unfortunately did not facilitate achieving the goals that were initially planned. This failure can be mostly attributed to incoherently-designed law and the fact that the delegation of power was not accompanied by a transfer of appropriate funds (HARDT, 2006; WILKIN, 2003). Nowadays, there is a broad recognition among researchers from various fields that the same policies may lead to substantially different results depending on the countries or regions in which they are implemented. Regional differentiation with respect to unemployment rate, average farm size or the extent of reliance on non-agricultural income sources in Poland fully support this statement. Given this context, it is very likely that the "disequilibrium" between macro policies and expectations formulated at the micro level has been due to the excessively-centralized way of making decisions.

The above-presented discussion shows that the appropriate adjustment of agricultural policies to local conditions during transition has been very difficult in Poland. There have been two factors (the great number and diversity of farmers), both inherent to the nature of local agriculture, which have very much affected the efficacy of every potential measure, no matter if it was implemented by a left or right wing government. Moreover, the great majority of undertaken reforms consisted of "rolling back the state" Communism, on the other hand, left as its aftermath a people used to relying on the state. The discussed arguments revealed, however, other weaknesses of agricultural policies which had been pursued. These policies suffered from insufficient integration into the broader rural development framework, which resulted in a lack of coordination of various policies targeted to rural areas and the inefficiency of spent resources. Moreover, the provision of employment opportunities outside agriculture and a regional approach to planning and implementing policies were not high on the agenda.

4 INSTITUTIONAL ARRANGEMENTS AT THE MICRO LEVEL EVOVLING IN RESPONSE TO INAPPROPRIATE ADJUSTMENT OF MACRO POLICIES

In this part, we investigate mechanisms which evolved in response to the discrepancy between implemented agricultural policies and farmers' expectations. Further, we identify factors which facilitated the evolution of these mechanisms using the dairy and black currant sectors. These examples were chosen for a number of reasons; in both fields, Poland is one of the most important producers in the EU. With respect to the former, Poland occupies fourth place in terms of production, and regarding the latter, Poland holds the first position both in terms of overall production as well as deliveries to the EU internal market (Table 1).

Table 1: Milk and black currant production in Poland and in EU-25, 2004

	Milk production (million t)	Share of EU milk production (%)	Black currant production (1,000 t)	Share in EU black currant production (%)	Share of black currant deliveries to EU market (%)
Poland	11.8	8.3	142.6	33.2[a]	56
EU-25	142.9	100	429[a]	100	99

Source: IERiGŻ

Note: [a] For the EU data presents production of all currants.

Moreover, both sectors entered the transition period with a considerable number of farmers' cooperatives in the processing industry, and experienced quite a substantial inflow of foreign capital. Furthermore, chosen sectors have always been characterized by a highly fragmented production structure (Table 2 and Table 3). At the same time, however, they have always been relatively concentrated at the regional level. Given the considerations from the previous section, both sectors were particularly vulnerable to the inappropriate adjustment of policies geared toward local needs.

Though they have much in common, during the transition period, important differences between these two sectors have appeared. These differences included, among others, the concentration process at the farm level and various forms of cooperation between farms and the processing industry. In effect, development in the milk sector is perceived to be an example of real success. On the other hand, the black currant sector is seen as completely unpredictable mainly due to price fluctuations. Below, we argue that changes in institutional arrangements at the micro level which have taken place in the dairy sector could be treated as a response to the fact that policies implemented at the macro level were insufficiently "filtered through local practices and needs" (RODRIK, 2000). We also provide explanations of why similar adjustments were not the case in the black currant sector.

Table 2: Polish currant producers with respect to farm size in 2002

Farm size (UAA-ha)	No. of producers (1000)		Utilized area (1000 ha)	Farms distribution (%)		Land distribution (%)
	1996[a]	2002	2002	1996[a]	2002	2002
< 1	77.6	74.7	11.5	96.1	90.7	33.5
1-1,99	n.a.	4.3	5.2		5.3	15.2
2-4,99	n.a.	2.5	7.1	3.6	3.0	20.7
5-4,99	n.a.	0.6	4.1		0.7	12.0
10-15	n.a.	0.2	1.9	0.3	0.2	5.5
> 15	n.a.	0.1	4.5		0.1	13.1
∑	n.a.	82.4	34.3	100	100	100

Source: IERiGŻ a.

Notes: [a] Producers of all kinds of berries except strawberries.; n.a. – Not available.

Table 3: Polish milk producers with respect to herd size in 1996 and 2002

Herd size (cows)	No. of producers (1,000)		Farms distribution (%)		Cows distribution (%)	
	1996	2002	1996	2002	1996	2002
1	873	593	41.8	45.9	16.1	14.0
2			27.7	21.9	21.4	13.3
3-4	362	225	19.1	15.0	24.8	15.5
5-9			9.7	10.7	23.0	21.0
10-19	19	44	1.5	5.1	6.8	20.0
> 20	3	11	0.2	1.4	7.9	16.2
∑	1 257	873	100	100	100	100

Source: PSR, 1998, 2003.

Because the black currant sector is poorly documented in terms of statistical data, the presented material regarding this field is based mainly upon expert opinion of the fruit and vegetable market gathered during three individual interviews.

As mentioned, both the milk and black currant sector in Poland has had to struggle with farm fragmentation. With respect to the former sector, this is well illustrated by the fact that since the beginning of transformation, the number of milk producers has decreased by about 1.2 million (66 %) and a further decrease, though of lesser magnitude, is still expected. As regards the latter on the other hand, one may recall estimates pointing out that the optimal number of farmers producing all kinds of currants should not exceed 18,000 (PAIZ, 2000).

From the sectors' efficiency point of view, small producers may be regarded as undesirable for at least three reasons: First, it heavily affects the transaction costs of product delivery/collection. Second, the smaller the scale of production, the longer the period needed for a given investment to become profitable. In effect, a small holding may prevent a farmer from making on-farm investments.

Third, since small-scale production usually goes together with labor-intensive production techniques, it is likely to be difficult to fulfill high quality requirements.

Following YAO (2000) and CARTER and SALGADO (2001) the inconvenient distribution of land endowments is very likely to persist because of insufficient land supply, very often due to a lack of employment opportunities outside agriculture, or farmer's limited access to credit, respectively. Therefore, from a farmers' perspective, the problem of small-scale production could be regarded as a consequence of exogenous factors. Given that in regions more abundant in land and/or less affected by credit rationing, this problem would not be so severe, and may be treated as a result of an unfavorable geographical location. One may argue then that, as was shown by RODRIK (2003), the negative consequences of such a state of affairs can be outweighed by good institutions. In this context, almost continuously-increasing unemployment in rural areas during the 1990s (FRENKEL, 2003) indicates that formal institutions in terms of targeted policies could hardly succeed in encouraging farmers to part with their land. Thus, they could hardly contribute to the process of farm concentration. As a consequence, informal institutions must have evolved in response to this failure. Below we investigate how this evolution looked like in the dairy and black currant sectors.

The main difference between measures adopted in these two sectors relates to the issue of the relationship and cooperation between farmers and the processing industry. On the one hand, in the dairy sector we observe the development of contractual agreements which, already before accession to the EU (when contracts became a must) covered almost 100 % of dairy deliveries. On the other hand, black currant production, not counting the largest suppliers, has always taken place without any previous arrangements.

This difference in contractual arrangements between these sectors has been of great consequence in the level of support given to farmers by processors. As was found by DRIES and SWINNEN (2002, 2005) dairies in Poland have developed extended programs that aim to assist their supplying farms. These programs entail providing access to inputs and leasing cows, as well as loans for buying cooling and milking equipment. In addition, most of the companies provided farmers with extension services. What is important here is that this support was not directed only towards large producers but aimed to increase the scale of production of relatively small farms as well (DRIES and SWINNEN, 2002). This supports the hypothesis that institutional arrangements at the micro level evolved in response to the inadequacies of policies stimulating farm concentration.

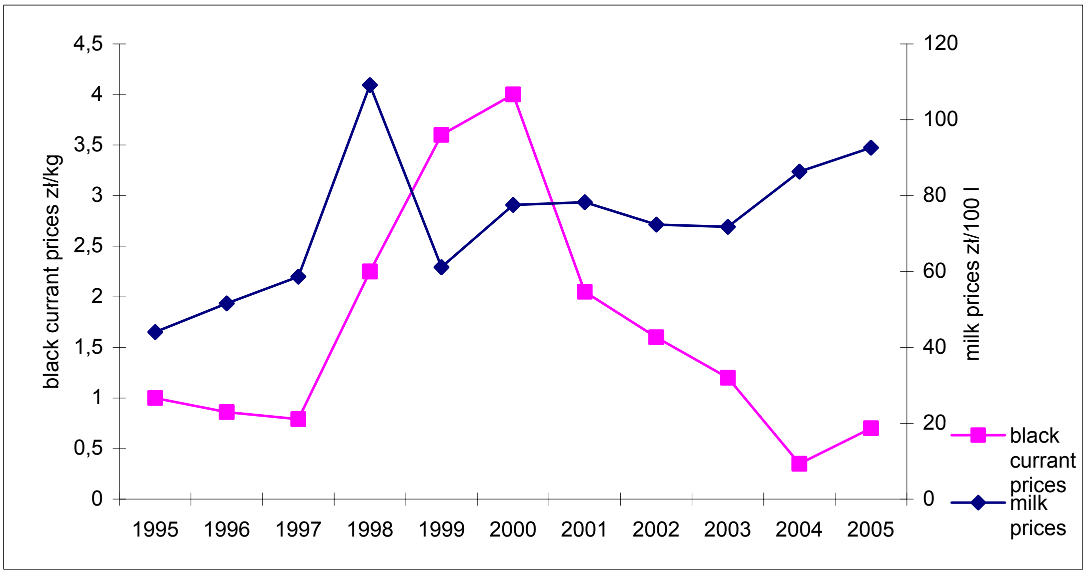
A completely different view emerges from the black currant sector. According to interviewed experts, since there are hardly any contractual arrangements, processors have no incentives to engage in any form of support to farmers. However, this situation could be different if they had loyal suppliers. The example presented in MAACK (2005) regarding strawberry producers who have agreed to a four-year contract with a company and benefited from its assistance with credit intake and advisory services supports this assertion. This cooperation resulted in considerable productivity gains and was beneficial to both contracting parties. It seems that nowadays there is a growing recognition that in the long run, these kind of agreements are indispensable. Here is a statement from the head of the fruit processor, "Wink Polska", who presents his opinion on the matter:

Our relations with fruit growers and their organizations are not bad, but there is a lack of permanent representation of both producers and processors as well as forms of day-to-day cooperation, agreeing on interests or analyzing the situation in Poland and abroad as regards yields, trees rooting policy, etc. There are several associations of fruit growers, but each of them has its own priorities and tries to ensure its own interest. There is a similar situation in the processing sector. I hope it will change soon […]. Both parties – processors and fruit growers – will benefit from stabilization, assured terms of transactions and a rational development of the production base. This could be made only through contractual agreements, which one needs for support (ZIELONY SZTANDAR, 2004).

The difference in attitudes towards vertical cooperation between two chosen sectors may be due to several reasons. First, during the transition process, prices of black currant, compared to milk prices, have revealed much higher fluctuations (Figure 1).

For example, from 1997-2000, prices increased fivefold only become eleven times lower over the next four years. In such unstable circumstances, neither producers nor processors have been eager to engage in long-term agreements. Both parties simply preferred to count on prices changing in accordance with their wishes. In the milk sector, on the other hand, the variation in prices was lower and so were incentives for seeking extra profits connected with sudden change in prices.

Figure 1: Milk and black currant prices in Poland, 1995-2005



Source: IERiGŻ b; GUS.

Second, both sectors were obliged to meet different requirements with regard to product quality, and so their initial level of adjustment was also different. Though it is difficult to compare, one may hazard a guess that quality standards were more demanding in the dairy sector. As a result, the introduction of contracts and the provision of support to farmers in this sector was driven by this additional factor.

Third, as shown in the above-mentioned quotation, the fruit sector in general lacks cooperation between agents operating at the same stage of the supply chain. One reason for this relates to the issue of a dramatic reduction in the number, and the diminishing role of, horticulture cooperatives. In 1988 there were 140 co-operatives controlling roughly 50 % of the market. Within ten years their number has decreased to 12, whereas market share has dropped to less than 1 %. Changes in the number and position of dairy cooperatives, on the other hand, were much less severe. Although the number of cooperatives decreased from 352 in 1993 to 270 in 1999, they still controlled 70 % of the market. As a consequence, fruit growers have not only lost direct linkages to the processing industry; membership in cooperatives was also a very important element that had been keeping them together. In effect, they suddenly needed to ensure their interests on their own, which considerably increased transaction costs incurred by themselves as well as their trading partners. Thus, the potential benefits of signing a contract are very likely to be outweighed by the costs of its preparation, monitoring and enforcement. Recently, a lot of effort has been expended in order to organize fruit growers into producer groups, but, as already stated in Section 2, the results have been rather unsatisfying. The reason for that is surely the low level of farmers' social capital. However, what seems to matter here as well is lack of stability on the market. In such circumstances, in turn, following HAYEK (1988), attempts to cooperate could be seen as irrational. This is because individual adjustment to changing conditions is much quicker than group adjustment.

Fourth, it is reasonable to assume that different institutional innovations in the dairy and black currant sectors stem from different paths of cooperative development. The fact that cooperatives in the dairy sector have retained a strong position must have influenced the behavior of other companies. This is because the traditional functions performed by cooperatives, in addition to product processing and marketing, also included providing its members with inputs and consultancy. Thus, other dairies working on their strategies must have taken this into account. On the contrary, in the black currant sector this factor could not make such a contribution since the role of horticulture cooperatives has decreased over transition to become only marginal.

Fifth, compared to the milk sector, the black currant sector has been characterized by the existence of an additional stage in the supply chain, namely wholesalers between farmer and processor. The relevance of this intermediary could be illustrated by the fact that in 1999, as well as in 2004, 80 % of the whole currant production was supplied through collecting points (GUS, 2005). This fact must have determined the nature of relations between farmers and the processing industry.

Finally, the evolution of relations between producers and processors were determined by both parties' hopes and expectations with respect to market regulations after EU accession. When compared to the situation before accession, nowadays the dairy market looks completely different, whereas in the case of black currants, one may say that the status quo has been maintained. Such a state of affairs had been surely anticipated by parties engaged. Thus, both sectors had much different incentives to stimulate certain adjustment processes. For instance, dairies must have taken into account that after May 2004, the milk supply in Poland would be regulated by the quota system. In this context, institutional innovations that took place in the dairy sector before accession can be treated as a way of gaining loyal suppliers.

5 CONCLUSIONS

Results from recent opinion polls conducted among farmers clearly suggest that their assessment of changes that have taken place in Poland over the last 16 years is negative. Similarly, they negatively evaluate post-1989 agricultural policies. This indicates that measures undertaken in order to facilitate the adjustment of local agricultural sectors to newly-emerging free-market conditions have not met farmers' expectations. This paper is an attempt to provide an explanation of why such a situation has happened. One reason is the farmers' mentality itself, which is still infused with *homo sovieticus* habits. The second factor is the heterogeneity of actors in the agricultural sector (large number of actors and diversity of their needs). Moreover, a lack of coordination in rural policy, as well as the excessive centralization of the decision-making process also contributed to this state of affairs.

Further, we argue that contractual arrangements between farmers and the processing industry could be seen as a response to the inappropriate adjustment of macro policies to local needs. Using the examples of the dairy and black currant sectors, we illustrate what factors facilitated the evolution of these institutional innovations. Price stability, the strong position of cooperatives, a shorter supply chain and high quality requirements all seem to stimulate closer and more formal relations between farmers and processors. Adjustments to anticipated policy regulations are also important.

An analysis of the relationship between macro policies and local needs during transition allows one to trace the factors accounting for failures or successes of particular policies. It may thus provide very useful conclusions, which should not be underestimated when evaluating current, or preparing new, policy measures. In addition, in Poland there are at least several fields where conflict between the macro and micro levels may appear in the near future. The concept of multifunctional agriculture, the redefinition of the CAP, as well as further WTO negotiations or GMO issues could serve as examples. While bearing them in mind, one needs to take into account that factors responsible for inappropriate policy adjustment during the last fifteen years will not change immediately. We therefore hope that our paper may provide some insights which could be used for dealing with these problems.

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THE AUSTRIAN PRIVATE FOUNDATION AS A LEGAL FORM IN FARM MANAGEMENT, WITH SPECIAL EMPHASIS ON TAX ISSUES

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ABSTRACT

Farmers are faced with numerous problems due to the increasingly difficult conditions within management enterprises. Thereby, the choice of legal form, amongst other issues, has to be carefully considered to legally minimize tax burdens. Existing agricultural enterprises in Austria are mainly sole proprietorships, but the establishment of private foundations could gain significance in the future. Private foundations' potential to provide lasting security for assets, as well as possible favorable taxation, make this investment form especially attractive for larger farms. This paper discusses the basic legal aspects of the private foundation in Austria with respect to its suitability for agricultural businesses. Furthermore, model cost estimates are illustrated to demonstrate the effectiveness of the involved taxation aspects.

Keywords: *Farm management, private foundation, inheritance and gift tax, income tax.*

1 INTRODUCTION

European agriculture is characterized by increasing competition and increasing capital investments. These developments lead, in turn, to continual structural fluctuation, and farmers are subjected to numerous demands in the sphere of business management. Alongside the technical requirements of production, it is especially necessary to ensure an economic structure suited to these demands. Literary sources advocate the theory that the profit margin after income tax is relevant in management decision-making (e.g. SCHWINN, 1993; KUßMAUL, 1998;

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SEICHT, 2002). For this reason, farmers are obliged to minimize their income tax burden within the framework of the legal possibilities open to them.

Presently, farms in Austria are predominately family businesses, run along the lines of sole proprietorship. From a management point of view, the question is posed as to whether other legal structures would be more profitable to farmers in the future, especially in the form of private foundations. Existing private foundations in Austria are mostly comprised of family foundations, whereby relatives and heirs benefit from the income resulting from assets. In addition, assets are protected by limiting the heirs' accessibility named in the foundation. In all these cases, it is obvious that the founder tries to secure the right to exert influence over stipulations made in the foundation's documentation (NOWOTNY, 2003).

Using these introductory factors as a starting point, private foundations' potential as a legal form for family farming businesses will be evaluated in this paper, with special consideration given to the range of legal structures appertaining to the demands specific to these farming enterprises. Alongside taxation aspects, freedom in management decision-making, securing assets, as well as business liability and financing are all integral factors to be considered. In the majority of cases, not all these aims can be fully realized and in some cases antagonistic relationships also exist.

This paper aims to illuminate the taxation consequences resulting from introducing farm assets into private foundations within the relevant legal framework. A decisive motive for this choice is the possible savings on income tax. Contrary to this are the expenses and taxes of the business, as well as the continual expenditure involved in foundation management. Establishing a foundation involves complex problems, and therefore a dynamic tax model concept will be used to illustrate the estimation of tax effects. The size of the farming business itself has a significant influence on the attainable taxation advantages. This factor is therefore a central point of the analysis.

2 LEGAL REGULATIONS APPERTAINING TO AUSTRIAN PRIVATE FOUNDATIONS

2.1 Civil law regulations

2.1.1 Concept and characteristics of private foundations

Private foundations are juristically independent, non-owned assets that are drawn up by the founder by means of a foundation deed to fulfill certain aims. Private foundations must be of a domicile origin. Instead of owners, the foundation has beneficiaries who have different entitlements according to the declaration and wishes of the founder. As a rule, self-use foundations stipulate the family and their offspring as beneficiaries (CERHA et al., 1993). According to

Article 1 par. 2 of the Austrian private foundation law, a private foundation is not allowed to exercise any commercial activities other than those of an incidental character. Private foundations are also barred from managing the business of trading companies and cannot be unlimited partners. The eligibility of immediate agricultural activities for private foundations is a controversial issue, but according to the foundation taxation legislation (Stiftungssteuerrichtlinien – StiftR) they should be acceptable (ORTMAYR, 1998; StiftR, 2001, Rz 34).

2.1.2 Establishment and formation of private foundations

A private foundation can be established for a definite or indefinite period of time (GASSAUER-FLEISSNER and GRAVE, 2005). The foundation is formed through the legal documentation of the intended foundation declaration, whereby it concerns a unilateral declaration of will with no obligatory recipient that can also be constructed as a last will. If the minimal requirements of private foundation law, stipulated in Article 9 par. 1 are fulfilled in the foundation deed, further stipulations can be made as long as these do not conflict with the compulsory law (HUBER, 1995). Quite often, an appendix is drawn up which, unlike the foundation deed itself, does not appear in the company register (WERKUSCH, 2001).

As long as the minimal capital of 70,000 EUR is not presented in cash, the services of a court-appointed foundation auditor are required to establish whether the value of the capital on hand fulfills this amount (CSOKLICH, 1994). The introduction of property accompanying the demand of an "establishment audit" must be taken into consideration by farmers planning a foundation and the expenses involved must be compensated by tax-saving effects in the following years.

2.1.3 Private foundation executive bodies

Every private foundation requires a board of directors and an auditor, and in addition, depending on the number of employees, an obligatory supervisory board is also required. The required number of 300 employees is, however, not attained in Austrian farms (LBG, 2005). The board of directors has to consist of at least three members for a stipulated or unstipulated period of time, and no immediate family member of the founder can be accepted as a member of the board. The founder himself, as far as he is a beneficiary, as well as legal entities are also barred from this function (HUBER and LEITNER, 2004). The first board of directors in the foundation is selected by the founder or the curator and those following are either chosen from the old board of directors or determined by the court. The founders can also select an advisory board to support the purpose of the foundation. This advisory board is not entitled to select or dismiss the board of directors due to possible conflicts of interests (BRIEM, 2002). The beneficiaries can exercise their control rights through the right to receive information and through access to the books; these rights can be exercised at any time (ARNOLD, 2002).

The foundation auditor is selected, usually at the request of the founder, by the court or, respectively, by the supervisory board, and has the status of a chartered accountant who has to check the annual statement of accounts, the bookkeeping and the assessment report according to the regulations laid down by trade law (VETTER, 2000). In addition, the fulfillment of the foundation deed's aims, as well as the status report, are to be checked.

To summarize, when creating a foundation, a farmer forfeits his unlimited powers of decision-making through the obligatory transfer of rights to supervisory bodies. However, the appointment of a foundation advisory council, to which beneficiaries can also belong, ensures a certain degree of influence.

2.1.4 Amendments, revocation and dissolution of a private foundation

The private foundation law allows for extensive amendment and revocation of the foundation from the period between its declaration of the establishment and recording of the deed. After the private foundation has been established, it can only be amended or revoked by the founder if he has inserted a clause to this effect in the trust document (RASTEIGER, 2004). If this right should be preserved for the following generation, then the heirs would have to have the status of founders as well (KRAUS, 2004).

Prior to the documentation of the foundation, the board of directors has the right to alter the declaration under certain circumstances, should the sole founder or last founder fall away. After documentation, the board of directors can only execute amendments when there is no possibility that the founder himself can do so. But the board of directors is, under all circumstances, duty-bound to adhere to the aim of the foundation (RASTEIGER, 2004).

Reasons that can lead to the dissolution of a private foundation are listed under Article 35, namely: The expiration of the intended period of time; application for bankruptcy procedure; denial of bankruptcy due to insufficient estate; as well as the court's or the board of directors' unanimous agreement to dissolve the foundation. The board of directors has to reach a unanimous agreement for dissolution if it receives a valid revocation on the part of the founder, if the aim of the trust has been fulfilled, or if the aim cannot be carried out due to lack of capital. This also applies where a non-profit foundation that has served as support of persons for a period of 100 years and where no unanimous agreement has been reached by the last beneficiaries to continue with the trust, or where other reasons that are listed in the foundation declaration for its dissolution have been unanimously agreed upon by the board of directors (GASSAUER-FLEISSNER and GRAVE, 2005).

2.2 Taxation methods in a private foundation as compared to sole proprietorship farming businesses

2.2.1 General

The following model concept will be illustrated using the relevant tax regulations as a basis, whereby a distinction must be made between capital transfer taxation, which generally takes the form of inheritance and gift tax or property transfer tax in Austria, and the continual profit tax. Alongside this, the taxation aspect of the dissolution of a foundation, as well as the Value Added Tax has to be considered. In the first instance, it is necessary to establish that in the field of agriculture the assessed value serves as the focal point for various taxes and expenditures, whereby this is concerned with a standardized profit value that should reflect natural and economic yield conditions and should be allotted to each business (BMLFUW, 2005).

2.2.2 Taxation of the transfer of assets

Asset transfer after death, or as a gift, is dependent on the inheritance and gift tax under Austrian law. The tax assessment stipulations are measured according to the value of the transferred assets, whereby in some cases various allowances can be deducted. In the case of properties, three times the assessed value is relevant. The tax rate increases according to the value of the assets and the degree of the family relationship status, and varies between 2 % and 60 %. In the case of property bequests, the tax increases, according to the family relationship status, by a "property tax equivalent" of 2 % or 3.5 %.

When transferring a farm, there are certain special regulations. The property tax law provides for the transfer of assets to close relatives with reciprocation, whereby the beneficiaries guarantee the transfer or provision of livelihood. The tax amounts to 2 % of the simple assessed value of the business. If the reciprocal value is under the threefold assessed value, then administrative practice takes the form of a composite endowment (JILCH, 2002). In this case, there is, alongside the property tax that is assessed from the reciprocal value, an additional inheritance and gift tax for the amount of the threefold assessed value exceeding the reciprocal value. If there is a house included in the properties used for farming purposes, allocating the reciprocation value for tax assessment purposes is calculated according to the simple assessed value (URBAN, 2005).

When transferring without reciprocation, taxation takes the form of a gift tax. On the other hand, a purchase according to market prices is taxed under property tax regulations. In all inheritance and gift tax business transfer cases, there is a possible tax exemption of 365,000 EUR, as long as the transferor is aged 55 or more, or as long as he is unemployable. Furthermore, the "Promotion of Start-ups Act" must be taken into consideration, whereby in certain cases, a business transfer can possibly be entitled to a reduction up to a significant amount of 75,000 EUR.

In addition, introducing capital into a private foundation falls under the system of inheritance and gift tax. In practice however, there is a linear tariff amounting to 5 % of the threefold assessed value. The allotment of properties falls under an additional property tax equivalent to 3.5 % of the basic value. Furthermore it must be considered that the inheritance and gift tax laws include the issue of additional taxation. If the capital endowed in a foundation or the representative capital is transferred within ten years to a beneficiary, then the difference between the beneficiary tariff and the normal tariff must be paid as additional taxation (BRAUNER, 2003; LANG, 2004).

If business capital is included in a private foundation, the book value is continued, and the undisclosed reserves are not disclosed. The inclusion of individual economic goods can, however, be considered as tax effective (StiftR, 2001, Rz 180ff.). In addition, the transfer of properties to a private foundation can take the form of a composite endowment. If the property is burdened by a mortgage, then the property tax is estimated on the credit amount involved, and the basis of calculation for the gift tax is reduced. Should the mortgage have no economic connection to the property, then an additional capital yields tax must be paid on behalf of the founder (STINGL, 2003).

2.2.3 Current taxation

The Austrian profit tax laws require that all business income, and this includes farming business, declare their profits by annual comparison with business capital, and use a double bookkeeping system (DORALT, 2003). For farms, however, there are numerous special regulations in the form of a flat rate of profit estimation whereby profit is calculated on a certain percentage rate of the assessed value, or on turnover. These simplifications are applicable where there is an assessed value up to 150,000 EUR and a turnover of up to 400,000 EUR, and they tend to produce lower profits than those attained using the double accounting system (JILCH, 2002). The basis for tax assessments is the total income declared by a tax payer within a calendar year, whereby there may be various tax-free and tax-deductible amounts to be considered. Income tax is assessed according to the progressive tariff illustrated in Table 1 below:

Table 1: Progressive Austrian income tax

Taxable income	Marginal tax rate
> 10000-25000 EUR	38.33 %
> 25000-51000 EUR	43.60 %
> 51000 EUR	50.00 %

Source: Austrian income tax law.

Farmers who adhere to auditing regulations are entitled to favorable taxation for undistributed profits up to the maximal amount of 100,000 EUR per annum. Hereby profits are taxed, minus personal withdrawals and plus the investments necessary for the business, by the accounted for, half-average tax rate assessed on income as a whole. Should private capital decrease in the following seven years due to omitting the consideration of losses incurred, then additional tax must be paid.

Private foundations for own use are, as opposed to farming enterprises, subject to corporate tax law at a flat rate of 25 %. Dividends are subject to the additional 25 % capital yields tax. Contrary to other corporations, the entire range of income sources, with the exception of income from non-independent work, can fall under this category (KNAUS, 2001). National and international participatory profits in private foundations are, independent of the degree of participation and for the purpose of avoiding double taxation, exempt from the corporation tax law (StiftR, 2001, Rz 39ff.).

A private foundation's accounting has to be executed by the board of directors and carried out according to Article 18 of the private foundation law, whereby there has to be a guarantee of information governed by numerous commercial law regulations (GASSAUER-FLEISSNER and GRAVE, 2005; GELTER, 2001). The taxable profit estimations are, however, dependent on the general tax law framework. Due to the norms of obligatory bookkeeping laid down by private foundation law, all other methods of ascertaining taxable business income fall away. Outside of the business, for example when letting or leasing, the income of the private foundation is to be declared as an excess income above the professional expenses, according to the principle of in and out flow (KNAUS, 2001). A double-entry accounting for tax purposes is not applicable in this instance.

Of great relevance for making a private foundation fiscally attractive is the "intermediate taxation" of certain capital income sources, whereby in the case of money investments, claims securities and, under special circumstances, income from participation, a reduced corporate tax rate of 12.5 % is applicable. The intermediate tax is assessed separately from the normal tax, and is declared in an evidence account. If the private foundation offers an endowment to beneficiaries, then it is consequently subject to assessment under the 25 % capital yields tax (KÖNIG et al., 2002; StiftR, 2001, Rz 84-114).

2.2.4 Taxation aspects of the dissolution of a private foundation

The taxation consequences in the case of revocation or dissolution of a private foundation must also be taken into account. As a general rule, taxation is assessed on the level of the last beneficiary, with 25 % capital yields tax, whereby undisclosed reserves are generally not disclosed. Only if the foundation is revoked is the income shortened on the application in order to reduce the relevant values by the values that were present when endowed to the private foundation. Similarly, only in the case of revocation can the gift tax be refunded. A simultaneous takeover of liabilities also reduces the basis for tax assessment. It must be taken into account that where there is an endowment to beneficiaries, the speculative time span in Article 30 of the Austrian income tax law comes into operation, whereby any subsequent property purchases can be taxable.

Furthermore, the issuing of property results in an inheritance and gift tax situation (KNAUS, 2001; OBERNBERGER, 2005).

2.2.5 Value Added Tax

The introduction of assets into a foundation does not usually subject itself to VAT, but the businesses that are run from the foundation are eligible for VAT. While those farmers who are not obliged to carry out double-entry accounting do not have to pay VAT to the tax office, this does not apply for a private foundation. The VAT taxation that is applied in this case can be disadvantageous and must be taken into consideration.

3 PRIVATE FOUNDATIONS IN THE FIELD OF FARMING – POSSIBILITIES FOR THE ARRANGEMENT OF THE LEGAL STRUCTURE

Forming a private foundation with the aim of including farming businesses offers various alternatives for practical application. On the one hand, the whole business can be brought into and managed by the foundation. However, the possible restrictions to the farmers' influence over the management of the business must be considered, as the board of directors is the most important decision-making organ. From the taxation point of view, it should be considered that all taxable income of the farming business has to be declared through double-entry accounting. The often favorable estimation of profits after general rates, as well as the advantages in terms of the VAT, are not, under any circumstances, relevant in a foundation.

Due to these considerations, it is often worthwhile, instead of managing a business through a private foundation, to lease the farmland to the beneficiary. In this case, the properties can still be managed by the sole proprietor and the lease payments can be deducted from the tax base. In the foundation, the lease payments result in income from property. The beneficiaries can still enjoy practically unlimited freedom of action, although mortgage loans on properties are not possible due to missing ownership rights. The founder can therefore attain a securing of assets by utilizing the various structural possibilities. Due to the smaller equity capital of the remaining farm, it will be less credit-worthy. Generally, though, and dependent upon the formulation of the foundation document, the foundation can take the responsibility for credits of the beneficiaries (BOLLENBERGER and CSOKLICH, 2001).

Not applicable to the above variations is the inclusion of domestic and business buildings in the private foundation. Hereby, the founder can reserve the right of abode without being subject to taxation. Only if this right is conceded after forming the foundation are the beneficiaries taxable on this endowment. In the case of transferring buildings to the private foundation, it must be considered that analogous to the business management through the foundation, a considerable restriction of the beneficiaries' economic freedom is incurred. These various possibilities can only be of use in farming businesses if the buildings entail high capital investment and consequently high profit expectations through their usage, as, for example, stables, or storage and production buildings.

4 MODEL ASSESSMENTS FOR EVALUATING TAXATION ASPECTS OF THE PRIVATE FOUNDATION IN THE FIELD OF AGRICULTURE

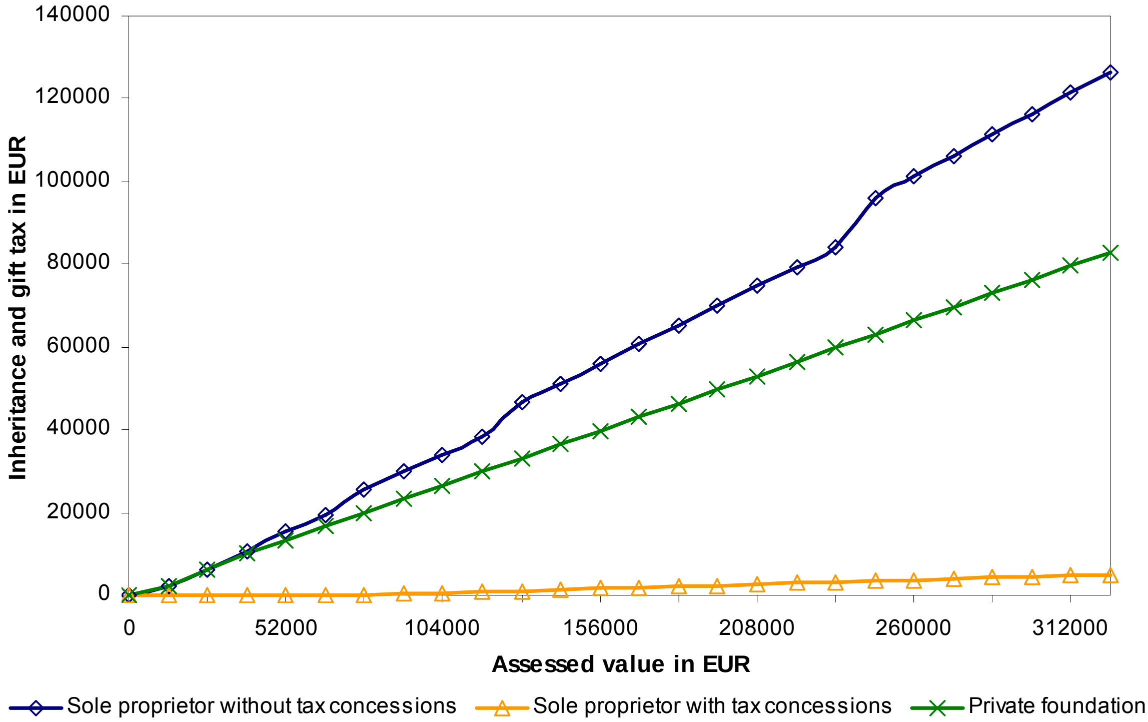
4.1 General

In the following chapter, the tax burden will be illustrated by means of quantitative model assessments. Because the structure and size of farming businesses are a decisive factor for the taxation advantageousness of a legal form, this criteria builds the central point of the considerations dealt with here. Alongside this, a farmer's dividend policy (private consumption) exercises considerable influence in profit taxation and must therefore be taken into account.

4.2 Tax burdens in transferring the farm

First, the taxation method of the transfer of assets can be seen within the context of all the framework conditions (Figure 1). The transfer of a farming business to close relations with a secured livelihood in reciprocation is not subject to property taxes up to a basic value of 75,000 EUR, where the "start-up promotion law" is applied. A larger amount is taxed at a rate of 2 %, whereby there is only a minimal general tax burden. If the transfer is made without reciprocation, and where the beneficiaries are not eligible for the Promotion of "start-ups Act, taxes are considerably more. Where there is an assessed value of 65,000 EUR, for example, the inheritance and gift tax amounts to more than 19,000 EUR. This tax burden increases even more in the case of distant relatives being the beneficiaries. In the transfer of assets to a private foundation, there is a linear tariff which lies between the favorable and unfavorable farm transfer tax amount assessed. In addition to the tax, there are the founding costs, which amount to around 10,000 EUR (KRAUS, 2004). On the other hand, the costs involved with drawing up a contract along conventional lines for transferring the farm properties falls away.

Figure 1: Establishing an agricultural successor and the related inheritance and gift tax



Source: Own calculations based on the Austrian inheritance and gift tax law.

Notes: Sole proprietor not benefited: Inheritance and gift tax in tax bracket 1 with a tax-free amount of 2,310 EUR, including the property tax equivalent, no application of the "Promotion of Start-ups" Act.

Sole proprietor benefited: Transfer with "security" of livelihood, 2 % property tax taken from the assessed value, application of the "Promotion of Start-ups" Act.

Private foundation: 5 % gift tax plus 3.5 % property tax equivalent, based on threefold assessed value.

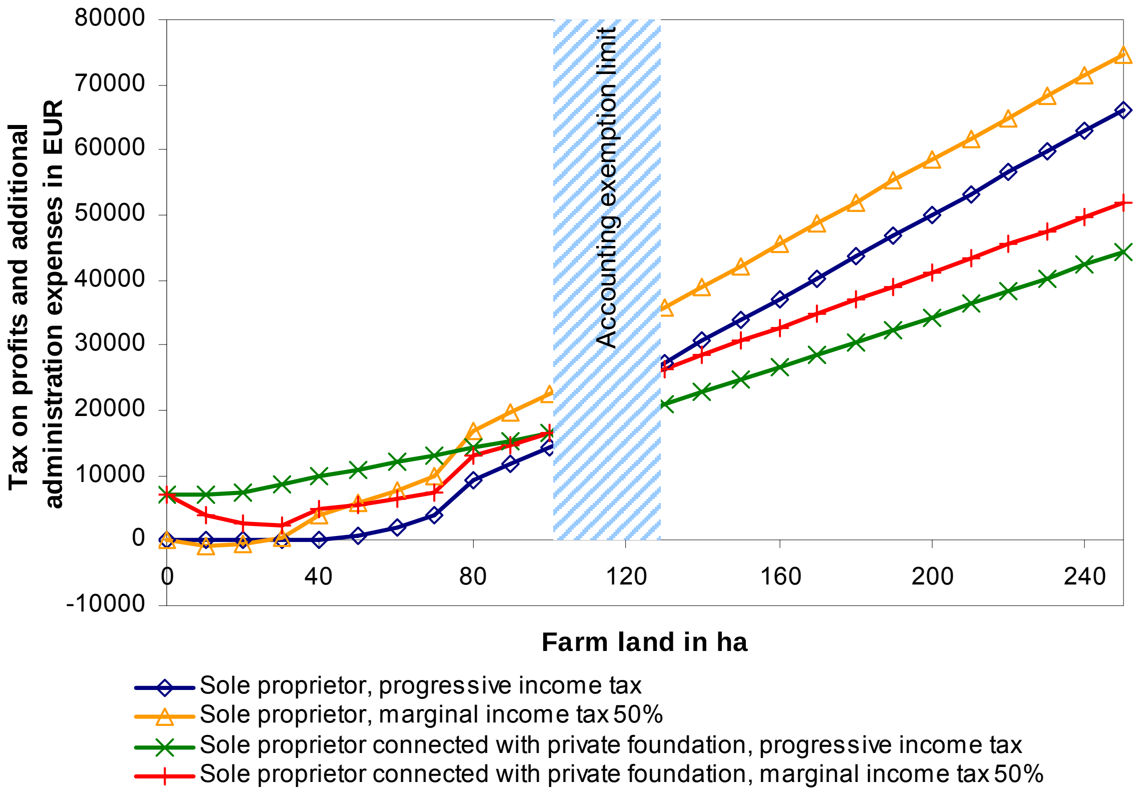
As can be deduced from this partial viewpoint, forming a private foundation is of greater advantage the larger the business is, the fewer beneficiaries entailed in a sole proprietorship and the more distant is the family relationship. Also, a private foundation can be of advantage in the case where, due to shorter intervals of inheritance succession, business transfers are expected to take place more often, because the inheritance and gift tax is payable only in the first instance.

4.3 Model evaluations of the profit tax burdens

Alongside the expenses incurred in a foundation, the current profit tax burden plays a significant role in the advantageousness of a legal form. Figure 2 illustrates that the annual income tax of a sole proprietorship is dependent upon the size of the arable farm itself. The spectrum of businesses that are mostly obliged to render taxable bookkeeping systems is illustrated in the diagram. For smaller farms, a private foundation is in all probability not advantageous for profit tax reasons, due to the possibilities of flat rate profit margins.

The model evaluations are based upon the assumption that all the illustrated farms show a profit that results from double-entry accounting. All the calculations are based upon the assumption that the land is solely owned and managed, with an average yield of 1,800 EUR per hectare. The taxable income from agriculture is simplified by using percentages ranging from 20 to 36 % of the yields, according to the sizes of the business in question. In addition, social insurance contributions are deducted according to the respective sizes of the farms. It is also assumed that the sole proprietor withdraws 100 % of the profit and the favorable taxation of profits that are not withdrawn is therefore not applicable. In the case of the private foundation, the sole proprietor pays a lease of 450 EUR per hectare to the foundation, and also in this case the farmer withdraws the same absolute amount from the business. Additionally, the annual management costs incurred in the foundation are given as 7,000 EUR and are already included in the profit tax calculation in the diagram.

Figure 2: Profit tax of an agricultural sole proprietor compared to a sole proprietor connected with a private foundation



Source: Own calculations based on the Austrian income tax law.

Income tax is dealt with in two aspects, firstly under the assumption of a progressive income tax rate without income outside of the farming income; and secondly, that there is a marginal tax rate of 50 %. In this case, further income of at least 5,100 EUR annually must be presented. To begin with, it is determined that arable farms of up to approximately 20 hectares show book losses under the assumed circumstances, whereby the income tax of 50 % is incurred due to the possible balance of losses, which can result in a tax credit. It must be pointed out however, that if this situation persists, there is the danger of the business being classified as a hobby by the tax authorities.

Figure 2 shows that the annual income tax burden of the private foundation (including additional management expenses), in connection with a sole proprietor farm that has a tax limit of 50 % from approximately 50 hectares of farming land, is less than a business run without a foundation. Taking into account that the tax is assessed by progressive tax rates, the inclusion of agricultural land is advantageous from 75 hectares or more. It must be stressed again, however, that the options of flat rate profits have not been taken into consideration here.

To provide an intermediate summary, it has been established that the profit tax burden in arable farms that are obliged to audit their books due to the size of the business, and that withdraw tax profits entirely, can be reduced by forming a private foundation. If the profits are, on the contrary, fully retained and as a result favorably taxed, then the profit tax burden, including the additional management costs associated with a foundation, would only be of advantage to the sole proprietor with land over 120 hectares, even if the business is obliged to show bookkeeping records.

4.4 Conclusive taxation evaluation of the private foundation in agriculture

To achieve a comprehensive quantitative evaluation it is necessary to compare the costs of forming a private foundation against the annual profit tax burden. To illustrate this, a model based on dynamic amortization calculations has been constructed. The amortization time span is taken to be that period of time in which the invested capital, in addition to the interest due, is released. Sources in the literature regard this method as unsuitable for evaluating profitability, but still feel that it could be informative as a risk estimate (SEICHT, 1997). This applies to the premise that the longer the regain period lasts, the more probable it becomes that there will be unpredictable disadvantages (THOMMEN and ACHLEITNER, 2003). Because the taxation framework has the tendency to change rapidly and because a short amortization time span seems favorable for a private foundation, the dynamic investment calculation that follows seems suitable. The following equation (1) is the starting point for the calculations:

$$I_0 = \sum_{t=1}^{m} R \cdot r^{-t} \tag{1}$$

I_0 = amount to be invested

m = time of return flow

r = discount rate

R = return flow in the years t

t = time in years.

Working from this general formulation, the following equation (2) for the dynamic evaluation of tax effects in a private foundation has been deduced:

$$\left(IGT_{PF} + FE_{PF} - IGT_{SP} - FE_{SP}\right)_0 = \sum_{t=1}^{m} IT_{SP} \cdot r^{-t} - \sum_{t=1}^{m} IT_{SP,PF} \cdot r^{-t} - \\ - \sum_{t=1}^{m} CT_{PF} \cdot r^{-t} - \sum_{t=1}^{m} CYT_{SP,PF} \cdot r^{-t} - \sum_{t=1}^{m} AE_{PF} \cdot r^{-t} \qquad (2)$$

AE_{PF} = administration expenses of the private foundation

CT_{PF} = corporate tax of the private foundation

$CYT_{SP,\ PF}$ = capital yields tax of the sole proprietor connected with a private foundation

FE_{PF} = formation expenses of the private foundation

FE_{SP} = formation expenses of the sole proprietor

IGT_{PF} = inheritance and gift tax of the private foundation

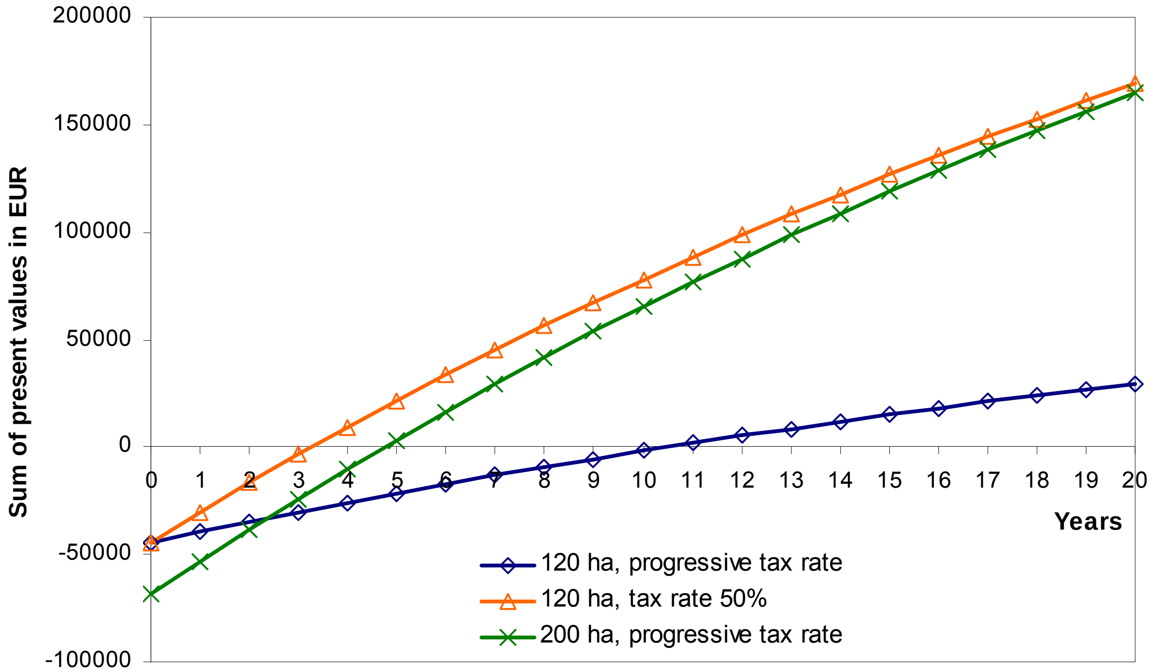
IGT_{SP} = inheritance and gift tax of the sole proprietor

IT_{SP} = income tax of the sole proprietor

$IT_{SP,\ PF}$ = income tax of a sole proprietor connected with a private foundation.

For the amount to be invested, the difference between the costs of a favorable transfer of the farm and the costs involved in the formation of a private foundation is calculated. Returns during individual years are mirrored in the expected profit tax savings, minus additional costs incurred in managing the private foundation, whereby the 12.5 % intermediate tax on specified capital income is not considered. The taxation framework conditions and the profit situation in agriculture are assumed to be constant. The relative amortization time span is illustrated in Figure 3 for two chosen farms of different size, with the comprehensive withdrawal of profit and with a discount rate of 3 %. If a marginal tax rate of 50 % is assumed, then the formation of a private foundation amortizes itself in a business with 120 hectares of acreage land after the third year, and by the acceptance of a progressive tax burden, in a time span amounting to 10 years. In a business with 200 hectares, the invested amount and the calculable interest is released after 5 years.

Figure 3: Dynamic amortization of a private foundation in agriculture



Source: Own calculations based on the Austrian inheritance and gift tax law as well as the Austrian income tax law.

5 Conclusions

Farmers have two motives for choosing the private foundation as a legal form. On the one hand is a surety of assets, and on the other hand are positive tax effects. The first aspect has been discussed with reference to the legal stipulations of private foundation law, and subsequently a quantitative analysis of the taxation effects was demonstrated.

Evolving from the comments made regarding private foundation laws, it can be deduced that the guarantee of lasting capital security is decisively dependent upon the declared will of the founder. In order to meet the demands of farming enterprises, the inclusion of the farm land in the foundation, together with running the farming business as a sole proprietor seems to be the most favorable arrangement. This allows for a compromise between capital security aims and the extensive influence of the beneficiaries over the asset management.

Under the assumed circumstances, the private foundation is advantageous in arable farms that are obliged to audit books for tax assessment purposes. As long as the amount of the basic assessed value allows for a flat rate profit determination, the private foundation would not prove to be favorable as far as profit tax perspectives are concerned. Further influential factors are the profitability of a farm and the dividend strategy of the business. As far as taxation is concerned, the private foundation is to be considered when farms not in the family are transferred, thereby creating a higher inheritance and gift tax burden.

In this contribution, general tendencies concerning the effects of private foundations in agricultural businesses have been discussed. Due to the broad spectrum of organizational possibilities, it is important that decisions should be made by looking at comparisons with the acceptance of specific plan information. It is to be assumed, however, that with the continuous growth in farm size, the legal form of private foundations will gain more recognition in the future.

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CREDIT AS A TOOL OF INTEGRATION BETWEEN POLISH FARMS AND BUYERS OF THEIR PRODUCTS

*ALINA DANILOWSKA**

ABSTRACT

The aim of the paper is to examine the role which credit plays as a tool of integration in the food chain in Polish agriculture, particularly in the integration of farms with food processors. This issue is explored from the perspective of transaction costs theory. The analysis showed that the practice of the use of loans by processors varies across the sectors of agribusiness. The data indicates that the dairy sector was a leader in implementing the loan contracts. Dairy processors were interested in financing different objectives from those supported by manufacturers from other sectors of the agrifood system. The former offered investment loans, while the latter granted loans for working capital. The credit activity creates transaction costs for both partners of the contract. Surprisingly, of five variables analyzed, only the period of contract was significant for the emergence of transaction costs.

Keywords: *Integration, contract, transaction costs, loan, farmers.*

1 INTRODUCTION

The process of integration by contract between farmers and other agents of the food chain is one of the most interesting and important processes that can be observed in Polish agriculture today. Integration has many dimensions: Organizational, economic, and technological. Its stages, forms and significance have varied widely across sectors of agricultural production and regions. This paper focuses on the economic dimension of integration. The aim of the paper is to examine the role that credit plays as a contractual tool of integration in the food chain in Polish agriculture, particularly in the integration of farms with food enterprises

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which are buyers of agricultural products. The analysis uses a transaction costs theory approach.

The main data source for the analysis is a survey by the author on the terms of credits from different sources, and the implementation of credit agreements. The investigation was carried out in the first quarter of the year 2004. It involved a systematic study of farms by the Institute of Agricultural and Food Economics (IAFE), farms which were in debt due to loans (including trade credits) owing to different non-financial institutions on 31 December 2001. 128 farms from all over Poland provided information about the terms and implementation of 142 credit contracts via which they owed money. 48 of these contracts were between farms (46 farms) and buyers of agricultural products. The additional information about the economics of farms under investigation was sourced from the Institute. The results of the analysis are compared with, and supplemented by, findings of other researchers in this area. The analysis used comparative and statistical methods of analysis: Descriptive method and probit model (MCCULLAGH and NELDER, 1989).

The paper is organized as follows. It begins with an analysis of the impact, forms and advantages of integration. Then there is a consideration of the characteristics pertaining to the farms and processors in the study. This is followed by an examination of the structure of loans by types of lenders, forms and objectives. The next part looks at the terms of the loans granted. The final section analyzes the determinants of the emergence of transaction costs associated with loans granted by the processors to farms.

2 THE PROCESS OF INTEGRATION – IMPACT, FORMS, TOOLS AND ADVANTAGES

There are many motives for integration. Transaction cost economics focuses on economizing the transaction costs which occur in the ex-ante and especially in the ex-post phase of transaction. This is realized by introduction of the different forms of governing of transactions. Williamson points to uncertainty, asset specificity and the frequency of transactions as major factors influencing the choice of the structure of governance, from market governance at one end to unified governance at the other (WILLIAMSON, 1985). Between these two, there is a variety of hybrid modes like short-term contracts, long-term contracts, franchising, and joint ventures. Williamson's concept is developed theoretically and an attempt is made to operationalize it.[1]

There are many examples of using the transaction cost economic approach to deal with the problems of integration in the area of agribusiness. The literature focuses on the forms of integration (VERHAEGEN and VAN HUYLENBROECK, 2001),

[1] See: BOERNER and MACHER, 2001.

incentives (SPORLEDER, 1992), and determinants of variation across regions and commodities (HARVEY et al., 2005). Special attention is paid to cooperatives (SZABO, 2002; COOK, 1995).

Integration between farmers and buyers of their products typically takes the form of a contract regulating the delivery of agricultural products. The processors initiate the cooperation and are in a stronger position than the farmers. This is due to the disparity between the number of processors and farms that want to sell their products. Moreover, the processors can operate (buy) over a much bigger territory than farmers who, because of time cost and scale of production, cannot afford to seek out buyers for their products. The stronger position allows the processors to control different factors like price, quantity, quality, timing of deliveries (SPORLEDER, 1992, p. 1227) and other terms of exchange with farmers, of which the terms of payment are very important.[2] But a relationship dependent solely on delivery contracts is not always sufficient for the processors to achieve their aims, so they have to introduce other tools to influence farmers' behavior, for example pre-financing (SWINNEN and GOW, 2001, p. 197-198).

Credit can be a single tool, or one of a vast range of tools used by processors in their relations with farmers. By its very nature it builds or strengthens the long-term relations between partners. The credit contract is long lasting and creates interdependency between the partners. There are many advantages for processors in providing loans to farmers. Loans can:

- Accelerate the introduction of technological innovation
- Reduce the risks relating to the quality of agricultural products by providing the proper technology (milk coolers, feed, seeds)
- Finance the specific inputs that help create a stable group of suppliers of high-quality products (it leads to the higher specificity of a farm's assets).

Loans can be of interest to farmers as a preferable alternative or supplementary source to bank credits for financing investments or current activity. The comparative advantage of processors' loans depends on interest rates and other terms that influence the transaction costs of borrowing.

2 In the dairy sector farmers usually grant trade credits to processors. According to transaction cost theory it can be explained as a way of reducing the costs of paying bills (PETERSON and RAJAN, 1997, p. 665), but farmers are often forced to accept disadvantageous terms of those credits because of their weak position (POSPISIL, 2001, p. 164). This kind of credit is outside the scope of this paper.

3 LOANS AS A TOOL OF INTEGRATION OF POLISH FARMERS AND PROCESSING COMPANIES

Polish farmers are familiar with integration by contract, because this was often used by state or cooperative enterprises under the communist economy. At the beginning of transition, the links between farms and other agents in food chain broke down. It has taken some years for them to re-emerge. According to DRIES and SWINNEN, foreign investors and enterprises that were undergoing thorough restructuring had the greatest influence on this process. Domestic enterprises started to follow them quickly (DRIES and SWINNEN, 2004). Among the different forms of cooperation like contracts for product delivery, training in the application of technology, deliveries of current means of production, loans are often used (DRIES and SWINNEN, 2005). The granting of credits by processors operating in different branches of the Polish food industry has been examined by a number of authors: SZLACHTA (2000), SARNECKI (1999), DRIES and SWINNEN (1994, 1995), SWINNEN and GOW (2001) in the dairy sector, URBAN (1999) in the sugar sector, OSTROMECKI (1999) in the meat sector. What is more, the processors supported farmers in financing the investments made within the SAPARD framework (DANILOWSKA and CHOROS, 2005).

3.1 The parts of loan contracts

On 31 December 2001, 195 farms out of the 1,270 included in the systematic study by the Institute of Agricultural and Food Economics were in debt due to loans owing to non-financial institutions. After further analysis, the information relating to 128 farms was deemed acceptable for the study. These farms owed money on 142 loans. An analysis of the breakdown of loans by creditors showed that 48 had been granted by buyers of agricultural products. They provided loans to 46 farms throughout the different regions of Poland. It should be noted that the buyers consisted of processors only – there were no middlemen. What is more, the farmers declared that they cooperated with them steadily. The breakdown of loans by types of processors is shown in Table 1.

Table 1: Breakdown of loans by buyers of agricultural products

Source of credits	Number of loans	Breakdown (%)
Total	48	100
Of which:		
-Dairy processors	40	83.3
-Other buyers (processors)	8	16.7

Source: Own calculation on the basis of a survey.

The main group of enterprises granting loans to farmers was dairy processors. In that group, there were different dairy companies – from small to large scale producers, domestic and international, cooperatives and corporations. They granted 83 % of the credits analyzed. The proportion of buyers granting loans from other sectors of agribusiness – sugar factories, tobacco companies, meat processors, fruit and grain processors – was relatively small. In this paper they are referred to as "other processors". The imbalance between the number of loans provided by dairy processors compared to other processors indicates that the loan was a popular instrument in the dairy sector, but rarely used in other food sectors.

The various characteristics of farms which took out loans from processors are shown in Table 2. Figues relating to all the farms studied by The Institute of Agricultural and Food Economics are also given to assist analysis. The table reproduces the basic indices relating to farms, their production potential, inputs, investment activity, production and income.

Table 2: Characteristics of farms in debt due to loans from processors and of all farms investigated by IAFE (December 2001)

Specification	Dairy processors		Other processors		Farms investigated by IAFE	
Total number of farms	39		7		1270	
	Mean	Median	Mean	Median	Mean	Median
Age of farmer (years)	45.6	45.0	42.7	41.0	45.0	45.0
Agricultural land (own and leased) (ha)	23.9	21.2	44.8	18.1	29.9	16.5
Fixed assets (000 zł)	420.8	339.1	726.5	739.8	430.6	302.1
Farm labor resources (person)	2.9	3.0	3.1	3.0	2.9	3.0
Purchased inputs (000 zł)	32.4	24.5	222.6	54.3	46.5	20.2
Investment outlays (000 zł)	16.7	3.7	62.1	3.1	23.1	2.8
Market output per 1 ha (000 zł)	3.1	2.8	11.5	5.2	3.2	2.7
Share of animal production in final gross output (%)	87.3	90.7	49.3	45.0	64.8	75.4
Agricultural income (000 zł)	27.5	22.0	45.1	16.3	30.7	14.8
Total debt (000 zł)	29.9	13.4	130.3	35.2	37.9	5.0

Source: Own calculations on the base of data from IAFE.

The noticeable attribute of farms studied is the difference between the economics of the average farm that was in debt due to loans from dairy processors and farms that borrowed from other manufacturers. What is more, the economics of the average farm supplying the dairy processors was close to the economics of the average farm investigated by IAFE. The biggest dissimilarity between them concerned the structure of production. The proportion of animal production in the final gross output of the farms that supply dairy processors was much higher (nearly twice) than that of the average farm investigated by Institute.

Farms supplying other processors were managed, on average, by farmers about three years younger than suppliers of dairy processors. Moreover, they had higher resources of land (90 %), capital (70 %) and labor (7 %). As that group involved the suppliers of processors from different sectors of agribusiness, the share of animal production in the final gross output was about 50 %, while in the other group it was nearly 90 %. The inputs of the former were far greater (7 times), and their average market output per 1 ha of agricultural land was nearly four times greater. These farms also secured a much larger agricultural income. They used credits from different financing sources, which is reflected by the level of debt.

3.2 Purposes and forms of loans granted by processors to farmers

The striking feature of the types of loans analyzed is the difference in their breakdown by the purpose they were granted for (Table 3).

Table 3: The breakdown of loans by purpose, and by type of lender

Specification	Dairy processors		Other processors	
	Number of loans	%	Number of loans	%
Total number of loans	40	100	8	100
Purpose of loan:[1]				
- Basic herd	9	21.4	0	0.0
- Equipment for specialization of production	19	45.2	0	0.0
- Machinery	4	9.5	0	0,0
- Construction and modernization of non-residential farm buildings	2	4.8	2	25.0
- Current means of production	7	16.7	4	50.0
- Working herd	1	2.4	2	25.0
Form of loan:				
Trade loan	16	40.0	7	87.5
Cash loan	24	60.0	1	12.5

Source: Own calculation on the base of questionnaire.

Notes: [1] In two cases, the credits from dairy enterprises were dual-purpose loans, so 42 "loans" were taken as 100 %.

Loans from dairy enterprises were dominated by the investment loans. They accounted for more than 80 % of all loans, and 90 % of the total value of loans. The dairy processors granted investment loans mainly for specialized equipment for milk production, generally for appliances for chilling milk. Of secondary importance were loans for the purchase of cows, in third place came loans for investing in machinery.

Other enterprises chiefly granted loans for working capital, the most popular of which were loans for feed and seed. 25 % of loans were devoted to financing investment connected with non-residential farm buildings.

Both types of enterprise gave trade credits and money loans. But the proportion of trade credits amongst those farms granted credits by dairy enterprises was only 40 %, whereas in the other group it was nearly 90 %. Such a high proportion of trade credits was a result of farmers' adaptation to special production technology, a move generally forced by processors.

The comparative analysis of the economics of farms and breakdown of credits by their purpose showed that the aim and level of credits granted by processors depended on the type of production (commodity).

3.3 The terms of loans from buyers of agricultural products

The terms of loans are very important because all of them create credit activity costs for lenders, and borrowing costs for borrowers. The lenders' costs are mainly of an administrative nature. Borrowing costs consist of interest and transaction costs,[3] that involve different kind of costs (except price) such as fees, costs of collateral, expenditure on producing documents to prove creditworthiness, traveling costs, opportunity costs of time and others (ADAMS and NEHMAN, 1979; PETRICK and LATRUFFE, 2003).

The terms of the loans studied varied between the groups of processors. For the majority of credits granted by the dairy manufacturers, creditors demanded payment of interest. In this group, interest rates varied to a large extent, from 1 % (the minimum) to 24.6 % (maximum). But one must point out that interest rates on most (73.9 %) of credits were between 1-5 %, and they were much lower than market interest rate.[4] The interest rates of most credits in that group were lower than the interest rate paid by the farmers on preferential credits.[5] The interest rates on 17.4 % of credits from dairy enterprises were between 5-10 %, and only 8.7 % of credits had rates higher than 10 %. The other buyers did not require interest payment. But in the case of trade credits (which dairy enterprises also granted) it is possible to take account of the interest in the price of the good which is the subject of the trade credit. In every case creditors have the possibility to put charges on their credits, but they have to take into consideration the level of interest rates on credits available for borrowers from other sources, for example banks.

The cost of borrowing consists not only of interest, but of different types of provisions and fees, which are charged to borrowers by creditors. The "other" enterprises did not charge borrowers any fees, while dairy enterprises used them only in 15 % of credits.

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3 There are many definitions of transaction costs. A review of them is presented by FURUBOTN and RICHTER (2003)

4 A central bank discount rate can be a benchmark. At the end of 1999, 2000, and 2001 it was 19.0 %, 21.5 %, and 14 % respectively.

5 The interest rate paid by farmers in the case of some kind of preferential credits was 0.25 of the central bank discount rate, for more details see (DANILOWSKA, 2005).

Table 4: Terms of granting and repayment loans by type of creditors

Specification	Dairy processors		Other processors	
	Number of loans	%	Number of loans	%
Total number of loans	40	100	8	100
Loans charged interest (event)				
-Yes	23	57.5	2	25.0
-No	17	42.5	6	75.0
Loans with additional fees (event)				
-Yes	6	15.0	0	0.0
-No	31	77.5	8	100.0
-No answer	3	7.5	0	0.0
Loans with collateral (event)				
-Yes	23	57.5	1	12.5
-No	17	42.5	7	87.5
Type of collateral				
-Personal guarantee (co-signer)	19	47.5	0	0.0
-Deposit (chattel mortgage)	1	2.5	1	12.5
-Others	3	7.5	0	0.0
Form of repayment				
-Money	2	5.0	2	25.0
-Products	38	95.0	6	75.0
Frequency of repayment:				
-Single	0	0.0	7	87.5
-By installment	40	100.0	1	12.5
Period of repayment (months)				
0-12	16	40.0	7	87.5
> 12-36	14	35.0	0	0.0
> 36	10	25.0	1	12.5

Source: Own calculation on the basis of a survey.

The contract of the loan can be of long duration, and during its term opportunistic behavior on behalf of the borrower or other events can make the repayment of the loan impossible, so generally lenders require collateral. The two groups of lenders examined applied different strategies regarding collateral. The other manufacturers required collateral for only one loan (12.5 %), while the dairy manufactures required it for 57.5 % of loans. Dairy enterprises preferred personal guarantee as collateral.

The terms of repayment varied noticeably across the two groups. The dairy manufactures required repayments by installment and in the form of milk deliveries. The majority of loans from the other processors were repaid all at once, and in the most cases also by product deliveries. It is worth mentioning that this form of repayment is very favorable for both parties of the loan contract, farmers and lenders. It saves on transaction costs connected with repayment in the form of cash, the cost of monitoring and additionally, decreases the risk of delays and defaults.

There are differences in frequency of repayment between credits from the two groups. It is a result of the specificity of production technology. Milk production needs everyday contact and deliveries throughout the whole year, whereas one cycle of sugar beet production last some months and is possible once a year. Dairy manufacturers account for milk with farmers systematically every month, whereas other enterprises perform this once after product deliveries at the end of the production cycle.

4 THE DETERMINANTS OF TRANSACTION COSTS OF LOAN CONTRACTS

The precondition of granting credits by manufacturers to farmers was the cooperation between them in the form of product deliveries. The aim of providing loans was to strengthen the cooperation and as a result to reduce the transaction costs connected with arranging a stable group of suppliers of high quality agricultural products. But credit contracts give rise to transaction costs for creditors as well as for borrowers. Some activities connected with concluding the contract and its implementation create costs for both partners, but in different ways, forms or values. They can be described as costs of "bilateral character". Collateral can be an example here. The creditor should choose and check the collateral; the borrower has to devote resources and time to provide it.[6] The kind and the level of these costs depend on the creditor as the stronger contract partner and the one that is granting the loan. Some costs only affect the farmers; these do not depend on the terms of the contract at all, but on other different conditions, like the distance from farm to processor. What are the determinants of the transaction costs of loan contracts, and how strongly do they influence these costs? This paper will only consider "bilateral" costs that affect both contract partners (farm and enterprise). Of course, as already mentioned, these are not of the same value and form. To examine the relationship, a probit estimation model has been applied.

4.1 The choice of variables to model

The emergence of transaction costs for both parties of the loan contract is a dependent variable. It is of dichotomous character. It takes the value of 1 if any of four possible events given below took place during the ex-ante and ex-post period of the contract, or the value of 0 if these situations did not happen. Every

[6] Because the personal guarantee was the most popular form of collateral, the cost of travel of the cosigner can be an example.

selected event creates cost in the form of resources or time. The list of these events is:

1. Additional fees;
2. Investigation of the creditworthiness of the farmer;
3. Monitoring the farmer's situation during the term of the loan contract;
4. Settlement of collateral.

A set of independent variables was drawn up (Table 5) as determinants of the emergence of transaction costs. They are related to: (i) the economics of the farm, (ii) the characteristics of the relationship between the farmer and buyer of his products, (iii) characteristics of the loans. Because of the small sample included in the study the number of independent variables identified was limited to 5. Of these only one is of dichotomous character. Figures relating to all variables used in the model are displayed in Table 5.

Table 5: Variables used in the probit model

Variable	Mean	Std. Dev	Minmum	Maximum	Valid obser.
Total agricultural land owned (ha)	18.35	11.67	3.51	53.79	48
The period of cooperation (years)	13.04	8.58	1.00	32.00	48
The evaluation of cooperation (dummy)	0.85	0.36	0	1	48
Loan value (000 zł)	5.96	5.02	0.22	21.96	48
The period of repayment (months)	29.2	28.7	2.0	96.0	48
Transaction cost appearance (dummy)	0.56	0.50	0	1	48

Source: Own calculation on the base of survey.

The economics of the farm is represented by the area of land it possesses. It is to be expected that this variable will have a negative impact on transaction costs. This variable acts to reduce the transaction costs in two ways: 1. the bigger the area of the farm, the better the collateral, even considering that the most popular form of collateral was personal guarantee; 2. the size of the farm indicates its production potential and similarly the scale of the transactions between farmers and processors. Taking the value of the loan as given, the greater the scale of agricultural production the buyer is interested in, the smaller the need to take other precautions like demanding collateral or investigating creditworthiness. What is more, repayment in the form of deducting the installment from a farmer's bills (the bigger the scale of production, the higher the bills) for deliveries of a product decreases the risk of delays and defaults.

The next two variables merit special attention because of their role in the ex-post phase of the contract and the essential problem of opportunism. The relationship between farmer and manufacturer is represented by two features: The duration of cooperation and the assessment of cooperation made by farmers. The two variables are likely to influence the transaction costs negatively. The first is important, especially in view of the threat of opportunistic behavior which may occur. The longer the cooperation lasts, the better the knowledge about farmer's reputation.

The second variable takes the value 1 if the farmer judged the cooperation to be "good" or "very good", or 0 where the assessment was worse ("average" and "bad") The opinions expressed by farmers about the quality of cooperation were probably nearly the same as those of manufacturers regarding the quality of cooperation with farmers. This may be reflected in a creditor's refraining from investigating a farmer's creditworthiness (ex-ante phase) or monitoring his economic situation during the period of repayment (ex-post phase).

Table 6: Length of cooperation and its evaluation by farmers

Specification	Dairy processors		Other processors	
	Number	%	Number	%
Total number of farms	39	100	7	100
The period of cooperation[1] (years)				
1-5	11	28.2	4	57.1
6-10	4	10.3	2	28.6
>10	23	58.9	1	14,3
No answer	1	2.6	0	0.0
The evaluation of cooperation				
- Very good	5	12.8	1	14.3
- Good	27	69.2	6	85.7
- Average (not good or bad)	6	15.4	0	0.0
- Bad	1	2.6	0	0.0

Source: Own calculation on the base of a survey.

Notes: [1] To the end of 2001.

The data presented in Table 6 demonstrates the fairly lengthy period of cooperation between farmers and processors that granted loans. The cooperation of farmers with dairy processors lasted much longer than those with the other processors. Nearly 60 % of farmers in the study cooperated with dairy processors for longer than 10 years, many of them more than 20 years. Only one of the farms that collaborated with other processors has had a working relationship for longer than 10 years. Most of the farms in that category cooperated from between 1-5 years. It indicates that the aforementioned collapse of cooperation between farmers and processors generally concerned sectors of agribusiness other than the dairy sector.

The assessment of cooperation was generally positive. All farmers who delivered products to "other" processors, and more than 80 % of milk suppliers, ranked the cooperation "good" or "very good".

The value of the loans ought to influence positively the transaction costs. The bigger the value of the loan, the greater the risk and the need of collateral. The length of the period of repayment is also likely to have a positive influence. The longer the period of repayment, the higher the risk of events not even connected with opportunism which can interrupt the repayment or make it impossible.

4.2 Results of the model

As shown by the Chi-squared statistic, the model is significant. It is characterized by a relatively high prediction accuracy at nearly 70 %. The analysis showed that, from 5 variables modeled, only one – the period of repayment – is statistically significant. As was expected, the parameter has a positive value. Its influence on the emergence of "bilateral" transaction costs is quite high, taking into consideration that the length of period of repayment is expressed in months. On average, each month of the repayment period increases the probability of transaction costs arising by 1.65 %.

Table 7: The results of the probit model estimation

	Coefficient	**Std. Error**	**z-value**	**Pr(>|z|)**	**Marginal effect**[1]
Constant	-0.4253	0.7711	-0.552	0.5811	
Own agricultural land (ha)	-0.0016	0.0198	-0.084	0.9328	-0.06 %
The period of cooperation (years)	-0.0023	0.0251	-0.095	0.9244	-0.09 %
The evaluation of cooperation (dummy)	0.2036	0.5695	0.358	0.7206	7.91 %
Loan value (000 zł)	-0.1102	0.0718	-1.534	0.125	-4.21 %
Period of repayment (months)	**0.0433**	**0.0172**	**2.506**	**0.0122**	**1.65 %**
LR test (Chi-squared)	16.912	(p-value = 0.00467)			
McFadden's R^2	25.5 %				
McFadden's R^2 (adjusted)	7.7 %				
Prediction accuracy	68.75 %				
Observations	48				

Source: Own calculation on the base of a survey.

Notes: [1] Because of nonlinear dependencies the marginal effect is in percentage points calculated as a sample mean. For the variables of dichotomous character marginal effect was calculated by changes from 0 to 1.

The results concerning the four other variables which, from the literature on the characteristics of contracts (size of partner, period and quality of cooperation, loan value), are seemingly important, is somewhat surprising. It indicates that they were of no importance for the emergence of transaction costs either negatively or positively. It might suggest that the processors granted loans under special loan programs (schemes) aimed at the large range of farms. Procedures and terms of loans under these schemes were standardized and simplified (to reduce the costs of lending especially given that the sizes of loans were not particularly high) and the individual characteristics of borrowers, value of loans, the period, and quality of the cooperation were not important.

5 CONCLUSION

The analysis of the granting of loans by processors to farms that delivered products to them has shown that the use of loans varies across the sectors of agribusiness in Poland. If we look at the loan contracts as the tools/forms of integration by contract, findings are consistent with those concerning other countries (HARVEY et al., 2005). The data indicates that the dairy sector is a leader in implementing loan contracts. The processors from dairy sector were interested in financing different objectives from those supported by manufacturers from other sectors of the agrifood system. The former offered investment loans, while the latter granted loans for working capital. The reasons for that distinction need special attention and investigation. A comparative analysis of the economics of farms that sell their products to the two groups of processors suggests that the scale of resources which the farms have at their disposal could be one of these reasons. Dairy farms seem to be smaller and of different sizes. It is in line with the findings of DRIES and SWINNEN (2004, 2005) but inconsistent with the observations of the WORLD BANK (2001).

The terms of loans regarding interest rates, collateral, and frequency of repayment were rather advantageous for farmers. The system of loan repayment by delivery of products warrants special attention as a tool of reduction of the cost (transaction costs) of reimbursement and risk of delays and default.

The credit activity produces transaction costs for both partners of the contract. Surprisingly, the many features of contracts indicated by researchers as very important for transaction costs, like the size of partners, value of contract, the duration and quality of contacts did not statistically have a significant influence on the emergence of the set of transaction costs. Only the period of contract was important.

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WHO, WHY AND HOW: PROBLEMS OF FARMERS' INTEREST REPRESENTATION IN POLAND

ALDONA ZAWOJSKA[*]

ABSTRACT

This paper examines the political access, public status, attitudes and actions of farmers in Poland. It also explores how the interests of Polish farmers are represented by two agrarian parties (the Polish Peasant Party and the Self-Defense Party), main farmers' unions and other organizations. A review of the theoretical and applied literature suggests that the source of farmers' power has been their ability to organize interest groups or collective actions. In Poland, however, the large rural electorate that is likely to shape a policy biased in favor of farmers, seems to be highly significant.

Keywords: *Interests, representation, farmers, political parties, Poland.*

1 INTRODUCTION

According to new political economy, policies result from the interaction of individuals (voters, politicians, bureaucrats, lobbyists) in an institutional context of decisions. Governance, as the process of making decisions and their implementation, contains the many mechanisms and institutions through which people and groups articulate their interests, mediate their differences and exercise their legal rights and obligations. Good governance includes the state, private sector and civil society. Communication between them is the foundation of good governance.

Farmers should be the main interest group that participates in all dialogue concerning agricultural policy that cannot be recognized simply as a question of consensus. This policy is still an arena of competing interests.

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As Lang points out, "*We need to recognize that the central driving force in the food economy is the desire to make money out of food. As humans, we may think of food as an issue of need; economically it is a commodity for greed. Those of us who observe and research this process need to build into our analyses the complexity of competing sectoral interests*" (LANG, 2000).

At the national level, domestic groups pursue their interests by pressurizing the government to adopt favorable policies, and politicians seek power by constructing coalitions among those groups. At the international level, national governments seek to maximize their own ability to satisfy domestic pressures, while minimizing the adverse consequences of foreign developments. Neither of the two games can be ignored by central decision-makers (PUTNAM, 1988, p. 424).

Broadly, this paper will focus on the heterogeneity of farmers' interests in Poland; political access and the public status of farmers in Poland; attitudes and actions of farmers (collective action problem, signaling), and the representation of agricultural interests at the national and European level.

2 DATA SOURCES AND METHODS

The main data sources include: A literature review; information regarding the Sejm's activities; deputies' declarations of financial interests and curriculum vitae; data collected by the institutions for public opinion (OBOP, CBOS); farmers' organizations, and government agencies. Statistical data is derived from the Central Statistical Office of Poland (GUS).

The paper consists of an overview of the political programs of the main "farmers'" parties in Poland regarding agricultural questions. There is also a survey of the parliamentary activities of deputies, and voter-deputy communication for two parliamentary clubs during the former (4^{th}) and current (5^{th}) Sejm cadences.

The analysis is conducted using the conceptual framework of public choice theory, including the economic theory of collective action, and new institutional economics.

3 HETEROGENEITY OF POLISH FARMERS AND THEIR INTERESTS

Polish farmers represent a crucial part of the economy and of the international credibility of the country. Unlike in many EU states, the Polish rural sector is of major importance to the social and economic equilibrium of a country that is home to 38.2 million people, of which 14.7 million (38.4 %) live in rural areas.

The main factor influencing the social standing of rural people is their economic position. The economic status of farmers in Poland depends, amongst other things, on their contribution to GDP and the overall workforce. During the last

15 years of transition in the Polish economy, the percentage contribution of GVA from agriculture, hunting, forestry and fishing has been on a steady decline from 12.9 % in 1989; 8.3 % in 1990; 7.1 % in 1995, down to 3.76 % in 2003, with a recovery back to 4.14 % in 2004.

The significance of agriculture in Poland is much greater compared to the EU as a whole, mainly due to the proportion of the population working in agriculture and the number of farm holdings. It is estimated that farm workers in Poland comprise 18.0 % of the total workforce, but the population linked to agriculture is much larger, reaching almost 10.5 million. This means that up to 28 % of Poland's inhabitants live on farm land.

The employment structure of rural society remains dominated by people running family farms. As is well known, farm policies in industrial countries are strongly biased against small farmers, and in favor of large ones. Most of the 1.95 million Polish private holdings are small, family-style subsistence or semi-subsistence farms that rely on their own family labor (ZAWOJSKA, 2004).

The aging of the population of farmers in Poland seems to have ceased. In 2002, almost 61 % of operators of individual farms (above 1 ha UAA) were less than 50 years old. By comparison, more than ⅓ of larger farm (over 10 ha UAA) operators were 40 years old or less, and ¾ were below 50 years of age.

The position of landowners or tenant farmers is determined by the size of the property. Some studies suggest (DUDEK, 2006) that the larger the farm area, the lower the likelihood of experiencing poverty.

Historical figures relating to farms classified by size of area per holding indicate that small-scale farmers are not being driven off the land. In 2003, there were around 58.8 % of individual farm holdings with 1-5 ha, whereas only 9.9 % controlled more than 15 ha (in 1990 52.8 % and 6 % respectively). The latter, however, represented 44 %, whereas the smallest only 19.5 % of total UAA (GUS, 2003).

The average Polish individual farm works 7.4 ha of agricultural land (compared to 19 ha in the EU) but farm size differs considerably between regions. South-eastern Poland stands out in particular, with an average farm size of less than 5 ha. This means that the majority of farm operators here look for other jobs, treating farms as an additional source of income.

The fragmentation, polarization and regional differentiation of Polish farms all indicate the complexity and heterogeneity of the interests involved. This is a crucial point in terms of coalition-building involving farmers. The heterogeneity allows the monolithic view of agriculture, which largely prevails in public opinion, to be contested.

On the other hand, because of similarities in culture and customs among the rural population, the setting up of (interest) groups is an appropriate way for farmers to learn not only about aspects such as management and market issues, but also about agricultural policies that create significant benefits for certain groups of individuals, who can therefore organize politically to maximize these benefits.

In this case, the motivation to act and mobilize forces might stem from groups that share the same identity rather than the same interests. A group's identity is what produces a social reward for its members, for example, becoming recognized as part of a privileged group that is capable of making change (GRAFF and MASON, 2005).

4 POLITICAL ACCESS AND THE PUBLIC STATUS OF FARMERS IN POLAND

As Bordonaro writes "The country's economy is still centered on agriculture. Like many other historical cases, the transition from a strongly rural economy to a more 'modern' one is full of social tensions" (BORDONARO, 2005).

At the beginning of the market economy, political, administrative and economic organizations and institutions were perceived as being hostile to farmers, demonstrated by the survey "Farmers 1992" conducted on random sample of farmers (ROSNER, 1992). At the same time, the farmers declared a lack of influence on the development of the agricultural sector and rural areas.

Another survey conducted by Podedworna in 1995 amongst modern farmers indicates that the political activity of the respondents was insignificant. They were not interested in politics, particularly not at a higher level. A low level of political activity goes together with a belief that farmers have little influence on agricultural policy (PODEDWORNA, 1998, p. 15).

Existing institutions have been losing the trust of the public. Why? To some extent this is because they have lost sight of the public interest.

