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Price Support at Any Price?

Costs and Benefits of Alternative Agricultural Policies for Poland

Witold M. Orlowski

Poland's agriculture sector
can defend its income only by
becoming more effi...
by relying less on pr...
supports and reduc...
employmen, amon...
things.

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Summary findings

Orlowski argues that Poland must choose an agricultural policy that promotes efficiency, structural change, and adjustment to the new market environment and eventual membership in the European Union. That policy must take into account both the needs of, and the financial constraints on, Polish agriculture.

Results of simulation experiments performed with the use of the computable general equilibrium model of the Polish economy suggest that Common Agricultural Policy-type price supports are not the most efficient agricultural policy for Poland. Orlowski discusses alternative policies and scenarios.

Rather than discuss whether the relationship between farmers' incomes and average Polish wages is fair, Orlowski analyzes whether medium- and long-term development trends in the Polish economy may cause this relationship to deteriorate, and what policies will counteract those trends. Rapid growth in the nonagricultural sectors combined with real appreciation of domestic currency (caused either through good current account performance or significant capital inflows) may jeopardize farmers' relative income position. And such developments are probable if positive projections for economic development and membership in the European Union are realized.

The agriculture sector can defend its relative income only by becoming more efficient.

Price supports improve farmers' relative income but at a high cost to taxpayers and consumers and to macroeconomic efficiency. To meet these costs, Poland must put in place firm quantity controls. But the best strategy would be to avoid price supports until the moment of joining the European Union's Common Agricultural Policy, says Orlowski.

In the interim, policies aimed at reducing farm employment seem most appropriate. Orlowski discusses two such policies: encouraging older farmers to retire and promoting jobs in rural areas.

He also proposes two feasible scenarios for integrating Polish agriculture with that of the European Union by 2005–10.

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1. Introduction

The economic transformation of Poland, started in 1990, has resulted in a new, more open and competitive environment for all economic agents. Polish agriculture has found itself in a totally new situation. The new market conditions require a deep structural adjustment, in a search for a new equilibrium position. The Polish agriculture has to face two major challenges:

(1)   General *liberalization* of the economy, and particularly opening to the world market and a market-led economic growth;

(2)   *Integration* with the European Union, that will eventually lead to a full membership of Poland in EU.

Is the Polish agriculture of today ready to face these challenges (taking into account that both targets,liberalization and adjusting to highly regulative EU agricultural policies, are to a certain degree contradictory)? And, if the answer is "no", what policies may ease the way to the new equilibrium? We have tried to answer these questions, using a Computable General Equilibrium model of the Polish agricultural policy.

A good starting point for the analysis was provided by a report on the agricultural strategy for Poland, prepared by a Polish/EC/World Bank team in 1990 (Agricultural Strategy for Poland, 1990). The main conclusion of the report was that the key issue of adjusting of the Polish agriculture to the new market environment does not lie in the farm sector, but in the agribusiness sector. The report stressed necessity to improve its efficiency by privatization, demonopolization and appropriate policies encouraging rural development. The key message of the report - the need to improve the agricultural and rural market environment - remains, beyond any doubt, valid. However, the experience of the years 1990-94 shows that the abilities to adjust of the farm sector might have been judged in a somehow too optimistic way. Also the economic, political and social developments of these years have modified external conditions of the agricultural policy. In this paper we try to evaluate costs and benefits of policies that ease a process of transformation of the farming sector.

The issue of the agricultural policy, its costs and benefits, seems to be particularly interesting, given a broad dispute on problems connected with the eventual membership of Poland in the European Union (EU). Polish agriculture will be therefore included in a framework of the Common Agricultural Policy (CAP), with all -good and bad - consequences. Economists generally stress costs of extending CAP to Poland, and the other Central and Eastern European (CEE) countries. However, differences among authors in estimating these costs are sizeable. While the lowest estimates for CEE countries reach about ECU 3-4 bn per year (CEPR, 1992; Baldwin, 1994, Tangermann, 1994), the highest ones reach ECU 40 bn per year (Anderson and Tyers, 1993). Also policy recommendations given by various authors to the CEE countries in a pre-accession period vary. Some authors propose an immediate introduction of a CAP-type price supporting system (however, with target prices much lower than in the EU, see Nallet and Van Stolk, 1994). Others claim that the CEE countries should avoid rapid increases in their agricultural prices; after all, one does not know what the EU price level

will be in 10 years' time, given the GATT Urugway Round Agreement (URA) and a likely reform of the CAP (Mahé, 1994, Buckwell, 1994, Tangermann, 1994, Tardidi, 1994). Finally, some authors suggest that an extension of the CAP to CEE countries in not feasible at all in the foreseeable future, because of high budgetary costs (Anderson and Tyers, 1993, Baldwin, 1994). The conclusions are generally drawn from partial equilibrium models, with assumed parameters that decide about the supply response of the CEE agricultural sector to higher price levels.

What should be an appropriate agricultural policy for Poland? The answer depends on an appropriate setting of targets of such a policy. The obvious choice would be to set targets similar to the CAP. The Treaty of Rome (Art.39, §.1) calls for a policy that allows: (1) to promote efficiency growth, (2) to achieve a reasonable balance between farmers' income and incomes coming from other activities, (3) to stabilize markets and to achieve a certain level of self-dependence in agricultural production ("security of supply"), (4) to stabilize prices for producers and consumers. These targets do compete one with another, so the problem of definition of an objective function has a crucial meaning for setting the agricultural policy. In fact, the progress in achieving the above goals by the CAP is considered as very slow (Bowler, 1985) while the costs of the policy - namely transfers from taxpayers, consumers, and macroeconomic costs of resources misallocation - exploding (Hill, 1984).

One may ask whether an agricultural policy of price/income supporting is necessary at all. Munk gives a review of the discussion on reasons for implementing agricultural policies, generally based on welfare economics (Munk, 1993). Let us note that almost all the industrial nations have implemented active agricultural policies (today, New Zealand is the only case of the agriculture nearly without subsidies). At the same time there is an overwhelming criticism of these policies, considered costly, non-efficient, protectionist and market-disrupting. If one wants to generalize very broadly, the main reason for implementing policies supporting agricultural prices or incomes is provided by the growing gap between productivity of labor in traditional agriculture (based on medium-sized family-owned farms) and that in the other sectors of the economy. An income generated in the agricultural sector (in normal market conditions) would not allow farmers to have a living standard comparable to the nation's average. Thus, the alternatives for the policy would appear to be either to allow traditional agriculture to be replaced by specialized, industrial-type food production (and the major part of the existing agricultural labor force shifted to the non-agricultural activities) or somehow increase farmers' income. The first option is likely to entail considerable transactional social costs. The second option brings the risk of dismantling (or at least severely interfering with) the market mechanisms and entailing large costs for budget and consumers. In our view, agricultural policy is in fact a macroeconomic rather than sectoral issue: how much can the nation afford (in the form of direct and indirect transfers to the agricultural sector) to achieve fulfillment of certain social targets, and what tools should be used to minimize the cost of the policy. There is also a microeconomic problem connected with it: what tools should be used to minimize the market distortions caused by the policy.

In this paper we will argue that *the most efficient way in which Poland can secure a reasonable level of farmers' income involves an accelerated reduction of agricultural employment*. A very high agricultural employment, and a small average size of farms, represents the biggest gap

between Polish agriculture and the agriculture of the European Union (Poczta, 1993). Therefore, a policy aimed at reducing agricultural employment allows to achieve two goals at the same time: increasing average income and easing the way of integration with the EU.

2. Agricultural Policy - Does Poland Need It?

This section discusses the starting point for the analysis. The basic questions are:

(a)   What is the current level of development of the Polish agricultural sector, and what structural reforms are necessary to improve its efficiency?

(b)   Are there clear development trends that may result in a deterioration of farmers' income relation relative to other households in the medium- and long-term?

(c)   What factors are crucial for integrating the Polish agriculture with EU?

2.1 Polish agriculture in early 1990s: structural problems

Poland has inherited from communism a mostly private, but inefficient agriculture of an extremely traditional structure. The agrarian structure is dominated by small-sized family-owned farms (farms below 10 hectares i.e. 25 acres represent over 80% of the total population of farms and use almost 57% of a land, a very high proportion by European standards, see Figure 1).

Productivity of labor is very low: employment in agriculture reaches 3.6 mn people (25% of total employment, 1993), while gross value added produced in agriculture is only slightly above 6% of total Polish GDP. The productivity of capital is almost as low as in the case of labor. The key problem is an inefficient structure of agriculture that does not allow to make good use of production factors (Poczta, 1993). Another problem is the efficiency of
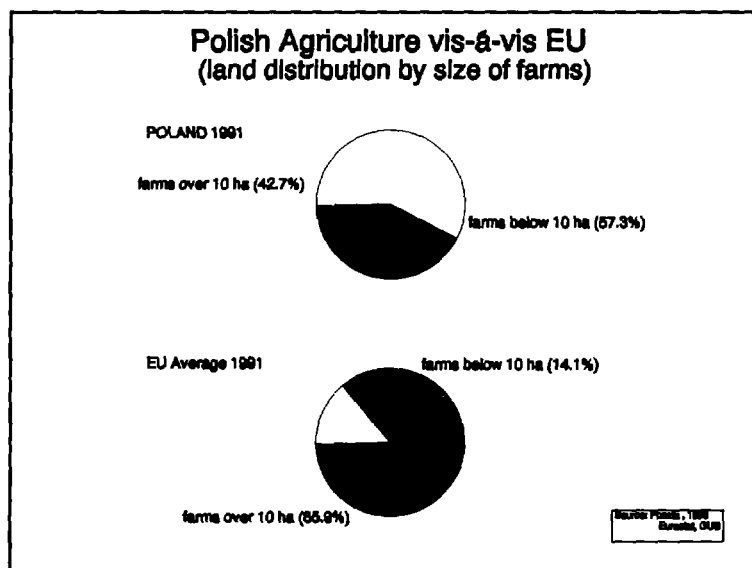

Figure 1

distribution and processing of agricultural products, which is also relatively low (Agricultural Strategy for Poland, 1990).

At the starting point of the economic reforms in the early 1990s, the average competitive position of Polish products on world markets remained quite good. New concessions were given to agricultural exports by the association agreement between Poland and the EU (increased quotas, some reductions of tariffs; Czyzewski, Orlowski, Zienkowski, 1993b). Nevertheless, the rise of agricultural prices to (or above) the world prices level resulted in a growing competition on the national market between imports and domestically produced goods. Such a situation created a threat to the interests of Polish producers. In result of this, an agricultural policy debate started. The agricultural lobby pushed for the introduction of a system of high tariffs, variable levies and non-tariff barriers, as well as towards budget-subsidized preferential credits and minimum prices for basic products. Eventually, after an initial liberalization and a fall of the Producer Subsidy Equivalent (PSE, a measure of a level of protection of agriculture) to a low negative level in 1990-91, a new system of protection was put in place (the level of protection vary depending on sectors). Total transfers to farmers in 1993 were estimated on a level of $ 2.4 bn[1] (the PSE around 15%, compared with about 48% in the EU, OECD 1995).

The Polish farming sector, although mostly private, has had considerable problems in adjusting to the new market conditions. Prices liberalization has resulted in a substantial deterioration of the position of agriculture with respect to the other sectors: the terms of trade of agricultural products vis-á-vis non-agricultural products bought by farmers worsened during 1990-91 by more then 60%[2]. A reduced level of demand for food resulted in a totally new situation of production surpluses. During the period 1990-93, the gross agricultural output decreased by 13% (however, the fall was observed mainly in the state-owned sector; the fall of output in private farms was only 3%). Low adjustment abilities of the traditional farming sector, caused by an inflexible production function and a role of the sector as a resource reservoir (Timmer, 1989) may represent a major impediments to restructuring the Polish agriculture in a medium- and long-run. Therefore, an appropriate agricultural policy for Poland should concentrate on factors that make the adjustment easier and faster.

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[1] Excluding subsidies to KRUS (social security fund for farmers). In this text we follow the OECD methodology of excluding this type of subsidies from agricultural policy costs. We treat social security as a separate issue (subsidies are paid not only to the social security fund for farmers).

[2] One may argue, however, that the terms of trade that the agriculture enjoyed in late 1980s were artificially high, mainly due to effects of a initial food prices liberalization performed in a chaos of the disintegrating command economy. Terms of trade of agriculture vis-á-vis other sectors, relatively stable until 1987, started to grow rapidly (in favor of agriculture) in the years 1988-89. If a relation of prices of agricultural products to goods and services bought by farms in 1986 stands for 100, in 1989 it has reached 122. Even a more dramatic growth was observed in a relation of prices of agricultural products to non-agricultural inputs purchased by farms: the relation grown from 100 in 1986 to 136 in 1989.