What do I mean here by institutions? North first explores their nature proposing the following definition: "Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction." He emphasizes the key implications of institutions: "In consequence they structure incentives in human exchange, whether political, social, or economic" (NORTH, 1990, p. 3). North underlines the intangibility of institutions: Rules and regulations are given as examples of formal institutions while conventions and codes of behavior are informal institutions.

Economic institutions, such as the structure of property rights, the presence and perfection of markets, for example, determine the motivations of, and the constraints on, economic actors, and affect economic outcomes. Various groups and individuals usually benefit from different economic institutions, so there is generally a conflict, finally resolved in favor of groups with greater political power. The allocation of political power is, in turn, affected by political institutions and the distribution of resources. Political institutions allocate de jure political power, while groups with greater economic power might possess greater political power (ACEMOGLU et al., 2005).

In Poland, the participation of farmers in decision-making was a new concept to most academics, and especially officials who were used to top-down thinking and decision-making. Moreover, it was a new notion for farmers themselves.

According to research into public opinion, since 1998 the level of Poles' activity in civic organizations has been rather stable. However, it was observed that there was a better perception of the usefulness of local collaboration, mainly amongst farmers. In 2006, 75 % of them expressed such a view, the highest proportion since 2002 (41 % in 2002; 55 % in 2004). The optimistic signal is that almost 35 % of farmers declared they were performing voluntary work in civic organizations, and their involvement with those organizations increased significantly (CBOS, 2006).

My hypothesis is that, most recently, farmers have recognized that the allocation of benefits is consistent with social construction and political power. My own study suggests that they are tending to increase their access to the political process. One piece of evidence for this is that, during the 2001 parliamentary elections, as many as 61 farmers were elected to the Sejm (13.3 % of seats), but this dropped to 35 (7.6 %) in 2005.

Additionally, voting for specific parties can be treated as an indicator of the political orientation of farmers. Farmers figure prominently among populist parties.

The large number of people linked to agriculture suggests that the likely loss of rural votes resulting from decisions negatively affecting agricultural interests, influences politicians when making these sorts of decisions, especially at election time.

5 ATTITUDES OF AND ACTIONS BY FARMERS

Under the command economy, Polish farmers were treated rather well. They were never forced onto collective farms. And despite the small size of their plots of land, they had guaranteed state markets and also could sell privately. But times have changed. The old institutional framework – political, economic, and social – was damaged and the new institutions were still in the making.

At the beginning of transition in Poland, life was much less secure for farmers than it was under communism. Many families, particularly on smaller farms, saw their incomes collapse. A study by Wilkin found that the attitude of the average farmer was very disturbing. It was a mixture of pessimism, dissatisfaction, substantial passivity (psychologically supported by a reliance on state assistance) and a sense of helplessness. Farmers were critical of the role of the government regarding rural and agricultural issues (WILKIN, 1997).

They have a deeply rooted conviction that the government should have a very active role in agriculture and must act on their behalf. To understand this phenomenon, one cannot just analyze the new market conditions but also one has to take into account the nature of any collective actions by farmers and some constitutional facts.

Poland has a parliamentary constitution with proportional representation. This determines the character of the political parties and consequently is also relevant for the problems of farmers' representation.

The economic theory of collective action is concerned with the provision of public goods (and other collective consumption) through the collaboration of two or more individuals. "*A common, collective, or public good (benefit) is defined as any good, such that, if any person in a group consumes it, it cannot feasibly be withheld from the others in that group*" (OLSON, 1965, p. 14).

In other words, collective action means that people do work together towards common goals. Public policy, including agricultural policy can be recognized as a public good, and as such has an inherent free-rider problem. According to Olson, problems of collective political and economic action underlie every aspect of human activity and have profound political and economic consequences.

The possibility of farmers acting collectively to take charge of their own interests has received virtually no attention in almost 70 years of policy debates (LEVINS, 2001, p. 2). Nowadays, it is believed that working together is beneficial for farmers both individually and as a group. Collective action will help them to increase economic power in agribusiness as well as political power in the decision-making process. What is more, in Levins's words, farmers "acting alone is suicidal" in the 21st century.

Generally, the problems of collective action within a new institutional environment contributed to political instability, economic under-performance, and social inefficiencies in Poland. Early efforts to create and strengthen small farmer associations or production cooperatives generally failed, except in a few cases, because of lack of trust and misunderstanding of Western-style bottom-up cooperatives.

Research by BANASZAK (2005) carried out in 2003 and 2005 with leaders of producer groups in Wielkopolskie voivodship indicates that, for the associated farmers, the critical problem appears to be neither cooperation and contacts with public institutions nor finding purchasers for output, but collective action i.e. members' commitment, mutual understanding, building trust amongst members as well as avoiding a free-rider problem and behavior guided by self-interest.

According to Olson, the free rider becomes a major obstacle to the creation of important groups. When farmers face decisions in which cooperative action could benefit all as opposite to individual maximization, i.e., if there are dominant or locally dominant strategies for everybody that jointly produce an inefficient equilibrium, they may visualize the game as non-cooperative and act separately. This is the well-known Olsonian prediction that in various settings "*rational, self-interested* [players] *will not act to achieve their common or group interests*" (OLSON, 1965, p. 2).

On the other hand, Poland is a good example of collective action among farmers to protest the government's policies and to bring about more favorable policy outcomes including tax policy, social policy and, chiefly, agricultural policy.

To achieve socio-political goals, farmers have practiced non-violent resistance or non-violent action. They have shown muscle via frequent blockades of major roads, street demonstrations and manifestations, occupying the provincial and central administrative office buildings, and even via blockades of railways carrying imported grain. The biggest demonstrations of the transition period began in February 1999, and they mobilized thousands of small-scale producers who raised roadblocks at more than 100 locations around the country to protest the government's failure to improve agricultural sector.

Those more recent actions (in 1999, 2003 etc.) were made as a signal to the government, and widespread enough to warrant a place in the media showing that rural population still needs a voice.

The leaders of the two largest farmers' unions, Lepper of the radical Self-Defence union and Serafin of the more moderate National Union of Farmers' Organizations, have been making efforts to channel rural dissatisfaction. Some blockades have resulted in increasingly dramatic clashes between police and farmers.

How did government leaders respond to protest movements? Representatives of the authorities including Balcerowicz, spoke about "*the act of lawlessness and anarchy*". Balcerowicz thanked the policemen for "*defending the law and, in doing so, exposing their lives and health to danger*" (GOLIK, 1999).

By contrast, in 1999 an opinion poll revealed that almost all (96 %) Poles thought that farmers were justified in their protests, and more than half (52 %) of respondents supported the forms of protest practiced by farmers. Moreover, 81 % of them thought the road blockades organized by farmers was the only successful method of forcing the government to deal with rural problems (OBOB, 1999).

One of the crucial factors influencing the decision of potential protesters to take action is the probability of success. To assess this probability, individuals use information available to them, for example, the government's response to past protests. On the other hand, when the main motivation of politicians is to hold office, they will try to maximize their chances of being re-elected. Thus, it should be the case that they will take into account their competitors' policies when deciding their response to protest movements (BUENROSTRO et al., 2005, pp. 2, 30).

In Poland the conflicts were usually resolved when the government agreed to farmers claims. In 1999, after a few weeks of protests, the government and three farmers unions reached a preliminary agreement on government measures to address short-term problems in the agricultural sector. However, the Self-Defense Party rejected the agreement and called for farmers to continue blockading roads. The protests ended after the government signed an agreement with the farmers on minimum state prices for grain.

Agricultural interests can exploit agrarian myths, which include the confusion of modern commercial agriculture with rural heritage, to generate public support for programs which benefit farmers. As Brooks states, "*political pressure can then lead politicians to collude in propagating these myths. Once politicians are lured by the support of vested agricultural interests, they too have a stake in ensuring that the public is convinced of the agrarian worth of their policy actions*" (BROOKS, 2003, p. 3).

In a young market economy like Poland, however, farmers often focus on only what is in their own short-term personal interest, and the competitive process puts pressure on less efficient farmers, and increases their incentive to lobby for government support.

6 REPRESENTATION OF AGRICULTURAL INTERSETS AT THE NATIONAL AND EUROPEAN LEVEL

According to North, political bodies (political parties, the Senate, a regulatory agency), economic bodies (firms, trade unions, family farms, cooperatives), social bodies (churches, clubs, athletic associations), and educational bodies (schools, universities) are all organizations (NORTH, 1990, p. 5).

Poland has a broad range of interest groups that actively and freely take part in the political process. These include, among others, trade unions, NGOs, and civic associations. Labor groups are possibly the most influential, affecting the political process at the local, regional, and national levels. Several organizations have a direct impact on public policy, and many current and former government officials and policy makers have or have had affiliations with these organizations.

This section deals with the role played by selected organizations in the representation of agricultural interests.

6.1 Representation of agricultural interests in the political parties and in parliament

In Poland, farmers had been best able to protect their interests by using the legislative route rather than by means of non-violent collective actions. It is possible for a farming vote of 6.5 % (even twice as much if those with links to the agriculture are considered) of the national electorate to be decisive in parliament.

Free competition for votes resulted in a proliferation of parties. In public decision-making, fragmentation slows down the decision processes, makes political players more vulnerable to pressures from main economic players, increases political tensions through misrepresentation of large chunks of the electorate and often facilitates unexpected political consequences (KAMINSKI, 2003, p. 2).

The parliament (Sejm) has 460 members, elected for a four-year term by party-list proportional representation in multi-seat constituencies with a threshold at national level of 5 % for a single party and 8 % for coalitions. This requirement waived for national minorities.[1]

The 2005 parliamentary election used the d'Hondt-Jefferson divisor method of calculating seats, which is friendlier towards larger parties. In the 2001 election, seat allocation within party-list proportional representation was made using a modified Sainte-Laguë formula.

According to the current electoral ordinance, only political parties and groups of voters can submit candidates for parliament. This means that voters can only vote from these candidates. The previous right of social organizations, including trades unions, to field candidates, has been removed.

Parties can be regarded as unitary actors and power is concentrated at the tops of their hierarchies. When it comes to coping with actors outside the party, such as the electorate in campaigns, or lobbying organizations, it is usually the party as such, or the party leadership, that acts.

Very important is the relation between voters (the principals) and the main political actors (the agents), i.e. parties. Two types of such relation are of great interest: Delegation and instruction. Delegation requires no more than the confidence voters have in the persons elected. Feeling such confidence, they are satisfied to delegate the decision-making to the people elected. Instruction prevails when the voters do not limit themselves to selecting representatives they have confidence in, but also require that they shall execute a certain

[1] The scheme for local and regional elections is similar to the system for Sejm elections (proportional representation with d'Hondt formula), with somewhat different principles which govern elections in communes (gminas) up to 20,000 inhabitants. In this case (similar to Senate elections) the majoritarian system (simple majority) with multiple-member (1-5) districts is used.

program. At the same time as people are elected, a program that those elected are obliged to implement is actually adopted. The program can be considered as an instruction from the voters to the elected (MOBERG, 2000). The Polish system seems to be a mixture of delegation and instruction with a tendency towards instruction.

The 2005 election resulted in five parties in newly elected Sejm:

- Left wing: Democratic Left Alliance (*SLD*), social democrats;
- Populist left wing: Self-Defense of the Republic of Poland (*Samoobrona RP*), agrarian party;
- Center: Polish Peasant Party (*PSL*), agrarian party;
- Eurorealist right wing: Liberal-conservative Civic Platform (*PO*) and conservative Law and Justice Party (*PiS*);
- Eurosceptic right wing: League of Polish Families (*LPR*), nationalist party.

Between themselves, the two agrarian parties control 80 of the 460 parliamentary seats, as Table 1 shows.

Both are commonly identified to be legitimate representatives of farmers and rural populations. But some studies (PODEDWORNA, 1998; CYBULSKA, 2005) suggest that they are not recognized as representative of farmers' interests. Cybulska points out that, in 2005, only 44 % of farmers identified themselves with the Polish Peasant Party (PPP), compared to 65 % in 1997. In 2005, half of the famers who responded identified with the more influential Self-Defense (CYBULSKA, 2005).

In the 2005 parliamentary elections, PPP captured 6.96 % of the votes and 5.4 % of seats. Self-Defense registered 11.41 % of votes and the third highest number of seats (12.2 %). In the 2001 elections, PPP received 8.98 % of votes and 9.13 % of seats, while Self-Defense obtained 10.2 % and 11.5 % respectively.

In the 2004 European Parliament election, PPP ran as part of the European People's Party and won 6.3 % votes, which gave it 4 of the 54 seats reserved for Poland. Self-Defense captured 10.78 % of votes and 6 seats.

The main political voice of rural interests has traditionally been the PPP, but with the emergence of Farmers' Self-Defense[2] in 1991 this is changing. It could signal the beginning of the superiority of Self-Defense as the main and legitimate political representative of rural interests. Anyhow, these two parties are competitors for rural votes, especially at the local level.

[2] Self-Defense was originally a peasant union affiliated with the PPP. It transformed itself into a political movement with Andrzej Lepper as leader and split from the mother party.

The party programs are best characterized by their attitude towards two main areas of agrarian policy: Guaranteed prices in agriculture, and credits, subsidies and tax relief (NALEWAJKO, 1994).

Members of the PPP attempt to sustain the position of small farmers, favoring subsidization and protectionism policies which support the inefficient economic sector in rural areas. The party argued for guaranteed minimum prices for basic agricultural products, preferential credits for infrastructure and expansion of farms as well as provision of welfare funds. PPP's campaign themes stressed the importance of rural development but also took on a strongly anti-liberal cast as the PPP sought to broaden its appeal beyond the narrow class base of its natural rural constituency.

What distinguishes populist, radical Self-Defense is its style of confrontational direct action and radical rhetoric in protection of the "poor and the disadvantaged". The party targeted "losers" of transition with a program offering simple solutions to complex problems. Its leader, Lepper, roughly criticized the government's agricultural policies and questioned its bargaining positions with the EU on a range of issues, including land ownership and farm subsidies. The party advocates state-funded agriculture.

A parliamentary system depends, for its functioning, on the existence of stable, centralized, and disciplined political parties. By contrast to Self-Defense, the PPP is a veteran of the Polish political scene. During the 4th cadence, the former lost 21 of 53 original members of its Parliamentary Club.

An important fact is that 69 % of Self-Defense deputies in the 5th cadence lacked parliamentary experience, as opposed to 98 % in the 4th cadence. The lack of familiarity with the workings of parliament is much greater among this party than the PPP.

From the data in Table 1 we find that PPP Club members are clearly better educated. An analysis of declarations of assets and financial interests shows that 69 % of PPP Club members and 53 % of Self-Defense possess agricultural holdings. In general, the farm is not the main source of income for them but rather, in many cases, the annual parliamentary salary which exceeds PLN 100,000 (EUR 26,000).

Table 1: Parliamentary clubs of Polish peasant party and self-defense

Characteristics	4th cadence as of June 2005		5th cadence as of April 2006	
	PPP	Self-Defense	PPP	Self-Defense
Number of deputies	39	32	25	55
As % of whole Chamber	8.5	7.0	5.4	12.0
Re-elected deputies by party (%)	–	–	64.0	30.9
Shares by education (%)				
Tertiary	79.5	25.0	96.0	49.1
Secondary	20.5	59.4	4.0	45.5
Lower vocational	0.0	15.6	0.0	5.5
Deputies possessing agricultural holding (%)	51.3	68.6	60.0	52.7
Number of statements per deputy	90.4	145.3	16.2	14.7
Number of interpellations per deputy	15.1	66.4	9.7	4.8
Number of written questions per deputy	6.5	15.8	1.6	1.6
Number of offices per deputy	3.1	1.9	2.5	1.9
Deputies having their own WWW page (%)	17.9	9.4	32.0	12.7
Deputies replying to e-mail (%)	15.4	21.9	n.a.	n.a.

Source: Own research.

Notes: N.a. = not available.

As a picture of deputies' activity in the Chamber's proceedings, one can take the number of the statements, interpellations and questions. Figures in Table 1 suggest that Self-Defense members during the previous cadence were more effective. It is possible in both clubs, however, to find deputies who have been involved in no activity mentioned above.

Finally, communication between deputies and voters as well as deputies' "public relations" are of rather low quality in terms of the number of local offices and individual web-sites.

6.2 Professional agricultural organizations

Various interest groups and professional associations within the agricultural sector have a long tradition and some of them had a fairly broad membership even before 1989. Farmers in Poland are one of the most unionized professions. Their interests are represented, as a rule, by three main occupation-based organizations: The National Union of Farmers' Groups and Agricultural Organizations, the Independent Self-Governing Trade Union Solidarity of Individual Farmers, and the Agricultural Self-Defense Trade Union.

They are corporatist associations which are aimed at representing the general interests of the agricultural sector as a whole, in contrast to the Federation of Agricultural Employers, Tenants and Landowners Unions or economic-oriented producers' associations included in the Federation of Agricultural Producers Association, for example.

The largest is the National Union of Farmers' Groups and Agricultural Organizations (KZRKiOR), a self-governed association of cooperatives, farmers' unions and other farmers' organizations. It has the longest tradition, since it has evolved from the movement of farmers' groups from more than a century ago. It combines 25,000 rural housewives' groups, 22,500 farmers' groups and around 1,200 co-operatives.[3] The organization has about 1.1 million members, of which more than 800,000 are rural women. It is a member of the International Federation of Agricultural Producers and COPA-COGECA. KZRKiOR supports Polish farmers, amongst others, by providing information about EU programs and by lobbying the European Commission.

The Agricultural Self-Defense Trade Union, founded in 1992, is formally a separate structure from the political party, but in practice both these formations have the same infrastructure and members' base, whose number is hard to assess.

Of fundamental importance is the confidence of agricultural trades unions, especially amongst the rural population and farmers. A TNS Omnimas study carried out in 2004 shows that nearly 30 % of rural respondents and 40 % of farmers trust KZRKiOR. Similarly, 40 % of farmers but 33 % of rural respondents state that they trust the Self-Defense union (OBOB, 2004).

Polish agricultural interests via the umbrella association COPA are also represented by the two previously mentioned trade unions as well as by the Federation of Agricultural Producers' Union and the National Board of Agricultural Chambers.

Agricultural self-government is expected to play the special role in farmers' interest representations. The nationwide structure of The National Board of Agricultural Chambers comprises 16 regional chambers. Their activities are focused on increasing farmers' influence on the issues that directly affect agricultural production (lobbying for common solutions to ensure the independent assessment of purchased agricultural raw materials, e.g. milk throughout Poland etc.). Similar to trade unions, they participate in consultations and bilateral dialogue with the state administrative organs (Ministry of Agriculture, state agricultural agencies). Additionally, the chambers' representatives have participated in the tenders organized by the Agricultural Property Agency.

Some of the national organizations of Polish farmers are closely linked to political parties. Their extensive engagement in electoral activity and the voting power of their farm membership leads to representation in parliament.

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[3] The cooperatives used to provide services such as ploughing, transportation, construction of buildings and the repair of agricultural and horticultural machinery to individual farms.

The upward transfer of power to regional and national unions and federations ought to be limited to where such transfer is constructive. Otherwise, the local farmers lose hold of their own affairs, while national unions representing a wide variety of interests and large membership tend to be insensitive to individual concerns.

7 CONCLUSIONS

Agriculture in Poland continues to be a strong political force: It accounted for over two thirds of the private sector economy in 1989, and it is still a large part of the private sector today. In 2002 as many as 99.9 % of farms larger than 1 ha were run by private owners. In sharp contrast to the situation in the EU as a whole, Polish agriculture is still a relatively large domestic sector in terms of jobs and value added.

Major sources of heterogeneity of Polish farmers are demographic differences and distinctions between small and large farmers.

Polish farmers recognized that they would have little influence on government until they were able to organize themselves into groups. Nowadays, they are highly organized to defend their economic and political interests, sometimes by non-violent collective actions. Farmers, their organizations, and agrarian parties have successfully extracted preferential treatment from government. Farmers benefit from all the general concessions available, such as exemption from income tax and special retirement arrangements for example. They have been fighting hard to enter the EU on their own terms including lobbying for more rights and subsidies for farmers.

Nevertheless, farmers want short-term solutions, no matter whether those solutions are compatible with their own long-term interests or long-term economic goals. Those very government policies designed to preserve and protect agriculture have contributed to encouraging small-scale, inefficient farmers to remain in operation.

Farmers in Poland have been successful, since the political evidence is that the support of the rural electorate opens the way to government at national and local level. Similarly, governments are unwilling to risk losing the electorate's support by making decisions that hurt farmers. One factor has been particularly important in determining farmers' voting power: The size of the farm-related vote, which in Poland is relatively large.

The agrarian parties (PPP and Self-Defense) have focused much of their political energies on directing outputs for the selective benefit of those who have provided them with electoral support. The proportional electoral law, however, is to blame for splitting the political parties from society. Great challenges may rest at the community level, such as how to identify or help create organizational bodies which represent the full range of farmer interests.

Five Polish farm organizations are members of the European agricultural umbrella association COPA. They are expected to speak for the interest of national farmers, although these bodies are not directly represented in Poland's various social dialogue institutions. As yet, it is difficult to assess how influential they are at the European level.

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FARM COMPETITIVENESS IN CHANGING MARKET AND POLICY ENVIRONMENT

Agriculture in the Face of Changing Markets, Institutions and Policies: Challenges and Strategies
JARMILA CURTISS, ALFONS BALMANN, KIRSTI DAUTZENBERG, KATHRIN HAPPE (eds., 2006)
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HOW COMPETITIVE IS MILK PRODUCTION IN THE CENTRAL AND EASTERN EUROPEAN COUNTRIES IN COMPARISON TO WESTERN EUROPE?

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ABSTRACT

This paper discusses the competitiveness of milk production in the Central and Eastern European countries (CEEC). The analysis compares the production costs at farm level in Eastern and Western European countries were. The analysis was carried out using the methodology of the International Farm Comparison Network (IFCN). A typical farm database of the IFCN was used as the data source.

Keywords: *Milk production, costs, competitiveness, CEEC.*

1 INTRODUCTION

The competitiveness of agriculture in the CEEC has been discussed for several years. The fear exists that, owing to lower wages and prices for domestic resources, agriculture – and in particular milk production – in the CEEC is more competitive than that of Western Europe (SIEMER, 1998).

At the same time, a majority of countries in Central and Eastern Europe show negative trends in the dairy sector, reflected by a decrease in milk production since the beginning of the transition period. Between 1992 and 2004, cow's milk production in the CEEC fell from 107.7 to 83.5 million tonnes. The CEEC' share of global milk production also decreased from 23 % to 16 % (ZMP, 2005).

Lower costs for resources and a simultaneous decrease in milk production does not give an unequivocal answer to the question of the competitiveness of the dairy sector in the CEEC. In spite of several studies carried out on agriculture in

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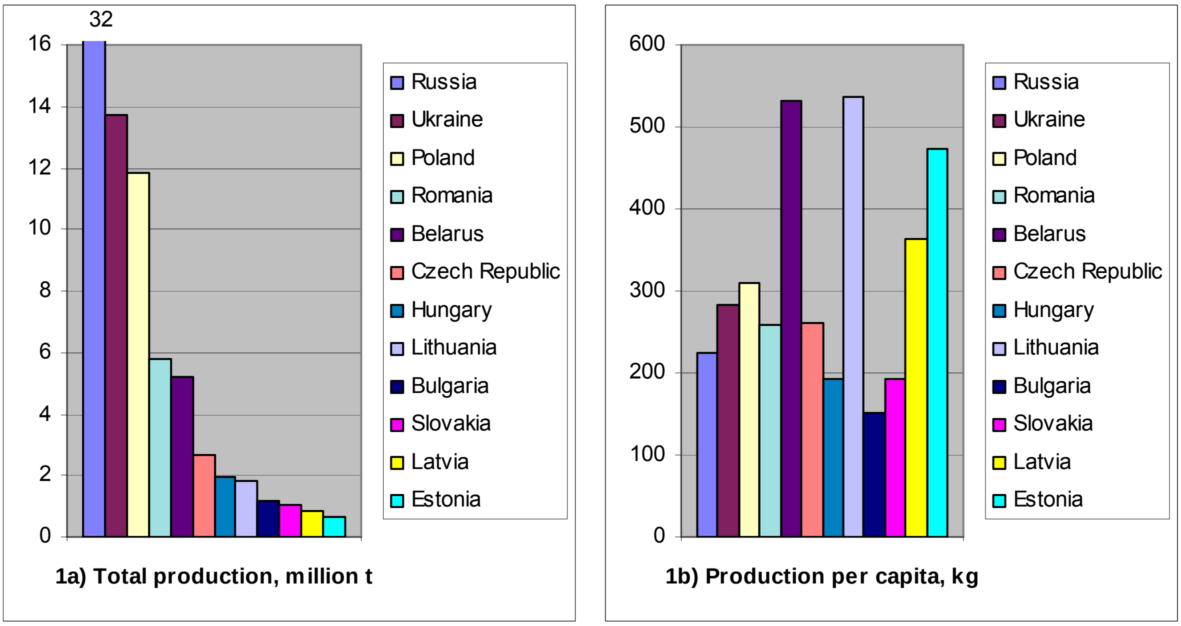
the CEEC,[1] precise conclusions and recommendations regarding competitiveness are still unresolved. The goal of this paper is to compare farms and their production costs so as to estimate competitiveness.

2 MILK PRODUCTION IN CEEC

With an annual total of 83,5 million tonnes (2004), the CEEC is one of the worlds biggest milk production regions. The biggest milk producers are: Russia, Ukraine, Poland, Romania and Belarus (Figure 1a). Together these countries produce more than 80 % of cow's milk in the CEEC.

Figure 1: Milk production in the CEEC, 2004



Source: ZMP, 2005

There are big differences between the CEEC in population and total area. Per capita milk production gives us more information about the intensity of milk production in the country (Figure 1b). The biggest per capita milk production is in Latvia (537 kg) and Belarus (531 kg), followed by Estonia (473). The biggest milk producer in the CEEC, Russia, has one of the lowest levels of per capita milk production (only 223 kg).

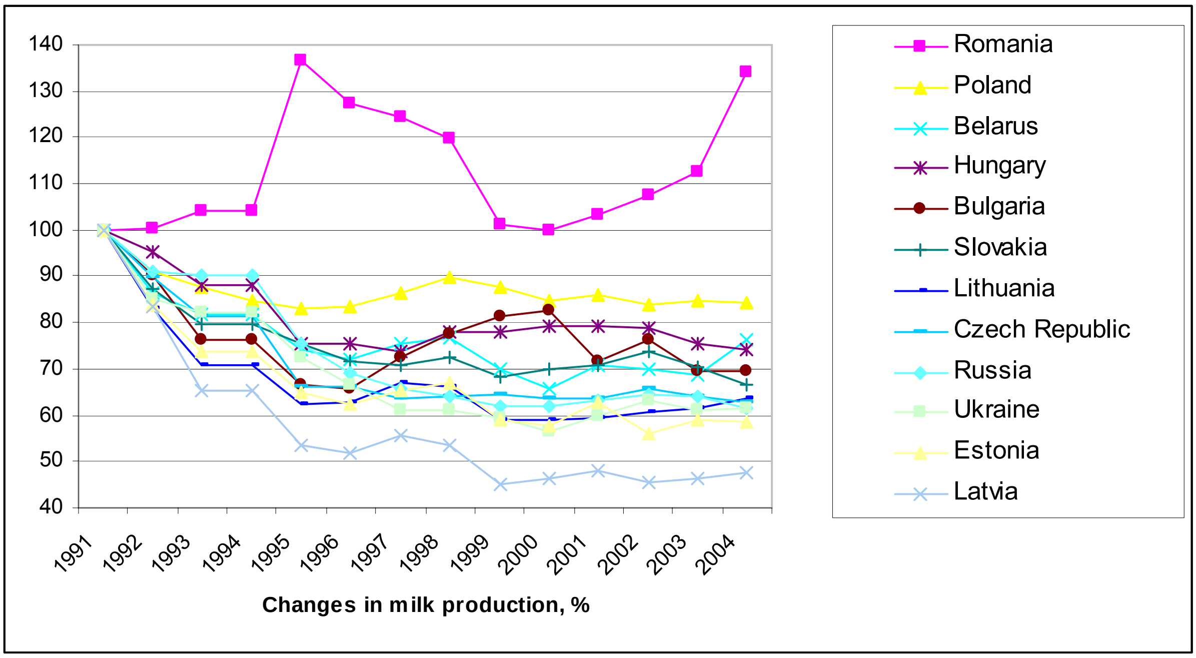
The current level of cow's milk production in the CEEC is 23 % lower than it was 12 years ago. Negative trends in the dairy sector have been observed since the beginning of 1990 in all CEE countries. Political and economic changes resulted in a reduction in state support for milk producers and consumers, rapid price growth for production equipment, a change in the land ownership and land restitution to former owners, and a change in the purchasing power of the

[1] See: SÄCHSISCHE LANDESANSTALT FÜR LANDWIRTSCHAFT (2004; 2005a, b): Network of Independent Agricultural Experts in the CEE Candidate Countries.

population. With political independence, economic contacts were also broken. At the same time, Western companies, with their cheaper and attractive products, got good market access. (PIRSCHER and TILLACK, 1999)

Milk producers in the CEEC reacted to the changes in conditions by reducing their milk production. The biggest and quickest decreases were observed in the first years of transition (Figure 2). During this period, the countries reduced their milk amount between 17-47 %. After a significant drop in milk production during the first years of transition, most countries stabilized their milk production. In some countries like Russia, Hungary and Bulgaria, levels of milk production are still decreasing. Today the countries, except Romania are producing 15 % to 45 % less milk than in 1990, with the biggest decrease in milk production observed in the Baltic States.

Figure 2: Development of milk production in the CEEC

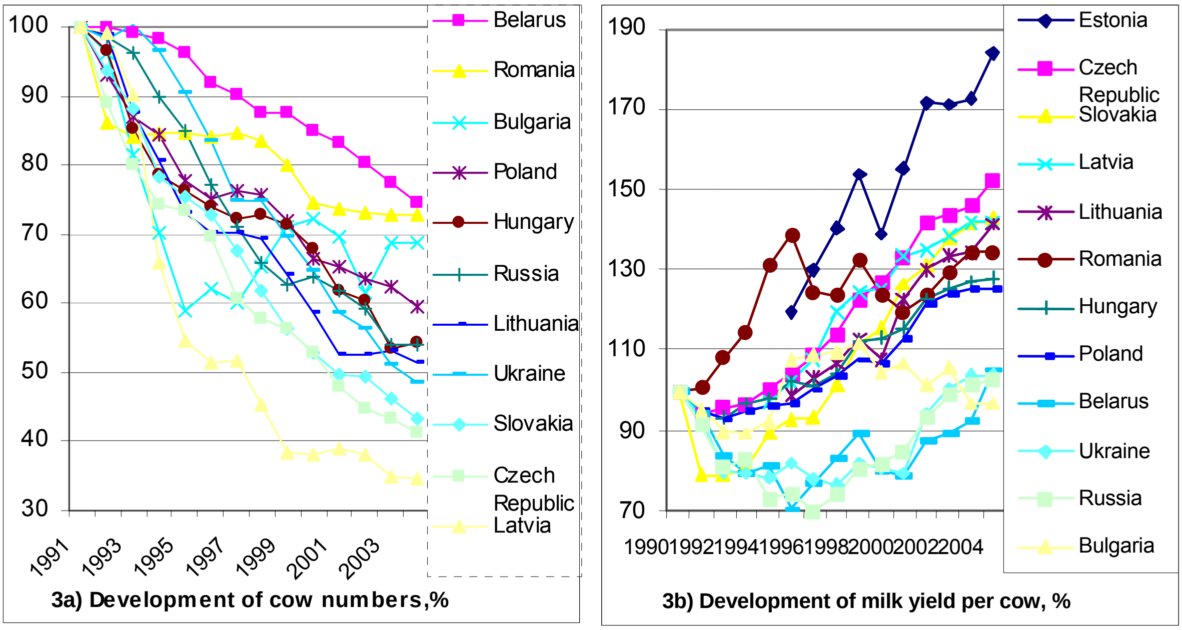


Source: ZMP, 2005.

The trends in milk production were derived from the trends in livestock numbers and milk yield. With respect to livestock numbers, all CEEC have similar trends. Since the beginning of the 90's, a continual reduction of the numbers of cows in all the CEEC was observed, as shown diagram 3a. Belarus, Romania, Bulgaria and Poland have experienced the smallest reduction in livestock. While Latvia, Estonia, Czech Republic, Ukraine and Slovakia now have less than half of the they former stock.

As regards to milk yield, countries show very different trends. After the reduction in the early 90s, milk yield in the new European Union countries showed a stable growth since the mid 90s compared to the 1990 level. Only in the former Soviet Republics was the milk yield, until recently, significantly below the 1990 level.

Figure 3: Development of the cow numbers and milk yield in the CEEC



Source: ZMP, 2005.

There are also great differences between the CEEC regarding type of milk production and herd size. Milk production on small family farms (households) is very common, for example, in Bulgaria and Poland. These are either very old, or were built up after the partition of big farms during the socialist era. However, a lot of countries retained big farms, which can produce milk at an industrial level (Belarus, Czech Republic) (HEMME et al., 2005).

The production type of milk significantly determines the proportion of milk delivered to the dairy. In most cases, small family farms produce milk only for home consumption and sell the rest at the local market. Dairies prefer big farms because of lower transportation costs and better milk quality. Owning direct access to milk plants, bigger farms normally receive higher prices than small farms (NETWORK OF INDEPENDENT AGRICULTURAL EXPERTS IN THE CEE CANDIDATE COUNTRIES, 2004). In the last few years, milk prices in Western Europe have shown negative trends, while in the CEEC prices have grown significantly, especially for high-quality milk. Milk prices in the CEEC are still below the level of West European countries (ZMP, 2005). In view of impending globalization and decreases in custom-tariffs, one can assume that milk production in Western Europe could shortly lose its advantage in the form of higher prices for milk.

In the last few years, milk production in the CEEC has reduced significantly. This reduction should not be understood, as a negative trend, but as an adaptation to new conditions. It would be wrong to conclude that the production decrease during transition is a result of disadvantages in competitiveness (SIEMER, 1998).

3 MEASURING COMPETITIVENESS BY COMPARING TYPICAL FARMS

Competitiveness cannot be shown directly from statistics or farm data. Neither is there a simple concept and definition of competitiveness. One of the definitions of competitiveness is: *An ability to operate in a local and foreign market and simultaneously receive a profit* (SCHÜLE, 1999).

To realize advantages in competitiveness, the enterprise can use one or both of these strategies: Cost leadership and product differentiation. For milk production as a homogenous product, the cost leadership strategy is more common (RAMANOVICH and LAJTOS, 2005). It means that the farms which produce milk at lower costs and have a higher profit are more competitive. The enterprises that have higher costs will cease production in the long term. On a global scale it leads to the shifting of milk production from less competitive regions to more competitive ones. Here competitiveness depends on production costs (technology and prices for inputs) and prices for milk and by-products.

Special analyses are necessary to estimate competitiveness. Official statistics do not provide such an indication and have a high level of aggregation. Besides, it is very difficult to find information on different cost components and on the use of resources and labor, expressed in internationally comparable units. This is very important as a comparison of various production systems must be done on an equal basis. Detailed data at the farm level is available in most cases. Different systems of data collection and bookkeeping makes however cross countries comparisons difficult. It can distort the results if the returns and expenses in the countries analyzed do not express the same components. If we want to compare various farm types and regions, an effective tool for comparison is necessary (ISERMEYER et al., 2003).

To solve this problem the International Farm Comparison Network (IFCN) was established. The IFCN is a worldwide association of agricultural scientists, advisors and farmers. The IFCN methodology of competitiveness analysis is based on cost comparison at the farm level (HEMME, 2000). The criteria for competitive milk production are lower costs and profitability. To have reliable information about production costs and prices the IFCN have built a set of typical farms for important dairy areas. Typical farms describe the most common type of milk production under the regional conditions (KIRNER, 2003). The network started in 2000 with 21 farms in 8 countries. It now already includes102 farms from 33 countries (HEMME et al., 2005).

The advantage of the IFCN database is that it provides very detailed information for every farm, which is organized in the same way for different regions and countries. It makes comparisons between all farms possible. Owing to a big amount of variables it is not only possible to say how big the production costs are, but also why they are at a particular level, and what the future perspectives of the farms are.

Creating a typical farm starts with determining the main characteristics (farm size, farm type, strategy) of a dairy farm in a region. It should be done in discussion with local experts who have good contacts with farmers and access to local farm statistics. On the basis of these criteria typical farms for the region are constructed. Normally, the first farm corresponds to a typical dairy farm with an average number of cows, while the second one is a bigger farm. For farm classification other criteria can also be used: Management quality, farm strategy and farm type. Typical farms are constructed on the basis of existing farms. To verify the data and eliminate untypical factors, the data is discussed with local dairy farmers and experts. After this, the farm is ready and can be analyzed (HEMME, 2000).

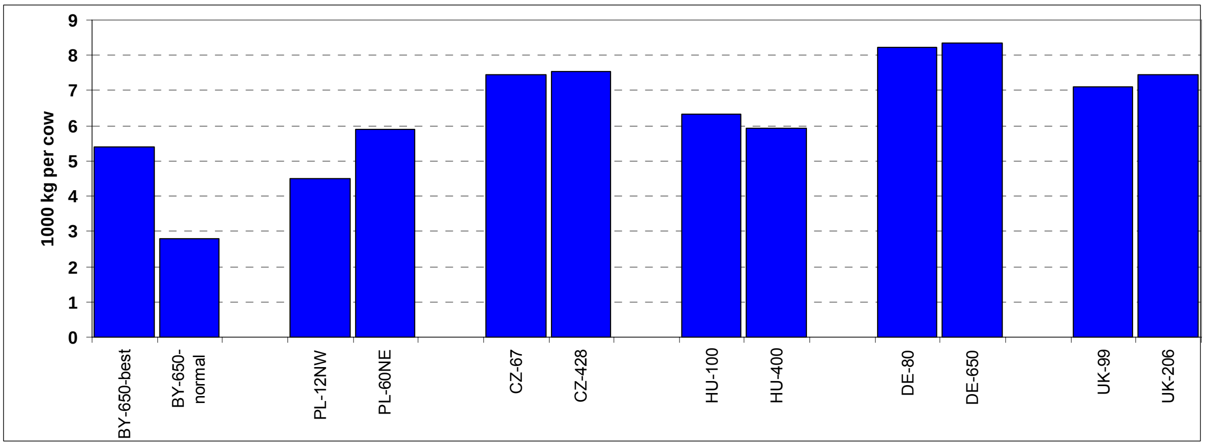
Typical farms are not statistically representative of the country and, in a large-scale analysis they can't compete with country-wide databases, if these exist. A peculiar feature of the IFCN farm database is a deep and detailed analysis of milk production and a knowledge creation for the regions, where statistical data is not available.

4 ANALYSIS DESCRIPTION AND RESULTS

For the analysis of competitiveness of the milk production in Eastern Europe, farms from Poland, Belarus, Czech Republic and Hungary were chosen. They were compared with farms from the main milk production areas in Western Europe: Germany and United Kingdom.

The farms are very different in terms of ownership, herd size and the intensity of milk production. The milk yield (Figure 4) shows the intensity of production, while the number contained in the farm name signifies the amount of cows on the farm.

Figure 4: Milk yield on typical farms



Source: HEMME et al., 2005; IFCN Dairy Report.

Note: The data refer to the year 2004.

The typical farms which were analyzed from Belarus are large-scale agricultural enterprises with 650 cows. They were converted from former Kolkhozes.

Large-scale farms in Belarus produce about 65 % of the total volume of milk and own about 74 % of cows. The farm types in Belarus were constructed using management quality as their basis. The first farm (BY-650-normal) has average management quality; the second one (BY-650 best) is managed in the best way. The management quality affects the milk yield on the farm. The best-managed farm has an annual milk yield of about 5,400 kg; the farm with average management only yields 2,900 kg.

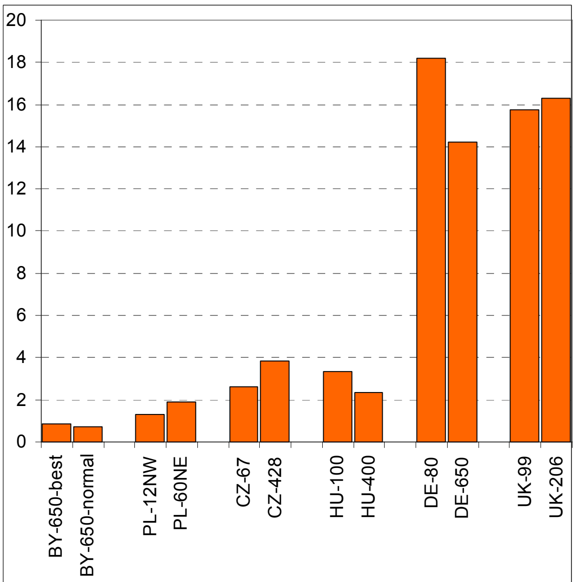
The farms in Poland are typical family farms in the Lubuskie (PL-12NW) and Podlasie (PL-60NE) regions. These medium-sized and large family farms in Poland own about 36 % of cows in the country, and their share is continuously growing. The bigger farms have more intensive milk production with annual yields of about 1,500 kg milk or more per cow.

The typical farms from the Czech Republic are large family farms (CZ-67) and cooperative farms (CZ-428). These farm types own more than 82 % of cows in the Czech Republic. With more than 7 t milk per year, the milk yield of Czech farms is at the Western European level.

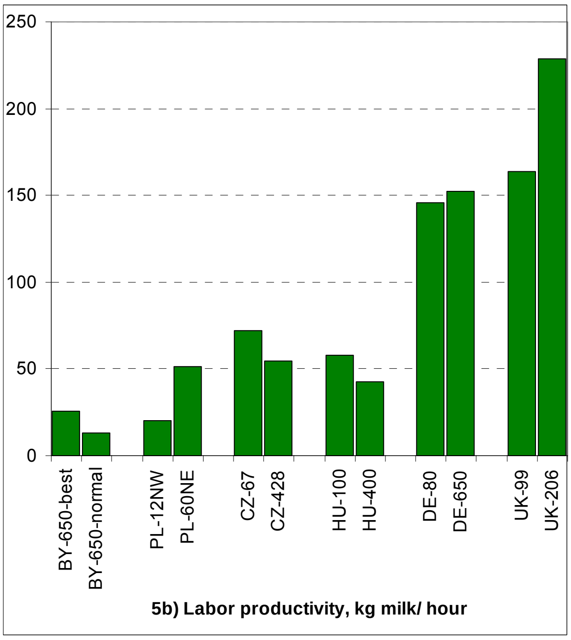
The hungarian farms used for comparison are a family farm (HU-100) and a cooperative (HU-400). Farms of this type own almost 80 % of cows and the percentage of cows in this group increases yearly. The milk yield on the farms is about 6 t per year.

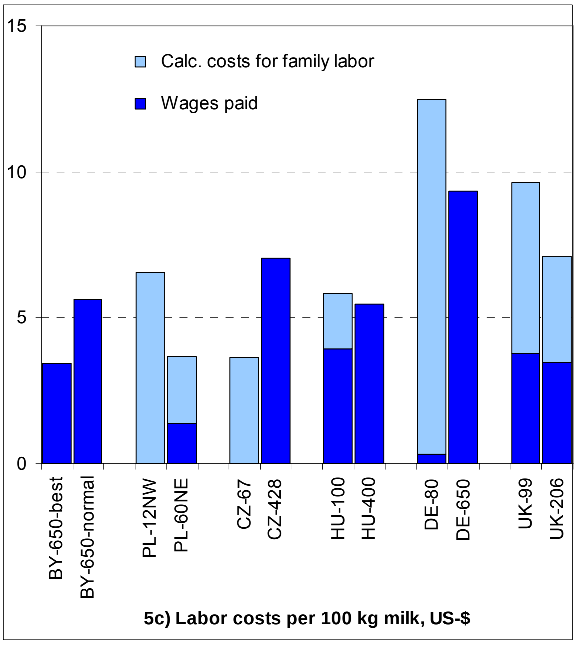
Farms from Germany and UK are family farms (DE-80, UK-99, UK-206) and a cooperative farms (DE-650). The German farms have the biggest milk yield; more than 8 t milk per year. Farms from the UK, meanwhile, produce about 1000 kg milk less.

Figure 5: Labor data – Wage, productivity and costs



5a) Average wages on the farm, US-$/hour





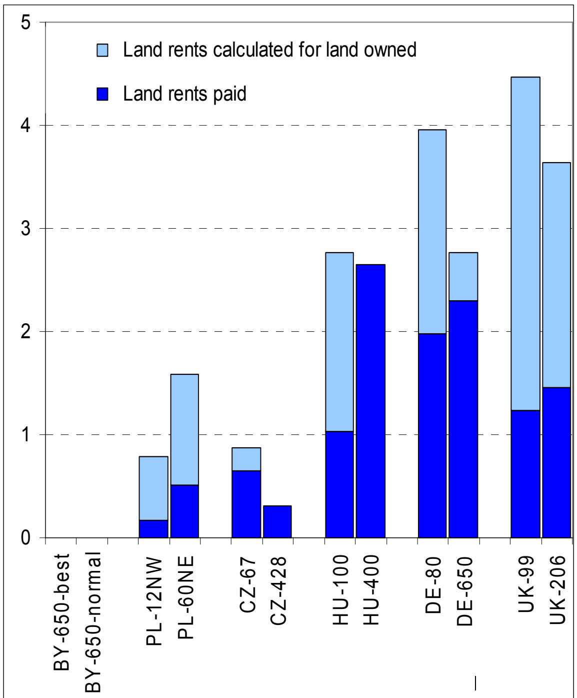
Source: HEMME et al., 2005; IFCN Dairy Report.

Note: The data refer to the year 2004.

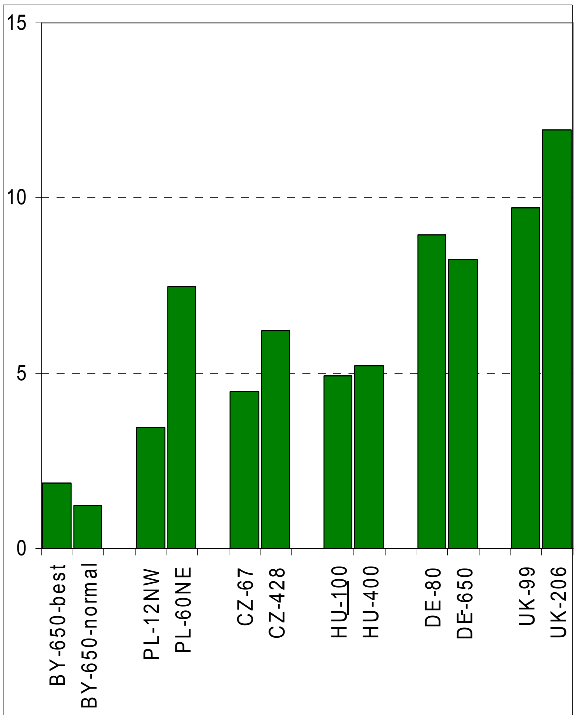
We asserted earlier (page 1) that, the availability of cheaper local resources makes the CEEC have advantages over Western European countries in milk production. Figure 5 illustrates the information about labor used on the farms. As can be seen, wages paid on farms in the CEEC are much lower than in Western Europe. They vary from only 1 US$ per hour in Belarus to 18 US$ per hour in Germany. But at the same time, labor productivity is also very different. A worker from the 206 cow farm group in the UK produces 10 times more milk per hour than a worker on a farm in Belarus. The result of this was that there are only small differences in the labor costs per 100 kg milk between Eastern

Europe and Western Europe. Compared to the *UK-206,* Eastern European farms have a cost advantage of only 0-4 US$ per 100 kg milk.

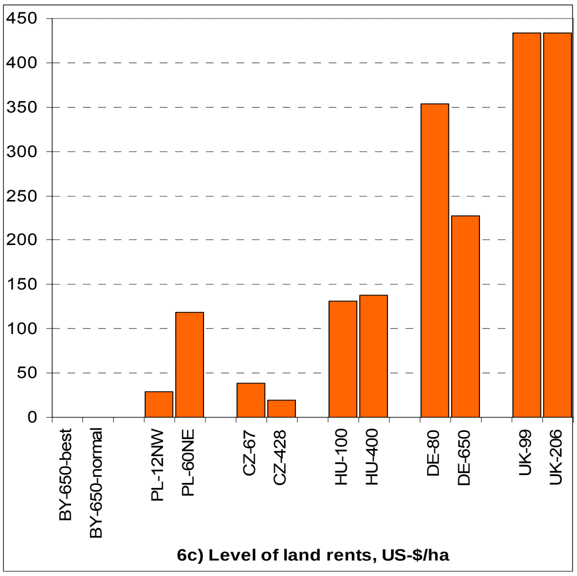
Figure 6: Land data – Rent, productivity and costs



6a) Land costs per 100 kg milk, US-$



6b) Land productivity, 1000 kg milk/ha



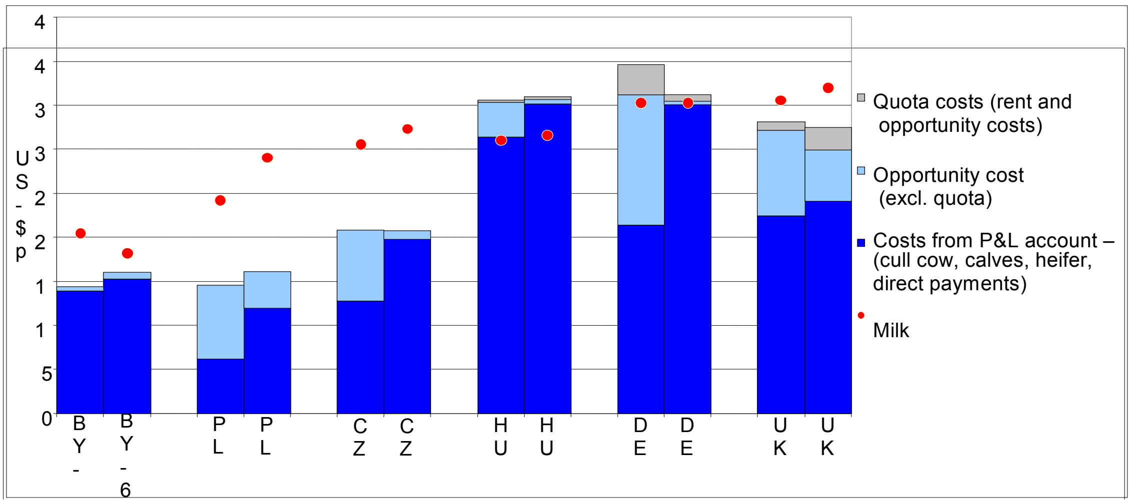
Source: HEMME et al., 2005; IFCN Dairy Report.

Note: The data refer to the year 2004.

The situation with land costs is similar, although some slight differences were noted. Like wages, land prices (land rent) in the CEEC are much lower than those in Western Europe. Compared to the United Kingdom, land prices in the CEEC are up to 20 times lower.[2] Differences in land productivity are not as marked as with labor. As a result, the *UK-206*, for example, produce milk with higher land costs of 1-4 US$ per 100 kg milk than Eastern European farms.

These results confirm the hypotheses that the CEEC have competitive advantages in milk production. Cheaper labor and land together reduce production costs by about 10 US$ per 100 kg milk. As regards competitiveness, not only costs for local resources are important, but overall production costs and also milk prices. Now we shall compare production costs and milk prices on the typical farms in Eastern and Western Europe.

Figure 7: Costs of milk production and milk prices



Source: HEMME et al., 2005; IFCN Dairy Report. Note: The data refer to year 2004.

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2 Belarus is a special case where no land markets exist.

The comparison of the production costs show that farms in Eastern Europe produce milk at lower costs than farms in Western Europe. The production costs per 100 kg milk vary from 14 US$ in Belarus to more than 35 US$ in Hungary. Variations in production costs were also observed within the countries. In the Czech Republic, for example, there were differences between farms of about 9 US$ per 100 kg milk. Costs of milk production in Western Europe are much higher. Farms in Germany have production costs between 36 and 39 US$ while farms in the United Kingdom produce milk with costs of about 33 US$. The cost advantage of the CEEC is about 15-20 US$ per 100 kg milk. One of the reasons for higher production costs in Western Europe is the high prices for milk quotas, which do not exist in most Eastern European countries. Per 100 kg milk, farmers in Western Europe had quota costs of 1-3 US$.

At the same time, milk prices in the CEEC are lower than those in Western European Countries. The lowest price received is by milk producers in Belarus: Only about 20 US$ per 100 kg milk, which is below the global market price. Milk prices in the Czech Republic and Hungary are comparable to those in Germany and the UK: 30-38 US$ per 100 kg milk. In the CEEC, milk prices depend on the milk quality and as such, the price for high-quality milk is much higher.

All farms in the CEE countries analyzed – excluding Hungary – register a business profit from milk production. The 100 cow farm group in Hungary can cover all their costs, but do not make any business profit. The 400 cow farm group in Hungary produces milk at a loss. The farms in the UK can produce milk with a business profit of 3-5 US$ per 100 kg milk. Farms in Germany operate at a profit (DE-80), or without loss in their accounts. However, the production costs with opportunity costs for their own inputs are lower than the receipts. Predicted farm losses can be recovered by making alternative use of their own resources.

5 CONCLUSIONS

The analysis has confirmed competitive advantages of milk production in the CEEC. A majority of farmers in these countries produce milk at a competitive price. Principal reasons for the lower production costs are cheaper local resources: Labor and land. Lower labor and land costs account for about 50 % of the whole cost advantage. But we must keep in mind that the CEEC can lose these advantages if prices for local resources increase. To preserve competitiveness, a more effective use of resources is necessary. A disadvantage in the CEEC is the lower milk prices, though farmers can get higher prices for producing high-quality milk.

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PRODUCTION AND TRADE OF ANIMAL PRODUCTS IN SELECTED ECO COUNTRIES

FARHAD MIRZAEI[*], *OLAF HEIDELBACH*[**]

ABSTRACT

The Economic Cooperation Organization (ECO) is an inter-governmental organization comprising Afghanistan, Azerbaijan, Iran, Pakistan, Turkey and several countries of the Commonwealth of Independent states (CIS) including Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The agricultural sector has remained a major contributor to the national economies of the ECO member countries. According to FAO estimates, in 2002 agriculture generated 25.2 percent of GDP and employed 42 percent of the economically-active population in the ECO region. Livestock production in the ECO countries is predominately based on traditional systems. The amount of livestock products in ECO was about 6,000,000 metric tons (Mt) during the study period. Most of this production belonged to Turkey, Iran and Pakistan, but most red meat, skins and honey is produced by CIS countries. This paper looks at the performance of livestock production and export of Iran and CIS countries within the ECO region and examines the comparative advantage indices for these countries. The data from 1992-2002 is supplied by the FAO (2004). Changes in Iran's production and export structure were compared with CIS producers. The objectives of this paper are: (1) to identify the comparative advantage of Iranian livestock production and export in comparison with CIS countries; (2) to discuss the reasons for changes in comparative advantage over time. The research results show that past trade and production policies, and the economic behavior of producers and exporters, have been such that they could manage neither appropriate and timely responses to world demand, nor proper adaptation to market niches.

Keywords *Comparative advantage indices, livestock production and export, Iran, CIS countries, ECO region.*

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1 INTRODUCTION

The Economic Cooperation Organization (ECO) is an inter-governmental organization comprising Afghanistan, Azerbaijan, the Islamic Republic of Iran, Turkey, Kazakhstan Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan and Uzbekistan. The ECO region covers a vast land area of 793.72 million hectares of arable land, including 116.93 million hectares of perennial crops, 248.62 million hectares of pastures and 44.08 million hectares of irrigated land. The population of the region (in 2004) was 391.13 million and was growing at 1.54 percent annually. An agricultural labor force of 62.2 million constitutes about 38.5 percent of the total labor force in the region. Pakistan alone, with 157 million people, has over 40 percent of the population of the region. Next comes Iran, with 17.8 percent, and then Turkey, which accounts for 18.5 percent of the population. The economically-active population employed in agriculture is high, at 45.1 percent in Pakistan and 43.3 percent in Turkey. Afghanistan has the highest percentage of the economically-active agricultural population with 65.6 percent. However, agricultural production in the region has almost stagnated during the past 15 years. The index of agricultural production (with a base of 1990-91=100) improved by only 9 percent in 2004. Up to the year 2000, the index of agriculture production remained below 100. Since the population increased faster, the index of per capita agricultural production improved by a meager 4 percent. The region is a net importer of food, valued at about US$ 6 billion (in 2000). Yet food imports make up only about 5 percent of the value of all goods and services exported by the countries of the region. Kazakhstan and Turkey are the countries with the lowest food imports. Regional exports need to be promoted to improve incomes and employment. Often it is erroneously assumed that better quality and low-priced imports adversely affect local production. Experience has shown that when two countries produce the same commodities are open to trade, quality and prices in both countries stimulate demand, and both of the trading partners gain through improving the quality and cost-effectiveness of their products. That promotes exports to destinations outside of these countries. The ECO region has considerable scope for enhancing its inter-country trade and thereby increasing the level of their foreign trade outside of the region. The agricultural sector is important to the economies of ECO countries, particularly in terms of its contribution to the GDP and provision of employment opportunities, though with considerable inter-country variations. In 2003, the share of agriculture of total GDP ranged from more than 47 percent in Afghanistan to below 8 percent in Kazakhstan; it ranged between 10-20 percent in Iran, Turkey and Azerbaijan, and between 20 and 35 percent in the remaining five ECO countries. In 2003, the agricultural labor force accounted for 42 percent of the total labor force in the region. In addition to food and feed materials, the sector is a supplier of high quality fiber, wool products, silk, honey, fruits and vegetables. The major farm products of the ECO member countries in 2001 were wheat, barley, rice, sugar cane, sugar beet, seed cotton, potatoes, tomatoes, meat, milk and milk products. The main issues and constraints faced in the process of reform in the agriculture and livestock sectors in ECO Countries can be identified as: a) lack of an adequate institutional framework for implementing the reform policies, b) extremely limited capacity for policy analysis to provide technical support in policy-related decision-making, c) macro-economic constraints, d) limited availability of information, especially on cost of production of crops and livestock for making farm-level decisions on production and marketing fronts, e) existing food security policies aimed at enhancing self-sufficiency at the expense of the long-term efficiency of resource use, and comparative advantage in the production of different commodities in these countries (LERMAN, 1999). The contribution of agriculture to the ECO countries' exports fluctuates but stays near 8 percent, while imports hover around 10 percent. Although intra-regional trade among ECO countries is still low, at about 4 percent of total exports, the share of agriculture in intra-regional trade is quite significant at about 21 percent. The market potential and constraints assessment showed that households marketed their livestock products as a rule to middleman/middle women and got rather low prices. Only meat and milk and milk products are marketable commodities for households.

The objectives of this paper are: (1) to identify the production and export comparative advantage of Iranian livestock products in comparison with CIS countries; (2) to discuss reasons for changes in comparative advantage over time.

We start by presenting the methodology applied and the data used for analysis. We proceed by describing results and then by drawing conclusions.

2 METHODOLOGY AND DATA

This paper looks at the performance of livestock production and export of selected ECO member countries and examines comparative advantage indices such as Domestic Resource Cost (DRC) and Revealed Comparative Advantage (RCA). Within the framework of DRC methodology, all materials and technical resources are divided into marketable (sellable) and non-marketable (unsellable). Marketable resources include all types of material and technical resources available on the market, including inputs as fertilizers, seeds, fuel and lubricants and chemicals. Non-marketable resources include expenses for supplying water, rental fees for land, labor costs and the lease of equipment. The Domestic Resource Cost formula as discussed in MONKE and PEARSON (1994) is in the following: "DRC=G/(E-F), i.e., non-marketable resources/world prices – marketable", If DRC > 1, it is more cost-effective to import a product, and if DRC < 1, a country has comparative advantages in its production. Another applied index is the RCA, which is grounded in traditional international trade theory and based on export specialization. The original RCA index was formulated by BALASSA (1965) as *RCA = (Xij/Xtj)/(Xin/Xtn)* where *X* represents exports, *i* is a country, *j* is a commodity and *n* is a set of countries (in this case, the ECO members). RCA is based on export performance and observed trade patterns, and measures a country's exports of a commodity relative to its total exports and to the corresponding export performance of a set of countries, e.g. if RCA > 1, then a comparative advantage is revealed. Indices for Iran and CIS countries are estimated for the period 1992-2003, with the data supplied by the FAO (2004).

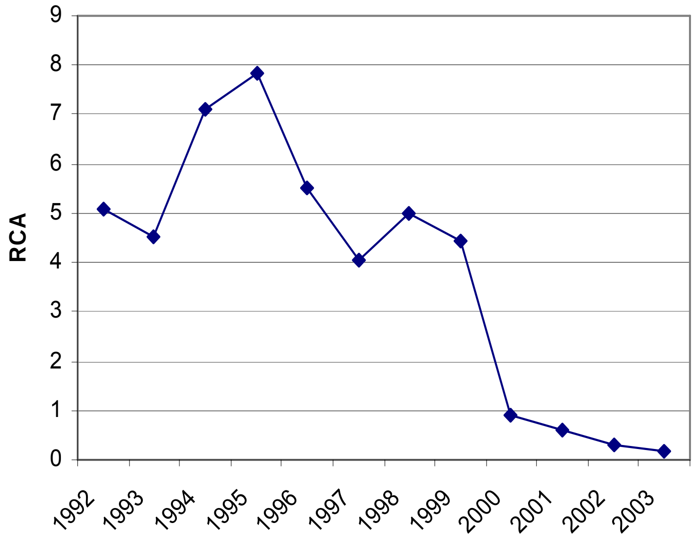
3 RESULTS

The animal population in the ECO region grew at an annual rate of 6.7 percent from 1994-2003. This increase was 3.75 percent in Iran, 4.2 percent in Pakistan, 6 percent in Turkmenistan and 2.9 percent in Uzbekistan. In fact, the other member states experienced a decline in their livestock populations. The contribution of CIS countries to the total value of agricultural products is 14.1 percent; the share for Iran, Pakistan and Turkey is 33.6 percent, 34.4 percent, and 17.9 percent, respectively. The Iranian export rate is 10.4 percent, Kazakhstan's is 25.4 percent, Turkey's is 43.7 percent, Pakistan's is 16.7 percent, and of the rest of the members' rate is 4.8 percent. The Iranian import rate is about 37.7 percent, Turkey's is 22.1 percent, Tajikistan's is 19.4 percent, Uzbekistan's is 10 percent, and the share of the remaining countries is 10.8 percent. The data implies that Iran and Turkey are, respectively, the largest importer and the largest exporter in the region. The calculation of livestock products is carried out for five major products, namely milk, mutton, beef, poultry meat and eggs. Data on the cost of production for livestock products was collected by the Department of Livestock Affairs of the Ministry of Agriculture, while the data on trade was extracted from the Yearbook of the Islamic Republic of Iran. The calculations were carried out in collaboration with the FAO and the Institute of Agricultural Planning and Economic Research.

Due to the absence of non-marketable information for CIS countries, we couldn't estimate their DRC index. However, agricultural production plays a major role in their economies and it might be reasonable to assume that the DRC index will be below one. It is clear that if a country can export its commodity, then it will have a comparative advantage in its exportable commodity production. The results of DRC analysis for Iran show that its value for dairy products is below 1 (DRC < 1). This means that there is a comparative advantage in the country for milk production. Low DRC values depend on its components, namely the cost of domestic factors of production, revenue earned from production and tradable cost and input at shadow prices. A low DRC for milk indicates a low ratio of the shadow price of domestic factors to the shadow price of tradable factors. In addition, the value of DRC for red meat indicates that there is comparative advantage for red meat production. Also, the value of DRC indicates a comparative advantage for egg production in the country and reveals that there are comparative advantages in the country for egg production. The DRC calculation results show that there is a comparative advantage for poultry production (DRC < 1).

The RCA trend for livestock products of selected countries during the study period shows that there is no harmonized trade policy in these countries with respect to regional and global markets (Table 1). A comparative advantage for Kazakhstan in livestock production (Figure 1) is revealed (RCA > 1) in 1992, but RCA in 1993 declined.

Figure 1: RCA trend for Kazakhstan



However, this country has protected its revealed comparative advantage (RCA = 4.54). Although this index was relatively stable from 1996-1999, it experienced a significant reduction after 1999. From 2000 on, Kazakhstan lost its powerful revealed comparative advantage in the region. This subject indicates the inflexibility of trade policy-makers who are trying to protect their trade advantage in the regional niche market.

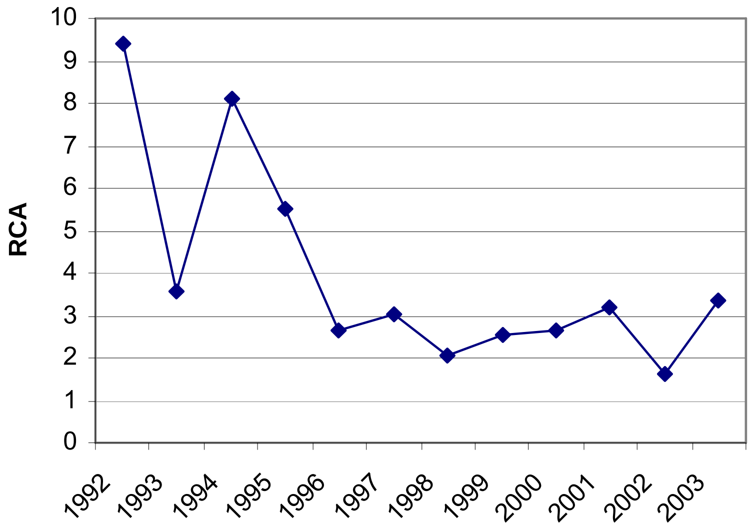
Table 1: RCA values for selected countries

Year/Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Iran	0.84	0.27	1.72	0.28	0.29	0.82	0.8	0.92	2.8	2	1.65	1.56
Kazakhstan	5.06	4.54	7.12	7.84	5.53	4.06	5	4.42	0.9	0.61	0.31	0.16
Kyrgyzstan	9.42	3.06	8.1	5.5	2.63	3.03	2.03	2.55	2.63	3.21	1.6	3.34
Uzbekistan	0	0.21	0.07	0.11	0.26	0.21	0.28	0.38	0.31	0.26	0.08	0.19
Turkmenistan	0.01	1.32	0.59	1.75	1.82	2	0.8	1.21	0.87	0.63	1.23	0.51
Tajikistan	0.02	0.74	0.1	0.23	0.23	0.18	0.31	0.1	0.21	0.11	0.02	0.1

Source: Own calculations based on FAOSTAT, 2004.

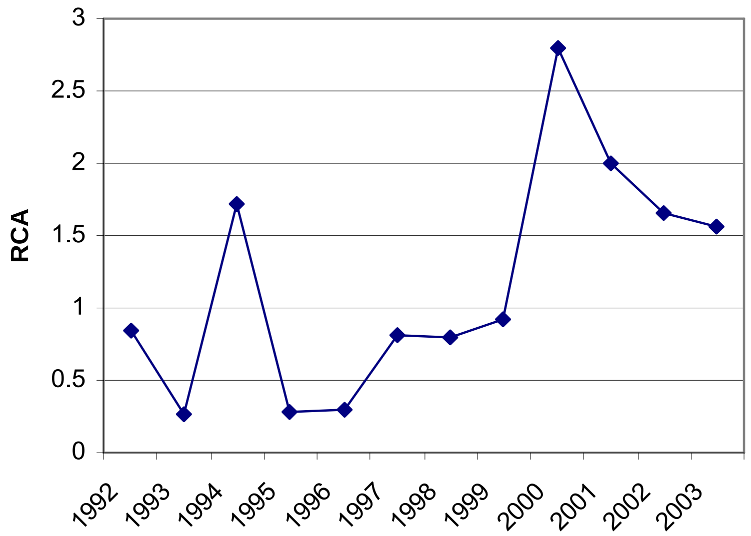
Despite Kyrgyzstan's revealed comparative advantage (RCA > 1) during the study period, fluctuation is also visible for this country (see Figure 2). After some vacillation, RCA declined by 2.8 times over the study period (from 9.42 in 1992 to 3.34 in 2003).

Figure 2: RCA trend for Kyrgyzstan



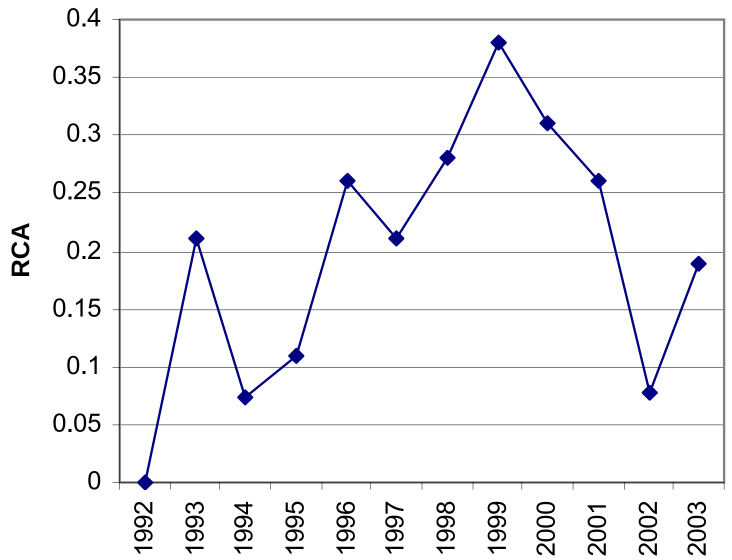
Fluctuation is even more characteristic for the rest of the selected countries. In Iran (Figure 3) after 2 years of comparative disadvantage, RCA increased in 1994 to a value above 1. However, Iran again lost its advantage during the following years (1995-1999). Although we can observe RCA values above 1 from 2000 on, the absolute value is decreasing steadily.

Figure 3: RCA trend for Iran



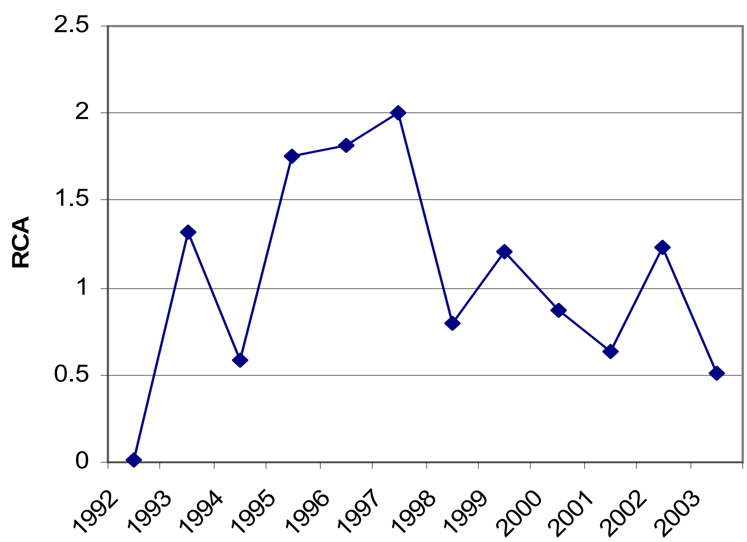
Uzbekistan (Figure 4) did not realize any livestock product export in 1992 (RCA_{1992} = 0). In the following years it didn't gain any revealed comparative advantage.

Figure 4: RCA trend for Uzbekistan



Turkmenistan (Figure 5) had an RCA value higher than 1 in 1993, 1995, 1996, 1997, 1999, and 2002 and an RCA value less than 1 in all other years. The regular fluctuation is caused by uncertain policies and trade imbalances.

Figure 5: RCA trend for Turkmenistan



Finally, Tajikistan (Figure 6) shows similar development to Uzbekistan – however, its RCA fluctuation is more intensive.

Figure 6: RCA trend for Tajikistan

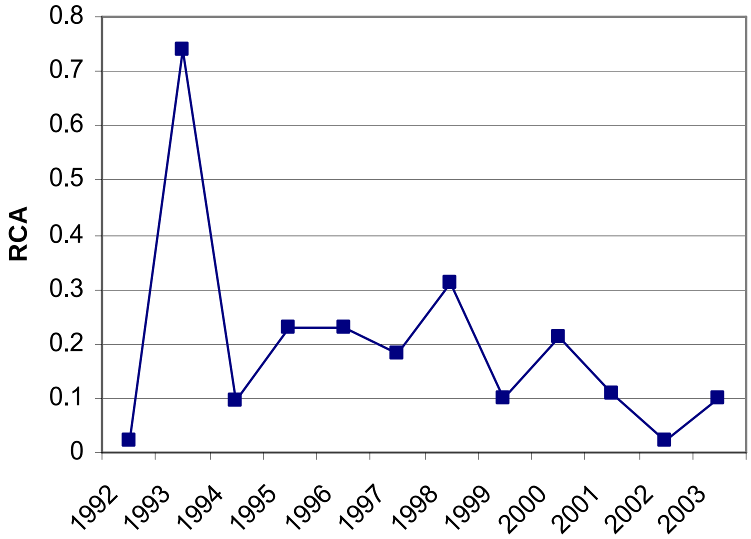
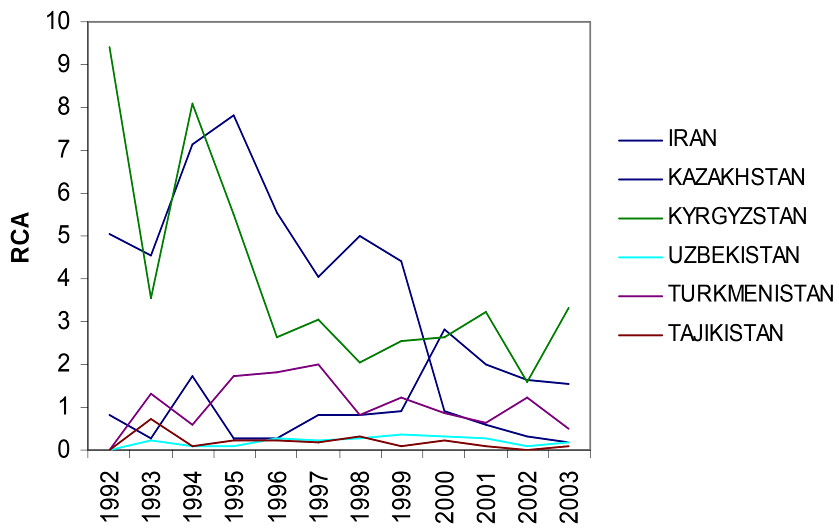


Figure 7 summarizes the RCA results for all countries, and shows a clear and deductive image of selected countries' RCA. What can be observed are instabilities in policy-making and untimely reactions to target market signals, as well as increasing regional and world demand. This might be explained by higher elasticities of demand for livestock products compared to most crop products, i.e., rising incomes have a more significant effect on demand.

Figure 7: RCA trends for analysed countries



4 DISCUSSION: PROSPECTS OF THE LIVESTOCK SECTOR IN SELECTED COUNTRIES

The ECO region can become a strong agricultural exporting block through regional co-operation in productivity enhancement, including pooling skills and experiences, cross training, more efficient use of international consultants, savings on joint export infrastructures and safety accredited testing laboratories. Enhancing institutional capacities in the region for developing market economies and harmonizing trade policies, particularly on pricing and food safety standards, will further help to develop the region’s competitiveness in international markets.

The CIS countries have a somewhat different status. This region is comprised of five countries that were part of the Soviet Union and are suffering from the effects of the inherited central planning and control system.

Geographically, Kazakhstan is the largest of the CIS group of countries, and its agricultural sector contributes 8 percent to GDP and employs 22 percent of its economically-active population. Wheat is the major agricultural commodity produced. Further products include cotton, meat, poultry and milk. With the disintegration of the USSR, demand for these products declined abruptly and is only now slightly picking up. Farmers are reducing their production and are trying to adjust supply to the market demand. This resulted in the slow adoption of modern technologies. This vicious circle of low demand, lower production (supply), non-use of modern technologies and inputs is negatively effecting incomes and employment in rural areas. This holds especially for small farmers, farm workers, women and other weaker sections of society. The livestock sector in Kazakhstan has tremendous potential to contribute substantially to income, growth, employment and export opportunities in rural areas. Its potentials are marked by the vast but underexploited rangelands, the flexible, low-cost production structure of the small-holder farms, and the availability of low-cost by-products from large-scale crop production (feed grain and oilseed meals).

The Kyrgyz Republic was one of the poorest states of the former Soviet Union and the country was the main provider of high-quality wool, cotton, silk, tobacco, fruits and vegetables, and mutton. Agriculture is the most important sector of the economy and accounts for about 45 percent of the gross domestic product. The livestock sector was one of the sectors that suffered most after the collapse of the Soviet Union. There is a great need for comprehensive sector development with emphasis on small farmers and food security.

In Tajikistan, agriculture is the main source of living for an estimated 72 percent of the total population in the country. The sector contributed about 26 percent to the GDP and 35 percent to tax revenues in 2002. It is the second income source for foreign currencies (mostly from exports of cotton) after the aluminium sector. Livestock production accounts for about 30 percent of total agricultural production. A large share of livestock production comes from private plots – 63 percent in 1994, compared to only 37 percent from state and collective farms. Since 1988, total livestock production has dropped by 35 percent. The sector faces a number of constraints: Deterioration of grazing land, insufficient supplies of medicine, fodder crops, minerals and vitamins; and weak animal husbandry management are some issues that limit growth.

In Turkmenistan, agriculture is the main source of livelihood for an estimated 55 percent of the total population. The sector contributed about 27 percent to annual GDP in the last five years and is the second most important income source for foreign currencies (mostly resulting from exports of cotton) after the energy sector.

In Uzbekistan, agriculture is a priority sector as it is still a major contributor to economic growth of the country. It provides about 30 percent to the GDP. More than half of the country's population (63 percent) live in rural areas, and are engaged in agriculture and related activities. Agriculture employs about 35 percent of the labor force of the country and is one of the main foreign exchange earners of the country.

5 CONCLUSIONS

Three percent of world's livestock products are produced in the ECO region, but 5.9 percent of the world's population lives in this region. In all of the investigated countries, the agricultural sector plays an important role in both income generation and employment provision. The livestock sector has a significant, but in recent years decreasing, share in agricultural production, partly caused by the lowered export potential for most of the investigated countries as shown by the results of the RCA analysis.

Low production and the resulting food insecurity may be overcome by enhancing the production of commodities with comparative advantage and promoting trade between ECO member countries by abandoning tariffs and quotas.

From a methodological point of view, the RCA analysis provided a framework for describing changes in comparative advantage over time. Further analysis is necessary to determine the reasons that lead to the changes and draw more specific policy conclusions.

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EUROPEAN AGRICULTURE WITHOUT DIRECT PAYMENTS – A PARTIAL EQUILIBRIUM ANALYSIS

OLIVER BALKHAUSEN, MARTIN BANSE***

ABSTRACT

The paper analyses the effects of a reduction of direct payments on land use and production in Germany, France, the Netherlands, and Poland. The analysis is based on the partial equilibrium model ESIM and results refer to the year 2013. According to the model results land use decreases among all countries and all agricultural sectors. In case of an abolishment of payments 8 % to 11 % of the total agricultural area falls idle. Beef and sheep production is slightly increasing in Germany, since direct payments in ruminant production are already abolished under the MTR reform so that profitability in production does not suffer from reduced payments. In France and the Netherlands, where payments for ruminants still exist, a reduction of direct payments is projected to result in strong production decreases. Effects on ruminant production in Poland are moderate. Apart from the decoupling option chosen under the MTR reform, results are driven by the own price elasticity of pasture and ruminants.

Keywords: *Direct payments, decoupling, elasticity, partial equilibrium model.*

1 INTRODUCTION

Since the beginning of the last decade direct payments belong to the Common Agricultural Policy (CAP) of the EU and as concluded under the Mid Term Review (MTR) reform they will be part of the CAP in the near future as well, though paid decoupled from production.

However, policy makers and scientists discuss the legal and economic foundation of maintaining these payments in the long-run. Many doubt that the

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current level of direct payments can be maintained beyond the next revision of the CAP for at least four reasons: Firstly, due to the critical financial situation in many member states and the immense part of the EU budget which is allocated to the agricultural sector subsidies to farmers have already been subject to criticism in the course of establishing a new financial perspective for the years 2007 to 2013. Further EU-accessions and the reform of the sugar market will lead to further increasing budgetary shortages. Secondly, by decoupling the major part of direct payments from production their trade distorting effect has been reduced significantly. However, several WTO members even claim a reduction of green box measures. It remains to be seen whether the new CAP payments will be under fire within the next negotiations again. Thirdly, direct payments have been introduced to compensate farmers for the reduction of institutional prices in the course of the MacSharry reform in 1992. It is questionable whether farmers still have to be compensated when these price cuts took place about 20 years ago. Fourthly, several EU members still claim higher support for second pillar measures and a re-allocation of money is expected to be on the agenda for negotiations on further CAP reforms again.

Against this background, this paper has the purpose to look at the effects of reducing direct payments on land use and production in individual member countries of the enlarged EU. It will be analysed whether these effects will be different from the effects of keeping the level of decoupled payments as concluded in the MTR reform. This is done by an extended version of the European Simulation Model (ESIM).

The focus in this paper is on agricultural markets in Germany, France, the Netherlands, and Poland. These member states have been selected as each of them represents a certain group of EU member states, which chose a rather similar way of implementing the decoupling regulations under the MTR reform, and it shall be identified to what extend the effects of reducing direct payments depend on the decoupling option chosen. Germany, for example, represents the group of countries, which have (almost) fully decoupled their payments. France belongs to those countries, which have coupled their payments to the (almost) highest degree possible. Like some other member states, the Netherlands keep the largest part of their beef payments coupled, while payments in other sectors are fully decoupled. Poland, finally, represents the group of the new member states (NMS) that opted for the Single Area Payment Scheme (SAPS).

The paper is organised as follows: The next chapter provides an overview of ESIM. In chapter 3 ESIM is applied to simulate the effects of reducing direct payments. What follows is a sensitivity analysis, which tries to identify those parameters, which are crucial with respect to the simulation results. Finally, results are discussed and conclusions are drawn.