The Polish farming sector is not homogenous. Private farms may be divided into two categories: a *dynamic sector*, about 45% of farms, which increase productivity and output, producing about 60% of the value added, and a *stagnating sector*, where productivity and output are falling (Hunek, 1995).

Polish Agriculture viv-a-vis EU
(indices, EU-12 average=100)

	Polish agriculture 1991	of which: developing sector (see text)
Average farm size		
Value Added/farmer (PPP adjusted XR)*		
Value Added/farmer (current XR)*		
Gr.output/farmer (physical measures)*		
Gross output/ha (physical measures)*		
Employment in agric.per 100 ha		
Value added in agric. (% of GDP)		
Farmers (% of total empl.)		

0   100   200   300   400   500

EU Average=100

■ Polish agriculture 1991

☐ of which: developing sector (see text)

* 1986-1990 average

Source: Poczta, 1993
Hunek, 1994, Eurostat, GUS

Figure 2

Figure 2 provides a comparison of the current situation of the Polish agricultural sector and the EU average. The black bars show the average indices for the whole sector, the white bars refer to the dynamic sector.

The figure shows that gross output per hectare is similar for Poland and the EU if measured in physical measures. However, the relation deteriorates dramatically if related to the number of farmers: the Polish farmer produces only a small fraction of the output and value added produced by the average EU farmer (around 25-30%). Also the average farm area represents less than 40% of the

EU level[3]. Let us note, that all the measures are slightly better when only the dynamic sector is taken into account. The main message of the figure is as following: Polish agriculture employs 4 times more farmers per hectare that the Western European agriculture. With a comparable level of output per hectare, all efficiency parameters (per farmer) are several times smaller in Poland. *Reduction of the excess employment in agriculture is the main structural problem that must be solved* to improve farmers' income and to integrate successfully with the EU. It is also a condition for making an appropriate and efficient use of the other production factors (Poczta, 1993).

2.2 Income parity: what may endanger it?

The fall in the income relation (a ratio of average income per farmer[4] and average wage outside agriculture) in 1990s is always used as a main point while advocating a need to support the agricultural sector in Poland. One may argue, however, that the situation of Polish farmers is not as bad. *First*, as it was mentioned above, the fall in the income relation is measured with respect to an artificially high base of late 1980s. *Second*, a significant part of farmers' income is coming from outside farming activities (data of the IERiGZ, the Institute of Economics of Agriculture and the Food Economy, based on sampling, show that around 50% of income of farmers is coming from non-farming activities). *Third*, the situation differs substantially between the dynamic sector and the stagnating sector, so the average change in the income relation may be misleading.

This paper does not discuss whether the current income relation is high enough or not. It rather tries to analyze whether there are medium- and long-term development trends in the Polish economy that may lead to deterioration of this relation.

For the analysis we use a Computable General Equilibrium model of the Polish economy POLAGR (see Box 1). The model was specially developed for evaluating effects of various agricultural policies.

Sensitivity analysis is used in order to assess the factors that may endanger the level of the income relation. We start from the base solution of the model (a steady case) for the period 1991-2010, and see what directions of changes in the income relation generated by the model are caused by changes in key macroeconomic factors outside agriculture[5]. In the base run we generate a steady growth path *without any active agricultural policy* (i.e. without price/income supporting). The

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[3] The comparisons with the EU average may be misleading: a 16.5ha EU average farm size reflects both, the 70ha farms of UK (10 times a Polish farm area), and 5.5ha Greek farm (smaller than the Polish average farm).

[4] It should be stressed, that the income of farmers includes both income from farming activities and from other sources (wage income, social security transfers,other transfers).

[5] Using the year 1991 as a starting point is connected with a fact, that the PSE level in that year was on a low level close to zero (estimated at -3%).

Box 1. The most important properties of the POLAGR Model

The model belongs to a type of Computable General Equilibrium (CGE) models. The most important assumptions underlying construction of such models are:

(1) Prices of goods and factors are flexible, and are determined by the demand and supply.

(2) Both producers and consumers try to maximize their utility functions, that leads to reactions to price changes (generally speaking; a growth of prices makes consumers reduce their demand, and producers increase the supply).

(3) Production factors are mobile, move freely across sectors.

A logic of CGE models is that at a given income level and production factors distribution, the demand for goods and services is confronted on all the markets with the disaggregated supply. If the markets are not in equilibrium, price adjustments take place. Changing prices change sectoral profitability of production, leading to a change in demand for and in the sectoral distribution of production factors. The demand for production factors is confronted on the factors' markets with the supply, determining prices of factors, end eventually leading to a new income structure. The model is being solved until such a vector of prices is found, that allows for equilibrium on all the markets, full utilization of production factors, and a maximal possible level of utility for consumers and producers (the general equilibrium solution). The income of all economic agents (households, firms, government, world) is divided between consumption and savings. Savings determine investment and therefore the economic growth over time (the models are generally savings driven). Please note, that high budget deficits and net exports reduce saving (of government and world, respectively) and slow down growth.

In the POLAGR model, a set of assumptions was introduced to capture characteristic features of the agricultural sector in Poland's economy of transition. *First*, it is assumed that the labor employed in agriculture is not mobile in a short run (i.e. one year; the capital is not assumed to be mobile in a short run, neither). However, both agricultural labor and capital are mobile in a longer run. Mobility of the agricultural labor is explained by a model, linking outflow of labor from agriculture to other sectors with the income relation (farmers' income to average wage), and with a number of job offers in non-agricultural sectors of the economy (parameters of this model were estimated on Polish 1980-93 data, and verified by international comparisons). Capital medium run mobility is reflected by a model linking investment to returns on capital in various sectors.

Second, the agricultural output is assumed to be price inelastic in a short run. The domestic output depends on decisions taken in the previous period, based on price relations in that period (therefore, the supply of domestic agricultural products in a given period does not change, even if prices change; the effects will be observed only in the next periods).

Third, in the case of 8 basic agricultural products we assume, that prices are not flexible and do not clear the markets. The prices are either equal to world prices (in the absence of a price supporting policy), or set on a level that is higher than the world price level (in such a situation, the model calculates variable levies and subsidies to exports that fill a gap between domestic and world prices). As prices are not flexible, the markets for the 8 basic products are cleared by the additional imports (if demand is bigger than supply) or exports (if production surpluses appear). The model does not allow for cumulating stocks of a surplus production over time - the surpluses are exported in a period at which they appear, if necessary with export subsidies.

The graph showing the model structure, as well as information about the model disaggregation, database and parameters may be found in the Annex.

active agricultural policy as well, but seeks for alternative growth paths. Therefore, the analysis concentrates on evaluating effects of a different path of growth on the income relation, without any policy counteraction (the results should be interpreted as likely directions of changes rather than forecasts).

Economic growth assumed in the base solution (generally based on the long-term projections of the World Bank, 1994) reaches 4.4% yearly (see table 2.1), with growth of investment considerably higher than growth of consumption. A 3.7% annual increase of the personal consumption is not equal for all groups of goods and services. Consumption of food products grows only by 1.7% yearly and consumption of non-food goods and services by 4.6%. Structural changes in agriculture are moderate. The number of farmers falls by one quarter between 1991 and 2010 (average yearly fall of 1.6%) and the average farm area grows by more than 2 hectars. As growth of output per farmer reaches 3.3% yearly, and average wage grows only by 3% yearly, a 11% increase of the income relation takes place.

Tab.2.1 The base solution - main indicators

	Index		Average growth rate
	1991	2010	
Gross Domestic Product	**100.0**	**224.9**	**4.4%**
of which:			
Personal Consumption	100.0	200.2	3.7%
Fixed Capital Formation	100.0	363.2	7.0%
Income Relation (farmers' income/wage)	100.0	110.8	0.5%
Number of farmers (in millions)	3.285	2.416	-1.6%
Average farm area (in hectars)	6.3	8.6	1.6%
Output per farmer	100.0	184.6	3.3%

Source: Model POLAGR, simulation Jan.1995

In the sensitivity analysis, three factors that may have an important impact on the income relation were taken into account:

(a)   the rate of growth of GDP in non-agricultural sectors;
(b)   the scale of the real appreciation of zloty;
(c)   efficiency gains in agriculture (we define efficiency gains as growth of value added exceeding growth of output).

Figure 3 shows the likely impact of the growth rate outside agriculture on the income relation[6]. The base run assumes a 4.4% average GDP growth rate in the period 1991-2010. The sensitivity analysis shows, that *the higher the growth rate, the bigger the risk of the fall in the income relation*. This is mainly due to a fact that a higher growth rate is accompanied by higher growth of productivity in non agricultural sectors and higher growth of real wages.

Sensitivity Analysis
Income relation and GDP growth rate

Income relation (farmers/average)

average growth 3.4%

average growth 4.4% (base)

average growth 5.4%
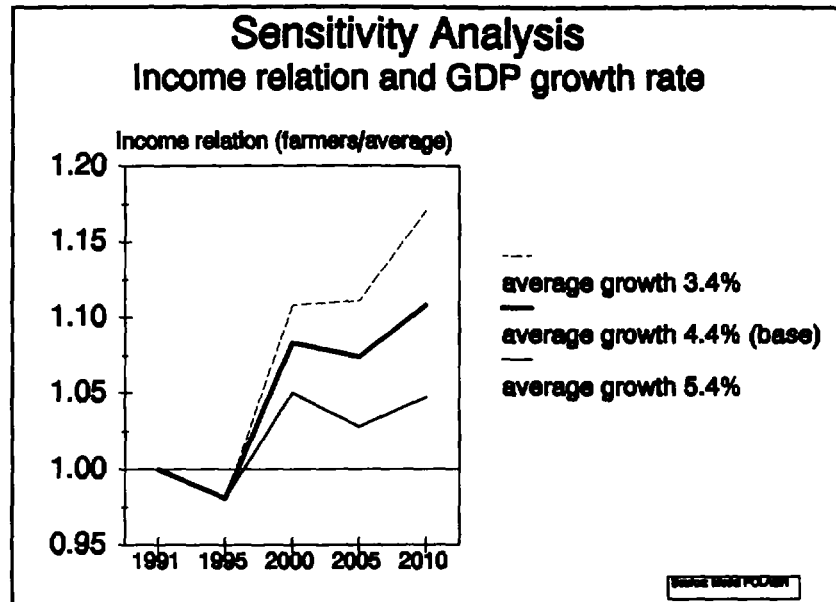
Figure 3

Figure 4 shows the impact of real appreciation of the domestic currency (defined as a rate of devaluation lower than the inflation rate) on the income relation. The impact is negative: *the higher the real appreciation, the bigger the risk of a fall in the income relation*. This result is due to the current level of prices of basic agricultural products in Poland, close to the world market level. Therefore, a real appreciation of zloty makes Polish food non-competitive on the world market (if exports are not subsidized). Moreover, as prices of basic agricultural

Sensitivity Analysis
Income relation and zloty appreciation

Income relation (farmers/average)

no real appreciation (base)

real appreciation 33%

real appreciation 66%

Figure 4

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[6] As the graphs show, increase of the income relation over time is not smooth even in the base run. Differences among various subperiods are mainly caused by demographic trends (the model produces detailed projections of a process of retirement of farmers, based on the demographic structure observed in 1991).

products are linked in the model to the world prices, the income from farming activities is linked to them as well. If the real appreciation of zloty takes place, the level of agricultural income remains almost unchanged in dollar terms, that means a relative fall terms).