2 THE EUROPEAN SIMULATION MODEL (ESIM)

ESIM is a recursive dynamic partial equilibrium model with lagged price responses at the supply side. It is programmed in GAMS and covers 36 products plus voluntary set-aside area and 29 regions. World market prices are endogenous and trade is modelled as net trade. The models' focus is on the EU with a detailed formulation of agricultural policies in individual EU-15 member states as well as in the NMS and the EU accession candidates. In order to model country-specific options of implementing the decoupling regulations the aggregated model region of the EU-15 has recently been split up into individual member states.

Supply of crops and fodder in ESIM is determined by a yield function, dependent on the own price and price indices for intermediate inputs and labour, and an area allocation function dependent on own and cross incentive prices (including direct payments – see below) as well as intermediate input, capital, and labour cost indices. All area allocation functions are isoelastic, homogeneous of degree zero in all in- and output prices, and locally symmetric. In order to take into account the possibility that producers retire and land is falling idle as a result of decreasing direct payments total agricultural area is not fixed but is allowed to vary. Supply of animal products is a function of own and cross incentive prices as well as a feed cost index (FCI) and price indices for other intermediate inputs, capital and labour.

Direct payments enter the area allocation functions in the same way as prices; that is, market price and direct payment per product unit make up an "incentive price", which is the explaining variable. The calculation of the level of direct payments depends on the country in question and the policy applied:

- Coupled payments per ton in member states of the EU-15 are calculated by

  *Payment per ton * Yield in base period/Actual yield.*

  That is, the payment per ton is adjusted by the actual yield for each crop and simulation period. Thus, an increase in yield leads to a decrease in the premium per ton and vice versa.

- Coupled payments per ton in the NMS are calculated by

  *Phasing-in factor * Payment per ton in EU-15*
  ** Yield in base period/Actual yield.*

  That is, the calculation corresponds almost to the one applied for EU-15 members. However, the phasing-in factor takes care that payments in the NMS reach the level existing in the EU-15 only stepwise.

- Decoupled payments per ton in both member states of the EU-15 and NMS are calculated by

  Uniform payment per ha/Actual yield.

Thereby, the payment per ha in each member state is calculated by dividing the available budget for decoupled payments by the total eligible area. That is, decoupled payments in ESIM are generally modelled as a uniform regionalised payment per hectare irrespective for which type of the Single Farm Payment (SFP) a member state has opted.[1]

Feed demand is modelled for 15 feed components plus silage maize, grass, and arable fodder. Product-specific feed demand per unit of animal output is isoelastic, homogeneous of degree zero in the prices of all feed products, locally symmetric, and the possibility to substitute roughages for other feed components exists. Total product-specific feed demand in a country is the product of feed demand per unit of animal output. An exogenous additive intercept which represents feed demand of animals not covered in ESIM is also included to guarantee market clearing for feed demand and supply.

Based on this approach the endogenous animal product-specific FCI reflects relative changes in feed prices. Thus, an increasing price for any feed component results in reduced demand for this component due to two effects. First, the substitution effect, in which other components are substituted for the more expensive one, and second, the output effect, which results in an increasing FCI, in lower animal production, and therefore lower feed demand.

Certain parameters are considered crucial in simulating the impact of reducing direct payments on area distribution and production. These are own price elasticities of ruminants, own and cross price elasticities of area allocation, and own and cross price elasticities of feed demand with emphasis on the substitution possibilities between roughages and other feed components. Some of these parameters are displayed in Table 1. Area allocation elasticities in ESIM are very low for pasture and voluntary set-aside area compared to other crops. This is because pasture is modelled as permanent pasture and the substitution for crop land is limited due to different soil qualities and geographical/ climatic conditions. The same holds for voluntary set-aside, which is generally marginal land. Supply elasticities for ruminants are about 1. Elasticities for milk are irrelevant due to the binding milk quota under all scenarios presented below. Own price elasticities of feed demand are the highest for oilmeals. Feed demand elasticities for cereals are still higher than those for roughages, which lie between -0.3 and -0.9.[2]

[1] The SFP, which is based on actual receipts by each farmer in the reference period 2000 to 2002, can not be modelled in ESIM.

[2] More detailed information can be obtained from BALKHAUSEN and BANSE (2005) and from BANSE et al. (2005).

Table 1: Selected elasticities for Germany, France, the Netherlands, and Poland in ESIM

	Own price elasticities	Selected cross- and input-price elasticities
Elasticities of area allocation		
Cereals and oilseeds	0.21 to 0.88	up to -0.16 within group
Silage maize	0.54 to 0.77	up to -0.10 corn price
Other fodder	0.68 to 0.72	up to -0.27 common wheat price
Pasture	0.07 to 0.17	up to -0.01 common wheat price
Vol. set aside	0.12	up to -0.01 common wheat price
Elasticities of supply		
Beef	0.79 to 1.06	-0.47 to -0.42 FCI
Sheep meat	0.95 to 1.27	-0.57 to -0.36 FCI
Feed demand elasticities		
Cereals	-0.7 to -1.4	up to 0.8 within group
Oilmeals	-0.6 to -2.0	up to 1.1 within group
Silage maize	-0.5 to -0.9	up to 0.4 within group "roughages"
Other fodder	-0.5 to -0.8	up to 0.6 within group "roughages"
Grass	-0.3 to -0.7	up to 0.4 within group "roughages"

Source: Own compilation.

3 ESIM SIMULATION

3.1 Scenarios

In order to assess the effects of reducing direct payments with ESIM three scenarios are formulated and results for Germany, France, the Netherlands, and Poland are compared for the projection year 2013. All scenarios include the accession of the 10 NMS in 2004 and the accession of Bulgaria and Romania in 2007. The "rest of the world" component is calibrated such that FAPRI world market price projections (FAPRI, 2004) for 2013 are met. The three scenarios include:

1. A BENCHMARK scenario representing the actual implementation of the MTR reform including (partially) decoupled payments in each member state. That is, direct payments and national top-ups are fully or partially decoupled depending on the policy applied.
2. A REDUCTION scenario including a 50 % reduction of direct payments between 2010 and 2013. That is, from 2010 on direct payments are reduced by 12.5 % each year. The released funds are re-allocated to second pillar measures and are partly used to improve the agricultural structure and competitiveness in EU member states. Accordingly, it is assumed that technical progress is proceeding faster than under the

BENCHMARK scenario. Since the largest part of the re-allocated funds is used in the NMS, the additional acceleration in technical progress is assumed to be higher in Poland than in Germany, France, and the Netherlands.

3. An ELIMINATION scenario including a complete elimination of direct payments until 2013. That is, from 2010 on direct payments are reduced by 25 % each year. Since released funds under the ELIMINATION scenario are approximately twice as much as under the REDUCTION scenario the acceleration of technical progress is assumed to be higher than under the REDUCTION scenario.

3.2 Results

Table 2 depicts direct payments per ha and per ton for the three scenarios described above. All values are depicted in Euro. According to the exchange rate assumed for Poland in 2013 one Euro costs 3.67 Zloty. Direct payments are shown in real terms. The assumed inflation rate amounts to 1.5 %.

Table 2: Direct payments in 2013 under various scenarios

	Germany			France			Netherlands			Poland		
	Benchmark	Reduction	Elimination	Benchmark	Reduction	Elimination	Benchmark	Reduction	Elimination	Benchmark	Reduction	Elimination
Beef (€/t)	0	0	0	357	188	0	407	214	0	136	71	0
Sheep (€/t)	0	0	0	576	303	0	0	0	0	312	164	0
Cereals and oilseeds (€/ha)	323	170	0	258	136	0	326	172	0	114	60	0
Grass (€/ha)	323	170	0	183	96	0	326	172	0	101	53	0
Silage maize (€/ha)	323	170	0	252	132	0	326	172	0	113	59	0
Fodder (€/ha)	323	170	0	183	96	0	326	172	0	101	53	0
Set-aside (€/ha)	323	170	0	183	96	0	326	172	0			

Source: Own calculations.

Table 2 shows that direct payments differ significantly among member states as well as among products and product categories, respectively. In case of crops, this can be explained by varying yield and base yield levels among countries. As mentioned above, direct payments per ha are calculated by a yield component multiplied by the premium per ton. Differences in direct payments among countries and products can additionally be traced back to different coupling rates applied under the MTR reform. In France and the Netherlands, where a part of direct payments is kept coupled to production, the available budget for direct payments is not completely allocated to the uniform regionalised payment. That is, the maximum possible amount of the flat rate payment is only paid in Germany (323 €/ha). According to the full decoupling approach, however, payments to German ruminant producers are abolished.

After the SAPS will be expired in 2009 the degree of coupledness of direct payments in Poland is based on the average degree of coupledness applied in the EU-15. Therefore, direct payments in Poland are partly coupled from 2009 on. In the Netherlands payments for beef remain coupled to production under the MTR reform. In Poland and France both beef and sheep meat payments are kept partly linked to production. Accordingly, under the BENCHMARK scenario and the REDUCTION scenario farmers in these countries still receive direct payments for beef and/or sheep production on the expense of a higher budget allocated to the regionalised payment.

In those member states, where the payments for cereals and oilseeds are partly linked to production (France and Poland), the payment per ha is higher for cereals and oilseeds than for set-aside and those products, which were not eligible for direct payments before the MTR reform was implemented (grass and fodder). In France, for example, payments for cereals and oilseeds amount to 258 €, while the payments for each grass, fodder, and set-aside amount to 183 €.

In Table 3 ESIM results of the REDUCTION scenario and the ELIMINATION scenario are expressed as a percentage change relative to the BENCHMARK scenario.

Table 3: ESIM results under various scenarios compared to the BENCHMARK scenario in 2013 in %

	Germany		France		Netherlands		Poland	
	Reduction	Elimination	Reduction	Elimination	Reduction	Elimination	Reduction	Elimination
Supply								
Beef	0.6	1.3	-5.3	-11.2	-5.5	-11.5	2.0	3.7
Sheep	1.1	2.3	-7.1	-14.8	5.4	11.7	-1.2	-3.3
Non ruminants	-0.1	-0.4	0.1	0.3	0.9	1.9	0.9	1.9
Area								
Total area used	-3.9	-9.2	-3.4	-7.9	-4.5	-10.5	-4.1	-8.5
Grandes Cultures	-4.9	-11.9	-3.7	-9.0	-6.0	-12.6	-3.9	-8.2
Cereals	-3.8	-8.4	-2.5	-5.3	-3.7	-8.2	-3.9	-8.2
Oilseeds	-7.9	-17.1	-6.6	-14.3	-10.1	-21.3	-3.9	-7.4
Silage maize	-8.0	-15.0	-7.8	-15.4	-8.5	-16.9	-5.6	-10.7
Arable fodder	-7.6	-14.6	-7.8	-15.8	-16.3	-32.3	-7.2	-13.9
Grass	-1.7	-4.2	-1.6	-4.1	-2.6	-7.8	-3.9	-8.6
Incentive Prices								
Beef	3.6	7.9	-4.0	-8.1	-4.9	-10.0	0.2	0.8
Sheep	4.2	9.5	-5.0	-10.1	4.2	9.5	-1.6	-2.9
Non ruminants	-0.2	-0.3	-0.3	-0.4	-0.3	-0.4	-0.2	-0.3
Cereals and oilseeds	-13.8	-28.5	-10.7	-22.0	-11.5	-23.7	-11.3	-21.8
Silage maize	-14.5	-27.8	-13.6	-26.8	-13.8	-27.1	-12.5	-23.0
Arable fodder	-16.4	-31.6	-15.6	-30.8	-25.9	-48.2	-12.0	-22.5
Grass	-27.7	-56.7	-26.6	-54.9	-35.9	-74.0	-22.4	-43.5
Producer Prices								
Beef	3.6	7.9	3.6	7.9	3.6	7.9	3.6	7.9
Sheep	4.2	9.5	4.2	9.5	4.2	9.5	4.2	9.5
Non ruminants	-0.2	-0.3	-0.2	-0.3	-0.2	-0.3	-0.2	-0.3
Cereals and oilseeds	0.6	1.6	0.6	1.6	0.6	1.6	1.3	3.2
Silage maize	17.7	40.2	8.4	19.6	10.5	24.3	-2.1	-3.0
Arable fodder	18.1	41.7	8.3	20.0	27.5	72.6	9.2	21.1
Grass	12.0	28.8	2.6	7.6	3.5	13.0	6.0	16.3

As a result of the reduction/elimination of direct payments, incentive prices for cereals, oilseeds, and silage maize decrease sharply. Under the REDUCTION scenario incentive prices for cereals and oilseeds fall between 10.7 % (France) and 13.8 % (Germany), while the decrease lies between 21.8 % (Poland) and 28.5 % (Germany) under the ELIMINATION scenario. Decrease rates in incentive prices for silage maize are very similar compared to those of cereals and oilseeds. In general, the decrease in incentive prices is the highest in those countries, where the value of direct payments and the share of direct payments in incentive prices under the BENCHMARK scenario are comparatively high. This is mainly true for countries, which have decoupled their payments for ruminant producers under the MTR reform, so that the available budget for direct payments for ruminant producers is completely allocated to the uniform regionalised payment. For example, in Germany direct payments amount to 30 % of the incentive price for cereals and oilseeds, while they amount to 23 % of the incentive price in France. Due to the decrease in incentive prices the Grandes Cultures area falls between 3.7 % (France) and 6.0 % (the Netherlands) under the REDUCTION scenario and between 8.2 % (Poland) and 12.6 % (the Netherlands) when direct payments are completely abolished. Within the group of Grandes Cultures oilseed and silage maize area decrease much stronger than the cereal area, which can be traced back to comparatively low own price elasticities of cereal products.

Strong area decreases are also projected for arable fodder. More specifically, decrease rates in fodder area lie between 7.2 % (Poland) and 16.3 % (the Netherlands) under the REDUCTION scenario and between 13.9 % (Poland) and 32.3 % (the Netherlands) in case of a complete abolishment of direct payments. This is the result of incentive prices that decrease between 12 % (Poland) and 25.9 % (the Netherlands) under the REDUCTION scenario and between 22.5 % (Poland) and 48.2 % (the Netherlands) when direct payments are completely abolished.

The decreases in pasture area are significantly lower than in case of arable fodder though decrease rates in incentive prices are much higher for grass. That is, pasture area falls between 1.6 % (France) and 3.9 % (Poland) under the REDUCTION scenario and between 4.1 % (France) and 8.6 % (Poland) when direct payments are completely abolished. There are mainly two reasons for this comparatively low decrease in pasture area. First, area allocation elasticities are higher for fodder than for pasture. And secondly, producer prices for fodder are increasing stronger than those of grass, which leads to a substitution of grass for fodder in the feed ratio of ruminants. In the Netherlands, for example, costs for arable fodder increase by 72.6 % when direct payments are completely abolished. Cost for grass, in contrast, increase by 13 % only.

One of the most significant results of simulating the reduction and/or elimination of direct payments is the strong decrease in total area, which is used for agricultural production. Since direct payments are reduced or eliminated so that incentive prices fall sharply across all crop sectors and an obligation to keep land at least in good condition in order to be eligible for direct payments does not exist anymore farmers are expected to lie larger parts of their land idle. According to the results of ESIM total area used for production purposes in Germany decreases by 3.9 % when payments are reduced by 50 % and by 9.2 % in case of a complete elimination of direct payments. In France, the Netherlands, and Poland 7.9 %, 10.5 %, and 8.5 % of the total area are projected to become idle land under the ELIMINATION scenario, respectively.

The simulation results for beef and sheep supply are very different across member states and the projected results largely depend on the decoupling option chosen under the MTR reform. France, for example, decided to keep all payments coupled to production to the maximum possible degree. The Netherlands have opted for coupled payments in the beef sector. Accordingly, under the BENCHMARK scenario direct payments for beef producers still exist in both member states while payments for sheep producers are granted in France only. Thus, direct payments and incentive prices in both countries decrease under the REDUCTION scenario and under the ELIMINATION scenario. As a result, beef and sheep supply in France decreases by 5.3 % and 7.1 % under the REDUCTION scenario and by 11.2 % and 14.8 % when direct payments are completely abolished, respectively. In the Netherlands beef supply decreases by 5.5 % and 11.5 %, respectively. Since beef and sheep production is decreasing in several member states of the EU when direct payments are reduced or abolished, producer prices for both beef and sheep are increasing across all member states.

In contrast to France and the Netherlands, Germany has opted for the full decoupling approach. That is, under the BENCHMARK scenario payments for beef and sheep are completely abolished. Accordingly, payments and, thus, incentive prices for beef and sheep neither decrease under the REDUCTION scenario nor under the ELIMINATION scenario. Instead, German producers of beef and sheep benefit from increasing producer prices on the European level, so that supply of beef and sheep increases slightly under both scenarios.

According to the relative moderate coupling rates, which correspond to the EU-15 average, the effects of reducing and abolishing direct payments in Poland are also quite moderate. That is, beef supply increases by 2 % under the REDUCTION scenario and by 3.7 % when payments are fully eliminated. In the case of sheep, supply decreases by 1.2 % and 3.3 %, respectively.

In all countries beef and sheep supply is negatively affected by the strong increase in feed costs. Costs for arable fodder increase between 8.3 % (France) and 27.5 % (the Netherlands) under the REDUCTION scenario and between 20 % (France) and 72.6 % (the Netherlands) under the ELIMINATION scenario. Costs for grass increase between 2.6 % (France) and 12 % (Germany) and between 7.6 % (France) and 28.8 % (Germany), respectively.

Compared to beef and sheep, incentive prices and supply of non ruminants change only slightly across members states reviewed in this paper. That is, incentive prices decrease uniformly between 0.2 % and 0.4 % and supply changes vary between -0.4 % and 1.9 %. This is no surprise as pork and poultry production are not eligible for direct payments under the MTR reform and, thus, are not directly affected by the reduction or elimination of direct payments, but only indirectly via cross effects from other products.

3.3 Sensitivity analysis

ESIM results crucially depend on certain model parameters for which the empirical foundation is limited. These are the own price elasticities of ruminants, the own and cross price elasticities of pasture area, and the own price and substitution elasticities of feed demand per unit of animal output. These parameters are therefore varied for all member states of the EU-15, the 10 NMS, Bulgaria, Romania, and Turkey. This is done to cover the complete agricultural market of the EU in 2013 because of potential cross effects, although these sensitivity analyses focus on the German market only. Sensitivity analyses performed and their justifications are the following:

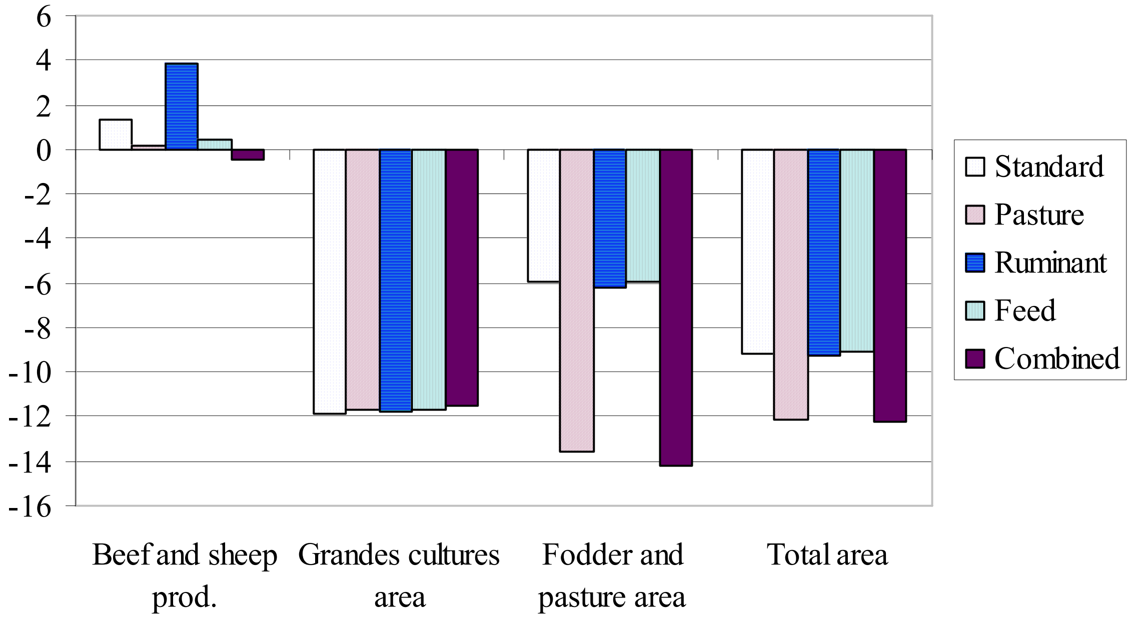
1. PASTURE: Pasture area allocation elasticities are multiplied by 4. Other area elasticities are adjusted to meet homogeneity and symmetry for the area allocation matrix. As discussed above the pasture area allocation elasticity is low (between 0.07 and 0.17) in the original elasticity set. Especially in the long run, conversion from cropland to pasture land is an option and this is why these crucial elasticities, which restrict this conversion, are raised. The calibration of the area allocation matrix in order to comply with the conditions of homogeneity and symmetry is done mechanically by minimizing the sum of the squared relative deviations of price elasticities from the original matrix.
2. RUMINANT: All ruminant supply elasticities (with respect to own prices, cross prices, feed cost, other inputs) are multiplied by 2. No adjustment of other elasticities is necessary, as the ruminant supply matrix in ESIM contains no cross price elasticities with respect to other products. Ruminant supply is often modelled as relatively inelastic in behavioural partial equilibrium models because of its linkage to area. This linkage, however, is explicitly modelled in ESIM through the feed demand matrix. Therefore, higher supply elasticities may be suitable.
3. FEED: All feed demand elasticities (own and cross price elasticities) for arable fodder, grass, and silage maize are divided by 2. Again, all feed demand elasticities are adjusted to meet the micro-economic conditions. This adjustment decreases the substitution possibilities between roughages

and other feed components as well as the substitutability among roughages.

4. COMBINED: Combined elasticity changes from sensitivity analyses 1-3.

These sensitivity analyses are carried out only for the BENCHMARK scenario and the ELIMINATION scenario. In Figure 1, results for major variables under the above mentioned sensitivity scenarios are shown as percentage changes under the ELIMINATION scenario relative to the BENCHMARK scenario.

Figure 1: Effects of the ELIMINATION scenario relative to the BENCHMARK scenario in Germany under various elasticity sets in %



Source: Own calculations.

A first observation is that under almost all sensitivity analyses the direction of deviations from the BENCHMARK scenario is the same as under the STANDARD elasticity set, although considerable deviations exist in some cases. Under the PASTURE elasticity set, which implies a higher price responsiveness of pasture area, roughage area is decreasing much stronger (-14 %) than under the STANDARD elasticity set (-6 %) when direct payments are completely abolished. Apart from the higher price flexibility of pasture area this strong decrease in fodder and grass area can additionally be traced back to increased costs for fodder and grass, which leads to a relative decrease in ruminant production (stagnation instead of an increase of 1.5 %) and, thus, a lower demand for arable fodder and grass. Since the stronger decrease in roughage area is neither compensated by a relative increase in Grandes Cultures area nor by an increase in other area uses, the decrease in total area used for agricultural production is even stronger under the PASTURE elasticity set (-12 %) than under the STANDARD elasticity set (-9 %).

Under the RUMINANT elasticity set, ruminant supply increases stronger (+4 %) than under the STANDARD elasticity set (+1.5 %). However, this increase in ruminant production is obviously not strong enough to increase demand for grass and fodder and, thus does not attract a relative increase in production of these products. As a result, the decrease rate in roughage area under the RUMINANT elasticity set does not differ from the decrease rate under the STANDARD elasticity set (-6 %). Since also the area cultivated with Grandes Cultures does not change after switching from the STANDARD elasticity set to the RUMINANT elasticity set, the share of agricultural area, which becomes fallow land in the course of eliminating direct payments, also remains the same.

Under the FEED elasticity set, which includes decreasing substitution possibilities between roughages and other feed components as well as a lower substitutability among roughages, ruminant production increases only marginally (0.2 %). Under the standard elasticity set the increase rate in ruminant production amounted to 1.5 %. This relative decrease in ruminant production under the FEED elasticity set occurs because beef and sheep meat producers face stronger limitations in switching from roughages to other feed components when costs for roughages increase sharply, witch is the case when roughage area decreases as a result of reducing/abolishing direct payments. As a result, ruminant production becomes somewhat more expensive and decreases in relative terms under the FEED elasticity set.

Under the COMBINED elasticity set beef and sheep supply is not increasing as under all other elasticity sets included in this sensitivity analysis, but it is slightly decreasing (-0.4 %) when direct payments are abolished. This can be explained as follows: The four times higher area allocation elasticity for pasture leads to a strong decrease in pasture area and accordingly to a significant increase in the producer prices for grass. So far, this has also occurred under the PASTURE elasticity set, where ruminant production could even marginally benefit from the elimination of direct payments because other feed components could be relatively easy substituted for the more expensive components like arable fodder and grass. The substitutability between roughages and other feed components, however, is more restricted under the COMBINED elasticity set, so that increasing production costs through higher prices for roughages can not be outweighed by easily changing the feed ration. As a result, ruminant production becomes too expensive and decreases even in absolute terms when direct payments are eliminated though incentive prices for beef and sheep are higher than under the BENCHMARK scenario. The decrease in ruminant production and the resulting decrease in demand for grass and/or arable fodder lead to an even stronger decrease in grass and arable fodder area than under the PASTURE elasticity set.

As a final conclusion, the level of area allocation elasticities for pasture has by far the most significant impact on area allocation among the parameters looked at in this analysis. For most variables the direction of the results of a variation in all elasticities is the same. The increase in supply elasticities for ruminants by 200 % results in a stronger increase in beef and sheep supply than under the STANDARD elasticity set. The variation in feed-demand elasticities does not significantly affect the results of this sensitivity analysis. However, combined with an increase in area allocation elasticities for pasture the limited substitutability of feed components leads to an absolute decrease in ruminant production when direct payments are abolished. The deviations in the Grandes Cultures area relative to the BENCHMARK scenario do not vary among the different sets of elasticities. According to the strong decreases in grass and fodder area under the PASTURE elasticity set and the COMBINED elasticity set and the relatively high share of pasture land and arable fodder area in total agricultural area the strongest decrease of the total area also occurs under these elasticity sets.

4 SUMMARY AND CONCLUSIONS

According to the ESIM simulation results a substantial reduction of direct payments will have significant effects on agricultural markets in the member states reviewed in this paper. Due to a reduction or even abolishment of direct payments and a strong decrease in incentive prices crop and fodder area is expected to decrease sharply. In case of a complete elimination of payments Grandes Cultures area is projected to decrease between 8.2 % in Poland and 12.6 % in the Netherlands. Decrease rates for pasture area are expected to lie between 4.1 % in France and 8.6 % in Poland, while those for arable fodder area are projected to vary between 13.9 % in Poland and 32.9 % in the Netherlands. Between 3.4 % (France) and 4.5 % (the Netherlands) of agricultural land will fall idle in the course of a 50 % reduction of direct payments. In case of a complete elimination of payments total area used for production purposes is even projected to decline between 7.9 % in France and 10.5 % in the Netherlands.

While the direction of the effects of reducing direct payments is homogeneous among all members when the focus is on area uses, the direction of effects is heterogeneous among member states in case of beef and sheep production. In this case model results crucially depend on the decoupling option chosen under the MTR reform. In France and the Netherlands, where still a high level of payments is paid to beef (both countries) and sheep (only France) producers, the profitability of ruminant production decreases sharply when direct payments are reduced or even abolished. Accordingly, beef and sheep production in France as well as the beef supply in the Netherlands decrease strongly. Similar results could be expected for Spain, Portugal, Belgium or Austria, which also opted for comparatively highly coupled payments in the ruminant production sector. In member states like Germany, which have decided to decouple payments for beef and sheep completely, beef and sheep producers do not suffer from a reduction of direct payments, since they do not receive any direct subsidies under the current CAP. Due to the increase in producer prices on the EU-level, which takes place as a result of the decrease in production in some members, German beef and sheep producers even benefit from a reduction of direct payments. In Poland as the representative of the NMS the degree of coupledness of direct payments for beef and sheep is rather moderate as it corresponds to the average coupling rate applied in the EU-15. Accordingly, the slightly negative impact of the reduction of direct payments on incentive prices can be more or less compensated by the increase in producer prices on the EU-level. As a result, changes in beef and sheep supply are comparatively low.

Apart from the policy options chosen by the member states, the own price response of pasture land and ruminants drives model results to a large extent. The sensitivity analysis, which has been conducted for the German market, has shown how strong area allocation responds to a change in the price elasticity of pasture area. The reaction of ruminant supply also depends heavily on the value of the own price elasticity. The own price and substitution elasticities of feed demand per unit of animal output have a minor impact on model results though their influence increases when changes are combined with changes in the price elasticity of pasture land. A better empirical foundation of these parameters could therefore substantially contribute to more reliable model results.

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MEASURING THE DEGREE OF MARKET POWER IN THE UKRAINIAN MILK PROCESSING INDUSTRY

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ABSTRACT

There has been a recent increase in the number of NEIO studies that measure and test for the degree of market power in agricultural and food markets in developed market economies. These have largely focused on the USA and European food sectors. But imperfect competition seems especially prevalent in the food sectors of transition countries. A technique for assessing the degree of oligopoly market power, developed by BRESNAHAN (1982) and LAU (1982), is used here to measure oligopsony power in food processing. As an example, we provide an application to the Ukrainian milk processing industry. Our results do not show evidence of oligopsony power in this sector during the sample period from January 1996 to December 2003.

Keywords: *Oligopsony power, new empirical industrial organization, milk processing industry, Ukraine.*

1 INTRODUCTION

Agricultural supply analysis is generally conducted using models that postulate a perfectly competitive market structure, because a typical assumption is that there is a large number of spatially dispersed farmers and processors who act as price takers in a specific agricultural market. However, imperfect competition analysis should be given more attention by agricultural economists, because recent studies suggest that agricultural markets are more typically oligopolistic (MCCORRISTON, 2002). There has been a recent increase in the number of New Empirical Industrial Organization (NEIO) studies that measure and test for the

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degree of market power in the food processing industry as well as in other industries.[1] Moreover, up to now the NEIO studies have typically been conducted for industries in developed market economies and have largely focused on the USA and European food sectors, thus ignoring market conditions of the food industry sectors of transition countries, which are potentially different from the situation in developed market economies. The objective of this study is to use an empirical market structure model based on the NEIO approach to measure the degree of oligopsony market power in the Ukrainian milk processing industry.

2 STRUCTURAL MODEL OF OLIGOPSONY MARKET POWER

The structural model used in this research to test for oligopsony market power of the milk processing industry in Ukraine consists of a farm milk supply function and a condition for profit maximizing farm milk demand of the milk processing industry. Let us assume that the inverse supply equation for farm milk supplied to the milk processing industry can be represented by:

$$W_X = g(X, \mathbf{S}) \tag{1}$$

where W_X is the price of farm milk, X is the quantity of farm milk and $\mathbf{S}$ is a vector of supply shifters. Given this representation of farm milk supply, the profit equation for the milk processing industry can be written as:

$$\Pi = P \cdot f(X, \mathbf{Z}) - W_X \cdot X - \mathbf{W_Z} \cdot \mathbf{Z}, \tag{2}$$

where P is the output price of the milk processing industry, $f(X, \mathbf{Z})$ is the production function of the milk processing industry, $\mathbf{Z}$ is a column-vector of quantities of other milk industry inputs and $\mathbf{W_Z}$ is a row-vector of prices of these inputs.

The first order condition for profit maximization (FOC) that allows for imperfect competition (oligopsony power) in the farm milk market is:

$$W_X + \Theta \frac{\partial g(X, \mathbf{S})}{\partial X} X = P \cdot \frac{\partial f(X, \mathbf{Z})}{\partial X}, \tag{3}$$

where Θ is a parameter indexing the degree of market power. If $\Theta = 0$, then the market for farm milk is perfectly competitive. If $\Theta = 1$, then the market for farm milk is monopsonistic and the marginal factor cost and the value marginal product should be equated. Intermediate values of Θ imply the presence of oligopsonistic structure, in which case the interpretation of the first-order condition is that the "perceived" marginal factor cost equals the value marginal product of farm milk.

[1] For a list of empirical studies on industries with monopoly power, see BRESNAHAN (1989, p. 1051) and CARLTON and PERLOFF (1999, p. 263). For an overview of structural model estimates for the agricultural and food markets, see SEXTON and LAVOIE (2001), and WOHLGENANT (2001).

3 ECONOMETRIC APPLICATION OF MARKET STRUCTURE MODEL

Let us assume that the farm milk supply function can be written as:[2]

$$\ln X = \beta_0 + \beta_X \ln W_X + \beta_D \ln W_D + \beta_R \ln W_R + \beta_F \ln W_F + \beta_K \ln Z_K + \delta_T T + \frac{1}{2}\delta_{TT} T^2 + \delta_{XT} T \ln W_X + \delta_{DT} T \ln W_D + \delta_{RT} T \ln W_R + \delta_{FT} T \ln W_F + \delta_{KT} T \ln Z_K, \tag{4}$$

where W_X is the price at which milk is supplied, W_D is the direct marketing price for milk that is sold directly to consumers[3], W_R is the price received for beef cows, W_F is the price of mixed feeds (compound feed), Z_K is the number of dairy cows as quasi-fixed factors and T is a linear time trend to account for autonomous change (technical change and other unaccounted-for factors affecting short-run supply response over time). Solving equation (4) for W_X and differentiating with respect to X yields the following expression for the marginal effect of the input level on milk prices:

$$\frac{\partial g(\bullet)}{\partial X} = \frac{W_X}{(\beta_X + \delta_{XT} T)\ X}, \tag{5}$$

where $\beta_X + \delta_{XT} T = \varepsilon_{WX}$ is the own price elasticity of farm milk supply. Let Y be the aggregate output of the milk processing industry, $X_i\,(i = 1,...,n)$ quantities of production factors including farm milk (X), labor (A), capital (K), energy (E), and T a time trend. The marginal product of X is defined as the partial derivative of the translog production function[4] (appropriately defined but not shown here because of the limitation of space) and is given by:

$$\frac{\partial Y}{\partial X} = \frac{Y}{X}\left(\alpha_X + \alpha_{XX} \ln X + \alpha_{XA} \ln A + \alpha_{XK} \ln K + \alpha_{XE} \ln E + \gamma_{XT} T\right). \tag{6}$$

Using equations (5) and (6), equation (3) can now be re-written as:

$$W_X = \left[P \frac{Y}{X}\left(\alpha_X + \alpha_{XX} \ln X + \alpha_{XA} \ln A + \alpha_{XK} \ln K + \alpha_{XE} \ln E + \gamma_{XT} T\right)\right] \Big/ \left(1 + \frac{\Theta}{\beta_X + \delta_{XT} T}\right). \tag{7}$$

To account for the seasonality in our monthly data, eleven monthly dummy variables are added to equations (4) and (7). To allow for the existence of random shocks, an additive disturbance term is added to equations (4) and (7) and it is assumed to have a zero mean, constant variance, and be independently and normally distributed.

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2 Note that equation (4) can be interpreted as a truncated second-order approximation to a general logarithmic farm milk supply function.

3 During transition the market share of milk sold directly to consumers rapidly increased from 0.1 % in 1990 to 21.2 % in 2000. This had a significant impact on the milk supply in Ukraine.

4 Cf. CHRISTENSEN, JORGENSON and LAU, 1973.

4 DESCRIPTION OF THE DATA

The data used in the estimation was obtained from the State Committee of Statistics of Ukraine. The data set includes 96 monthly time-series observations, from January 1996 to December 2003. The choice of the sample period was dictated by data availability. Table 1 provides a summarized description of variables used in estimation.

Table 1: Description of variables

Description of Variables	(1) Symbol	Mean	Standard Deviation	Minimum	Maximum
Monthly quantity of milk delivered to the milk processing industry (metric tons)	X	295730.0	131600.0	92526.0	588200.0
Monthly average price for milk delivered to the milk processing industry (UAH/metric ton)	w_X	452.2	214.2	166.9	990.5
Monthly average price for milk sold by "direct marketing" (UAH/metric ton)	w_D	438.5	171.3	166.9	800.9
Beef cattle price index (January 1996=100)	w_R	241.5	103.6	100.0	411.2
Mixed forage price index (January 1996=100)	w_F	263.3	94.4	100.0	426.7
Number of milking cows at the beginning of month (thousand heads)	z_K	5730.3	912.1	4449.6	7531.3
Aggregate output of the milk processing industry, in milk equivalent (tons/month)	Y	351570.0	144440.0	126430.0	673380.0
Monthly average number of workers	A	78700.0	7716.1	67940.0	97499.0
Capital (thousand UAH/month)	K	760.5	331.1	491.0	2228.7
Energy (thousand kWh/month)	E	1904800.0	955040.0	572880.0	4369800.0
Output price index of the milk processsing industry (January 1996=100)	P	182.0	52.1	95.5	276.6
Time trend $(T=1,2,...,96)$	T	48.5	27.9	1.0	96.0

Data on monthly quantities of milk delivered to the milk processing industry, monthly average price for milk delivered to the milk processing industry, and average price for the milk that was sold directly to consumers reported at the market level were collected from two statistical reports: *The sale of milk and dairy products to procurement organizations of the milk processing industry by all types of agricultural farms* and *The sale of agricultural products to procurement organizations by agricultural enterprises.* Data on the number of milking cows at the beginning of the month were composed from the statistical report *The statistical summary data about state stock-breeding by all types of agricultural farms.* All these statistical reports were published by the Division of Agriculture and Environment Statistics, State Committee of Statistics of Ukraine.

Data on price indices were collected from the periodicals of the Division of Price Statistics, State Committee of Statistics of Ukraine, *Industrial producer price indices*.

Data on aggregate output of the milk processing industry were calculated using the observations regarding the quantity of dairy products produced monthly using the following weights: 22.3 for butter, 3.5 for cheese, 1.03 for fresh milk products (liquid products, yogurt, etc.), 6.7 for milk powder (skimmed milk powder, whole milk powder and buttermilk), and 2.5 for condensed milk. Data on production is published regularly in the statistical issues of *Industrial products* by the Division of Manufacturing Statistics, State Committee of Statistics of Ukraine. The weights for dairy products are established by the Division of Household Surveys in the State Committee of Statistics of Ukraine.

The monthly average numbers of workers in the milk processing industry were obtained from the Division of Labor Statistics of State Committee of Statistics of Ukraine. Annual and monthly data are published in *Labor of Ukraine*.

The Capital variable was constructed based on monthly and annual observations regarding facilities depreciation in the milk processing industry and the annual price indices for capital goods. The annual observations were interpolated to a monthly level. The process of constructing this variable unfolds in two steps. First, the annual price indices for capital goods which were collected from the STATISTICAL YEARBOOK OF UKRAINE for 2003 (p. 71), 2002 (p. 83) and for 2000 (p. 75) were used to deflate the annual data for depreciation in the milk processing industry. The data on depreciation were obtained from the State Committee of Statistics of Ukraine. In the second step, annual observations for the period of 1995-2003 were interpolated to monthly levels using the spline method in the statistical software SAS (SAS, 1985).

For calculating the energy variable the annual observations regarding electric power consumption to produce butter were used. These data were collected from the STATISTICAL YEARBOOK OF UKRAINE for 2003 (pp. 101-103) and for 2000 (pp. 94-96). In order to obtain the variable on a monthly basis it has been assumed that the electric power consumption in the milk processing industry has developed throughout the year in a fixed proportion to butter output. A detailed description of the data is available from the authors upon request.

5 ESTIMATION RESULTS AND SPECIFICATION TESTING

Since equations (4) and (7) represent a nonlinear simultaneous equation system, they were estimated using nonlinear three-stage least squares.[5] The quantity of milk (X) and the price of milk (W_X) were designated as endogenous. Two alternative specifications of the market structure models were considered: One in

[5] For nonlinear three-stage least squares see AMEMIYA, 1977.

which the parameter Θ was restricted to zero and one in which Θ was estimated as a constant parameter. In the first case, the market structure model represents the competitive market condition. All the exogenous variables in the system were used as instruments. The estimations were carried out using the SHAZAM Econometrics Software (SHAZAM, 2004). Table 2 lists some estimation results for statistical inference in both models. The fit of each system is quite good.

Table 2: Statistical Inference of N3SLS Estimation

Statistic	Competition Model		Market Power Model	
	Supply	FOC	Supply	FOC
R-square	0.9811	0.9748	0.9811	0.9617
Durbin-Watson	1.0658	1.0897	1.0543	1.5729
Function Value	159.2445		124.8969	
Objective Value	1.6588		1.3010	

In the case of the farm milk supply equation, the R-square between observed and predicted values is 0.98, while that for the first-order condition is 0.97 and 0.96, respectively. The values of the Durbin-Watson statistic lie in the inconclusive range, where it is not possible to make a decision about the hypothesis of the existence of autocorrelation. It is also clear that they are close to the lower bound where the hypothesis of the existence of autocorrelation cannot be rejected.

The statistics and parameter estimates for market power and for the competition models are reported in Table 3. The asymptotic t-ratios indicate that most parameters (with the exception of some dummy parameters) are significant, at least at the 5 percent significance level.

For the milk supply equation, 16 of the 24 parameters yield t-statistics[6] indicating statistical significance at the 1 % level or less. Moreover, the parameters of the supply functions are very robust to change in the model specification. In fact, most parameters are almost identical and change only to the second decimal. The parameters β_X and δ_{XT} are highly significant at any reasonable level of significance. The time trend enters interactively with supply-side exogenous variables, so that the supply curve rotates with each successive time periods. A Wald test of the joint hypothesis that the coefficients of the five time trend interaction terms were collectively zero is rejected with a Wald χ^2 statistic of 286.36 at the 1 percent significance level $\left(\chi^2_{5;0,01} = 15.09\right)$.

[6] All the test statistics and standard errors reported in this article are asymptotic.

Table 3: Results of N3SLS estimation of Market Structure Models

Parameter	Competition Model			Market Power Model		
	Estimate	Standard Error	t-Ratio	Estimate	Standard Error	t-Ratio
Milk supply (Equation 4)						
β_X	-1.2521	0.3150	-3.9748	-1.2689	0.2112	-6.0084
β_D	-0.2078	0.1854	-1.1207	-0.1770	0.1707	-1.0365
β_R	-0.1426	0.4015	-0.3550	-0.1512	0.3985	-0.3795
β_F	-1.5624	0.1978	-7.8997	-1.5938	0.1658	-9.6159
β_K	4.3421	1.4330	3.0300	4.4192	1.1412	3.8726
δ_T	0.4832	0.2410	2.0050	0.4816	0.1991	2.4190
δ_{TT}	-0.0022	0.0004	-5.3676	-0.0023	0.0003	-7.2632
δ_{XT}	0.0285	0.0050	5.6524	0.0287	0.0048	6.0114
δ_{DT}	0.0011	0.0038	0.2983	0.0010	0.0038	0.2673
δ_{RT}	0.0073	0.0059	1.2467	0.0072	0.0057	1.2744
δ_{FT}	0.0247	0.0051	4.7999	0.0255	0.0041	6.2579
δ_{KT}	-0.0825	0.0262	-3.1518	-0.0827	0.0208	-3.9677
ξ_2	0.0274	0.0358	0.7643	0.0279	0.0350	0.7949
ξ_3	0.3754	0.0365	10.2900	0.3763	0.0360	10.4630
ξ_4	0.5714	0.0387	14.7460	0.5736	0.0387	14.8330
ξ_5	1.0948	0.0464	23.6030	1.0989	0.0455	24.1680
ξ_6	1.2993	0.0558	23.2780	1.3060	0.0539	24.2090
ξ_7	1.2088	0.0579	20.8730	1.2156	0.0555	21.8990
ξ_8	1.0942	0.0575	19.0310	1.1012	0.0555	19.8580
ξ_9	0.9084	0.0523	17.3820	0.9155	0.0518	17.6650
ξ_{10}	0.6985	0.0441	15.8300	0.7042	0.0441	15.9820
ξ_{11}	0.2906	0.0401	7.2553	0.2951	0.0396	7.4550
ξ_{12}	0.2344	0.0534	4.3921	0.2357	0.0437	5.3990
β_0	-11.1080	12.2950	-0.9034	-11.6840	10.3330	-1.1307
First order condition (Equation 7)						
Θ	–	–	–	-0.0060	0.0044	-1.3737
α_X	32.1270	6.2684	5.1252	35.7500	8.4857	4.2130
α_{XX}	1.5589	0.1502	10.3820	1.4222	0.2051	6.9349
α_{XA}	-2.8280	0.6386	-4.4282	-3.2495	0.8660	-3.7524
α_{XK}	-0.5812	0.2146	-2.7091	-0.3500	0.2996	-1.1682
α_{XE}	-0.9415	0.1242	-7.5802	-0.8612	0.1640	-5.2508
γ_{XT}	-0.0090	0.0022	-4.1559	-0.0070	0.0029	-2.4031
ξ_2	21.6900	16.9800	1.2774	26.4290	21.4830	1.2302
ξ_3	14.6430	18.4150	0.7952	25.0740	23.6600	1.0597
ξ_4	18.2690	19.2800	0.9475	32.3890	25.2350	1.2835
ξ_5	-52.1380	24.3420	-2.1419	-33.4830	31.7140	-1.0558
ξ_6	-60.8760	26.0080	-2.3407	-38.5940	34.2280	-1.1276
ξ_7	-47.1170	25.0300	-1.8824	-22.5370	33.4830	-0.6731
ξ_8	-47.8430	24.4940	-1.9533	-2.4698	39.3990	-0.0627
ξ_9	-31.0330	22.9920	-1.3497	-31.0060	32.1930	-0.9631
ξ_{10}	-2.4816	20.4460	-0.1214	5.3974	26.2670	0.2055
ξ_{11}	40.4640	17.1080	2.3652	46.4740	21.6780	2.1439
ξ_{12}	108.100	17.4570	6.1925	116.270	22.3430	5.2036

The estimates of the parameters of the equation for the first order condition and their implications for the market power parameter Θ are of primary interest. The estimate of Θ is close to zero and insignificant. While the negative value of Θ is not theoretically possible, it ranges from -0.0133 to 0.0013 in the 95 % confidence interval. With a Wald χ^2 statistic of 1.89, the hypothesis that the milk processing industry is a price-taker in the farm milk market is not rejected even at the 10 percent level $(\chi^2_{1;\,0,10} = 2{,}71)$. The hypothesis of monopsonistic (cartel) behavior is also tested and rejected at the 1 percent level.

Since the individual parameters of the estimated supply function are not readily interpretable, we calculated the supply elasticities and the rate of autonomous change $\Delta = \partial \ln X / \partial T$ in farm milk supply. These are evaluated at the sample mean and presented in Table 4. The own and cross price elasticities of farm milk supply evaluated at the sample mean are less than one in absolute terms; they have the expected signs and are compatible with economic theory. The estimated own price elasticity of farm milk supply (ε_{WX}) is 0.13. While the own price elasticity for the competition model is not statistically significant, it is highly significant at any reasonable level of significance for the market power model.

Table 4: Price elasticities and rate of autonomous change

	Competition Model			Market Power Model		
	Estimate	**Standard Error**	**t-Ratio**	**Estimate**	**Standard Error**	**t-Ratio**
ε_{WX}	0.1293	0.1573	0.8222	0.1254	0.0213	5.8791
ε_{WD}	-0.1529	0.1332	-1.1486	-0.1278	0.1165	-1.0973
ε_{WR}	0.2136	0.1511	1.4136	0.1987	0.1492	1.3320
ε_{WF}	-0.3642	0.1357	-2.6841	-0.3548	0.1285	-2.7614
ε_{ZK}	0.3406	0.5919	0.5755	0.4082	0.5846	0.6982
Δ	0.0141	0.0042	3.3530	0.0143	0.0033	4.3182

The sign structure of the cross-elasticities of farm milk supply is of considerable interest. The farm milk delivered to the milk processing industry is a substitute for the farm milk that was sold directly to consumers and a complement for beef cattle. The price elasticity of mixed feeds is negative and statistically significant at least at the 1 percent level. A Wald test of the joint hypothesis that the own and cross price elasticities of farm milk supply evaluated at the sample mean add up to zero (homogeneity of degree zero of the supply function in prices) is not rejected with a Wald χ^2 statistic of 1.19 even at the 25 percent level $(\chi^2_{1;\,0,25} = 1.32)$. Furthermore, the variable number of milking cows (Z_K) has a positive but statistically insignificant impact on the farm milk supply. The rate of autonomous change in the farm milk supply evaluated at the sample mean is significant at any reasonable level of significance and amounts to 18.3 percent annually[7].

6 SUMMARY AND CONCLUSIONS

The objective of this paper has been to measure the degree of oligopsony market power in the Ukrainian milk processing industry. For this purpose, a structural econometric model has been estimated on the basis of monthly data at the industry level. Estimation results show no evidence of oligopsony power in the Ukrainian milk processing industry over the sample period from January 1996 to December 2003. However, it may be appropriate to conduct similar analyses at a regional level, since the concentration of milk processing plants and the structure of agricultural farms in the regions of Ukraine are quite different. While the Herfindahl-Hirschman index in the Ukrainian milk processing industry on the national level is very small and amounts to 0.0088, in 7 out of 25 regions it is larger than 0.2387. Hence, it would be desirable to apply the structural econometric model also to regional data and to measure the degree of oligopsony market power at a regional market level. The authors hope that this can be achieved in further analyses.

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[7] This number is extraordinarily high and must be considered an overestimation, even if one assumes that a large fraction of this number is due to unaccounted-for variables besides technical change: The observed average annual rate of change in milk supply over the sample period is 6.8 %. The change in exogenous variables explains an annual rate of change in milk supply of -3.9 %, which supports an autonomous rate of change of only 10.7 %.

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DETERMINANTS OF FOREIGN DIRECT INVESTMENTS IN THE FOOD PROCESSING INDUSTRY: AN EMPIRICAL ANALYSIS FOR UKRAINE

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ABSTRACT

The paper discusses the determinants of foreign direct investments in the Ukrainian food processing industry. We construct two empirical models of foreign direct investments inflows using a knowledge-capital model developed by CARR et al. (2001) and a simultaneous equation system for foreign direct investments and food imports. Strong support was found for the explanatory power of market size of a host country on its foreign direct investments that suggests the prevalence of market-seeking investments. Relative wages in manufacturing may also play a role, although the empirical results are highly sensitive to the choice of regression model. Finally, a complementary relationship is found between foreign direct investments in the Ukrainian food industry and corresponding imports, which is consistent with earlier findings for developing countries.

Keywords: *FDI, food processing industry, Ukraine.*

1 INTRODUCTION

Ukraine ranks among the largest countries in Europe, with a population of about 47 million. With rich black soil, a favorable climate, Black Sea ports, and close proximity to major consumer markets in the European Union, the Former Soviet Union (FSU), North Africa and the Middle East, Ukraine has the potential to become one of the largest food exporters of Eastern Europe.

Taking advantage of such potential both in the domestic and foreign markets requires modern processing technologies, competitive quality standards, and excellent marketing skills. However, since 1991 only half of the enterprises made the necessary investments and changed managerial practices to cope with the increasingly competitive market environment. Concomitantly, foreign investment

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has a crucial role to play in building a competitive food processing industry, and Ukraine's food processing sector was the leader in attracting foreign direct investments (FDI).

As of January 1, 2005, the total value of FDI in Ukraine was 8.4 billion dollars. The food industry was a major recipient of FDI at nearly $1.13 billion or 14 % of total investments. Major sources of foreign investments in Ukraine's food industry include the Netherlands (26.7 %), the United States (13.8 %), Germany (9.8 %), Cyprus (8.0 %), and Switzerland (7.6 %). Other sources of investments include the United Kingdom, Sweden, France, the Russian Federation, Denmark, Austria, and Belgium. Listed countries account for almost 90 % of total foreign investments in the Ukrainian food processing industry.

Foreign capital inflows are believed to be of key importance for the restructuring of the domestic food industry, since local capital markets appear to be insufficiently developed to provide the financial funds needed for the large-scale modernization and consolidation of food industry enterprises. In addition to financial capital, foreign investors also bring technological and managerial know-how, which are similarly in short supply. This central role of FDI for Ukrainian economic development results in attracting large inflows of FDI to become one of the major objectives in the country's strategy. Thus it is of interest for the Ukrainian government and foreign investors to examine the determinants of FDI in the food processing industry and forecast the future prospects of FDI inflows.

A closer look at the allocation of FDI between individual branches of the Ukrainian food industry provides an initial insight into possible investment motives of foreign firms. The beverage, tobacco and confectionary industries attracted the largest quantities of FDI in Ukraine, while enterprises active in the processing of fish and meat, grain milling and production of milk products received only relatively small amounts of foreign investments. Hence, FDI are mainly concentrated in activities towards the end of the value chain, linked to the final consumption stage. This pattern of FDI resembles Multinational Enterprises (MNE) activity in other CEE countries (OECD, 2002). KADITI (2004) assumes that one of the reasons for these is the aggressive marketing strategy of food industries in Western Europe in an effort to achieve economies of scale in production and distribution for their large varieties of highly differentiated products. Thus, the incentive to invest in the Ukrainian food sector might be mainly market seeking, together with the motive of escaping the high tariff and non-tariff barriers associated with the exporting of food products to the country. Actually, Ukrainian tariff rates for foodstuffs are high. Moreover, the import of foods to Ukraine is complicated by other barriers, such as sanitary and phytosanitary measures, compulsory certification of imports, outdated Ukrainian standards, corruption, and non-transparent and quickly changing legislation.

However, it can be expected that FDI in the Ukrainian food processing industry might also be motivated by the objective to benefit from lower production costs due to lower prices for natural resources (raw agricultural material) and/or cheap labor. It is therefore important to conduct a systematic empirical analysis of determinants of foreign investments in the domestic food industry. This study aims to construct a model for FDI inflows into the Ukrainian food industry and reveal the impact of different variables proposed by the theory and previous empirical work.

The remainder of the paper is organized as follows. In the next section we summarize the theoretical basis for the econometric analysis. Section 3 introduces the econometric models used to identify determinants of FDI in the Ukrainian processed food industry, while section 4 presents data. Section 5 presents obtained empirical results and section 6 concludes the paper.

2 THEORETICAL BACKGROUND

Early theoretical analyses of multinational firms considered FDI to be determined by ownership, location and internationalization advantages: The so-called OLI paradigm introduced by DUNNING (1977). Overall, Dunning concludes that foreign countries that attract investments by MNE have a large and growing market, a high gross domestic product (GDP), low production costs, and political stability.

Recent theoretical treatments have instead built general equilibrium models in which MNE arise endogenously. Since MARKUSEN (1984) and HELPMAN (1994), MNE general equilibrium theory has suggested two very distinct motivations for FDI: To access markets in the face of trade frictions (horizontal FDI), or to access low wages for part of the production process (vertical FDI). More recent work by MARKUSEN et al. (1996) and MARKUSEN (1997) combine both the vertical and horizontal motivations for FDI in one theoretical model, labeled the knowledge-capital model, and CARR et al. (2001) have proposed and estimated an empirical specification that explains world FDI patterns based on this knowledge-capital model.

One of the important issues of modern economic theory is the relationship between FDI and trade flows. Theories that rationalize substitutability are primarily based on the Heckscher-Ohlin model of international trade, where differences in factor movements are the major causes of trade between countries (MUNDELL, 1957; BRAINARD, 1997; GOLDBERG and KLEIN, 1999).

Discarding key assumptions of the Heckscher-Ohlin model leads to inferences of complementarity rather than substitutability. Capital may complement trade when there are technological differences between countries (PURVIS, 1972; MARKUSEN et al. 1995), or when countries base their trade relations on economies of scale (ETHIER, 1982). LIPSEY and WEISS (1981, 1984) found that affiliate sales increased exports, when measured at the aggregate country, industry and to some extent enterprise level. Moreover, FRANKEL (1997) stated that trade causes investment; and trade and FDI are expected to have a strong complementary relationship, especially after the Uruguay Round, as the establishment of more openness in trade has also led to liberalized rules for FDI.

3 METHODOLOGY

An ample empirical literature has developed around the issue of determining the forces attracting FDI in the food processing industry. Most empirical FDI analysis constructs bilateral panel data of FDI activity and specifies a list of gravity regressors that include the GDP of the host and home countries as well as distance between the home and host country. The choice of potential determinants depends not only on the subject discussed, but also on data availability. Factors such as market size, relative labor costs, interest rates, import protection, exchange rates, export orientation, market structure, geographical distance, political stability, and cultural similarity are some of the variables used most frequently.

As with trade flows, a gravity specification actually fits cross-country data on FDI reasonably well. However, there is no similar paper to ANDERSON and VAN WINCOOP (2003) that lays out a tractable model that specifically identifies gravity variables as the sole determinants of FDI patterns. In fact, intuition and theory suggest that MNE and FDI behavior is likely to be much more complicated to model than trade flows. CHAKRABARTI (2001) points out that the absence of a consensus on a theoretical framework to guide empirical work on FDI is rather conspicuous. Thus, it is perhaps not surprising that CHAKRABARTI (2001) finds that most determinants of cross-country FDI are fairly fragile statistically.

The most comprehensive empirical specification we have that is grounded to some extent in theory is modified gravity framework introduced by CARR, MARKUSEN and MASKUS (2001). Their empirical specification for the FDI from country j to country i in time period t is given by the following linear specification with a mean zero error term:[1]

$$\begin{aligned} FDI_{ijt} = \alpha + \beta_1 SUMGDP_{ijt} + \beta_2 GDPDIFSQ_{ijt} + \beta_3 SKDIF_{ijt} + \beta_4 (SKDIF_{ijt} * GDPDIF_{ijt}) + \\ \beta_5 TCOST_{jt} + \beta_6 TCOST_{it} + \beta_7 (TCOST_{it} * SKDIFSQ_{jt}) + \beta_8 DIST_{ij} + \varepsilon_{ijt} \end{aligned} \quad , (1)$$

where FDI[2] represents a measure of FDI activity, typically foreign affiliate sales or the stock of FDI in the host country.

The first two terms on the right-hand side account for country sizes which are most connected with the horizontal MNE aspects of the model. The first, *SUMGDP*, is defined as the sum of the two countries' real GDPs, and

1 CARR et al. also include in the specification an independent variable, "trade investment costs", which could not be included here due to a lack of data.

2 The subscripts for home and host countries and time are dropped for exposition purposes.

GDPDIFSQ is defined as the squared difference between the two countries' real GDP. Since horizontal MNE are most common between large countries of similar size, there is an expected positive correlation between *SUMGDP* and FDI activity and an expected negative correlation between *GDPDIFSQ* and FDI activity. The intuition is that with some positive level of trade frictions, larger and more similar sized markets better support the higher fixed costs associated with setting up production across countries (versus exporting) and lead to greater MNE activity.

The next two terms capture relative factor endowment effects and are related most to the vertical MNE aspects of the knowledge-capital model. *SKDIF* is a measure of the skill difference (proxied here by wage rate) between the parent and host country and is intended to proxy for relative factor abundance differences across countries. As higher skill level in the home country means higher production cost, it would lead to more affiliate production in the host nation and vertical FDI will be encouraged. Thus the higher the skill difference (*SKDIF*) between the home and host countries, the greater the level of FDI activity, and this variable should have a positive coefficient. The fourth term (*SKDIF*GDPDIF*) interacts skill difference with GDP differences between the parent and host country and is predicted to have a negative coefficient.

The last four terms on the right-hand side of equation (1) capture trade frictions. $TCOST_i$ is the trade cost in the host country (i.e. Ukraine) and is expected to have a positive coefficient, as higher trade costs in the host country make exporting to that market more expensive, increasing the relative benefits from FDI. On the other hand, trade costs in the home countries ($TCOST_j$) are expected to have a negative coefficient, since higher trade costs in the parent country make it more difficult to ship goods back to the parent country from foreign affiliates. This makes vertical FDI a less attractive option. The next term interacts host trade costs with the squared skill difference. When high trade costs exist, horizontal investment is preferred to vertical investment, whereas greater skill difference favors vertical investment. Thus an interaction between host trade costs and squared skill difference is expected to negatively affect FDI flow, weakening the direct effect of host country trade costs. Finally, *DIST* is the distance between countries. Since higher distances make both trade and control of overseas FDI more difficult, the net effect is ambiguous. It is included since it usually performs well in gravity-type models.

An important issue that requires an empirical answer is the interplay between FDI inflows in the food processing industry and food imports. The relationship between FDI and trade is unclear and generally little explored. Previous empirical studies focused mainly on determinants of FDI outflows and exports from developed countries. The earlier studies (CARTER and YILMAZ, 1999; MARCHANT et al., 1999) estimated both FDI and exports simultaneously, but they did not develop an explicit theoretical model. Alternatively, MARCHANT et al. (2002) and MAKKI et al. (2002) developed a simultaneous equation system for FDI and exports based on existing theoretical FDI models. In particular, MARCHANT et al. (2002) extend the BAJO-RUBIO and SOSVILLA-RIVERO (1994) FDI model, where a multinational firm chooses the level of FDI that minimizes the total cost of producing at home and foreign plants. MAKKI et al. (2003), on the other hand, consider the case of a firm that maximizes its profits, that is the BARREL and PAIN (1996) model.

Generally, results of empirical studies indicate that the relationship between FDI and exports in food processing industries tends to be substitutive between developed countries (GOPINATH et al., 1998, 1999) and complementary between developed and developing countries (SOMWARUU and BOLLING, 1999; CARTER and YILMITZ, 1999; MALANOSKI et al., 1997; MARCHANT et al., 1999, 2002; MATTSON and KOO, 2002).

Based on previous empirical literature, we specify the econometric model to estimate FDI inflows and food imports into Ukraine as a system of equations that accounts for many of the host country characteristics as well as some of the home countries' characteristics. The empirical model in the reduced form is expressed as:

$$\begin{aligned} FDI_{ijt} &= f(GDP_{it}, PCGDP_{it}, TAR_{it}, OPEN_{it}, EXCHR_{ijt}, WAGR_{ijt}, DIST_{ij}, EXP_{jt}, FDIST_{ijt}, IMP_{ijt}, \varepsilon_{ijt}) \\ IMP_{ijt} &= f(GDP_{it}, PCGDP_{it}, TAR_{it}, EXCHR_{ijt}, DIST_{ij}, EXP_{jt}, FDIST_{ijt}, FDI_{ijt}, \varepsilon_{ijt}) \end{aligned}, \quad (2)$$

where subscript i represents the host country (i.e. Ukraine), subscript j represents the home country, subscript t denotes time period; *FDI* is the FDI inflows into the Ukrainian food processing industry; *IMP* is a value of food imports; *GDP* and *PCGDP* are, respectively, the Ukrainian gross domestic product and gross domestic product per capita; *TAR* is the Ukrainian import tariff for food; *OPEN* indicates the openness of the Ukrainian economy, measured as a ratio of imports plus exports of goods to GDP; *EXCHR* is the real exchange rate expressed as a ratio of local currency (hryvnja) to the home country currency (indexed 2000 = 100); *WAGER* is the relative wage rate (ratio of the home country wage rate in manufacturing to corresponding Ukrainian wage rate); *DIST* is the distance between countries; *EXP* is the total value of food exports from the home country; *FDIST* is the FDI stocks in the Ukrainian food processing industry at the beginning of the year.

The choice of some explanatory variables (e.g. market size, per capita income, distance) may not require additional justification, while others may require some explanation.

The effect of trade barriers on FDI has been widely debated. MUNDELL (1957) proposed the tariff discrimination hypothesis arguing that FDI will be encouraged when there are obstacles to trade like tariffs, which make it difficult to export. According to this view, trade barriers have a positive effect on FDI and a negative effect on imports.

The degree of openness is related to the investment possibility and economic environment, as most investment projects are directed towards the tradable sector, and is expected to positively influence FDI.

Exchange rate is an indicator of strength (or weakness) of domestic currency to foreign currency. It is expected that exchange rates positively influence FDI; a depreciation of domestic currency causes an increase in FDI since it becomes relatively cheaper for foreign firms to buy assets or to build plants in Ukraine. And, *vice versa*, exchange rates negatively influence imports, as it becomes more expensive for domestic consumers to purchase foreign goods.

The effect of wages on FDI is rather controversial. Cheaper labor cost should encourage "efficiency-seeking" FDI; however, previous empirical studies have given conflicting results.

Total food exports from the home country are the indicator of its power on world markets, and are expected to have a positive impact on the value of food imported to Ukraine from this country. Moreover, the value of food exports to some extent reflects the development of the food processing industry in the home economy, as the main world food exporters are also the main investors. Consequently, the value of home country food exports is positively related to FDI.

Finally, imports could negatively or positively influence FDI; a positive parameter for imports indicates a complementary relationship between FDI and imports, while a negative parameter indicates a substitutive relationship. Much the same is true for the import equation.

4 DATA

Data on FDI in the Ukrainian food processing industry are obtained from State Statistics Committee of Ukraine. The data it provides are recorded in thousand USD and based on the quarterly statistical reports of enterprises.

FDI from offshore countries is a separate. As many Ukrainian and international analysts mention, there are rather large volumes of capital flight from the country. Usually, these financial resources are settled precisely in offshore countries like Cyprus (4th place in the list of investment leaders, with a total amount of FDI accumulated by the Ukrainian food processing industry equal to 90.5 million USD at the beginning of 2005). When some of this "flight" capital returns to the motherland, officially this process is treated as foreign investment. Offshores may be used by foreign investors as well. As it is impossible to reallocate FDI from offshore countries back to original source countries, they are excluded from our study.

GDP data, population, and exchange rates for each country are obtained from the IMF International Financial Statistics online service. Export and import data were obtained from the COMTRADE database. All money variables (GDP, GDP per capita, imports, and exports) are converted to 2,000 U.S. dollars to maintain a common unit of measures. Wages in manufacturing are obtained from the International Labor Organization online statistical database. The distance between countries is proxied by distance between capitals.[3]

One of the limitations of this study is the tariff data. We use MacMaps' online database (BOUËT et al., 2004) which lists ad-valorem import tariff equivalents by a two-digit HS code for each country used in the study for the year 2001. It is assumed in this study that tariffs prior to and after 2001 are the same as they were in that year. The aggregate food tariff for each country in a specific year is calculated as a trade-weighted tariff, with weights given to each two-digit product based on how much that product is imported in that year.

The data cover 22 countries for the years 1996 through 2004.

5 EMPIRICAL RESULTS

5.1 Determinants of FDI in food processing industry

We first test our hypothesis following the knowledge-capital model (equation 1). However, this equation was initially developed for affiliate sales as a measure of multinational activity. The problem is that data for affiliate sales are available for the United States and Sweden only. Still, the equation may be used for FDI stock and (to a lesser extent) for FDI flows as well, as was shown in BLONIGEN and DAVIES (2000). Thus, in our analysis FDI stocks in the Ukrainian food processing industry are used as a measure of MNE activity.

Another problem is that FDI data are highly skewed, with most of the activity confined to a few countries. One simple way to control statistically for this is to log the data, which is the typical practice with "gravity" models, whereas CARR et al. (2001, 2003) used interactions of variables in levels to deal with nonlinearities. However, the proposed linear model is not a structural equation derived from theory, so BLONIGEN and WANG (2004) suppose that there is nothing inherently inconsistent with specifying a log-linear model, and this functional form transformation is often used when data are highly skewed. The absence of consequences on this issue leads us to use both approaches.

During the estimation procedure, we specified different forms of the empirical model in order to better fit the data. Table 1 presents estimates for determinants of ingoing FDI in the Ukrainian food sector using classical regression models (OLS) and panel techniques (fixed effect model and random effect model.

First, we estimated classical OLS models. The R-squared and F-test statistics for the model in level form are quite good, but the coefficient estimates of trade costs have the wrong signs. Statistically significant are the coefficients on skill

[3] Computed using the online calculator available at <http://www.indo.com/distance>.

difference and interaction term between skill difference and Ukrainian trade costs (tariffs), which have expected positive/negative effects on FDI, respectively, and an unexpected positive coefficient on home countries' trade costs. However, the RESET test strongly suggests omitted variable bias or wrong specification, and the Breusch-Pagan test detects strong heteroskedasticity. As suggested by BLONIGEN and WANG (2004), for a better fit we take the log of the data. For the negative values of the interaction variable between skill difference and GDP difference, we follow BLONIGEN and WANG (2004) to set them to 0.1. The interaction terms on skill difference in the logged model become perfectly collinear with skill difference and, thus, two variables (skill difference and its interaction with host country trade costs) are dropped from the model. The logged model does not show a better fit (R-squared remains unchanged). However, this specification can pass the RESET test fairly well and has lower heteroskedasticity than the model in level form. All estimated coefficients, except the interaction term between skill difference and GDP difference, are statistically significant. As expected, FDI is positively related with the economic size of home and host countries and negatively associated with difference between them. On the other hand, the obtained coefficients on trade costs are unexpected.

Table 1: Estimations for the FDI inflows in the Ukrainian food processing industry, knowledge-capital model results

Variables	OLS model		Fixed Effects Model		Random Effects Model	
	Levels	Logs	Levels	Logs	Levels	Logs
SUMGDP	10.88	1.98^{***}	15.10^{**}	2.72^{**}	16.15^{**}	1.43^{**}
	(1.36)	(3.83)	(2.02)	(2.55)	(2.30)	(2.08)
GDPDIFSQ	0.0003	-0.35^{*}	0.0004	0.064	0.0003	-0.037
	(0.46)	(-1.69)	(0.87)	(0.21)	(0.72)	(-0.14)
SKDIF	1454.59^{***}	dropped	-723.02^{**}	dropped	-555.42^{*}	dropped
	(3.28)		(-2.11)		(-1.69)	
SKDIF*GDPDIF	-0.12	0.086	0.096^{*}	0.010	0.075	0.056
	(-0.95)	(0.97)	(1.66)	(0.03)	(1.32)	(0.37)
$TCOST_j$	350.67^{**}	1.40^{***}	-370.58	-0.91	-186.46	0.76
	(2.14)	(3.41)	(-1.36)	(-0.69)	(-0.77)	(1.02)
$TCOST_{i\ (Ukraine)}$	-528.36	-2.42^{***}	-124.49	-1.38	-188.81	-1.69
	(-1.64)	(-3.04)	(-0.26)	(-0.56)	(-0.43)	(-1.18)
$TCOST_i$*SKDIFSQ	-0.13^{***}	dropped	0.104	dropped	0.069	dropped
	(-2.85)		(1.62)		(1.10)	
DIST	-0.21	-0.19^{*}		dropped	-11.85	-0.195
	(-0.04)	(-1.68)			(-1.24)	(-1.17)
Intercept	11045.63	6.68^{**}	43184.9^{*}	-2.07	56237.7^{*}	6.09
	(0.68)	(2.59)	(1.70)	(-0.19)	(1.93)	(1.22)
Observations	198	198	198	198	198	198
Adj. R^2	0.223	0.223	0.102	0.163	0.083	0.216

Source: Own calculations.

Notes: T-statistics (z-statistics for random effect model) are given in parentheses; *, ** and *** denote significance levels at 10 %, 5 % and 1 %, respectively.

Although the OLS model fits the data quite well, the LM test allows us to conclude that the classical regression model with a single constant term is inappropriate for our data. Since the country-specific characteristics may generate unobserved differences, we include country effects into the model. The LM test rejects the OLS model in favor of a random effects model. However, another competing specification might induce the same results: The fixed effects model. Moreover, empirical studies suggest that using a fixed effects model in our case is preferable to a random effects model, as when the data contain all existing cross-sectional units, a fixed effects model performs better. Thus, we estimate a fixed effects model and a random effects model and conduct a Hausman test to check whether there is any difference in the true coefficients of these two models.

Columns four to seven of Table 1 report the estimation results of the fixed effects model and random effects models. These models have much lower R-squared values and thus lesser explanatory power, than the classical OLS model. Based on the Hausman test, we can conclude that among these models the fixed effects model is the better choice. As can be seen, outcomes from these models (in level form and in logs) show mixed results. The coefficient estimates for the sum of the countries' market size and the home countries' trade costs have expected signs, but the latter is not significant. As in the case of the OLS model, obtained results suggest that Ukrainian food tariffs have no impact on the investment decisions of MNE, as the coefficient on host country trade costs is negative, although it is insignificant. Obtained coefficients on GDP difference and interaction terms on skill difference have the wrong signs, but they are statistically insignificant. The most surprising result is the negative and significant coefficient on skill difference, which is contrary to the theory and the results of the OLS model. This implies that obtained empirical results are highly sensitive to the choice of regression model. As both models (i.e. OLS and fixed effects model) suffer from some weaknesses, it is impossible to draw a precise conclusion about the impact of skill difference between Ukraine and the home country at the level of FDI into the domestic food industry.

Relationship between FDI and imports

The empirical model of FDI inflows and food imports (equation 2) contains equations that are independent of each other, as they are not estimating the same dependent variable and have different independent variables. However, FDI and imports are endogenous since imports are the function of FDI, and FDI is a function of imports. Moreover, the equations use the same data, and it would be reasonable to allow contemporaneous correlation among the error terms. We use the Seemingly Unrelated Regression (SUR) method, which produces more efficient estimates of parameters when errors are correlated between equations (GREEN, 2003). This empirical specification allows us to determine endogenous variables as a system of equations and facilitate the discussion of how each explanatory variable affect different endogenous variables simultaneously.

All variables are expressed in levels. Although for estimation purposes it is more convenient to express variables in the natural logarithms, a large quantity of negative observations on FDI flows does not allow this alternative to be used.

Table 2 presents parameter estimates from the system of FDI and import equations. Results indicate that FDI inflows in the Ukrainian food processing industry and food imports are complements. FDI flows are found to have statistically significant and positive effect on imports, and *vice versa*. Moreover, FDI flows are positively influenced by the value of FDI stocks. These imply that countries which have invested in the Ukrainian food industry in previous years tend to make further investments. On the other hand, FDI stocks were negatively related to imports, although the coefficient is not significant. Countries that have made sizeable investments in the Ukrainian food industry are likely to rely to a greater extent on local production than on imports.

Table 2: Estimations for FDI and food import flows into Ukraine

Variable	FDI equation		Import equation	
	Parameter estimate	z-value	Parameter estimate	z-value
GDP	4779.25^{***}	2.56	-3011.99	-1.07
Per capita GDP	-219.17^{***}	-2.57	157.07	1.22
Tariff	-46.94	-0.80	254.72	1.43
Openness	31265.24^{*}	1.70		
Exchange rate	-6.75	-0.24	-95.86	-1.12
Wage rate	36.16	0.94		
Distance	-0.24	-0.39	3.097^{*}	1.67
Total food exports	0.06	0.56	0.78^{**}	2.49
FDI stocks	0.08^{***}	4.86	-0.02	-0.45
FD inflows			0.82^{**}	3.91
Imports	0.09^{***}	3.90		
Intercept	-37069.60^{*}	-1.81	-2739.25	-0.17
Adj. R^2	0.279		0.210	

Source: Own calculations.

Notes: *, ** and *** denote significance levels at 10 %, 5 % and 1 %, respectively.

One of the most important determinants of FDI is market size. As we expected, market size, indicated by host country GDP, is positively related to FDI inflows. An increase in Ukrainian GDP causes an increase in investments since foreign firms may decide to take advantage of greater market opportunities. On the other hand, per capita income appears to be negatively related to FDI. The estimated parameter is negative and statistically significant. Similar results were obtained by MAKKI et al. (2003) for the case of developed countries; at the same time in developing countries higher per capita income evidently attracted FDI. Possible explanations of these unexpected results may be found when we look at empirical results for the import equation. They indicate that an increase in host country GDP causes a decrease in the value of food imports, but per capita GDP is positively related to imports, although both coefficients are statistically insignificant. This suggests that demand for processed food, including imports, tends to increase with income, but the growth of the whole economy measured as total GDP implies the growth of domestic food production, which substitutes for imports.

The openness of countries is an important factor influencing foreign investment. Our analysis indicates that openness is positively associated with FDI, and significant. Tariffs for food, unexpectedly, are negatively related to FDI and positively related for imports; however, coefficients are not significant. This is in contrast to the tariff-jumping hypothesis of FDI. A possible explanation may be found in the Ukrainian tariff structure. Higher tariffs are usually applied for high-value processed food, which accounts for a base of imports from developed economies. Thus these countries face a high aggregate tariff for food and, as they are the main food exporters to Ukraine, the relationship between tariffs and food imports is positive.

The exchange rate captures the effects of broader economic policies on both FDI and trade. Exchange rates were found to negatively influence FDI, but it is statistically insignificant. Thus, the depreciation of the Ukrainian currency does not attract foreign investors. As expected, the exchange rate negatively affects imports, as it becomes more expensive for domestic consumers to purchase foreign goods.

The findings regarding wage rates are consistent with our hypothesis. Multinational companies often choose production locations based on labor costs. For this study, the wage rate is expressed as ratio of home country wages in manufacturing to the corresponding Ukrainian wages. Our results show a positive relationship between FDI and wage rates, as expected.

Empirical results indicate that distance has little impact on MNE decisions to invest into the Ukrainian food industry. However, distance is found to be positively related to imports, and this finding is not consistent with the theory. A possible explanation for this unexpected relationship is the structure of domestic food imports. The main food exporters to Ukraine are western economies, which are more distant than neighboring CIS countries.

The total food exports from the home country is found to have a positive and significant impact on the value of food imported into the domestic market from this country, as expected, but has a little explanatory power in case of FDI.

Therefore, the results of our study indicate a bidirectional complementary relationship between FDI inflows and food imports into Ukraine. This finding is consistent with empirical results obtained by other researchers for developing countries. However, to some extent the relationship between imports and FDI is based on the level of data aggregation. Aggregate data may mask identification of the substitution effects and exaggerate the complementarity effect (BLONIGEN, 1999). Therefore, obtained results should be treated with cautious.

6 CONCLUSIONS

This paper has analyzed the determinants of ingoing FDI in the Ukrainian food processing industry. The contradictory results of the empirical study suggest that the knowledge-capital model, as well as the simultaneous equation system for FDI and food imports applied in the study, is not able to fully capture the complexities of the real world of foreign trade and production by the food industry. However, some important conclusions can be drawn from the analysis.

Strong support was found for the explanatory power of the sum of the countries' market size and market size of a host country, as measured by GDP, in its FDI. An increase in Ukrainian GDP causes an increase in investments, since foreign firms may decide to take advantage of greater market opportunities. This finding confirms a hypothesis that the main incentive to invest in the Ukrainian food sector might be market seeking. At the same time tariffs for food, unexpectedly, are negatively related to FDI, which is contrary to the related tariff-jumping hypothesis. Relative wages in manufacturing may also play a role, as multinational companies often choose production locations based on labor costs. However, the empirical results are highly sensitive to the choice of regression model. Finally, a complementary relationship is found between FDI in the Ukrainian food industry and corresponding imports, which is consistent with earlier findings for developing countries.

In addition, the obtained results suggest possible areas for further research. First, it might be useful to include industry-specific variables in the analysis. A particular advantage of this approach is that it allows identification not only of country-aggregate, but also industry-specific determinants of FDI and any interaction between them. Moreover, in an empirical investigation of FDI in a particular industry of single country, such as one carried out in this paper, industry-specific variables are likely to have more explanatory power than country-level ones. Second, the complex motivation for FDI is likely to require modeling in a multilateral context, a context in which an MNE considers home, host and third country characteristics when choosing enterprise activities. For example, the multinational firm might choose the most preferable host country for its FDI and use this market as a platform to serve other markets through exports, presumably leaving other neighboring countries in a low-FDI "shadow". Thus it may be fruitful to develop an empirical model of MNE activity in a multi-country world that could predict how a variety of neighboring country characteristics (GDP, trade costs, endowments, etc) should affect FDI in the Ukrainian food industry.

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FARM EFFICIENCY AND PRODUCTIVITY

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ALLOCATIVE EFFICIENCY OF CORPORATE FARMS IN THE LENINGRAD REGION

*DAVID EPSTEIN**

ABSTRACT

The article presents an analysis of the allocative efficiency of using resources. We compare the values of marginal products within primary types of resources with their cost, which allows us to make conclusions concerning insufficient or excessive use of these resources. By analyzing data from the Leningrad Region with the Cobb-Douglas production function, the author comes to the conclusion that there is considerable underuse and deficit both of labor and, especially, of monetary resources. This deficit results from the low share of profits in the revenue of agricultural enterprises (3-5 percent) and cannot be overcome without a state policy that supports agricultural producers' incomes, which still remains very weak in the country.

Keywords: *Allocative efficiency, corporate farms, transitional agriculture, Russia.*

1 PROBLEM DEFINITION

In an earlier paper we analyzed the differences in the financial and economic performance and efficiency of agricultural enterprises, having divided them into five groups using a special algorithm (EPSTEIN, 2000; EPSTEIN, 2005). The best group in terms of financial and economic performance became Group 1, the less successful being Group 2, while the least successful was marked as Group 5. We saw that the differences in financial and economic performance are, by more than 50 percent, determined by the quality of managing the enterprise. So the question arises of how efficient is the use of different types of resources, taking their price into account, i.e., what the allocative efficiency is. This concept is

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related to the application of the production function and the calculation of the marginal products of resources used. When the circumstances of competition are close to perfect, the quantity of a resource used by the enterprise is set at a level where this resource's marginal product coincides with its cost. An excess in the cost of the marginal product per unit of a resource over the cost of the resource demonstrates an underuse of this resource, while an increase in the use of a resource can result in an increase in the enterprise's profit. By contrast, a significant excess of a resource's cost per unit over the price of the marginal product points to the excessive use of this resource. The criterion of allocative efficiency is thus the ratio between the marginal product of the resources and their costs.

We would like to pay special attention to estimating the allocative efficiency of using monetary resources (cash) by evaluating them using various indicators (material costs[1], monetary material costs[2], credits and loans). Our hypothesis is that, due to certain distinctive features of agricultural markets, without a special state regulation system, agricultural enterprises face a significant deficit of monetary resources. One of the indicators of this deficit is the extremely low profitability of Russian agriculture, which amounted to an average of 4.8 percent in 2000-2004 (ratio between profits (subsidies inclusive) and the cost of production) (Russian Statistics Yearbook, 2004, p. 593). If there is a monetary deficit, developing institutions as well as a general policy of financial support for agricultural enterprises, which exists in virtually every developed country, is needed. If there is no deficit, other institutional measures are needed, for instance, strengthening the bankruptcy policy and reducing the state support, which was observed in the recent years.