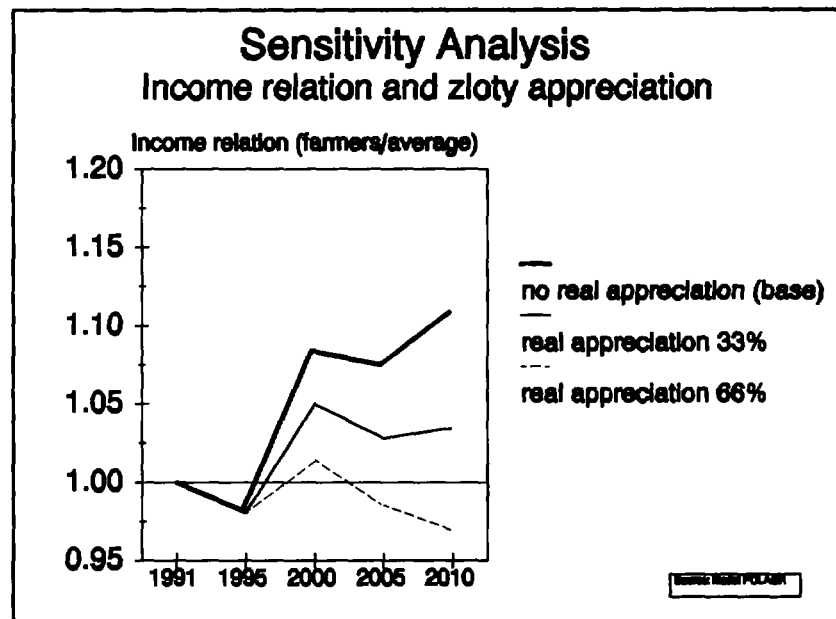Figure 5 presents the impact of efficiency gains in agriculture on the income relation. In the base run, no such gains was assumed. In the sensitivity analysis we have tested the impact of 1-2% yearly efficiency gains (the gains of this order were recorded in Western Europe). *The higher the efficiency gains, the smaller the risk of the fall in the income relation.*

Sensitivity Analysis
Income relation and efficiency gains in agriculture

Income relation (farmers/average)

yearly efficiency gains 2%
yearly efficiency gains 1%
no efficiency gains (base)
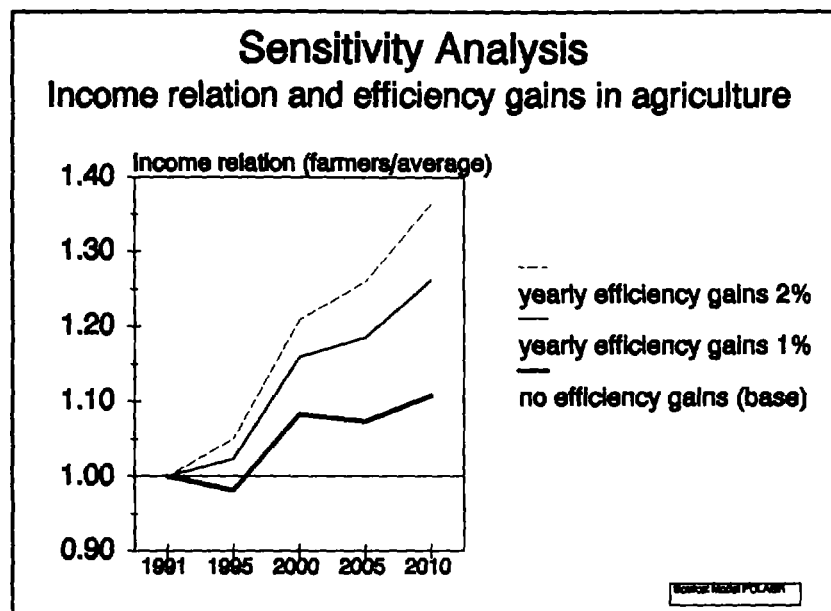
Figure 5

The conclusions that can be drawn from the sensitivity analysis are that a fast rate of growth of non-agricultural sectors, accompanied by the real appreciation of the domestic currency (caused either by a good current account performance, or by a significant capital inflow), may seriously jeopardize the relative income position of farmers. Such developments are quite probable, if the positive scenario of the economic development and integration with the EU realizes. The agricultural sector may defend successfully the income relation by increasing its efficiency (reducing input requirements).

2.3 Integration with the European Union

An active agricultural policy may be required by the process of Poland's accession to the EU. Extending the CAP to the new members from Central and Eastern Europe is seen as one of the main challenges for the enlargement. The basic question is whether CEE countries should introduce a price supporting system as a necessary condition for the accession (a price *supporting* system, not only a price *stabilizing* system), and what would be costs of such a system.

It is generally known that the most important part of the CAP is a price supporting system, that causes EU market prices to be far higher than the world prices level for the lion's share of the

agricultural production. This requires huge transfers from consumers and taxpayers to farmers, as well as a complicated system of border barriers (import levies and export subsidies) that allow EU exporters to sell goods abroad at world prices, and to import food without creating a threat for EU producers. At the same time free circulation of agricultural products within the single market of the EU is provided for. A precondition for integrating national food markets into a single, barrier-free common market, is the same (or similar) level of price supporting[7].

Such a requirement does not mean, however, that CEE countries must introduce a CAP-type price supporting system immediately. *First,* we do not know what will be the CAP of 2010. Both the commitments made by the EU under GATT (URA) and internal pressure to reduce budgetary costs (MacSharry's reforms) are likely to result in lower food prices in the EU. *Second,* one should avoid too high costs of the system (they may create too heavy a burden for the EU budget, and by far too heavy if Poland is to cover the costs from its own resources - it must be the case, until Poland becomes a full member of the EU, Tangermann, 1994). *Third,* the burden of transfers to farmers may be relatively higher for Eastern European consumers than for Western Europeans, given much higher share of food in consumer expenditures. *Fourth,* introduction of a price supporting system, even if initially the key parameters (target prices) are low (as proposed by Nallet and Van Stolk, 1994), is an invitation to a political game. The pressure to increase the parameters may easily make the system unbearable for both consumers and taxpayers. *Fifth,* agricultural sectors of CEE countries, and particularly of Poland, need restructuring. Any system that slows down restructuring (and an artificially high level of food prices and farmers' income does) should be avoided.

Moreover, introducing price supporting is not panacea for the integration. After entering a single market farmers from CEE countries will have to face strong competition from much more efficient Western Europeans. If the productivity gap is not reduced, the Central European, and especially Polish farmers will have to compensate the low productivity by low labor costs. Therefore, and quite paradoxically, high prices may not translate into high income after joining the CAP.

The four reports prepared for the DG I (Mahé, 1994, Buckwell et al., 1994, Tangermann et al., 1994, Tardidi et al., 1994) stress the point that full integration requires full participation of the CEE countries in the single market (and, therefore, in CAP), but suggest keeping price support on a low level until joining the EU as the best strategy. Therefore, *increasing the price level may be inevitable at one point; nevertheless, it is probably not a right, and beyond any doubt not the only imaginable strategy for the pre-accession period.*

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[7] In fact, a system of "green exchange rates", special exchange rates that are used for calculating national prices of basic products and may differ from market exchange rates, causes certain differences in price levels even within the EU (Bowler, 1985).

3. Price Support: Timing and Costs

The analysis of the likely effects of various agricultural policy mixes for Poland presented in chapters 3-5 is based on simulation analysis performed with the use of the CGE model POLAGR.

The model is solved for the 19-year period 1991-2010 (in fact, the agricultural policy variables are not changed before the year 1995). The base solution of the model (or the steady case) represents a steady growth path of 4.4% (yearly average). *In the base case, no active agricultural policy is applied* (the base run assumes a dynamic continuation of the situation from 1991, with the PSE level close to zero). The simulation experiments assume certain agricultural policy mixes (namely price supporting, various forms of income supporting, investment incentives etc.). *Deviations from the base run calculated for every experiment represent an evaluation of the agricultural policy effects (costs and benefits).*

Agricultural policy cost measures used the model are shown in Box 2. Benefits are measured by the income relation (a ratio of per capita income of farmers, both from farming and from other sources, to the average wage), decrease of the number of farmers, productivity growth and the macroeconomic impact.

Box 2. Policy cost measures in the POLAGR model

The POLAGR model uses agricultural policy cost measures comparable with the OECD methodology (OECD,1994,Annex III).

Cost for taxpayers is defined as a net cost of exporting production surpluses (export subsidies minus revenue from import levies) + direct payments to farmers + policy costs not connected with price or income support (including investment incentives for job creation but excluding social security payments) :

$$C_{Tax} = E^*(P_{Dom}-P_W)-M^*(P_{Dom}-P_W)+DP+PC_{NPIS}$$

where: E=exports, P_{Dom}=domestic producer price, P_W=world price, M=imports, DP=direct payments, PC_{NPIS}=policy costs not connected with price or income support.

Cost for consumers is derived from a Consumer Subsidy Equivalent (CSE) concept and is equal to:

$$C_{Cons} = Q_C^*(P_{Dom}-P_W)$$

where: Q_C=volume of consumption. The cost is therefore equal to consumer welfare loses caused by higher P_{Dom} prices they have to pay for food (dotted area *ABDE*). Please note, that the cost is smaller that the total welfare loss, caused both by higher prices and by reducing the volume of consumption from Q^* to Q_C (area *ABCDE*).
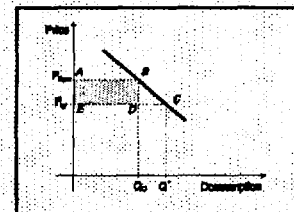
Producer Subsidy Equivalent (PSE) is defined as:

$$PSE = (Q^*(P_{Dom}-P_W)+DP+OS)^*100/(Q^*P_{Dom}+DP)$$

where: Q=volume of production. PSE informs what percent of the producers' income from farming is due to the price support or direct income support.

This section evaluates the effects of various strategies of targeting EU prices level. The question we try to answer is: what is the best strategy of approaching EU prices, that allows to avoid excessive costs and that is coherent with the URA commitments of Poland?

3.1 Targeting EU prices: how and when?

Series of simulation experiments allow to evaluate effects of various strategies of targeting EU prices. Let us start from formulating a list of possible options for Poland. The generally recognized list of options is as follows (Tangermann et al., 1994):

(a) Fast approach to the current EU price level, with all budgetary consequences (FAST PATH experiment).

(b) Fast approach to the current EU price level, combined with firm supply controls that allow to keep budgetary expenditures under control. Price support only applies within production quotas, while production in excess of quotas is punished by penalties (FAST PATH/OUTPUT REDUCTION experiment).

(c) Transition of Poland to common EU prices after the accession, assuming that a liberal reform of the CAP takes place and the EU price level is reduced after 2000 (LAST MOMENT INTEGRATION experiment).

Every strategy of targeting EU prices leads to various costs for taxpayers and consumers. Moreover, every strategy has its own macroeconomic impact. Generally speaking, one may expect that the earlier the artificial price level is introduced, the bigger misallocation of resources and the slower the path of restructuring and reducing the excess employment (the income relation has an evident impact on farmers' decisions to move to other activities, particularly in the case of young farmers, OECD, 1994).

In the FAST PATH experiment, we have assumed that the price level in Poland is increased to the current EU price level by the year 2000. No output reductions, or any other constraint is enforced.

In the FAST PATH/OUTPUT REDUCTION experiment, we assume firm quantity controls (output reductions from the potential level growing to 10% of the gross output), that allow to keep total transfers to agriculture (an aggregate measure of support) at a level compatible with Poland's commitments to GATT (below $ 3bn yearly[8], Polish GATT schedules according to SAEPR, 1995).

In the LAST MOMENT INTEGRATION experiment, we assume that the price adjustment takes place between 2005 and 2010 (in a transition period, after Poland becomes a full member of the EU). Thanks to the CAP reform, the EU price level in 2005 is assumed to be lower (differences between world prices and EU prices reduced by 50%).

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8 The commitments as measured by the Agregate Measure of Support (AMS).

3.2 Targeting EU prices: simulation experiments results

Three experiments lead to different results. First, the costs are quite different.

Table 3.1 shows policy costs indicators for three experiments[9] (all the tables show deviations from the base run). In line with the OECD definition, the total policy cost shown in the third row does not include an increase in social security payments (covered from the general revenue of the budget).

Tab.3.1   Targeting EU prices
     Simulation experiments: POLICY COSTS

	Fast path (EU prices by 2000)		Fast path/output reduction (EU pr. by 2000, quotas)		Last moment integration (50%EU prices by 2010)	
	2000	2010	2000	2010	2000	2010
In $ billions(91 prices): (1) Cost for taxpayers (2) Cost for consumers	1.67 1.55	5.09 1.77	1.00 1.56	0.68 1.81	0.00 0.00	0.35 0.89
Total annual cost **(1+2)** (excl.social security)	**3.22**	**6.86**	**2.56**	**2.49**	**0.00**	**1.24**
Increase of social security expenditures	-0.06	-0.13	-0.06	-0.09	0.00	-0.03
Producer Subsidy Equivalent (PSE) in %	33.4%	43.5%	28.8%	23.8%	0.0%	14.1%

Source: Model POLAGR, simulation Jan.1995

The FAST PATH experiment leads to an extreme! expensive policy. The total policy costs reach almost $ 7bn by the year 2010 (PSE on the EU level), violating Poland's GATT commitments and putting an unbearable burden on the taxpayers and consumers.