2 DATA AND METHODOLOGY

Classification is based on two solvency measures, defined in the caption to Table 1. Both measures calculate a ratio of the coverage of fixed costs (in the denominator) by value added (sales revenue less the cost of purchased and intermediate inputs) in the nominator, but they use two different definitions of fixed costs. K1 is calculated with the full wage cost, plus full depreciation in the denominator. K2 is calculated with minimal wage cost[3], plus depreciation of the machinery, equipment and vehicles in the denominator. It thus provides a measure of contribution from sales to fixed costs.

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1 Purchased and intermediate inputs.
2 Purchased inputs.
3 In our analysis, we set the minimum wage at 50 % of the average wage for the Oblast.

Table 1: Algorithm for the solvency classification of corporate farms

Solvency groups	K1 = (Revenue − Input costs)/(Wages + depreciation) K2 = (Revenue – Input costs)/(Minimum wages + farm machinery depreciation)
1 (best)	K1 ≥ 1
2	K1 < 1 and K2 ≥ 1
3	K2 < 1 and K2 ≥ 0
4	K1 < 0 and K1 ≥ −0,3
5 (worst)	All others

If K1 is greater than 1, the farm generates some surplus after paying its workers and covering its depreciation expenses, and can continue to grow. If K1 equals 1, the farm can at least maintain the labor and fixed assets at a stable level, without attrition. If, however, K1 is less than 1, the value added does not cover the fixed costs and the farm needs to raise external capital (i.e., to borrow) in order to grow or just stay in place. If no borrowing is possible, the farm will be forced to reduce its labor or its asset base (or both). Yet even farms with K1 < 1 can continue to survive if their gross earnings are sufficient to cover the minimum (reservation) wages and the depreciation of farm machinery, equipment and vehicles (excluding farm buildings). This less restrictive solvency measure is captured by the ratio K2, which is calculated by the minimum wage cost plus machinery depreciation in the denominator. If K2 is greater than or equal to 1, the farm can manage to keep its workforce and main production assets even without making a profit. If, however, K2 is less than one, the operating earnings are not sufficient to cover even these minimum requirements.

The algorithm used to classify the farms into five solvency groups is shown in Table 1. The best and the worst performers (groups 1 and 5, respectively) are identified using only the ratio K1. Identifying the intermediate performers (groups 2 and 3) requires the ratio K2.

To calculate the marginal products we plot a revenue production function. The data on spending resources are partially presented in kind (labor, land) and partially in value terms – as the costs of the used resources (material cost, fixed assets, credits).

All agricultural enterprises (corporate farms) in the Leningrad Region that submitted data for 2001 to the National Statistics Committee [Goskomstat] are used as the basic body of the data. The Leningrad Region's agricultural sector is one of the most efficient in the country, thus, if we find here shortage of money, this shortage could be expected for corporate farms in other regions. Besides, this region has a considerably full database of all enterprises.

Since the allocative efficiency of various specializations (for instance, poultry farms and, typical for the Leningrad Region, farms producing milk, potatoes and vegetables) can differ significantly owing to different technologies used, it is incorrect to evaluate it using one production function. Therefore, we withdrew monospecializing farms from the sampling. The latter include poultry farms, greenhouse farms, farms that feed pigs and cattle using purchased fodder, and farms that produce animal fur.

The remaining sample consists of 158 farms. When plotting the regression equations, the exact number of farms may be lower if this or that indicator is not included in the reporting of all farms.

For our analysis we plotted the sales revenue production function in a Cobb-Douglas form, and, based on this, calculated the marginal products of the following types of resources: Basic (fixed) production assets (F) in thousand roubles; labor resources (L) in people; material costs (M) in thousand roubles; agricultural land (S) in hectares.[4]

The fixed assets' cost estimation for a considerable number of the farms is based on their initial cost, taking into account the rarely-done reappraisal. At the same time, as the experience of plotting production functions shows, given a high inflation rate, this indicator (the initial cost of the fixed assets) is often insignificant, which is related to the drawbacks of its evaluation by the farms. Using the depreciated cost of permanent assets is also of no statistically important influence. However, refusal to use any indicator characterizing the size and influence of the fixed capital would result in an overstatement of the coefficients of other resources. In the allocative efficiency estimation, this would mean *a fortiori* erroneous results. We therefore used the initial cost for the indicator of "cost of machinery and equipment, vehicles" (we shall keep the F symbol for this indicator). As the machinery and equipment belong to the most frequently upgradeable part of basic capital, the inaccuracy in calculating it is significantly lower than that when calculating the cost of fixed assets. The cost of "machinery and equipment, vehicles" is generally a significant indicator in the regression equations of the production function.

The Cobb-Douglas function allows us to calculate the value of the marginal product of primary resources.

Indeed, if we only have the four above-mentioned factors (L, M, F, S), then

$$Y = CL^{a_1} M^{a_2} F^{a_3} S^{a_4} \ . \tag{1}$$

The value of the marginal product is determined as the first derivative of Y of this resource. Let us present the computations for the labor force (L):

$$\frac{\partial Y}{\partial L} = a_1 C L^{a_1 - 1} M^{a_2} F^{a_3} S^{a_4} \cdot \frac{L}{L} = a_1 \frac{Y}{L} \ . \tag{2}$$

It is obvious that the marginal product of labor with the given number of workers is equal to the value of the a_1 coefficient to L, multiplied by the average labor productivity calculated using the production function.

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4 Using the trans-log function in this case results in significant multicollinearity.

However, with the increase in the number of workers per person there is an increase not only in revenue, but also in expenditures – on average, amounting to the sum of remuneration of labor with additional social payments. This means that if the average wage with social payments at an enterprise is lower than the marginal product per worker, equal to a_1Y/L, the additional profit per each additional worker will increase, while profitability will increase with the growth in the number of workers, and vice versa.

Similarly, the partial derivative of Y to M is equal to:

$$\frac{\partial Y}{\partial M} = a_2 \frac{Y}{M} . \tag{3}$$

If the calculated value of the marginal product per rouble of material costs is higher than one, a deficit occurs and there is an underuse of material cost[5], while if the marginal product is lower than one, there is an excessive use of material resources, resulting in the decline of profitability.

Marginal products in other types of resources are calculated similarly.

The marginal product equations above are true if the actual production output coincides with the amount of revenue Y (prescribed by the production function). It also remains true if there is a permanent proportional deviation of the actual revenue from the calculated one, which can be the case in each of the groups.

3 RESULTS

3.1 Average allocative efficiency of the primary types of resources

Below we present the characteristics of the primary types of resources, labor, land, capital, material resources, in general, and in the context of the five groups of enterprises.

[5] Purchased and intermediate inputs.

Farm characteristics across solvency groups

The distribution of the main financial and physical characteristics of Leningrad Oblast farms in 2001, by solvency groups, is presented in Table 2. The number of farms is distributed fairly uniformly, with about one-third of the farms in the best two groups and one-third in the worst two groups, respectively.

Table 2: Main characteristics of corporate farms in Leningrad Oblast, 2001 (per farm averages)

	Number of corpo-rate farms	Sales revenue (rubles)	Number of workers	Ag. land (ha)	Material costs (purchased and inter-mediate inputs) (rubles)	Value of machines, equip-ment, vehicles (rubles)	Annual wages per worker, '000 rubles (including social deductions) (rubles)	Deprecia-tion (percent of sales revenue)
1 (best)	11	83236	515	3397	50307	33053	44336	6.1
2	35	39641	315	2997	28424	15106	40181	6.5
3	53	18077	186	2578	16273	8535	30323	9.9
4	24	18157	212	2624	19105	8982	29624	9.5
5 (worst)	34	10684	148	3158	13844	6601	22474	22.9
All farms	157	25860	234	2861	21273	11367	31700	11.9

Source: Own calculations.

In the context of the groups, the above indicators demonstrate a natural decline in resource security with an increase in the number of the group, with the exception of land resources.

Below are the characteristics of the three revenue regression equations. As the indicator of running costs, the first equation contains material costs; in the second equation, material costs are divided, based on statistical data, into monetary and non-monetary costs (CASH_M, NONCASH_M). In the third equation, an additional indicator of the sum of credits and loans (CRED) was introduced, while the material costs are, respectively, decreased by the sum of credits and loans (MMCRED[6]). The equations differ in the number of farms, as some data were missing for some farms. Credits and loans are mainly used by relatively successful farms.

[6] M minus CRED.

Table 3 Regression equation characteristics of revenues from primary factors and resources

Indicator	Equation 1		Equation 2		Equation 3	
	Coefficient	t - ratio	Coefficient	t - ratio	Coefficient	t - ratio
Dependent variable: Sales revenue, '000 roubles						
Constant	0.264	2.977	1.468	5.088	-5.152	-6.941
Number of workers, L, persons.	0.378	5.289	0.358	4.691	0.433	4.361
Agricultural land, ha	-0.267	-6.224	-0.202	-4.650	-0.125	-3.478
Value of machinery and equipment, F, '000 roubles	0.132	3. 870	0.116	3.359	0.135	2.749
Material costs (purchased and intermediate inputs), M, '000 roubles	0.796	14.268				
Monetary costs, CASH_M, '000 roubles			0.423	13.174		
Non-monetary costs, NONCASH_M, '000 roubles			0.360	9.874		
Credits and loans, CRED, '000 roubles					0.166	6.322
MMCRED, '000 roubles					0.552	7.694
N		157		126		113
R^2		0.956		0.966		0.952
Standard error		0.242		0.216		0.266
F		832.6		678.2		420.5

Source: Own calculations.

Notes: OLS estimation of Cobb-Douglas models in logged variables. All the coefficients significantly different from zero ($p < 0.01$).

We see that the equations have high coefficient values that are of statistical importance, and that all resources, except agricultural land, obtain positive regression coefficients[7].

The given equations allow us to calculate the marginal products of the resources and compare them with the costs of the resources.

The evaluation of the marginal product of labor and material costs, the value of machinery and equipment is given based on the calculated coefficients by means of calculating logarithmic values of resources and production output (Table 4).

Table 4: Evaluation of primary resources' allocative efficiency

Resource	Regression coefficient, a	Resource average value, r	Revenue Y calculated using production function	Resource average productivity Y/ r	a*Y/r	Resource cost, '000 roubles	Resource excessive or insufficient use
Number of workers, persons	0.378	233.78	23,522.13	100.616	38.03	31.7	Insufficient
Material costs, '000 roubles	0.796	21273	23,522.13	1.106	0.88	1	Excessive
Machinery and Equipment, '000 roubles	0.132	11367.4	23,522.13	2.069	0.27	0.1	Insufficient

Source: Own calculations.

It is obvious that the marginal product of the number of workers is higher than its cost, which demonstrates its underuse.

The average use of material resources is excessive, as the marginal product per thousand roubles is only 880 roubles. However, this is the average result for all farms, although significant differences in allocative efficiency between the groups could be expected. Taking the hypothesis of money deficiency into account, it is therefore appropriate to separately consider the ratio between the marginal product and the costs of resources for the monetary and non-monetary parts of material costs.

The marginal product of one thousand roubles in the cost of machines and equipment amounts to 270 roubles, significantly higher than the expected "normative cost of the resource", which is 100 roubles for machinery and equipment, calculated based on the normative usage expectancy period of 10 years. In fact, we see that the use of machinery and equipment is highly profitable in modern Russian conditions, while the "machinery and equipment" resource can

[7] The negative sign for agricultural land has long been typical of the Cobb-Douglas equations applied to farms in the Leningrad Region (we witnessed this effect starting with data from 1980) and can possibly be explained by the fact that the region is dominated by milk cattle breeding and the weaker farms located in remote parts of the region have larger areas of agricultural land.

be defined as highly scarce. The big gap between the value of machinery's marginal product and the cost of the resource demonstrates a high deficiency in monetary resources among the corporate farms. Otherwise, the farms would increase the amount of equipment and this gap would be significantly lower.

We will further consider allocative efficiency in the context of groups of farms, and will then make a detailed analysis of the efficiency of using monetary resources and credits.

3.2 Allocative efficiency of using main resources by groups of farms

Below is the ratio between the marginal product and the resource costs for each of the five groups based on the coefficients of equation 1. They are calculated in the same way for the whole body of farms, with the average values of resources in each group being taken as the parameters of the groups.

Table 5: Ratio between the marginal product and the cost of resource by groups, for labor, capital, material costs

Indicators/ Groups	1	2	3	4	5	Average
Number of farms in group, 2001	11	35	53	24	34	157
Marginal product for labor	61.04	47.50	36.68	32.41	27.25	38.03
Remuneration for one worker with additional payments, '000 roubles	44.34	40.18	30.32	29.62	22.47	31.7
Ratio between marginal product and remuneration of labor for groups, percent	1.38	1.18	1.21	1.09	1.21	1.20
Excessive or insufficient use of labor	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Marginal product per one rouble in the cost of capital (Machinery and equipment), rouble/rouble	0.33	0.35	0.28	0.27	0.21	0.27
"Price" of one rouble in the cost of machinery and equipment calculated based on the expected usage of 10 years, roubles	0.1	0.1	0.1	0.1	0.1	0.1
Excessive or Insufficient use of machinery and equipment	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Marginal product per one rouble of material costs, rouble/rouble	1.32	1.11	0.88	0.76	0.61	0.88
Excessive or insufficient use of material costs	Insufficient	Insufficient	Excessive	Excessive	Excessive	Excessive

Source: Own calculations.

It is obvious that there is a deficiency in labor usage and that profitability grows for all groups with an increase in the number of employees. A deficiency in the number of qualified workers seems to impede the further increase of the total number of employees.

A similar situation can be found using capital represented by the cost of machinery and equipment indicator. Even in Group 5, the marginal product per rouble invested in machinery and equipment exceeds 0.2 roubles, and is thus twice as big as the normative return. The deficit of capital is obvious and is an unexpected conclusion, since a number of experts think that there is abundance in machinery, especially in weak farms. In reality, even weak farms using it fairly effectively, though its numbers are insufficient.

The situation with material costs is radically different. Only the first two groups use material resources profitably, though they have a deficit of these resources. But Groups 3-5 face significant losses from each additionally-invested rouble of material costs**.** The considerable decrease in material costs per production unit are the condition for making this resource profitable.

This is a rather important conclusion: Material costs in general are effectively used only by the first two groups. This conclusion seems unexpected at first glance; due to the obvious deficiency of monetary resources in the enterprises from Groups 3-5, they need to spend money efficiently. This leads us to a more detailed analysis of the marginal product of material resources issue, taking into account that material costs are a fairly complicated aggregation. Apart from the monetary material costs[8], they also contain self-manufactured products (seeds, feed, dung, etc.), as well as the costs of the resources received as a result of barter exchange. In this situation, there is an obvious overstatement of the amount of non-monetary material costs by weak enterprises in their balance sheets, as they are being evaluated by the self-cost, which is generally significantly lower than the actual market price.

In the next section we will analyze the allocative efficiency of using monetary and non-monetary material resources, as well as credits, using equations 2 and 3 as presented above (see Table 3).

3.3 Allocative efficiency of using monetary resources and credits

We included the amount of monetary resources per rouble of material costs in Table 6. It is apparent that it is much lower than 1 for all groups of this sampling, and is lowest for the farms in Groups 4 and 5.

8 Purchased inputs.

Table 6: Marginal product and efficiency of monetary and non-monetary material costs by groups of enterprises

Indicators/ Groups	1	2	3	4	5	Average
Number of farms in group	7	25	44	22	28	126
Monetary expenditure as payment for purchased goods and services per 1 rouble of material costs, rouble/rouble	0.623	0.527	0.485	0.430	0.270	0.483
Marginal product of monetary material costs, rouble/rouble	1.10	1.08	0.97	0.94	1.20	1.09
Marginal product of non-monetary material costs, rouble/rouble	1.55	1.03	0.78	0.60	0.38	0.87

The given calculations demonstrate that if monetary costs are considered as an independent factor, the **farms of all groups use monetary material costs with a return close to the minimum necessary.** The marginal product per rouble of cash input costs in Groups 1, 2, and 5 is greater than 1 rouble, and Group 5 achieves the highest return. Farms in Group 5 thus experience the most pronounced cash shortage, and their cash resources are accordingly used with maximum return.

The allocative efficiency of using monetary resources in Groups 3 and 4 is close to the optimum. The deficit of monetary resources in these groups is concealed by their inadequately efficient use. **For three groups out of five, the significant deficit of monetary resources is obvious.**

Non-monetary material resources are efficiently used only by Groups 1 and 2, while in Groups 3 and 5, their marginal product is significantly lower and declines with the number of the group. As we have already stated, this can be explained by an overstatement of the amount of non-monetary material costs by weak enterprises, since they evaluate their own production at its self-cost. For weak enterprises, the latter is generally much lower than the market price. To be able to use the non-monetary inputs efficiently, they should significantly decrease their expenditures per rouble of revenue. By contrast, the enterprises of Groups 1 and 2 could receive additional profit from increasing the use of non-monetary inputs. It is important here that the deficit of monetary resources can be found in farms of all groups.

Analysis of the allocative efficiency of monetary material resources thus clearly points to the deficit of monetary resources. The reason of this deficit is well-known – it lies in the disparity of prices, resulting in unfairly low profitability of agricultural enterprises.

Our conclusion on the deficit of monetary resources is supported by the allocative efficiency analysis of using short-term credits and loans.

In 2001, credits and loans in the Leningrad Region were given to slightly over 130 enterprises, i.e., to approximately two-thirds of the farms. Since highly-specialized industrial enterprises were excluded from the analyzed body, 113 enterprises remained.

Equation 3 (Table 3) demonstrates that an increase in credit results in a statistically important positive influence on the output of farms, and the marginal product per rouble of credit is higher than one rouble, i.e., there is a certain deficit of credits. In Table 7, the values of credit's marginal product for the five groups of enterprises can be found.

Table 7: Marginal product per rouble of credits and loans for five groups of enterprises

Indicators/Groups	1	2	3	4	5	Average
Number of farms in group	13	28	31	20	21	113
Marginal product of credits and loans for enterprises, rouble/rouble	1.51	1.12	1.07	0.93	1.07	1.06

Source: Own calculations.

The average marginal product of credits is somewhat lower than one-third of the Central Bank of Russia's rate, which was 24 percent in 2001. The state reimburses no more than two-thirds of the Central Bank's interest rate to the farms. However, commercial credits are provided at higher rates than the Central Bank's rate. Thus, with the Central Bank's rate of 24 percent, the state reimburses no more than 16 percent, but with the commercial credit rate of, for instance, 26 percent, the farms have to pay 10 percent (the difference between 26 and 16) themselves. For Groups 3-5 the marginal product is significantly lower than the required 10 percent. That means that even the subsidized credit rate is too high for the weaker groups' farms due to low production profitability.

4 CONCLUSIONS

We can conclude that 1) credit is a deficit resource for farms in the Leningrad Region, and 2) relatively low profitability for enterprises in Groups 3-5 is an obstacle to its expansion.

Thus, the results demonstrate a deficit of both labor and monetary resources in the farms, and a deficit of capital. This deficit cannot be overcome without a state policy that supports the incomes of agricultural producers, which is now very weak.

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PATHWAYS TOWARDS EFFICIENT LEVELS OF MACHINERY INVESTMENTS NEEDED FOR THE SUSTAINABLE DEVELOPMENT OF ARABLE FARMS IN BULGARIA

*NIKOLAY NAYDENOV**

ABSTRACT

The paper discusses conceptual issues of machinery investment at the micro level. Empirical evidence is provided for power intensity of mobile farm machinery used on cultivated farm land in grain production areas of Bulgaria. Improved models of break-even budgeting of machinery investment projects have been developed, taking into account the losses of yield due to the non-timeliness of operations and the difference between field reliability characteristics. Analysis of the factors influencing machinery-acquiring policy shows that investment decisions should be taken carefully because of the differences in farm sizes in the EU and Bulgaria, as well as the considerable subsidies for agriculture in EU countries. It is concluded that decision models and criteria used will not only have to assess the economic benefits, but also requirements for the sustainable development of rural areas' social factor.

Keywords: *Sustainable agriculture, power intensity, machinery investments.*

1 INTRODUCTION

Bulgaria's transition to a market economy raises various questions for the sustainable development of agricultural farms in terms of their competitiveness through efficient use of long term assets, labor, management expertise, etc. The level of machinery investments is of crucial importance for arable farming because of the capital-intensive character of the business and the need for renovating machinery fleets.

The approach for estimating the rational machinery fleet at the farm level is to take into account the opportunities for flexible solutions of small versus large

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productive machinery aggregates in competition with the use of mechanization services for some field work. Machinery investment policy has to apply models of capital for labor substitution and take into consideration technological and social factors. These issues will have to be generalized as well in light of EU requirements for sustainable development of rural areas.

2 POWER INTENSITY OF MACHINERY FLEETS IN BULGARIAN ARABLE FARMS BEFORE EU ACCESSION

Surveys in Bulgaria and other pre-accession countries showed that the level of power intensity for agricultural machinery was below the rate experienced in the EU-15. The research done by the author in the north-central & northeast regions of Bulgaria (the "Wheat belt" zone) (NAYDENOV and JOTOVA, 2004) was based upon the hypothesis that the power intensity of mobile agricultural machinery fleets in arable farms essentially depends on farm size, in terms of the cultivated land. The objects of study were the fleets of mobile machinery in a sample of 154 agricultural farms (115 cooperatives and 39 large land renters) of arable specialization. The average size of the surveyed farms was 991.6 hectares of cultivated land.

It was proven that a significant negative correlation exists between the power intensity in kW per 100 hectares and the cultivated land in the farm (see Table 1). The regression equation for farm size between 100 and 3,000 ha of cultivated land was (NAYDENOV and JOTOVA, 2004):

$$\mathbf{Y = 1488.\ X^{-0,2994}}, \qquad (1)$$

where Y was the approximate level of power density (kW/100 ha) and

X – the farm size in decares of land. (one hectare is equal to 10 decares).

Table 1: Relations of the power intensity of the machinery fleet (кW/1,000 da) by farm size (decares, 10 da = 1 hectares)

	Type of machines in the farm	Correlation coefficient	Model of the relation Y = f (X)
1.	**Mobile agricultural machinery** (tractors, grain harvesters, forage harvesters) – on average 90.29 кW/1,000 da)	0.818	$Y = 1488\ X^{-0.2994}$
2.	**Tractors** – on average 52.77 кW/1,000 da	0.578	$Y = 87.38 - 0.0034\ X + (6E\text{-}08)\ X^2$
3.	**All types of mobile combines** (combine harvesters, forage harvesters, etc.) – on average 36.94 кW/1,000 da	0.674	$Y = 190.98 - 16.4\ Ln(X)$
4.	**Only combine (grain) harvesters** – average power intensity 27.62 кW/1,000 da	0.703	$Y = 191.98 - 17.2\ Ln(X)$

Source: NAYDENOV and JOTOVA, 2004.

The average power intensity of mobile agricultural machinery in surveyed farms was 90.29 kW per 100 hectares, i.e., 122.7 h. p. per 100 ha. It was also estimated that the power intensity variations narrowed around the theoretical line of intensity by farm size. Especially in the range of 200-800 ha, the power intensity varied between 30-40 % plus and 20-30 % minus around the line of approximation.

The decline of intensity variations by farm size could be explained by the following factors, which have a single or multiple influence on the process. **Firstly**, this was the effect of strong discreetness in the alteration of tractor and combine number on very small farms. The difference of one machine in the fleets of these farms affected the level of power intensity by at least 40 kW (for tractors) or 70 кW (for combine harvesters) per 100 ha. This effect decreased by farm size. **Secondly**, there was a clear trend for small farms to own relatively more machines. This could be explained by the fact that the failure of one tractor or combine in a fleet of two or three machines during crucial campaigns (such as sowing or harvesting) would have catastrophic consequences for the business, while that failure could be compensated easily in large machinery fleets on the large farms.

We need also to underscore that the average approximate level of power intensity in an arable farm of about 100 ha land was 180-200 кW per 100 ha, i.e., approximately two times more than the level of 90.29 кW per 100 ha for the "average" arable farm of 991.6 ha land size.

The difference between the power intensity of mobile agricultural machinery in the EC, on average (HEINRICH, 2001; KOVACS et al., 2003) and that researched in Bulgaria can be explained by the difference of farm sizes. We suggest that the power intensity in a small farm of 50-100 ha in Bulgaria could be extrapolated to a power density of 200-250 kW per 100 ha, i.e., it is very close to the average level quoted for some EC countries (HEINRICH, 2001).

It can be concluded that comparison with the EU figures of power intensity should be done carefully, because the farm sizes in EU countries are much smaller than in Bulgaria, and also due to the considerable subsidies for agriculture in the EU-15. Another conclusion is that because of the lack of sufficient financing for machinery from EU programs, the process of technical renovation is expected to be very slow and difficult.

3 METHODOLOGICAL APPROACH FOR ESTIMATING THE RATIONAL MACHINERY FLEET TO BE ACQUIRED ON THE FARM

3.1 Fleet of tractors and working machines

Agricultural machinery investment decisions are very important due to their strategic and long-term influence. Once the decision is taken and the necessary machinery is acquired, it is not possible to change the machinery policy without heavy monetary losses when trading machines to second-hand users.

There are two different groups of machines in arable farming – universal and specialized machines. Both groups can be differentiated by their type of use – almost continuously-used (universal) machines (tractors, trailers, ploughs, harrows, surface cultivators, etc.) and seasonally-used machines.

Investment into specialized and seasonally-operated mobile machines such as combine harvesters and forage harvesters is treated by the well-known economic model of ***"break-even" analysis*** (KAY and EDWARDS, 1994). Some applications have also been developed for single working aggregates for pick-up balling, forage harvesting, etc., consisting of a tractor and a working machine. Normally these models estimate the minimal size of the annual operational program ("break-even" size), which justifies the costs of operating own machines versus hiring services from contractors or larger farms.

Investment into whole fleets of tractors and working machines is more complex, and therefore more difficult. The problem is that one asset in the fleet, tractors, are used with working machines in various combinations throughout the year, i.e., they are used under the scheme of (more or less) a "fixed" asset. The appropriate number of tractors is usually estimated for the most intensive period of field operations under the condition of fulfilling the operations within the optimal agro-technical period. Another problem is that an inappropriate unit for measuring the work had been used till now – "*hectares of shallow ploughing*". This unit did not express the real energy matter of machinery operations and did not allow flexible solutions for choosing a small versus a large number of machinery aggregates necessary for a fixed amount of field operation work.

The idea is to develop and investigate an enhanced model for planning a universal machine fleet for investment projects in arable farming based on the philosophy of "break-even" budgeting; this is done by expressing the operational work as energy consumption. The algorithm for estimating the machines to be acquired and those which will have to be used as hiring services can be traced by the steps given below, as follows:

1. Analyzing the production structures of arable farming that specializes in grain in the target area, choosing the appropriate crops to be grown and the proportion of crops within the cultivated farm land.
2. Preparing technological carts for every crop, which include: Schedule of agro-technical operations by month, specified as working periods of days/weeks; energy consumption for each operation in kWh per hectare (IVANOV, 1999), etc.
3. Studying agro-meteorological statistics data; preparing forecast files of working days available by month; investigating plot characteristics such as size, configuration, distance, etc.; determining field efficiency ratios, etc.

4. Calculating the power needed **εj,k** , kW, for each field operation:

$$\varepsilon_{j,k} = \frac{E_{j,k}}{\Delta t_{j,k} . D_i . R_{j,k}} \qquad (2)$$

where **E j, k** is the energy consumption (kWh) of the **j**-th technological operation for the **k**-th type of crop according to farm specialization;

Δt j, k – the duration of the **j-t**h operation for **k**-th crop, days;

D i – working day duration, hours, during the operation period **i**;

R j, k – the index of the field efficiency level.

5. Summing up the **ε j, k** by each period **i,** choosing the most intensive period of field operations **i max**, from which the estimation of machinery fleet begins (see Figure 1).

6. Consequently, the alternatives "***own machinery fleet***" versus "***contracting services***" are compared by calculating the elements of the following inequality for annual costs:

$$\sum_k \sum_j Cf_{n,j,k} \le \sum_k \sum_j \left(Z_{j,k} - Cv_{j,k} . W_{j,k} \right) \qquad (3)$$

where **n** is the variant of using the appropriate number of tractors of one type in combination with working machines for implementing the **j**-th operation for growing the **k**-th kind of crop;

Cf n,j,k – fixed costs of machinery fleet to be owned, consisting of **N** tractors (**N=1, 2, …**) of the kind **n** and working machines of **j**-th type of the **k**-th kind of crop;

Cv n,j,k – specific variable costs of the fleet of aggregates, Euro per hectare;

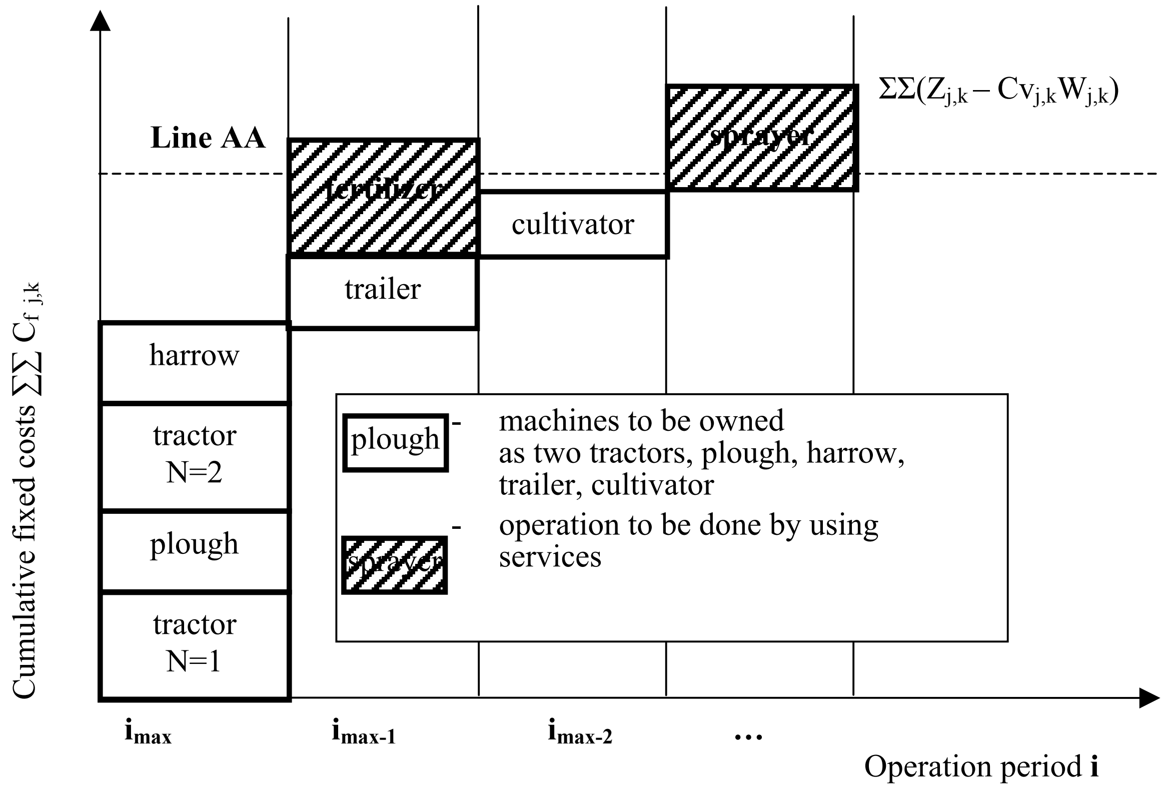
Z j,k – costs of hiring services from contractors or larger farms;

W j,k – program of **j**-th operation for **k**-th kind of crop, hectares.

Inequality (**3**) is calculated for **N** = 1,2, …, beginning with the most powered operation in the most intensive period **i max** and going further, to next less intensive periods **i max-1**, …, (see Figure 1). The example given shows the case of a small farm of 100 hectares growing, for example, winter crops and maize in a 50:50 proportion.

It is clear that when owning more universal machines such as tractors, ploughs, harrows, trailers and surface cultivators, their fixed costs are spread throughout several operations for both crops. If the cumulative fixed costs figure is lower than the transformed "break-even" line **AA (**Figure 1), it would be necessary to acquire both the tractors and machinery mentioned above. Respectively, it would not be appropriate for this small farm of 100 hectares to buy their own fertilizer for winter crops and a sprayer, because these operations are carried out less frequently than those mentioned above and the fixed costs figure will exceed the "break-even" line **AA**.

Figure 1: Break-even budgeting model to select own machinery fleet versus mechanization services

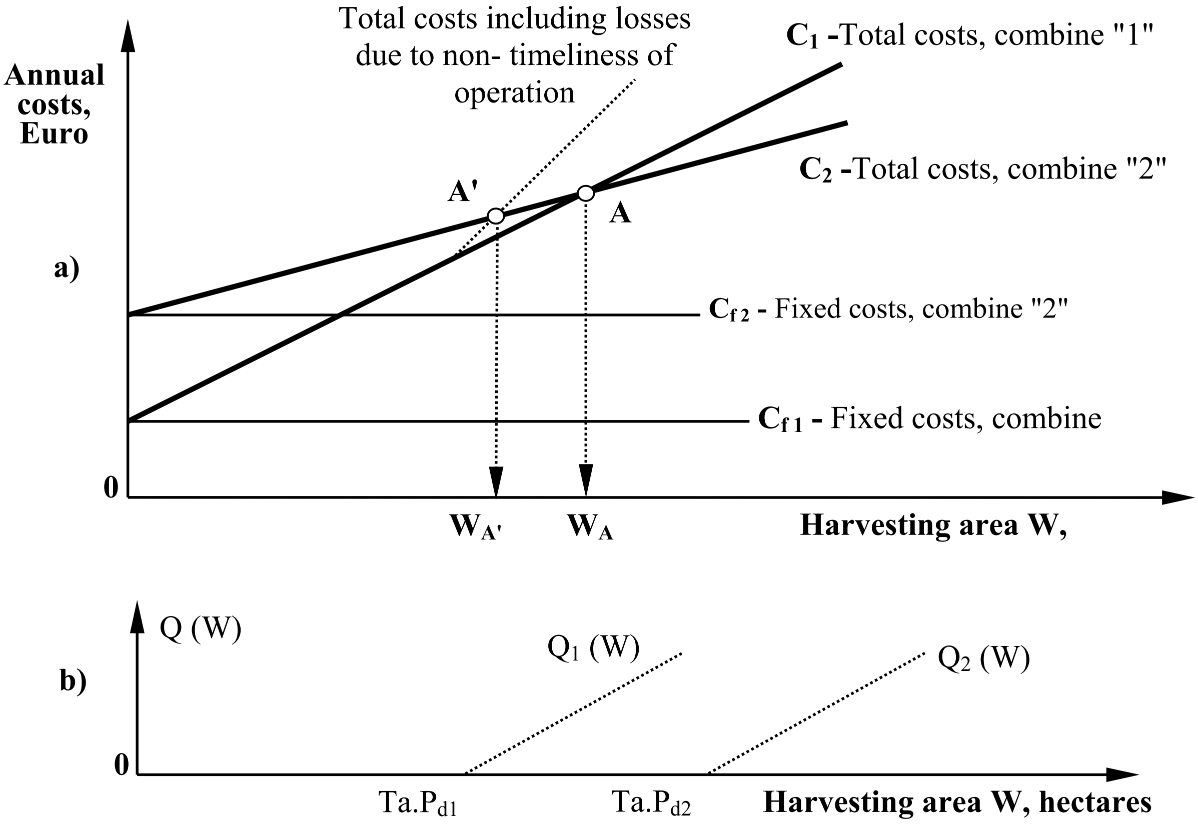


Model (3) can also be improved by investigating variants to used tractor aggregates of various productivity, i.e., to compare large aggregates versus small ones, mixed fleets (simultaneously large and small aggregates) versus homogeneous fleets, etc.

3.2 Specialized machinery

The operation of these harvesting machines is characterized by potential high losses of yield due to non-timeliness of operation, and because of technological losses from worn out machines. It is obvious that model (3) of break-even budgeting can be improved via the evaluation and formalization of timeliness and reliability factors facing the decision for combine harvesters. Thus, the next step of the improved approach is to choose an alternative combine harvester of an appropriate capacity for every concrete interval of annual harvesting area (NAYDENOV, 1998).

Figure 2: Model for estimating the break-even harvesting area for combines of different size



Source: NAYDENOV, 1998.

To simplify, let us assume that the annual program per one combine **W** in hectares is realized by harvesting only the cereals wheat and barley. The cost of possible additional grain losses due to non-timeliness of the operation (after the agro-technical period of harvesting) of the lower capacity Combine 1 can be estimated as (Figure 2-b):

$$\mathbf{Q1\ (W) = (W - P_{d1} . Ta) . \xi}, \tag{4}$$

where **Pd1** is the real daily capacity of **Combine 1**, hectares per day;

Ta – the normal agro-technical period of harvesting, days;

ξ – the average losses from each hectare due to a delay of operation behind **Ta**, Euro per ha.

Equation **(4)** is correct if **W > Pd1 . Ta** , otherwise **Q1 (W) = 0**.

The costs of owning and operating alternative combines, including yield losses due to non-timeliness and technological losses, for the break-even program **W' A, 1-2** are equal, i.e.:

$$\mathbf{Cf1 + Cv1 .WA' + \xi.WA' - Ta . Pd1 . \xi = Cf2 + Cv2 . WA'}, \tag{5}$$

where **Cv 1** and **Cv 2** are the variable costs of both combines (Euro per hectare), including the technological losses of yield.

From **(5)**, the break-even harvesting area per one combine taking into account the timeliness and quality of operation is derived as follows:

$$WA'_{1-2} = \frac{(Cf\,2 - Cf\,1) + Pd1.Ta.\xi}{(Cv1 - Cv2) + \xi}\,. \tag{6}$$

Model (6) is correct, if **Cv1 + ξ > Cv2**, as well as if **Cf2 + Ta . Pd1 . ξ > Cf1.** In fact, this model is a little bit approximate because it does not take into account the non-perpendicularity of **Q1 (W)** curve to the line of total costs **C1** (W).

Similarly, if the alternative combines are **Combine 2** and a new **Combine 3** of a much larger size (i.e., daily capacity), a new break-even harvesting area **W'A 2-3** can exist. The amount of the break-even area will be influenced by the fixed costs of the second and third combines **Cf2** and **Cf3 and** by the variable costs **Cv2** and **Cv3 ,** including the technological losses, the average losses ξ due to the non-timeliness, the agro-technical period **Ta** and the daily capacity **Pd2**.

It can be concluded that when a decision to choose the appropriate capacity machine within an investment project has to be taken in accordance with the model **(4)**, a number of factors will have to be assessed. The most important of them are: The expected annual harvesting program, the cost of owning and operating alternative combines and the losses of yield due to the non-timeliness of operation and technological reasons. If the annual program per one machine during its useful life is expected to be lower than the break-even area **W A, 1-2**, or, respectively, **W A, 2-3,** it would be profitable to invest in a machine of smaller capacity.

The value of real daily capacity of the machine aggregates is influenced by a number of technical and organizational factors. For example, besides the main parameters – width and working speed – the real capacity is strongly affected by the level of field efficiency **R**. In principle, that feature is defined first of all by the plot's size, the grain transport organization, the failure rate of the machine and the organization of field repair, as well as by the agro-meteorological conditions throughout the harvesting campaign. Thus, both the organizational factors and reliability characteristics of the selected machine have to be assessed when planning and implementing investment projects.

If there is not a considerable economic gap between using two machines instead of a larger one with double capacity, it is preferable to invest in buying two smaller-sized machines. The consideration is that the failure of the larger combine for a long period would be a catastrophe for the harvesting campaign, whereas the failure of one of two smaller combines will be connected with fewer consequences. There are also practical considerations based on repair requirements and policy. It is preferable to choose the machine which is of the same or similar model as those already owned. Thus, the owner keeps small inventories of spare parts and avoids additional technological problems in repairing machines of new makes.

Let us discuss an example of estimating the break-even harvesting program with real information. Two combine harvesters, imported from Russia are considered. The first combine – "SK 5M1" – is used on smaller size farms. The second machine – "Don 1500 B" – sees widespread use in agro-companies in the typical grain-producing area of North East Bulgaria.

Taking into account the technological losses and also losses due to non-timeliness of harvesting, the break-even program of alternative combines "SK-5M1" versus "Don-1500B" is approximately 300 hectares annually, i.e., the campaigns of consecutively harvesting wheat and barley, sunflower and maize would take no more than 40 days in total, which is normal for Bulgarian conditions. Thus, we can conclude that it is appropriate to buy a smaller size combine as "SK-5M1" if the expected annual program per machine would be less than approximately 300 hectares.

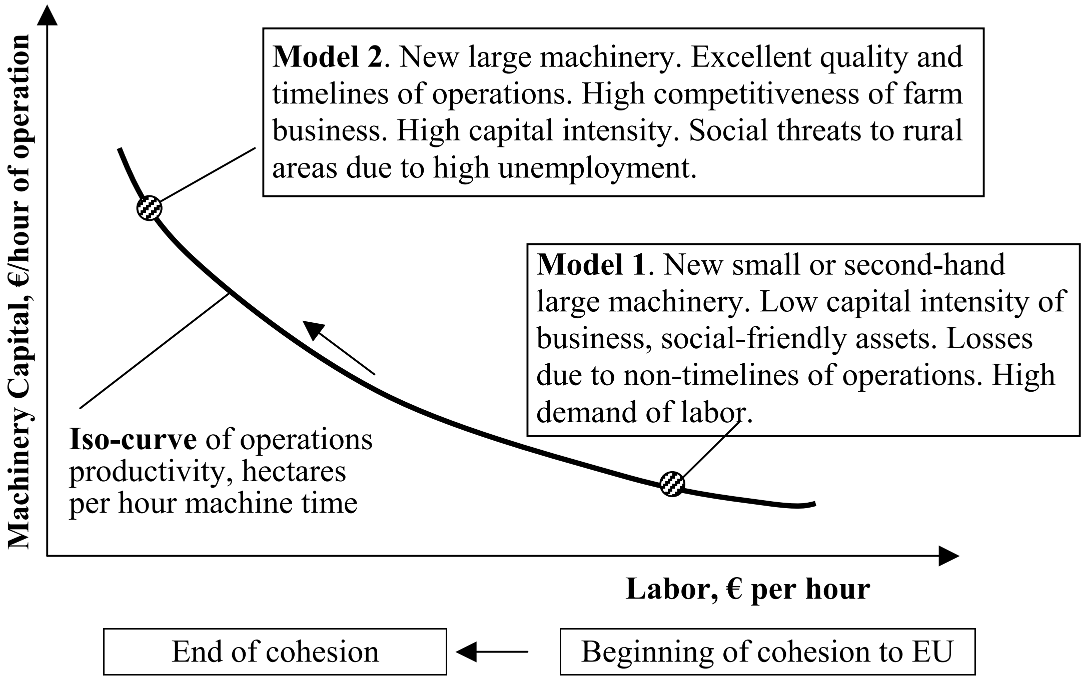
4 FACTORS INFLUENCING THE EFFICIENCY OF MACHINERY INVESTMENTS IN ARABLE FARMINBG DURING ACCESSION

The current level of machinery's power density in Bulgarian arable farms is a "picture" of the process of agriculture mechanization since the 1980s. Undoubtedly, the level of efficient investment in machinery is to be estimated while bearing in mind the above-described results and various important factors that influence the specific investment projects in arable farming.

It should be noted that appropriate models of capital substitution for labor in farm mechanization will have to be developed and investigated (see Figure 3). This is because the mechanization level is the result of a fluctuating capital/labor price ratio in specific regions of Europe.

The models are to present the least cost combination points, where a relatively large amount of labor is combined with a small amount of capital for machinery. It can be concluded that the proportion of agriculture machinery, fuel and lubricants costs to the labor costs for fieldwork, repair and maintenance is very important for finding the right level of investment in machinery. Furthermore, the increasing sophistication and quality of agricultural machinery imported from the EU recently is to be analyzed, as are the increased costs of fuel and lubricants in 2005 and 2006.

Figure 3: Principle scheme of substitution, "Machinery capital for labor of operation and servicing"



The problem facing Bulgaria and other pre-accession countries is in making the right decision in the context of the economic, social and ecological sustainability of agriculture and rural areas. If there are not sufficient funds for supporting the machinery fleets' renovation process through introducing contemporary (but expensive) machinery, produced with well-paid labor in the EU countries, the solution might be an irrational one – using smaller and older machinery requiring less capital investment (Model 1 on Figure 3).

Model 1 is expensive for farm business due to low labor productivity and the need of permanently injecting labor to maintain worn-out machinery. The decision must also evaluate the labor for mechanization in the context of sustaining the social factor in rural areas. Fortunately, labor in Bulgarian rural areas is still cheap in comparison with the EU.

A further influence on the adoption of larger, more capital-intensive machinery has been recognized – the need to improve timeliness of operations (Model 2 on Figure 3). This adoption can result in decreasing timeliness losses when handling a limited number of arable crops, as a result of a desire to substitute power for labor. Timeliness has become increasingly important in European agriculture because of the trend towards large rainfall periods during harvesting campaigns. It should also to be taken into account that time available for field work in Southeast Europe is approximately 30% longer than in Central and Western Europe. The conclusion is that the adoption of large, more powerful (and expensive) machinery for labor in Bulgaria is to be made carefully, through cost/benefit analysis and other methods.

The third factor of preference for the higher level of machinery density nowadays could be the adoption of combinable crops such as wheat and barley (for the expanded beer industry) or sunflower and corn, rather than crops that were more traditional and labor intensive in Bulgaria before the beginning of transition such as perennials and fruits and vegetables. Another factor could be the absence of livestock from an increasing number of farms in areas of arable farming. This is not an attempt to argue that there have not been cost savings in agriculture through power (capital) versus labor substitution, but changing the crop structure in accordance to the EU agriculture policy will also have an important influence on the man/machine balance in Bulgarian farming patterns. Farmers will continue to seek to substitute power (i.e., capital invested in machinery) for labor, but there are limits to the size of machines which are most appropriate for the large number of small farms in Bulgaria. There are also increasing environmental concerns about soil compaction when using very large machines.

5 CONCLUSIONS

1. The strong negative correlation between power density (kW per hectare) and cultivated farm land is estimated as a result of surveying fleets of mobile agricultural machinery in Bulgarian grain production areas. The average is 90.29 kW per 100 hectares for fleets of tractors, combine harvesters and forage harvesters on one "average" farm of 991.6 hectares of land. The difference compared to average EU figures before 2004 can be explained by the fact that EU farms are much smaller than Bulgarian farms.
2. Improved models of break-even budgeting for agricultural machinery investment projects have been proposed. They take into account not only the expected costs of owning and operating the alternative machines, but also consider the capacity (size) of both machines, technological losses of yield, timeliness of operations and the difference between field reliability characteristics.
3. Comparing the EC and Bulgarian figures in terms of the appropriate level of investments for farm machinery should be done carefully because of the differences in farm sizes, as well as the considerable subsidies for agriculture in the EU countries. Decision-making models and criteria used will have to assess not only the economic benefits, but also take into account requirements for sustaining the social factor in rural areas.

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SMALL-SCALE FARMING IN ROMANIA – SHADOW PRICES AND EFFICIENCY

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ABSTRACT

This paper aims to shed empirical light on the relative efficiency of small-scale maize producers in Romania. Farmers in transition countries still face heavily distorted price systems resulting from imperfect market conditions and socioeconomic and institutional constraints. To capture such distortions we formulate a stochastic shadow-cost frontier model to investigate the systematic input-specific allocative inefficiency. We further adjust the underlying cost frontier by incorporating shadow price corrections and subsequently reveal evidence on farm-specific technical inefficiency. The empirical results indicate relatively high technical efficiency for the small-scale farmers, but relatively poor scores for systematic input price efficiency. The usage of extension services, as well as agricultural training on the farm level, are found to have a positive effect on the technical efficiency level of the farms. All model specifications agree on the negative effect on efficiency with respect to the use of insecticides.

Keywords: *Efficiency, shadow cost frontier, functional consistency, Romania.*

1 INTRODUCTION

Profound structural changes are still taking place in the process of transition from a command to a market-oriented economy in Romania. This is especially true for the agricultural sector, where structural reforms are concentrated on the privatization of land and the downsizing of agricultural enterprises and have led

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to the emergence of numerous small farms (LERMAN, 1999; OECD, 2000). These farmers – so-called individual farmers – are currently the most important actors with respect to land and output markets (OECD, 2000; LEONTE, 2002). However, they are still heavily constrained due to an insufficient factor endowment and the lack of developed input and output markets. As a result, most technology-intensive crops have been substituted by the cultivation of more traditional crops and the importance of subsistence farming has increased (TESLIUC, 2000). The production of maize as one of the main traditional crops in Romania has increased in importance, which is also related to its relatively simple manner of production and storage (TESLIUC, 2000). Hence, this crop currently plays a central role in agricultural production by being cultivated on a relatively large territory and providing a relatively large proportion of output (NIS, 2004). According to GORTON et al. (2003) maize shows a comparative advantage in Romania. Given the importance of maize production for agricultural transition and rural development in Romania, this research aims to assess the relative efficiency of small-scale maize production and tries to determine different factors for maize farms' inefficiency. Against the background of a restructuring Romanian agriculture, the individual farmers' decisions are often made with respect to shadow prices, that is, the prices the decision-maker actually has to pay, rather than those observed as prevailing market prices (see TODA, 1976; ATKINSON and HALVORSEN, 1980; KUMBHAKAR and BHATTACHARYYA, 1992; WANG et al., 1996). The following study therefore uses such shadow prices to model and analyze the relative efficiency of small-scale Romanian maize producers. With respect to policy-relevant empirical-based productivity studies, GORTON and DAVIDOVA realized in 2001 that "(…) there is a lack of evidence in the Baltic States and Romania." This lack still exists with respect to Romanian agricultural production. After briefly outlining the case of small-scale maize production in Romania, the applied model is subsequently described as a combination of the shadow price approach for revealing systematic allocative efficiency and the error components approach for obtaining producer-specific technical efficiency estimates. The estimated models are tested and corrected for theoretical consistency, and further bootstrapping techniques are applied to investigate the statistical robustness of the most consistent model. Finally, the relative efficiency scores and possible factors for their variance over the sample are discussed.

2 THE CASE STUDY – SMALL-SCALE MAIZE PRODUCTION IN ROMANIA

The majority of the restructuring measures in Romanian agricultural since 1989 has concentrated on the privatization of land and aimed to change collective agriculture to individual agriculture, as well as to downsize farms (LERMAN, 1999). The prospective owners could choose among the following options: Individual farming, joining a family-based association, joining a formal association, and pursuing a mixed strategy (SABATES-WHEELER, 2001). The majority of farmers chose individual farming and thus, in 2002, 4.7 million individual farms cultivated 62 % of the arable land, with an average size of 1.6 hectares per farm (NIS, 2004). However, by reestablishing the situation before collectivization, privatization led to the fragmentation of agricultural land and consequently, the new individual farmers were constrained in their business development by the fragmented structure and small size of the land holdings. The farms could not be adjusted to their efficient size because restituted land was banned from resale until 1998, and a simplification of the complex leasing law was only conducted in that same year. Due to this structure, renting agricultural land was not attractive to farmers, as obtaining a large piece of land implied substantial transaction costs from coordinating several different land owners (TESLIUC, 2000). Furthermore, the new individual producers lacked the necessary know-how to cultivate their land. They had no cash to invest and rarely had access to credit or agricultural equipment. Further, up and downstream sectors were not restructured to suit the needs of small farmers, which led to high transactions costs on the different input and output markets. Such transaction costs and the lack of capital reinforced the decline in the use of inputs like fertilizer and certified seed (KENNETH, 2003; OECD, 2000; TESLIUC, 2000). In response to these difficulties, producers diversified their production, substituted commercial with non-commercial crops, technical crops with traditional crops, and increased subsistence production. The latter further promoted stagnation in the development of input and output markets and led to a kind of vicious cycle. The increase in maize cultivation in Romania during this period is basically linked to these developments in the agricultural sector. Maize is one of the traditional agricultural productions and the area devoted to it increased from about 26 % (1990) to about 36 % (2003) of the arable land (NIS, 2004). The cultivation of maize shows the relative advantage of low input intensity: No certified and commercially – distributed seed is needed, the crop can be harvested by hand and easily stored without the need for sophisticated facilities. Moreover, maize can be consumed in the household as well as in animal production; the latter leads to relatively less dependence on the purchase of additional fodder (TESLIUC, 2000). Although economic reforms in Romanian agriculture have reduced direct state control over production decisions, various obstacles in the input and output markets still distort farmers' production decisions. Despite some studies on the economic efficiency of farming in transitional countries (see e.g. HUGHES, 1998; MATHIJS and SWINNEN, 2000) none considers the effects of distorted input and output price relations with respect to the relative efficiency of agricultural production in Romania. Due to the vast literature on shadow prices (for an overview, see e.g. KHUMBHAKAR and LOVELL, 2000) non-observable shadow price ratios have to be considered as relevant for producer decisions in distorted agricultural markets. The divergence between the analyzed (i.e., estimated) shadow prices and the observed market prices can be interpreted as the sum of allocative inefficiency due to the prevalence of various market constraints, as well as optimization failure by the farm management. Various approaches for modeling this divergence can be found in the literature: The usual method consists of additively translating observed prices to create shadow prices. Alternatively, shadow prices can be modeled by multiplicatively scaling observed prices into shadow ones (LAU and YOTOPOULOS, 1971). We follow the latter approach here and define the relationship between the normalized shadow prices for the variable and fixed inputs w^*, f^* and the normalized market prices w, f as

$$w^*_i = \theta_i w_i \qquad f^*_l = \theta_l f_l \tag{1}$$

where θ_i, θ_l are (non-negative) price efficiency parameters and i,l are indices for variable and fixed inputs, respectively. If no bending market restrictions are the case, then θ_i, θ_l equal unity, whereas if market distortions restrict optimizing behavior, then $\theta \geq 0 \wedge \theta \neq 1$. Consequently, a Romanian maize farmer can be regarded as allocatively efficient with respect to observed market prices only if observed market prices reflect the farmer's opportunity cost with respect to inputs. It has to be considered that the price efficiency parameters θ_i, θ_l may reflect both effects of market distortions as well as optimization errors.

3 THE MODEL – A COMBINATION OF SHADOW PRICES AND ERROR COMPONENTS

We start our modeling efforts by formulating a simple single-output translog cost function and its associated cost-minimizing input cost share equations (see e.g. ATKINSONM and HALVORSEN, 1980; KUMBHAKAR, 1989; WANG et al., 1996; KUMBHAKAR and BHATTACHARYYA, 1992):

$$\begin{aligned} \ln C(w,y,f,e;\alpha,\beta,\gamma,\delta,\chi) &= \alpha_0 + \sum_{i=1}^{2}\alpha_i \ln w_i + \frac{1}{2}\sum_{i=1}^{2}\sum_{k=1}^{2}\beta_{ik}\ln w_i \ln w_k + \gamma_y \ln y \\ &+ \frac{1}{2}\gamma_{yy}(\ln y)^2 + \sum_{i=1}^{2}\beta_{yi}\ln y \ln w_i + \sum_{l=1}^{2}\delta_l \ln f_l + \frac{1}{2}\sum_{l=1}^{2}\sum_{m=1}^{2}\delta_{lm}\ln f_l \ln f_m + \sum_{i=1}^{2}\sum_{l=1}^{2}\delta_{il}\ln w_i \ln f_l \\ &+ \sum_{l=1}^{2}\delta_{yl}\ln y \ln f_l + \sum_{n=1}^{6}\chi_n \ln e_n \end{aligned} \tag{2}$$

and

$$S_i(w,y,f;\alpha,\beta,\delta) = \alpha_i + \sum_{k=1}^{2}\beta_{ik}\ln w_k + \beta_{yi}\ln y + \sum_{l=1}^{2}\delta_l \ln f_l \qquad i = 1,2 \tag{3}$$

respectively, where symmetry and homogeneity of degree +1 in input prices are imposed through the parameter restrictions

$\beta_{ik} = \beta_{ki},\ i \neq k,\ \sum_{i=1}^{2} \beta_i = 1,\ \sum_{k=1}^{2} \beta_{ik} = 0,\ k = 1,2;\ \sum_{i=1}^{2} \beta_{yi} = 0$ and where y is maize output; w's are prices of the variable inputs labor and fertilizer; f are prices of the quasi-fixed inputs land and organic fertilizer; and the control variables e = herbicide used, insecticides used, seed applied, subsidies received, extension services used, agricultural training received. Incorporating shadow prices according to (1) and following the input-oriented approach with respect to technical efficiency, observed expenditure and observed input cost shares can be expressed in terms of shadow cost and shadow input cost shares as

$$
\begin{aligned}
\ln C = {} & \alpha_0 - \sum_{n=1}^{6} \chi_n D_n + \gamma_y \ln y + \frac{1}{2}\gamma_{yy} (\ln y)^2 + \sum_{i=1}^{2} \alpha_i \ln(\theta_i w_i) + \frac{1}{2}\sum_{i=1}^{2}\sum_{k=1}^{2} \beta_{ik} \ln(\theta_i w_i)\ln(\theta_k w_k) \\
& + \sum_{i=1}^{2} \beta_{yi} \ln y \ln(\theta_i w_i) + \sum_{l=1}^{2} \delta_l \ln(\theta_l f_l) + \frac{1}{2}\sum_{l=1}^{2}\sum_{m=1}^{2} \delta_{lm} \ln(\theta_l f_l)\ln(\theta_m f_m) \\
& + \sum_{i=1}^{2}\sum_{l=1}^{2} \delta_{il} \ln(\theta_i w_i)\ln(\theta_l f_l) \\
& + \sum_{l=1}^{2} \delta_{yl} \ln y \ln(\theta_l f_l) + \ln\left\{\sum_{i=1}^{2} (\theta_i)^{-1} \left[\beta_i + \sum_{i=1}^{2} \beta_{ik} \ln(\theta_k w_k) + \beta_{yi} \ln y\right]\right\}
\end{aligned}
\tag{4}
$$

and

$$
S_i = \frac{(\theta_i)^{-1}\left[\beta_i + \sum_{k=1}^{2} \beta_{ik} \ln(\theta_k w_k) + \beta_{yi} \ln y\right]}{\sum_{i=1}^{2} (\theta_i)^{-1}\left[\beta_i + \sum_{k=1}^{2} \beta_{ik} \ln(\theta_k w_k) + \beta_{yi} \ln y\right]} \qquad i = 1,2 \tag{5}
$$

respectively, where symmetry and homogeneity of degree +1 in input prices are imposed as outlined above. Classical error terms are appended, one input cost share equation is deleted, and the remaining system of I equations is estimated. Parameter χ includes the relative technical inefficiency with respect to a group of farmers defined along different characteristics, and θ gives the systematic allocative inefficiency for the respective inputs. Various recent contributions point to the crucial importance of considering the consistency of the estimated frontier with basic microeconomic requirements such as monotonicity with respect to inputs as well as concavity of the function (see e.g. RYAN and WALES, 1998; SAUER, 2006). Monotonicity of the estimated cost function – i.e., positive first derivatives with respect to all input prices – holds when all variable input prices and quasi-fixed inputs are positive for all observations in the sample. The necessary and sufficient condition for a specific curvature consists in the definiteness of the bordered Hessian matrix as the Jacobian of the derivatives $\partial C / \partial w_i$ with respect to w_i and $\partial C / \partial f_l$ with respect to f_l: If $\nabla^2 C(y,w,f)$ is negative definite, C is concave, where ∇^2 denotes the matrix of second order partial derivatives with respect to the shadow translog cost model defined by (4). The Hessian matrix is negative definite at every unconstrained local maximum.

Hence, the underlying function is concave and an interior extreme point will be a global maximum. The condition of concavity is related to the fact that this property implies a quasi-concave production function and consequently a convex input requirement set (see in detail e.g. CHAMBERS, 1988). Hence, a point on the isoquant is tested, i.e., the properties of the corresponding production function are evaluated subject to the condition that the amount of production remains constant. With respect to the translog shadow cost function model, curvature depends on the specific variable input price and quasi-fixed input bundle, as the corresponding Hessian **H** for our 4 input case shows:

$$H = \begin{pmatrix} h_{11}\, h_{12}\, h_{13}\, h_{14} \\ h_{21}\, h_{22}\, h_{23}\, h_{24} \\ h_{31}\, h_{32}\, h_{33}\, h_{34} \\ h_{41}\, h_{42}\, h_{43}\, h_{44} \end{pmatrix} \tag{6}$$

where h_{ii} is given by

$$\frac{d^2C}{d(w_i, f_l)^2} = \frac{d}{d\ln(w_i, f_l)}\left(\frac{d\ln C}{d\ln(w_i, f_l)}\right) = (w_i, f_l)^{-2}\left(\beta(\delta)_{rr} + S_r(S_r - 1)\right) \tag{7}$$

for r = i, l and S_r as the cost share of input r, and h_{ij} is given by

$$\frac{d^2C}{d(w_i, f_l)^2} = \frac{d}{d\ln(w_i, f_l)}\left(\frac{d\ln C}{d\ln(w_k, f_m)}\right) = \left[(w_i, f_l)(w_k, f_m)\right]^{-1}\left(\beta(\delta)_{rs} + S_r S_s\right) \tag{8}$$

for r = i, l and s = k, m. Given a point x^0, it is necessary and sufficient for curvature correctness that at this point v'Hv ≤ 0 and **v's** = 0 where **v** denotes the direction of change. For some input bundles concavity may be satisfied, but for others not, and hence what can be expected is that the condition of negative definiteness of the Hessian is met only locally or with respect to a range of input bundles. The respective Hessian is negative definite if the determinants of all of its principal submatrices are negative in sign (i.e., $Det_j < 0$ where *Det* is the determinant of the leading principal minors and j = 1, 2, …, n). Hence, with respect to our translog shadow cost model, every input bundle has to be checked *a posteriori* to determine that monotonicity and concavity hold. If these theoretical criteria are jointly fulfilled, the obtained estimates are consistent with microeconomic theory and consequently can serve as empirical evidence for possible policy measures. Concavity can be imposed on our translog shadow cost model at a reference point (usually at the sample mean) following JORGENSON and FRAUMENI (1981) and RYAN and WALES (1998). By this procedure the bordered Hessian in [6] is replaced by the negative product of a lower triangular matrix **Δ** times its transpose **Δ'**. Imposing curvature at the sample mean is then attained by setting

$$\beta(\delta)_{rs} = -(\Delta\Delta')_{rs} + \alpha(\delta)_r \lambda_{rs} + \alpha(\delta)_r \alpha(\delta)_s \tag{9}$$

where r = i, l and s = k, m and λ_{rs} = 1 if r = s and 0 otherwise and $(\Delta\Delta')_{rs}$ as the rs-th element of ΔΔ' with Δ as a lower triangular matrix:

$$H = -(\Delta\Delta') = -\begin{pmatrix} d_{11}d_{11} & d_{11}d_{12} & d_{11}d_{13} & d_{11}d_{14} \\ d_{11}d_{21} & d_{12}d_{12}+d_{22}d_{22} & d_{12}d_{13}+d_{22}d_{23} & d_{21}d_{14}+d_{22}d_{24} \\ d_{11}d_{31} & d_{31}d_{12}+d_{32}d_{22} & d_{31}d_{13}+d_{23}d_{23}+d_{33}d_{33} & d_{31}d_{14}+d_{23}d_{24}+d_{33}d_{34} \\ d_{11}d_{41} & d_{41}d_{12}+d_{42}d_{22} & d_{41}d_{13}+d_{42}d_{23}+d_{34}d_{33} & d_{41}d_{14}+d_{24}d_{24}+d_{34}d_{34}+d_{44}d_{44} \end{pmatrix} \tag{10}$$

Our point of approximation is the sample mean, where all data points are divided by their mean transferring the approximation point to an (n + 1) – dimensional vector of ones. At this point the elements of **H** do not depend on the specific input price bundle. The estimation model of the normalized translog shadow cost frontier is then reformulated as follows:

$$\begin{aligned}
\ln\left(\frac{C}{C'}\right) &= \alpha_0 - \sum_{n=1}^{6}\chi_n\left(\frac{D_n}{D_n'}\right) + \gamma_y \ln\left(\frac{y}{y'}\right) + \frac{1}{2}\gamma_{yy}\ln\left(\frac{y}{y'}\right)^2 + \sum_{i=1}^{2}\alpha_i \ln\left(\theta_i \frac{w_i}{w'_i}\right) \\
&+ \frac{1}{2}\sum_{i=1}^{2}\left(h_{ii}+\alpha_i-\alpha_i\alpha_i\right)\ln\left(\theta_i \frac{w_i}{w'_i}\right)^2 + \frac{1}{2}\sum_{i=1}^{2}\sum_{k=1}^{2}\left(h_{ik}-\alpha_i\alpha_k\right)\ln\left(\theta_i \frac{w_i}{w'_i}\right)\ln\left(\theta_k \frac{w_k}{w'_k}\right) \\
&+ \sum_{i=1}^{2}\beta_{yi}\ln\left(\frac{y}{y'}\right)\ln\left(\theta_i \frac{w_i}{w'_i}\right) + \sum_{l=1}^{2}\delta_l \ln\left(\theta_l \frac{w_l}{w'_l}\right) + \frac{1}{2}\sum_{i=1}^{2}\left(h_{ll}+\delta_l-\delta_l\delta_l\right)\ln\left(\theta_l \frac{w_l}{w'_l}\right)^2 \\
&+ \frac{1}{2}\sum_{l=1}^{2}\sum_{m=1}^{2}\left(h_{lm}-\delta_l\delta_m\right)\ln\left(\theta_l \frac{w_l}{w'_l}\right)\ln\left(\theta_m \frac{w_m}{w'_m}\right) + \sum_{i=1}^{2}\sum_{l=1}^{2}\left(h_{il}-\delta_i\delta_l\right)\ln\left(\theta_i \frac{w_i}{w'_i}\right)\ln\left(\theta_l \frac{w_l}{w'_l}\right) \\
&+ \sum_{l=1}^{2}\delta_{yl}\ln\left(\frac{y}{y'}\right)\ln\left(\theta_l \frac{w_l}{w'_l}\right) + \ln\left\{\sum_{i=1}^{2}(\theta_i)^{-1}\left[\alpha_i + \sum_{i=1}^{2}\left(h_{ik}-\alpha_i\alpha_k\right)\ln\left(\theta_k \frac{w_k}{w'_k}\right) + \beta_{yi}\ln\left(\frac{y}{y'}\right)\right]\right\} + \varepsilon_i
\end{aligned} \tag{11}$$

However, the elements of Δ are nonlinear functions of the decomposed matrix in (10), and consequently, the resulting normalized translog model becomes nonlinear in parameters. Hence, linear estimation algorithms are ruled out even if the original function is linear in parameters. By this "local" procedure, a satisfaction of consistency at most or even all data points in the sample can be reached. The transformation in (11) moves the observations towards the approximation point and thus increases the likelihood of getting theoretically consistent results, at least for a range of observations (see RYAN and WALES, 2000). However, by imposing global consistency on the translog functional form DIEWERT and WALES (1987) note that the parameter matrix is restricted, leading to seriously biased elasticity estimates. Hence, the translog function would lose its flexibility. As a second analytical step, we finally (*a posteriori*) check the theoretical consistency of our estimated model by verifying that the Hessian is negative semi-definite (i.e., functional concavity). In a second step, the behavioral (shadow price) cost function in its constrained and unconstrained version (equation (4) and (11)) is "adjusted" by the estimated shadow price parameters θ and hence corrected for systematic allocative inefficiency by using these shadow prices as direct arguments in the cost function. An adjusted cost frontier is then modeled by simply adding the error components

$$\xi_i = v_i + u_i \tag{12}$$

and applying stochastic frontier techniques to obtain the shadow-cost frontier and finally estimates of relative cost efficiency on the farm level (see e.g. COELLI et al., 1998; KHUMBHAKAR and LOVELL, 2000). As the price efficiency parameters θ_i, θ_l reflect both allocative effects of market distortions as well as optimization errors, the relative inefficiency measured by the adjusted cost frontier consists solely of technical inefficiency (systematic and/or farm specific). The stochastic frontier decomposes the error term into a two-sided random error that captures the inefficiency component and the effects of factors outside the farmer's control. The theoretical foundation of such a model was first proposed by AIGNER et al., (1977) and MEEUSEN and VAN DEN BROECK (1977). The two-sided random error is assumed to be identically and independently distributed with a zero mean and constant variance, and is independent of the one-sided error. Distribution of the error's inefficiency component is assumed to be asymmetrical. Following BATTESSE and COELLI (1995), the maximum likelihood estimation for equation 1 is obtained from the following log-likelihood function:

$$\ln L = -\frac{N}{2}\ln\left(\frac{\theta}{2}\right) - \frac{N}{2}\ln\sigma^2 + \sum_{j=1}^{N}\ln\left[1 - F\left(\frac{\varepsilon_j\sqrt{\delta}}{\sigma\sqrt{1-\delta}}\right)\right] - \frac{1}{2\sigma^2}\sum_{j=1}^{N}\varepsilon_j^2 , \tag{13}$$

where L is the log-likelihood function, N is the number of observations and $F(.)$ is the standard normal distribution function. The variable σ^2 is the overall standard deviation equal to the sum of the standard deviations of the two error terms and δ is here the proportion of the overall error term that is explained by the one-sided error. Assuming the half-normal distribution of the one-sided error term, the relative efficiency score defined at the mean is given as:

$$E\left[\exp\left(-u_j\right)\right] = 2\left[\exp\left(-\delta\,{}^{\sigma^2}\!/_2\right)\right]\left[1 - F\left(\sigma\sqrt{\delta}\right)\right]. \tag{14}$$

The measurement of farm level efficiency requires the estimation of the non-negative one-sided error, which also depends on the assumptions regarding the distribution of the two- and one-sided error terms. Based on BATTESSE and COELLI (1988), the best predictor of the relative efficiency of farmer i is given as:

$$E\left[\exp\left(-u_j \setminus \varepsilon_j\right)\right] = \left[\frac{1 - F\left(\sigma_w - {}^{\delta\varepsilon_j}\!/_{\sigma_w}\right)}{1 - F\left({}^{-\delta\varepsilon_j}\!/_{\sigma_w}\right)}\right]\exp\left(-\delta\varepsilon_j + {}^{\sigma_w^2}\!/_2\right), \tag{15}$$

where $\sigma_w = \sqrt{\delta(1-\delta)\sigma^2}$. The likelihood function is expressed in terms of the variance parameters i.e., $\sigma^2 = \sigma_v^2 + \sigma_u^2$ and $\delta = \sigma_u^2 / \sigma^2$. By following a single-equation cost frontier approach on this estimation stage, we are able to avoid the "Greene"-problem with respect to the consistent specification of the individual error components (see KUMBHAKAR and LOVELL, 2000). Systematic, allocative, input-specific efficiency measures, as well as group-wise technical efficiency measures are obtained by the translog shadow cost model. Measures of technical efficiency on the farm level result from the error components' model and such farm-specific radial cost efficiency measures are obtained by simple calculation. As we are also interested in the effects of imposing theoretical consistency on the translog cost frontier, we investigate the relative effect of such correction by using the simple index formula

$$\frac{\left(eff_i^{in} - eff_i^{con}\right)}{eff_i^{in}} * 100 . \tag{16}$$

To test the robustness of our estimates by the adjusted shadow cost model (based on (4) and (11)) we apply a simple stochastic resampling procedure based on bootstrapping techniques (see e.g. EFRON, 1979, or EFRON and TIBSHIRANI, 1993). This seems to be necessary, as our cross-sectional data sample consists of a (rather) limited number of observations. If we suppose that ψ_n is an estimator of the parameter vector ψ_n, including all parameters obtained by estimating (16) based on our original sample of 64 Romanian maize farmers $X = (x_1,...,x_n)$, then we are able to approximate the statistical properties of ψ_n by studying a sample of 100 bootstrap estimators $\psi_n(c)_m, c = 1,...,C$. These are obtained by resampling our 64 observations – with replacement – from X and recomputing ψ_n by using each generated sample. Finally, the sampling characteristics of our vector of parameters is obtained from

$$\Psi = \left[\psi_{(1)m},...,\psi_{(100)m}\right]. \tag{17}$$

4 DATA AND ESTIMATION

We used data on 64 maize farmers based on a 2003 survey of agricultural households in 15 Romanian villages. The sample villages were chosen by a multistage, representative random sampling procedure focused on seven regions that were defined by historical borders, landscape structure and distance to relevant input and output markets. The overall survey focused on data for 2002 with regard to various outputs, inputs and other household characteristics. The most frequently produced crop was maize, cultivated by about 92 % of the households; less than a quarter of all households cultivated more technically-demanding crops such as sunflower, soya or sugar beet. Table 1 summarizes the statistics of the sample data:

Table 1: Descriptive statistics

Variable	Mean	Std. Err.	Min	Max
Total Costs (in euro)	285.728	641.857	11.01	3,626.525
Output Maize (in kg)	4,696.313	8,510.552	56	42,000
Price of Maize (in euro/kg)	0.103	0.017	0.056	0.130
Quantity of Labor (in mandays/month)	563.125	314.864	15	1,506.286
Price of Labor (in euro/mandays)	0.699	1.259	0.0138	6.399
Quantity of Fertilizer (in kg)	18.198	37.083	1.176	264.706
Price of Fertilizer (in euro/kg)	0.187	0.052	0.004	0.320
Quantity of Land (in ha)	1.909	3.921	0.08	30
Quantity of Org. Fertilizer (in kg/ha)	3,527.145	7,202.45	0	34,188
Herbicides used (binary)	0.594	0.495	0	1
Insecticides used (binary)	0.937	0.244	0	1
Commercial Seed used (binary)	0.406	0.495	0	1
Subsidies received (binary)	0.297	0.460	0	1
Extension Services used (binary)	0.5	0.504	0	1
Training used (binary)	0.187	0.393	0	1

Source: Own calculations based on survey data.

The total costs of maize production are used as the dependent variable for the cost function estimations. The total output of maize produced, its price, and the prices for the variable inputs labor and fertilizer, as well as the quantities of the fixed variables land and organic fertilizers, are applied as explanatory variables. Land can be considered quasi-fixed, as, due to the aforementioned inflexibilities in the land market, it cannot be expected to be adjusted in a short- or even middle-term perspective. Organic fertilizer is considered quasi-fixed, as small-scale Romanian farmers cannot be expected to flexibly adjust the size of their livestock production as a response to crop input needs. Further binary variables for the use of herbicides, insecticides, commercial seeds, received subsidies, extension services used, and finally agricultural training and received advice are applied. All monetary variables are in Euro. The estimation procedure is as follows: In a first step, the translog cost system given by (4) and (5) is estimated using the cost function, as well as the cost shares s_i derived from the non-distorted translog cost function lnC to obtain estimates for the allocative efficiency parameters θ with respect to the individual inputs, as well as group-wise technical efficiency effects χ. The estimates of the former are subsequently substituted in (4) and after adding the error components given by (12) in a second step, the adjusted translog cost frontier is estimated by applying the decomposition formula given in (14) and (15) to obtain estimates of producer-specific technical efficiency. As we "corrected" the cost frontier for price distortions, the resulting efficiency estimates u are solely technical. Finally, producer- and input-specific estimates of cost efficiency are obtained by simple calculation using the estimates for θ and u. The two-stage model is estimated using a non-linear iterative seemingly unrelated regression (ITSURE) technique with symmetry and homogeneity conditions imposed. As GREENE (2000) notes, the OBERHOFER-KMENTA (1974) conditions are met for the SURE model, so efficient maximum likelihood estimates can be obtained by iterating the basic feasible generalized least square (FGLS) procedure. This two-stage model is then estimated again (model 2) by imposing curvature correctness (i.e., functional concavity) on the cost function in (11) by basically following the decomposition shown by (9). We thus go beyond similar modeling efforts (see ATKINSON and HALVORSEN, 1980; KUMBHAKAR, 1989; KUMBHAKAR and BHATTACHARYYA, 1992; WANG et al., 1996) and also incorporate considerations on the consistency of the estimated frontier with basic microeconomic principles (i.e., cost minimization). Finally, the estimation results of the unconstrained and constrained models are compared with respect to the relative differences in the individual efficiency scores.

5 RESULTS AND DISCUSSION

All estimated cost systems show a relatively good overall fit with respect to commonly used statistical criteria. However, in the unconstrained model I, only 27 % of all observations adhere to functional concavity, in contrast to 80 % in the constrained model II (due to space limitations, the parameter/model statistics are not shown here but can be obtained from the authors). A trade-off between the statistical significance and the theoretical consistency of the estimated function as documented by earlier studies (see e.g. SAUER, 2005) are not confirmed by the results here. The estimated shadow price parameters show a high significance across the models. Table 2 and 3 summarize the estimation results with respect to systematic input-specific allocative, producer-specific overall technical and producer- and input-specific cost efficiency.

Table 2: Systematic input-specific allocative efficiency

	Model I		Model II	
Efficiency[1]	**Mean**	**Std. Err.[2]**	**Mean**	**Std. Err.[2]**
AE Labor	0.476	0.007***	0.320	0.010***
AE Fertilizer	0.138	0.006***	0.585	0.009***
AE Land	0.380	0.001***	0.503	0.001***
AE Organic Fertilizer	0.260	0.001***	0.292	0.001***

Source: Own calculations.

Notes: [1] Allocative efficiency estimates are parameter based: No min. and max. values are available.

[2] *, **, *** Significance at the 1, 5, and 10 % levels, respectively.

Table 3: Producer-specific technical and cost efficiency

	Model I				Model II			
Efficiency	**Mean**	**Std. Err.**	**Min**	**Max**	**Mean**	**Std. Err.**	**Min**	**Max**
TE	0.938	0.074^{***}	0.606	0.999	0.869	0.131^{***}	0.488	0.999
CE Labor	0.447	0.035^{***}	0.289	0.476	0.278	0.042^{***}	0.156	0.320
CE Fertilizer	0.129	0.010^{***}	0.084	0.138	0.509	0.077^{***}	0.285	0.585
CE Land	0.357	0.028^{***}	0.230	0.380	0.438	0.066^{***}	0.245	0.503
CE Organic Fertilizer	0.244	0.019^{***}	0.157	0.260	0.254	0.038^{***}	0.142	0.292

Source: Own calculations.

Notes: *, **, *** Significance at the 1, 5, and 10 % levels, respectively.

The systematic allocative efficiencies with respect to the inputs labor, fertilizer, land, and organic fertilizer were found to be moderately higher with respect to the constrained model II. However, in the unconstrained model, the variable input labor shows the highest efficiency (about 48 %) whereas the same holds for the use of the variable input fertilizer in the constrained model (about 59 %). On the other hand, the lowest allocative efficiency was found for fertilizer in the unconstrained (about 14 %) and for the quasi-fixed input organic fertilizer in the constrained model (about 29 %). What can be generally concluded from these results is that price distortions prevail in the agricultural input markets for labor and inorganic fertilizer. Hence, the underlying modeling assumption that maize producers optimize their production decisions with respect to unobservable shadow price ratios does hold for the sample. This indicates that cost minimization based on observable market prices may be inappropriate, and thus, a model incorporating market distortions is more suitable in an agricultural transition context. The values for the shadow prices indicate that "prices" actually paid by the farmers for the inputs used are far less than the observed market prices due to the existence of market distortions. These findings strongly suggest that there is a considerable gap between agricultural input market prices and farm input prices. Different factors could account for such a price gap with respect to labor and fertilizer. As the price for hired labor rises, farmers tend to substitute family for hired labor. Due to a lack of data, labor is used here as an aggregated measure consisting of hired and family labor. Hence, an increasing amount of family labor leads to a decrease in the average individual shadow price at the farm level for the variable input labor. With respect to fertilizer, as the price increases as a consequence of the availability of commercially-produced and marketed high quality fertilizers in the market, the scope and demand for black market fertilizer also increases. Consequently, the quantity of available "underpriced" fertilizer increases, leading to a lower shadow price for fertilizer with respect to the individual farmer. The estimated shadow parameters for the quasi-fixed inputs land and organic fertilizer show that the farms' resource endowment – i.e., land endowment as well as livestock size – crucially influences its relative allocative performance. In the case of land, the evidence of the two models is mixed: For model I, evidence suggested that increasing the amount of cultivated land leads to an increase in allocative efficiency, whereas for model II, the opposite holds. In the case of organic fertilizer, the models show evidence for an efficiency gain as the farmers apply more fertilizer when producing maize. Based on the estimated allocative efficiency parameters from the first step, a maximum-likelihood estimate of the corrected cost frontier is obtained and a technical efficiency index is derived for both models. Table 4 contains the frequency distributions for the producer-specific technical efficiencies.

Table 4: Frequency distribution – Producer-specific technical efficiency

Efficiency Index	Percentage		Cumulative Frequency		Cumulative Percentage	
	Model I	Model II	Model I	Model II	Model I	Model II
0.4-0.5	–	1.56	–	1	–	1.56
0.5-0.6	–	6.25		5	–	7.81
0.6-0.7	1.56	6.25	1	9	1.56	14.06
0.7-0.8	3.12	9.37	3	15	4.69	23.44
0.8-0.9	14.06	14.06	12	24	18.75	37.50
0.9-1.0	81.25	62.50	64	64	100	100
Mean	0.938	0.824				
Std. Err.	0.074***	0.162***				
Min.	0.606	0.423				
Max.	0.999	0.998				

Source: Own calculations.

Notes: *, **, *** Significance at the 1, 5, and 10 % levels, respectively.

The estimated technical efficiency mean is about 94 % (model I) and about 87 % (model II) respectively, whereas the least technically-efficient farm shows a value of about 61 % (model I) and about 49 % (model II). This implies that on average, up to 13 % of profits are lost due to technical inefficiency, which is rather moderate compared to the revealed levels of allocative inefficiency. The frequency distributions of the individual farm's technical efficiency indices show that there is a moderate variation in the level among farms in the sample: For both models, the majority of farmers show a relative technical efficiency of more than 90 %. Based on the estimated systematic input-specific allocative efficiency, as well as the estimated producer-specific technical efficiency, producer- and input-specific cost efficiency levels are computed (see Table 3). With the exception of labor, the cost efficiency levels are moderately higher for the constrained model (model II) compared to those for the unconstrained model (model I). For model I, maize farmers most efficiently used the variable input labor, whereas they least efficiently used the variable input fertilizer with respect to costs. For model II, farmers in the sample most efficiently used fertilizer and least efficiently used the quasi-fixed input organic fertilizer. These cost efficiency results reveal partly mixed evidence for the different model specifications. With regard to the effects of different production settings, institutional, as well as policy-related factors in both estimation stages delivered evidence, either with respect to groups of producers defined along such factors (shadow cost estimation stage) or with respect to individual producers (error components estimation stage). In the latter case, the derived farm-specific efficiency index facilitates the decomposition of the efficiency performance at the individual maize farm level and allows for the identification of factors that influence farmers' efficiencies. Table 5 and 6 summarize the various found effects.

Table 5: Group-wise technical efficiency effects

	Model I		Model II	
Factor	**Mean**	**Std. Err.**	**Mean**	**Std. Err.**
TE Difference Herbicide	-0.024	0.011**	-0.042	0.016***
TE Difference Insecticide	-0.022	0.014	-0.008	0.020
TE Difference Seed	-0.013	0.009	-0.024	0.013*
TE Difference Subsidies	+0.018	0.007**	-0.036	0.038
TE Difference Extension	+0.025	0.009***	+0.051	0.015***
TE Difference Training	+0.029	0.013**	+0.087	0.019***

Source: Own calculations.

Notes: *, **, *** Significance at the 1, 5, and 10 % levels, respectively.

Table 6: Producer-specific technical efficiency effects

Factor	**Model I**	**Model II**
Herbicide	-*	+**
Insecticide	-***	-***
Seed	-	+
Subsidies	-	-***
Extension	-***	-***
Training	-***	+*

Source: Own calculations.

Notes: *, **, *** Significance at the 1, 5, and 10 % levels, respectively; '-' represents a negative correlation with TE, '+' represents a positive correlation.

The results for the shadow frontier show that the use of herbicides, the use of insecticides, and the application of commercial seeds are negatively correlated with the technical efficiency of maize producing farms for both models. The use of extension services and agricultural training were found to be positively correlated to technical efficiency for both models, however, mixed evidence was found for receiving subsidies. These correlations are only partly confirmed by the results of the error components estimation: Here, both the unconstrained as well constrained model specification agree on a negative effect on efficiency through the use of insecticides, the use of extension services, and receiving subsidies. Mixed evidence was found for the use of herbicides, the application of commercial seeds, and the use of agricultural training. It can be concluded for this part of the analysis that only with respect to the use of insecticides do all model specifications agree on the negative efficiency effect. The reported efficiency results of the unconstrained, as well as constrained model specification, point to the relevance of theoretical consistency for the estimated frontier. As outlined in Section 3, model II differs from model I by applying a matrix decomposition technique to impose concavity on the translog cost frontier to ensure functional regularity, and the adherence to the basic microeconomic principle of cost minimization (see SAUER, 2005). Table 7 illustrates the relative differences in the efficiency scores for the unconstrained and constrained specifications.

Table 7: Relative difference in efficiency scores unconstrained vs. constrained specification

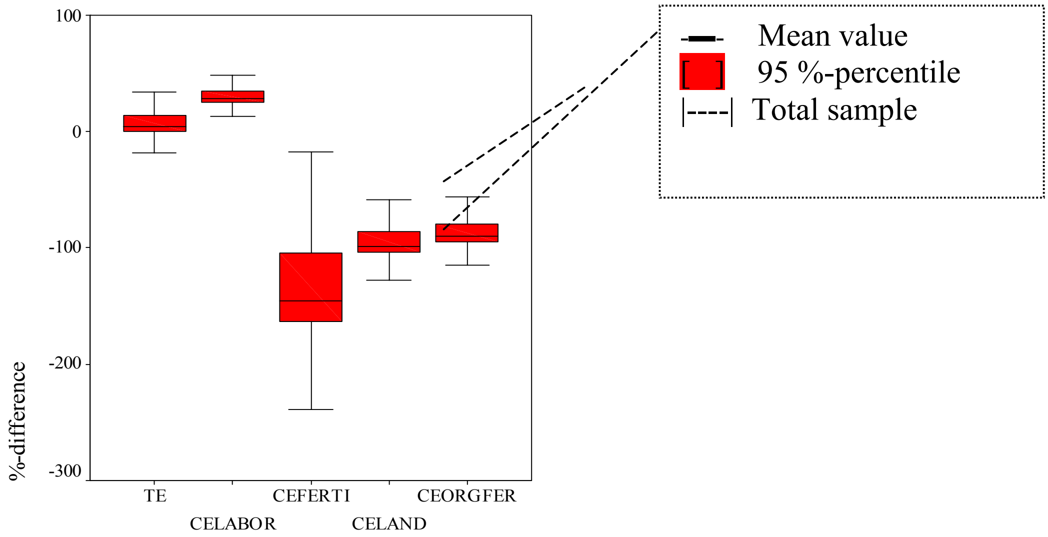
Measure	**Mean (%)[2]**	**Std.Err.[1]**	**Min**	**Max**
Technical Efficiency	7.36	12.14	-18.06	41.45
Cost Efficiency Labor	30.52	8.15***	13.25	53.00
CE Fertilizer	-131.41	51.49**	-239.19	11.85
CE Land	-94.09	16.06***	-127.71	-49.41
CE Organic Fertilizer	-86.62	13.63***	-115.14	-48.70

Source: Own calculations.

Notes: [1] *, **, *** Significance at the 1, 5, and 10 % levels, respectively;
[2] '+' implies means' underestimation of real efficiency, '-' implies overestimation of real efficiency.

The relative difference in the efficiency scores in absolute terms ranges, on average, from about 7.4 % (producer-specific technical efficiency measure) to about 131.4 % (producer- and input-specific cost efficiency measure for organic fertilizer). Hence, this is empirical evidence for the validity of our concerns about the appropriate functional form and its theoretical consistency (see SAUER, 2005). Figure 1 illustrates these differences with respect to the single efficiency measure.

Figure 1: 95 %-percentile and mean differences in efficiency by imposing curvature correctness



Source: Own calculations.

Finally, the results of the applied bootstrap procedure confirmed the estimates for the theoretically-consistent model (model II) on the estimation stage of the error-components specification.

6 SUMMARY AND IMPLICATIONS

This study focuses on the relative efficiency of small-scale maize farmers in Romania by using a cost function modeling framework combining the stochastic frontier approach of shadow prices, as well as the mainstream error components model. Various market distortions are addressed by adopting the concept of a shadow cost frontier delivering insights on systematic input-specific allocative efficiency. After correcting for shadow prices, we subsequently reveal evidence on farm-specific technical efficiency and develop an efficiency index for a sample of Romanian maize producers in 2002. Finally, various transition policy-relevant factors are investigated with respect to their impact on technical efficiency on group, as well as individual farm level. By referring to the ongoing discussion on the stochastic frontier's functional consistency with respect to microeconomic theory, we formulated two basic model specifications – one without and one with functional concavity imposed – and estimated the individual cost system by means of iterated seemingly unrelated regression techniques (ITSURE). The empirical results show that price distortions prevail in the agricultural input markets in the Romanian economy and that a model incorporating such market distortions seems to be more suitable in an agricultural transition context than one solely based on observable market price ratios. The estimated shadow parameters for the quasi-fixed inputs revealed that the farms' resource endowment – i.e., land endowment as well as livestock size –

crucially influences its relative allocative performance. A high technical efficiency on farm level with a moderate variation over the sample was found, but relatively poor scores on systematic allocative efficiency were also revealed. With respect to group-wise technical efficiency, the empirical results for the shadow frontier show that the use of herbicides, the use of insecticides, and the application of commercial seeds are negatively correlated with the technical efficiency of maize farmers. This suggests that there is a need for policy measures targeting efficiency improvement with respect to the application processes (i.e., technology) due to chemicals, as well as seeding. On the other hand, positive efficiency gains can be reported for the use of extension services, as well as agricultural training on the farm level, suggesting further engagement by the political actors in these areas. However, the results of the error component estimations only partly confirm those policy implications. Overall, all model specifications agree – but only with respect to the use of insecticides – on the negative effect on efficiency by the additional usage of such chemicals. The revealed relative difference in the efficiency scores of up to 240 % on the individual farm level, the consequence of imposing curvature correctness, confirmed the relevance of theoretically-consistent modeling with respect to the stochastic measurement of efficiency. The empirical applications hence document the need for *a posteriori* checking the regularity of the estimated frontiers by the researcher and, if necessary, the *a priori* imposition of theoretical requirements on the estimation models (see SAUER, 2006).

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HOW LARGE IS THE MARGINAL PRODUCT OF LAND IN THE MOSCOW REGION?

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ABSTRACT

The marginal product of arable land and grassland is estimated by a shadow price parameterization. The shadow prices are obtained from multiple runs of a linear programming model of the Moscow region land market that randomly uses varying crop yields. The marginal product of land approximates the possible price of agricultural land from 2001-2003 under the assumption of a properly functioning land market. In 2003, this value (for arable land) varied from 290 to 1,309 roubles, depending on distance from Moscow and soil fertility. Higher crop yields negatively influence the marginal land product values. There is a declining trend of these values during the studied period, which impedes emerging market institutions.

Keywords: *Agricultural land, marginal product, land value, transitional economies, parameterization, Moscow region.*

1 INTRODUCTION

The agricultural land market in Russia, and specifically in the Moscow region, is still underdeveloped, although most of the juridical pre-conditions for its normal operation have already been formed. This can be explained by the low marginal product of land and high land transaction costs. Because of the limited number of transactions, land prices and land rent vary greatly and only weakly relate to the true marginal product of agricultural land. To address these problems, the true marginal land product has to be determined. It is also useful to inform land market agents for taxation purposes and project analysis.

The aim of this paper is to determine the marginal product value of arable land and grassland in the Moscow region. The research questions are defined as follows:

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a) What is the most applicable methodology for approaching the marginal product value of agricultural land given the Moscow region's current situation?

b) How large is this marginal product and how is it affected by current economic reforms?

c) What are the policy implications of the discovered changes in the marginal product of land?

Moreover, we test the following three hypotheses in this study:

a) The marginal product of land increases during the second stage of economic reforms in the agricultural sector (from 2001-2003).

There are three reasons for this hypothesis. The first is increasing agricultural production in Russia and, particularly, in the Moscow region, both gross and per unit of land. The second reason is the relative stabilization of farming's institutional environment. The third is that developing the agro-industrial complex was declared a national priority by the President of the Russian Federation. Because of this, the investment climate in Russian agriculture is expected to turn for the better, forming favorable conditions for the growing agricultural land marginal product.

b) The marginal product of land positively depends on proximity to Moscow city.

In developed markets, the closer a plot of land is to a major food market and industrial center, the higher its agricultural land prices will be. A similar situation is likely with land marginal product in an underdeveloped land market which is the result of non-market land allocation processes.

c) Given the fixed capacity of the agricultural product market, increasing crop yields causes land marginal product to decline.

Assuming that sales cannot be increased (which implies price-making behavior of market actors) and agricultural land cannot be used for non-agricultural purposes, a global increase of yields releases a portion of land from intensive production. It is likely that the latter causes the reduction of land marginal product and, consequently, devaluates the property. This can be applicable to the situation in the Moscow region.

A review of the current state of agricultural land price studies can be found in TRIVELLI (1997). A great deal of international experience with modeling land markets (e.g. LLOYD, RAYNER and ORME, 1991) is scarcely applicable for answering the research questions of our study; this is due to a lack of data on actual land transactions.

The estimates of land shadow prices based on common micro-economic approaches can often be found in publications that are not specifically aimed at land marginal product analyses (see e.g. BOOTS, 1997; OSBORNE and TRUEBLOOD, 2002;

BEZLEPKINA, OUDE LANSINK and OSKAM, 2005). The marginal product of land is commonly found – following the basic theory presented in CHAMBERS (1988) – by estimating either a production function or a profit function for agricultural farms.

Useful experience in valuing agricultural land in the absence of a land market has been gained by the Soviet school of agricultural economics, which includes two streams. The first, founded by V. Dokuchaev in the 19th century, determined chemical, mechanical, biologic and geographical factors of soil fertility and measured their contribution to land value. For this purpose, simple statistical tools such as analytical grouping and linear regressions of net farm income were used (TYAPKIN, 1987). This stream emphasized the importance of eliminating differences in the economic conditions of land use. These studies are mostly applicable to the problems of cadastral valuation.

The second stream of the Soviet school focused on measuring land marginal product in actual economic conditions. This approach is particularly relevant to agricultural land market studies, and is characterized by the presence of a model of agricultural land's marginal product. The models differ with respect to specific research tasks and available data (e.g. BOBYLEV, 1987; BELENKIY, 2003) and sometimes such models are accompanied with land market simulations in partial equilibrium models (GATAULIN and SVETLOV, 1995).

In the case of the Moscow region, production or profit functions analyses are hindered by the heterogeneity of farm data. Attempts to compile the homogeneous sets of farms result in the large variation of estimates of land marginal product due to the loss of representativeness.

Partial equilibrium models are more practical, but labor-intensive to implement and very sensitive to missing data. Moreover, in the case of transitional economies, farm data is not sufficient to derive land supply and demand functions in the vicinity of equilibrium.

All this justifies the choice of a linear program as the most suitable research tool for this study. KANTOROVICH's (1965) idea of obtaining land rental values directly from a mathematical program meets a reasonable criticism (e.g. DANILOV-DANILYAN, 2004): The mathematical program for agricultural land use displays land shadow prices' great sensitivity to small changes in those parameters, which in principle cannot be precisely defined. As a consequence, the opinion has prevailed among economists that this type of model is not applicable to land value applications.

It is noticeable that the large variability of resources' marginal value is their inherent feature rather than a distortion caused by the mathematical programming methodology. Decision-makers acting on real land markets face uncertainty and fickleness in land marginal product to the same extent as an economist working with a mathematical programming model does.

The practice of real decision-making provides the idea of dampening this problem. The factors of land marginal product variation can be split into unidentifiable noise and factors that can be explicated. For this purpose, we engage the parameterization of agricultural land shadow prices obtained from 6,000 tests. For testing, we vary (at random) the productivity of the most important crops in the linear program to simulate agricultural land allocation in the Moscow region.

2 THEORETICAL FRAMEWORK

This study originates with the neo-classical representation of a price-taking firm n acting in a competitive environment:

$$\max(\mathbf{w}\mathbf{y}_n - \mathbf{v}\mathbf{x}_n \mid \mathbf{y}_n = \mathbf{f}_n(\mathbf{x}_n,\mathbf{z}_n),\ \mathbf{z}_n \le \mathbf{b}_n), \tag{1}$$

where $\mathbf{x}_n$, $\mathbf{y}_n$, $\mathbf{z}_n$ are non-negative vectors of variable inputs, outputs and fixed inputs, respectively; $\mathbf{v}$ is a constant non-negative vector of prices of variable inputs; $\mathbf{w}$ is a constant non-negative vector of output prices; $\mathbf{b}_n$ is a constant non-negative vector of amounts of freely-disposable fixed inputs; $\mathbf{f}_n(\cdot)$ is a production function.

In this specification, a firm-specific net marginal product of a resource is equal to the Lagrangean multiplier of the corresponding inequality $\mathbf{z}_n \le \mathbf{b}_n$.

Assumption 1. Instead of classical fixed inputs, there exist semi-fixed inputs that are marketable within a region but cannot be traded outside it.

Assumption 2. The firms are price-makers with respect to semi-fixed inputs.

Assumption 3. Transaction costs at the regional market of semi-fixed inputs are negligible.

These assumptions aim to represent a regional land market. Thinking of agricultural land as a semi-fixed input and the price-making assumption stems directly from the research question (b): We have to develop a framework that can address this question. Nearly zero transaction costs are assumed because we are interested in the analysis of the land market when transaction costs are reasonably low and virtually do not affect decisions. The situation under actual (high) transaction costs does not call for modeling, as it can be observed directly.

Given the assumptions 1-3 and introducing set N of firms in the region such that $n \in N$, it can be derived from (1) that the totality of the firms belonging to the set N reaches the state

$$\max(\mathbf{w}\mathbf{y} - \mathbf{v}\mathbf{x} \mid \mathbf{y} = \Sigma_{n\in N}\, \mathbf{y}_n,\ \mathbf{x} = \Sigma_{n\in N}\, \mathbf{x}_n,\ \mathbf{y}_n = \mathbf{f}_n(\mathbf{x}_n,\mathbf{z}_n),\ \Sigma_{n\in N}\, \mathbf{z}_n \le \Sigma_{n\in N}\, \mathbf{b}_n). \tag{2}$$

In this specification, the regional value of the marginal product of a specific kind of land is equal to the Lagrangean multiplier associated with the inequality that represents the corresponding quasi-fixed input. All consequent specifications and generalizations of (2) inherit this property.

Assumption 4. All firms in N have the same production function $\mathbf{f}(\cdot)$.

This assumption is quite restrictive with respect to the actual situation in the Moscow region. However, it is determined by two reasons: The excess complexity of the empirical model otherwise and robustness considerations.

Assumption 5. There exists a set Q of classes of semi-fixed inputs that are mutually-exclusive at the firm level.

This way we allow for differences in soil fertility and in plot location. Land plots that differ in at least one of these two factors are treated as different resources that cannot be jointly available to the same farm.

With the imposed assumptions 4 and 5 we can rewrite (2) as:

$$\max(\mathbf{wy} - \mathbf{vx} \mid \mathbf{y} = \Sigma_{n\in N}\, \mathbf{y}_n,\ \mathbf{x} = \Sigma_{n\in N}\, \mathbf{x}_n,\ \ \mathbf{y}_n = \mathbf{f}(\mathbf{x}_n,\mathbf{z}_n), \\ \forall q\ \Sigma_{n\in N(q)}\, \mathbf{z}_n \le \Sigma_{n\in N(q)}\, \mathbf{b}_n), \tag{3}$$

where $q\in Q$ and $N(q)$ is a class of firms belonging to N that use the resources from class q.

Assumption 6. Firms are long-term profit maximizers.

This assumption transforms (3) into the following problem:

$$\max(\mathbf{wy} - (\mathbf{v}+\mathbf{d})\mathbf{x} \mid \mathbf{y} = \Sigma_{n\in N}\, \mathbf{y}_n,\ \mathbf{x} = \Sigma_{n\in N}\, \mathbf{x}_n, \\ \mathbf{y}_n = \mathbf{f}(\mathbf{x}_n,\mathbf{z}_n),\ \forall q\ \Sigma_{n\in N(q)}\, \mathbf{z}_n \le \Sigma_{n\in N(q)}\, \mathbf{b}_n), \tag{4}$$

where $\mathbf{d}$ is a non-negative constant vector of incremental capital recovery costs per unit of an input.

This assumption attempts to capture the actual decision-making process on the land market, where the bargains have long-term consequences and are thus expected to be justified by long-term utility.

Assumption 7. The firms' decision-making processes are subject to the constraints of the economic environment.

The corresponding generalization of (4) is the following:

$$\max(\mathbf{wy} - (\mathbf{v}+\mathbf{d})\mathbf{x} \mid \mathbf{y} = \Sigma_{n\in N}\, \mathbf{y}_n,\ \mathbf{x} = \Sigma_{n\in N}\, \mathbf{x}_n,\ \mathbf{y}_n = \mathbf{f}(\mathbf{x}_n,\mathbf{z}_n), \\ \forall q\ \Sigma_{n\in N(q)}\, \mathbf{z}_n \le \Sigma_{n\in N(q)}\, \mathbf{b}_n,\ \mathbf{y}_{\min} \le \mathbf{y} \le \mathbf{y}_{\max}), \tag{5}$$

where $\mathbf{y}_{\max}$ is a non-negative vector of satiation levels of exogenous demand and $\mathbf{y}_{\min}$ is a non-negative vector of the lower boundary of outputs. The purpose of vector $\mathbf{y}_{\min}$ is to reflect long-term intents, expectations about the future, etc., that can neither be identified precisely nor, consequently, explicitly expressed by a specification of the utility function. Any component of both $\mathbf{y}_{\max}$ and $\mathbf{y}_{\min}$ can be infinitely large.

3 EMPIRICAL MODEL

In the empirical model the production function $\mathbf{f}(\cdot)$ is assumed to be linear. This results in a linear programming specification of (5) and facilitates the determination of values of Lagrangean multipliers from the solution of a dual linear program.

Although restrictive, the linear specification is predetermined by the scarcity of available data, which does not permit the derivation of a true form of production functions. Modeling under the linearity assumption requires controlling for the closeness of linear dependencies in the vicinity of an optimum to tangents to actual production functions, using both formal and informal analytical procedures.

In our model the technologies are assumed to have a neutral return to scale. To derive $\mathbf{f}(\cdot)$, we use average consumption of resources throughout $N(q)$ in all production processes reflected by the available data, both empirical and technical. In comparison to farm data envelopment, this approach allows for optimal inter-farm resource allocation when changing land usage. Another important advantage is a maintainable size of the linear program matrix.

The detailed representation of the agricultural production technologies is not presented here due to space limits. It can be found in IL'INA and SVETLOV (2004).

The empirical model considers the following commodities:

a) Quasi-fixed input groups: Arable land; grassland[1].

For each group, nine mutually exclusive types of quasi-fixed inputs are defined, differing in distance from the major Moscow city market (three grades), and in soil fertility (also three grades). The grades in distance and fertility are chosen to roughly minimize the differences in agricultural land area between subsets of farms using a particular type of quasi-fixed inputs. Below we refer to these subsets as *q-groups*, following the notation of (3).

b) Outputs: Grain; potatoes; vegetables; milk; beef; pork.

c) Intermediate products in crop production: Grain for fodder; hay from permanent grasses grown in arable lands; haylage; corn silage; grass silage; grass from annual grasses; grass from permanent grasses grown in arable lands; roots for fodder; hay from haylands; gramma grass.

d) Intermediate products in animal production: Milk for fodder; milking cows; sows.

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[1] The reservation is made in the model-supporting software for three more resource groups representing labour, stalls for cattle and pigpens. However, the specification used in this study does not consider these quasi-fixed inputs: Because of the previous recession of agricultural production, they are abundant.

Vector $\mathbf{y}_{min}$ includes finite components for all six outputs. Vector $\mathbf{y}_{max}$ has two finite components: For potatoes and for vegetables.

The above-formulated problem was solved 6,000 times (2,000 times for each year from 2001-2003) varying the normalized (mean = 1) yields per unit of land.

For each of the 6,000 tests, these parameters are chosen separately and at random for four crops: Cereals, potatoes, vegetables and all other crops (i.e., fodder crops).

The random values are chosen from the interval between 0.7 and 1.3 assuming uniform distribution. The corresponding crop yields per hectare are calculated and placed into the matrix of the linear program, then the model is solved with Sunset software XA and the solution is saved for further statistical processing.

Some of the tests (929 in 2001, 608 in 2002 and 473 in 2003) resulted in unfeasible solutions and were excluded from the analysis. For all feasible solutions, common logarithms of shadow prices of arable land and of grassland were subjected to both linear and quadratic parameterization using the normalized incremental yields per unit of land as exogenous variables.

4 DATA

Four sources of data were used: Annual data from the Moscow region corporate farms registry for the period 1998-2003, provided by Rosstat[2]; soil rates of the Moscow region corporate farms provided by the department of Statistics of Moscow Timiryazev agricultural academy; maps of the Moscow region as a source of data on distances between farms and Moscow; data on animal rations (KALASHNIKOV et al., 1995).

The annual data of the Moscow region corporate farms registry include more than 200 variables for each of more than 300 corporate farms, of which the following categories were used:

a) Gross annual sales of each product (in kind);
b) Annual revenues from sales of each product (in thousand roubles);
c) Gross annual intermediate production (in kind);
d) Production costs of annual outputs and annual intermediate production, including depreciation costs as a proxy for **d** in equation (4) (in thousand roubles);
e) Numbers of milk cows, fattening herd and sows (annual average);
f) Sown area per crop (hectares);
g) Arable land and grassland areas as of November 1 (hectares).

[2] Rosstat (former Goskomstat) is a federal statistical agency of the Russian Federation.

These data are used for calculating parameters of the linear program. We use a four-year period prior to the year of estimation to smooth the randomness of crop yields. Additionally, data on annual depreciation accrued in agricultural production and annual average number of workers in agricultural production are used when calculating crop yields per hectare to be used as parameters of the linear program. This data enables smoothening (by means of linear regression) the differences in intensity between the farms in different *q*-groups. The reason for this procedure is to capture the impact of given distance from Moscow and soil fertility. Otherwise, the results would also depend on specific intensity in terms of labor and fixed assets consumption.

The finite components of $\mathbf{y}_{\min}$ ($\mathbf{y}_{\max}$) are set to the lowest (highest) of the corresponding values throughout the available annual data.

5 Results

The estimated linear functions of the common logarithm of the land marginal product are presented in Table 1. The values of F indicate that the confidence in the parameterization model is very high, with the influence of fodder crop yields on the land marginal product being the greatest. As the majority of crops in terms of land share are fodder, this conforms our expectations. The second most influential crop is cereals.

It is noticeable that higher crop productivity (excluding potatoes) is associated with lower land marginal product. This supports hypothesis (c). In the case of higher crop yields, the market for relatively profitable production is satiated while smaller land area is used. The empirical model suggests that land released from meat production is used for more efficient vegetable production. Such land reallocation takes place until vegetable production reaches the limit of market capacity, which is caused by lacks of both market infrastructure and payable demand. The situation with potatoes is similar. A further increase of crop productivity expands less profitable activities (specifically, cereals and milk production) which negatively affects the land marginal product.

In the majority of cases, the parameters of functions in Table 1 vary from one *q*-group to another within their confidence intervals. The significant differences are mostly observed between the parameters relating to the fodder crop yields. This gives weak evidence in support of the research hypothesis (b). Wholesale prices, herd productivity and other factors varying throughout the groups, excluding crop yields per unit of area, appear to have insignificant influence on the agricultural land marginal product.

Table 1: Common logarithm of marginal agricultural land product in the Moscow region, 2003 (thousand roubles per hectare) as a linear function of crop productivity

Distance from Moscow	Rate of soil fertility*	Type	Land marginal product function	R^2	F
<60 km	110 and above	A	$\mathbf{5.75}-\mathbf{0.85}x_1+\mathbf{0.14}x_2-\mathbf{0.10}x_3-\mathbf{1.59}x_4$	0.443	304.4
		G	$\mathbf{4.55}-\mathbf{0.70}x_1+\mathbf{0.13}x_2-\mathbf{0.09}x_3-\mathbf{1.21}x_4$	0.420	277.7
	90…110	A	$\mathbf{5.79}-\mathbf{0.89}x_1+\mathbf{0.15}x_2-\mathbf{0.10}x_3-\mathbf{1.65}x_4$	0.429	287.9
		G	$\mathbf{4.84}-\mathbf{0.79}x_1+\mathbf{0.14}x_2-\mathbf{0.09}x_3-\mathbf{1.44}x_4$	0.451	314.1
	less than 90	A	$\mathbf{6.01}-\mathbf{0.98}x_1+\mathbf{0.19}x_2-0.13x_3-\mathbf{2.00}x_4$	0.366	221.1
		G	$\mathbf{5.45}-\mathbf{1.15}x_1+\mathbf{0.20}x_2-\mathbf{0.14}x_3-\mathbf{2.19}x_4$	0.474	345.0
60…110 km	110 and above	A	$\mathbf{5.90}-\mathbf{0.93}x_1+\mathbf{0.15}x_2-\mathbf{0.11}x_3-\mathbf{1.72}x_4$	0.432	291.7
		G	$\mathbf{4.59}-\mathbf{0.71}x_1+\mathbf{0.13}x_2-\mathbf{0.09}x_3-\mathbf{1.27}x_4$	0.435	296.5
	90…110	A	$\mathbf{5.89}-\mathbf{0.93}x_1+\mathbf{0.15}x_2-\mathbf{0.11}x_3-\mathbf{1.75}x_4$	0.426	283.7
		G	$\mathbf{4.87}-\mathbf{0.81}x_1+\mathbf{0.15}x_2-\mathbf{0.10}x_3-\mathbf{1.48}x_4$	0.455	319.9
	less than 90	A	$\mathbf{6.13}-\mathbf{0.98}x_1+\mathbf{0.21}x_2-0.15x_3-\mathbf{2.20}x_4$	0.332	190.3
		G	$\mathbf{5.38}-\mathbf{1.12}x_1+\mathbf{0.21}x_2-\mathbf{0.14}x_3-\mathbf{2.19}x_4$	0.464	331.8
>110 km	110 and above	A	$\mathbf{5.08}-\mathbf{1.00}x_1+\mathbf{0.16}x_2-\mathbf{0.12}x_3-\mathbf{1.90}x_4$	0.421	278.2
		G	$\mathbf{4.66}-\mathbf{0.74}x_1+\mathbf{0.14}x_2-\mathbf{0.09}x_3-\mathbf{1.33}x_4$	0.445	307.5
	90…110	A	$\mathbf{6.03}-\mathbf{0.98}x_1+\mathbf{0.17}x_2-\mathbf{0.12}x_3-\mathbf{1.89}x_4$	0.417	274.1
		G	$\mathbf{4.88}-\mathbf{0.81}x_1+\mathbf{0.15}x_2-\mathbf{0.10}x_3-\mathbf{1.50}x_4$	0.458	323.3
	less than 90	A	$\mathbf{6.14}-\mathbf{0.88}x_1+\mathbf{0.25}x_2-0.19x_3-\mathbf{2.45}x_4$	0.261	135.9
		G	$\mathbf{5.36}-\mathbf{1.12}x_1+\mathbf{0.21}x_2-\mathbf{0.14}x_3-\mathbf{2.19}x_4$	0.450	326.0

Source: Authors' calculations.

Notes: * The average fertility rate of agricultural land in the Moscow region (weighted with areas) is 100.

Symbol ‘A’ denotes arable land, ‘G’ – grassland.

The variable x denotes normalized yields per hectare (average yield for a group is 1) for cereals, potatoes, vegetables and fodder, respectively. The parameters of land marginal product functions presented in bold are significant at $\alpha = 0.05$.

The fitted quadratic functions are characterized with R^2 within 0.642…0.823 for arable land and within 0.792…0.860 for grassland. Corresponding F values are within 196.9…507.0 and 416.0…671.7, indicating very high confidence in the regression. For 2003, the estimated quadratic function of the common logarithm of the arable land marginal product (the case of medium distance and fertility) is

$$\mathbf{31.31}-\mathbf{22.15}x_1+\mathbf{2.08}x_2+0.29x_3-\mathbf{31.81}x_4+\mathbf{5.54}x_1^2-\mathbf{0.67}x_1x_2-0.02x_1x_3+\mathbf{9.73}x_1x_4-$$
$$-0.30x_2^2-0.01x_2x_3-\mathbf{0.63}x_2x_4+0.05x_3^2-0.17x_3x_4+\mathbf{9.83}x_4^2 \text{ (thousand roubles)}$$

and the common logarithm of the grassland marginal product (the same case) is

$$\mathbf{25.48}-\mathbf{17.42}x_1+\mathbf{1.48}x_2-0.02x_3-\mathbf{25.95}x_4+\mathbf{4.17}x_1^2-\mathbf{0.62}x_1x_2+0.15x_1x_3+\mathbf{7.85}x_1x_4+$$
$$+0.05x_2^2+0.06x^2x^3-\mathbf{0.84}x_2x_4-0.12x_3^2+0.03x_3x_4+\mathbf{8.12}x_4^2 \text{ (thousand roubles).}$$

For both functions, the significant estimates are typed in bold. The negative dependence of land marginal product on crop yields remains unchanged: The elasticities of the arable land marginal product on the variables are -4.67, 0.39, 0.44 and -7.41. The positive elasticities are not significant at $\alpha = 0.05$.

Table 2 presents the arable land marginal product values estimated by both parameterization approaches in comparison to the corresponding shadow prices obtained directly from the linear program in the case of mean yields. For one of the *q*-groups, the shadow price does not fit into the 95 % confidence interval of the estimate by the quadratic parameterization.

Since the quadratic form provides a narrower confidence interval and higher F and R^2 compared to the linear form, the values obtained from the former are more trustworthy.

Table 2: Arable land marginal product in 2003 at average crop productivity level, roubles per hectare

Distance from Moscow	Rate of soil fertility*	By linear parametrization			By quadratic parametrization			By linear program
		min	estimate	max	min	estimate	max	
<60 km	110 and above	616	**2255**	8258	629	**1309**	2721	714
	90…110	494	**1979**	7919	504	**1108**	2438	567
	less than 90	184	**1222**	8110	183	**581**	1845	197
60…110 km	110 and above	476	**1998**	8393	483	**1096**	2488	540
	90…110	416	**1822**	7981	422	**986**	2303	472
	less than 90	110	**1008**	9268	107	**442**	1825	112
>110 km	110 and above	342	**1720**	8646	345	**886**	2276	383
	90…110	321	**1617**	8153	323	**833**	2146	361
	less than 90	43	**750**	13099	40	**290**	2121	34

Source: Authors' calculations.

Notes: * Average fertility rate of agricultural land in the Moscow region (weighted with areas) is 100.

Values in columns ‘min’ and ‘max’ are the boundaries of 95 % confidence intervals.

From Table 2 it can be concluded that in the statistical sense, the differences in the arable land marginal product of lands belonging to different location-fertility groups are insignificant in the majority of cases. But the decrease of this value with an increasing distance from Moscow or decreasing soil fertility conforms to theoretical expectations, which adds to the robustness of this approach.

Table 3 presents a comparison of the estimated agricultural land marginal product throughout years 2001-2003. The changes during this period have the same direction regardless of type of land or location-fertility class. The land marginal product in the Moscow region decreases, contrary to the hypothesis (a).

Table 3: Marginal agricultural land product in the Moscow region from 2001-2003, roubles per hectare (by quadratic parameterization)

Distance from Moscow	Rate of soil fertility*	Type	2001	2002	2003	2003 to 2001, %
<60 km	110 and above	A	5,395	2,132	1,309	24.3
		G	920	391	308	33.5
	90…110	A	5,018	1,899	1,108	22.1
		G	1,015	371	275	27.1
	less than 90	A	4,166	1,370	581	13.9
		G	496	96	73	14.7
60…110 km	110 and above	A	5,235	1,944	1,096	20.9
		G	893	378	297	33.3
	90…110	A	4,913	1,791	986	20.1
		G	991	358	263	26.5
	less than 90	A	4,066	1,261	442	10.9
		G	442	86	68	15.4
>110 km	110 and above	A	5,064	1,763	886	17.5
		G	866	358	275	31.8
	90…110	A	4,775	1,648	833	17.4
		G	958	345	254	26.5
	less than 90	A	3,970	1,161	290	7.3
		G	423	82	65	15.4

Source: Authors' calculations.

Notes: * Average fertility rate of agricultural land in the Moscow region (weighted with areas) is 100.

Symbol 'A' denotes arable land, 'G' – grassland.

Another noticeable observation is that the expected dependence of land marginal product on distance from Moscow and on soil fertility is observed throughout the period of 2001-2003. The exception is the case of grassland in 2001, whose marginal product peaks at medium soil fertility.

The estimated land marginal product is low, characterizing the agricultural land in the Moscow region as hardly sufficient collateral. OSBORNE and TRUEBLOOD (2002) estimated shadow prices of agricultural land[3] in the Central economic district of Russia, to which the Moscow region belongs. Their result was \$ 19.7 per hectare in 1995, declining to \$ 11.9 per hectare in 1998. According to their estimations, 40 to 120 hectares had to be mortgaged in 1997 to buy a tractor

[3] Since OSBORNE and TRUEBLOOD (2002) do not distinguish arable and low-intensity lands, their estimations should be attributed to the type of land that has the smallest marginal product. Hence, in our case they must be compared to grasslands.

(without accounting for transaction costs, which likely made the area of land to be mortgaged for buying a tractor raise to infinity). For the Moscow region, where relatively intensive suburban agriculture prevails, GATAULIN and SVETLOV (1995) found that the equilibrium price of grasslands used for hay production and pastures in 1994 were $ 170 and $ 213 per hectare, respectively.

Our results are $ 51.20 in 2001, declining to $ 28.6 in 2003 for a hectare of grassland[4] in the Moscow region. Despite the stabilization of Russian agriculture in terms of amount of production, there is no evidence that strengthening market institutions increases land price. As a consequence, agricultural land property remains unattractive and inefficiently allocated. This situation can be explained in accordance to the justification of the research hypothesis (c) formulated in Section 1. The agricultural production crisis in the 1990s caused many lands to lose value. Recovery has improved crop productivity[5]; but meanwhile, market capacity has grown slowly – resulting in decreasing land value.

6 CONCLUSIONS AND DISCUSSION

Research hypothesis (a) is clearly rejected by the results of our study, while hypothesis (c) is not rejected. As for hypothesis (b), the differences between land marginal products at different distances from Moscow are not significant in a statistical sense. However, a stable monotonic dependence suggests that in reality the factor of distance is influential, although its effect cannot be reliably proved by means of the applied methodology. This calls for its further improvement.

With respect to the research questions formulated in Section 1, the following can be concluded:

a) The methodology has proved its relevance to the aim of this study.
b) The marginal land product in the Moscow region from 2001 to 2003 is very low. Moreover, it displays a declining trend.
c) In this respect, for the purpose of making the land valuable there is a strong need for expanding markets and diversifying production, the pre-condition for which is increasing the population’s incomes and, consequently, increasing payable demand.

The declining trend of the agricultural land marginal product signals that an effective land policy based on well-developed economic and political institutions is missing. Indeed, virtually valueless land hardly substantiates the

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4 The case of medium fertility plots located between 60 and 110 km from Moscow.

5 In the Moscow region, the yield per hectare in 2002, compared to that of 1996, was 112.1 % (cereals), 129.3 % (vegetables). Both displayed a relatively stable trend, except 1999, which was extremely unfavourable.

expectation that the costs of establishing land market and property institutions will be repaid, which in turn slows down institutional reforms in agriculture.

Prior to utilizing Europe's experience regarding land markets, the institutional development of regional agriculture should facilitate growth of the land marginal product. In particular, politicians' fears about foreign landlords accumulating land should be replaced with a policy aimed at attracting investors regardless of their citizenship. Large land areas should be temporarily taken out of agricultural use, both for ecological reasons and for changing the dynamics of the land marginal product. Temporary and reasonable protectionism on agricultural production markets can also be considered a tool that can help establish a truly functioning land market by increasing the demand of internal agricultural production.

Finally, a rural financing system that can perform efficiently in the absence of land mortgages should be established. This is a way to prevent a repetition of the dramatic failure of P. Stolypin's agrarian reform that took place a century ago and was substantially based on land mortgage schemes.

This study has highlighted many subjects that require improvement in the applied methodology. Considering the continuously-emerging "agro-holdings" (RYLKO and JOLLY, 2005), the supply and demand of land outside the Moscow region is an important factor influencing the agricultural land marginal product inside the region. This leads to the idea of a mathematical model that would be able to consider data about external supply and demand. However, the problem here is in obtaining such data.

With regard to the utility function, a recent study by SVETLOV (2005) does not support the hypothesis about the profit-maximizing behavior of Moscow region corporate farms. Furthermore, the depreciation costs only roughly approximate the capital recovery costs. To capture the long-term preferences precisely, a propensity to invest should also be taken into account. Although we attempt to control the effects of unobserved preferences of farm management by assumption 7 in Section 2, there is a need for a more precise utility function to make estimations more truthful.

For parameterization purposes, we vary only crop yields. Varying output prices as well could enrich the analysis. However, this would introduce additional degrees of freedom into the regression equations. To conclude about the pros and cons of varying the prices, a further research agenda is proposed.

Despite the arguments in favor of the chosen representation of technologies (see Section 3), the data envelopment representation is also worth trying. Joint verification of the models would strengthen the conclusiveness of the study.

The model presented in this study allows infeasible solutions when testing. Such solutions provide incomparable shadow prices that are excluded from the parameterization procedures. However, the conditions leading to unfeasibility are quite realistic and can provide valuable data for the parameterization. In this respect, a formulation of the model disabling unfeasibility would improve the methodology.

Finally, the present version of the methodology excludes from consideration a large area of agricultural lands, namely that area occupied by household plots. The reason for this imperfection is the absence of necessary data at our disposal. It is very likely that household land is not marginal and therefore does not affect the obtained values; however, this is a hypothesis that needs further testing.

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PRICE TRANSMISSION IN THE AGRI-FOOD MARKET

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SPATIAL PRICE TRANSMISSION ON THE TURKISH WHEAT MARKET – AN INITIAL APPLICATION

ENNO-BURGHARD WEITZEL, AHMET BAYANER***

ABSTRACT

Spatial price transmission is analyzed on the Turkish wheat market from 1994 to 2003. The Johansen cointegration test shows that 58 percent of all bivariate province pairs are cointegrated. An asymmetric error correction model is applied, revealing that 94 percent of the contemporaneous (lagged) adjustment occurs symmetrically. Transmission elasticities do not show a regional pattern.

Keywords: *Asymmetric error correction model, spatial price transmission, market efficiency, Turkey.*

1 INTRODUCTION

Accession negotiations between Turkey and the European Union started on October 3rd, 2005. Thus, accurate and timely information on the Turkish economy in the light of necessary adjustment processes is of crucial importance, and not only for policy makers. Agriculture accounts for 11 percent of the total Turkish GNP and employs seven million people, or almost 30 percent of the total workforce (TURKSTAT, 2004). Thus, agriculture is Turkey's most important sector, with wheat being its major crop.

Prices play an extraordinary role in market economies, as they coordinate the allocation of scarce resources in the most efficient way. Hence, prices for one homogenous product should be the same everywhere in the economy – minus transportation costs. The aim of this paper is to analyze the spatial price transmission on the Turkish wheat market from 1994 to 2003. Section 2 presents recent developments in Turkey's agricultural policy and sketches comparisons

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to the EU. The next section provides the methodological framework, which is followed by the empirical application in Section 4. The main results are discussed thereafter. Section 6 concludes.

2 POLICY DEVELOPMENTS ON TURKEY'S WHEAT MARKET

Traditionally, Turkey heavily supports farmers through various policy instruments such as tariffs, export subsidies, administered prices and input subsidies, among others. Table 1 provides an overview of the producer support estimate (PSE) published by the OECD. It is expressed in absolute values, as well as in shares of domestic production value for Turkey and the EU in comparison.

Table 1: Comparison of PSE in Turkey and the EU

		Turkey			EU	
	% of domestic prod. value	Mill. EUR	Share of price support	% of domestic prod. value	Mill. EUR	Share of price support
1994	12 %	2,581	37 %	35 %	94,761	64 %
1995	12 %	2,988	45 %	35 %	96,123	62 %
1996	14 %	3,910	56 %	32 %	91,727	56 %
1997	24 %	6,931	73 %	32 %	92,664	56 %
1998	27 %	9,393	82 %	36 %	102,33	63 %
1999	23 %	7,651	74 %	39 %	108,241	65 %
2000	24 %	8,521	86 %	34 %	97,244	59 %
2001	15 %	4,459	70 %	35 %	103,937	58 %
2002	20 %	5,912	73 %	34 %	96,989	56 %
2003	29 %	9,605	80 %	36 %	104,474	55 %

Source: OECD, 2005; own calculations.

Table 1 shows that producer support in the EU was around 30 to 40 percent of production value since the mid-1990s and, in absolute terms, peaked at € 108 billion in 1999. In Turkey, the level was around 25 percent at the end of the 1990s, with a sharp increase in the last three years.

The share of producer support received as price support, shown in columns four and seven of Table 1, was around 60 percent in the EU and declined to 55 percent in 2003. The drop in the years 1996 and 1997 was due to exceptionally high world market prices for cereals and was not policy induced. Thus, it was not sustainable. The decline in market price support, which started with the MacSherry reform in 1992, continued through the Agenda 2000 and the most recent Mid-Term-Review.

In Turkey, a varying share of 37 to 86 percent of producer price support has been granted since the mid-1980s. Non-market price support was mainly concentrated on input and credit subsidies, but in recent years, an increasing share of support has been granted in the form of direct payments to the producers. A major step in this direction took place in 2001, when the share of direct payments increased four percent from the previous year, to more than 20 percent. Also, the share of input payments has fallen from 30 percent at the end of the 1980s to less than two percent in 2002-2004 (OECD, 2005, p. 71).

2.1 Cereal-specific support policies

Table 2 presents surveys of the Turkish and EU cereal markets (on average) in 2002 and 2003. The EU is a net exporter of cereals as a product group as well as for wheat and barley, and a net importer for maize. This pattern was stable during the observation period of 1994 to 2003. Wheat accounts for almost 50 percent of cereal production and barley for another 25 percent. Somewhat more than half of the production is used for feed, and human consumption is about 120 kg per capita per year.

Table 2: Market data for cereals

	Wheat	Barley	Maize	Cereals
EU				
Production (mill. t.)	97.7	47.3	37.1	201.1
Total human cons. (mill. t.)	38.9	0.3	2.5	46.1
Human cons. per capita (kg/year)	102.5	0.9	6.5	121.5
Feed (mill. t.)	42.8	33.2	31.1	121.1
Net trade (mill. t.)	5.5	7.6	-2.7	10.5
Turkey				
Production (mill. t.)	19.3	8.2	2.5	30.7
Total human cons. (mill. t.)	13.4	0.0	1.3	15.5
Human cons. per capita (kg/year)	189.0	0.0	18.2	218.3
Feed (mill. t.)	1.2	5.6	2.2	9.3
Net trade (mill. t.)	-0.9	0.4	-1.5	-2.1
Turkey/EU in percent				
Production	19.7 %	17.3 %	6.6 %	15.3 %
Human cons. per capita	184.5 %	0.0 %	278.3 %	179.6 %

Source: FAO (2005); own calculations.

Turkey is a net importer of cereals, as well as for wheat and maize. For barley, the trading position is slightly positive, however, it is still close to zero. In contrast to the EU, Turkey's trading position has changed over time. Wheat is the paramount crop and accounts for 63 percent of total cereal production. Some 30 percent of total production is used for feed, and human consumption is, at 218 kg per capita per year 1.8 times as high as in the EU.

Cereal prices in Turkey are supported by an intervention price system, tariffs, and export subsidies. Intervention prices vary from year to year according to the political situation and the phase of the election cycle. Their impact on market prices, however, has declined in recent years, as the quantity bought by the Turkish Grain Board (Toprak Mahsulleri Ofisi, TMO) has declined significantly. Moreover, payments were often delayed so that, due to inflation, the real value of the payments was far below that announced at the time of harvest. Intervention prices for cereals in August 2002 were about € 165/t for durum wheat, € 145/t for common wheat, € 138/t for corn and € 103/t for barley (USDA, *GAIN Report No. TU 2033 of 06.08.2002,* p. 1). Turkey has bound high *ad valorem* tariffs for cereals, between 45 and 180 percent in the WTO, while applied rates are usually much lower and vary over time. In addition to tariff barriers, Turkey frequently restricts wheat imports by limiting import licenses (USDA, *GAIN Report No. TU 2014 of 20.03.2002,* p. 7).

Evaluating the effects of price-supporting policies, Turkey and EU farmgate prices for wheat are compared from 1994 to 2003 in Table 3. Turkish cereal prices were below EU levels until 1995, but from 1996 on, with increasing Turkish prices and decreasing EU prices, Turkish prices exceeded those of the EU. In 2001, Turkish prices were lowered, but were still above the EU-level. The price decline of 2001 (expressed in €) has to be interpreted in the context of a sudden devaluation of the Turkish Lira in that year. The year 2003 saw a sharp increase in the Turkish price level.

Table 3: Wheat farmgate prices in Turkey and the EU (€/t)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Wheat										
EU price	140	143	143	134	123	121	120	124	114	123
Turkish price	101	124	179	204	182	170	169	143	159	209
Turkish price in % of EU	72	87	126	152	148	141	141	115	140	169

Source: OECD, 2005; own calculations.

2.2 Non product-specific support policies

Farmers in the EU receive direct payments per ha, which are regulated in the Mid-Term-Review and based on average regional historical payments. These direct payments, however, are so-called decoupled, since they are no longer tied to producing a specific crop, or producing anything. The premium per hectare is neither the same across the EU nor within a member country. It is computed taking into account the historic payments that an individual farm received. The total amount is somewhat less than before the Mid-Term-Review.

In the past, Turkey has provided a high degree of support to farmers through subsidization of inputs such as fertilizer and credit subsidies. These policies, however, have been phased out (fertilizer subsidies in 2001, credit subsidies in 2000). Subsidies for pesticides and seed, however, were still in place in 2002. Most farmers in Turkey are exempt from income tax payments (GRETHE, 2003, p. 52).

In 2001, Turkey began implementing a major World Bank-supported agricultural policy reform, under which all credit and input subsidies, as well as price support provided through state enterprises and agricultural sales cooperatives (valued before reform at about $5 billion US) are to be replaced by $1.9 billion in direct income payments to farmers (GRETHE, 2003, p. 52). These payments are set at $ 81/ha and are limited to 20 ha per farmer. A major challenge for the implementation of such a system in a country like Turkey is the registration of farmers and agricultural area and the distribution of cash support; Turkey has about 4 million agricultural holdings (compared to 7 million in the EU) and the system of area registration is much less developed.

Agriculture in the EU is supported in various ways, but overall, agricultural payments consume about 36 percent of the EU budget. Another large share of the EU budget (about 11 percent) is spent on the so-called second pillar of the CAP, which covers various policies summarized under rural development. This policy package includes such heterogeneous measures as agro-environmental measures, investment aid, aid for less-favored areas, and early retirement schemes. Furthermore, many EU member states provide significant support to the agricultural sector through tax exemptions and budgetary outlays for specific agricultural social security systems.

3 THE ASYMMETRIC ERROR CORRECTION MODEL

The asymmetric Error Correction Model (ECM), initially proposed by VON CRAMON-TAUBADEL and FAHLBUSCH (1994) later elaborated by VON CRAMON-TAUBADEL and LOY (1996), is a general case of an ECM. According to the Granger representation theorem (GRANGER, 1983), an ECM is an appropriate representation for time series if cointegration holds. The basic idea of an ECM is that a certain proportion of the disequilibrium from one period is corrected in the next period. Thus, there is a long run equilibrium component and a short run error correction part. There is a large body of literature on asymmetric price adjustment that covers various economic sectors and periods, as well as geographic areas. In his extensive study, PELTZMAN (2000, p. 466) finds that: "Output prices tend to respond faster to input increases than to decreases." For a thorough review of the literature on asymmetric price transmission, see MEYER and VON CRAMON-TAUBADEL (2004). The asymmetric ECM has evolved as a workhorse and where applied, it generally took the following form:

$$\Delta y_t = \alpha + \phi^+ ECT^+ + \phi^- ECT^- + \sum_{j=0}^{K} \beta_j^+ \Delta x_{t-j}^+ + \sum_{i=0}^{L} \beta_i^- \Delta x_{t-i}^- + \gamma_t \qquad (1)$$

The error correction term (ECT) is the one period lagged residual from the long run regression of y_t on x_t. Here it is split into $ECT^+ = max(ECT, 0)$ and $ECT^- = min(ECT, 0)$. MEYER and VON CRAMON-TAUBADEL (2004, p. 597) make three important points regarding a specification such as in equation (1). First, it is only possible to consider asymmetry with respect to speed, not magnitude, since cointegration assumes a long run equilibrium to which the vectors need to return. Thus, positive and negative deviations may not be corrected with the same speed. However, they are corrected fully at one point. Second, only since ENDERS and GRANGER (1998) modified the standard cointegration Dickey-Fuller test has it been possible to test for cointegration without maintaining the hypothesis of symmetric adjustment in the long run. Third, equation (1) is based on linear error correction, meaning constant parameters Φ^+ and Φ^-. However, VON CRAMON-TAUBADEL (1996) investigates possible non-linearity in price transmission by allowing for higher order polynomials of the ECT. He finds that smaller values of the ECT are more associated with smaller values of Φ than larger values of the ECT. Since cointegration is necessary, the bivariate tests are conducted applying the maximum likelihood method proposed by JOHANSEN (1988).

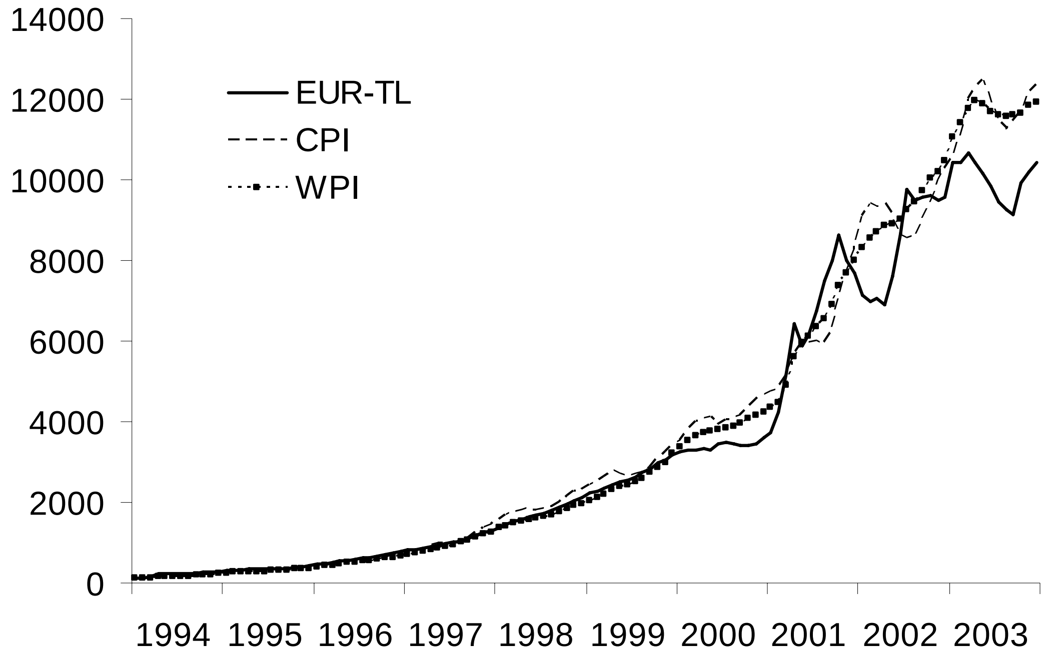
4 EMPIRICAL RESULTS

4.1 Data and unit root tests

The basis for the following analysis are price data provided by TMARA (2006). Prices received by farmers for durum wheat were collected at the provincial level for the period of January 1994 to December 2003 and represent averages of the first and second week of each month. The average monthly increase of the Turkish wholesale price index (WPI) was 3.9 % (TURKSTAT, various issues) during the observation period. Thus, having data that was collected within a period of two weeks implies that a variation of approximately 1.9 % is due to inflation.

All nominal prices are characterized by the high level of inflation in Turkey, which is depicted inFigure 1, which shows the general WPI, the consumer price index (CPI) (TURKSTAT, various issues) for food and the exchange rate of the Turkish Lira to the Euro (EUROSTAT, 2006).

Figure 1: Turkish price indices from 1994-2003

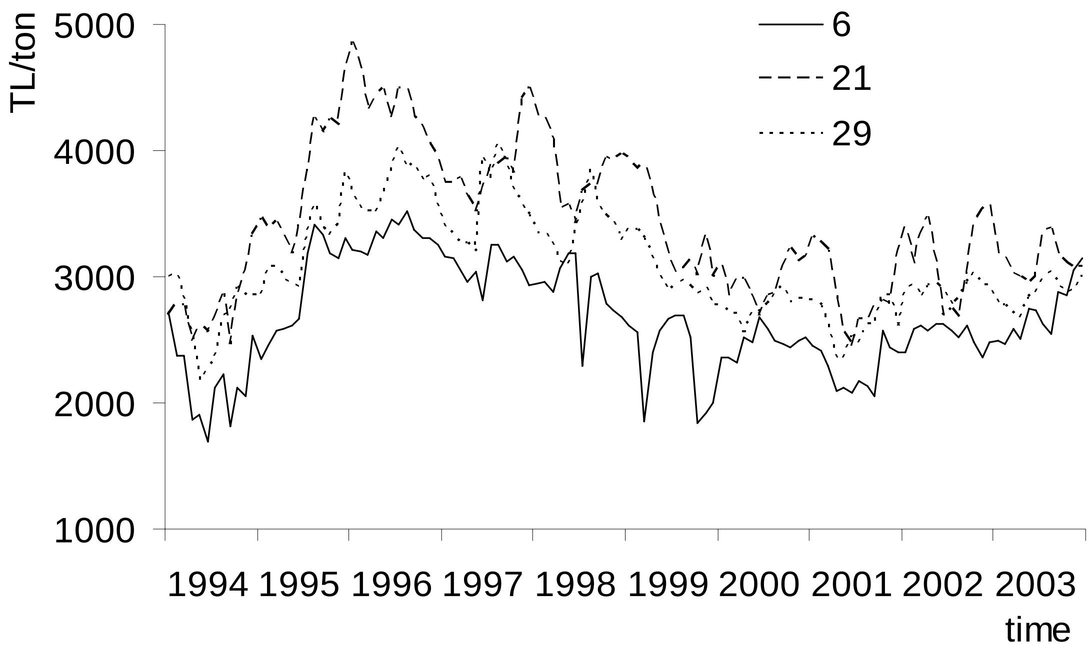


Source: Own representation; EUROSTAT, 2006; TURKSTAT.

Notes: EUR-TL = Euro – Turkish Lira exchange rate; CPI = Turkish consumer price index for food; WPI = Turkish general wholesale price index; January 1994 = 100 for all indices.

From 1994 to 2003, the Turkish price level rose by approximately 12,000 %. To eliminate the effects of inflation as a common factor on market integration, prices were deflated by the general WPI. Furthermore, this enhances the ability to interpret the estimated equilibrium parameters. Those provinces that were founded after January 1994 were excluded from the sample, as were those provinces that lost territory to the newly-founded ones. This should ensure that the provincial prices have the same spatial base throughout the observation period. The price development of three example provinces is displayed in Figure 2, where province six has the lowest average price among all provinces, and province 21 has the highest. Only six provinces show significant seasonal dummies for single months. Thus, a stable seasonal pattern could not be verified and no seasonal adjustment is carried out. Out of the 28 regional price series, 15 show a significant negative trend. Nevertheless, since this trend is not common to all series and it is assumed that this trend is not the exclusive component of the data generating process (DGP), no adjustment is made. To class the national prices, they are compared to matching international cif Rotterdam and fob EU ports prices (IGC, various issues). The US$ notation is converted to TL using the monthly average exchange rate provided by EUROSTAT (2006) and deflated using the general Turkish WPI (TURKSTAT, various issues).

Figure 2: Development of real wheat prices from 1994 to 2003



Source: Own representation; TURKSTAT, 2004.

Notes: Price development for provinces 6, 21, and 29.

The first step is conducting an augmented Dickey-Fuller (ADF) test to the level data of all time series. The appropriate lag length is established applying the method proposed by HALL (1994), with the results being presented in Table 4. The columns give the t-values for the corresponding alternative hypotheses, intercept and trend, only an intercept, and none of all, which are denoted trend, const, and none, respectively. The according lag lengths are given as n. Although the hypothesis of a unit root is rejected in the more general alternative hypotheses, it cannot be rejected using the most restrictive alternative hypothesis of no trend and no intercept, given in column two of Table 4. Applying the same test to the first differences of the time series identifies the degree of integration. The hypothesis of a unit root in the first differences is rejected for every single province. Thus, one cannot reject the hypothesis that prices for wheat in the provinces are integrated processes of order one, *I(1)*.

Table 4: ADF test for Unit Roots in levels

	t-none	n	t-const	n	t-trend	n
P2	0.69	9	** -4.27	0	** -4.26	0
P3	0.61	9	** -3.95	0	-2.89	9
P5	0.70	8	-2.24	8	-2.23	8
P6	0.75	6	-2.61	8	-3.16	8
P7	0.07	8	-2.70	1	* -3.81	3
P10	0.18	0	-2.23	0	-2.26	0
P15	0.17	7	-2.63	0	-2.58	0
P16	0.10	12	-2.35	12	-3.31	12
P18	0.30	2	-1.84	2	-2.05	2
P19	0.43	3	* -3.00	0	-3.03	0
P20	0.04	7	* -3.32	0	* -3.47	0
P21	0.15	0	-2.25	0	-2.67	0
P23	0.39	9	-2.75	0	-2.81	0
P24	0.41	12	-1.62	12	-2.18	12
P26	0.48	9	-1.64	9	-1.75	9
P29	0.29	3	-2.14	0	-2.31	0
P31	0.15	0	-2.28	0	-2.29	0
P32	-0.62	11	-0.78	11	-3.16	11
P35	0.13	0	-2.31	0	-2.43	0
P36	-0.09	0	-2.52	0	-2.93	0
P37	0.30	1	-2.36	1	-2.55	1
P38	0.70	7	-2.59	7	-2.60	7
P40	0.33	3	** -4.04	0	** -4.35	0
P42	0.53	4	** -3.7	0	* -3.69	0
P43	0.97	8	-1.83	8	-1.84	8
P44	-0.19	0	-1.42	11	-3.23	11
P45	0.61	6	-2.28	11	-2.25	6
P46	0.59	11	-2.51	11	-2.83	11

Source: Own calculations; EViews 5.1.

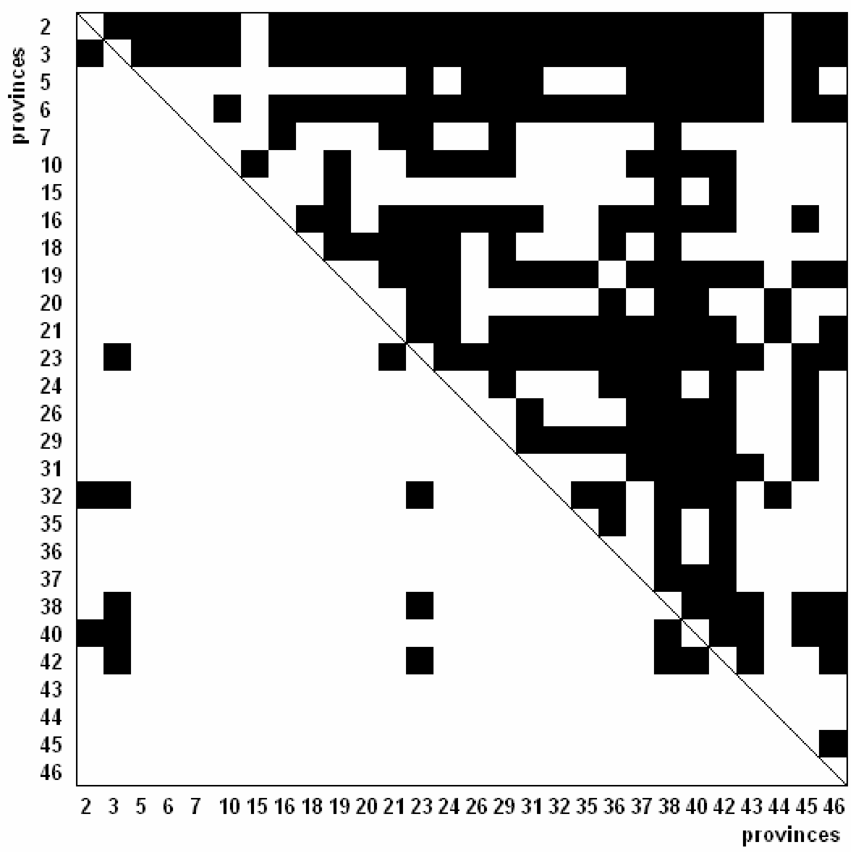
Notes: H_0: Series has a unit root; column 6, 4, and 2 show the t-values for the alternatives of a trend and a constant, just a constant and none respectively; columns 3, 5, and 7 give the lag lenght n; * Denotes rejection of the H_0 at the 5 % level; ** Denotes rejection at the 1 % level.

4.2 Cointegration analysis

This section analyzes whether the *I(1)* integrated time series show a linear long run equilibrium. The results of the JOHANSEN cointegration test for all possible bivariate pairs of provinces are presented in Figure 3. The upper triangle represents the trace statistic for the null hypothesis of no cointegrating vector versus the alternative hypothesis of one or more cointegrating vectors. The lower triangle holds the results of the H_0 of one cointegrating vector versus the

H_1 of two or more cointegrating vectors. Black boxes indicate cointegration between two provinces and white boxes show no integration. As a first result, the trace statistic shows that 58 percent of all possible combinations of regional prices have a statistically significant linear long run relationship (upper triangle). If cointegration is revealed, there is most likely a single cointegrating vector. As can be seen from the lower triangle in Figure 3, the null hypothesis of one rather than two cointegrating vectors cannot be rejected in all but 15 cases. There are significant regional discrepancies, with some provinces cointegrated with the majority of all other provinces, e.g. provinces 2, 3, 23, and 38, whereas there are other provinces that are hardly cointegrated at all, e.g. provinces 7, 15, and 44.

Figure 3: Johansen cointegration results



Source: Own calculations, EViews 5.1

Notes: ■ H_0 rejected; □ H_0 not rejected; upper triangle H_0: no cointegration; H_1: one or more cointegrating vectors; lower triangle H_0: one cointegrating vector; H_1: two or more cointegrating vectors.

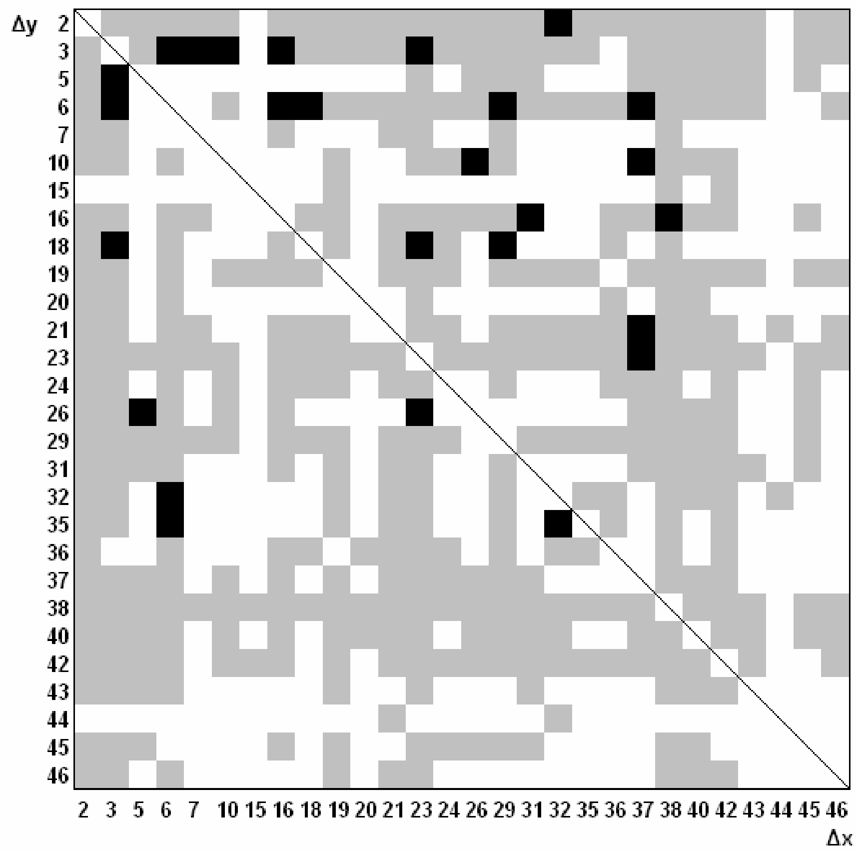
4.3 Estimation of the asymmetric ECM

Having established cointegration, the next step is to estimate the asymmetric ECM as laid out in Section 3. Since an autoregressive distributed lag model ADL(1,1) resembles the data-generating process reasonably well, K and L in equation (1) are both set to zero, giving the following equation to be estimated:

$$\Delta y_{i,t} \quad = \quad \alpha_{i,j} + \phi^{+}_{i,j} ECT^{+}_{i,j} + \phi^{-}_{i,j} ECT^{-}_{i,j} + \beta^{+}_{i,j} \Delta x^{+}_{j,t} + \beta^{-}_{i,j} \Delta x^{-}_{j,t} + \gamma_t \tag{2}$$

with $i \neq j$ and $i, j = 1, \ldots, N$, the number of provinces included in the analysis. The estimation is only carried out for those pairs that are cointegrated, according to the Johansen test. A Wald coefficient test is applied for the estimated contemporaneous adjustment coefficients $\beta^{+}_{j,t}$ and $\beta^{-}_{j,t}$. Figure 4 shows the results of the null hypothesis $\beta^{+}_{j,t} = \beta^{-}_{j,t}$, where Δy is given on the ordinate and Δx on the abscissae. Black boxes label the rejections, whereas grey boxes show that the H_0 cannot be rejected. This is true for 94 percent of all bivariate regressions. Thus, symmetry is the rule for contemporaneous price adjustment. Although only a small percentage in terms of total pairs shows asymmetry, 12 out of 28 provinces transmit prices asymmetrically. Since these provinces are spread nearly all across Turkey, from Izmir in the west to Diyarbakir in the east, no regional pattern can be established.

Figure 4: Results of Wald test for contemporaneous symmetry



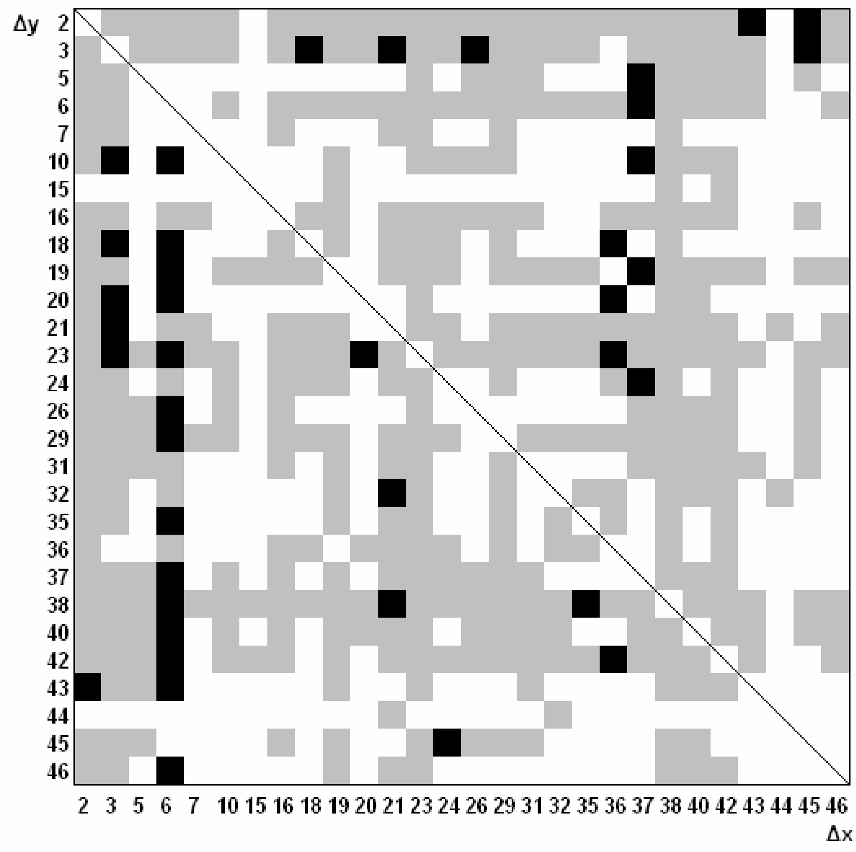
Source: Own calculations; EViews 5.1

Notes: ■ H_0 rejected, ■ H_0 not rejected, □ Not cointegrated;
H_0: $\beta^{+}_{j,t} = \beta^{-}_{j,t}$; H_1: $\beta^{+}_{j,t} \neq \beta^{-}_{j,t}$.

A similar pattern is revealed for the lagged adjustment to the error correction term. Here, as depicted in Figure 5, the null hypothesis of symmetric price transmission can be rejected in 10 percent of all possible combinations.

Consequentially, the number of provinces that transmit prices asymmetrically increases to 22. There are only five provinces, namely Antalya, Burdur, Hatay, Kars and Malatya, that show no asymmetry whatsoever.

Figure 5: Results of Wald test for error correction symmetry



Source: Own calculations; EViews 5.1.

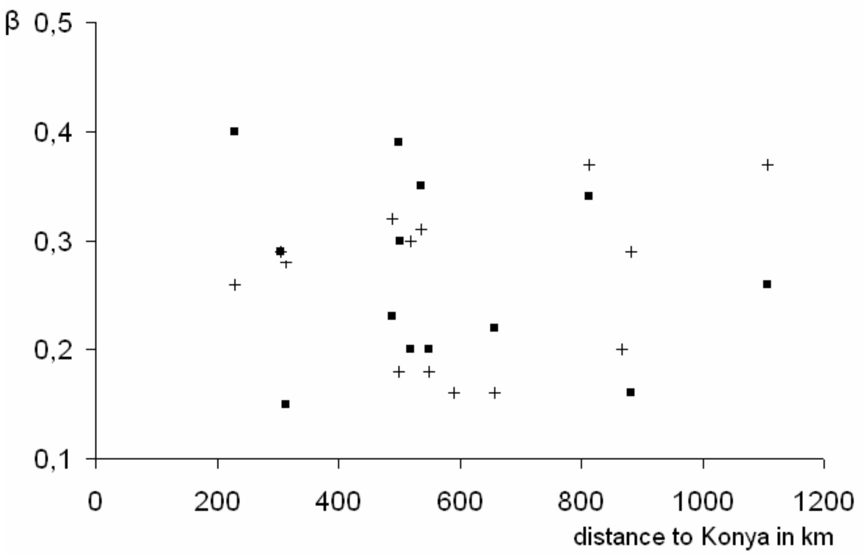
Notes: ■ H_0 rejected, ■ H_0 not rejected, □ Not cointegrated; H_0: $\Phi^{+}_{j,t} = \Phi^{-}_{j,t}$; H_1: $\Phi^{+}_{j,t} \neq \Phi^{-}_{j,t}$.

The results in terms of the coefficients' magnitude are exemplified for one specific province. Konya is chosen since this province is cointegrated with 22 other provinces and is also the most important producer, as well as consumer[1], of wheat among the Turkish provinces. Figure 6 shows the coefficients of contemporaneous price adjustment for the case that the price in Konya is exogenous, as well as for the endogenous case. Both series are given in relation to the distance of the other province to Konya[2]. If contemporaneous price adjustment is significant (in 15 out of 22 cases), then it is incomplete since the coefficients are smaller than one. They are all positive; thus, a shock in the exogenous province is adjusted in the endogenous one in the same direction.

Figure 7 contains the coefficients for the error correction, of which all 22 are significant at the one percent level. As theory requires, they are all negative, i.e., errors of previous periods are indeed corrected to the long run equilibrium.

[1] Consumption refers to human consumption, animal food and wheat processing capacity.
[2] Distance is measured as the road mileage between the two provinces' capitals.

Figure 6: Coefficients for contemporaneous price adjustment

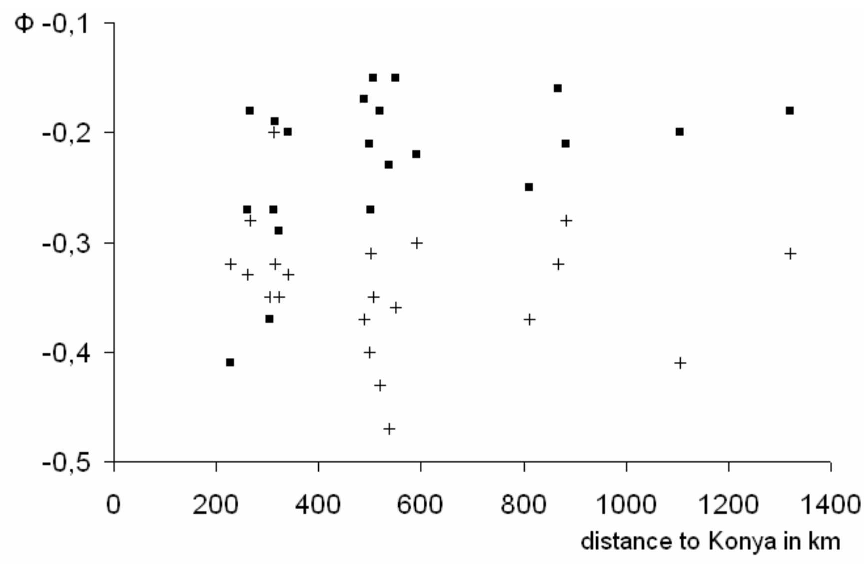


Source: Own calculations; EViews 5.1.

Notes: ■ Price in Konya is exogenous, + Price in Konya is endogenous. The given coefficients are significant at the 5 % level at least.

As for the contemporaneous adjustment, the error correction occurs incompletely, i.e., since the coefficients are smaller than one (in absolute values) the correction will take significantly longer than one period to be completed. In contrast to the contemporaneous adjustment, the coefficients for the endogenous error correction are larger (in absolute values) than the exogenous ones. This points to the identification problem that might be due to missing strict exogeneity, no common factor, that is pushing the system, or the application of an OLS-method.

Figure 7: Coefficients for error correction



Source: Own calculations, EViews 5.1.

Notes: ■ Price in Konya is exogenous, + Price in Konya is endogenous. The given coefficients are significant at the 1 % level.

5 Discussion and Outlook

The cointegration analysis showed significant differences in the degree of cointegration among the provinces. Why are some provinces like Adyaman, Afyon, or Kayseri cointegrated with virtually all other provinces, whereas Antalya, Burdur, and Malatya are hardly cointegrated with any other province? Having established the pattern of cointegration, an interpretation based on economic criteria needs to be developed. One promising factor is distance and the implicit transportation costs. Applying the asymmetric ECM revealed adjustment processes that were symmetric in more than 90 percent of the cases. Thus, it must be scrutinized whether or not the symmetric ECM is a more appropriate model specification. Although the analysis of the coefficients' magnitude is limited by the identification problem, an interesting task is to investigate the types of market integration that prevail. Turkey's trading position changed during the observation period, going from being an importer to an exporter, and vice versa. Thus, the implicit assumption of constant parameters over time should be investigated, applying a model that allows for regime shifts, for example a Markov-Switching model. The aforementioned transportation costs and the obviously prevailing symmetry lead the way to the alternative application of a threshold cointegration model, suggested by Hansen and Seo (2002). This model allows for a neutral band (of transaction costs) in which no price adjustment takes place.

6 Conclusion

This paper analyzed the Turkish wheat market for spatial price transmission between 28 of 81 provinces. Fifty-eight percent of all possible combinations of provinces are cointegrated, and no apparent regional pattern of this cointegration could be established. The application of the asymmetric error correction model revealed that 94 [90] of the contemporaneous [lagged] adjustment occurs symmetrically. The asymmetric cases are spread all over Turkey, with no spatial structure. For the example province of Konya, the magnitudes of the adjustment coefficients reveal that there exists significant contemporaneous price adjustment (in 15 out of 22 cases) regardless of Konya being modeled exogenously or endogenously. Nevertheless, the coefficients are not greater than 0.4, implying incomplete contemporaneous adjustment. The error correction (lagged adjustment) is significant for all 22 provinces that Konya is cointegrated with. The absolute magnitude of the coefficients is smaller than 0.5 at maximum. Thus, it takes significantly longer than one period until the error is corrected.

Further research in this area should focus on the effects of distance in terms of transport and transaction costs. Furthermore, the role of changing economic environments and their effects on the assumptions of constant parameters should be thoroughly investigated.

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FARM TO RETAIL PRICE TRANSMISSION ON THE PORK MARKET: A GERMAN-HUNGARIAN COMPARISON

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ABSTRACT

The study of marketing margins and price transmission on various commodity markets has been a popular research topic of the past decades (see MEYER and VON CRAMON-TAUBADEL, 2004, for a recent survey). With a few exceptions, however, these studies have focused on developed economies. Until now there are no comparative studies on marketing margins and price transmission between a developed and a transition country, which focus on the same period and market. In this paper, therefore, we examine the above phenomena on two markets: Hungary and Germany. We apply the Johansen (maximum likelihood) and Gregory-Hansen (with recursively estimated breakpoints) cointegration procedures. Price transmission modeling suggests that, despite the inherent differences between the two countries, the pricing dynamics are surprisingly similar. Prices on both markets are cointegrated, and exogeneity tests reveal long-run producer to retail causality. Homogeneity is rejected, suggesting a non-competitive mark-up pricing strategy. Price transmission is symmetric in the long run.

Keywords: *Price transmission, marketing margin, pricing, structural breaks, German pork market, Hungarian pork market.*

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1 INTRODUCTION

Measuring the spread in vertical price relationships and analyzing the nature of price transmission along the supply chain from the producer to consumer have both evolved as widely used methods to gain insight into the functioning of, and degree of competition in, food markets. Asymmetric price transmission has been studied by numerous authors using different econometric methods, from the classical WOLFFRAM, 1971, and HOUCK, 1977, specification to cointegration (VON CRAMON-TAUBADEL, 1998) and threshold autoregressive models (e.g. GOODWIN and HARPER, 2000). None of these studies (except BOJNEC, 2002, BAKUCS and FERTŐ, 2005), however, focus on a transition economy. Because of the inherited pre-1989 distorted markets, low developed price-discovery mechanisms and often ad-hoc policy interventions, transitional economies could be expected to have generally larger marketing margins and more pronounced price transmission asymmetries.

The aim of this paper is to investigate and compare the dynamics of the marketing margin on the Hungarian and German pork meat markets. The paper is organized as follows. Section 2 reviews some of the theoretical literature concerning marketing margins and price transmission, while section 3 describes the empirical procedures we apply. Our data and results are reported and discussed in section 4, with a summary and some conclusions presented in section 5.

2 MARKETING MARGIN AND PRICE TRANSMISSION

2.1 Theoretical background

The marketing margin is the difference between the retail and the producer or farm gate price. It represents marketing costs such as transport, storage, processing, wholesaling, retailing, advertising, etc.:

$$RP = FP + M \qquad (1)$$

M, the marketing margin, is composed of an absolute amount and a percentage or mark-up of the retail price:

$M = a + bRP$, where a $\geq$ 0 and 0 $\leq$b$<$ 1. (2)

With the use of logarithmic data, the long-run elasticity between the prices is readily available from the marketing margin model. If prices are determined at producer level, we use the mark-up model:

$$RP = \alpha_1 + \varepsilon_{FP} FP\,, \qquad (3)$$

where ε_{FP} is the price transmission elasticity from the producer price (FP) towards the consumer price (RP). If $\varepsilon_{FP} = 1$, we have perfect transmission, and thus the mark-up will be ($e^{\alpha 1}$ - 1). $0 < \varepsilon_{FP} < 1$ implies that the transmission between the two prices is not perfect.