The high policy costs are not only due to the higher (supported) domestic price levels. Other factors influencing the outcome are both increased output (supply response to higher prices) and depressed domestic consumption. This leads to increase in production surpluses, making integration of the Polish agriculture in the CAP of 2010 more costly for the EU budget (production surpluses are twice as big as in the base run) . Such a phenomenon does not appear in two other scenarios: In the FAST PATH/OUTPUT REDUCTION experiment a slowdown in domestic food consumption is accompanied by a similar slowdown in domestic output caused by quantity control, and in the LAST MOMENT INTEGRATION experiment domestic food consumption is only slightly lower than in the base run (in both experiments production surpluses are close to the base run values).

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[9]For a definition of cost see Box 2.

The FAST PATH/OUTPUT REDUCTION experiment leads to much lower costs (within the GATT commitments), as the production surpluses remain low and high prices are applied only to limited production quotas. In the LAST MOMENT INTEGRATION experiment, policy costs do not appear before 2005. However, as the domestic demand is relatively high, and the price level lower than in the other experiments, policy costs are also much smaller.

Figure 6 presents a comparison of policy costs in the three experiments. The FAST PATH experiment appears infeasible, as costs are exploding. Therefore, only the FAST PATH/OUTPUT REDUCTION experiment may be treated as a feasible scenario for a fast path of price level adjustment (the cost stabilizes on an acceptable level). The last experiment does not cause, by definition, any costs

Figure 6

before Poland's accession to the EU (by that time, a big part of costs is likely to be covered by the common CAP budget). The costs in 2010 are lower than in the other scenarios, mainly because of a lower level of EU prices. However, a part of cost reduction comes also from a slightly higher level of the personal income, that leads to bigger domestic consumption of food and reduces production surpluses.

The next figure shows a comparison of the policy results with respect to the income relation (one of the primary policy targets). The best improvement is obtained in the FAST PATH experiment (the income relation 50% above the base run level). However, such a result requires unbearable costs. A feasible variant (FAST PATH/OUTPUT REDUCTION) stabilizes the income relation on a level 20% above the base run. Exactly the same result is obtained by the year 2010 in the LAST MOMENT INTEGRATION experiment.
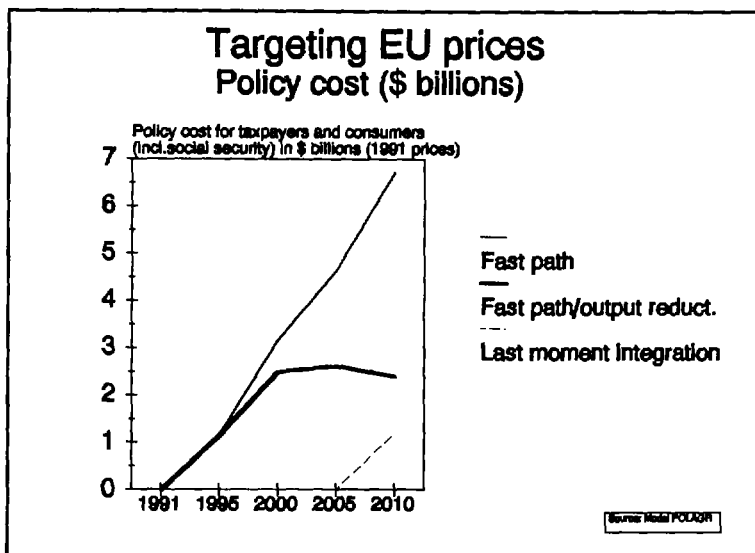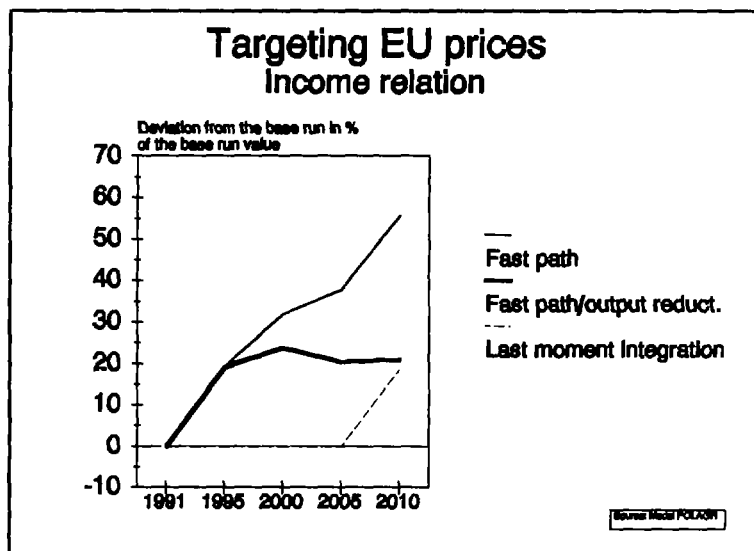
Figure 7

Table 3.2 gives basic characteristics of the impact of various paths of EU prices targeting on the agricultural sector.

Tab.3.2 Targeting EU prices
    Simulation experiments: POLICY EFFECTS

	Fast path (EU prices by 2000)		Fast path/output reduction (EU pr. by 2000, quotas)		Last moment integration (50%EU prices by 2010)	
	2000	2010	2000	2010	2000	2010
Income Relation (farmer's income/wage) index, 91 level=100 index, base sol.=100	142.9 131.9	172.4 155.6	134.1 123.8	133.9 120.3	108.3 100.0	131.6 118.7
Number of farmers in millions index, base sol.=100 Employment in agriculture as % of total	3.085 106.6	2.780 115.1 18.1%	3.084 106.6	2.651 109.7 17.3%	2.894 100.0	2.416 100..0 15.8%
Average farm area in hectares index, base sol.=100	6.7 93.8	7.4 86.9	6.7 93.8	7.8 91.1	7.2 100.0	8.6 100.0
Output per farmer index, 91 level=100 index, base sol.=100	126.3 95.7	216.4 117.2	118.4 89.7	164.1 88.9	131.9 100.0	184.6 100.0

Source: Model POLAGR, simulation Jan.1995

The path of reduction in the number of farmers (27% reduction in the base run), remains the same in the LAST MOMENT INTEGRATION experiments, but slows down considerably in both FAST PATH and FAST PATH/OUTPUT REDUCTION experiments (the number of farmers in 2010 is, respectively, 15% and 10% above the base run). Consequently, the average farm area grows only to 7.4-7.8 ha (in the base run 8.6 ha). An artificially supported high income relation creates a major disincentive for the labor mobility in agriculture, discouraging farmers from searching for a job outside farming.

The output per farmer value increases considerably in the FAST PATH (a supply response, leading to production surpluses and unbearable costs), and falls in the FAST PATH/OUTPUT REDUCTION experiment (10% below the base run). This means that both FAST PATH experiments lead to undesirable effects: either a slowdown in reduction in the number of farmers is accompanied by huge production surpluses, or by a significant fall of productivity. It means, that restructuring of Polish agriculture is considerably slowed down by both FAST PATH experiments - a technical reduction of policy costs through quantity controls makes the policy feasible from the financial (and GATT) point of view, but does not eliminate a general harmful impact on structural changes.

The quantity control necessary to curb the supply response should be quite severe: the FAST PATH/OUTPUT REDUCTION experiment leads to an output level that is more than 25% percent below the FAST PAST scenario level (and 3% below the base run, despite much higher prices).

Table 3.3 presents the macroeconomic impact of the policies applied in the experiments.

Tab.3.3 Targeting EU prices
Simulation experiments: MACROECONOMIC IMPACT

	Fast path (EU prices by 2000)		Fast path/output reduction (EU pr. by 2000, quotas)		Last moment integration (50%EU prices by 2010)	
	Index 2010 (base=100)	growth rate (aver.) 1991-2010	Index 2010 (base=100)	growth rate (aver.) 1991-2010	Index 2010 (base=100)	growth rate (aver) 1991-2010
Gross Domestic Product	**96.8**	**4.2%**	**97.1**	**4.2%**	**100.1**	**4.4%**
Fixed Capital Formation	77.0	5.6%	89.1	6.4%	98.0	6.9%
Personal Consumption	102.1	3.8%	98.8	3.7%	100.4	3.7%
of which: Food products	97.3	1.5%	95.5	1.4%	98.2	1.6%
Other goods & services	103.5	4.7%	99.8	4.5%	101.1	4.6%

Source: Model POLAGR, simulation Jan.1995

The impact on fixed capital formation is negative in all the experiments, while the impact on the level of personal consumption varies (the level lower than in the base run only in the FAST PATH/OUTPUT REDUCTION experiment). While the FAST PATH experiment mainly affects investment, the FAST PATH/OUTPUT REDUCTION experiment has a more equally distributed negative impact on the final demand components. The macroeconomic policy impact in the LAST MOMENT INTEGRATION is not significant (the policy does not begin before 2005).
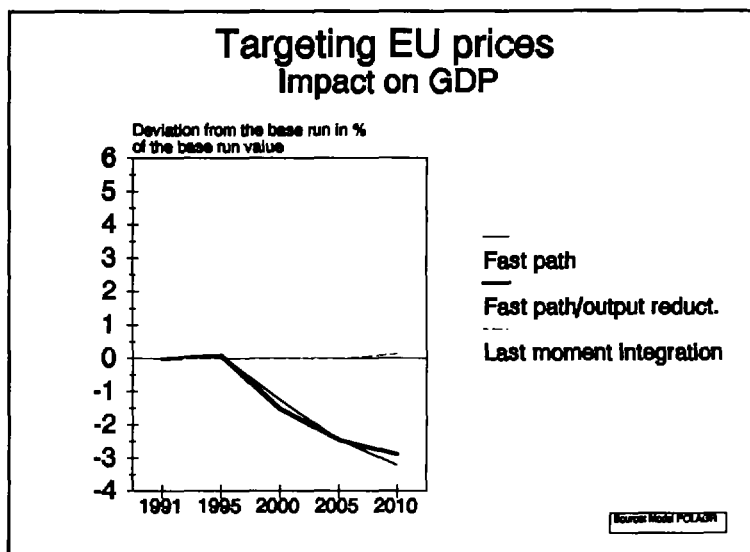

Figure 8

Both experiments connected with a fast price level growth lead to serious macroeconomic efficiency losses, mainly due to misallocation of resources. Generally speaking, both experiments lead to a shift from saving and investment to consumption. The impact on the long-term growth rate of GDP is similar, reaching 0.2 per cent points (3% loss of a potential GDP by 2010). Figure 8 shows that both fast path experiments lead to analogous macroeconomic losses (the LAST MOMENT INTEGRATION experiment is almost neutral from that point of view, as price supporting does not influence macroeconomic variables before the end of the projection period[10]).

A shift from saving to consumption in both FAST PATH experiments is a result of several factors. *First,* high budgetary spending on export subsidies result in higher deficits that reduce savings of the government. *Second,* lower level of the disposable income of population (except farmers) and higher expenditures on food lead to reduction of households' savings. Growth of savings of farmers, especially in the FAST PATH scenario, may partly compensate for this fall. However, a bulk of farmers' savings is reinvested in the agricultural sector. Therefore the overall capital mobility decreases and serious misallocation of resources appears (excessive investment in agriculture crowds out more productive investment in other sectors; moreover, excessive investment in agriculture causes further development of production surpluses leading to deficits growth). *Third,* the enterprise sector is hurt by higher prices of agricultural inputs (therefore, interests of farmers and of the food processing industry turn out to be contradictory[11]). *Fourth,* high production surpluses in agriculture increase net exports, reducing a possible absorption of foreign savings.

The experiments lead to a set of conclusions:

(a)   Fast move towards the EU price level through price support leads to heavy policy costs (for taxpayers and consumers). To make the policy financially feasible, firm quantity controls must be introduced.

(b)   High levels of price supporting will also have severe macroeconomic and sectoral consequences. The macroeconomic losses may be estimated on 0.2 per cent points of a yearly GDP growth. The structural change in agriculture, and - first of all - a pattern of reduction of the excess employment will be significantly slowed down.

(c)   Keeping price level low until the end of the accession process allows to avoid creating a threat for the structural change and economic growth in a critical period of 1995-2005, and seems to be a preferable strategy of targeting the EU price level. Poland avoids paying high intermediate costs in the period 1991-2005 and better prepares its agriculture for entering the single market.