If however, prices are determined at the consumer level, then the use of the mark-down model is appropriate:

$$FP = \alpha_2 + \varepsilon_{RP} RP, \quad (4)$$

where ε_{RP} is the elasticity of transmission between the consumer price (RP) and the producer price (FP). As before, there is perfect transmission, if $\varepsilon_{RP} = 1$, and the mark-down equals (1 - $e^{\alpha 2}$). Imperfect transmission results if $\varepsilon_{RP} > 1$.

A common perception is that responses to price increases differ from responses to price decreases. More precisely, retailers tend to pass price increases to consumers more rapidly, whereas it takes longer for consumer prices to adjust to producer prices if the latter decrease. There are several major explanations for the existence of price asymmetries. First, asymmetrical price transmission occurs when firms can take advantage of quickly changing prices. This is explained by the theory of the *search costs* (MILLER and HAYENGA, 2001). They occur in locally imperfect markets, where retailers can exercise their local market power. Although customers would have a finite number of choices, they might face difficulties in quickly gathering information about the pricing of the competing stores because of the search costs. Thus firms can quickly raise the retail price as the producer price rises, and reduce retail prices much more slowly when upstream prices drop. Second comes the problem of *perishable goods* (WARD, 1982), that makes retailers hesitate in raising prices as producer prices rise. Wholesalers and retailers in possession of perishable goods may resist the temptation to increase prices because they risk a lower demand and ultimately being left with the spoiled product. Third, the *adjustment costs or menu costs* (GOODWIN and HOLT, 1999) may underlie asymmetric price adjustments. Menu costs involve all costs arising from re-pricing and the adoption of a new pricing strategy. As with perishable goods, menu costs also militate against retailers changing prices. Finally, the exercise of *oligopoly power* can favor asymmetric price transmission. It appears in markets with highly inelastic demand and concentrated supply; many food chains have such market organization characteristics. It also needs to be mentioned that such collusive behavior is rather difficult to maintain in the long run, because of the incentive for one firm to cheat the others (MILLER and HAYENGA, 2001, pp. 554).

2.2 Empirical evidence

There are a great number of empirical studies dealing with marketing margin and asymmetry problems in livestock markets. VON CRAMON-TAUBADEL (1998) finds asymmetrical price transmission on the German pork market. DAWSON and TIFFIN (2000) identify a long-run price relationship between UK lamb farm and retail prices, and study the seasonal and structural break properties of the series, concluding that the direction of Granger causality is from the retail to producer prices; thus lamb prices are set in the retail market. Threshold Autoregressive Models were developed by GOODWIN and HOLT (1999), GOODWIN and HARPER (2000) and BEN-KAABIA, GIL and BOSHNJAKU (2002) studying the US beef sector, US pork sector and Spanish lamb sector, respectively. GOODWIN and HOLT (1999) find that farm markets do adjust to wholesale market shocks, whereas the effect of retail market shocks are largely confined to retail markets. GOODWIN and HARPER (2000) in their pork market study find a unidirectional price information flow from farm to wholesale and retail levels. Farm markets adjust to wholesale market shocks, but retail level shocks are not passed on to wholesale or farm levels. BEN-KAABIA, GIL and BOSHNJAKU (2002) establish a symmetric price transmission, concluding a long-run perfect price transmission, where any supply or demand shocks are fully transmitted through the system. They also observe that an increased horizontal concentration allows retailers to exercise market power.

BOJNEC (2002) finds that both the Slovenian farm-gate beef and pork markets are weakly exogenous in the long run, with a mark-up long-run price strategy for beef and a competitive price strategy for the pork meat market. BAKUCS and FERTŐ (2005) use VECM to study the price transmission on the Hungarian pork meat market, and found competitive pricing and no evidence of price transmission asymmetries. Most empirical results emphasize the presence of feedback between the different market levels, and support the imperfect price transmission between farm and retail markets in all meat categories studied. In short, most studies find asymmetrical price transmission in livestock markets, and they also establish a mostly unidirectional price information flow from farm to wholesale and finally retail levels.

3 EMPIRICAL PROCEDURE

Most macroeconomic time series are not stationary over time, i.e. they contain unit roots. That is, their mean and variance are not constant over time. Utilizing the standard classical estimation methods (OLS) and statistical inference can result in biased estimates and/or spurious regressions.

Even though many individual time series contain stochastic trends (i.e. they are not stationary at levels), many of them tend to move together in the long run, suggesting the existence of a long-run equilibrium relationship. Two or more non-stationary variables are cointegrated if one or more linear combinations exist of the variables that are stationary. This implies that the stochastic trends of the variables are linked over time, moving towards the same long-term equilibrium.

3.1 Testing for unit roots

Consider the first order autoregressive process, AR(1):

$x_t = \rho x_{t-1} + e_t$, t = …,-1, 0, 1, 2,…, where e_t is white noise. (5)

The process is considered stationary if $|\rho| < 1$, thus testing for stationarity is equivalent with testing for unit roots ($\rho = 1$). (5) is rewritten to obtain:

$$\Delta x_t = \delta x_{t-1} + e_t \Delta y_t = \delta y_{t-1} + e_t, \text{ where } \delta = 1 - \rho \tag{6}$$

and thus the test becomes:

H_0: $\delta = 0$ against the alternative H_1: $\delta < 0$.

There are a large number of unit root tests in the literature (see MADDALA and KIM, 1998) for a comprehensive review), and due to their sensibility to the choice of the lag length and deterministic form it is a common practice to apply several tests. With structural breaks in the time series, the unit root tests often lead to the misleading conclusion of the presence of a unit root, when in fact the series are stationary with a break. There are, however, unit root tests that can handle the problem. Depending on specification, the PERRON (1997) test considers three models: With a break in the intercept, with a break in the trend, and with a break in both the intercept and trend. The test endogenously searches for the breakpoints. That is achieved by computing the t-statistics for all breakpoints, then choosing the breakpoint selected by the smallest t-statistic, that being the least favorable one for the null hypothesis of a unit root.

3.2 Cointegration analysis

The two most widely used cointegration tests are the Engle-Granger two-step method (ENGLE and GRANGER, 1987) and Johansen's multivariate approach (JOHANSEN, 1988). Let's consider a simple relationship in the form of (7), used by several cointegration tests:

$$\Delta y_t = \pi y_{t-1} + \eta_t, \tag{7}$$

where y_t is an (n x 1) vector of non-stationary variables, π is an (n x n) matrix, and η_t is a vector of possibly serially correlated normally distributed disturbances. The Johansen procedure is based on estimating π and its rank. It as the advantage that it allows for the existence of more than one cointegrating relationship (vector) and the speed of adjustment towards the long-term equilibrium is easily computed. The procedure is a Maximum Likelihood (ML) approach in a multivariate autoregressive framework with enough lags introduced to have a well-behaved disturbance term.

The Engle and Granger two step method uses an OLS regression to estimate the long-run relationship (8):

$$y_{1t} = \mu_1 + \mu_2 y_{2t} + e_t \, y_{1t}, \tag{8}$$

where y_{it} are non-stationary variables, μ are coefficients to be estimated, and e_t are disturbances.

The residuals from (8) are then tested for unit roots. The null hypothesis of unit roots is equivalent with the no cointegration hypothesis. If, however, the null hypothesis is rejected, the variables are considered to be cointegrated. If however, unlike (8), the true data-generating process contains various regime shifts, then the Engle and Granger test is likely not to reject the no-cointegration null hypothesis.

GREGORY and HANSEN (1996) introduce a methodology to test for the null hypothesis of no-cointegration against the alternative of cointegration with structural breaks. 3 models are considered under the alternative. Model 2 with a change in the intercept:

$$y_{1t} = \mu_1 + \mu_2 \varphi_{t\tau} + \alpha^{\mathrm{T}} y_{2t} + e_t \text{ , t = 1,…,n.} \tag{9}$$

Model 3 is similar to model 2, only it contains a time trend:

$$y_{1t} = \mu_1 + \mu_2 \varphi_{t\tau} + \beta t + \alpha^{\mathrm{T}} y_{2t} + e_t \text{ , t = 1,…,n.} \tag{10}$$

Finally, model 4 allows a structural change both in the intercept and the slope:

$$y_{1t} = \mu_1 + \mu_2 \varphi_{t\tau} + \alpha_1^T y_{2t} + \alpha_2^T y_{2t} \varphi_{t\tau} + e_t \quad \text{t = 1,…,n.} \tag{11}$$

Because, usually, the time of the break is not known a priori, models (9)-(11) are estimated recursively allowing T to vary between the middle 70 % of the sample:

$$|0.15n| \le T \le |0.85n|$$

For each possible breakpoint, the ADF statistics corresponding to the residuals of models (9)-(11) are computed, then the smallest value is chosen as the test statistic (being the most favorable for the rejection of the null). Critical values are non-standard, and are tabulated in GREGORY and HANSEN, 1996.

3.3 Asymmetrical error correction representation

With the development of cointegration techniques, attempts were made to test asymmetry in a cointegration framework. VON CRAMON-TAUBADEL (1998), demonstrated that the earlier specifications are fundamentally inconsistent with cointegration and proposed an error correction model of the form:

$$\Delta RP_t = \alpha + \sum_{j=1}^{K} (\beta_j^+ D^+ \Delta FP_{t-j+1}) + \sum_{j=1}^{L} (\beta_j^- D^- \Delta FP_{t-j+1}) + \varphi^+ ECT_{t-1}^+ + \varphi^- ECT_{t-1} + \sum_{j=1}^{P} \Delta RP_{t-j} + \gamma_t \tag{12}$$

ECT^+_{t-1} and ECT^-_{t-1} are the segmented error correction terms resulting from the long-run (cointegration) relationship:

$$ECT_{t-1} = \mu_{t-1} = RP_{t-1} - \lambda_0 - \lambda_1 FP_{t-1}; \ \lambda_0 \text{ and } \lambda_1 \text{ are coefficients} \tag{13}$$

and,

$$ECT_{t-1} = ECT_{t-1}^+ + ECT_{t-1}^- . \tag{14}$$

Using a VECM representation as in (12), both the short-run and the long-run symmetry hypothesis can be tested, using standard tests. Valid inference requires one price to be weakly exogenous in both the long and short run with respect to the parameters in (12). Following BOSWIJK and URBAIN 1997, we test for the short-run exogeneity by estimating the marginal model (15), then perform a variable addition test of the fitted residuals $\hat{\nu}_t$ from (15) into the structural model, (12):

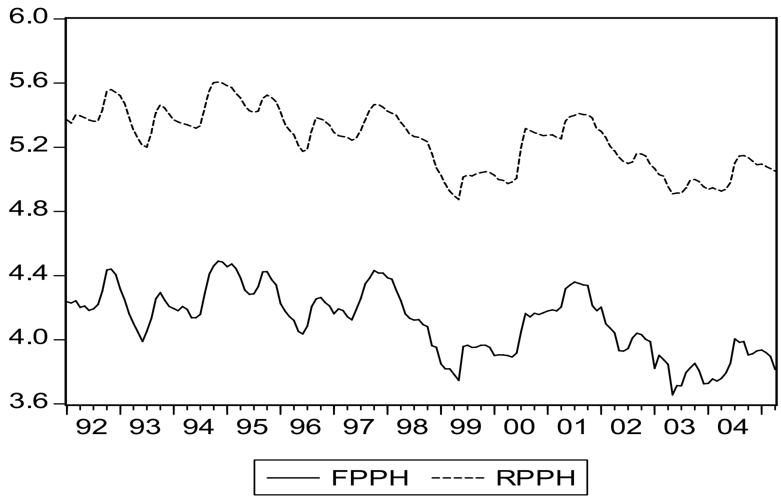
$$\Delta FP_t = \psi_0 + \psi_1(L)\Delta FP_{t-1} + \psi_2(L)\Delta RP_{t-1} + \nu_t \,. \tag{15}$$

Long-run exogeneity is tested by the significance of the error correction terms in the equations (12), and (15).

4 DATA AND RESULTS

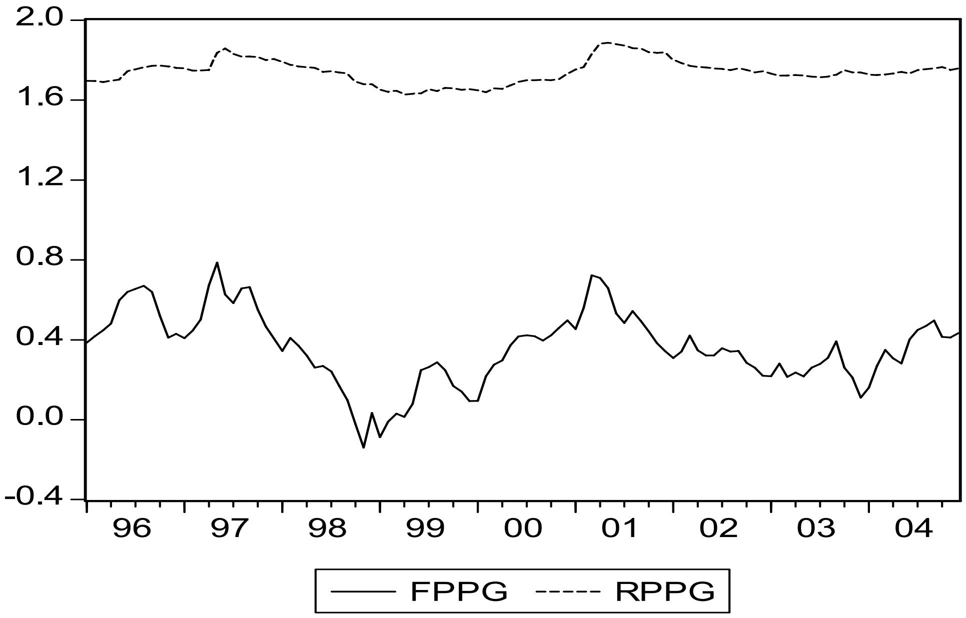
Our dataset consists of 160 monthly[1] (January 1992 - April 2005) farm-gate and consumer prices for Hungary, and 108 monthly (January 1996-December 2004) farm-gate and consumer prices for Germany. Both Hungarian and German farm-gate prices (FPPH and FPPG) are represented by the monthly producer purchase price of live pigs for slaughter. The Hungarian consumer price (RPPH) is defined as the average retail price of various meat cuts, while the German consumer price is represented by the retail price of chops. Hungarian data was deflated to January 1992 prices, using the monthly Hungarian Consumer Price Index (CPI). All data was transformed in logarithms, because, when analyzing cointegrating relationships between variables, it is common to use logarithms. Otherwise, with trending data, the relative error might decline over time and this is inappropriate (DAWSON and TIFFIN, 2000). The evolution of real farm and retail level prices is presented in Figures 1 and 2.

Figure 1: Log of real monthly producer and retail prices in Hungary



[1] With monthly data, seasonal effects might be present. Graphical analyses suggest that all four time series exhibit seasonality. Therefore, following common practice, throughout this paper, monthly centered seasonal dummies were included in the VARs and regressions.

Figure 2: Log of monthly producer and retail prices in Germany



4.1 Stationarity and integration tests – German data

First, we test unit roots in the logarithms of retail and farm gate prices and also their first differences using ADF (DICKEY and FULLER, 1979, 1981), DF-GLS (ELLIOTT, ROTHENBERG and STOCK, 1996), and Perron tests[2] in the presence of structural breaks (PERRON, 1997). As expected, results (not presented here, but available upon request) depend on the choice of lag length and deterministic assumptions. All tests, however, reject the null hypothesis of a unit root in the first differences, therefore we conclude that all three series are integrated of order one.

JOHANSEN (1988) cointegration test results (Table 1) found 1 cointegrating vector between the German retail and producer prices.

Table 1: Cointegration analysis of German prices

Number of CI vectors	**Trace statistic (1 % critical values in brackets)**
$r = 0$	29.16 (24.64)
$r \leq 1$	9.51 (12.58)

Note: 11 centered seasonal dummies included.

The resulting cointegration vector (t-statistics in brackets) is:

$$RPPG = 1.594 + 0.423\ FPPG \qquad (16)$$

(-31.11) (-6.33)

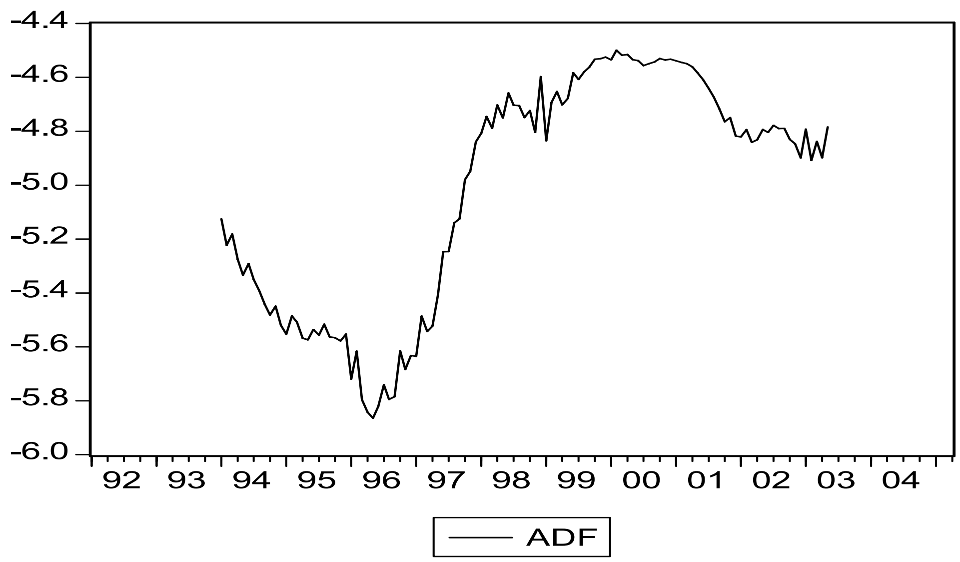
[2] RATS code, and EVIEWS software was used to test the order of integration.

4.2 Stationarity and integration tests – Hungarian data

As in the German case, unit root test results (not presented here, but available upon request) are ambiguous. After careful balancing, however, we conclude that both price series are non-stationary.

Unlike in the German case, both the Engle-Granger two step, and the Johansen ML procedures accept the no-cointegration null hypothesis. Therefore next we apply the Gregory-Hansen procedure [3], to test for cointegration in the presence of structural breaks. Models 2 to 4 (equations 9 to 11) were subsequently estimated, starting with model 4 (models 2 and 3 are nested within 4). The null hypothesis of no-cointegration was rejected in favor of the alternative of cointegration with a structural break in the intercept (model 2)[4]. The recursively estimated ADF statistics for the different breakpoints are presented in figure 3. The min ADF statistic is –5.864, – significant at 1 % – corresponding to a break occurring in April 1996.

Figure 3: Recursively estimated Gregory – Hansen ADF statistics



The resulting cointegrating relationship (t - statistics in brackets) is:

$$RPPH = 2.000E_1 + 1.922E_2 + 0.802FPPH \qquad (17)$$

$$(28.41) \quad (-10.42) \quad (51.03)$$

where $E_1 = \begin{cases} 1 & if \quad t < April \quad 1996 \\ 0 & if \quad t \geq April \quad 1996 \end{cases}$, and

$$E_2 = \begin{cases} 0 & if \quad t < April \quad 1996 \\ 1 & if \quad t \geq April \quad 1996 \end{cases}$$

3 The Gregory-Hansen cointegration tests in the presence of structural breaks were carried using a Gauss code.

4 Results were substantiated using the JOHANSEN (2000) maximum likelihood cointegration procedure in the presence of structural breaks. Malcolm code, in RATS programming language is available to test cointegration with up to two structural breaks.

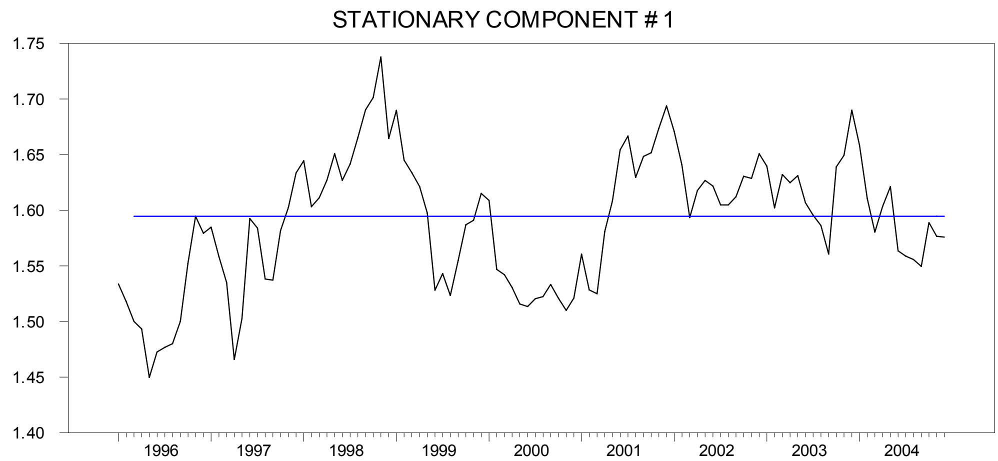
To ensure that the prices are indeed cointegrated, the residuals of (17) are tested for unit roots using the DF-GLS procedure. The test rejects the unit root null at 1 %.

4.3 Price spread and price transmission analysis – German data

Long-run exogeneity tests cannot reject the null hypothesis of weakly exogenous producer prices ($1.779 \sim \chi^2$, p = 0.18). It follows that the long-run causality on the German pork meat market runs from the producer towards the consumer level. To test the competitive transmission null hypothesis, we impose the $\beta_{RPPG} = \beta_{FPPG}$ restriction on (16). The test statistic is $\chi^2 \sim 4.639$ (p = 0.09), rejecting the null hypothesis of competitive pricing. Imposing the weak exogeneity restrictions results in the long-run equation represented by (18) and depicted in Figure 4:

$$RPPG = 1.552 + 0.543FPPG \quad (18)$$

Figure 4: Cointegrating relationship on the German pork meat market



With the use of logarithms, the long-run elasticity between the prices is readily available. Thus the German pork producer and retail prices are cointegrated with an imperfect transmission of $\varepsilon_{FPPG} = 0.543$.

The residuals of (18) and are now saved and segmented into negative and positive phases. The first differences of the farm prices are also split into negative and positive sections as follows: $\Delta FPPGM_t$, $\Delta FPPGP_t$. The transformed equation (12) was first estimated with 4 lags, and then reduced to more parsimonious models. Before proceeding to the price transmission analysis, the direction of the causality must be determined. The marginal models (15), not shown here, were also estimated, and the fitted residuals $\hat{v}_t$ saved. The variable addition test results of the saved $\hat{v}_t$ residuals into model (12), and its symmetric counterpart, are presented at the bottom of Table 2. Surprisingly, the test statistics show that the marginal model residuals are significant in the structural equation. As discussed in section 3.3, to test the long run causality the significance of the error correction terms (ECT_{t-1}, $ECTM_{t-1}$, $ECTP_{t-1}$) in the marginal equation 15 is tested. Results (not presented here) show that none were significant. It therefore appears that, although the long run causality runs from the producer to the retail prices, on the short-run, German retail prices control farm prices.

Table 2 presents the regression estimates of the asymmetrical and symmetrical representations, short and long-run symmetry, and some diagnostic tests. There are no traces of serial autocorrelation of order 1, 4, and 12. The Ljung-Box Q statistic doesn't reject the null hypothesis of no serial correlation amongst the first 36 residuals. The residuals however are non-normal, which implies that the test results must be interpreted with care, although asymptotic results do hold for a wider class of distributions (VON CRAMON-TAUBADEL, 1998). Some of the coefficient estimates are not significant; the coefficients of adjustment are around 50 %. The error correction terms (ECT_{t-1}, $ECTM_{t-1}$ and $ECTP_{t-1}$) have the right (negative) sign, and $ECTM_{t-1}$ causes a slightly greater change in the retail price than $ECTP_{t-1}$. $ECTP_{t-1}$ is not significant at conventional levels; an F-test concludes that the long-run symmetry null hypotheses cannot be rejected, suggesting long-run price transmission symmetry. The short-run symmetry hypothesis is then tested. At 1 % probability, the nulls of symmetry cannot be rejected in this case either.

Table 2: Symmetric and asymmetric VECM models (dependent variable ΔRPPG)

Independent variable	Symmetric representation (standard errors in brackets)	Asymmetric representation (standard errors in brackets)
$\Delta FPPG_t$	0.043^{*} (0.017)	–
$\Delta FPPG_{t-1}$	0.075^{**} (0.019)	–
$\Delta FPPGM_{t-2}$	–	0.089^{**} (0.033)
$\Delta FPPGP_t$	–	0.171^{**} (0.029)
$\Delta RPPG_{t-1}$	0.078 (0.08)	- 0.023 (0.075)
ECT_{t-1}	$- 0.117^{**}$ (0.02)	–
$ECTM_{t-1}$	–	$- 0.160^{**}$ (0.04)
$ECTP_{t-1}$	–	- 0.059 (0.042)
Constant	0.0006 (0.001)	- 0.003 (0.002)
Adjusted R^2	0.49	0.56
Autocorrelation LM(1)	0.002	0.035
Autocorrelation LM(4)	0.11	1.212
Autocorrelation LM(12)	0.559	0.737
Autocorrelation (Ljung – Box Q statistic)	Q(36) = 36.038	Q(36) = 47.087
Normality (Jarque–Bera)	$76.68^{**\dagger}$	$61.03^{**\dagger}$
Variable addition test (ν_t, marginal model residuals)	0.426 [~F(1.99)]	9.131^{**} [~F(1.97)]
Long-run symmetry	–	2.321 [~F(1.98)]
Short-run symmetry	–	2.919 [~F(1.98)]

Notes: * Significant at 5 %, ** significant at 1 %.

† Non-normality – implies that the test results must be interpreted with care, although asymptotic results do hold for a wider class of distributions (VON CRAMON-TAUBADEL, 1998).

4.4 Price spread and price transmission analysis – Hungarian data

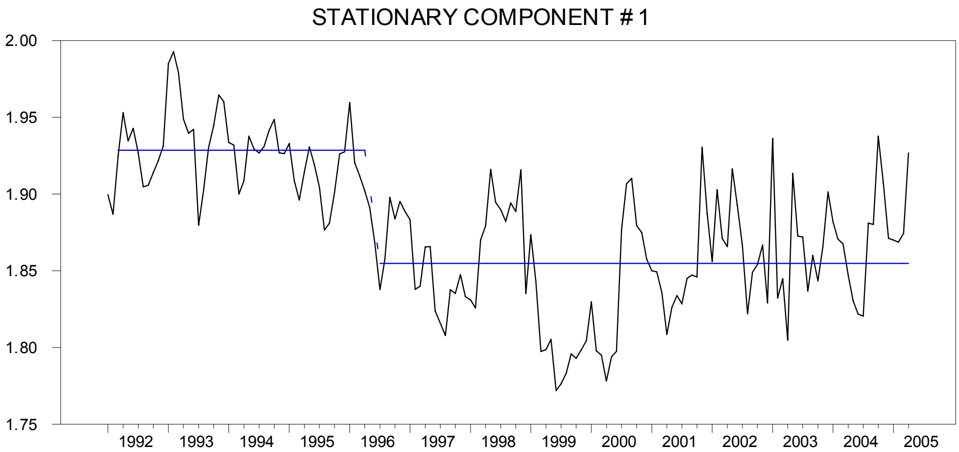
Long-run exogeneity tests cannot reject the null hypothesis of weakly exogenous producer prices ($0.459 \sim \chi^2$, p = 0.38). It follows that the long-run causality on the Hungarian pork meat market runs from the producer towards the consumer level. Homogeneity restrictions, i.e. $\beta_{RPPH} = \beta_{FPPH}$ on (17) are rejected ($12.43 \sim \chi^2$, p = 0.00). The significance of the break point is also tested by variable exclusion tests; however, the null hypothesis that the intercepts in the 2 sub-periods are equal is rejected ($12.32 \sim \chi^2$, p = 0.00). Re-estimating the model by imposing the exogeneity restrictions can improve its statistical properties. Equation (19) and Figure 4 represent the re-estimated long-run relationship between the producer and retail prices on the Hungarian pork meat market:

$$RPPH = 1.928E_1 + 1.8542E_2 + 0.819FPPH \qquad (19)$$

where $E_1 = \begin{cases} 1 & if \quad t < April \quad 1996 \\ 0 & if \quad t \geq April \quad 1996 \end{cases}$, and

$$E_2 = \begin{cases} 0 & if \quad t < April \quad 1996 \\ 1 & if \quad t \geq April \quad 1996 \end{cases}.$$

Figure 4: Cointegrating relationship with a structural break on the Hungarian pork meat market



With the use of logarithms, the long-run elasticity between the prices is readily available. Thus the Hungarian beef producer and retail prices are cointegrated with an imperfect transmission of $\varepsilon_{FPPH} = 0.807$. Equation 19 and Figure 4 show that, after the structural break in April 1996, the margin on the Hungarian pork market was squeezed.

As with the German data, we split the error correction terms (the residuals of equation 19) as well as the first differences of the Hungarian farm prices into positive and negative phases, then estimate equation 12. Coefficient estimates as well as some diagnostic tests are presented in Table 3. The variable addition test (bottom of Table 3) of the residuals from a marginal equation shows that the $\hat{\nu}_t$ residuals are not significant in the structural equation. Therefore the short-run causality on the Hungarian pork meat market runs from the producer towards the consumer prices. The models appear to be well specified, there are no traces of serial autocorrelation, and the coefficients of determination are quite high. Both $ECTM_{t-1}$ and $ECTP_{t-1}$ are highly significant, and of the right sign, $ECTM_{t-1}$ being slightly bigger (in absolute values) than $ECTP_{t-1}$. A formal test, however, cannot reject the null hypothesis of the two correction terms being equal, suggesting that long-run price transmission is symmetric. The short-run symmetry null hypothesis is rejected, an increase in farm prices induces a bigger increase in retail prices (on short-run) than a decrease in farm prices.

Table 3: Symmetric and asymmetric VECM models (dependent variable ΔRPPH)

Independent variable	Symmetric representation (standard errors in brackets)	Asymmetric representation (standard errors in brackets)
$\Delta FPPH_t$	0.519^{**} (0.03)	–
$\Delta FPPH_{t-1}$	0.156^{**} (0.054)	–
$\Delta FPPHM_t$	–	0.175^{**} (0.039)
$\Delta FPPHM_{t-1}$	–	0.216^{**} (0.054)
$\Delta FPPHP_t$	–	0.831^{**} (0.036)
$\Delta FPPHP_{t-2}$	–	$- 0.171^{**}$ (0.06)
$\Delta RPPH_{t-1}$	0.105 (0.064)	0.227^{**} (0.038)
$\Delta RPPH_{t-2}$	–	0.102^{*} (0.052)
ECT_{t-1}	$- 0.277^{**}$ (0.056)	–
$ECTM_{t-1}$	–	$- 0.203^{**}$ (0.067)
$ECTP_{t-1}$	–	$- 0.198^{*}$ (0.093)
Constant	- 0.0303 (0.001)	$- 0.006^{*}$ (0.002)
Adjusted R^2	0.79	0.89
Autocorrelation LM(1)	1.254	0.03
Autocorrelation LM(4)	0.783	0.483
Autocorrelation LM(12)	0.565	0.721
Autocorrelation (Ljung – Box Q statistic)	Q(36) = 23.496	Q(36) = 35.187
Normality (Jarque–Bera)	$84.71^{**\dagger}$	$26.85^{**\dagger}$
Variable addition test (ν_t, marginal model residuals)	0.082 [~F(1.151)]	0.093 [~F(1.147)]
Long-run symmetry	–	0.001 [~F(1.148)]
Short-run symmetry	–	7.943^{**} [~F(1.148)]

Notes: * Significant at 5 %, ** significant at 1 %.

† Non-normality – implies that the test results must be interpreted with care, although asymptotic results do hold for a wider class of distributions (VON CRAMON-TAUBADEL, 1998).

5 CONCLUSIONS

With many empirical studies of livestock markets in developed countries, we have simultaneously examined how retail price is formed and how price transmission works in the livestock markets of a developed and a transition economy. We analyzed the long-run relationship between two retail prices and the farm-gate price for pork meat in Germany and Hungary. Vertical price transmission was analyzed in the cointegration framework, using a relatively new cointegration technique that also allows cointegration in the presence of structural breaks. Results indicate that the retail and farm gate prices on both markets move together in the long run: That is, they are cointegrated, with a structural break occurring on the Hungarian market in April 1996. The exogeneity tests found that farm prices were weakly exogenous in both the long abd short term, and established a unidirectional long-run Granger causality from producer to retail prices. Prices are set on the farm level market and transmitted up through the wholesale and processing level to the retailers. Our long-run causality findings are in line with most empirical studies carried out on livestock markets (VON CRAMON-TAUBADEL, 1998; BOJNEC, 2002; ABDULAI, 2002; BEN-KAABIA et al., 2002, to name just a few). Short-run causality, however, is different in Germany from Hungary. German retailers and processors might be able to exercise their market power on the short-run, and impose prices upon farmers. The marketing analysis found that both countries possess a non-competitive market structure, where processors and retailers charge a mark-up of the retail price plus a constant absolute margin that might suggest the exercise of market power. The existence of a mark-up pricing strategy concur with BOJNEC (2002), who studied the Slovenian pork and beef meat market, and found competitive pork but non-competitive beef marketing margin formation processes.

We carried out both short and long-run asymmetry tests and, contrary to popular belief, we found that the null of symmetrical price transmission cannot be rejected in the long run. This result contradicts the findings of the studies set in developed markets that usually establish asymmetrical price transmission on livestock markets, and a farm to wholesale to retail price information flow. Short-run price transmission in Hungary proved to be asymmetric, and retailers tend quickly to pass on increasing short-run producer price movements. Finally, Table 4 summarises the similarities and differences between the two markets.

Table 4: Comparing marketing margin and price transmission results

Economic Phenomena	Germany	Hungary
Cointegration	Yes	No
Cointegration with a structural break	No	Yes
Mark-up pricing	Yes	Yes
Competitive pricing	No	No
Long-run causality	Producer to retail	Producer to retail
Short-run causality	Retail to producer	Producer to retail
Long-run price transmission	Symmetric	Symmetric
Short-run price transmission	Symmetric	Asymmetric

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THE NATURE OF SELECTED PRICE TRANSMISSIONS IN THE AGRI-FOOD CHAIN AND THEIR CONSEQUENCES[1]

LUKÁŠ ČECHURA[*]

ABSTRACT

The paper outlines the theoretical framework for analyzing the market structure in vertically-related markets. The VECM (Vector error correction model) is employed to analyze the relations between the agricultural (farm) price and the wholesale price in the vertical sector for pigs, broilers and wheat (Bohemian flour). The results suggest that the processing stage for pigs, and probably for broilers, may exercise oligopsonistic power. The markets are pushed into an equilibrium state, whereby it takes approximately 12 months to reach an equilibrium relationship after unitary innovation (shock). The price transmissions do not seem to change significantly post-EU enlargement. Moreover, the results imply that Czech farmers' degree of competitiveness is reduced. Agricultural policy may diminish the negative effects of the asymmetric relations in price transmissions in the short-run. However, in the long run these effects may deteriorate.

Keywords: *Price transmission, equilibrium relationship, market power, oligopsony.*

1 INTRODUCTION

Growing concern about the nature of the agri-food chain in the Czech Republic has arisen from changes in the Czech agrarian sector, which changed from supply-driven to demand-driven during the 1990s. This conversion brought about changes in relations among vertical markets that have had an important impact, especially on farmers and agricultural enterprises. To be successful,

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farmers and agricultural enterprises have had to accommodate their behavior (decisions) with respect to the market. Even agricultural policy has taken into account the conditions on the retail market. However, it seems not to take into consideration the nature of transmission in vertical markets or the exploitation of market power in a given commodity vertical chain.

The question is whether market power is abused with respect to upstream suppliers and/or downstream consumers in the Czech agri-food chain. Whereas agricultural producers are represented by numerous farmers and enterprises, the processing industry is concentrated and the retail market is significantly influenced by multiple large, national retail chains.

It is well known that in the presence of oligopoly, prices may adjust differentially to changes in costs due to the curvature of the demand function. The concept of oligopoly is very well illustrated in the industrial organization literature. On the other hand, its related concept of oligopsony, i.e., competition among few buyers, is described very briefly, if ever, in the theoretical literature. ROGERS R. T. and SEXTON R. J. (1994) introduce two reasons why industrial organization economists pay little attention to the buyer's market power: (i) they do not think it is very important, and (ii) they do not believe it presents any unique modeling issues relative to the seller's market power.

Oligopsony may not be important on the industrial markets but it can have a very significant impact on the agricultural market or on the agri-food chain. This significance arises from the characteristics and specifics of agricultural production and agricultural and food markets. Thus, modeling oligopsony can supply unique results about the nature of relations in agri-food chains that help to understand, among other issues, how the markets are pushed into equilibrium states, what is the position of single elements in the chain, what is the competitiveness of farmers, what is the effect of agricultural policy and how is this effect in the chain distributed?

Changes in the agri-food chain and the unmet need for precise analysis of the agrarian sector have resulted in a lack of theoretical, methodological and empirical information about vertical markets in the Czech Republic that could be employed in policy analysis and exploited by policy-makers. This paper will contribute to the analysis of agri-food chain in the Czech Republic in at least two ways: Methodologically and empirically. Strictly speaking, the paper attempts, by employing the below-outlined theoretical framework and econometric methodology, to answer questions concerning equilibrium in the chain, market power in the chain, changes in price transmission after EU enlargement, the competitiveness of farmers or agricultural enterprises, and the effects of agricultural policy.

2 MATERIAL AND METHODS

The paper's objective is to quantify and analyze relations in selected price transmissions based on the outlined theoretical framework and by employing VAR modeling and co-integration analysis.

The paper follows a hypothesis that assumes simultaneous relations in price transmission with an excess of demand power over supply power. It is supposed that the chain is demand-driven, which can be characterized as oligopsonistic. That the price of agricultural producers is influenced by economic relations on the processing market and the price of food producers is the result of international food companies having a large role on the consumer market. The space for price movement or price adjustment depends on the target profit (or margin) of the demand side of the chain.

Price transmission is analyzed in the following agri-food chains:

(i) Vertical sector for pigs – This consists of the agricultural market for pigs, the processing market for processed pig products and the retail market for processed pig products.

(ii) Vertical sector for broilers – This consists of the agricultural market for broilers, the processing market for processed broilers and the retail market for processed broilers.

(iii) Vertical sector for wheat (Bohemian flour) – This consists of the agricultural market for wheat, the processing market for Bohemian flour and the retail market for Bohemian flour.

The analysis aims to address the following points:

(i) The determination of long-run relationships between the agricultural and processing market in the agri-food chain and the speed of establishing an equilibrium relationship;

(ii) The power and the manner of reactions to innovations (shocks) in vertical markets;

(iii) The characterization of the market structure and the position of farmers and agricultural enterprises in the agri-food chain;

(iv) The identification of changes in price transmissions after EU enlargement and,

(v) The discussion of the competitiveness of Czech farmers and agricultural enterprises and of the effects or efficiency of agricultural policy.

To make the analysis possible, the theoretical framework must first be defined and then the econometric methodology with respect to the above-stated points established.

2.1 Theoretical framework

The theoretical framework is defined to enable analysis of the market structure in the agri-food chain. The idea of the theoretical framework follows LLOYD et al. (2004).

The characteristics of producers on the agricultural and processing markets can be defined by including the necessary assumptions as follows.

Agricultural market

The agricultural market consists of *n* producers (farmers or agricultural enterprises) that supply the quantity of agricultural product Q_A depending on the price level P_A. This can be expressed in the form of inverse supply function (1).

$$P_A = f\,(Q_A|\, x_1, \ldots, x_n) \tag{1}$$

The characteristics of the supply side on the agricultural market can be supposed to be close to the competitive market. Thus, the first order condition for profit maximization of all agricultural producers is equal to:

$$MR = P_A = MC\ .$$

Assuming the competitive market structure on the supply side of the agricultural market implies not taking into account the substitution matrix (i.e., the Hessian matrix of second-order partials of the profit function) of prices of agricultural products supplied by different agricultural producers in the profit maximization of ith processing firm.

Processing market

The demand function for the processed product can be expressed in the form of an inverse demand function (2).

$$P_P = f(Q_P) \tag{2}$$

The profit function of ith processing firm, which determines output supply and input demand of ith processing firm, can be expressed as follows:

$$\pi_i = P_P(Q_P)\cdot Q_{Pi} - P_A(Q_A)\cdot Q_{Ai} - C_i \tag{3}$$

where $Q_{Pi} = \frac{Q_{Ai}}{k}$, k is the input-output coefficient and C_i are other costs.

Assuming that other costs C_i do not depend on the Q_{Pi}, i.e., are constant for each level of production in the production space R, then the profit function depends only on the input price from the agricultural market (i.e., on the price of the agricultural raw material) and on the output price, i.e., the price on the processing market. Consequently, the profit function can be defined as the maximum value function:

$$\pi_i(P_P, P_A) = \max P_P(Q_P)\cdot Q_{Pi} - P_A(Q_A)\cdot Q_{Ai} - C_i\ . \tag{4}$$

The first order condition for profit maximization of firm i can be written as:

$$\frac{\partial \pi_i(P_P, P_A)}{\partial Q_{Pi}} = 0 \text{ , i.e. } P_p + Q_{Pi} \cdot \frac{\partial P_p}{\partial Q_P} \cdot \frac{\partial Q_P}{\partial Q_{Pi}} - kP_A - kQ_{Ai} \cdot \frac{\partial P_A}{\partial Q_A} \cdot \frac{\partial Q_A}{\partial Q_{Ai}} = 0 . \tag{5}$$

Condition (5) can be reordered into (6).

$$P_P + Q_{Pi} \cdot \frac{\partial P_p}{\partial Q_P} \cdot \frac{\partial Q_P}{\partial Q_{Pi}} = kP_A + kQ_{Ai} \cdot \frac{\partial P_A}{\partial Q_A} \cdot \frac{\partial Q_A}{\partial Q_{Ai}} \tag{6}$$

For better orientation below, it is useful to express relation (6) in elasticity notation

$$P_p \cdot (1 + \frac{\chi_i}{e_{PP}}) = kP_A \cdot (1 + \frac{\delta_i}{e_{PA}}) , \tag{7}$$

where χ_i is the conjectural elasticity of firm i in the processing market, e_{PP} is the price elasticity of demand for the processing market of given product, δ_i is the conjectural elasticity of firm i in the agricultural market and e_{PA} is the price elasticity of an agricultural product's supply.

Expressing (7) for the whole market, i.e., summing all firms on the market by using firms' market shares as weights, results in (8).

$$P_p \cdot (1 + \frac{\chi}{e_{PP}}) = kP_A \cdot (1 + \frac{\delta}{e_{PA}}) \tag{8}$$

In relation (8), χ and δ are states for industry level market parameters.

Assuming the following situations or values of χ and δ, respectively:

(i) $\chi = \delta = 0$: if both χ and δ are equal to zero then the market structure is competitive, i.e., there is no market power, and the above-stated relation (8) simplifies to (9).

$$P_P = kP_A , \tag{9}$$

where kP_A is the industry level of marginal cost.

(ii) $\chi > 0$ and $\delta = 0$: if χ is higher than zero and δ is equal to zero, then there is oligopoly power and no oligopsony power on the market. In this situation, the first order condition for profit maximization can be rewritten into (10).

$$P_p \cdot (1 + \frac{\chi}{e_{PP}}) = kP_A \tag{10}$$

(iii) $\chi = 0$ and $\delta > 0$: if χ is equal to zero and δ is higher than zero, there is oligopsony power and no oligopoly power on the market. Then, the relation (8) can be rewritten into (11).

$$P_p = kP_A \cdot (1 + \frac{\delta}{e_{PA}}) \tag{11}$$

(iv) $\chi > 0$ and $\delta > 0$: if both parameters are higher than zero, both oligopoly and oligopsony power can be found on the market. The first order condition for profit maximization is in the form of (8).

Assuming that demand shifts on the processing market play a major role in changes in the price transmission of the agri-food chain and cost shifts are not significant, then according to LLOYD et al., (2004) the market structure is competitive if and only if the price transmission elasticity is equal to 1. Oligopoly power is exercised if the price transmission elasticity is higher than 1 and oligopsony power is present if the price transmission elasticity is less than 1. There could also be the possibility of both oligopoly and oligopsony power. In such a case, price elasticity is higher than one but lower than the elasticity of oligopoly power only. The precise numbers of the price transmission elasticises for determining the type of market power depend on the height of parameters in the relation (8). In this paper, the calculation of price transmission elasticises for a given market structure is not done. The above-stated information is sufficient for determining if market power (oligopsony power) is exercised or not, and this is sufficient for the purposes of the following analysis.

2.2 Econometric methodology

To establish the theoretical framework of the empirical analysis, it is possible to employ econometric methodology. With respect to the aims and the hypothesis of the paper, addressing the theoretical framework with the observed data can be done by using VAR modeling and co-integration analysis. The following brief description of both concepts presents their most important features, which are central to the aims and hypothesis of the paper.

The VAR modeling follows the idea that all variables in the model are stochastic and simultaneously dependent. That is, the model structure contains just endogenous variables, of which the lags are equal. The VAR(p) model is possible to write in the form of (12) (CHAREMZA et al., 2003), whilst it assumes that $C_S = 0$ for s > p:

$$X_t = \eta + \sum_{s=1}^{p} C_s X_{t-s} + U_t \tag{12}$$

where X_t is g x 1 vector of stochastic stationary variables, p denotes the length of lags and $u_1, \ldots, u_t$ are nid $(0,\Sigma)$.[2]

The economic series are usually integrated of the order d. To get stationary series, the series must be differentiated d times. The differentiation used in the VAR modeling to obtain stationary time series, however, omits any information

[2] In the case of E (Xt) = η = 0 the VAR (p) model simplifies into the form of

$$X_t = \sum_{s=1}^{p} C_s X_{t-s} + U_t .$$

about the long run adjustments that the data may contain. The VAR model contains information about the short run relationship among variables, whereas information about the long run is not provided. This feature of VAR modeling can be regarded as a specification mistake when the long run relationship among variables exists. In other words, if the long run relationship exists, the model should contain it. Thus, the concept of co-integration should be employed.

The co-integration analysis is powerful because it facilitates describing the existence of an equilibrium, or stationary (long run) relationship among two or more time-series, each of which is individually non-stationary. The modeling non-stationary time series may result in spurious regression. Thus, it can be said that the regressions involving levels of time series of non-stationary variables make sense only if these variables are co-integrated (BANERJEE et al., 2003).

The linkage of co-integration analysis with VAR modeling results in VECM (Vector Error Correction Model). In this case, the relation (12) contains error correction mechanism, i.e., the general form of VECM can be expressed in (13). Vector Error-correction mechanisms combine the advantages of modeling both levels and differences. Thus, in the VECM, the dynamics of both short run (changes) and long run (levels) adjustment processes are modeled simultaneously.

$$\Delta X_t = \eta + \Pi X_{t-1} + \sum_{s=1}^{p} C_s \Delta X_{t-s} + \psi D_t + u_t \ , \tag{13}$$

where $C_S = 0$ for $s > p$, X_t is g x 1 vector of stochastic non-stationary (integrated of order 1) variables and $u_1, \ldots, u_t$ are nid $(0,\Sigma)$ and D_t is a vector of non-stochastic variables. The hypothesis of co-integration is formulated as a reduced rank of the Π-matrix, which contains two coefficients, α and β. The coefficients α and β are g x r matrices of full rank. The hypothesis implies that the process ΔX_t is stationary, X_t is non-stationary, but $\beta' X_t$ is stationary. Thus, it can be said that the relations $\beta' X_t$ are stationary relations among non-stationary variables (HANSEN et al., 2002). The essential problem is the determination of r, that is, identifying the number of co-integrating vectors, and the estimation of the co-integrating matrix β. The procedure employed in this paper to determine r and estimate the co-integrating matrix β is that of Johansen.

The paper contains two estimated models for each agri-food chain. The first one contains variables for the agricultural (farm) price (denoted by AP_t) and the wholesale (processing) price (denoted by PP_t) of a given product. The second one consists of margins, i.e., the margin of wholesale prices with respect to agricultural prices (denoted by $marginPA_t$) and the margin of retail prices with respect to wholesale prices (denoted by $marginRP_t$).

From the above-mentioned information and with regard to the aims of the paper, it is obvious that the VECM facilitates identifying the existence of the long run relationship between markets in the agri-food chain and the speed of establishing the equilibrium relationship.

Moreover, the VECM enables analyzing the power and the manner of reactions on innovations (shocks) in vertical markets (i.e., the analysis of dynamics in the vertical sector) and the way of establishing the equilibrium relationship. This is analyzed by the impulse-response analysis, i.e., application of the orthogonal process of fitted VECM. In other words, the impulse response function represents the behavior of the modeled series in response to innovations (shocks) and is thus exploited in the dynamic policy simulation.

The characterization of the market structure and the position of farmers and agricultural plants in the agri-food chain is done based on the fitted models and the above-outlined theoretical framework. That is, the first model may provide the estimation of the price transmission elasticity for the given vertical markets, and the theoretical framework contains information about the values of the price transmission elasticity for different market structures. The second model serves to analyze relations in the whole price transmission, i.e., the whole agri-food chain.

Identifying changes in price transmission after EU enlargement is done by incorporating a dummy variable into the fitted models, which captures changes in the price transmission after the EU enlargement.

Finally, the results are discussed considering the competitiveness of Czech farmers and agricultural enterprises and the effects or efficiency of agricultural policy.

The RATS software version 6 and the package CATS in RATS are used to fit and test the models.

2.3 Data

The data set is gathered from the Czech Statistical Office and covers the period January 1995 to December 2005.

The following prices are used:

(i) Vertical sector for pigs: The agricultural (farm) price of pork in Czech Crowns per kilogram, the wholesale price of processed pig products in Czech Crowns per kilogram (the wholesale price is the weighted average of wholesale prices of processed pig products; the weights stem from the slaughter yield) and the retail price of processed pig products. (the retail price is the weighted average of retail prices of the processed pig products; the weights are as stated above).

(ii) Vertical sector for broilers: The agricultural (farm) price of broilers in Czech Crowns per kilogram, the wholesale price of broilers in Czech Crowns per kilogram and the retail price of broilers in Czech Crowns per kilogram.

(iii) Vertical sector for wheat (Bohemian flour): The agricultural (farm) price of wheat in Czech Crowns per ton, the wholesale price of Bohemian flour in Czech Crowns per ton and the retail price of Bohemian flour in Czech Crowns per ton.

The prices are not deflated. All variables are logarithmically transformed.

3 RESULTS AND DISCUSSION

Firstly, the price transmission of pigs is analyzed. The analysis starts with the unit root tests to determine the order of integration in modeling the employed variables. According to the results of the Augmented Dickey Fuller (ADF) test, both endogenous variables, i.e., the logarithm of the agricultural price of pigs (logAP) and logarithm of the wholesale price of processed pig products (logPP), are integrated of order 1 (i.e., I(1)).

As stated in the econometric methodology, the analysis of the integrated series is made by linking the concept of VAR modeling with co-integration analysis, i.e., the VECM may be employed. The VECM consists of two endogenous variables (i.e., logAP, logPP), constant in the co-integration space and a dummy variable (dum1). The dummy variable contains number 0 for the period January 1995-May 2004 and the rest is assigned the number 1. The VECM model has 4 lags in the VAR space, with the length of lag being chosen based on AIC (Akaike's Information Criterion), SIC (Schwarz Information Criterion) and with respective auto-correlation residuals structure.

The L-max test and the Trace test suggest that the model contains one co-integrating vector at the 10 % significance level. That is, the results of the estimation inform about the existence of equilibrium relationship. The VECM has one co-integrating vector, thus the model contains unique information about the long run relationship between variables and can be used to characterize market structure.

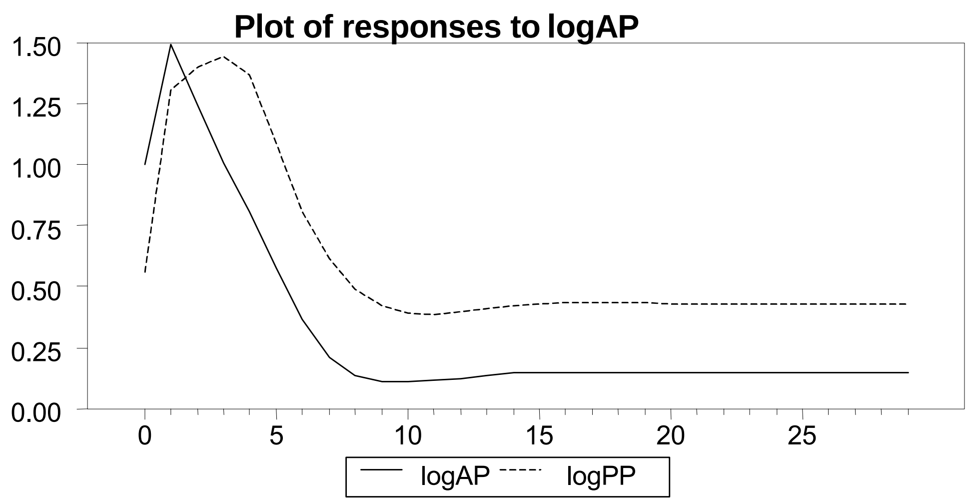
To obtain the demanded co-integrating vector, it is necessary to normalize the eigenvectors by the coefficient of logAP. The resulting co-integrating vector (1,000; -0,823; 0,066) for logAP, logPP and the constant represents the equilibrium relationship between agricultural and wholesale prices. The co-integrating vector is significant in the equation for logAP at the 5 % significance level. In the second equation, this is not the case. Consequently, logPP may be an exogenous variable with respect to logAP.

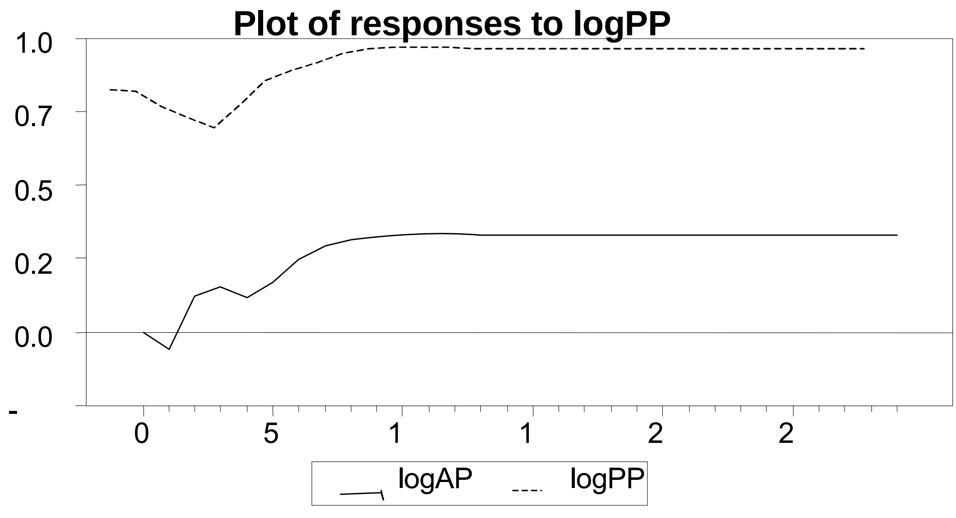
Assuming that there are no strong knock-on and feedback effects, which could make interpreting the coefficients difficult (see LLOYD et al., 2004), then the coefficients of the equilibrium relationship, i.e., the co-integrating vector, represent, considering the logarithmic transformation, price transmission elasticity.

In this case, the "pass-back" price transmission elasticity is equal to 0.823. Elasticity is smaller than 1, which implies, according to the theoretical framework, that the processing stage may exercise oligopsonistic power.

The impulse-response analysis of the VECM for pigs shows the system's reaction to innovations (shocks). Thus, it illustrates the dynamic of the system and informs about the speed and the way of establishing equilibrium. Graphs in Figure 1 demonstrate responses of the system to the unitary orthogonal innovation (shock) in logAP (left graph) and in logPP (right graph). A series' response is normalized by dividing by its innovation variance.

Figure 1: Impulse-response analysis of VECM for pigs





The left-hand graph shows responses of logAP (black line) and logPP (dashed line) to the unitary innovation in the agricultural price (logAP). The responses of both series, which firstly rise and then fall, are significantly positive. After approximately one year, the series seems to reach equilibrium.

The right-hand graph presents responses to the innovation in the wholesale price (logPP), which is positive for all periods. The responses of the agricultural price are negative in the first month after the shock and then positive. Equilibrium is again reached after 12 months.

The responses and the final state after the innovation differ depending on the type of the innovation. The nature of the differences, together with the path of responses after the given innovation, supports the above-stated characterization of the type of market structure.

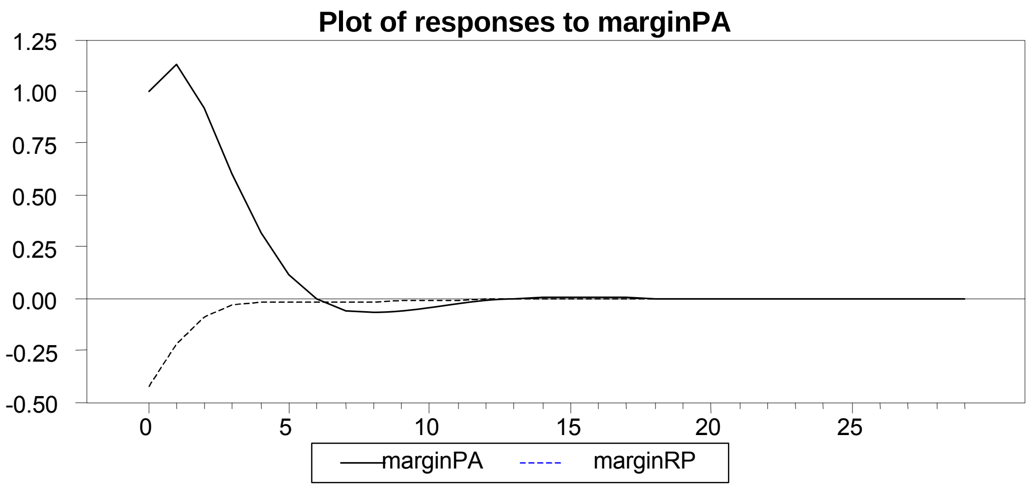
The second model consists of marginPA (marginPA = logPP – logAP) and marginRP (marginRP = log_retail_price – logPP). The model is estimated in the form of the VAR model due to the stationarity of variables marginPA and marginRP. The VAR model has 2 lags (according to AIC and SIC), constant and a dummy variable (dum2). The dummy variable contains zero between 1995 and 2004 and one for year 2005, in which there seems to be a significant change in the spread of margins.

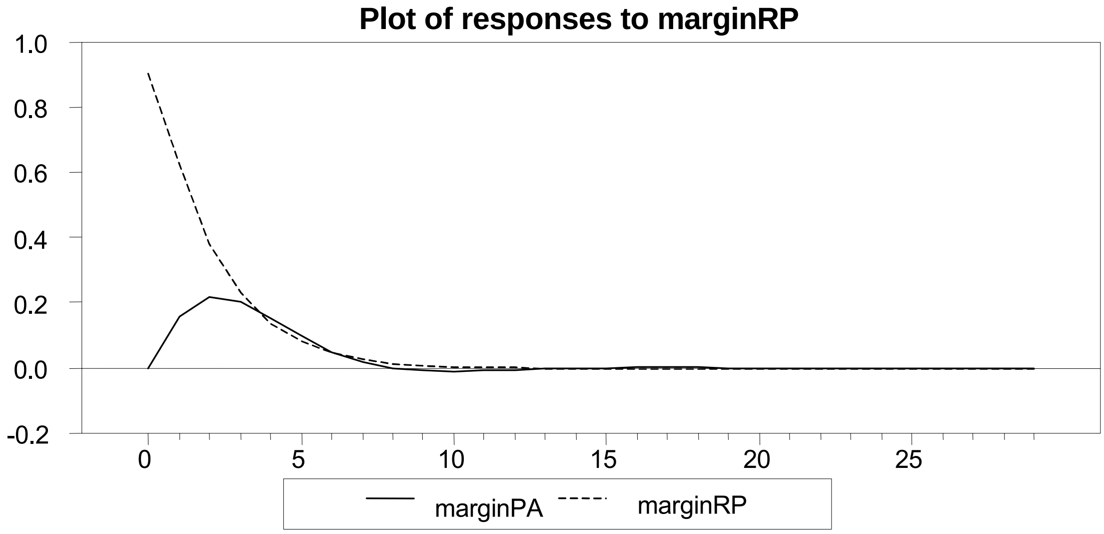
Even if the F-test suggests that both maginRP in the equation for marginPA and marginPA in the equation for marginRP are not significant regressors at the 5 % level, the impulse-response analysis is shown because it presents interesting results.

The left-hand picture in Figure 2 demonstrates responses to the innovation in the marginPA (black line). The second picture illustrates responses to the innovation in the marginRP (dashed line).

The path of responses in both pictures may imply, considering the above–stated arguments, that the processing industry plays a major role in the agri-food chain for pigs.

Figure 2: Impulse-response analysis of VAR model for pigs





The dummy variables (dum1 and dum2) are significant in both models. Dum1 is significant in the first equation of VECM, while Dum2 is significant in both equations of the VAR model.

Dum1 in the VECM expresses the increase in agricultural prices after EU enlargement. Dum2 captures a slow decrease in marginPA and an increase in marginRP after the EU enlargement. However, the period is too short to draw conclusions about the changes in the price transmission of pigs.

Secondly, the agri-food chain of broilers is analyzed. The series of prices, i.e., the agricultural price of broilers and the wholesale price of broilers, are integrated of order one according to the ADF test. Thus, the VECM is estimated to contain prices as endogenous variables constant in the co-integration space and to have 4 lags in the VAR space.

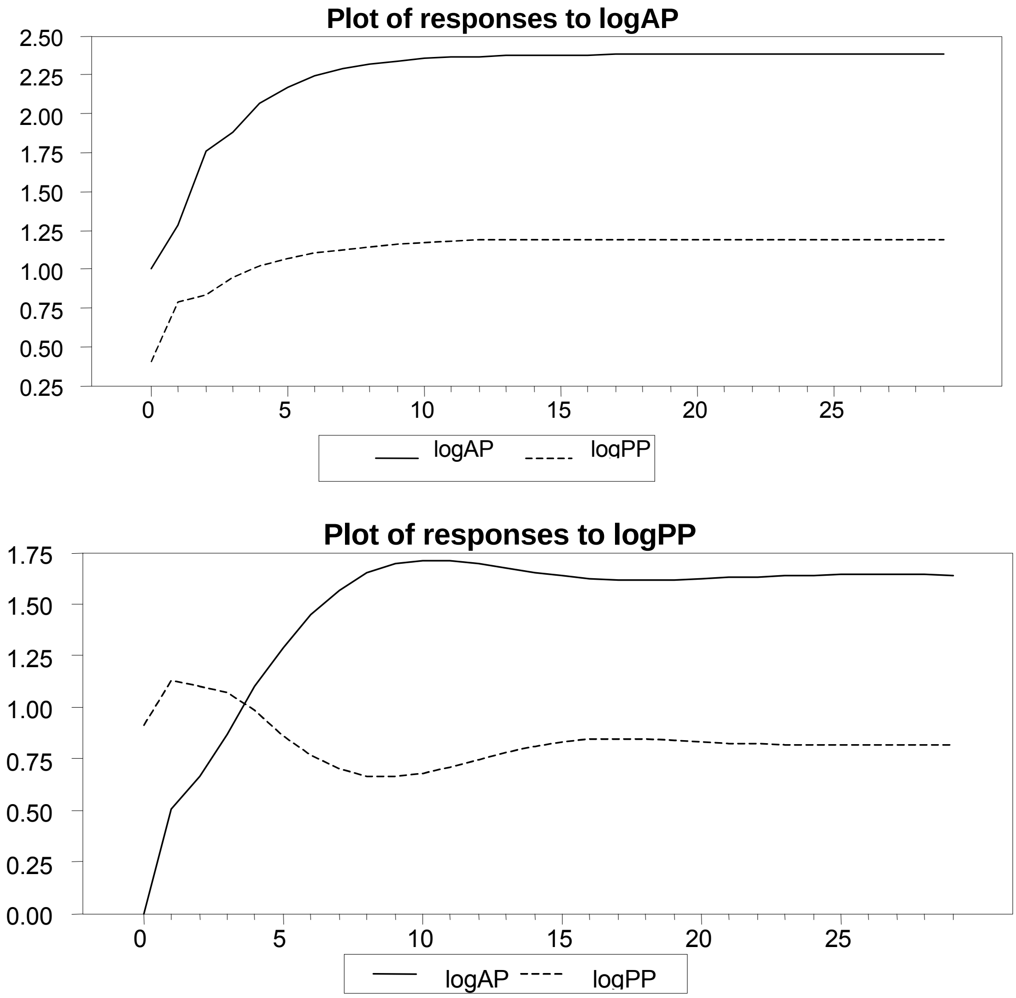
The fitted model has one co-integrating vector according to the L-max test and the Trace test. That is, the model offers unique information about the long run relationship, and one may conclude that the equilibrium relationship between prices exists.

Re-normalization of the eigenvectors by the coefficient of the agricultural price results in the following co-integrating vector: (1,000; -0,747; -0,317). The co-integrating vector is significant in both equations of the VECM at a 5 % significance level. That is, the relationship between variables seems to be simultaneous.

Assuming again that there are no significant strong knock-on and feedback effects, then the "pass-back" price transmission elasticity is equal to 0.747. The "pass-back" elasticity suggests that the processing stage may exercise oligopsony power only.

Graphs in Figure 3 show responses of the series to the unitary orthogonal innovation in logAP (left graph) and in logPP (right graph). The response of a series is normalized by dividing it by its innovation variance.

Figure 3: Impulse-response analysis of VECM for broilers



The left-hand graph shows responses of the series logAP (black line) and logPP (dashed line) to the innovation in logAP, which are positive in all steps. The reaction of the agricultural price is higher than that of the wholesale price, and the series may reach equilibrium within 1 year.

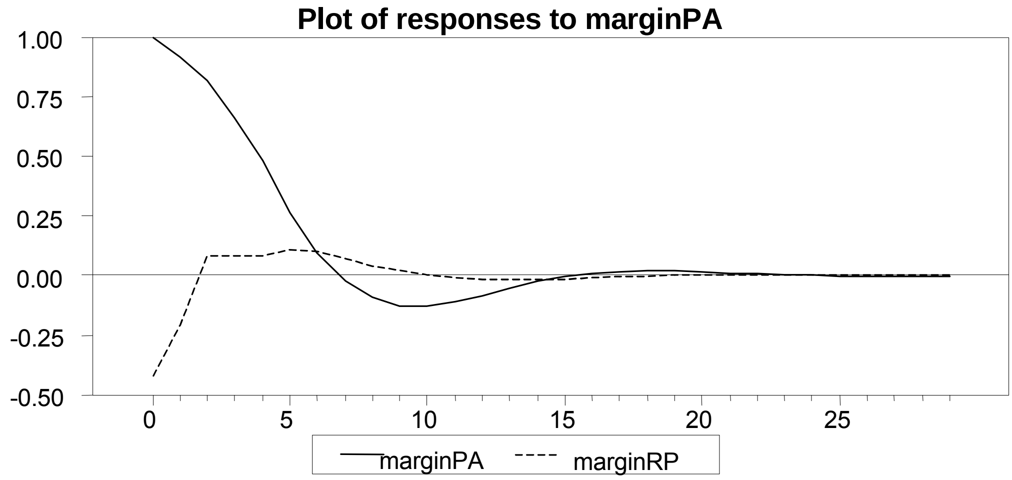
The right-hand graph presents the series' responses to innovation in logPP. The responses of both series are positive again in all periods. The responses of logPP are higher than the responses of logAP in the first 3 steps. However, from the 4th step the responses of logAP exceed the responses of logPP. The system may reach equilibrium within 20 months.

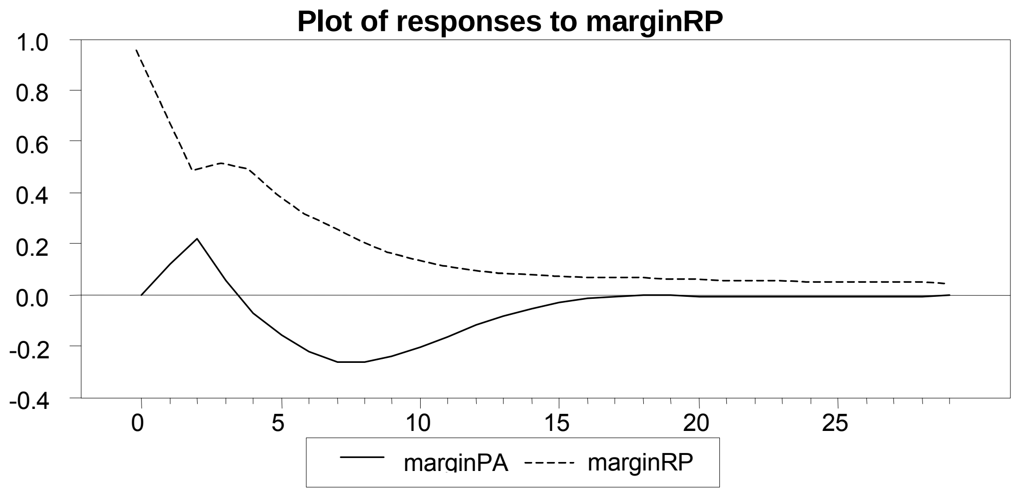
The results of the impulse-response analysis contradict the above-stated conclusion about market power and should be analyzed more closely.

Figure 4 contains the impulse-response analysis of the VAR model for broilers. The VAR(3) model consists of margin PA, margin RP, constant and dum1. The F-test suggests that marginPA and maginRP are significant regressors in both equations at the 5 % significance level.

The left-hand graph shows the series' responses to the innovation in marginPA, and the right-hand graph presents responses of the series to the innovation in marginRP. The results of the impulse-response analysis imply that the retail stage may play a dominant role in the agri-food chain of broilers.

Figure 4: Impulse-response analysis of VAR model for broilers





The dummy variable is not significant in the VECM but is significant in the VAR model. However, their values do not suggest that there has been any significant change in the price transmission of broilers after EU-enlargement.

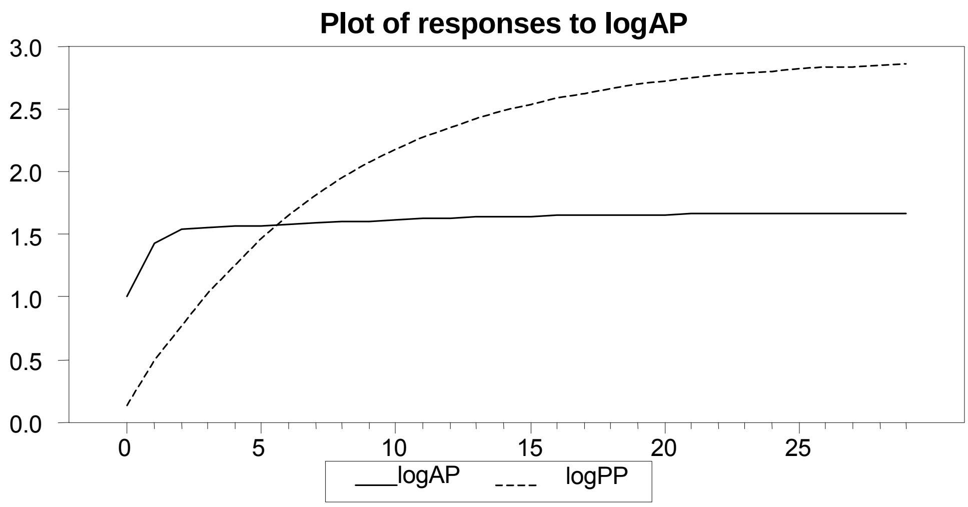
Finally, the vertical sector of wheat (Bohemian flour) is analyzed. According to the ADF test, the variables, i.e., the agricultural price of wheat and the wholesale price of Bohemian flour, are integrated of order one. The analysis of integrated series I(1) starts with the estimation of the VECM considering the possible existence of a long run relationship between variables. The VECM consists of two endogenous variables (agricultural price of wheat and wholesale price of Bohemian flour) and constant in the co-integration space. The length of lags in the VAR space, in this case 3 lags, was chosen according to the information criterions (AIC and SIC).

The L-max test and the Trace test of the fitted VECM suggest that the model has one co-integrating vector at the 10 % significance level. That is, the series are co-integrated and the equilibrium relationship between them may exist.

The eigenvectors are normalized by the wholesale price of Bohemian flour due to the significance of the parameter α in the second equation of the VECM. The resulting co-integrating vector has the form of (-0,829; 1,000; -2,020) and is not significant in the first equation. This may imply that the agricultural price of wheat may be exogenous with respect to the wholesale price of Bohemian flour. However, exogeneity tests do not confirm this hypothesis.

Assuming that the co-integrating vector is also relevant for the first equation and that there are no significant strong knock-on and feedback effects, then the "pass-back" price transmission elasticity is equal to 1,206 (i.e., 1/0.829). In this case, the "pass-back" elasticity suggests that the processing stage may exercise the oligopoly power only or both oligopoly and oligopsony power. However, considering that the co-integrating vector is not significant in the first equation, the identification of market structure is not clear.

Figure 5: Impulse-response analysis of VECM for wheat (Bohemian flour)



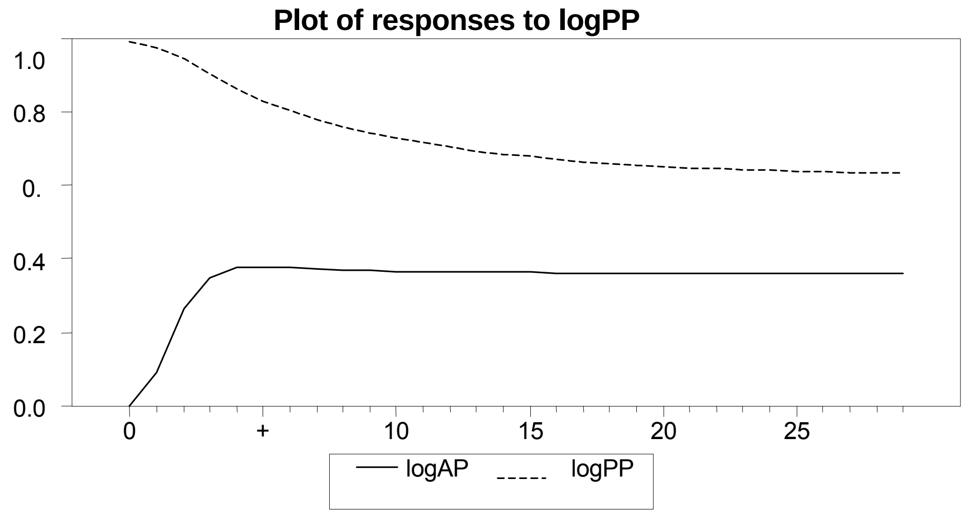
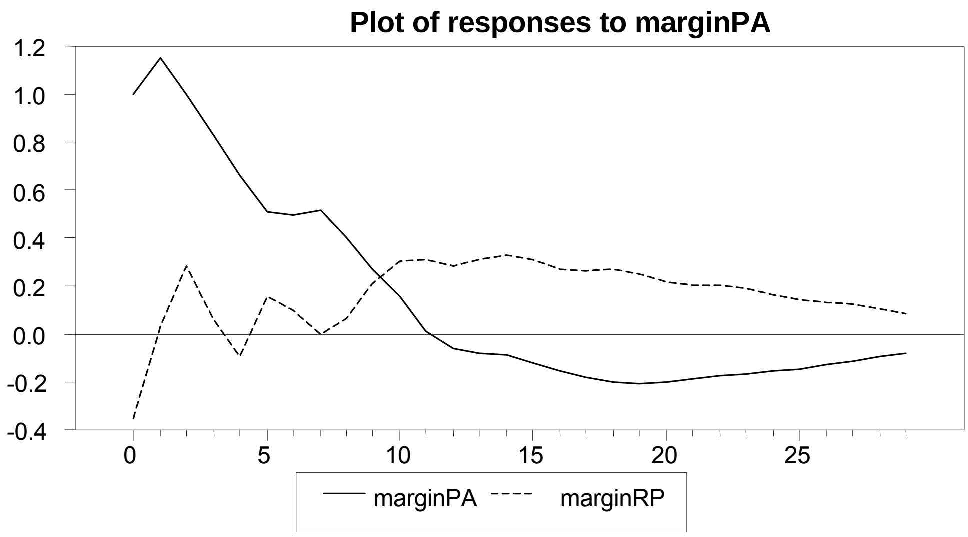


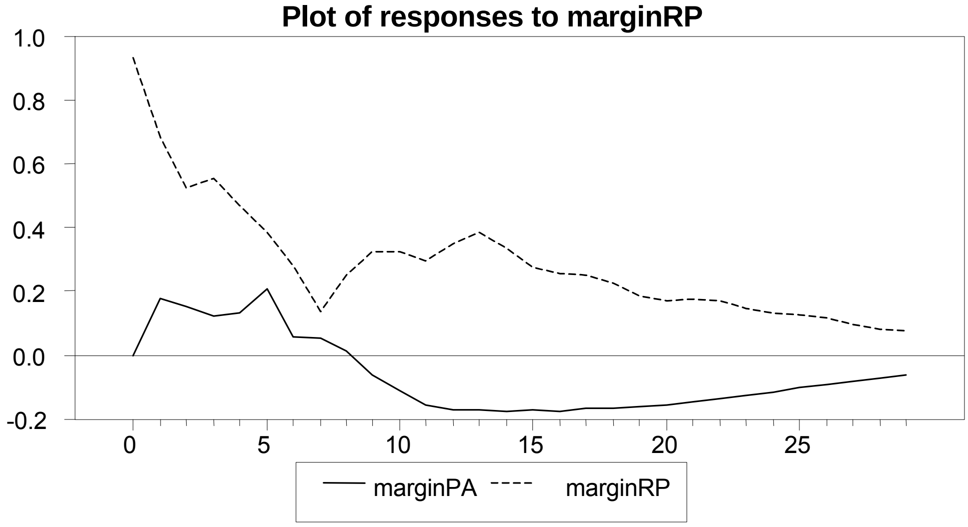
Figure 5 presents the results of the impulse-response analysis of the VECM for wheat (Bohemian flour).

The left-hand graph shows the responses of series logAP (black line) and logPP (dashed line) to the innovation in logAP. The right-hand graph contains the series' responses to the innovation in logPP.

All series' responses to innovations are positive. The responses of logPP exceed, in both graphs, the responses of logAP. This is again a case which may be in contradiction to what has been stated above about the market structure.

Figure 6: Impulse-response analysis of the VAR model for wheat (Bohemian flour)





The impulse-response analysis of the VAR model for wheat (Bohemian flour) is presented in Figure 6. In this case, the VAR(8) model consists of margin PA, margin RP, constant and dum1. F-test suggests that the variables are significant regressors in both equations at the 10 % level.

The left-hand graph shows series' responses to the innovation in marginPA and the right-hand graph presents responses of the series to the innovation in marginRP. The results of the impulse-response analysis imply that the retail stage may again play a dominant role in the agri-food chain for wheat (Bohemian flour).

The dummy variable is not significant in both models, which may imply that there has not been any significant change in wheat's price transmission (Bohemian flour) after EU-enlargement.

The obtained results can be discussed with respect to the Czech farmers' competitiveness and effects (efficiency) of agricultural policy.

The results suggest that the processing stage may exercise market power. Strictly speaking, the processing market for pig products may have oligopsony power, and the processing market for broilers also seems to exercise oligopsony power. However, the results in this vertical sector are not unambiguous and the vertical markets of wheat (Bohemian flour) may be non-competitive as well. In light of these results, it seems that the Czech farmers' degree of competitiveness is reduced due to the possible market power abuse at the processing and/or retail stage. Asymmetric relations, which result in asymmetric price transmission in the vertical sector, may have several effects on farmers.

The short-run effects may produce a skewed distribution for the agricultural (farmer's) price. That is, the short-run price dynamic can be nonlinear (see CHAVAS et al., 2004). The prices may respond differently to positive and negative innovations (shocks) and/or to small and large innovations (shocks). Some of these responses can be found in the above-presented impulse-response analysis, however, the precise description of distribution demands deeper analysis. The implications of asymmetric price transmission, considering the farmer's competitiveness in the short run, may be seen in higher price volatility and consequently, in higher degree of risk for the agricultural sector. The higher degree of risk may result in the reduction of output (see risk-adjusted value of marginal product) *ceteris paribus*. However, this consequence can be abolished by effects of agricultural policy.

The long run effects can be evaluated based on the estimated co-integrating vectors. Assuming that the processing stage exercises oligopsony power, i.e., the case of the vertical sectors of pigs and broilers (possibly also wheat), then the long-lasting positive change in the wholesale price by 1 % results in the increase in the agricultural price by less than 1 % (i.e., by 0.823 % in the case of pigs and by 0.747 % in case of broilers). That is, the processing/farm price margin is going up. The negative change in the wholesale price has the opposite effect. However, taking into account that the analysis is based on nominal prices, then it can be assumed that the long-lasting change in the wholesale price is positive. Considering the role of agricultural policy and assuming a long-run increase in prices (at least nominal), it can be concluded that the financial "aid" for farmers is distributed within the agri-food chain. Thus, the long-run effects (efficiency) of agricultural policy may be deteriorated with respect to Czech farmers.

4 CONCLUSIONS

The paper outlines a theoretical framework for the analysis of the market structure in vertically-related markets. The linkage of co-integration analysis with VAR modeling is used to fit the theoretical model. Results of the analysis suggest the following: The equilibrium relationship in all investigated vertical markets exists; the processing stage may exercise oligopsony power in the processing stage for pigs and broilers; the market structure of the vertical markets for wheat is not precisely determined; the impulse-response analyses show that the price dynamic takes approximately 12 months to reach equilibrium. Moreover, the price transmissions do not seem to significantly change their nature after EU enlargement.

The results imply that the Czech farmers' degree of competitiveness has been reduced. Agricultural policy may diminish the negative effects of the asymmetric relations in price transmissions in the short run. However, in the long run, the effects of agricultural policy may deteriorate, assuming oligopsony power in the processing stage.

Finally, the analysis suggests that the hypothesis of the paper cannot be rejected.

The analysis of the nature of price transmission in vertical markets is not comprehensive in this paper. However, the paper contributes to the analysis of price transmission in the Czech Republic both methodologically and empirically, and opens further topics for future research.

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RURAL LABOR MOBILITY

Agriculture in the Face of Changing Markets, Institutions and Policies: Challenges and Strategies
JARMILA CURTISS, ALFONS BALMANN, KIRSTI DAUTZENBERG, KATHRIN HAPPE (eds., 2006)
Studies on the Agricultural and Food Sector in Central and Eastern Europe, Vol. 33, Halle (Saale), IAMO, pp. 451-466.

LABOR MOBILITY IN TRANSITION COUNTRIES AND THE IMPACT OF INSTITUTIONS

THOMAS HERZFELD, *THOMAS GLAUBEN*

ABSTRACT

The economic transformation in countries of Central and Eastern Europe as well as Asia has resulted in a diverse picture of change in agricultural labor use. Annual migration within this sector ranges between an emigration of about nearly 8 percent of the agricultural labor force, to an immigration into agriculture of about 10 percent on average. This paper considers the determinants of this occupational labor flow and separates the migration rate in an annual and a time-invariant part. The most important determinants of the annual migration rate are the ratio of sectoral income per worker and the relative magnitude of agricultural labor. The time-invariant part of the migration is very closely related to initial conditions and the method of land privatization.

Keywords: *Intersectoral migration, intersectoral income differential, institutions, transition economies.*

1 INTRODUCTION

Economies in transition have undergone a tremendous change since the start of economic reforms. In most of them, agriculture was collectivized and intersectoral movement of labor more or less restricted before the break-up of the economic planning system. Economic reforms implied decollectivization, privatization of land and assets, adjustment of relative prices and liberalization of labor markets. However, the speed and degree of implementation varied widely between the different countries. ROZELLE and SWINNEN (2004) compare the agricultural reform process in several transition countries. A striking result is the significant divergence in agricultural labor productivity and agricultural

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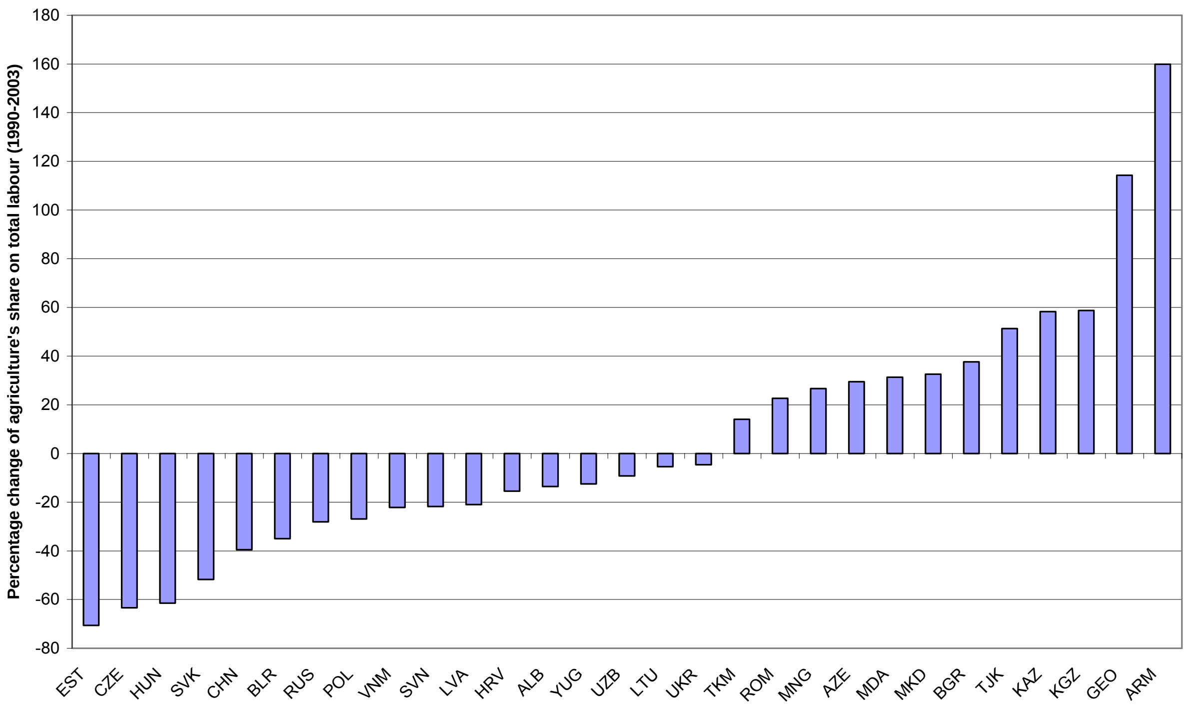
labor use over the reform period. Whereas Central European and East Asian countries experienced an increase of labor productivity after reforms, the drop is highest for Transcaucasian and Central Asian countries. Adjustment of the labor force to new economic conditions seems to take different paths and to proceed at different speeds. The continuous decline of the proportion of the workforce employed in agriculture which, it is hypothesized, occurs in parallel with economic development, cannot be observed in all transition countries (see sources cited in MUNDLAK, 1978). In Armenia, Georgia, Kazakhstan, Kyrgyzstan, Macedonia, and Tajikistan it has even increased by more than 50 %. This paper refers to this inflow of labor as immigration. Other countries experienced a steep drop in agricultural employment which far exceeds the development in non-transition countries (see Figure 1). This outflow of labor is termed rural migration or emigration. The objective of this paper is to provide a more detailed analysis of one aspect of this adjustment process: Determinants of occupational migration from agriculture to non-agricultural sectors. More specifically, the determinants which drive intersectoral migration in transition countries are analyzed econometrically, focusing the impact of different privatization methods and other institutional indicators. Finally, this paper looks at whether migration converges to a common rate in the whole sample or in more homogeneous sub-samples.

Figure 1: Change in agriculture's share of total labor, 1990-2003



Source: Own calculations based on WORLD BANK (2005), ILO (2006), and national statistics.

Notes: Percentage change between 1990 and 2003, except China (1978-2003), Croatia, Macedonia, and Serbia (1996-2003), Slovenia (1993-2003) and Tajikistan (1991-2003).

Previous literature on the transition process in agriculture focused mainly on privatization methods (e.g., CSAKI and LERMAN, 1997; LERMAN, CSAKI and FEDER, 2004; SWINNEN, 1998), the development of productivity (see among others MACOURS and SWINNEN, 2000; LERMAN et al., 2003; ROZELLE and SWINNEN, 2004; MATHIJS and SWINNEN, 2001) or evolving farm structures (LERMAN, CSAKI and FEDER, 2004). Aspects of agricultural labor form a smaller block of literature, mainly concentrating on either participation in emerging off-farm activities and particularly in Chinese rural areas: CHAPLIN, DAVIDOVA and GORTON (2004); BUCHENRIEDER, KNÜPFER and HEIDHUES (2002); GLAUBEN, HERZFELD and WANG (2005a); GLAUBEN, HERZFELD and WANG (2005b); DE BRAUW et al. (2002); ZHANG, DE BRAUW and ROZELLE (2004).[1] BROOKS and TAO (2003) analyze the determinants of the share of non-agricultural employment for Chinese provinces using a fixed effects model. Results show that non-agricultural real GDP and the nominal wage index are the most important explanatory variables.

Turning to the change in agriculture's share of total labor, SWINNEN, DRIES and MACOURS (2005) separate the literature discussing the adjustment of the agricultural labor force into two categories, with the first focusing on the reduction in surplus labor after the removal of subsidies, central planning and mobility restrictions. By contrast, the second category highlights the buffer role played by agriculture, e.g., in form of subsistence farms, in periods of high unemployment and economic uncertainty. The theoretical model provided by SWINNEN, DRIES and MACOURS (2005) shows the importance of institutional reforms for the change in agricultural labor. An effective privatization of corporate farms as well as the break-up of state enterprises and collective farms into private family farms will reduce the total numbers employed in agriculture, but this is partly offset by increased labor efficiency. Decreasing relative agricultural prices and increasing wages in non-agricultural sectors also lead to a reduction in agricultural labor.

Two approaches can be found within the empirical literature. DRIES and SWINNEN (2002) focus on the development of the proportion of the workforce employed in agriculture in Polish macro-regions between 1990 and 1997. A similar study for seven countries of Central and Eastern Europe for the period 1989-1998 is undertaken by SWINNEN, DRIES and MACOURS (2005). Both studies use the annual percentage change in labor employed in agriculture since the start of economic reforms as dependent variable. Statistically significant explanatory variables are the change in privately used land, the change in the proportion of agricultural land operated by individual farms, and the terms of trade. A slightly different focus informs the work by BUTZER, MUNDLAK and

[1] Interregional migration in China also forms a widely discussed topic in the literature. Migrants move from rural to urban regions or from poor western to rich eastern provinces (TAYLOR und ROZELLE, 2003).

LARSON (2003) as well as BUTZER, LARSON and MUNDLAK (2002). Both papers rely on the approach developed by LARSON and MUNDLAK (1997) and MUNDLAK (1978). The migration rate between agriculture and non-agricultural sectors for South-east Asian countries and Venezuela is explained using a principal components approach. The main determinants of intersectoral migration are the income ratio between sectors, the growth of non-agricultural employment, and unutilized capacity in non-agriculture.

This paper follows the approach by MUNDLAK and co-authors. The rate of occupational migration between agriculture and non-agricultural sectors is calculated for 29 transition countries in Central and Eastern Europe as well as Asia for up to 26 years. Several macroeconomic and institutional variables are used to explain this migration rate in a panel framework. The following section explains the methodology and describes the database. Section three presents the results of the econometric analysis and the paper finishes with some concluding comments.

2 METHODOLOGY AND DESCRIPTION OF DATA

Starting from early models of migration like Todaro's seminal work (TODARO, 1969; HARRIS and TODARO, 1970), migration is understood as a mechanism to equalise marginal earnings in agriculture and non-agricultural sectors. Institutions which limit intersectoral mobility may restrict this equalisation.[2] Due to data limitations most of the empirical literature uses average sectoral income per worker instead of marginal income. Wages are thought to be less informative due to other additional income components and uncertainty regarding the probability of finding employment in the preferred sector. The use of sectoral income may suffer from price differences between agriculture and non-agricultural sectors. But this effect should diminish over time since almost all transition countries liberalized prices relatively fast.[3]

Using the framework developed in LARSON and MUNDLAK (1997) and MUNDLAK (1978) the intersectoral migration rate and resulting income ratios between sectors are calculated for a panel of transition countries. Assuming that the growth rate of agricultural labor (n_A) would equal the growth rate of total labor (n), differences between both rates could be attributed to migration. Thus the migration rate from agriculture is calculated as the difference between growth rates of total labor and agricultural labor (Equation 1).

$$m = \frac{(L_t - L_{t-1})}{L_{t-1}} - \frac{(L_{At} - L_{At-1})}{L_{At-1}} = n - n_A \tag{1}$$

[2] For recent surveys of literature on the general subject of migration see MASSEY, ARANGO und HUGO (1993) as well as TAYLOR und MARTIN (2001).

[3] Another source of measurement error may be a differing informal sector's share in both sectors.

According to the above-mentioned literature, one should expect migration to increase with the income ratio between non-agricultural sectors and agriculture and the relative magnitude of agricultural labor, which constitutes the source of supply (HARRIS and TODARO, 1970, ZAREMBKA, 1970). The income ratio between non-agricultural sectors and agriculture is calculated as the ratio of sectoral GDP per worker. Assuming perfect intersectoral mobility, this ratio should approach a value of one. By contrast, higher values point to mobility-restricting institutions.

Annual sectoral labor and GDP data are taken from WORLD BANK (2005), ILO (2006), UNITED NATIONS (2006) and are supplemented by information from national statistical yearbooks. This study analyses 29 transition countries from Europe and Asia.[4] The data covers up to 26 years with most of the countries starting in 1990.[5]

The econometric analysis proceeds in two steps.[6] First, the migration rate is explained using a fixed effects model (Equation 2). Relying on theoretical models of migration the lagged income differential IR_{it-1} should explain a large part of the migration rate. The labor ratio (LR_{it-1}) between agricultural and non-agricultural sectors accounts for a potentially larger migration rate if the agricultural sector is relatively large. A change in relative prices might affect productivity in agriculture and, therefore, act as a migration determinant. The variable Terms of Trade (TOT_{it-1}) should control for this relationship. These three variables form a basic specification. Finally, a set of additional explanatory variables is included in matrix X_{it} to control for the robustness of the basic specification. First, the lagged unemployment ratio ($Unemp_{t-1}$) is included to take into account the probability of finding jobs outside of agriculture. Second, the annual average of the EBRD transition indices (*EBRD*) should check for the impact of economic liberalization on intersectoral mobility. The vectors β_{1-4} contain the coefficients to be estimated.

$$m_{it} = \alpha + \beta_1 IR_{it-1} + \beta_2 LR_{it-1} + \beta_3 TOT_{it-1} + \beta_4 X_{it} + \upsilon_i + \varepsilon_{it} \tag{2}$$

The estimated fixed effects ($\hat{\upsilon}_i$) are, as a second step, explained by institutional variables and initial conditions using a cross-country approach (Equation 3). The matrix Y_i contains variables to control for initial conditions, like GDP per capita

4 The countries are: Albania, Armenia, Azerbaijan, Belarus, Bulgaria, China, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Poland, Romania, Russia, Serbia and Montenegro, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and Vietnam. Bosnia has had to be excluded due to missing data.

5 Data for China covers the whole sample (1978-2003); the observation of Bulgaria, Czech Republic, and Romania starts in 1980; and Poland follows in 1981. Most of the remaining countries enter the sample in 1990.

6 The fixed effects model does not allow the inclusion of time invariant variables, like initial conditions, as exogenous variables. They would lead to perfect multicollinearity with the country-specific fixed effects.

in 1990, agriculture's share of GDP in 1990, and dummies for the land privatization procedure. A second subset of variables controls for institutional quality, approximated by a corruption index, literacy of adult population and the proportion of paved roads.

$$\hat{\upsilon}_i = c + \gamma' Y_i + u_i \tag{3}$$

The explanatory variables in equation 2 capture the annual part of the migration rate m_{it}; and the fixed effects $\hat{\upsilon}_i$ might be regarded as the time-invariant part of the intersectoral migration. Therefore, this two-step procedure implies a decomposition of the annual migration rate.

3 RESULTS OF THE EMPIRICAL ANALYSIS

3.1 Descriptive analysis

Table 1 shows the average migration rate per annum as a percentage of the agricultural labor force and the average income ratio for all countries over the sample period. The average migration rate varies between an emigration of up to 8 percent of the agricultural labor force (Estonia) and an immigration of up to 10 percent (Georgia).[7] The ranking is highly correlated with the change in agriculture's share of total labor (see Figure 1). A comparison of these estimates with decade averages for the 80s by LARSON and MUNDLAK (1997) shows a relatively high migration in Estonia, Slovak Republic, Czech Republic, and Belarus. A first look at the calculated income ratios shows an interesting picture and the variable varies between 0.8 and 4.7. Whereas the CIS countries exhibit income ratios near one in 1990 and 1991, the variance increases significantly over the sample period. Non-CIS countries show a higher variation of income ratios at the beginning of the sample period. These results are comparable with estimates by LARSON and MUNDLAK (1997) for Asia, Latin America and the group of other countries. Only African countries show higher income differentials between non-agricultural sectors and agriculture.

[7] As a comparison, the average annual migration rate between 1989 and 2003 in the five federal states on the territory of the former GDR amounts to 6.5 % and the income ratio to 1.6.

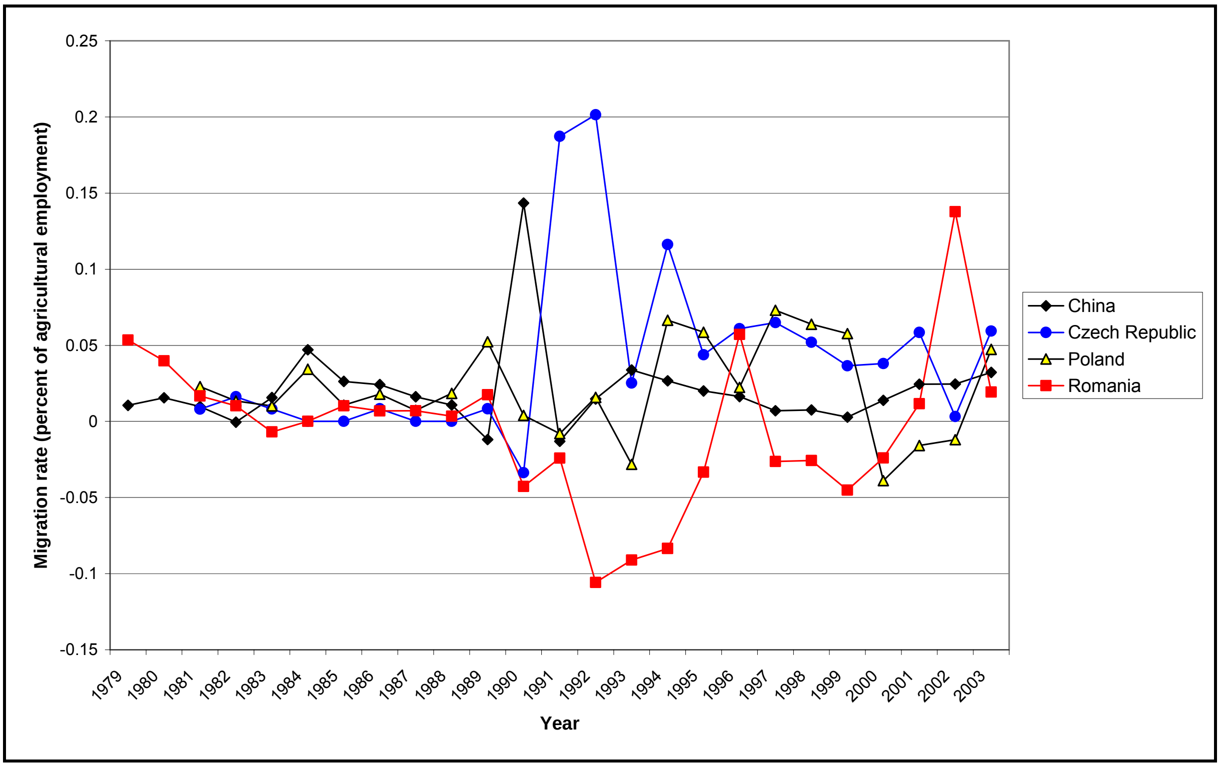
Table 1: Migration rate and income ratio

Country	Sample period	Average migration rate	Income ratio	No. of years with	
				Emigration	Immigration
Albania	1992-2003	0.010	4.351	4	7
Armenia	1990-2003	-0.088	1.156	0	13
Azerbaijan	1999-2003	0.014	1.388	3	1
Belarus	1988-2003	0.032	0.862	15	1
Bulgaria	1980-2003	-0.003	1.020	13	10
China	1978-2003	0.020	4.000	22	3
Croatia	1996-2003	0.017	2.405	5	2
Czech Republic	1980-2003	0.040	0.776	18	1
Estonia	1989-2003	0.079	1.010	13	1
Georgia	1990-2003	-0.102	2.540	5	8
Hungary	1990-2003	0.067	1.149	12	2
Kazakhstan	1990-2003	-0.054	0.944	5	7
Kyrgyzstan	1986-2003	-0.030	0.961	7	11
Latvia	1990-2003	0.008	0.843	7	6
Lithuania	1982-2003	0.005	2.644	11	10
Macedonia	1996-2003	-0.045	2.441	2	5
Moldova	1990-2003	-0.027	2.014	4	9
Mongolia	1990-2003	-0.021	4.181	4	9
Poland	1980-2003	0.021	3.997	18	5
Romania	1978-2003	-0.006	2.176	13	11
Russia	1990-2003	0.019	0.799	7	6
Serbia and Montenegro	1996-2003	-0.004	0.886	3	4
Slovak Republic	1990-2003	0.051	1.680	9	4
Slovenia	1993-2003	0.015	2.665	6	3
Tajikistan	1991-2003	-0.038	4.119	1	11
Turkmenistan	1990-2003	-0.012	3.284	3	9
Ukraine	1987-2003	0.000	1.314	6	9
Uzbekistan	1990-2003	0.005	1.319	8	4
Vietnam	1993-2003	0.018	4.698	10	3

Source: Own calculations based on WORLD BANK (2005); ILO (2006); UNITED NATIONS (2006); National statistics.

A closer look reveals that the average migration rate masks significant temporal differences between and within countries, as Figure 2 shows. The average migration of 4 percent in the Czech Republic is highly influenced by the development after 1990, where up to 20 percent of the agricultural labor force left the sector in only one year. The period prior to that (1981-1988) is characterized by a migration rate close to zero. By contrast, Romanian data indicate a flow from non-agricultural occupations to agriculture after 1989, accounting for up to 10 percent of agricultural employment. Different privatization procedures and subsequent restructuring are acknowledged as one of the main reasons behind this (ROZELLE and SWINNEN, 2004). Poland, as a third example, experienced not such a significant shift in the migration rate. An emigration of more than 5 percent of the sector's labor force occurred only in the years 1994 to 1999. Finally, China shows a large decrease in agriculture's share of total employment since 1978, whereas the annual migration rate is mostly positive but comparatively low (2 % of the agricultural labor force). Occupational migration might be broken down into two parts. First, the actual change of occupation by workers which fits the situation in the Czech Republic and Romania in 1990-93. The second part is related to the decision of those new entrants into the labor force who shun the agricultural sector. This is more likely to describe the development in Poland and China.

Figure 2: Annual migration rates for selected economies, 1979-2003



Source: Own calculations based on WORLD BANK (2005), ILO (2006) and national statistics.

3.2 Results of the econometric analysis

Starting from a basic model which covers all countries, different specifications of equation 2 are estimated and the results reported in Table 2. The fixed effects approach is favored in all specifications compared to a cross-section analysis. The country-specific fixed effects explain almost half of the dependent variable's variation. Unfortunately, all specifications suffer from a high correlation between the exogenous variables and the unobserved fixed effects, which is mainly driven by the relationship between the income ratio and the fixed effects.[8] Column 1 shows the basic specification over the whole sample period. An increasing income ratio (*IR*) has a positive and statistically significant effect on the migration rate. Countries with a larger pool of agricultural labor (*LR*) experience a higher sectoral migration. Increasing relative agricultural prices (*ToT*) lower the annual migration significantly. Restricting the sample to the post-1989 period (Column 2), results in a smaller impact of the income ratio on the migration rate. On the other hand, the impact of the labor ratio and terms of trade increases, although the differences are not statistically significant except for the labor ratio. Including additional explanatory variables results in a smaller sample as most of them are not available for all countries and over the whole sample period. The unemployment rate (*Unemp*) and the progress in economic reforms (*EBRD*), captured by the EBRD transition index, has no significant influence on the dependent variable. Unfortunately, it reduces the statistical significance of the variables *IR* and the *ToT*. It also increases the contribution of the unobserved fixed effects. Controlling for additional exogenous conditions like infrastructure (*Telephone*), agricultural support (*PSE*), foreign direct investments (*FDI*) or inflation does not alter the results much. These additional specifications are presented in the Appendix.

As stated above, the fixed effects explain a large part of the migration rate and they are highly correlated with the average migration rate. The second step of the econometric exercise consists of explaining these fixed effects with indicators of initial conditions, privatization procedure and institutional quality. Results are presented in Table 3. The estimated fixed effects from the basic model [1] in Table 2 which covers all countries enter the following cross-country estimation as dependent variable. Unfortunately, some of the explanatory variables are highly correlated, which may increase coefficients' standard errors. Different specifications are therefore estimated.

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[8] Using the fixed effects estimator has the advantage that the correlation between the fixed effects and the explanatory variables does not affect the estimator's consistency and leads to unbiased coefficients (BALTAGI, 2005).

Table 2: Determinants of annual migration rate

	[1]	[2]	[3]	[4]
	Parameter (t-value)	**Parameter (t-value)**	**Parameter (t-value)**	**Parameter (t-value)**
Constant	-0.0372* (-1.91)	-0.0478* (-1.79)	-0.0494 (-1.43)	-0.0421 (-0.83)
IR_{t-1}	0.0211*** (3.55)	0.0159*** (2.64)	0.0289*** (4.32)	0.0096 (1.32)
LR_{t-1}	0.0448*** (2.71)	0.0929*** (2.98)	0.0357*** (2.62)	0.1381*** (3.05)
ToT_{t-1}	-0.0380*** (-3.44)	-0.0472*** (-2.92)	-0.0298 (-1.17)	-0.0493 (-1.48)
$Unemp_{t-1}$	–	–	0.0001 (0.08)	–
EBRD	–	–	–	-0.0024 (-0.18)
R^2	0.0950	0.1222	0.1034	0.1279
ρ	0.4372	0.5523	0.5155	0.5929
F-Test (ν_i=0)	3.81***	3.91***	3.67***	3.40***
N/Countries	395/29	348/29	294/28	304/27

Notes: The heteroscedasticity consistent estimator (WHITE, 1980) has been used to estimate the asymptotic covariance matrix. Coefficients significant at the 1 %, 5 %, and 10 % level of significance are indicated with ***, **, and *, respectively. The displayed R2 measures only the contribution of the explanatory variables without the fixed effects. The ρ indicates the share of the explained variation due to the fixed effects.

Column 1 presents the results of the first specification which controls for initial conditions and the kind of land privatization. Countries which have chosen distribution in kind (*Distribution*) procedures exhibit a significantly lower migration than countries which implemented a distribution of shares, the reference category. By contrast, the restitution of land (*Restitution*) is significantly correlated with a higher migration compared to the reference. Referring back to the literature mentioned in the introduction these results support both categories. Countries which opted for distribution experienced immigration into agriculture, highlighting the subsistence aspect. On the other hand, restitution of agricultural land seems to have accelerated restructuring within the sector, including a faster emigration from agriculture.

Table 3: Determinants of country fixed effects

	[1]	[2]	[3]
	Parameter (t-value)	**Parameter (t-value)**	**Parameter (t-value)**
Constant	-0.0152 (-0.14)	-0.7287^{***} (-4.06)	-0.2564 (-1.07)
Distribution	-0.0408^{**} (-2.10)	–	-0.0396^{*} (-2.02)
Restitution	0.0330^{*} (1.78)	–	0.0364^{**} (2.09)
AGSHARE90	-0.0022^{**} (-2.63)	–	-0.0026^{***} (-3.07)
Log(GDP90)	0.0093 (0.71)	–	–
Literacy	–	0.0062^{***} (2.84)	0.0032 (1.38)
Corruption	–	0.0307^{***} (3.31)	–
Land	–	0.0299 (0.88)	–
Roads	–	0.0001 (0.28)	–
R^2	0.6427	0.5954	0.6591
N	29	28	28

Notes: The heteroscedasticity consistent estimator (WHITE, 1980) has been used to estimate the asymptotic covariance matrix. Coefficients significant at the 1 %, 5 %, and 10 % level of significance are indicated with ***, **, and *, respectively.

Initial conditions seem to have only a limited impact. The GDP per capita in 1990 (*GDP90*) is not statistically significant at conventional levels. Countries where agriculture had a higher share of national GDP in 1990 (*AGSHARE90*) seem to have a lower migration. A second specification [2] accounts for the impact of institutional indicators like education, corruption, arable land per capita and infrastructure quality on the fixed effects. The unobserved country specific part of the migration rate is positively correlated with the educational level (*Literacy*) and institutional quality (*Corruption*).[9] The third Column [3] presents the results of a stepwise regression procedure and includes only variables with a significance level below 0.2. Again, countries which privatized land via distribution in kind and where agriculture was more significant in 1990

[9] The corruption index is compiled by TRANSPARENCY INTERNATIONAL and measures the perceived level of corruption within a country. It is scaled from 0 to 10 with higher values indicating a lower level of corruption. The variable in the estimation is the average of the annual values over the period 1995-2005.

experience a significantly lower migration. By contrast, countries which implemented restitution show a higher intersectoral migration.

The final question raised in the introduction relates to the development of differences between countries regarding migration and income ratio over time. Trade liberalization, like the agreements between the so-called Višegrad states, and the process of EU accession is expected to lead to integration of prices of tradable goods (ČIHAK and HOLUB, 2001). But the effect on non-tradable goods like labor is less clear. Referring to the literature on economic growth, σ-type convergence is observed if the variance of the migration rate and the income ratio decrease over time, meaning that migration and income ratio approach common levels within country groups. Two sub-samples are formed: First, those CEE countries which joined the European Union in 2004; and second, members of the CIS (former Soviet Union without the Baltic States and Georgia). Both sub-regions may be regarded to share some common characteristics. Whereas most European transition countries privatized agricultural land in the form of restitution to former owners, almost all CIS countries distributed land in kind or in shares (ROZELLE and SWINNEN, 2004). Some of the new EU-member states formed a trading union over the 90s, and all shared preferential trade access to the EU. However, no signs of convergence could be observed. Whereas the variance of the annual migration is very low before 1990, it shows no trend after the beginning of the economic reforms. Regarding the income ratio, variances even increase from 1990 to 2003 for the two subgroups as well as for the whole sample. The calculated variances are plotted for the whole sample and the two sub-samples in Figures A1 and A2 in the Appendix.

4 CONCLUSION

Transition countries of Central and Eastern Europe as well as Asia have chosen different ways to transform their agricultural sectors from a planned to a market economy. The adjustment of the agricultural labor force partly reflects these different approaches with increasing labor use in some countries and sharply declining employment in agriculture in others. Country specific fixed effects explain almost half of the variation of annual migration rates in the econometric analysis. In addition, migration is positively correlated with the income ratio between non-agricultural sectors and agriculture; the labor ratio between both sectors and the development of relative prices. As the income ratio is still increasing in Armenia, China, Croatia, Georgia, Kazakhstan, Lithuania and Tajikistan, an increasing migration from agriculture to other sectors is to be expected in the future. The privatization procedure and agriculture's share of GDP in 1990 are the most important determinants of the country specific part of the migration rate captured by the fixed effects in the first step of the analysis. Finally, the variance of the migration rate and the income ratio do not indicate any convergence even within more homogeneous sub-samples.

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APPENDIX

Table A1: Determinants of annual migration rate, additional specifications

	[1]	[2]	[3]	[4]
	Parameter (t-value)	**Parameter (t-value)**	**Parameter (t-value)**	**Parameter (t-value)**
Constant	-0.0367 (-1.39)	-0.0621^{**} (-2.04)	-0.0270 (-1.04)	-0.0321 (-1.29)
IR_{t-1}	0.0203^{***} (3.45)	0.0418^{***} (2.64)	0.022^{***} (3.61)	0.0204^{***} (2.92)
LR_{t-1}	0.0450^{***} (2.61)	0.1609^{**} (2.12)	0.0448^{**} (2.58)	0.0418^{**} (2.23)
ToT_{t-1}	-0.0385^{***} (-3.01)	-0.0500^{***} (-2.75)	-0.0494^{***} (-3.18)	-0.0278^{**} (-2.41)
Telephone	8.23E-06 (0.14)			
PSE		0.0001 (0.43)		
FDI			-0.0012 (-1.18)	
Log(Inflation)				-0.0036 (-1.40)
R^2	0.0932	0.1252	0.1023	0.1086
ρ	0.4335	0.6808	0.4349	0.4345
F-Test ($\nu_I = 0$)	3.49^{***}	4.24^{***}	3.82^{***}	3.23^{***}
N/Countries	388/29	162/13	374/29	357/29

Notes: The heteroscedasticity consistent estimator (WHITE, 1980) has been used to estimate the asymptotic covariance matrix. Coefficients significant at the 1 %, 5 %, and 10 % level of significance are indicated with ***, **, and *, respectively. The ρ indicates the share of the explained variation due to the fixed effects.

Figure A1: Variance of income ratio, 1990-2003

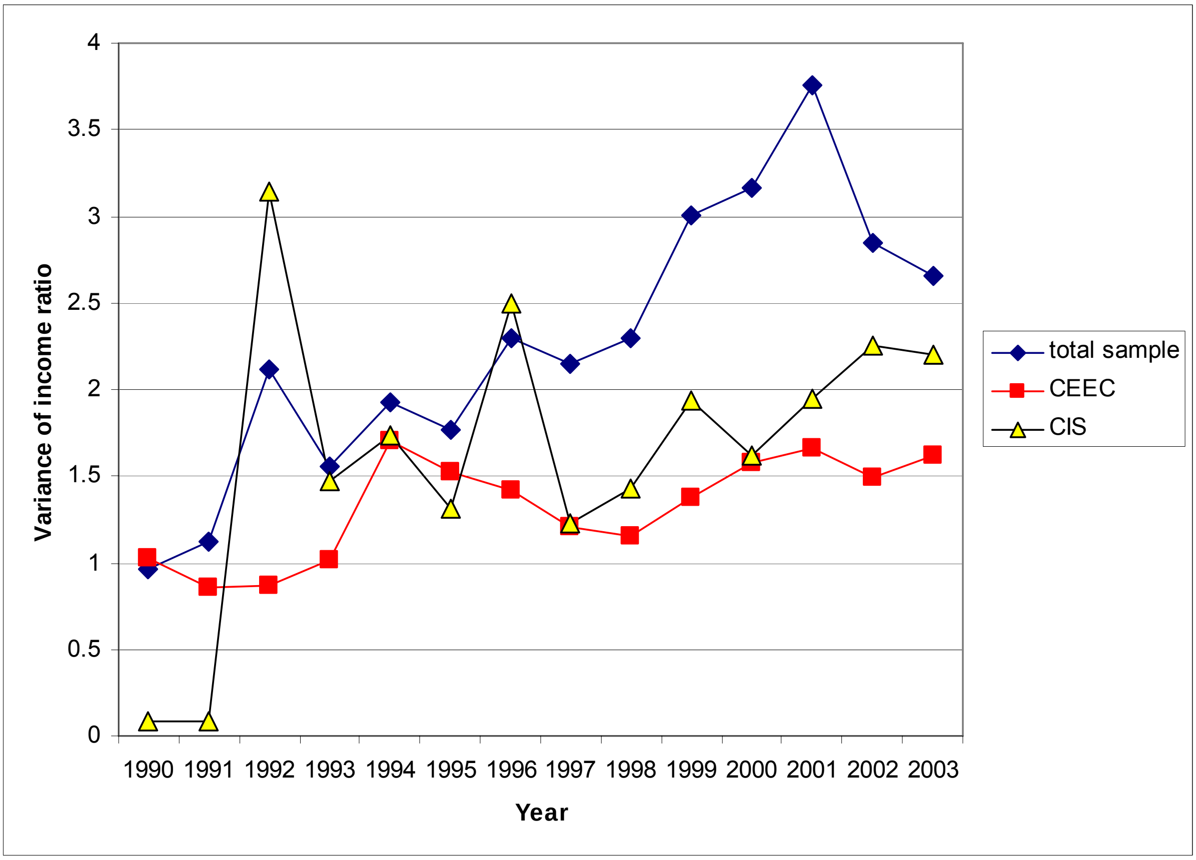
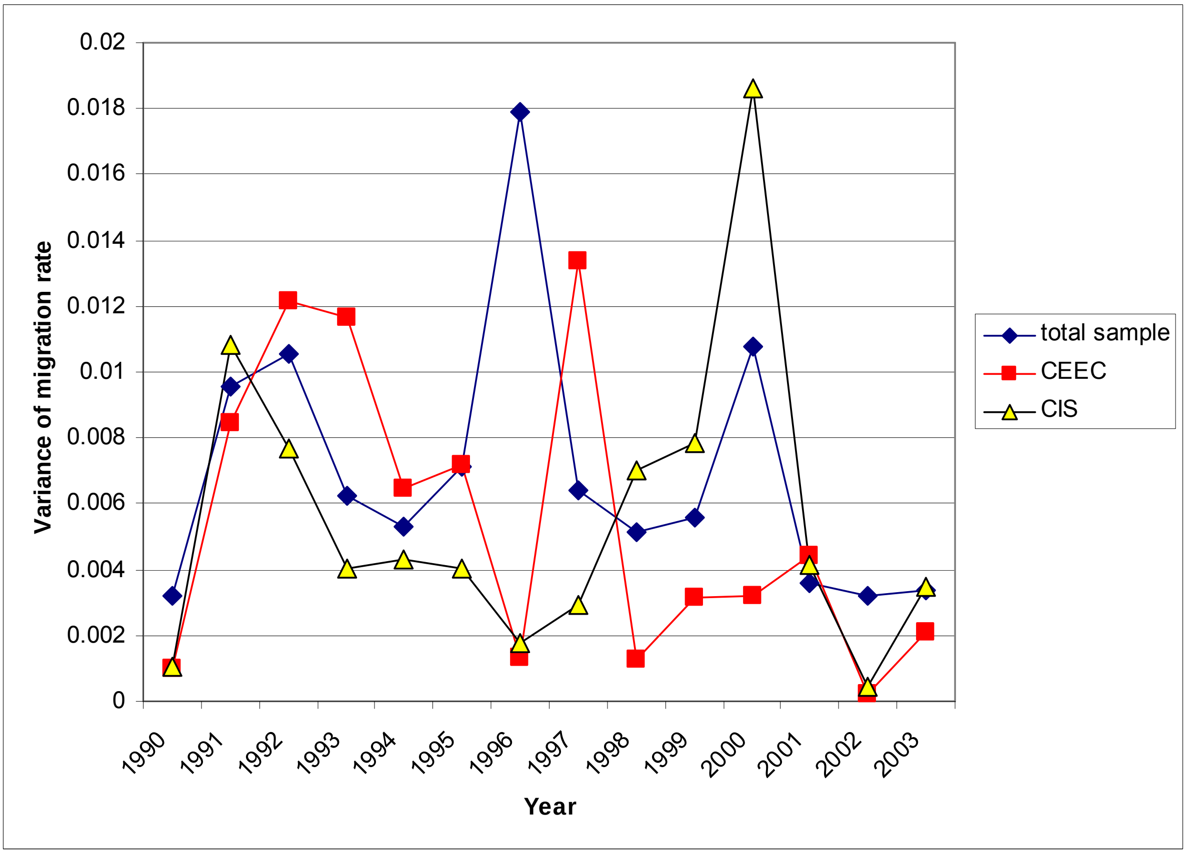


Figure A2: Variance of migration rate, 1990-2003



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CHOOSING TO MIGRATE OR MIGRATING TO CHOOSE: MIGRATION AND LABOR CHOICE IN ALBANIA

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ABSTRACT

Very little systematic analysis exists of the income generating strategies of Albanian households within the emerging market economy, and how this relates to income dynamics, people's mobility and poverty. Our results show that agricultural, migration and human capital assets have a differential impact across livelihood choices, and that this impact varies by gender and age. Two areas of policy concern derive from this analysis. First, migration is clearly crucial for the economic future of Albania, both in terms of financing economic development, serving as an informal safety net, and in reducing excess labor supply and poverty. The suggestion of a potential disincentive effect on labor effort and participation is however worrying, as it would have implications in terms of missed opportunities for development. Second, agriculture appears to be more of a survival strategy than part of a poverty exit strategy.

Keywords*: Migration, agriculture, labor, Albania.*

1 INTRODUCTION

A decade and a half into the socio-economic and political transition to an open, market-oriented democracy, Albania has changed dramatically. The economy has grown at an average annual rate of about 6 percent since 1993, and its structure has gradually changed as state owned agriculture and manufacturing, the pillars of the socialist economy, have given way to services and construction. GDP per capita in constant Purchasing Power Parity (PPP) dollars has doubled to US$ 4330 in just over 10 years (WDI, 2005).

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This growth was both stimulated and accompanied by profound changes in the economic structure and social fabric of the country. Despite this progress, approximately 25 percent of Albanians, and 30 percent of rural Albanians, live in poverty (WORLD BANK, 2003). Albania also remains predominantly a rural country, with 58 percent of the population still residing in rural areas (INSTAT, 2002).

Persistent poverty, poor access to basic services, dismal infrastructure, high levels of unemployment, and the large income differential with its EU neighbors fuel a steady flow of international migration, which has become the single most important political, social and economic phenomenon in post-communist Albania. Private transfers are estimated to have reached US$ 1 billion annually in 2004, constituting 14 percent of GDP. Remittances thus serve as the most important source of foreign exchange, over 1.7 times larger then the value of exports (IMF, 2005).[1]

Notwithstanding its policy relevance, the impact of the migration phenomenon on the livelihood strategies of the families that stay in Albania is an issue that has received relatively little attention.[2] We take advantage of the 2002 Albania Living Standards Measurement Study (*ALSMS*) survey[3] to identify the principal income strategies of Albanian households and investigate the role of migration, and access to migration networks, in different livelihood strategies and individual labor activity choice. In addition to migration, we also focus on the role of agricultural and livestock activities given their still predominant role in the economic strategies of the poor.

We begin by focusing on the role of agriculture and migration in household economic strategies, based on an analysis of income shares. We then posit how international migration, human capital and agricultural assets may affect labor market participation including activity choice, and use multivariate analysis to identify the determinants of participation in different labor activities.

2 THE STRUCTURE OF HOUSEHOLD INCOME IN ALBANIA

In this section, using data from the 2002 *ALSMS*, we look at the structure of household income and participation in labor activities to document the principal economic activities utilized by Albanian households. As can be seen in Table 1, while only 29 percent of total household income comes from on-farm activities,

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1 This is likely to be underestimated, since it does not account for the money not remitted from abroad but brought back by Albanians returning home, or not sent through the official banking system.

2 Exceptions include MCCARTHY et al. (2006), who focuses on agricultural production decisions and GERMENJI and SWINNEN (2004) who use an earlier data set.

3 The 2002 ALSMS was carried out by the Albania Institute of Statistics (INSTAT) with the technical assistance of the World Bank. The survey, conducted on a sample of 3599 households and based on a two-stage cluster design, is nationally representative.

62 percent of all households, urban and rural, had some on-farm income. Approximately 50 percent of income among rural households derives from agriculture, and over 90 percent of all rural households, reaching virtually 100 percent in the Mountain region, are involved in some form of on-farm activity.

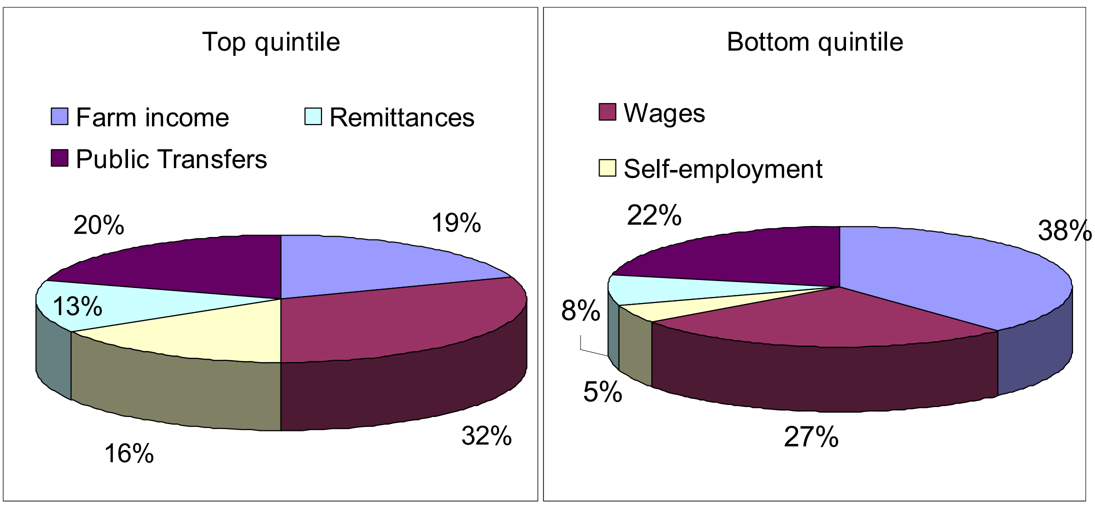
Agricultural income and activities are more important for poor households than for wealthier ones (Figures 1 and 2). On average, 38 percent of income among households in the bottom consumption quintile derives from on-farm activities, while agriculture accounts for only 19 percent of income in the top quintile. Similarly, it is indicative that 3 out of 4 households in the poorest quintile carried out on-farm activities. Surprisingly, and although the percentage is significantly lower, more than half of the top 20 percent of wealthiest households also had agricultural activities.

Table 1: Sources of income and participation rates, by regions

		Sources of income, percentages					*Participation in economic activities, shares*					
In percentages	**obs.**	**Farm.**	**Wages**	**Self-emp.**	**Remit.**	**Public Transf.**	**Farm**	**Wages**	**Self-emp.**	**Remit.**	**Public Transf**	**Poverty rate**
All	3,599	0.29	0.31	0.10	0.10	0.20	0.62	0.45	0.15	0.28	0.57	0.25
REGION	*(unw)*											
Tirana	600	0.01	0.58	0.12	0.07	0.23	0.09	0.70	0.15	0.16	0.54	0.18
Coast Urban	480	0.06	0.45	0.14	0.12	0.23	0.36	0.62	0.20	0.35	0.53	0.20
Coast Rural	520	0.49	0.20	0.05	0.12	0.14	0.91	0.31	0.10	0.30	0.49	0.21
Central Urban	479	0.04	0.39	0.16	0.10	0.31	0.16	0.58	0.23	0.32	0.64	0.19
Central Rural	520	0.48	0.18	0.08	0.11	0.15	0.98	0.30	0.13	0.31	0.57	0.29
Mountain Urban	400	0.04	0.51	0.10	0.06	0.29	0.21	0.64	0.13	0.12	0.55	0.25
Mountain Rural	600	0.56	0.16	0.02	0.06	0.20	0.99	0.28	0.03	0.15	0.74	0.50

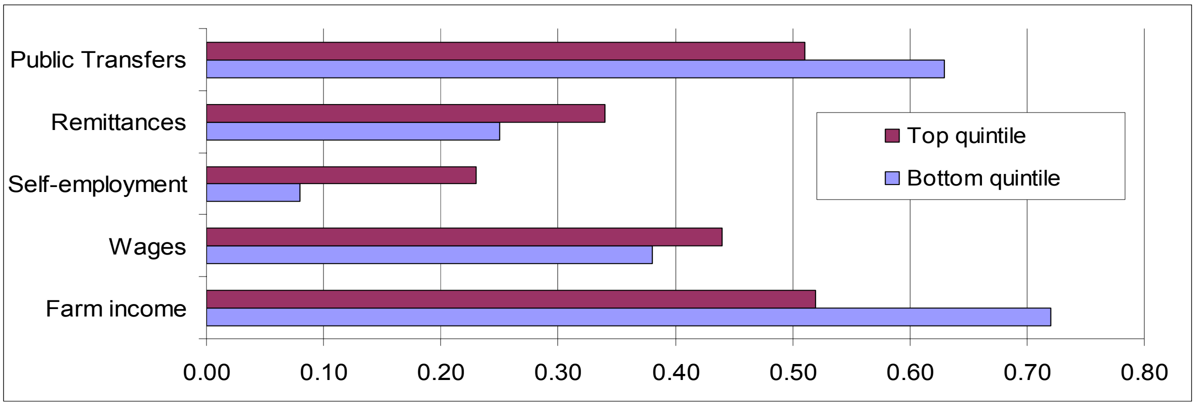
Source: Own calculations, ALSMS, 2002.

Figure 1: Income composition, top and bottom quintiles



Source: ALSMS, 2002.

Figure 2: Share of households receiving income from source, top and bottom quintiles



Source: ALSMS, 2002.

However, very few households depend on agricultural income only. Approximately 1 in 2 households in the bottom quintile also had some off farm income. Particularly prominent among the poor were public transfers; 63 percent received some kind of public transfer (primarily pensions and ndihma ekonomike[4]), comprising 22 percent of total income, while only 38 percent had off-farm wage income, and 25 percent remittances.

Private transfers are also relatively widespread. More than a quarter (28 percent) of all households reported receiving remittances in 2002, comprising 10 percent of total income[5], the bulk of these households residing in the Coastal and Central regions. This does not include income brought back from current temporary migration, which is considered part of wage income. The share of households receiving remittances increases somewhat across quintiles, ranging from 25 percent in the first quintile to 34 percent in the fifth. Greater heterogeneity is found among regions, with over 30 percent of the households in the Coastal and Central regions receiving remittances, compared to around 12-16 percent in the Mountain region and Tirana.

4 It is a cash assistance program, known as *Economic Assistance,* which is the largest component of public social assistance programmes in Albania.

5 Given the relatively high level of migration assets in Albania, these figures may seem to underestimate the incidence of remittances among families with international migrants.

Table 2: Access to international migration assets, by quintiles and regions

In percentages		Obs. (unw.)	Permanent		Temporary	
			Greece	Italy & beyond	Greece	Italy & beyond
All		3,599	13	20	13	5
Quintiles	1	720	9	11	16	4
	2	720	11	16	17	4
	3	720	13	19	13	4
	4	720	15	26	10	6
	5	719	19	27	9	7
Regions	Tirana	600	6	23	5	3
	Coast urban	480	10	25	8	7
	Coast rural	520	17	25	13	7
	Central urban	479	15	20	10	6
	Central rural	520	17	17	20	3
	Mountain urban	400	6	14	11	5
	Mountain rural	600	12	8	19	6

Source: Own calculations, ALSMS, 2002.

A high share of private transfers comes from remittances from abroad. These figures are thought to be underestimated, and the real magnitude of this phenomenon is probably much higher than what both official foreign exchange statistics as well as survey figures suggest. Access to migration assets is very important, and varies by income level and region.[6] Households in the upper quintile have two to three times the number of former household members (permanent migrants) living in Greece (9 to 20 percent) and Italy and further a field (11 to 27 percent) compared to households in the bottom quintile, as seen in Table 2.

The opposite is true for temporary migrants to Greece. Twice as many households in the first quintile had at least one current household member with experience in migrating to Greece (17 to 9 percent). Instead, both permanent and temporary migrants to Italy and beyond show increasing percentages as higher the quintile is, witnessing higher migration returns in farther countries. In terms of regions, permanent migrants to Greece are found in the Central region and the rural Coast, while permanent migrants to Italy are found predominantly among households in Tirana, the Coastal and urban Central regions. Temporary migrants to Greece are located principally in the Central and Mountain rural

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6 We characterize two types of migration assets: Temporary (adults who spent at least one month outside the household during the last 12 months) and permanent (all children of the women in a household who are still alive but are not living in the household). Elsewhere we have discussed the importance of these networks for the decision to migrate (CARLETTO et al., 2005).

areas, while temporary migrants to Italy and further a field are evenly distributed.

3 Focus on key assets: Education, land, and migration

The objective of this section is to analyze the individual labor activity decision, focusing in particular on the role of assets across different options. Our interest lies on which factors pull individuals off the farm, or conversely encourage intensification of farm activity. We focus on the three key assets available to rural Albanian households: Agricultural land, human capital (i.e. education) and migration networks.

Migration – In the framework proposed by the New Economics of Labor Migration (NELM) (STARK, 1991) migration is viewed as a mechanism the household can use to diversify economic activities in the face of risk and obtain liquidity and capital in the presence of credit and insurance market failures. In this vein, there are a number of potential avenues through which migration may have an impact on labor participation and occupational choice.

First, access to migration assets can be expected to ease the constraints in access to capital and lead to more investment and more labor being allocated to self-employment activities, including agriculture. Similarly, migration could cover other transaction costs or help hedge against risks which limit participation in wage or other riskier activities. The evidence on the effect of migration on productive investment is mixed, with some studies finding a positive impact of migration on investment in the place of origin and others finding no significant impact on productive investment[7].

It is difficult to predict the net effect of migration on household productive activities.[8] The migration of some household members may affect the time endowment of the household, leading for instance to a reallocation of family labor towards specific activities, such as working on the family farm. On the other hand, the extra-income earned by the migrant members, may also induce other members of the household to work less, as the marginal value of the additional income diminishes and they may decide to substitute work for leisure. Evidence of this is provided for instance by AZAM and GUBERT (2004) for Western Mali. Also, seasonal or potential migrants may reduce their participation in the labor force while at home (or display a preference for casual as opposed to

7 Studies finding evidence of a positive effect include LUCAS (1987) in South Africa, WOODRUFF and ZENTENO (2001) in Mexico, BLACK et al. (2003) in Ghana and KONSEIGA (2004) in Burkina Faso. Studies finding no measurable impact are MINES and DE JANVRY (1982), and TAYLOR et al. (1996) in Mexico, and DE BRAUW and ROZELLE (2003) in China.

8 See discussion in LUCAS (2006) and MCKENZIE (2005).

long term jobs) as they are waiting for their first or next migration experience. Anecdotal suggest this may be the case in Albania (CARLETTO et al., 2004).

Education – The effects of education on labor market participation and occupational choice are in principle more straightforward to predict. Regarding labor market participation the evidence is univocal in pointing to educational attainment (and human capital in general) as perhaps the single major determinant of labor market participation. PENCAVEL (1986) and KILLINGSWORTH and HECKMAN (1986) provide a review of labor supply studies for men and women respectively and give ample evidence of this proposition.

When it comes to occupational choice, the bulk of the evidence unsurprisingly points to more education being associated to white collar as opposed to blue collar jobs, and to off farm as opposed to on-farm jobs (e.g. CHRISTIADI and CUSHING, 2006; SOOPRAMANIEN and JOHNES, 2001). A study by TIEFENTHALER (1994) on the rural Philippines, however, argues that in less developed regions, and particularly for informal sector jobs, these effects may be much less significant.

Land – Ownership of land assets is, on the contrary, expected to lead to more on-farm labor participation (as for instance in MATHSE and YOUNG (2004) for Zimbabwe). At a certain level of farm size, land ownership could also be associated with more off farm activity, due to a technology effect (as e.g. in MWABU and EVANSON (1997) for Kenya). The latter effect is however unlikely in Albania, given the uniformly small land sizes resulting from land privatization.

4 MODELLING LABOR PARTICIPATION AND ACTIVITY CHOICE

In order to test these hypotheses, we first model participation in the labor force and then, for employed working-age individuals, we predict their choice of occupation. Over the past 30 years, an increasing body of literature has been focusing on estimating behavioral models in labor economics. MOFFITT (1999) provides a good review of the econometric practices in this field.

In line with this literature, we use a probit model to investigate the probability of having performed any work in the twelve months prior to the survey. The model is specified as follows:

$$W_i = \alpha + \beta_1 X + \beta_2 Z + \beta_3 HC + \beta_4 LA + \beta_5 A + \beta_6 RD + \beta_7 H + \\ + \beta_8 SA + \beta_9 M + \beta_{10} LM + \beta_{11} G + \varepsilon \qquad (1)$$

where:

- W_i is the labor participation binary dependent variable, equal to 1 if the individual has performed any work in the 12 month prior to the survey, and 0 otherwise;

- *X, Z, HC, and LA* are vectors of individual-level demographic characteristics, household-level demographic characteristics, human capital assets, and land assets, respectively;
- *A* is a vector of household non-agriculture endowments. It includes a non-agricultural household asset index Following MORRIS et al. (2000), and a dummy for whether the household has a fixed phone or not;
- *RD* refers to relative deprivation, that is, a household's wealth position relative to other households in a given geographical area – here, the village –, calculated following STARK and TAYLOR (1989).
- *H* refers to the headcount poverty index at the district level (INSTAT, 2004);
- *M* refers to migration assets, which include a dummy for previous temporary individual migration to Greece and Italy by the individual making the choice, a dummy for previous temporary migration to Greece and Italy by another member of the household, and the number of permanent migrants to Greece and Italy;
- *LM* refers to local labor market conditions. These include the structure of employment by sector (services, construction and industry, with agriculture as the default) at the village level and unemployment rates at the district level, all taken from the 2001 Census;
- *G* refers to location variables for the three major regions (Coast, Central and Mountain), further disaggregated by urban/rural, with Tirana as reference category;
- And ε is the error term.

We estimate the model separately for men and women in our sample, as Wald tests have shown that parameters statistically differ by gender.

Our second equation aims at investigating workers' occupational choice. Since BOSKIN'S (1974) seminal paper, conditional or multinomial logit (MNL) models have been standard practice for this type of analysis. A recent application to a transition economy is VERME (2004).

The occupational choice model estimated is specified as follows:

$$L_i = \alpha + \beta_1 X + \beta_2 Z + \beta_3 HC + \beta_4 LA + \beta_5 A + \beta_6 RD + \beta_7 H + \\ + \beta_8 SA + \beta_9 M + \beta_{01} LM + \beta_{11} G + \varepsilon \tag{2}$$

where:

- L_i is the employment choice dependent variable, which assumes 1 if she is a wage worker and 2 if self-employed, working on farm being the reference category;

- All other notations are as in Equation (1), with the only addition of age interaction terms in vectors *LA* and *M*.

We introduce some age interaction terms in the model in order to gauge how the impact of migration and agricultural assets vary with age. In all regressions we account for autocorrelation among observations in the same household by correcting the calculation of the standard errors[9].

5 REGRESSION RESULTS

5.1 Labor market participation: Probit model

The results of our model for the labor participation probit are reported in Table 3. The coefficients on the demographic and family characteristics return the expected results. Having more children under six years of age is associated with lower labor market participation for women but not for men. Conversely, being married makes men – but not women – more likely to participate.

It is interesting to note how the squared term on the education variable is negative for men (as expected) but positive for women, suggesting that further years of schooling have an increasingly positive effect on female labor participation. Agricultural land displays the expected positive effect on labor participation for both sexes, and in both cases with diminishing marginal "returns", as shown by the negative sign on the quadratic term. Interestingly, also relative deprivation has a positive effect. The more relatively deprived a household, the more likely that its female members will engage in some productive activity.

The effects of local labor market conditions at the district level are also interesting. As expected, higher district level unemployment rates are associated with lower participation rates for both sexes. Higher unemployment means more surplus labor and, therefore, it is more likely that individuals in these areas will be more likely to have a higher reservation wage than what they can expect to earn in the market[10].

9 The Hausman test could not reject the null hypothesis that the Independence of Irrelevant Alternatives (IIA) assumption holds; that is, that the odds of outcomes in the model do not depend on other available choices.

10 We are modelling labour participation as a choice. However, we cannot fully account for bottlenecks on the demand side, and for the fact that some of the individuals in our sample can be truly rationed on the labour market, and hence involuntarily unemployed. A similar caveat applies to the possible mismatch between supply and demand when it comes to occupational choice.

Table 3: Selected regression results. Clustered probit on labor market participation

	Male		Female	
	Coef.	Rob.	Coef.	Rob. z
Individual				
Age	0.20	13.86	0.15	13.60
Age squared	0.00	-13.29	0.00	-11.57
Years of education	0.13	4.53	0.02	0.94
Years of education squared	0.00	-2.42	0.00	3.03
Dummy: Married	0.68	6.72	0.08	1.19
Household				
# of children <6 yrs	-0.05	-1.00	-0.07	-1.97
Household size	0.01	0.13	-0.01	-0.13
Household size squared	0.00	-0.66	0.00	-0.83
Age of household head	-0.01	-0.59	0.00	-0.14
Age of household head squared	0.00	0.48	0.00	0.33
Dummy: Female headed hh	-0.43	-2.29	0.30	2.92
Dummy: Widow/er headed hh	0.35	1.88	-0.15	-1.30
Hh: Non-agriculture asset score index	-0.07	-2.50	0.03	1.65
Hh: Dummy, hh has a fixed phone line	0.10	1.42	0.13	2.31
Hh: Size (ha.) of agr land owned	0.63	4.29	0.67	5.80
Hh: Size (ha.) of agr land owned squared	-0.14	-2.97	-0.16	-4.31
Household: Relative deprivation	-0.03	-0.48	0.23	5.46
Area				
Community: Share of jobs in industry (excluded agr.)	-1.10	-1.99	-1.32	-2.95
Community: Share of jobs in constructions (excluded agr.)	0.56	0.83	-1.51	-2.96
Community: Share of jobs in services (excluded agr.)	-0.87	-2.69	-1.86	-6.98
District: Unemployment rate	-0.03	-6.15	-0.01	-3.50
District: Headcount ratio	0.01	1.92	0.02	4.57
External mig				
Individual temp mig to Greece 1997-2001	-0.54	-5.37	0.00	-0.03
Individual temp mig to Italy and other countries 97-01	-0.79	-5.86	-0.23	-0.96
Other members temp mig to Greece 1997-2001	-0.08	-0.77	-0.08	-1.20
Other members temp mig to Italy and other countries 97-01	-0.18	-1.07	-0.20	-2.00
Hh: Permanent migration. Number of children in Greece	0.05	1.27	0.03	0.93
Hh: Permanent migration. Number of children in Italy and other	-0.06	-1.53	-0.10	-3.10
Region				
Dummy: Costal urban region	0.11	1.03	0.02	0.23
Dummy: Costal rural region	-0.04	-0.19	-0.79	-4.13
Dummy: Central urban region	0.23	2.16	0.29	3.20
Dummy: Central rural region	0.34	1.45	-0.57	-2.93
Dummy: Mountain urban region	-0.55	-3.90	-0.59	-5.16
Dummy: Mountain rural region	-0.08	-0.36	-0.78	-3.99
Constant	-2.90	-5.27	-2.38	-5.38
N. observations	4,477		4,995	
Log pseudo-likelihood	-1,499		-2,576	
Chi2	1,001		1,048	
Pseudo-R2	0.34		0.21	
McFadden's Adj R2	0.33		0.20	
McKelvey and Zavoina's R2	0.50		0.38	

The composition of labor demand also has an impact, with lower labor participation in communes with lower share of non-agricultural jobs. This may reflect the buffer role agricultural employment can play and the large phenomenon of underemployment, a well known fact of Albanian agriculture. Labor force participation is also higher in poorer districts.

The effects of the migration variables are extremely interesting. In the case of previous individual temporary migration, we observe a substantial negative effect on labor participation for men. This is consistent with the wait-for-the-next-migration effect we hypothesized earlier. Elsewhere has been shown that previous migration experience is a very important determinant of temporary international migration from Albania (CARLETTO et al., 2005), supporting the view of a cyclical/seasonal process. It is therefore more than plausible that many temporary migrants are either waiting for the next episode of seasonal migration, or are planning a more permanent migration, therefore not working while in Albania. This effect does not seem to hold for women.

On the contrary, previous temporary migration to Italy by other household members as well as permanent migration to Italy are associated with a disincentive effect on female labor participation. This may be explained by a number of reasons outlined earlier: An income effect which reduces the marginal value for women of entering the labor market, or a general reallocation of time and tasks at the household level as the time endowment of the household is altered by migration. The fact that only migration to Italy appears significant may suggest the presence of an income effect via migrant remittances, as migrants to Italy tend to remit significantly larger amounts.

5.2 Occupational choice: Multinomial logit (MNL) model

The results of the occupational choice model are reported in Table 4. Labor activity choice depends on a mix of individual, household and community level characteristics. In our sample, women are much less likely than men to participate in any labor activity. Among activities, women are least likely to participate in self employment activities, followed by wage employment, then on-farm labor. That is, of all labor activities, women are most likely to be found working on the family farm.

Among working adults, having more children under six years of age is associated with men having a higher likelihood of working in agriculture as opposed to wage work, whereas the opposite is true for women. Marital status also matters, but again in quite opposite ways for the two sexes: Married men are more likely to be salaried workers than farmers, whereas married working women tend to "get stuck" on farm and are less likely to be engaged in wage employment. Working on-farm for women may be considered more compatible with rearing children.

Table 4: Selected regression results. Clustered multinomial logit

	Male -Age interaction-				Female -Age interaction-			
	Wage		Self-empl.		Wage		Self-empl.	
	Coef.	Rob.z	Coef.	Rob.z	Coef.	Rob.z	Coef.	Rob.z
Individual								
Age	0.26	5.36	0.42	6.75	0.17	2.97	0.29	2.59
Age squared	0.00	-5.29	-0.01	-6.88	0.00	-2.58	0.00	-2.66
Years of education	-0.12	-1.33	0.01	0.06	-0.35	-4.16	-0.18	-1.32
Years of education squared	0.01	2.66	0.00	0.29	0.03	6.25	0.02	2.53
Dummy: Married	0.57	1.84	0.08	0.23	-0.87	-2.85	-0.35	-0.88
Household								
# of children <6 yrs	-0.26	-2.63	-0.07	-0.54	0.09	0.57	0.01	0.02
Household size	0.03	0.22	0.12	0.63	0.19	0.91	0.11	0.41
Household size squared	0.01	0.75	0.00	0.27	-0.01	-0.75	0.01	0.75
Age of household head	-0.04	-1.06	0.00	0.05	0.08	1.48	0.09	1.29
Age of household head squared	0.00	0.70	0.00	-0.31	0.00	-1.26	0.00	-1.40
Dummy: Female headed hh	0.89	1.54	0.56	0.88	0.99	2.28	0.76	1.35
Dummy: Widow/er headed hh	-0.39	-0.73	-0.39	-0.68	-1.09	-2.05	-0.03	-0.05
Hh: Non-agriculture asset score index	-0.03	-0.49	0.34	4.18	0.07	0.80	0.35	2.91
Hh: Dummy, hh has a fixed phone line	0.02	0.05	0.35	0.85	0.63	1.72	0.83	2.04
Hh: Size (ha.) of agr land owned	-1.53	-3.69	-1.08	-1.83	-3.48	-5.80	-0.89	-1.36
Hh: Size (ha.) of agr land owned squared	0.35	4.07	0.26	2.94	0.41	3.36	0.37	3.58
Hh: Size (ha.) of agr land owned*age	-0.01	-0.79	0.00	-0.38	0.03	2.78	-0.01	-0.88
Household: relative deprivation	-3.09	-10.88	-3.71	-10.63	-1.92	-7.48	-2.86	-6.72
Area								
Community: Share of jobs in industry (excluded agriculture)	14.78	5.33	13.43	4.54	5.14	2.30	3.55	1.26
Community: Share of jobs in constructions (excluded agriculture)	5.37	2.29	4.26	1.66	-0.53	-0.23	3.21	0.94
Community: Share of jobs in services (excluded agriculture)	8.12	7.57	8.61	7.14	6.07	5.84	4.72	3.16
District: Unemployment rate	0.01	0.79	-0.02	-1.19	0.03	2.35	-0.01	-0.29
District: Headcount ratio	0.02	1.42	0.02	1.04	-0.04	-2.47	-0.07	-2.94
External mig								
Individual temp mig in 1997-2001	0.75	0.73	1.86	1.76	3.60	2.22	4.23	2.38
Individual temp mig in 1997-2001*age	-0.04	-1.36	-0.07	-2.21	-0.09	-2.83	-0.09	-2.28
Other members temp mig to Greece 1997-2001	-0.07	-0.21	0.38	0.98	0.45	1.58	-0.27	-0.70
Other members temp mig to Italy and other countries 1997-2001	0.20	0.48	0.26	0.53	-0.14	-0.33	-0.28	-0.54
Hh: Permanent migration. Number of children in Greece	0.04	0.11	0.59	1.19	-0.05	-0.14	-0.29	-0.48
Hh: Permanent migration. Number of children in Greece*age	0.00	0.04	-0.01	-0.91	0.00	0.43	0.01	0.53
Hh: Permanent migration. Number of children in Italy/other	0.35	1.13	-0.04	-0.08	-0.30	-0.76	-2.08	-2.66
Hh: Permanent migration. Number of children in Italy/other*age	0.00	-0.61	0.01	0.55	0.01	1.51	0.04	2.58
Region								
Dummy: Costal urban region	1.66	1.62	2.34	2.26	-0.47	-0.39	0.77	0.62
Dummy: Costal rural region	0.97	1.02	1.30	1.27	-1.86	-1.48	-1.31	-0.89
Dummy: Central urban region	1.54	1.18	2.51	1.90	0.26	0.21	1.05	0.80
Dummy: Central rural region	0.49	0.52	1.21	1.18	-2.29	-1.83	-1.32	-0.90
Dummy: Mountain urban region	-1.08	-0.98	-0.89	-0.79	-0.96	-0.76	-0.45	-0.33
Dummy: Mountain rural region	-0.16	-0.17	0.02	0.02	-2.49	-1.97	-1.84	-1.28
Constant	-5.51	-3.46	-12.19	-5.35	-4.13	-2.13	-8.02	-2.73
N. observations	3,557				3,204			
Log pseudo-likelihood	-1,790				-935			
Chi2	606				771			
Pseudo-R2	0.48				0.66			
McFadden's Adj R2	0.46				0.63			

The impact of assets varies across labor activities. Human capital assets are proxied through individual level of education. As expected, for women education has a strong and increasingly positive impact on the probability of being in wage employment as opposed to farming. This reinforces the positive and increasing effect observed in the participation model. The negative relationship between education and on-farm activity for men kicks in at levels of education higher than primary.

Agricultural assets – measured by the size of agricultural landholding – is associated, as expected, with a higher probability of participation in on-farm labor activities, though this decreases with land size. Some evidence of a reverse effect is found for land and age in the female model: For a given amount of land, the older the individual the lower the relative odds she will work in wage activities. Non-agricultural assets, on the other hand, increase the probability of being self-employed compared to working on-farm.

The composition of labor demand at the community level also affects labor participation. A higher share of non agricultural employment in the community – services, industry and construction – is associated with a lower probability of participating in on-farm activities. The district unemployment rate, significant and negative in the participation model, does not seem to have a large impact on occupational choice. However, it does increase the likelihood of having women employed as wage earners.

Migration assets, which appear to be largely substitutes, not complements, for labor activities, also affect occupational choice. For both men and women, individual temporary migration leads towards more self-employment, particularly for younger individuals, and for women, this previous migration experience leads to a higher likelihood of working in wage labor as well. In both cases, the relative odds for female participation given previous migration experience are significantly greater then for male participation. This differential effect may not be due only to the individual history of migration per se, but to some unobservable characteristic of the household or individual which is linked to both migration and labor force participation. In the model of female occupational choice, however, we also find evidence that permanent migration to Italy reduces the relative probability of being self-employed, and that this effect increases with age.

6 CONCLUSIONS

Farming is still key to the livelihoods of many Albanian households which remain heavily dependent on low-productivity agriculture. An important share of household income – as well as home-produced food consumption – comes from the small farm sector. A majority of Albania's economically active population continues to work in agriculture, despite the decreasing importance of agricultural in the national economy over time. Very few farmer households – less than a third – market production, implying that for the majority of farming households cash income derives from public and private transfers, or from diversified income strategies.

Migration is used as a mechanism to diversify economic activities in the face of risk and obtain liquidity and capital in the presence of credit and insurance market failures. While we are unable to detangle the direction of causality between migration and poverty, access to migration assets appear to play a particularly important role for households with lower levels of human capital.

While low levels of assets limit successful livelihood strategies, the multivariate analysis shows that access to household and individual level assets condition individual labor participation and labor activity choices. We find that agricultural, migration and human capital assets have a differential impact across livelihood choices, and that this impact varies by gender and age. We also find some migration assets to reduce the relative odds of choosing any labor activity. For men the disincentive to labor participation is due to returned migrants likely to be in Albania planning a future migration episode; for women it is linked to an income effect – via remittances – and/or a reallocation of time and occupations at the household level.

Migration assets also appear to have an impact on occupational choice. For both males and females (and more so for the younger ones), previous individual migration experiences make people more likely to work off-farm, particularly as self-employed. This is consistent with the story of return of temporary migrants being able to start up their own business thanks to the saving accumulated when working abroad. However, labor choice is not the same as investment, and thus further research is warranted to shed light on this issue.

Two areas of policy concern derive from this analysis of household and individual economic strategies in Albania. First, migration is clearly crucial for the economic future of Albania, both in terms of financing economic development, serving as an informal safety net, and in reducing excess labor supply and poverty. The suggestion of a potential disincentive effect on labor effort and participation is however worrying, as it would have implications in terms of missed opportunities for development. More research is needed to shed light on this issue.

Second, agriculture appears to be more of a survival strategy than part of a poverty exit strategy. Agricultural activities are too atomized, and largely subsistence oriented, with the possible exception of the more fertile coastal plains where a greater commercial orientation emerges. Education may play a role in encouraging diversification out of agriculture, and in Albania this means promoting a relatively higher level of education, beyond the high school level.

One implication is that agriculture and migration are not necessarily substitutes. They may be complements, if engaging in some kinds of business at home requires dealing with risk or liquidity constraints in a way that migration can cater for. As the economy grows and modernizes, it is easy to forecast a substantial reduction in the share of agricultural employment in the future. It is also likely that the patterns and roles of migration will keep evolving as the push and pull factors driving migration change – wage differentials with neighbouring economies; employment opportunities at home. A better understanding of what this means for household livelihood strategies is crucial for designing policies that are more effective in stimulating growth and reducing poverty and social exclusion.

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RURAL NON-FARM EMPLOYMENT IN UKRAINE

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ABSTRACT

Developing rural non-farm employment opportunities is widely recognized as being important for economic growth and rural employment, and as a sustainable livelihood strategy for rural populations. However, this issue, as yet, has not been analyzed properly in the Ukrainian context. This paper combines two complementary data sets on rural households and their members from the State Statistic Committee of Ukraine 2004 household survey to present a profile of rural non-farm employment in Ukraine. Also, we empirically investigate the factors enhancing or impeding access to non-farm rural employment and income diversification for Ukraine's rural population, as well as its (nonagricultural sector) importance for the agricultural sector's growth. The evidence suggests that, despite substantial heterogeneity of the nonagricultural sector, gender, education, access to infrastructure and land are important factors influencing access to rural non-farm employment, as well as rural non-farm incomes.

Keywords: *Non-farm employment, Ukraine, economic growth, income diversification.*

1 INTRODUCTION

Rural non-farm employment (RNFE) development is widely recognized to be a pillar of rural development policy and, from a long-term perspective, a critical factor for providing rural employment and income.

Rural development policy is a complex issue, but is basically about two things: Delivering public services in rural areas, in particular physical and social

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infrastructure, and supporting economic development in rural areas (KUHN and DEMYANENKO, 2004). In the latter context, non-farm employment, in addition to agriculture, offers an important source of rural employment and opportunity to raise rural incomes, and hence living standards in rural Ukraine.

RNFE as defined in this paper includes all economic activities associated with work, either waged or self-employed, located in rural areas, except agriculture, hunting, and fishing (LANJOUW and LANJOUW, 1997). These might be derived from agriculture and natural resource use via upstream or downstream linkages. Other activities are similar to those in urban areas, in particular manufacturing, services and commerce.

Why is RNFE worth particular attention? In general, according to BERDEGUE et al. (2000), RNFE might serve as a partial solution to three major problems in rural areas.

First, RNFE can contribute to a sustainable livelihood strategy for the rural population. This means that the existence of assets (human or capital) in rural households related to RNFE strengthens their livelihood position. This is important for rural areas, but especially for agriculture, since one of the most challenging adjustments facing agriculture in Ukraine today is the need to reduce hidden unemployment and movement to more manageable and efficient capital/labor ratios. RNFE is desperately needed to provide alternatives to agricultural employment in rural areas and to "draw" excess labor out of farming.

Second, modern and efficient agriculture is intensive in terms of inputs, services and commercial linkages. If Ukrainian agriculture is to be transformed and competitive, it will require improved linkages with input supply systems, agricultural processing chains, and systems for distributing fresh and processed products. Modern agriculture requires cooperation with the agro-industry in order to successfully meet the demanding quality and safety norms and standards of international markets. It also requires access to management, administrative and advisory services. All of these involve RNFE, in both the secondary (processing, agro-industry, etc.) and the tertiary sectors (technical, commercial and transportation services).

Third, RNFE can contribute to the "urbanization" of Ukrainian rural areas, which have traditionally been associated with underdevelopment and backwardness. A major share of the young rural generation strives to migrate to urban areas in pursuit of a "better life" in the form of better facilities, social and physical infrastructure, etc. RNFE opportunities might offer options for labor or professional development which are more attractive than agricultural work to some. Rural spaces exhibiting an increase in RNFE have changed the characteristics of the rural environment. Non-agricultural trade, transportation systems, and a wide range of services oriented to production, consumption and recreational needs significantly strengthen ties between towns and their hinterlands. Ultimately, this offers rural inhabitants not only better economic opportunities, but also narrows the quality gap between urban and rural lives (BERDEGUE et al., 2000).

This paper consists of four parts. The first part explains the RFNE situation and policies abroad. Then, using Ukrainian household survey data, we provide a profile of RNFE in Ukraine and an empirical analysis of the access of rural household members in Ukraine to RNFE opportunities. Finally, suggestions for promoting RNFE in Ukraine conclude the paper.

2 LESSONS LEARNED ABOUT RNFE ABROAD

BRIGHT et al., (2000) review the voluminous literature on RNFE in both developing and developed countries and make the following generalizations: Rural households in developing countries typically receive 30-35 % of their total rural income from off-farm sources; numerous studies demonstrate that there is a positive correlation of RNFE activities with: i) higher income levels of rural families; ii) higher potential for diversification of income sources; iii) higher productivity in agricultural activities.

Other studies on RNFE have shown a positive correlation between a higher diversification of non-farm activities, income and: i) educational level; ii) quality and access to infrastructure or services; iii) quality, objectives and organization of services; iv) opportunities created through local, regional and national government policies; v) access to credit and financial services. Studies on RNFE in developing countries suggest the following policies for sector promotion: Increase asset holdings of the rural community (in terms of education and infrastructure); remove land market constraints and improve access to credit for non-farm activities (BRIGHT et al., 2000).

Experience with RNFE in developed countries is also relevant to Ukraine. Rural employment growth in the EU is driven by both endogenous and exogenous factors. Endogenous factors include local impulses and local resources, while exogenous factors externally determine the transplantation of employment into the region. EU policy experience shows that a multi-sectoral, bottom-up approach must be taken regarding rural employment promotion, rather than concentrating on just one sector, be it agriculture, agro-food or tourism (VON MEYER et al., 2000). Other policy lessons from the EU are that infrastructure should be improved to make rural areas attractive to business and for living. Governments should try to improve the general conditions in rural areas and not target particular enterprises. Resources should be directed not to regions with potential for growth due to their location, comparative advantage, or other reasons, but to those which suffer from poor physical infrastructure, a poorly-trained labor force or lack of processing and marketing facilities (BRIGHT et al., 2000).

BERDEGUE et al. (2000) draw very similar conclusions from their review of RNFE literature for Latin America: i) RNFE is strongly concentrated in areas characterized by dynamic and prosperous agriculture; poor or depressed agricultural areas have access to RNFE as well, but however, in absolute terms; ii) poor households depend to a higher degree on RNFE, but the level of this type of income is very low in absolute terms, while households with higher agricultural incomes tend to have higher levels of non-farm incomes; iii) the conventional view is that households with greater levels of access to land have less access to RNFE; iv) educational level is a powerful determining factor in access to RNFE; v) RNFE arises as a consequence of prior investment in infrastructure (roads, electrification, etc.); vi) gender has a significant influence in determining access to RNFE (BERDEGUE et al., 2000).

3 NON-FARM EMPLOYMENT IN RURAL UKRAINE

3.1 The profile of non-farm employment in rural Ukraine

In 2004 almost one-third (15.5 m) of Ukraine's population (total 47.4 m) lived in rural areas. While agricultural production constitutes the backbone of the rural population, the non-farm sector and income are increasingly significant as well. As Table 1 indicates, a significant share of the rural population is employed in agriculture (about 10 %), but approximately the same share is employed in non-farm sectors (education, healthcare, mining industry, etc.). On the other hand, approximately 71 % of the rural population is non-employed. This number includes those seeking work but who are unable to find it (unemployed), pensioners, pupils, students, etc. However, one should take into account the specifics of rural life in Ukraine. Most rural households, including those involved in non-farm sectors, tend to spend a considerable amount of time on subsistence or subsidiary farming as well. For example, rural households produce about two-thirds of Ukraine's total raw milk production. Moreover, according to official statistics, households produce about 60 % of the gross agricultural produce of Ukraine.

The RNFE profile is approximately the same across all regions. The most important sectors, in terms of rural employment, are the food processing industry, wholesale and retail trade, transport, and education. The relative importance of employment in agriculture largely reflects the degree of regional agriculture specialization. For example, in the leading southern and eastern regions, higher percentages of the rural population are employed in agriculture than in other regions.

The fact that almost the whole Ukrainian rural population formally or informally works in agriculture represents an important challenge for rural development policy. Ukrainian agriculture has been in a process of restructuring over the last 15 years. Based on its natural endowments (climate, soils, geographical location) and given an adequate agriculture policy, Ukrainian agriculture can be expected to gradually restructure towards an internationally-competitive and efficient sector. However, technical progress will release labor from agriculture, as illustrated in

Table 2, which documents the steady and ongoing decline in the number and share of agricultural employment in counties such as Germany, France, and the USA.

Table 1: Sectoral profile of Ukrainian rural employment, primary occupation, 2004, %

	Branch of activity	Ukraine	West[1]	North	Center	South	East
Employed	Agriculture	9.27	4.76	11.09	9.92	13.58	10.48
	Fishery	0.11	0.09	*	0.03	0.16	0.23
	Mining industry	0.50	0.38	0.25	0.40	*	1.82
	Processing industry	2.12	2.63	2.46	2.07	0.83	2.05
	Electricity, gas, and water supply	0.61	0.71	0.86	0.58	0.42	0.89
	Construction	1.55	1.68	1.28	0.99	2.56	1.29
	Wholesale and retail	1.95	1.74	2.43	1.65	1.56	2.65
	Hotels	0.25	0.39	*	0.33	0.29	0.18
	Transport and communication	1.60	1.11	2.64	1.84	1.67	1.52
	Finance	0.13	0.12	0.15	0.04	0.25	0.15
	Real Estate	0.04	0.05	*	0.10	0.03	0.07
	State government	2.07	2.56	1.91	2.53	1.71	1.79
	Education	3.83	4.05	3.59	3.35	4.29	3.22
	Healthcare	2.05	1.96	3.17	2.08	1.85	1.73
	Public services	0.45	0.55	0.29	0.37	0.86	0.13
	Servants	0.01	0.03	*	*	*	*
Non-employed (pensioners, pupils, students, unemployed, children, etc.)		73.43	77.07	69.85	73.71	69.94	71.76

Source: Own calculation based on household survey conducted by the Derzhkomstat in 2004.