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[10]   One may ask a question, to what extent the results of the LAST MOMENT INTEGRATION experiment are trivial showing simply that if Poland does not introduce price supporting before the last moment, it will not have to pay the interim costs. What we wanted to show, however, was that thanks to 20 years of an undisturbed structural change the agricultural sector will be much better prepared to accept the price supporting by 2005-2010. Therefore the costs (both sectoral and macroeconomic) are likely to be smaller than today.

[11]   The food processing industry may not realize it immediately, as high tariffs for food create an illusion of defending both domestic farmers *and* the domestic food processing industry.

4. Are There Alternatives to Price Support?

This section discusses the likely effects of introducing agricultural policies that do not support prices (for the moment, we forget about the EU integration matters). The main option that we would like to discuss is investing money in accelerating the structural change instead of supporting prices and incomes. The alternative agricultural policies, provided they speed up structural changes, may be considered as more appropriate strategies than price supporting for the interim period 1991-2005, before Polish agriculture fully joins the CAP.

4.1 Alternatives to price support: possible options

The income relation, and particularly the farmers' average income may be supported in two ways. The first, discussed above, is to increase total agricultural income (through price support). Even if the sectoral impact of the policy is negative, and the number of farmers increases (compared to the base run), the average income and the income relation is likely to grow (generally speaking, at the expense of taxpayers and consumers).

The second way of increasing the average farmers' income, is reducing the number of farmers below the base run level (with stable total agricultural incomes). This section presents two simulation experiments:

(a)   Reducing the number of farmers through faster retirement of old farmers (MORE PENSIONERS experiment); costs of higher pension payments will have to be financed from general revenues of the budget.

(b)   Collecting additional indirect taxes (on all products, not only food) for supporting the structural change in agriculture (that add up to the maximum amount coherent with Poland's GATT commitments) and investing them in promoting outflow of farmers from agriculture to other activities in rural areas (JOB PROMOTION FOR FARMERS experiment).

The first experiment (MORE PENSIONERS experiment) shows a policy that has a limited scope. The age structure of Polish farmers differs for the dynamic sector and the stagnating sector (in the stagnating sector, the average age of farmers is 6 years higher than in the dynamic sector, Hunek, 1995). Therefore, an accelerated retirement (that leads to lowering the maximal age of farmers by 5 years) means elimination of the smallest and the weakest farms of the stagnating sector. Given a long period of the policy application (15 years), the production factors (mainly land) may be easily absorbed by the dynamic sector without any losses of output (and with possible efficiency gains, that we ignore in the experiment). We ignore the problem, what policies should be applied to encourage old farmers to retire (the relative level of pension remains low and stable). Let us also note, that the early retirement schemes are frequently critizied as solutions to the overemployment in downsizing sectors, creating a risk for the stability of the public pension system (The World Bank, 1994). In the case of the Polish agriculture, however, we are not talking about the "early" retirement, but about encouragement to retire for people above the normal retirement age. As the productivity of these

people is very low, their retirement may free some assets (namely land) for a more efficient use. Moreover, a limited size of the group of farmers that may be encouraged to retire, together with a low level of pensions should not create major threats for the stability of the public pension system.

The second experiment (JOB PROMOTION FOR FARMERS experiment) takes advantage of a low level of rural development in Poland. We assume, that a mix of appropriate tax policy and public investment policy (investment incentives for jobs creation in rural areas, market services promotion, development of budget supported non-market services) together with a vocational training and a strong support for infant business, may allow for creating a significant number of jobs in rural areas over a 15-20 years period (supporting also the demand for newly created output). The budgetary cost of creating a job that was assumed in the experiment, was equal to 90% of the fixed assets value per employee in the service sector (in consecutive years)[12]. Again, we assume that mainly farmers from the stagnating sector take new jobs[13] (with the exemption of the old ones), and therefore the production factors are absorbed by the other farms.

A policy of supporting outflow of farmers from agriculture to other activities may provoke a lot of problems. Using active labor market policies for restructuring sectors with overemployment is not considered as the most preferable policy, mainly because of undesirable disincentive effects on the labor market. Policies of job creation are also considered as economically difficult and politically sensitive (The World Bank, 1994a). At the same time, however, a problem of downsizing employment in the farming sector requires a special treatment. *First,* the outflow of farmers from agriculture through normal labor market channels will not be easy, as the farmers do not have required labor skills. *Second,* the labor mobility in this sector is very low, so the market incentives would have to be very strong to make farmers seek for other jobs. *Third,* the natural channel of going out of agriculture would be moving to cities in a search for employment opportunities. Such developments could increase significantly the unemployment pressure in cities, and may lead to undesirable social tensions. *Fourth,* it would not allow for a fast development of the physical and social infrastructure needed for growth in the rural areas.

In the JOB PROMOTION experiment we assume that the process of moving farmers out of agriculture will have to be based on the market (by encouraging business to create jobs in the rural areas). However, a strong support will have to be given to vocational training, increasing labor mobility, supporting entrepreneurship and developing physical and social infrastructure in the rural areas. The macroeconomic sense of such a policy is to promote growth of the market services sector in the rural areas (promoting both supply and demand for market services) and to create

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[12] Choosing this ratio below 100% indicates our assumption that the new jobs, although highly subsidized, are to be created mainly by the private sector on market basis. The remaining part of costs of jobs creation, as well as the running costs once the jobs are created, are to be covered by business activities.

[13] The farmers from stagnating sector have generally worse labor profile that farmers from developing sector (higher average age, less skills). However, as their income from farming is low, they may be more eager to exchange it for a wage income that is also low, but more stable and secure. The farmers from stagnating sector will be only able to apply for jobs that require simple skills (a special vocational training may help a bit).

incentives for choosing labor-intensive technologies, making use of relatively low skilled labor. Let us also note, that the process may quickly create a positive feedback: growth of income in rural areas will create additional demand necessary to absorb the newly created output.

In this paper we do not make any particular proposal of the policy mix for accelerating reduction of employment in agriculture. We tend to believe, that such a mix may be created, and may work in the long run (we are talking about a program for 15-20 years). Its main target would be not to replace the market, but to help market solve a socially and politically sensitive problem of moving farmers out of agriculture[14].

The main question we try to answer in this section is what would be the impact of a successful policy of speeding up process of employment reduction in agriculture on the income relation and restructuring Polish agriculture. In other words, we try to find out *what would happen to Polish agriculture if resources that may be spent on price supporting are , instead, invested outside the agricultural sector.* The main target of the job promotion program is therefore not to create new jobs, but to encourage and to channel a flow of new investment towards the rural areas and towards low-skilled labor intensive technologies (that fit the labor supply of farmers).

Both experiments are compared with results of the feasible price supporting policy (results of the FAST PATH/OUTPUT REDUCTION experiment).

4.2 Alternatives to price support: simulation experiments

Policy costs are calculated differently in the experiments. While the MORE PENSIONERS experiment provokes only higher social security spending, the JOB PROMOTION FOR FARMERS needs financing by taxpayers, at a level comparable with the maximal support agreed under URA.

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[14] A target for the JOBS PROMOTION FOR FARMERS experiment is more than doubling the average yearly fall of employment in agriculture from 1.6% in the base run to 3.5-4% over a 20 years period. The base run figure is broadly in line with Polish experience in 1967-90 (1.2% yearly fall). Increasing the rate would require a substantial effort, particularly in an economy with high initial urban unemployment rate (that is why we assume that a supporting policy mix is necessary). However, the target rate is similar to rates of reduction of employment in agriculture observed in the most succesful EU countries in the period 1967-90 (Germany 3.8% yearly fall, Belgium 3.5%, Denmark 4.4%, Eurostat data).

Tab.4.1 Alternatives for price supporting
   Simulation experiments: POLICY COSTS

	Fast path/output reduction (EU pr. by 2000, quotas)		More pensioners		Jobs promotion for farmers	
	2000	2010	2000	2010	2000	2010
In $ billions(91 prices): (1) Cost for taxpayers (2) Cost for consumers	1.00 1.56	0.68 1.81	0.00 0.00	0.00 0.00	2.91 0.00	1.96 0.00
Total cost (1)+(2) (excl.social security)	**2.56**	**2.49**	**0.00**	**0.00**	**2.91**	**1.96**
Increase of social security expenditures	-0.06	-0.09	0.10	0.23	-0.00	0.01
Producer Subsidy Equivalent (PSE) in %	28.8%	23.8%	0.0%	0.0%	0.0%	0.0%

Source: Model POLAGR, simulation Jan.1995

As both table 4.1 and figure 9 show, the level of costs in the JOB PROMOTION FOR FARMERS experiment remains similar to the price supporting costs. However, the shape of the line is quite different: the investment experiment assumes a 15 year investment program. After the end of the program (in 2010), expenditure falls to zero. In contrast, the price support only freezes the expenditure level (the structural production surpluses are small thanks to output control, but costs for consumers remain high). The MORE PENSIONERS experiment entails a relatively small budgetary cost[15].
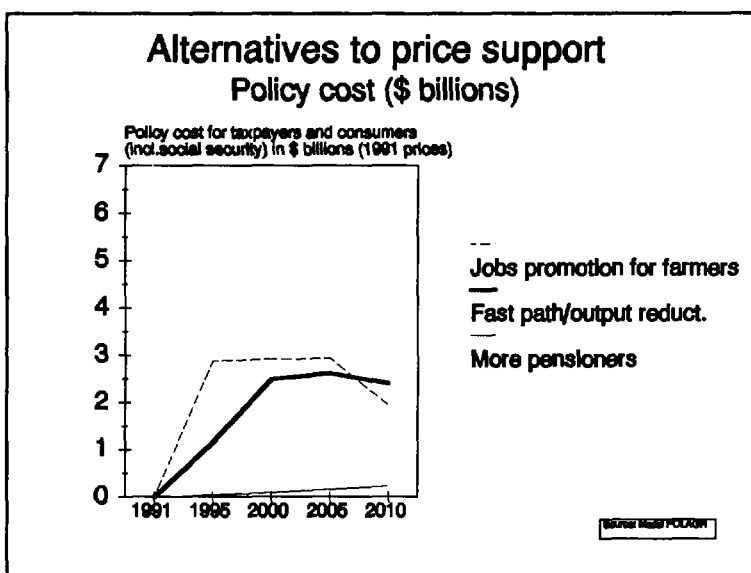

Figure 9

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[15] Relatively small budgetary costs result from a low ratio between an average pension for farmers and average wage (below 40% in 1993). If the increase of this ratio is necessary to encourage old farmers to retire, the cost for social security will increase.

Figure 10 shows effects of experiments on the income relation. The income of the MORE PENSIONERS experiment is relatively small, but positive (a scope of the policy is reduced by the age structure of farmers). However, the JOB PROMOTION FOR FARMERS experiment successfully competes with price support in increasing the income relation, although it is only after 2005 that the income relation in both experiments is similar. Moreover, the positive policy effect increases over time: the structural problems that keep the relation low are being *solved*, not only
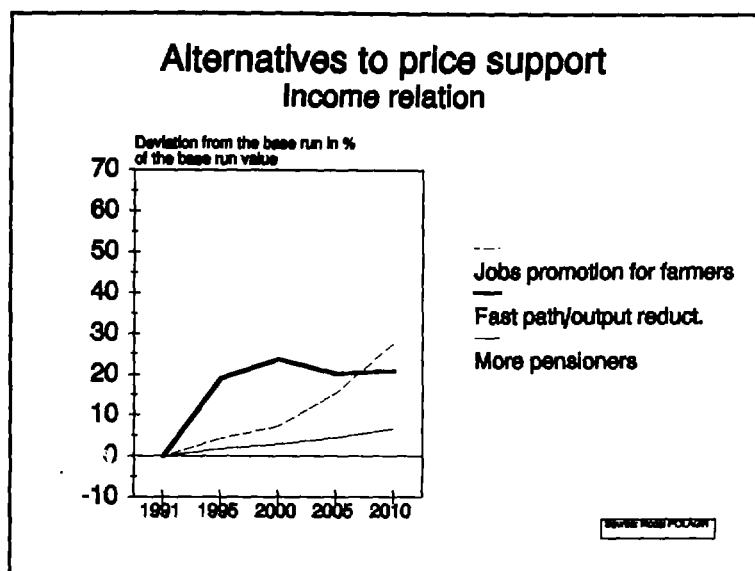
Figure 10

counteracted. This is thanks to the positive effects that the experiment (and, to a smaller degree, also the MORE PENSIONERS experiment) has on accelerating the structural change in the agricultural sector. Table 4.2 presents main indicators of this change.