Notes: [1] West: Transkarpathian, Lviv, Volyn, Ivano-Frankivsk, Ternopil, Rivne, Khmelnitsky, Chernivtsi oblasts; North: Zhytomyr, Kyiv, Chernigiv, Sumy oblasts; Center: Vinnytsya, Cherkasy, Poltava, Kirovograd oblasts; East: Kharkiv, Dnipropetrovsk, Zaporizhzhya, Donetsk, Lugansk oblasts; South: Odesa, Mykolaiv, Kherson oblasts and Crimea Autonomy.

* – No records.

Increasing rural unemployment, unless new jobs are created, implies significant social and economic problems for the government: Increased rural-urban migration creates more stress on urban areas, increased rural poverty, reduced local tax bases, etc. RNFE opportunities can reduce these personal and public costs (JOHNSON, 2005).

Entrepreneurship is the basis for much economic development, and in most countries, farmers and other rural residents have been among the most entrepreneurial segments. It is widely agreed that entrepreneurship is essential to the development of the Ukrainian economy, and particularly in rural areas (AKIMOVA et al., 2003).

Table 2: Farm employment in selected OECD countries and Ukraine

		1960	1970	1980	1990	2000	2010*
Australia	Farm employment, m persons	1.2	1.0	0.9	0.9	0.9	0.8
	% of total economic employment	27.8	18.6	14.2	11.1	9.0	7.6
Canada	Farm employment, m persons	2.5	1.8	1.8	1.0	0.8	0.6
	% of total economic employment	38.0	20.6	14.5	6.9	4.7	3.4
France	Farm employment, m persons	10.1	6.9	4.4	3.1	2.0	1.3
	% of total economic employment	51.1	32.0	18.7	12.6	7.4	4.6
Germany	Farm employment, m persons	10.9	6.8	5.4	3.2	2.1	1.3
	% of total economic employment	31.1	19.1	14.5	7.9	5.1	3.3
New Zealand	Farm employment, m persons	0.3	0.3	0.3	0.3	0.3	0.3
	% of total economic employment	38.6	29.7	25.8	21.0	17.6	15.3
Ukraine	Farm employment, m persons	–	–	–		7.9	5.3
	% of total economic employment	–	–	–		31.2	21.4
USA	Farm employment, m persons	13.1	9.6	8.5	7.7	6.3	5.2
	% of total economic employment	17.3	10.7	7.6	5.9	4.3	3.2

Source: Faostat, State Committee of Statistics of Ukraine.

Note: * Projections.

If we look at the profile of employment in Ukrainian rural areas, we notice that entrepreneurs and self-employed persons constitute only a small fraction of the total rural population, with almost negligible differences across the regions (see Table 3). The Ukrainian rural self-employed population is primarily engaged in agriculture, construction, processing and wholesale and retail activities (Table 4). Nevertheless, hired workers constitute the bulk of the employed rural population.

Table 3: Profile of Ukrainian rural employment by type, 2004, %

Type of Employment	Ukraine	West[1]	North	Center	South	East
Hired persons	26.44	22.78	30.14	25.99	30.02	28.19
Entrepreneurs (with hired persons)	0.16	0.14	*	0.41	0.09	0.03
Self-employed (w/o hired persons)	2.35	4.37	0.54	1.31	2.12	1.13
Subsistence and subsidiary farming	0.07	0.05	0.24	0.05	0.09	*
Non-employed (pensioners, pupils, students, unemployed, children etc.)	70.96	72.64	70.82	72.24	67.65	70.66

Source: Own calculation based on household survey conducted by the Derzhkomstat in 2004.

Notes: [1] West: Transkarpathian, Lviv, Volyn, Ivano-Frankivsk, Ternopil, Rivne, Khmelnitsky, Chernivtsi oblasts; North: Zhytomyr, Kyiv, Chernigiv, Sumy oblasts; Center: Vinnytsya, Cherkasy, Poltava, Kirovograd oblasts; East: Kharkiv, Dnipropetrovsk, Zaporizhzhya, Donetsk, Lugansk oblasts; South: Odesa, Mykolaiv, Kherson oblasts and Crimea Autonomy.

* No records.

As Table 5 shows, almost half of the total public expenditures earmarked for agriculture and rural development in Ukraine in 2006 are enterprise-targeted, or directly aimed at production. Such expenditures, as EU experience has shown, might increase agricultural output, but not agricultural competitiveness. Rural development measures (social and physical infrastructure, gasification, etc.) receive only about 15 % of planned spending. Moreover, these expenditures were largely neglected over the last several years, receiving only a tiny fraction of the total agricultural budget (KUHN and DEMYANENKO, 2004). It would be more efficient to reallocate budget funds toward Green box measures (according to WTO classification[1]), and within the Green box towards rural development measures, thus making agriculture more competitive and rural areas more attractive for the private sector. (DEMYANENKO and GALUSHKO, 2004).

Table 4: Sectoral profile of Ukrainian rural self-employment, 2004, %

	Branch of activity	Ukraine	West[1]	North	Center	South	East
Self-employed	Agriculture	0.62	0.61	0.04	0.35	1.26	0.81
	Fishery	0.01	*	*	0.06	**	*
	Mining industry	0.01	*	*	*	0.09	*
	Processing industry	0.18	0.47	*	0.03	*	*
	Construction	0.89	2.34	*	0.35	0.16	0.04
	Whole- and retail sale	0.59	0.88	0.50	0.41	0.59	0.21
	Hotels	0.01	*	*	*	0.06	*
	Transport and communication	0.07	0.15	*	0.04	*	0.04
	Real estate	0.02	0.07	*	0.08	*	*
	Education	0.008	0.02	*	*	*	*
	Healthcare	0.01	0.02	*	*	*	*
	Public services	0.08	0.19	*	0.09	*	*
	Servants	0.006	0.01	*	*	*	*
Others		97.49	95.21	99.45	98.53	97.81	98.90

Source: Own calculation based on household survey conducted by the Derzhkomstat in 2004.

Notes: [1] West: Transkarpathian, Lviv, Volyn, Ivano-Frankivsk, Ternopil, Rivne, Khmelnitsky, Chernivtsi oblasts; North: Zhytomyr, Kyiv, Chernigiv, Sumy oblasts; Center: Vinnytsya, Cherkasy, Poltava, Kirovograd oblasts; East: Kharkiv, Dnipropetrovsk, Zaporizhzhya, Donetsk, Lugansk oblasts; South: Odesa, Mykolaiv, Kherson oblasts and Crimea Autonomy.

* No records.

[1] According to WTO classification, farm support is divided into two broad categories: support exempted from reduction commitments (Green box measures) and support that is subject to reduction (Amber box measures).

Table 5: Public expenditures on agriculture and rural development, 2006

State support measures	b UAH	%
Amber box measures	4.6	45.8
Green box measures:	5.4	54.3
Administrative expenditures	0.7	6.9
Inspection services, pest and disease control	0.2	2.0
Rural development	1.5	14.9
Selection	0.2	2.4
R&D, education	1.4	13.7
Land reform and environmental protection	0.6	6.2

Source: Draft Law "On State Budget 2006", second reading.

3.2 The determinants of Ukrainian RNFE

To cast light on the determinants of access to RNFE in Ukraine, an econometric analysis is carried out using over 9,000 rural households and their members from the State Statistic Committee 2003 household survey. Since no similar analysis on Ukraine is as yet available, we mainly rely on RNFE studies from abroad in determining factors that might influence the probability of RNFE access. The dependent variable is a qualitative (dummy) variable that takes the value of one if a member of the household is primarily employed in the rural non-farm sector, and zero otherwise[2]. As Section 2 has shown, a broad set of demographic characteristics of the household and its members might influence access to RNFE. Level of education, gender, and age play a significant role (BERDEGUE et al., 2000; BRIGHT et al., 2000; FERREIRA and LANJOUW, 2001; GORDON and CRAIG, 2001). Specifically, level of education is expected to have a positive effect on RNFE access. Women are expected to have less access to RNFE. The impact of age is often found to be nonlinear, increasing the probability of RNFE up to some point and decreasing it thereafter (FERREIRA and LANJOUW, 2001). Locational factors also proved to determine access to RNFE (ISGUT, 2004). Since our data does include information on the distance of households from small towns or cities, we can only consider a very broad geographical factor (e.g. Eastern or Western regions of Ukraine) as an explanatory variable. Such a practice is common (e.g. FERREIRA and LANJOUW, 2001) and the information on the profile of RNFE in Ukraine presented in Section 3.1 also leads us to this decision. Availability of land might also have an impact. As BERDEGUE et al. (2000) mention, "the conventional view is that households with greater levels of access to land have less access to RNFE". Also, this might be highly relevant for Ukraine since the bulk of rural households tends to spend a considerable amount of time on subsistence or subsidiary farming as well (see Section 3.1). It is also conventional to consider household size and number of

[2] Note that we considered only employed rural population.

children as explanatory variables (e.g. FERREIRA and LANJOUW, 2001; BUCHENRIEDER, 2003).

The marginal effects or elasticity indicate the strength of the correlation between the probability of RNFE and a respective explanatory variable[3], holding all other explanatory variables at their means.

The results in Table 6 illustrate that Ukrainian men, as expected, are more likely to be engaged in the non-farm sector than women, controlling for all other variables. Being a man increases the probability of RNFE by almost 19 %, implying that more attention should be paid to rural women in order to facilitate their access to RNFE. Interestingly, the probability of RNFE declines with age, down to a turning point of around 45 years (at 2.0 % per each additional year) and then increases. This result is opposite to what, for example, FERREIRA and LANJOUW (2001) find. This implies a lack of (need for) programs, such as micro-financing, that would especially support young rural inhabitants. As expected, the more land that a household owns, the lower the probability of RNFE, but up to 45.45 ha per household member (at .06 % per each additional .01 ha), and afterwards it increases. Probably removing some land market constraints in Ukraine (e.g. a moratorium on the sale and purchase of agricultural land) would allow a greater consolidation of land (more than 45 ha per member), thus increasing access to RNFE. Controlling for other characteristics, the probability of RNFE does not appear to be associated with household size, while the number of children in the household negatively influences RNFE probability (i.e., every additional child decreases the probability of RNFE by approximately 6.2 %). Geographical location seems to influence the probability of non-farm participation, in particular living in the Western region increases the probability of RNFE by 31.5 % and only by 9.8 % in the northern region. This might be explained by western oblasts traditionally being less agriculturally-specialized than, for example, eastern or southern oblasts. The influence of education levels on the probability of non-farm labor participation has some peculiarities. Graduation from high and secondary school has a negative impact (decreases the probability of RNFE by 14 % and 38 %, respectively), whereas higher education has a positive impact (increases probability by 11 %). This result may be related to the fact that graduation from high and secondary school does not bestow a qualification, whereas graduation from higher education establishments provides such a qualification, making the individual more flexible on the labor market. However, technical (secondary) education (which also provides a qualification) does not have a significant influence on RNFE, controlling for all other variables.

[3] Table 7 in the appendix presents information on the exact definitions and descriptive statistic of the variables used in this analysis.

Table 6: Probit estimates of RNFE

Variable	dF/dx (elasticity)	Coefficients	p-value
Male*	.1898666	.5144023	0.000
Age***	-.0200476	-.0543145	0.057
Age squared***	.0002235	.0006054	0.090
Higher education*	.1139984	.3856681	0.008
High school education*	-.1423096	-.3905377	0.000
Primary education	.2511969	.9079051	0.104
Secondary education*	-.3816893	-.9966030	0.000
Technical (secondary) school	.0489094	.1338975	0.145
Number of children in household*	-.0619971	-.1679677	0.004
Household size	.0039011	.0105693	0.788
Land owned per capita*	-.0006891	-.0018671	0.000
Land owned per capita squared*	7.58E-08	2.05E-07	0.000
North Region**	.0985969	1.124556	0.047
South Region	.0664452	1.029380	0.167
West Region*	.3152760	1.781260	0.000
East Region	.0789343	1.065700	0.107
Number of observations	1332	Prob > chi2	0.0000
Log likelihood	-699.8044	Pseudo R2	0.2056
LR chi2(16)	362.28		

Source: Authors' estimates based on household survey conducted by the Derzhkomstat in 2003.
Notes: *, **, *** Statistical significance at 1 %, 5 %, and 10 % levels, respectively.

4 CONCLUSIONS AND SUGGESTIONS FOR POLICIES TO PROMOTE RFNE IN UKRAINE

Promoting RNFE is very difficult and not the responsibility of one ministry or one organization (e.g. any state or private organization responsible for a particular activity, be it road building, gasification, construction) but rather of the whole government, and requires coordination among different organizations and ministries. This task is likely to be easier at the local level, in the context of decentralization, than at the national level. Since the rural non-farm sector is heterogeneous, blanket policy recommendations are inappropriate. Bearing all this in mind and based on worldwide experience, however, some conclusions can be made. Below we present such conclusions for RNFE development in Ukraine.

The role of policies targeted at rural areas is widely recognized as providing incentives that stimulate RNFE participation, as well as households' capacity to respond to such incentives. For example, micro-financing can improve access to financial resources for the rural population: These might include micro-loans for non-farm investments or micro-insurance services to improve risk management strategies. Currently in Ukraine, micro-loans are mostly neglected, since state loan program funds are targeted towards agriculture (i.e., the partial interest rate compensation program). Hence, if the credit policy is widened to include the non-farm sector, it is particularly likely to benefit local non-farm self-employment initiatives. Secure ownership and usage rights of natural resources, particularly land, would provide the capacity to respond to incentives granted by micro-financing opportunities. Hence, allowing land sale and purchase in Ukraine would make it possible to use land titles as collateral and improve natural resource allocation, thereby increasing RNFE opportunities.

If state support to agriculture were located in the wider context of rural development, shifting it from so-called coupled support (or, according to WTO classification, Amber box measures) towards de-coupled support (Green box measures), would lead to more efficient public fund allocation, thus making agriculture more competitive and rural areas more attractive for the private sector. The competitiveness of the agricultural sector cannot be increased without the development of the industrial, commercial and service sectors that characterize modern agriculture. Technology promotion policies, human capacity building, increasing the attractiveness of rural areas to the private sector (roads, electrification, telecommunication, etc.) are not neutral in this regard. Voluminous empirical evidence shows a positive effect of education and infrastructure on RNFE opportunities.

Ukraine has no public institution responsible for RNFE. The ministries of industrial policy, health, and education are clearly urban-oriented, whereas the ministry of agriculture rarely looks beyond agricultural production. If such a public institution were established, the design and implementation of rural development (including RNFE) policy would be much more effective. The EU's experience in this regard might be helpful.

Empirical evidence proves gender to be an important factor that determines RNFE access. In Ukraine, women generally have less access to RNFE. Thus, RNFE policies that support rural women must pay greater attention to facilitating their access to RNFE.

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APPENDIX

Table 7: Variable definitions and summary statistics

Variable	Definition	Mean	Std. Dev.	Min	Max.
Male	1 if female, 2 if male	1.47	0.49	1	2
Age	Age of a household member, in years	39.70	10.17	17	72
Age squared	Age of a household member squared, in years	1678.60	819.47	289	5184
Higher education	1 if a member has a higher education, 0 otherwise	0.14	0.35	0	1
High school education	1 if a member has a high school education, 0 otherwise	0.55	0.49	0	1
Primary education	1 if a member has a primary education, 0 otherwise	0.005	0.07	0	1
Secondary education	1 if a member has a secondary education, 0 otherwise	0.09	0.29	0	1
Technical (secondary) school	1 if a member has a technical (secondary) education, 0 otherwise	0.32	0.47	0	1
Number of children in household	Number of children in household	1.02	0.96	0	8
Household size	Number of household members	3.81	1.42	1	10
Land owned per capita	Quantity of land owned by household per household member, in 0.01 ha	115.38	406.67	0	9008
Land owned per capita squared	Squared quantity of land owned by household per member	1.78e+05	3.15e+06	0	8.1e+07
Northern region	1 if household located in north region, 0 otherwise	0.15	0.36		
Southern region	1 if household located in south region, 0 otherwise	0.19	0.39		
Western region	1 if household located in west region, 0 otherwise	0.35	0.48		
Eastern region	1 if household located in east region, 0 otherwise	0.18	0.38		

Source: Authors' estimates based on household survey conducted by the Derzhkomstat in 2003.

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OPPORTUNITIES AND CHALLENGES FOR FARM HOUSEHOLD LIVELIHOOD STRATEGIES: PLURIACTIVITY IN FINLAND AND THE UK

*CLAIRE NEWTON**

ABSTRACT

In a post-productivist era, some farms may find it easier than others to devise new initiatives and enterprises for income generation. Many monoactive farm households may wish to continue as they have done in the past. This study investigated a variety of livelihood strategies of pluriactive farm households in both Finland and the UK. Some households were more entrepreneurial than others; the age and personality of members influenced livelihood decisions. Household activities remained restricted by access to assets and the opportunities these provided. Benefits and disadvantages of farm pluriactivity are discussed. Finnish farms have long been pluriactive, so a comparison provides useful information to help farm families choose more sustainable livelihoods, and should therefore be considered by those providing training and advice to farm households.

Keywords: *EU rural development policy, pluriactive livelihood strategies, entrepreneurial skills, capital assets, Finland, UK.*

1 INTRODUCTION

This study looked at recent trends in farming in both the UK and Finland, focusing on strategies employed by farm households and how these households might cope with Common Agricultural Policy (CAP) reform. While it was previously common in the UK for some farm incomes to be earned solely from agriculture, a post-productivist era where direct payments are reduced may encourage farm households to increasingly consider the opportunities (and the challenges to be overcome) of pluriactivity (defined later). A comparison is made with Finland, where additional farm income sources have long been an economic necessity.

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A variety of methodologies were used in a case study approach. Focused interviews enabled direct contact with household members, to gain accurate, first-hand data (MERTON et al., 1990). A Sustainable Livelihood Framework ensured an integrated approach in constructing interview questions (DFID, 2006), seasonal calendars established year-round workloads arising from pluriactivity, and SWOT analysis on interview data helped formulate the results (PASTEUR, 2001).Ten interviews were undertaken, split evenly between Finnish and UK farm households. Methodologies provided information on pluriactive livelihood strategies adopted on UK and Finnish farms, and the influences behind them.

2 THE UK AND FINLAND AS CASE STUDY LOCATIONS

A brief look at recent trends in farming in the UK and Finland establishes the context of this study. Though Finland's history of farm pluriactivity is longer, it has been common in both countries and is likely to increase further in the future.

2.1 Farming in the UK

The UK has for many years experienced the loss of farmers from the industry. Cheaply imported food, the decrease in food exports, increased mechanisation and high inflation in food retail prices compared to the price received by the farmer has taken its toll. Added to this were the crises of BSE and Foot and Mouth Disease, reducing the export of produce and lowering farm incomes.

Prime Minister TONY BLAIR (2000) suggested that farm households might continue to farm with support from non-agricultural income activities. This idea is now also supported by the European Union (EU) agricultural reforms and DEFRA (2005) explain how households will need to be flexible, entrepreneurial and work closely with their markets, suppliers and customers. This may involve specialising or diversifying, be agricultural or non-agricultural, on or off-farm. However, whilst protecting households to some extent from risks associated with a limited income source, a challenge exists for households to devise ways of exploiting their capital assets (explained later) in order to develop on and/or off-farm income generating opportunities (MANNION, 2001; DFID, 2006).

2.2 Farming in Finland

Finland's membership of the EU in 1995 gave rise to significant changes which put into context the status of Finnish farming and its possible future direction. On joining the EU, price supports decreased, Finnish producer prices immediately fell by 40-50 % (causing concern for future farm household livelihoods) and direct income payments became more common (MTT ECONOMIC RESEARCH, 2005). This price fall plus the ageing population of Finnish farming families, resulted in a huge drop in the total number of farms, but at the same time some increase in average farm size (Finnish farms were relatively small). From 1995 a change also occurred in farm types and structure. The number of dairy farms fell whilst those remaining increased their average herd size and yield. Meanwhile the number of farms growing crops increased. The increase in farm size and change in farm types attempted to make Finnish farming more economically viable. Finland's northerly geographic position restricts both growing season and crop varieties, increases costs, and influences it's history of combining on-farm agricultural work with additional income generating activities. Such families may increasingly work off-farm, with agriculture as a secondary activity, particularly if growing crops (MTT ECONOMIC RESEARCH, 2005).

3 RESEARCH INTO THE FARM HOUSEHOLD

This study focused on the household, not only the farmer, to accurately collect data regarding livelihood activities. DESERAN (1984) supports this: *"Farms are rarely operated by farmers alone but usually involve the labour of other family members"*. Decisions regarding use of common resources are the shared responsibility of the whole family (TRUST, 1985). The farm household is defined as those contributing in however small a way towards its livelihood.

3.1 Perceptions of farm income activities

Part-time farming with other income-generating activities has increasingly been adopted to alter otherwise low farm household incomes. HILL (2000) believes farming households compare well with non-farming when additional earnings are accounted for, but acknowledges that type and location of farms and farmer's age and education can constrain agricultural and non-agricultural opportunities.

3.2 Farm household livelihood strategies

This study utilises EIKELAND'S (1999) terms to distinguish between "industrial pluriactive" (self-employed in two or more enterprises) and "wage-earning pluriactive" (involved in both self-employment and wage earning). Pluriactivity denotes the multiple occupations undertaken by farm households (however significantly they contribute towards total family income). In addition to on-farm agricultural production, this could include either on-farm non-agricultural, and/or off-farm agricultural or non-agricultural work. Though not the only industry in which households seek additional income, the extent of farm pluriactivity has increased in proportion to the decline in agricultural income, and was being undertaken by over 60 % of family farms in the EU (SOFER, 2001). This is likely to increase further due to CAP reform.

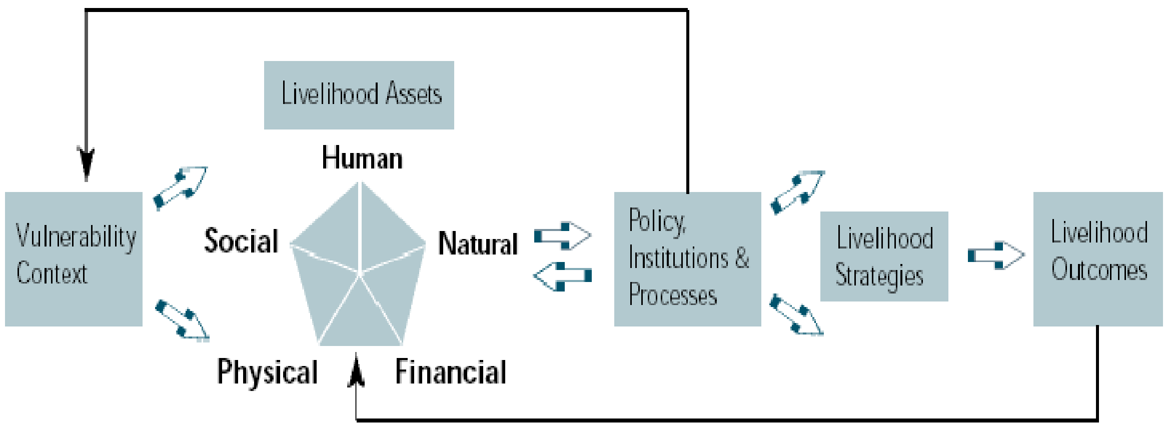
BROX (1984) and BROX et al. (1966) explain how some researchers believe that industrial pluriactivity would cease if sufficiently well paid wage-earning opportunities existed in rural areas. KINSELLA et al. (2000) suggest that farm households may choose pluriactivity either for a viable income or a temporary stage in the transition to leave farming, but don't account for lifestyle preference.

Should improved education and household members' personalities not be considered in addition to the above? This is addressed in the idea of the entrepreneurial farmer. CARTER (1998) and STANWORTH et al. (1976) suggest that pluriactive farmers (or portfolio owners) would not prefer to be wage-earners, but are differentiated by their relative youth, greater experience and training. They choose to specialise rather than keep to traditional mixed farming. Pluriactive farmers are said to take more risks in pursuing business success, to seek larger profits through expansion and to continually seek new markets and opportunities.

Particular strategies chosen depend upon access to capital assets (human, financial, natural, social and physical) (MANNION et al., 2001; DFID, 2006) (see Figure 1). They relate to skills, knowledge, land, labour, landscape or social networks available, and vary in importance depending upon economic or political changes. A farm household may establish an enterprise, utilising special skills or education (human capital assets). The utilisation of assets to provide products or services for which the public are prepared to pay can determine farm livelihood success.

Figure 1 illustrates the holistic approach taken to ensure that each household's individual farm context, access to assets, and influence from livelihood related policies was accounted for, thus establishing the decision-making process. This framework therefore identifies support required by pluriactive farm households. Such support is later expressed in terms of recommendations for policy change. The framework should be read in an integrated manner, using the feedback loops.

Figure 1: Sustainable livelihoods framework



Source: DFID, 2006.

Income from non-agricultural sources has long been a common phenomenon on Finnish farms (PELTOLA, 1999), existing to a greater extent than in the UK. The EUROPEAN COMMUNITIES' statistical report (2002) showed that, 24 % of Finnish male farmers had secondary gainful employment in 1997, as opposed to 9 % of UK male farmers. In some households, the distribution of labour could mean one person concentrating his/her time mainly on-farm, while their spouse may work off-farm in a non-agricultural job. PELTOLA (2000) believes that pluriactivity on Finnish farms will increase further in the future.

Whereas rural development funds could previously be used only for agri-environment schemes, forestry and early retirement, they now cover producer participation in quality assurance and certification schemes, processing and marketing of agricultural products, diversification of agricultural activities, and training (EUROPEAN COMMUNITIES, 2003). More emphasis is placed on production of goods and services on-farm, plus off-farm enterprises. Both farm households and rural communities could potentially benefit (KINSELLA et al., 2000).

4 POLICY SUPPORT FOR PLURIACTIVE FARMING LIVELIHOODS

The future of agriculture in a post-productivist era will inevitably incorporate increasingly diverse livelihood strategies. In order to ease the transition, agricultural policy needs to recognise each household as having different skills, interests and motivations for the chosen activity.

DEFRA (2005) suggest that UK farmers participate in cooperatives or partnership ventures, add value or diversify into non-agricultural activities. However, policy-makers may be challenged in providing adequate training for previously full-time farming households. These "contented monoactives" (SHUCKSMITH et al., 2002) may lack the knowledge and skills to ensure a profitable livelihood. Time will reveal whether EU Rural Development funds can address this. Much finance currently focuses on farm-centric measures such as investments in existing agricultural holdings and land improvement (EUROPEAN COMMUNITIES, 2003). Only grants for diversification of agricultural activities and for tourism and crafts might enable the establishment of new enterprises. An evaluation of existing rural development measures undertaken by the European Commission (EUROPEAN COMMUNITIES, 2004) revealed the benefits to be gained to depend upon individual farms. For example, whilst provision of training is regarded as having wide relevance, assistance with processing and marketing is not considered effective for primary producers or for use in restructuring. Likewise, farm investment measures are only suitable for modernising less competitive farms, and not for those already highly productive. However, the proposed policy reform concerning 2007-2013 discusses the intention to make such support measures more effective.

It is hoped that future EU policy reforms may enable Finland to use more nationally chosen options, which better suit Finnish farming conditions, and alongside the development of innovative technology, increase production efficiency (yield levels are currently lower in Finland than some EU countries), whilst reducing environmental damage (MTT ECONOMIC RESEARCH, 2005). In addition, the desired future would be for small farmers to invest in organic production, and the potential exists to further develop rural tourism. In general, keeping the countryside populated and increasing farm profitability are important challenges.

5 PLURIACTIVE HOUSEHOLD STRATEGIES IN FINLAND AND THE UK

The ten farm households interviewed (FIN1-5 and UK1-5)[1] were chosen for having additional non-agricultural incomes, either as wage-earners or in industrial pluriactivity, and a variety of factors determined their choice (EIKELAND, 1999). Theoretical sampling (GEIGER, 1990; MCCRACKEN, 1988) ensured that both geographical location and livelihood activities varied between households. Seasonal calendars were used to establish the year-round workload of each farm household (on and off-farm, as well as agricultural and non-agricultural), identifying both opportunities and challenges associated with pluriactivity.

Farm households were found to have been influenced by their capital assets, replicating the findings of MANNION et al. (2001). The focused interview plus SL Framework highlighted UK1's access to physical assets, in terms of accommodation and dining space, and the human capital of knowledge and interest. These assets facilitated the establishment of a bed and breakfast (B&B) enterprise as a form of industrial pluriactivity.

Since HILL (2000) suggested that livelihood opportunities were constrained by education (presumably a lack of it), a good education should therefore enhance employment prospects. This proved especially important when considering FIN4's intention to work full-time in agriculture until its financial non-viability became apparent and choosing to utilise a university education to combine farming with research.

The focused interview, SL Framework and seasonal calendar highlighted FIN5's utilisation of a college education in occasional mathematics teaching, the short hours complementing on-farm duties. Such flexibility would have been impossible with many other off-farm jobs.

Not all farm households undertook non-agricultural activities solely for extra income, supporting observations by PELTOLA (1999), evidence for which was found in two interviews. FIN5 had established a variety of non-agricultural activities, both on and off-farm. Despite the household enjoying the additional income, the primary reason behind their livelihood choice was fun. Similarly, UK1's B&B was initially a hobby, but was expanded to supplement their falling agricultural wage.

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[1] FIN1-5 and UK1-5 refer to the five Finnish and five UK farm households that were interviewed as part of this study. Each of the ten households was issued with letters abbreviating their country of location plus a number in order to be easily identifiable within the text, while keeping the geographical location and name of the farm confidential.

The suggestion made by HILL (2000), CARTER (1998) and STANWORTH et al. (1976) that the age of the farm household members influences the extent and type of pluriactivity was replicated several times. The husband in FIN5 was relatively young and could be considered to be entrepreneurial, judging by his energy and ideas for exploiting opportunities. These included producing and selling wine, running a restaurant, rearing organic pigs and selling ham direct to the public. Conversely, UK5 was nearing retirement and though the wife appeared unhappy with her job, she had no time or energy to improve it. She was literally waiting to sell the business.

Another factor believed by HILL (2000) to influence access to non-agricultural opportunities is the geographical location of the farm. Though UK1 were restricted by the natural capital of their hill farm in utilising their land (the physical environment was suitable only for sheep, and local planning laws allowed no development), they benefited from the landscape's popularity with tourists when choosing their B&B.

UK5 had deliberately purchased a farm in the vicinity of a large residential population, maximising sales opportunities. UK4, however, had been less fortunate, in witnessing the closure of shops which sold the farm's products. UK4 had subsequently relied on farmers' markets, limiting their sales capacity and increasing their income vulnerability.

The local community research opinion (BROX, 1984; BROX et al., 1966) is that industrial pluriactive households would prefer to be wage-earners. All the interviews disproved this, however. UK3, as an entrepreneur, was concentrating on developing industrial pluriactivity to increase product lines and profits, while FIN5 clearly enjoyed establishing their businesses, and had in fact considered discontinuing off-farm activities and concentrating solely on on-farm work.

Although KINSELLA et al. (2000) have suggested that farm households' choices are pluriactive either to ensure a viable income or as a stage in the transition to leaving farming altogether, none of the households wished to leave farming, thereby reinforcing pluriactivity as generating a viable income. Only FIN5 briefly considered swapping pig farming for other activities, until realising that the customers for their wine-making business and restaurant enjoyed the novelty of visiting a working farm. KINSELLA et al. (2000) don't account for pluriactivity being undertaken for non-financial reasons, but several households supported this in stating that income was not always the priority.

In summary, the methodologies adopted here revealed that access to capital assets significantly influenced the farms' pluriactive strategies. It was evident, too, that whilst valuable, increased income was not always the sole reason for non-agricultural activities.

6 INFLUENCES ON PLURIACTIVE DECISION-MAKING

Present and future influences upon farm household pluriactivity were examined. The interview showed FIN5 to be driven more by the challenge of business than by the farm subsidy payments they might have earned from restricting themselves to a particular line of production. Similar findings were recorded in interviews with UK2 and UK3, who were concerned less with EU policies and more with business expansion and marketing. They knew more money could be made from organic vegetables and dairy products than from the mixed arable farm they had inherited from their father. UK2's research had proved there was a market for vegetables and that "customers want organic". This suggests that if these three households had not inherited their farms, they would have been managing an enterprise anyway. Perhaps they were primarily business people as opposed to farmers seeking an agricultural lifestyle, as observed in the work of CARTER (1998) and STANWORTH et al. (1976).

Many interviewees wished to earn more and obtain a larger share of their total income from agriculture. FIN1, FIN2 and UK1 were concerned at the existing decline in income from agricultural production. Such concern was not expressed by all those interviewed, however. Some households had found new ways to improve their finances. FIN3, for example, had been influenced by EU agricultural policy to buy additional milk quotas, had increased their dairy herd and had doubled their average milk yield by changing both feeding and breeding practices.

Having discussed the influences behind previous decisions, it is important to understand the potential future influences on farm household livelihood activities. FIN1's plan was to transfer from dairy farming to crop production, freeing manpower and time for a more financially rewarding livelihood. Crucially, crop farming could continue alongside off-farm research.

FIN4 believed that the agricultural reforms leading towards the certification of food production (EUROPEAN COMMUNITIES, 2003) could encourage quality Finnish food. Food certification may provide the benefits that FIN3 believed forestry certification did, in terms of quality assurance, subsequent demand (especially from overseas) and increased selling prices. Certification may help support household incomes, reducing the likelihood of abandoned farms, as suggested by KINSELLA et al. (2000).

There were a variety of reasons for households choosing pluriactivity. Some used their entrepreneurial ability to remove restrictions they had encountered and increase farm profitability.

7 THE IMPACT OF PLURIACTIVE STRATEGIES ON FARM HOUSEHOLDS

Both positive and negative outcomes of pluriactivity and the extent of sustainability on the farm household were revealed through use of interviews, seasonal calendars and a SWOT (strengths, weaknesses, opportunities and threats) analysis framework (PASTEUR, 2001).

One obvious benefit for pluriactive farm households was the increased income beyond that earned solely from agricultural production, although increased income was not always the initial objective. UK1, for instance, had come to realise the benefits of a pluriactive livelihood that KINSELLA et al. (2000) refer to, in enabling the family to continue farming the land and living in "a beautiful location".

Apart from the additional income, the interview with FIN2 revealed the improved social life and increased social capital obtainable from combining on-farm agriculture and off-farm teaching. They believed this enabled them to "stand back" and better understand each other's livelihood problems.

The interview with FIN5 reflected the ability of pluriactivity to provide opportunities for managing various enterprises. Working in their restaurant enabled the parents to be with their children, though they admitted the need for yet more time together. Their diverse livelihood activities caused an uneven year-round spread which was sometimes problematic for their cash flow, and the seasonal calendar revealed the winter as a quiet time regarding work, as in other cases as well.

FIN4 explained that the distance between the farm and the research job resulted in long journeys, but the flexible working hours, the ability to undertake research on-farm via a computer, and the way that cereal farming and agricultural research complimented each other were positive features.

It became apparent that pluriactivity increased farm incomes, providing greater security and enabling families to stay on the farm and work it. For entrepreneurs, pluriactivity is an opportunity to experiment with a variety of businesses. Sustainability was reduced, however, if the spread of time and money was uneven throughout the year.

8 FARM PLURIACTIVITY IN THE UK AND FINLAND COMPARED

The interview data showed that both UK and Finnish farm households were capable of securing additional livelihood activities, either on or off-farm. Use of the SL Framework replicated MANNION et al. (2001) and DFID's (2006) theory that the activities chosen by households depend partly on capital assets, and that of HILL (2000), that activities also depend on age and geographical location. These factors combine with EU policy to determine livelihood outcomes.

Whereas Finnish farms have long obtained incomes from non-agricultural sources (PELTOLA, 2000), this has been less common in the UK. Regarding the extent of pluriactivity, archival data show that 63 % of men in the UK earned their income solely from agriculture in 1997, compared to only 45 % of men in Finland (EUROPEAN COMMUNITIES, 2002). These figures are partly the result of Finland's climate, which shortens the growing season and restricts the crop mix, and Finnish farm size, being typically smaller, and therefore less demanding on time and labour.

Many more farmers in Finland than in the UK own forest, the management of which provides additional non-agricultural income sources. It is remotely possible that Finnish farm households are more likely to include a female member who is obtaining her income from an off-farm profession, thereby increasing the likelihood of a farm being pluriactive. This is because Finnish rural women may be better educated than women in some other countries. The wife in FIN2, for example, earned her non-agricultural income from teaching. The wife in FIN5 partly earned her income from post office work. Although these two were the only examples among the Finnish households, a larger study may have identified others.

The findings revealed the way in which livelihood activities either complemented one another or were in conflict. Both FIN1 and FIN3, for example, talked of dairy farming being a constraint in terms of the time a farmer needs to spend on-farm, whereas this was not perceived as a problem with UK3. This may have been due to UK3 having concentrated on developing the on-farm processing and retail element in dairy farming and having therefore increased their income through value-adding. It is important to remember, too, that the costs of dairy farming in the UK may be lower, due to the milder winters and longer summers. If Finnish farms shift from dairy (or livestock, in general) to crop farming, time will be freed up for the increase in off-farm work which MTT ECONOMIC RESEARCH (2005) predict.

To summarise, it is clear that both UK and Finnish farm households are capable of non-agricultural livelihood activities. The way in which they complement each other or conflict is partly influenced by factors that include climate.

9 RECOMMENDATIONS FOR CHANGES

Recommendations for changes can be made in order to increase the benefits for pluriactive farm households. The likelihood of pluriactive farms being less vulnerable to changes in agriculture than monoactive farms has been discussed. The changing nature of agriculture and the increase in families leaving the industry may result in rural population decline, in turn reducing trade for rural businesses and the demand for local services. This problem may be worse in Finland, being a more sparsely populated country.

Despite EU rural development policy funding focussing heavily on farm-centric measures rather than the establishment of new enterprises, for example, a policy emphasis on rural development could help by encouraging and supporting producer participation in quality assurance and certification schemes.

In view of the need for alternative incomes, the National Farmers Union (NFU) (2002) consider that farmers would benefit from value-adding, the production of commodity products, new product development (including non-food) and service provision. However, for farmers to take advantage of this, it is suggested that they require new skills. Farm households need to be appropriately trained for new opportunities, and EU rural development grants might help. The SL Framework is a reminder of ways in which policy change can affect other livelihood aspects, either negatively or positively. Any support must enable farmers to benefit from changing market forces and consumer demands.

Social capital might increase if farmers utilise EU rural development funding. UK2 had received Objective 5b funding from MAFF (now DEFRA) to establish an organic vegetable cooperative. UK2 considered the cooperative to enable both risks and rewards to be shared amongst the local agricultural community. FIN3 also benefited from working in cooperation with neighbouring farms in sharing machinery and in terms of pooled ideas and resources, relating to the observations of FALK et al. (2000).

A requirement exists for some farm households to develop additional income-generating ideas. The provision of training and finance would maximise opportunity up-take through increased social capital.

10 CONCLUSIONS

This study explored the opportunities, challenges and sustainability of the livelihood strategies of pluriactive farm households. Interviews revealed many reasons for farm households choosing pluriactivity, including the need for additional non-agricultural incomes and increasing emphasis on rural development initiatives. Some farms had not initially established non-agricultural activities for economic reasons, however.

While geographical location, type of farm, the age and educational background of the household members (HILL, 2000) and access to capital assets (MANNION et al., 2001) varied between these farms, attempts were made to maximise the livelihood opportunities available.

It became apparent that EU policies did influence to some extent the livelihoods chosen. Farmers spoke of changing productivity in endeavouring to profit from a change in policy. Also, the decrease in agricultural incomes in recent years and the move away from production based subsidies increases the need for non-agricultural income sources. Nevertheless, not all households were motivated by policy. Some were entrepreneurs who would have been managing another business if it had not been a farm. This entrepreneurial attitude may be useful in a future where policy may have less influence on farms.

For those farm families looking for alternative income sources, the majority of EU Rural Development grants focus on farm-centric measures, including investments in agricultural holdings and support for young farmers, as opposed to assisting with the establishment of farm pluriactivity.

One disadvantage experienced by pluriactive households is the uneven spread of both time and money throughout the year. Some parents considered that they were not spending enough time with their children during the busy times. Winters were quiet for many, and an ideal time for non-agricultural activities.

All the farms appeared satisfied with their industrial pluriactive livelihoods; none intended to leave farming. Differences were found between the UK and Finland, partly as a result of how climate influences farm types and time spent on farming.

Finnish farm households have a longer history of pluriactivity and rural development projects than those in the UK. A look at Finnish farm households' management of time and types of work undertaken is therefore useful information to UK farmers in preparation for the reduction in direct payments. A pluriactive livelihood might reduce the risks associated with changes in policy.

The success of future farm pluriactivity, for both Finland and the UK, depends on the support that farmers receive to enable them to reduce their constraints and maximise their opportunities (PELTOLA, 2000; NFU, 2002).

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TERRITORIAL ASPECTS OF ENTERPRISE DEVELOPMENT IN REMOTE RURAL AREAS OF EUROPE

ZUZANA BEDNARIKOVA, TOMAS DOUCHA*, ZDENEK TRAVNICEK**

ABSTRACT

The overall objective of the international project TERA (6th Framework Program) is to identify and analyze the territorial factors that influence the development of enterprises in remote rural areas of Europe. Emphasis is placed on rural-urban linkages as this represents the key issue for the future development of rural areas. The objective of the initial part of the project is to specify and identify the project's study areas and to complete a descriptive and comparative analysis of the areas. The areas specified in this work are rural, remote and containing or adjacent to an urban center. The comparative analysis based on the reports from 6 individual partners, presents the socio-economic development contexts of the study areas and identifies their similarities and differences in terms of socio-economic and territorial characteristics. The results lead to a recommendation of the "best" strategy for further development.

Keywords: *Remote rural area, rural-urban linkages, rural development, comparative analysis, TERA.*

1 INTRODUCTION

Traditional rural policies were mostly geared towards agriculture, with a strong emphasis on direct subsidies delivered top-down. It is important to note the distortions that these policies have created is due to the fact that they are poorly integrated with the objectives of other sectors such as small business development and basic infrastructure implementation. Nowadays rural policy in the European Union should deal with rural development as a whole: The agricultural component fits into a more synergistic and wider picture. There is an emphasis on cross-sector coordination and the definition of real customized

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local strategies. Agriculture must be a component within these strategies, but it must not be addressed outside the other issues. As the use of subsidies declines, there is an increasing need for regions to identify their competitive advantages. Some regions are leaders in different manufacturing activities. Others base their development on attracting new activities, marketing local products and services, or attracting new residents with an exceptional natural environment. Other communities can look to advantages in terms of their rapid links to major urban areas. Some are investing in regional educational institutions (JOHNSTON, 2005).

The changing economic situation and rapid urbanization both point to an urgent need to integrate approaches of rural and urban development. Government policy needs to take account of the spatial pattern of economic activity. The sense of local and regional issues will help to provide a more detailed understanding of how the processes of global growth interact with local conditions and play out across a country; where and how they vary and what central government policy can do about it. The understanding of what aspects of the growth process can be influenced by policy represents an issue of high importance. Identifying regional and local economies and understanding how they operate can help determine the most economically-rational, and politically/administratively feasible level at which to intervene to achieve a particular purpose. Too often local government boundaries determine the geography of a policy when these may have little to do with the extent of economic linkages. On the contrary, thinking and acting instead, for instance, in terms of a "functional economic region" gives policies economic strength, and indicates when – and which – multiple actors in both the public and private sector to involve (HOBSON and PHILLIPSON, 2005).

TERA project (6th Framework Program; participants: Italy, Finland, Greece, Scotland, Czech Republic, Latvia) aims to contribute to EU efforts to increase the value added of development policies and to provide a new policy framework able to enhance the positive effects of policy delivery and to promote cohesion and sustainable spatial development in a larger EU.

The overall objective of TERA is to identify and analyze the territorial factors that influence the development of enterprises in remote rural areas of Europe. TERA will lead to increased understanding of how factors can be integrated, in order to contribute to the remote rural areas competitiveness and the overall quality of life. The emphasis is placed on the rural-urban linkages which represent the key issue for the future development of rural areas.

In this paper we describe the initial part of the project. The objective of this part is to specify and identify project study areas (by means of a factor analysis, cluster analysis or an expert assessment), to complete a descriptive analysis of the areas and finally to complete a comparative analysis and suggestions for a future development.

2 Objectives and Methodology Approach

The specification of criteria for the selection of the study areas is compatible with the objectives of TERA. The main objectives of the project are, in short:

(a) Identifying and analyzing territorial economic factors which influence the creation, development and survival of enterprises in peripheral rural areas of Europe and measuring the nature and degree of the influence of these factors.

(b) Assessing the extent to which current and recent EU development policies and national and regional development Programs and projects take account of these factors, especially in the context of parallel support policies such as CAP direct payments and national social welfare support systems.

(c) Specifying new policy directions which take account of territorial factors and promote the development of remote rural areas in a more targeted and effective manner.

The methodological approach of this paper follows the TERA work-package sub-tasks and comprises a few steps.

The first step involves the criteria for the identification and the selection of rural and remote study areas containing or adjacent to an urban center.

This step is followed by a comprehensive analysis of the socio-economic and developmental context of the study area. The procedure identifies in detail the social, economic, environmental and territorial characteristics of the study areas. This task has been pursued by each partner separately.

The comprehensive analysis leads to a comparative analysis of the socio-economic development context of the study areas that attempts to identify similarities and differences amongst them in terms of socio-economic characteristics, physical endowments and territorial characteristics.

The methodology process comprises three concurring steps:

1. Identification and selection of a remote rural area and an adjacent urban center;
2. A comprehensive analysis of a selected remote rural area;
3. A comparative analysis of selected remote rural areas.

3 Identification and Selection of Remote Rural Areas

3.1 Typology of rural areas

Rural areas make up 90 percent of the area of the enlarged EU and are home to half of the EU´s population, according to the OECD definition (Boel, 2005). Geography, history, culture and economic factors have combined to impart a remarkable range of diversity to European regions. Certain regions are generally considered to be "rural" – although what the word means remains to be defined.

"Rural" often reflects no more than the density of population. But this is only one component. The notion of rurality should also take account of the dynamics of the agricultural population seen from the point of view of employment, conservation of the countryside and other socio-economic criteria. The variety of agricultural activities and the differences in the level of economic development between regions lead us to conclude that there are many elements that define the "rural" character (BARTHELEMY and VIDAL, 1999).

One of the "rural" definitions follows the OECD distinction. The term "rural" is conceptualized as "a territorial or spatial concept, not restricted to any particular land use, degree of economic health or economic concept. It has distinguished three types of rural areas on the basis of their place in economic geography" (BARTHELEMY and VIDAL, 1999). The OECD makes clear that the distinction between types of rural territories is "primarily a function of geographic and economic remoteness from urban centers" (BARTHELEMY and VIDAL, 1999). The three types are:

- Economically-integrated rural areas, which are growing both economically and demographically, often located near an urban center, with incomes generally above the rural average. Although farmers make up only a small part of the work force, farm incomes are typically higher than the national average;
- Intermediate rural areas, which are relatively spatially remote, but their good infrastructure provides easy access to urban centers. These are areas traditionally dependent on agriculture and related activities, particularly in terms of jobs, although they are increasingly diversified into other sectors such as manufacturing and services;
- Remote rural areas are usually sparsely populated and often located in peripheral regions far removed from urban centers. They are characterized by low population density, an aging population, minimal infrastructure and services, low skill and income and weak integration with the rest of the economy[1].

3.2 Identifying remote rural areas

In the framework of the TERA project the aim is to identify the so-called remote rural areas to address more effectively the problems of rural development in the EU. Following this idea, the EU territory can be in principle structured into:

- Non-rural areas (NON-RA);
- Non-remote rural areas (NON-RRA);
- Remote rural areas (RRA).

[1] OECD (1994): Creating rural indicators, Paris.

From a rural policy-making point of view, the differentiation between NON-RRA and RRA are interpreted similar to the differentiation between NON-LFA and LFA in the framework of the CAP. However, we take into consideration the real status of the RRA and their preparation for future development[2].

Identifying and selecting remote rural areas lead to policy issues linked not only with agriculture, but with more complete regional development. One of the most serious policy-making questions is, what further attention should be given to those areas and which policy principles should be followed in the future. Referring to DATAR (the French agency for territorial development: *Délégation à l'Aménagement du Territoire et à l'Action Régionale*), the main policy-making principles can be summarized in: 1) Redistribution, 2) Refunding or repairing, 3) Protection, 4) Compensation and 5) Creation.

The first principle can be *redistribution* of the current stock of wealth, job places and capital in a remote rural area to ensure a better or more harmonious distribution of these factors. This principle refers more to a situation where the government and top-down "planning" play a strong role.

The second principle can be *refunding* targeted towards construction/reconstruction of the territorial structure, to smooth differences and imbalances caused mainly by any natural negative conditions of the remote rural area. Therefore, the goal is to provide remedies to these weaknesses in the name of common justice.

The third principle can be *protection*, which is focused mainly on environmental or cultural aspects, i.e., in the sense taking care of the landscape, nature and culture. The creation of nature or landscape protected areas, or national and regional parks, expresses the sensitivity of policy towards these issues.

The fourth principle *compensation* can be applied when regional planning is far from being an exact science and no models are able to reach the optimal distribution of means and resources. Developmental actions are actually activated in privileged areas or localities, such as places with a high concentration of regional factors.

The fifth principle *creation* is related to the belief that some mechanisms, local conditions and places can trigger growth and developmental processes. A region is thought of as a neutral space where planning actions can trigger exogenous dynamics from which endogenous processes can follow to ensure spontaneous and long-term development of the given area.

3.3 Study area requirements

TERA study areas are rural, LFA and remote with some dispersion of economic activity, and are adjacent to or containing an urban center.

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[2] For example we should take into consideration if policy goals aim at a "conservation" of the situation in a RRA, or at a "development" (changes) in a RRA, respectively.

To identify RRA, we rely mainly on official statistical data, which is linked with NUTS levels. The question is which of the NUTS 1-5 levels is the most suitable for the objectives of the TERA project. The selection of the NUTS level is country specific, but we follow three main criteria for this task:

- Sufficient homogeneity of a NUTS level;
- Sufficient data availability for a NUTS level;
- Sufficient size (acreage, population) for policy-making considerations.

NUTS levels differ considerably among EU countries. In this way, each TERA partner chose (as a study area) the NUTS level that was most meaningful for the purpose of the project and also reflected country-specific conditions.

In practice, this means that each TERA partner selected the most suitable levels among NUTS 3, NUTS 4 and NUTS 5.

3.4 Rural-urban linkages

Following the TERA objectives, identifying crucial territorial factors for the development of economic activity in remote rural areas of Europe is necessary. The existence of adjacent urban centers impacts on the economic interactions between remote rural areas and the urban centers.

The classic ideal view of rural-urban linkages is one of symbiosis. In a distinct geographical area:

- Towns function as service centers for their rural hinterlands, offering outlets for rural products, public and commercial services, and employment opportunities.
- Rural areas provide raw and processed materials, labor and demand for non-agricultural goods and services.

In economic terms, three types of rural-urban linkages are usually distinguished: Consumption linkages (demand for final products), production linkages (backward or forward supply of inputs for businesses), and financial linkages (e.g. rents extracted by urban landlords, remittances by migrants, rural savings channeled through urban institutions) (DEPARTMENT FOR INTERNATIONAL DEVELOPMENT, 2002).

A major theme in rural-urban linkages is the flow of migrants from the countryside to towns. Regional rural-urban migration often concentrates in small and intermediate urban centers where there are employment opportunities. It seems that many rural residents prefer to commute rather than migrate. Investments in transport facilities that respond to the needs of low-income groups would be likely to increase their options and reduce pressure on urban centers.

The external influence of adjacent urban centers can be seen in an indicator of un/employment (e.g. job creation, job destruction, employment opportunities) and population distribution in rural areas.

Urban centers play an important role in the provision of basic services for much of the urban population and most of the rural population. These urban centers are also particularly important in providing rural populations with access to government services and the rule of law (SATTERTHWAITE and TACOLI, 2003).

To consolidate the definition of the TERA study area with meeting the TERA objectives, the following definition is applied:

Remote rural areas are sparsely populated and often located in peripheral regions. They are characterized by low population density, an aging population, minimal infrastructure and services, low skill and income and a weak economy. Also these areas contain or are adjacent to an urban center.

3.5 Indicators for identifying remote rural areas

Reflecting both regional differences in economic structures and natural conditions, the role of indicators is to communicate an easily understood picture of the main trends by a selected number of key statistics.

The identification of RRA is based on the set of indicators and their analytical/ statistical evaluation. Considering the time limits, the data for all the applied indicators are readily available (there was no time for research activities to "fill gaps" in the data). This means that the implementation of indicators is based, as far as possible, on existing statistics.

To some extent, the suggested typology follows a typology developed by the POLITECNICO DI MILANO (1999).

In principle, each country – subject to data availability and its individual situation – apply the following categories of indicators:

A. Natural/general characteristics.

B. Demography.

C. Settlements.

D. Economy and social characteristics.

E. Infrastructure and history.

There are a few alternative ways of using the indicators listed above to select the study areas.

- The simplest way: To expertly select a cluster of RRA, and directly following the most important indicators – A cluster of the RRA.

- A simple way: To expertly select the most important indicators, define threshold values for the selected indicators and derive a cluster of RRA complying with threshold values.
- A more sophisticated way: To apply selected indicators on a cluster analysis methodology to identify a cluster of the most RRA.
- The most sophisticated way: To apply a factor analysis methodology for selected indicators.

3.6 Selection of the Czech study area

This section details the methodology of selecting a remote rural area in the Czech Republic. The development of settlements in Central Europe and mainly in the Czech lowlands has a very deep historical history. This development has resulted in a high number of relatively small/very small settlements in the Czech Republic less than ten kilometers from each other, which is one of the RRA criteria.

Individual indicators describing RRA defined at level NUTS 4 show different absolute values within specific districts. If we compare the order of the districts based on the value of each indicator, we find that the order of the districts mutually varies and doesn't allow RRA to be chosen precisely and unambiguously. Therefore, to determinate RRA in the most objective manner, the evaluators decided to use a statistical method of factor analysis which allows a multi-criteria valuation method to be used to select and identify a common context of a chosen number of indicators in selected problem spheres (criteria), and then to statistically verify them and classify them according to the score.

From the overall total of 22 chosen indicators, 17 indicators were identified after the first calculations, where 93.6 % of the spread is explained by only 9 indicators (Table 1).

Table 1: Overview of indicators

Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
Inhabitants/km^2 Settlements <150 inhab/km^2/setll total in %	Population more than 64 years (%) Index of age (64y*100/14y)	Commuting to work daily as % of employees % of employees commuting to work from a village	Population variance 2001/1991 re-counted to 1,000 inhab. without district town	Slope >15 % Average altitude of a district
Indicator 6	**Indicator 7**	**Indicator 8**	**Indicator 9**	
Economically active population and general population share (%)	Long term unemployment rate (>12 months) (%)	Share of highways, roads of I. and II. class to 100 km^2	Distance of district town from nearest regional town (km)	

Only 6.5 % of the unexplained criteria were not explained by these. This result can be considered as very favorable and evidential. For a more specific solution, the first outcome was adjusted in accordance with the (impact) of each indicator through assigning a coefficient in a range of + 3 to – 3. Predominantly urban areas were excluded from the matrix after the calculations, as they are not the subject of this project and the final order of NUTS 4 was set in line with the RRA criteria.

The successive re-assessment of each criterion based on a subjective evaluation of its meaning within RRA was terminated when the final order of NUTS 4 did not react to the sensitive changes of the scales. After evaluation of the time trends for the economic and social development in the last 15 years, the Bruntál district was chosen as a problematic RRA on the level of NUTS 4 for the purpose of the TERA project. This district is part of the NUTS 3 North Moravian district. The reason for the final choice is that both NUTS 3 and NUTS 4, which are cross-border areas with Poland, have been historically affected three times:

- The first time there was an extensive displacement of Germans after the 2nd world war, which mainly affected agriculture. The abandoned agricultural land was then managed by large-scale methods as state farms. Forcibly displaced inhabitants were replaced by people from inland, without any historical, ownership or expert continuity.
- The second serious breakpoint was the abnormal acceleration of heavy industry, mines, iron works and steel mills and large-scale agriculture, which contributed to the overall devastation of land and unbalanced the socio-economic development of the area.
- The third tragedy for the area was the collapse of heavy industry and the socialist agricultural businesses in 1990, with all the negative attendant phenomenon such as unemployment, negative migration, overall decrease of inhabitants, unfavorable structure of settlement, low quality of services and so on.

The impact of these changes in marginal NUTS 4 of the North Moravian district and Bruntál district has been confirmed.

4 COMPARATIVE ANALYSIS

The paper focuses on the socio-economic situation and developments in the study's remote rural areas (Table 2) and their potential for the future. It is presented as a comparative analysis of the areas and attempts to identify similarities and differences among them. The document is based on reports from 6 individual partners.

Table 2: Study remote rural areas and their urban centers

Country	Study area	Urban center(s)
Greece	Municipality of Archanes	Municipality of Heraklio
Finland	North Karelia	Joensuu
Scotland	East Highland	Inverness
Italy	Po Plain Area	Ferrara, Ravenna
Czech Republic	Bruntál	Ostrava
Latvia	Latgale	Rezekne and Daugavpils

The main socio-economic aspects of the study areas analyzed and compared are as follows:

(a) Location and physical characteristics

(b) Demography and human resources

(c) Settlements, housing

(d) Infrastructure – Road network and transport facilities

(e) Socio-economic situation

4.1 Location and physical characteristics

Following the suggested methodology, the study areas are examined with two methods: (1) assessment of the most important indicators (Greece, Scotland, and Finland); (2) factor and/or cluster analysis (Czech Republic, Latvia, Italy).

The selected study areas represent NUTS 3, NUTS 4 or NUTS 5 level. National NUTS levels were used according to national conditions, including data availability. The Scottish unit LAU (Local Administrative Units) is comparable with NUTS 3, and the Italian unit SLL (Sistemi Locali di Lavoro) are identified as the NUTS 4 level. The Latvian clusters can be territorially identified as areas at the NUTS 3 level.

Compared with neighboring areas and with national situations, all the selected study areas are marginal and represent remote rural areas linked with incorporated or adjacent urban areas (centers).

4.2 Demography and human resources

All study areas, except the Greek area, are sparsely populated with low population density, which is significantly lower than the population density of the given country. We can distinguish two levels of population density in the study areas. The first group contains areas with the density lower than 25 persons per km^2 (Finland, Latvia and Scotland). The second group contains areas with a significantly higher density (Czech Republic, Italy and Greece).

The population in all the study areas, except the Finnish and Latvian area, is growing. However, there is an overall trend of the population to be aging. The age distribution is characterized by a higher share of people over 65 and a lower share of people under 15.

The effect of migration is different among the study areas. A positive balance can be seen in the Greek and Scottish areas, with inward movement of people from other parts of the country. A negative balance predominates in the Finnish, Czech and Latvian areas.

The level of education as a reflection of the quality of human resources has shown improvement during recent years (the share of population with a higher education is growing), but the level is usually lower than the national average. This improvement is partially caused by immigration of people with higher education.

4.3 Settlements, housing

Each study area includes one or two urban centers, but the share of the rural population represents a significant (much higher than the national average) portion of the total population. This fact determines the rural character of the study areas.

The majority of people in the study areas lives in family houses. There is a tendency towards reducing the number of household members and of the size of houses.

The share of properties used as second residences or holiday homes is generally quite high. As a rule, the study areas have significant recreational potential, which could create good opportunities for future development in the areas.

4.4 Infrastructure - Road networks and transport facilities

All the areas studied can be relatively easily reached by road, railway or air. Transport facilities (bus and railway stations, airports) seem to be adequate. Among the study areas, the Czech, Finnish and Latvian areas can be considered as more isolated remote areas from this point of view.

4.5 Socio-economic situation

From the social and economic point of view, all the selected regions show similar characteristics (compared with national averages):

- Significantly lower GDP per capita;
- Much higher level of unemployment;
- Higher importance of the primary sector (agriculture and in some countries also forestry) in the structure of the local economy;
- Importance of the public sector in the economy;
- Growing share of tourism and other related services in the structure of the economy, which promises both opportunities and challenges.

5 FINAL RESULTS

The summary comparison of the study areas from the TERA objectives point of view is presented in Table 3.

Table 3: Comparison of the study areas

Indicator	Unit	CR	FIN	GRE	ITA	LAT	SCO
Population density*	%	51	63	174	64	15.3	24
Growth of population (last 10 years)	%	0.7	-3.0	6.3	-5.0	7.3	5.8
Share of 0-14 age population	%	18.1	18.0	15.6	9	16.1	18.3
Share of population over 65	%	11.1	25.0	19.4	24	23.6	15.9
GDP per capita	eur	7,200	16,500	7,241	n.a.	1,230	19,050
GDP per capita*	%	82	75	74	n.a.	35	80
Share of small businesses	%	57	95	100	n.a.	100	57
Unemployment	%	11.4	14.5	5.2	6-7	15.5	3.8
Share of employed in primary sectors	%	6.6	8.0	38.2	14-35	47.0	12.5
Share of employed in industry and construction	%	42.0	28.0	8.1	21-22	28.1	16.9
Share of employed in other sectors (services)	%	51.4	64.0	53.7	34-50	24.9	71.6
Average farm size	ha	110	29.2	2.6	15	15.6	40
Share of recreational houses in their total number	%	15.4	29.7	12.0	24	n.a.	4.2

Source: Individual studies of the Czech Republic, Finland, Greece, Italy, Latvia, Scotland.

Notes: n.a. = Not available.
* % of the national average.

Data and indications were used for elementary characterization and classification of the study areas. Two points of view (criteria) were applied for these purposes: The level of "remoteness" and the "best" strategy for future development (still reflecting only regional differences inside a given country, which means not considering regional differences at the EU-25 level).

Considering most of the indicators in Table 3, distances from capitals and links with local urban centers, we can roughly recognize:

- Areas with a higher level of "remoteness" – Finland, Czech Republic.
- Areas with a middle level of "remoteness" – Latvia, Scotland.
- Areas with a lower level of "remoteness" – Greece, Italy.

The concentration of typical features of all the studied areas can be used for identifying the "best" strategy for their future:

- *Czech Republic*: Economically underdeveloped area with a high environmental endowment, but with undeveloped recreational potentials (also influenced by the existence of very large – non-family – farms and a relatively low share of the active population employed in the tertiary sectors). The "best" strategy for the future could be the utilization of a combination of *refunding* and *creation* principles.

- *Finland*: Nice landscape and a higher environmental endowment seem to be a good basis for further developing the recreational potential of the area, combined with continuation in the existing industries. A threat for the future is the relatively problematic age structure of the population. A balance of *protection* and *compensation* principles could be the "best" strategy for the future development of the area, also to reduce the present high level of unemployment.
- *Greece*: The area is predominantly (even extremely) targeted on primary agriculture, with a lower economic level compared with the national average. There is potential for the tertiary sector, particularly in tourism linked with the nearby historical sites. Considering the high importance of primary agriculture, another key issue is the development of processing capacities meeting higher standards of quality and/or origin. The "best" strategy could be the utilization of the *creation* principle, possibly in combination with the *redistribution* principle (e.g. higher supports from EU structural funds).
- *Italy*: Economically undeveloped area with a high share of its acreage in protected areas, but with promising links to two cultural and historical urban centers. However, applying the *redistribution* principle to conserve the environment as a public good seems to be the "best" strategy for the future.
- *Latvia*: Economically a very poor area compared to national averages, with a very high level of unemployment and an enormously high share of the population employed in agriculture. The development of other sectors, including the tertiary sector, is a "must" for the future, to gradually eliminate the bad socio-economic situation, including the worst age structure among the studied regions. The principles of *refunding* combined with *creation* could be a solution for change to occur in the future.
- *Scotland*: The area seems to be the most economically developed among the study areas, with (surprisingly) higher employment in agriculture, much exceeding the EU and national levels. On the other hand, there is a large potential of combining the present activities with the development of tourism (the area also shows the highest employment in the tertiary sector among the studied areas). The leading *creation* principle could be the "best" solution for the future of the area.

6 CONCLUSION

The overall objective of the international project TERA (6^{th} Framework Program; participants: Italy, Finland, Greece, Scotland, Czech Republic, Latvia) is to identify and analyze the territorial factors that influence the development of enterprises in remote rural areas of Europe.

The objective of the initial portion of the project is to specify and identify projects study areas (by means of factor analysis, cluster analysis or expert assessment), to complete a descriptive analysis of the areas and finally, to complete a comparative analysis and offer suggestions for future development.

The comparative analysis is based on reports from 6 individual partners. The main socio-economic aspects of the study areas analyzed and compared are: Location and physical characteristics, demography and human resources, settlements and housing, infrastructure, the socio-economic situation.

The areas specified in this work are rural, remote, sparsely populated and containing or adjacent to an urban center. Overall, the population is aging. The effect of migration is different among the study areas. The level of education has shown an improvement. The study areas have significant recreational potential and can be relatively easily reached by car, train or air. All the selected regions show similar socio-economic characteristics (compared with the national average): Lower GDP per capita, high level of unemployment, high importance of the primary and tertiary sector, structure of enterprises based mainly on small businesses.

Data from the partners were used for an elementary characterization and classification of the study areas. Two points of view (criteria) were applied for these purposes: The level of "remoteness" (higher, middle, lower) and the "best" strategy for a future development (principles of redistribution, refunding, protection, compensation, creation). The results show that all levels of remoteness are equally represented among the areas, and the principle of creation, combined with refunding or redistribution, seems to be the most suitable strategy. This means that the study areas have significant potential which could create good opportunities for further development.

An ongoing aim is to design the structure of the CGE and NEG models which will be constructed for the TERA study areas. The CGE modeling frameworks should be able to account not only for (rather traditional) issues such as remoteness, distance, transport costs, factor mobility, etc., but also for externalities (such as quality of life) and dependence on natural resources. Also, the NEG macroeconomic models will explore the effects of intersectoral labor reallocations on employment/unemployment in remote rural areas.

Furthermore, these models should have a multisectoral nature and be able to assess the effects of policy changes on the development of enterprises in these remote rural areas and on the development of these areas as a whole.

To illustrate in practice how a number of key elements (remoteness and distance, factor mobility, externalities and agriculture, determining and disaggregation level) for the project might be captured using the CGE model, an example of Social Accounting Matrix (SAM) will be introduced. SAM explicitly accounts for a range of rural-linkages between activities, factors of production and households (PHIMISTER and ROBERTS, 2006).

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NEW POLICY APPROACHES FOR RURAL DEVELOPMENT: THE EXPERIENCE OF TWO CASE REGIONS IN EASTERN GERMANY

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ABSTRACT

The paper discusses the strengths and weaknesses of the LEADER approach as an instrument for rural development policy in post-socialist rural areas. In development theory and in the view of the European Commission, this approach appears rather promising. The economic success of promoted projects, evaluated by classical cost-benefit-analysis, and regional efficiency is analyzed for two case studies in Eastern Germany. These two regions participate in a national program – Active Regions – which follows a strong LEADER approach. The results show that the efficiency criteria of EU-policy are reached, in general, with a very wide scope between projects. The overall regional process meets EU criteria as well. The discussion of results shows that it is not possible to define general success factors by also considering other empirical findings. Regionally-specific conditions – hard factors like infrastructure and income level and weak factors like social conditions and local actors – have a large influence. Therefore, the planned introduction of the LEADER program in less-favored rural areas in post-socialist countries as an obligatory instrument of rural development requires special attention.

Keywords: *Rural development, LEADER-approach, Efficiency analysis Eastern Germany.*

1 INTRODUCTION

The Common Agricultural Policy (CAP) of the European Union (EU) has changed rapidly in the past fifteen years. Rural development policy is one key element of the CAP, now in the 2nd pillar. From 2007-2013 rural development policy will be organized in one single fund and under one Council regulation (COUNCIL, 2005).

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And will be obligatory to all EU member states, including the new member states in Central and Eastern Europe. Besides traditional instruments of promotion like support of investment, capacity building and training, the so-called LEADER-approach will be obligatory. The LEADER-approach as a methodological axis is a territorial and bottom-up approach. For successful introduction, specific conditions are necessary and there is little experience with it in the new member states (however, as a former socialist society, East Germany has already participated in LEADER-programs for several years). Conditions in rural areas are partly comparable to that in other new member states. Rural areas in Central and Eastern European countries face several problems. In socialist times, no special emphasis was given to them. During transformation, the declining importance of the agricultural and food sector could not be coped with by economic growth in other sectors. Therefore, the economic gap between rural and urban areas has widened in the last ten years (BAUM and WEINGARTEN, 2005). Pillar I support of the CAP favors economically competitive regions. It does not contribute to economic and social cohesion (DAX et al., 2005). Traditional instruments of pillar II are evaluated inconsistently as well concerning cohesion goals. The experience of adopting EU rural policy in the pre-accession period (SAPARD program) is not too promising. Therefore, it is useful to define necessary conditions and determine those instruments that meet the conditions in less favored rural areas.

The theory of regional development is not able to completely explain the observed differences in regional economic development or to determine all factors that are relevant for fostering economic growth (BAUM and WEINGARTEN 2005). Rural development policy has to rely on empirical findings and best practice examples. In EU discussion, territorial approaches that are not confined to mono-sectored promotion are especially assumed to be promising, although comparative evaluation has generally not taken place.

In Germany a national program – Active Regions – Shaping Rural Futures – was introduced in 2002, and follows the LEADER approach with some important differences, especially in application. The author had the opportunity to work in one of the model regions and participate in the evaluation of another. This paper will analyze the adoption and results of this program in some regions of Eastern Germany. The analysis will be based on two case studies of the national program and will be compared with other evaluation results and with the LEADER program. The economic evaluation relies on cost-benefit-analysis. The results and their possible relevance to other Central and Eastern European rural areas will be discussed at the end of the paper.

2 MATERIALS AND METHODS

2.1 The promotion program "Active Regions"

The German Federal Ministry of Food, Agriculture and Consumer Protection initiated the national program Active Regions – Shaping Rural Futures ("Regionen Aktiv") in 2001. In a nationwide competition, eighteen model regions were selected out of 206 regions that applied. The selected model regions were to develop new paths in promoting activities in the field of regional rural development, environmentally-friendly activities and consumer interests. Sustainability and a social policy approach were to be adopted. The national government gave special funds to the model regions, on top of normal funding, averaging € 3 million for the period 2002-2005. Compared to the LEADER program, the federal ministry introduced some new elements. Besides the declared goals, the implementation of the program is especially innovative; so-called regional development partnerships were established consisting of professional regional management, regional actors organized in an association and a public body administrating the public budgets. The selection and decision process of what kind, which amount and which actor to be promoted was given completely to the regions, thus strengthening their sense of responsibility (BMELV, 2002). Non-state actors were to have a majority in the decision-making process to guarantee a genuine bottom-up approach. The Federal Ministry gave no guidelines for the kind of support to be implemented, thus, projects from all sectors of rural life were possible. In the end, all kinds of actions could be chosen, except for those limited by European regulation. Compared with the local groups in the LEADER approach, under this program regional competence is stronger.

2.2 The model regions and the data source

Two model regions situated in northeast Germany were analyzed in detail, the Lübeck Bay region (Region Lübecker Bucht) and the Mecklenburg Lake District (Region Mecklenburgische Seenplatte). The two regions differ in their starting conditions; the Lübeck Bay region is influenced by the city of Lübeck, which has approximately 250,000 inhabitants in the center of the region. Parts of it belong to the former East, while parts belong to the former West Germany. The region may be characterized as typically rural but with strong links to an urban center. Table 1 shows some basic data of both regions. The Mecklenburg Lake District lies completely in East Germany, the distance to urban centers exceeds 140 km (to Berlin) and the largest town in the region, Neubrandenburg, has only 67,000 inhabitants. The region is characterized by the Federal Office for Building and Regional Planning as a rural area with strong development problems (BBR, 2000). In both regions, tourism is a major factor only in some areas: At the shore of the Baltic Sea in the Lübeck Bay area and around Lake

Müritz, the second largest German lake in the Mecklenburg Lake District, but in other parts rural tourism is developing slowly.

Table 1: Basic data of the two model regions

2002/2003

	Lübeck Bay Area	Mecklenburg Lake District
Area [km²]	1,936	5,810
Inhabitants [1.000]	425	317
Populations density [persons per km²]	219	55
Municipalities (number)	101	249
Tourism (number of overnight stays [mio.])	3.2	2.3
Rate of unemployment [p.c.]	17	25

Source: BMELV, 2002.

The regional development concepts of both regions reflect their different situations, potentials and problems. In both concepts, fostering regional products and marketing and rural tourism are important parts. In the Lübeck Bay area, aspects of environmental and consumer protection are main considerations of the regional goals, and thus integrate special needs of the urban population. On the other hand, in the Mecklenburg Lake district, the focus lies on fostering regional economic development through strengthening value-adding processes, which reflects the region's severe economic and social situation and its high rates of unemployment, outward migration and economic stagnation.

2.3 Method of economic evaluation

To evaluate the economic effects of this kind of project funding, cost-benefit analysis is appropriate. The projects have long-term cost and especially benefit effects, such that the duration of the contribution margin or profit calculation would be too short. For a more econometric analysis (data envelope analysis), necessary data are missing. But the limitations of cost-benefit-analysis have to be considered. Not all effects can be monetarized, the interest rate for discounting future benefits is disputable and future benefits, especially over periods of more than ten years, are only estimations. The economic effects are calculated from a regional project-based point of view. More tourism in the one promoted region could lead to less tourism in other regions, so that from a broader view, the effects would lead to a zero-balance, although they are assessed as a benefit in this calculation. The strictly regional perspective seems justifiable, as the objective of the programs is the promotion of regional economic development. Thus, only the promoted and realized projects and their costs and benefits are integrated in the calculations. Alternatives with a potentially higher interest rate are not considered, so an optimum is not determined.

The calculation itself follows a standard routine, with problems occurring especially in data collection and evaluation. Quantification of inputs (public and private budgets) is possible without data problems, whereas outputs, which in many cases will occur in the future, are insecure, and precise data may be missing or cannot be quantified by project actors. The efficiency of project promotion is calculated by the internal interest rate for different periods, and according to EU-standards in project funding, a minimum interest rate of 5 % should be reached to classify a project's funding as successful. For the Lübeck Bay area, 50 projects in total and 19 detailed analysis projects formed the basis in from 2002 to August, 2005. For the Mecklenburg Lake District, there were 40 projects in total and 15 detailed analysis projects from 2002 to November 2005. The duration of single projects differs, with some running for just months, and some more than two years; thus, the total public budget ranges between € 5,000 and € 400,000. In both cases, regional management was promoted completely by public budget and acted mostly as project management without direct measurable benefits. The overall benefits, including benefits of those projects without detailed evaluation, were assigned regional management (FOCK et al., 2005; NOLEPPA, 2006). Therefore, comparative efficiency is measured by the value of the internal interest rate with the discussed methodological limitations, and the value of 5 % is interpreted as a minimum criteria for efficiency.

3 RESULTS

Calculating economic efficiency leads to efficiency results of single projects, overall regional efficiency and, partly, to cross-program comparisons. With calculations on a single project basis, it is possible to find success factors depending on the project field/objective (i.e., direct marketing, rural tourism, product development, environmental protection, etc.), the kind of project funding (i.e., investments, employment, public relation and marketing) and the project actors (farmers, other profit or non-profit institutions, public or private). The Active Regions program offers a wide range of options because the limitations of funding were very wide. Cross-program evaluation is only partly possible, except with a special interest in future program design due to differing program objectives and different methods of evaluation.

As expected, the results of calculating the economic efficiency on a project basis exhibit a large range. Some projects have a high positive rate of interest, between 20 % and 100 %, in a period of only five years, whereas other projects need up to fifteen years to reach the break-even point or do not reach a positive return on disbursed project funds at all. The differing results are partly due to the respective projects' field and objective. Projects with aim to promote education, consumer protection or environmentally-friendly activities are not mainly undertaken for economic profitability, and consequently, a positive net return is only reached as an exception. In other cases, project management or project performance, not the project's objective, lead to differing success. The efficiency analysis shows that innovation is a main success factor. The funding of well-known standard activities such as direct marketing on farms, or tourism in combination with horse-riding led to positive but low internal interest rates; profit-making effects could be observed in these projects. However, projects with a high degree of innovation, for instance the developing vegetarian ice cream or creating new tourist routes with an emphasis on cultural activities ("Kultur- und Literaturreisen") were the projects with the most outstanding economic results. But innovative projects are naturally much more risky, and public funds function as venture capital in these cases.

For an evaluation of regional profitability, e.g. economic efficiency summarizing the effects of all projects and significant differences in the character of project funding, i.e., in fields like rural tourism or direct marketing, is of interest. Table 2 shows the results for regional profitability. In both cases, positive interest rates are reached in the long-term perspective. Considering only five years, the costs of project funding and maintenance (public and private) surpass the benefits. It must be considered that for both regions, some economically very successful projects largely contribute to positive economic returns (FOCK et al., 2005; NOLEPPA, 2006). In general, the investment of public funds is justified in both cases if the EU criterion of 5 % is taken, especially if non-monetarizable effects that contribute to public welfare, such as improvements in consumer protection, education or gender aspects can be quantified. Three further indicators lead to the generally positive evaluation of the two case studies: The minimum private co-financing rate of 25 %, which was set by the government and reached in both cases (27.5 % and 31.3 %). Secondly, the ratio of investment, which is high, at 150 % of public funds, compared to other promotion programs, and the cost-ratio per sustainable job opportunity of approximately € 100,000, which is rather low.

Table 2: Results of the cost-benefit-analysis on a regional basis

		Internal interest rates in p.c. In			
Characteristics		**5 years**	**10 years**	**15 years**	**20 years**
Mecklenburg Lake District		n.a.	0.8	6.3	8.4
Lübeck Bay Area	(a)	-8.1	6.2	10.2	n.a.
	(b)	-13.7	1.9	6.6	n.a.

Source: Own calculations in FOCK et al., 2005; NOLEPPA 2006.

Notes: a: Official data; b: Adjusted data.

The measurement of intervention success in regional development policy is complicated due to methodological and empirical problems (TOEPEL, 2000). Differentiating the success by project character is therefore, in this study, only possible intuitively, by constructing "clusters" and comparing relative economic profitability and other success factors. In the Mecklenburg Bay District, projects in product development and partly in marketing activities and promoting selling points of regional products, are successful above average. In the Lübeck Bay Area, the above-average projects are found in regional marketing activities and rural tourism, partly combined with cultural activities. The differences reflect the specific regional conditions. The urban-influenced Lübeck Bay area offers better opportunities for recreation and sales volume of regional products. In contrast, in the Mecklenburg Lake District, the favorable farm structure enables the development of new regional products. For regional marketing, a special infrastructure, with central selling points is useful because of the low population density. It is remarkable that non-government actors were, in both regions, able to define projects with high development potential out of the high number of theoretically-possible projects.

A third aspect is cross-program evaluation to determine general success factors for future program design. For the current LEADER-programs, results of economic evaluation are, in general, not available. The mid-term evaluation concentrated on aspects like program development, application of the bottom-up approach and network building according to EU-regulations (SCHWARZ et al., 2003). At this stage, the comparison of programs must concentrate on these aspects. Differences in the program implementation of LEADER and Active Regions are rather obvious and indicate higher economic efficiency in the national model project. The duration of implementation was shorter compared to LEADER, which could only start after two years of program specification and notification by EU-administration. It is obvious that the motivation of non-government actors is harmed by the long delay before implementation. The structure of local action groups and regional partnerships in the "Active Regions" program differs with the emphasis on public bodies in LEADER and private actors in "Active Regions". This is reflected by the character of selected projects and the promoted activities. Under the LEADER-program, projects with a non-profit character dominate and grants are given mainly to non-profit organizations or municipalities (FOCK et al., 2005). Concerning objectives like promoting value-adding processes and regional employment, the adaptation of LEADER appears less successful in the analyzed cases.

4 DISCUSSION

Empirical findings may contribute to the further development of instruments for regional development. Case study results are needed for improving policy design, especially as the "general theory of rural development" is still missing. Transferring experiences one-by-one from one region to another is not possible due to specific regional circumstances. Therefore, the results of the two analyzed regions in Eastern Germany can only serve as a basis for further analysis in other regions. Rural areas in Eastern Germany are influenced, as are others in Central and Eastern Europe, by specific post-socialist factors. Due to the German reunification process, integration into the European Union took place much faster and deficits in rural infrastructure were largely reduced. The starting situation for adopting rural development instruments following the LEADER-approach is only partly comparable to the situation in other Central and Eastern European regions.

The experience with endogenous rural development in one Polish region illustrates the problems and ambitious preconditions for implementation (GRAMZOW, 2005). Deficits in access to capital markets, physical infrastructure, the low income-level and the unfavorable farm and business structure are major obstacles. Positive experience with endogenous development is important. Another important bottleneck is that innovative and cooperative regional actors in administration and non-government associations are engaged in endogenous regional development. The experience in Poland corresponds to results of the mid-term evaluation of "Active-Regions" (KNICKEL et al., 2004), where similar success factors were defined. For many other regions, comparable conditions are given which will complicate the successful adaptation of measures following the LEADER-approach.

Especially in less-favored areas, high co-financing rates cause additional problems (GRAJEWSKI and SCHRADER, 2004). One reason for the quick implementation of the national "Active Regions" program and its higher attractiveness for local actors compared to LEADER is assumed to be its lean structure. Co-financing through different public bodies was not necessary. The possibility of influencing, directly or indirectly, the selection of projects is thus dropped. It is easier to establish an actual decision-making body at a regional level that is trusted by the local population. Under the model character of Active Regions, decision-making competencies are delegated to the regions with almost complete independence, whereas under the current LEADER programs, the supervising role of central administration continues.

With the high participation of profit-oriented actors, the character of promoted projects seems to be shifting in that direction as well. Projects with an innovative character are those with a special economic capacity. In decision-making bodies with a strong private and profit-oriented share, it is more likely that this kind of project will be chosen, which is in contrast to the dominance of public administration representatives, who are more risk-averse.

Objectives such as fostering regional income and regional employment can be supported directly, whereas infrastructure and non-profit projects can only be achieved indirectly. At least for the two analyzed model regions, the decision-making process shows satisfying results. Nevertheless, without a strong civil society, it will be difficult to realize the possible surplus of endogenous development strategies like "Active Regions" and the LEADER-approach. Transferring these instruments to rural areas in the new member states requires careful measurement, especially for less-favored areas with structural problems and weak societies.

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