Tab.4.2 Alternatives for price supporting
Simulation experiments: POLICY EFFECTS

	Fast path/output reduction (EU pr. by 2000, quotas)		More pensioners		Jobs promotion for farmers	
	2000	2010	2000	2010	2000	2010
Income Relation (farmer's income/wage) index, 91 level=100 index, base sol.=100	**134.1** 123.8	**133.9** 120.3	**111.4** 102.9	**118.2** 106.7	**116.3** 107.1	**141.6** 127.8
Number of farmers in millions index, base sol.=100 Employment in agriculture as % of total	3.084 106.6	2.651 109.7 **17.3%**	2.775 95.9	2.180 90.2 **14.2%**	2.519 87.0	1.542 63.8 **10.1%**
Average farm area in hectares index, base sol.=100	6.7 93.8	7.8 91.1	7.5 104.3	9.5 110.8	8.2 114.9	13.4 156.7
Output per farmer index, 91 level=100 index, base sol.=100	118.4 89.7	164.1 88.9	137.6 104.3	204.6 110.8	151.6 114.9	289.1 156.6

Source: Model POLAGR, simulation Jan.1995

The JOB PROMOTION FOR FARMERS experiment results in a 55% reduction of the number of farmers (almost 4% yearly, a number broadly in line with the experience of EU countries that have enjoyed the fastest reduction of the farm employment in the period 1965-90, Poczta 1994). Farm employment in 2010 is about 1/3 lower than in the base run. The share of farmers in total employment falls to a reasonable 10% level. The MORE PENSIONERS experiment gives a much smaller, but also significant result of decreasing the number of farmers by 10% (compared with the base run).

Thanks to the reduction of the number of farmers, the average farm area grows to 9.5 ha (MORE PENSIONERS) or even 13.4 ha (JOB PROMOTION FOR FARMERS) - quite satisfactory results by current EU standards. Let us remember that the price support system allowed only for an increase of the farm area to 7.8 ha (the base run area was 8.6 ha).

Both scenarios increase significantly the labor productivity in agriculture (by 10% in the MORE PENSIONERS experiment, by more than 50% in (the JOB PROMOTION FOR FARMERS experiment). In the second experiment, the agricultural sector seems to find its equilibrium position, at which no artificial support is needed to allow for a reasonable income relation level. The gap in labor productivity between the agriculture and the non agricultural sectors shrinks to a level, at which agriculture can successfully compete with other sectors in generating income per employee (results of the MORE PENSIONERS experiment, although much more modest, are encouraging as well).

Table 4.3 gives an overview of macroeconomic effects generated by the experiments.

Tab.4.3 Alternatives for price supporting
   Simulation experiments: MACROECONOMIC IMPACT

	Fast path/output reduction (EU pr.) y 2000, quotas)		More pensioners		Jobs promotion for farmers	
	Index 2010 (base=100)	growth rate (aver.) 1991-2010	Index 2010 (base=100)	growth rate (aver.) 1991-2010	Index 2010 (base=100)	growth rate (aver) 1991-2010
Gross Domestic Product	**97.1**	**4.2%**	**101.7**	**4.5%**	**105.2**	**4.6%**
Fixed Capital Formation	89.1	6.4%	105.0	7.3%	113.8	7.8%
Personal Consumption	98.8	3.7%	100.6	3.8%	104.7	4.0%
of which:						
Food products	95.5	1.4%	100.2	1.7%	101.6	1.7%
Other goods & services	99.8	4.5%	100.8	4.6%	105.7	4.9%

Source: Model POLAGR, simulation Jan.1995

Both experiments have a common, positive impact on savings and investment (effect in 2010 ranging from 5% in the MORE PENSIONERS experiment to 14% in the JOB PROMOTION FOR FARMERS; the price support gave a reverse result). Let us note, however, that a higher level of saving in the MORE PENSIONERS experiment is mainly caused by higher foreign savings (smaller trade surpluses). Low food price level causes consumption of food to exceed the base run level. Such a result leads to a decreased scale of production surpluses. Consumption levels are higher than in the base run also in the case of other goods and services (thanks to higher incomes, particularly in the JOB PROMOTION FOR FARMERS experiments).

The overall impact on GDP is positive in both experiments. The long term growth rate increases (by less than 0.1 per cent point compared to the base run) in the MORE PENSIONERS experiment. The experiment of JOBS PROMOTION FOR FARMERS leads to a significant, more than 0.2 per cent point increase of the average growth rate (from 4.4% in the base run to 4.6% in the experiment). Figure 11 shows that both alternative scenarios give much more desirable macroeconomic effect than price support.
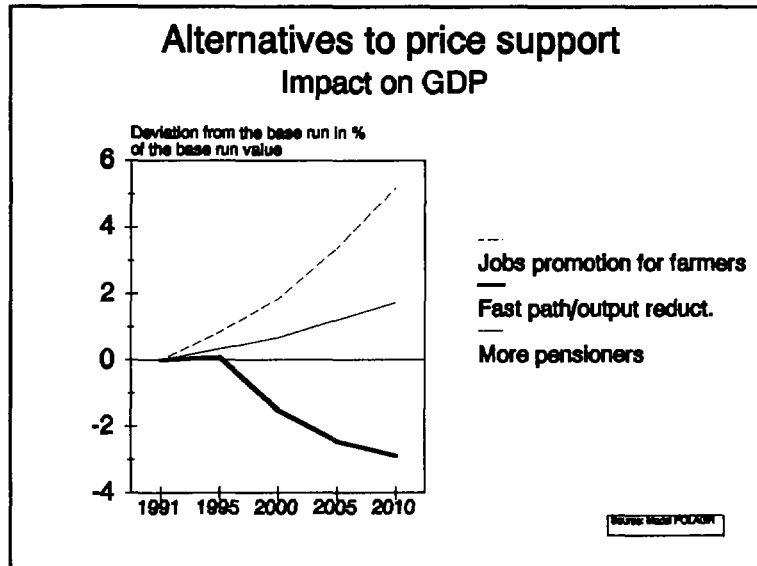
Figure 11

Several factors contribute to a generally positive outcome of both scenarios. *First*, higher level of personal income leads to higher savings of households (despite a fact, that an increased labor supply in the JOB PROMOTION FOR FARMERS experiment makes a downward pressure on wages). Initial negative effect of higher indirect taxes on urban households' savings is offset by both the increase of rural households' savings and by the higher economic growth (it means, however, that at least initially, before the higher growth effects appear, the program of job promotion is financed by urban households). *Second*, fiscal deficits are under control: the deficit increase slightly in the MORE PENSIONERS experiment, and decrease considerably in the JOB PROMOTION FOR FARMERS experiment. *Third*, firms' saving grow in both scenarios. *Fourth*, higher domestic food consumption reduces production surpluses, and allows for absorption of bigger foreign savings.

Some conclusions may be drawn from the simulation analysis:

(a)   Accelerating reduction of agricultural employment may allow for an improvement of the income relation on a scale similar to the price supporting. Obtaining such results takes more time, but the improvement seems to be more solid.

(b)   Reducing agricultural employment represents solving the problems rather than counteracting it. Significant progress may be obtained in restructuring the agricultural sector.

(c)   The overall macroeconomic impact of the policy is positive. However, the costs for urban households may be quite high, at least before the higher growth effects appear.

5. European Integration Scenarios

This section discusses possible (and financially feasible) scenarios of integrating the Polish agricultural sector with the EU agriculture. The scenarios take into account conclusions that may be drawn from the simulation experiments described in sections 3 and 4. The scenarios also take into account following observations:

(a) An automatic and rapid extension of the CAP price supporting system to the Polish agriculture would cause high budgetary costs, that will have to be covered by Poland until the accession. Moreover, high costs of the eventual Poland's membership create a risk of delaying it by many years.

(b) The CAP itself is changing. The changes are likely to result in lower food prices in the EU. The biggest error the CEE countries could make is overshooting - setting prices on a too high level, and being unable to push them down when the EU will be doing it.

(c) Introduction of the price supporting system can not break commitments made by the CEE countries in a framework of URA of GATT.

(d) The main budgetary cost of the CAP is connected with the disposal of production surpluses (by building up stocks or subsidizing exports). Therefore, the policy cost in CEE countries would depend to a large extent on the scale of the surpluses. A policy of high prices may depress domestic demand, and lead to even higher surpluses and costs.

(e) A principle of the agricultural policy for Poland is to avoid measures that slow down restructuring of the farming sector (as the experiments show, price supporting does).

5.1 Integration scenarios: in a search of feasible paths

The simulations described above suggest that the following guidelines should be adopted in constructing a feasible path of integration:

(a) The pre-accession and transition period should be devoted to solving the structural problems, not to counteracting their effects. Therefore, all disposable resources should be spent on promoting creation of jobs for farmers and reducing farm employment rather than on price supporting.

(b) Obtaining the EU price level is a necessary precondition of joining the single market. However, the most desirable (and the cheapest) strategy should be based on increasing price level as late as possible, taking advantage of the likely liberal reforms of the CAP. The policies that reduce production surpluses are crucial to make the eventual price supporting system affordable.

(c) Reducing agricultural employment by incentives to retirement of old farmers seems to be a relatively cheap and effective tool that helps solving structural problems of Polish agriculture.

Generally speaking, if the nation decides to transfer resources to the agricultural sector, the resources should be used efficiently. The main target of a pre-accession policy should be to reduce the gap between the agriculture of Poland and the EU rather than to support prices and incomes.

Such analysis leads us to construct two gradual integration scenarios:

(a)   The FULL FINANCING scenario assumes that the nation decides to allow for transfers to the agricultural sector (collected by increasing indirect taxes) that reach the maximal total transfer level agreed within the GATT (equal to total policy costs in the feasible price supporting policy presented in the FAST PATH/OUTPUT REDUCTION experiment). Let us remind, that as previous experiments show, such a policy may be, at least initially, quite costly for urban households (less costly, however, than price supporting).

(b)   The BUDGET CONSTRAINED scenario assumes that the disposable funds are equal to costs for taxpayers in the feasible price supporting policy, and therefore considerably reduced.

Both the scenarios assume the same policy mix: encouraging old farmers to retire (as in the MORE PENSIONERS experiment), promoting rural job creation (as in the JOB PROMOTION FOR FARMERS experiment), avoiding price supporting schemes until the moment of integration into CAP (as in the LAST MOMENT INTEGRATION scenario). The only difference is the scale of resources that may be used (the BUDGET CONSTRAINED scenario represents the same policy that the FULL FINANCING, realized with a considerably smaller financing).

5.2 Integration scenarios: simulation experiments

The policy costs of both scenarios are presented in table 5.1. The costs reach an assumed level in the period 1995-2005. It is only in the last years of the scenario that additional costs for consumers appear because of targeting EU price level.

Tab.5.1 EU membership - adjustment path
     Simulation experiments: POLICY COSTS

	Fast path/output reduction (EU pr. by 2000, quotas)		Gradual integration full financing		Gradual integration budget constrained	
	2000	2010	2000	2010	2000	2010
In $ billions(91 prices): (1) Cost for taxpayers (2) Cost for consumers	1.00 1.56	0.68 1.81	2.91 0.00	1.35 0.86	1.16 0.00	1.58 0.88
Total cost (1)+(2) (excl.social security)	**2.56**	**2.49**	**2.91**	**2.21**	**1.16**	**2.46**
Increase of social security expenditures	-0.06	-0.09	0.05	0.14	0.05	0.14
Producer Subsidy Equivalent (PSE) in %	28.8%	23.8%	0.0%	13.7%	0.0%	14.4%

Source: Model POLAGR, simulation Jan.1995

Figure 12 shows the total policy costs comparison. Expenditures are growing quickly in the case of the FULL FINANCING scenario (to the maximum level feasible under URA). In the case of the BUDGET CONSTRAINT scenario a fast increase of costs does not appear before the year 2000. Approaching the EU price level around 2010, although costly for consumers, does not provoke additional big costs for taxpayers, as both scenarios lead to small production surpluses.
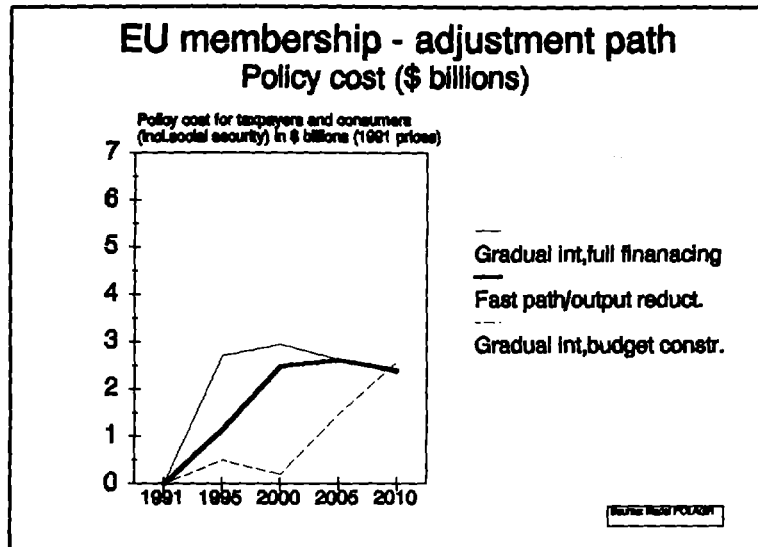
Figure 12

Figure 13 shows a very positive impact of both scenarios on the income relation. The positive effect is obtained mainly due to a reduction of the number of farmers, that leads to an increase in average income. In the period 2005-2010, the agricultural income is additionally enhanced by introducing a price support system. Additionally, one should take into account the fact that an increased supply of labor (obtained due to a massive shift of farmers to the non-farming activities leads to a slight lowering of the wage (in both scenarios, compared to the

Figure 13

base run). Such a situation improves even more the income relation, and leads to a higher level of competitiveness of Polish industrial exports on the EU markets (finding a general balance of payments equilibrium may play a crucial role in the transition period to the full EU membership (Czyzewski, Orlowski, Zienkowski, 1993b).

Table 5.2 summarizes main achievements in restructuring the Polish agriculture.

Tab.5.2 EU membership - adjustment path
   Simulation experiments: POLICY EFFECTS

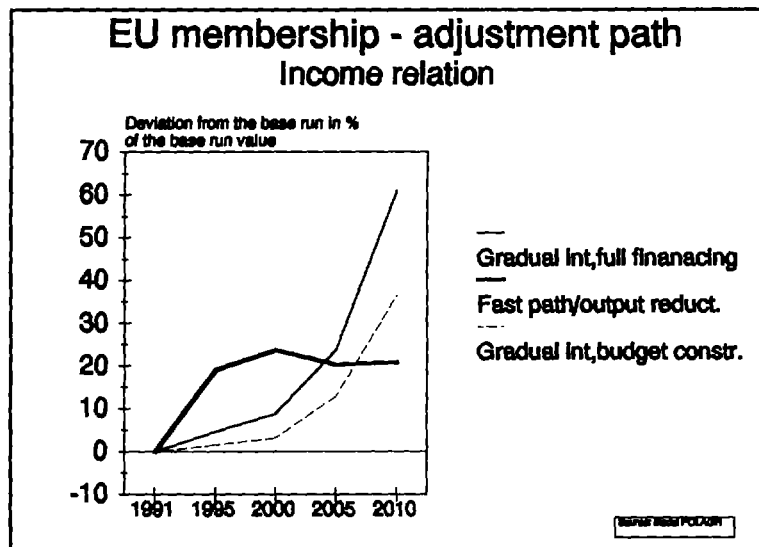|	Fast path/output reduction (EU pr. by 2000, quotas)		Gradual integration full financing		Gradual integration budget constrained	
	2000	2010	2000	2010	2000	2010
Income Relation (farmer's income/wage) index, 91 level=100 index, base sol.=100	134.1 123.8	133.9 120.3	117.8 108.8	178.4 161.0	111.9 103.3	151.5 136.8
Number of farmers in millions index, base sol.=100 Employment in agriculture as % of total	3.084 106.6	2.651 109.7 17.3%	2.487 85.9	1.508 62.4 9.9%	2.738 94.6	1.922 79.6 12.6%
Average farm area in hectares index, base sol.=100	6.7 93.8	7.8 91.1	8.3 116.4	13.7 160.2	7.6 105.7	10.8 125.7
Output per farmer index, 91 level=100 index, base sol.=100	118.4 89.7	164.1 88.9	153.5 116.4	296.1 160.4	139.5 105.7	232.4 125.9

Source: Model POLAGR, simulation Jan.1995

The FULL FINANCING scenario leads to an equilibrium position of the agricultural sector characterized by less than 10% of total employment, a share that allows for avoiding a big gap in labor productivity between agriculture and non agricultural sectors. The number of farmers is reduced by two thirds, and the productivity tripled (a result 60% above the base run level). The average farm area grows to 13.7 ha (in the base run 8.6 ha, in the feasible price supporting policy experiment 7.8 ha).

The BUDGET CONSTRAINT scenario leads to similar, but much more modest results (25% productivity growth, farm area 10.8 ha).

Both scenarios (and particularly the FULL FINANCING scenario) allow for a big reduction of the initial gap between agricultural sectors of Poland and the EU. They both also have a positive macroeconomic impact, shown in table 5.3.

Tab.5.3 EU membership - adjustment path
Simulation experiments: MACROECONOMIC IMPACT

	Fast path/output reduction (EU pr. by 2000, quotas)		Gradual integration full financing		Gradual integration budget constrained	
	Index 2010 (base=100)	growth rate (aver.) 1991-2010	Index 2010 (base=100)	growth rate (aver.) 1991-2010	Index 2010 (base=100)	growth rate (aver) 1991-2010
Gross Domestic Product	**97.1**	**4.2%**	**105.6**	**4.7%**	**103.1**	**4.5%**
Fixed Capital Formation	89.1	6.4%	113.2	7.7%	106.2	7.4%
Personal Consumption	98.8	3.7%	104.8	4.0%	102.5	3.9%
of which:						
Food products	95.5	1.4%	99.7	1.6%	98.9	1.6%
Other goods & services	99.8	4.5%	106.4	4.9%	103.6	4.8%

Source: Model POLAGR, simulation Jan.1995

Both scenarios lead to significantly higher levels of savings and investment. Also consumption levels are higher than in the base run (the food consumption slightly below the base run levels is compensated by much higher consumption of other goods and services). A relatively richer society may afford more expensive food: the fall of domestic food consumption (with respect to the base run) is not big, and a scale of production surpluses significantly lower than in the base run.

Figure 14 shows an overall positive macroeconomic impact of both integration scenarios. In the case of the BUDGET CONSTRAINED scenario the impact is smaller, reaching almost an additional 0.2 per cent point of the economic growth. In the case of the FULL FINANCING, however, the macroeconomic gains exceed 0.3 per cent points of an additional yearly GDP growth. Such an outcome is
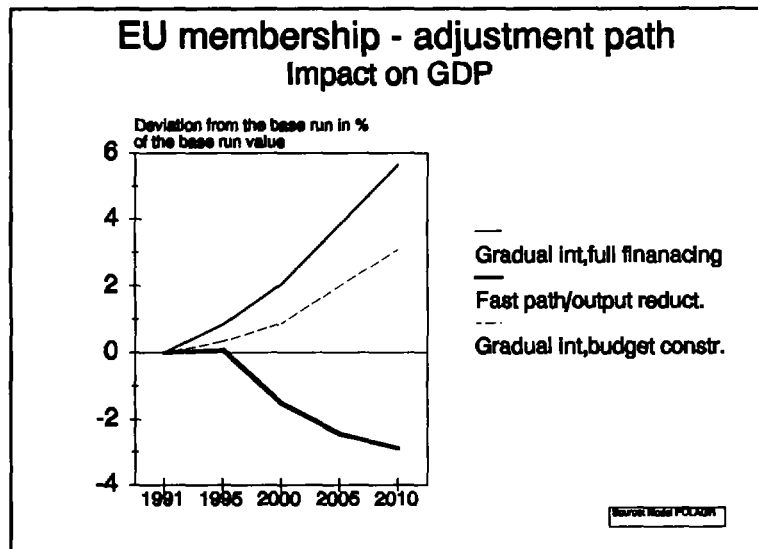
Figure 14

caused by higher savings of households[16], firms, government and rest of world, resulting mainly from the higher economic growth and lower production surpluses.

Some conclusions that may be drawn from the scenario analysis:

(a)   The pre-accession and transition period policy aimed at reducing the excess employment in the Polish agriculture allows for a significant reducing of the productivity gap between agricultural sectors of Poland and the EU. It creates a basis for the successful integration and competition on the single market.

(b)   Obtaining such results require financing reaching below $ 3bn per year, i.e. Poland's aggregate GATT commitment. Smaller scale financing will also lead to positive effects, but of a more modest scope.

(c)   The costs connected to reaching the EU price level and joining the single market depend mainly on a scale of production surpluses. Therefore, a pre-accession price policy that stimulates the supply response and reduces domestic demand makes the integration process much more costly.

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[16]With the exemption of initially smaller income and savings of urban households, particularly in the FULL FINANCING scenario.

6. Main conclusions from the simulation analysis

The main conclusion we draw from the simulation analysis is that *price support is not the only, and moreover not the most efficient way in which Poland can support its agricultural sector.* This conclusion does not mean that food prices should not be stabilized. However, the stabilized domestic price level should not exceed the world price level.

The main challenges the sector has to face, namely finding a new equilibrium position in the market economy and integrating with the EU require a deep restructuring of the sector to close (or reduce) productivity gaps vis-á-vis the EU agriculture and the other sectors of the Polish economy. *Reduction of productivity gaps is a precondition for an appropriate income and living standard for farmers, as well as for a successful competition on the single market without borders with Western European farmers.*

The most efficient way to solve the structural problems of the Polish agriculture is acceleration of reduction of the agricultural employment. Such a policy may require significant investment in promotion of the new jobs for farmers, and for training. As a result, not only the low labor productivity problem may be solved, but also a substantial improvement may be obtained in a level of the rural areas development and living standards. Best support for the Polish agriculture is to increase its productivity. *The market-led process of reducing the agricultural employment must not be slowed down. Instead, supporting policies may be introduced if there are possibilities of accelerating and easing the process.*

Can Poland afford transfers to the agricultural sector that allow for an accelerated restructuring?

First, one may ask the opposite question: can Poland afford a slow path of restructuring of the agricultural sector? The sector would become a growing burden for the economic growth. Earlier or later a kind of an income support may appear unavoidable from the social point of view.

Second, Poland has already reached a level of transfers to the sector over $ 2bn yearly (OECD, 1995). The problem is therefore not if the resources are to be transferred, but rather how they should be transferred to obtain the highest efficiency.

Third, the restructuring process does not necessarily have to be so costly for the other economic agents. Figure 15 shows the net burden for the rest of the economy (taxpayers, other sectors, consumers) obtained in the simulation experiments[17]. Let us notice, that only price support systems create a heavy burden. In the case of policies of reduction of the number of farmers,

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[17] "Price support" experiments show effects of various paths of reaching CAP price levels. "Alternatives" experiments show effects of policies reducing agricultural employment (without price supporting). "Gradual integration" experiments represent a mix of the slowest path of reaching CAP prices and policies aimed at employment reduction,

macroeconomic gains appear bigger than policy costs. It means that (except for the first years of applying the policies) the policies may be financed from additional economic growth.
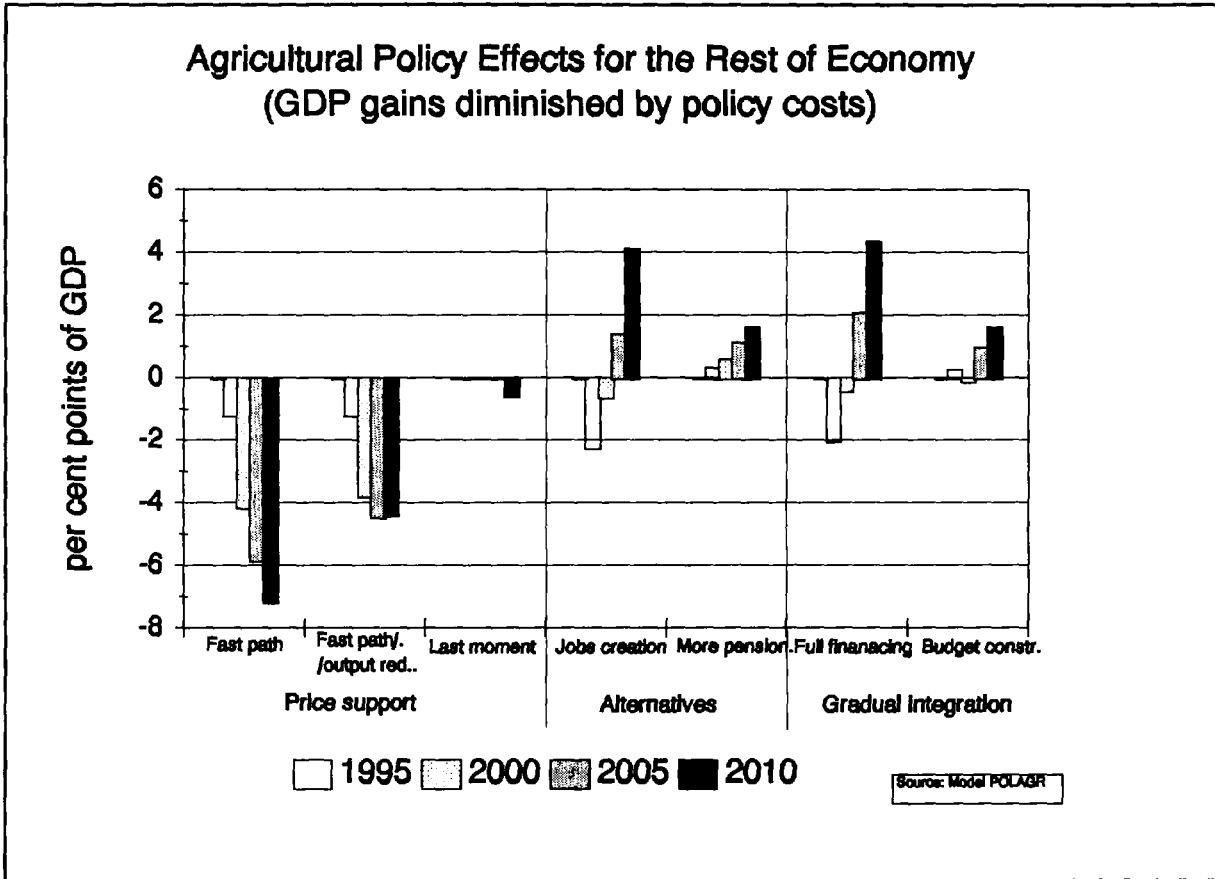
Figure 15

Successful integration of the Polish agriculture with the EU require a fast restructuring of the sector. The resources for restructuring that the Polish economy may find are scarce; therefore, it is even more important that they are used in an effective way.

Efficiency of the restructuring efforts will be to a big degree reduced, if the accompanying policies have contradictory effects (slowing down restructuring and economic growth). Therefore, a preferable way of supporting the income relation in the period prior to Poland's full participation in the CAP is accelerating agricultural employment reduction rather than supporting prices.

Appendix
The POLAGR model: main features

POLAGR is a Computable General Equilibrium model of the Polish economy, developed for agricultural policy analysis[18]. The main characteristics of the model are following:

(a)   Disaggregation level: 26 sectors (12 agricultural products, 12 food processing industries, other industries, services).

(b)   Social Accounting Matrix: the SAM matrix for 1991, developed on a basis on the 1990 SAM, 1990 input-output table, National Accounts by institutional sectors for 1991, 1991 surveys of farms (production technologies applied), 1991 households surveys[19].

(c)   Market clearing variables: market prices for non agricultural branches (14 branches); surplus production for 12 food products; wage for the labor market; deficit for the budget; trade balance for foreign trade.
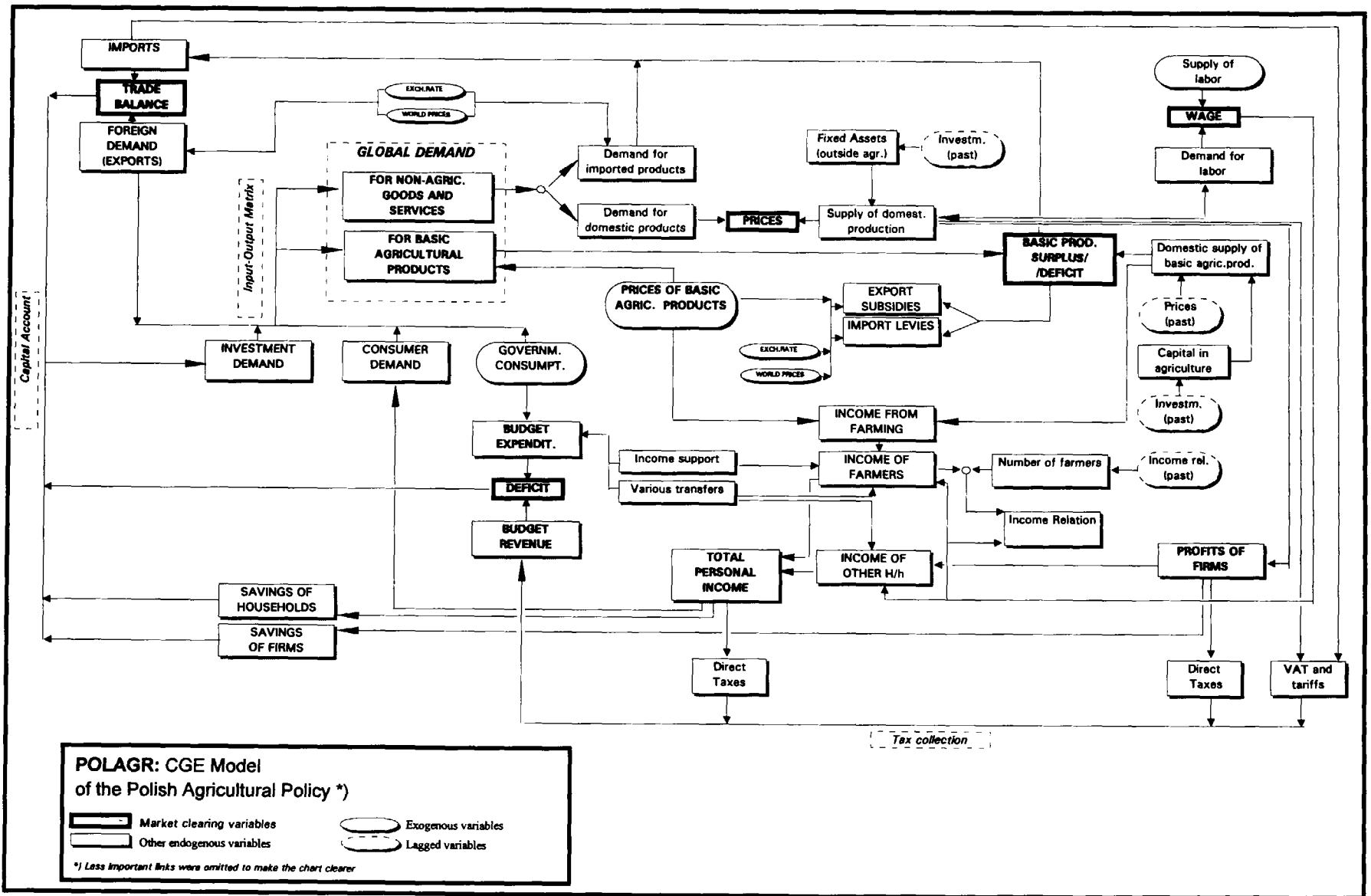
(d)   Macro closure: savings (investment).

(e)   Production factor mobility: mobile in a short run (1 year): labor (except farmers' labor); mobile in a medium run (over 1 year): capital, farmers' labor[20]

(f)   Labor supply projections: projection based on the age structure of farmers and non-farmer population in 1991, demographic projections until 2020 (source: GUS and Polish Academy of Sciences),model of labor distribution by farmers and labor reduction in agriculture (see *(i)*).

(g)   Sources of parameters:
        Production functions: Cobb Douglas, estimated on 1992-93 cross section sample (regions of Poland).
        Consumer demand functions: indirect addilog system, estimated on 1970-92 time series.
        Armington functions: estimated on 1990-94 quarterly time series.
        Land distribution functions in agriculture, functions of labor distribution by farmers and labor reduction in agriculture: estimated on 1982-94 time series.
        Export demand functions: literature search.
        Other parameters: calibrated on a basis of the 1991 SAM.

(h)   The structure of the model: presented in the graph (next page).

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[18] A preliminary version of the model may be found in Czyzewski, Orlowski, 1993a.

[19] Sources of data: Central Statistical Office (GUS), Research Center for Economic and Statistical Studies, Warsaw, Institute of Economics of Agriculture and Food Economy, Warsaw

[20] Please note, that as a result of short-time farmers' labor and capital rigidity, the agricultural output is fixed in short term (1 year) and inelastic with respect to prices. However, the output reacts to changes in relative prices in medium period (lagged relative prices and income relations influence both supply of production factors and agricultural production structure.

IMPORTS

TRADE BALANCE

FOREIGN DEMAND (EXPORTS)

EXCH.RATE

WORLD PRICES

GLOBAL DEMAND

FOR NON-AGRIC. GOODS AND SERVICES

FOR BASIC AGRICULTURAL PRODUCTS

Input-Output Matrix

Capital Account

Demand for imported products

Demand for domestic products

PRICES

Supply of domest. production

Fixed Assets (outside agr.)

Investm. (past)

Supply of labor

WAGE

Demand for labor

BASIC PROD. SURPLUS/ /DEFICIT

Domestic supply of basic agric.prod.

Prices (past)

Capital in agriculture

Investm. (past)

PRICES OF BASIC AGRIC. PRODUCTS

EXPORT SUBSIDIES

IMPORT LEVIES

EXCH.RATE

WORLD PRICES

INVESTMENT DEMAND

CONSUMER DEMAND

GOVERNM. CONSUMPT.

BUDGET EXPENDIT.

DEFICIT

BUDGET REVENUE

Income support

Various transfers

INCOME FROM FARMING

INCOME OF FARMERS

Number of farmers

Income rel. (past)

Income Relation

TOTAL PERSONAL INCOME

INCOME OF OTHER H/h

PROFITS OF FIRMS

SAVINGS OF HOUSEHOLDS

SAVINGS OF FIRMS

Direct Taxes

Direct Taxes

VAT and tariffs

Tax collection

POLAGR: CGE Model
of the Polish Agricultural Policy *)

Market clearing variables

Other endogenous variables

Exogenous variables

Lagged variables

*) Less important links were omitted to make the chart clearer

(i) <u>Model of labor distribution by farmers and employment reduction in agriculture:</u>

The model is composed of 2 parts. The first part describes a process of reduction of employment in agriculture: number of farmers below 35 years old[21] as a function of the observed trend of decline (represented by a lower than one elasticity with respect to the lagged employment), job offers generated by the economy (outside agriculture, expected elasticity <0, as more offers makes it easier for young farmers to find a job outside agriculture) and the income relation (expected elasticity >0,as high income relation encourages farmers to stay in agriculture). The second part describes decisions of all the farmers (who did not move out of agriculture) about splitting their endowment of labor into 2 parts: labor supplied to agriculture, and labor supplied outside agriculture (to the non-agricultural labor market, i.e. to non farming activities). The decision is crucial, as it determinates to what extent farmers' income depends on the income from farming activities. The distribution of labor depends on the existing trend (falling share of income from farming) and the income relation (expected elasticity >1, as high income relation discourages farmers from searching for additional sources of income).

a. Model of employment reduction (farmers below 35 years old)

$$\text{Employment} = a * \text{Employment}_{t-1}{}^{b} * \text{Job offers}_{t-1}{}^{g} * \text{Income relation}_{(t-1,t-2,t-3)}{}^{s} * e^{U91 * x}$$

where: Employment - number of farmers below 35 years old, Job offers - number of new jobs offers in non-agricultural sectors, Income relation - ratio of the average income of a farmer to the average wage, U91 - dummy, 1991 = 1 (rapid increase in urban unemployment). Subscript t-1 means 1 period lag. Subscript (t-1,t-2,t-3) means an average from 3 last periods.

Sample: 1980-1993
Estimated elasticities (t-statistics in parentheses):
b=0.747 (4.54), g=-0.873 (2.40), s=0.234 (3.44), x=0.095 (2.65) $R^2=0.955$

b. Model of labor distribution (all farmers)

$$\text{Labor distribution} = a * \text{Income relation}_{(t-1,t-2,t-3)}{}^{b} * \text{Trend}^{g}$$

where: Labor distribution - ratio of labor supplied by farmers to agriculture to labor supplied outside agriculture (to the non-agricultural labor market, i.e. to non farming activities), Trend - trend variable, 1980 value=1, 1993 value=14. Subscript (t-1,t-2,t-3) means an average from 3 last periods.

Sample: 1980-1993
Estimated elasticities (t-statistics in parentheses):
b=0.983 (4.84), g=-0.027 (1.61) $R^2=0.923$

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[21] A group of farmers likely to make a decision of moving out of agriculture (OECD, 1994a).

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