TRANSITION AND AGRICULTURAL LABOUR

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1.   INTRODUCTION

Reforms in transition countries have strongly affected output and factor markets. A key issue is the impact of the reforms on the labour market because labour is the key source of income for many people in transition countries, and especially so for the poorest countries, and the poorest groups within a country. Given the importance of agricultural employment in transition countries, and especially in the poorest transition countries, agricultural labour adjustments and their causes and effects should be of special interest. The pre-transition share of agriculture in total employment varied from around 10% in the countries with the highest income per capita, such as Slovenia and the Czech Republic, to around 50% in Albania (table 1). Among the Central and Eastern European countries (CEECs), also Poland and Romania have high agricultural labour shares.

Transition has strongly affected agricultural employment. Two strands of literature have discussed the (need for) major adjustments in agricultural labour. The first strand emphasised the surplus of labour in agriculture as a result of the Communist system of central planning, subsidies, and controls on labour reallocation. Several papers suggest that while surplus employment characterised many activities under the Communist system, overemployment was stronger in agriculture (Brada, 1989; Bofinger, 1993; Jackman, 1994). Hence, if input and output markets would be liberalised and subsidies cut, this literature predicted an outflow of labour from agriculture.

The second literature focuses more on the transition process itself and argues how the agricultural sector has played a buffer role during transition, absorbing labour laid off in other sectors, as a source of income and social security during difficult transition times (Seeth et al.,

1998; Leiprecht, 1999). This literature emphasises the inflow of labour in agriculture during transition.

What does empirical evidence tell us about the accuracy of both literatures on the development of employment in agriculture after 1989? Interestingly, labour adjustments in Eastern Europe during transition have not been uniform but reflect diverse adjustment patterns (figure 1 and table 1).[1] During the first five years of transition, labour employment in agriculture declined dramatically (around 50%) in the Czech Republic, Slovakia, and Hungary (CSH). In Slovenia and Poland labour use in agriculture declined by 10-15%. In contrast, agricultural employment increased during the first five years of transition in transition countries such as Romania, Russia and Ukraine. An important difference can be observed between the Baltic countries. Estonia, as CSH, has experienced a dramatic decline in agricultural labour input, while Latvia experienced only a moderate fall in agricultural employment and Lithuania saw a significant increase of labour use in agriculture.

In this paper we attempt to provide an explanation for this wide variation in labour adjustments during transition. In particular, we analyse how various factors including initial conditions, price liberalisation, subsidy cuts, and institutional reforms affecting ownership of assets and the governance and organisation of agricultural production have affected labour use in agriculture. We conclude that all these factors have affected agricultural employment, and that especially the institutional reforms are key to understanding the remarkable differences in agricultural labour adjustments among transition countries.

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[1] There are definitional and statistical problems with the data on farm labour in transition countries. However, just as in the case of statistical biases in output measurements, while there are no doubt important biases, the strong patterns that emerge from the data may be partly statistics but do reflect also important real effects. Most studies agree that despite statistical bias substantial real adjustments in input and output markets have occurred. For the agricultural labour data, case studies for countries where detailed statistics are available indicate that the broad patterns identified in our analysis are at most only partially due to statistical bias, and are robust to statistical corrections.

Somewhat paradoxically, we find that the large scale former collective and state farms which had been employers of much surplus labour under the Communist system have been the main cause of labour outflows from agriculture. The managers of their successor farm organisations, when given sufficient autonomy and when operating in a sufficiently liberalised environment, have laid off a large share of workers. In contrast, in those countries where household and family farming has grown strongly, these farms have indeed absorbed a significant amount of workers from other sectors.

In this paper we first provide a theoretical model to explain the interaction between institutional reform and labour use in agriculture. Then we provide an empirical test of the hypotheses based on data of several East European countries. The last section of the paper presents a general framework to explain the joint process of labour adjustments and institutional reform during transition.

2. A MODEL OF REFORM AND LABOUR ALLOCATION DURING TRANSITION

2.1 The general framework

Consider a pre-reform situation where agriculture is mostly organised in collective and state farms. This situation is represented by point A in figure 2. Reforms which have been implemented in transition countries affect both the amount of labour used in agriculture, as economic reforms affect sectoral incentives and constraints for labour use, and the organisation of labour use. The organisation of labour use is affected by privatisation and the transformation of collective and state farms into other farm organisations, such as individual farms.

Several factors will affect labour allocation and organisation in transition agriculture. The first factor (I) is the removal of initial distortions of labour allocation. Several studies suggest that while surplus employment characterised many activities under the Communist system, overemployment was stronger in agriculture (Brada, 1989; Bofinger, 1993; Jackman, 1994). This implies that economic liberalisation and institutional reforms which stimulate more efficient allocation of labour in the economy will induce a reallocation of agricultural labour and, more specifically, an outflow of labour from agriculture. The expected effect of this factor is represented by arrow I in figure 2. Obviously, whether this effect will take place depends on the actual implementation of the necessary reforms to induce this effect.

The second factor (II) concerns the changes in the organisation of labour use in agriculture. There is general agreement that collective and state farms as they existed under the Communist system were inferior farm organisations. There is an extensive literature arguing that in agriculture family farms are the most efficient farm organisations, in particular because of their comparative advantage in labour management (Carter, 1984; Lin, 1988; Pollak, 1985; Schmitt, 1991). However, so far farm restructuring has taken many forms in transition countries, and a variety of farms such as private cooperative farms, corporate farms, and individual farms have emerged (Csaki and Lerman, 1999; Mathijs and Swinnen, 1998). The development of individual (or family) farms differs strongly among countries (see table 1). However, these should all be seen as transition situations with specific incentives and constraints on organisations (see Deininger, 1995) and few countries, if any, have reached their long run equilibrium in terms of farm organisation.

Hence, although there is no general consensus on this point for transition countries, one could argue that most experts would agree that in the long run equilibrium family farms should be the most efficient organisation of agricultural production in most of the countries

under consideration here. If so, one should expect a reorganisation of agricultural labour use as indicated by arrow II during transition.

Hence, in combination both factors will cause a shift of pre-transition situation A to post-transition equilibrium B in terms of labour use and organisation in agriculture. Interestingly, if we compare this prediction with the actual evolutions of 13 transition countries in figure 3, we see that the countries are very heterogeneously spread in this two-dimensional framework. In countries such as Hungary, Czech Republic, Slovakia and Estonia agricultural employment has been very significantly reduced, but the shift to individual farms has been slow to moderate, while in countries such as Latvia, Lithuania and Romania, there has been a stronger shift to individual farms but much less reduction in labour use. A third group of countries have not moved much from their starting position: in Russia and Ukraine there has not been any radical change in either labour allocation or organisation based on these indicators.

What is interesting is that there are no countries "in the middle", i.e. non of the countries are on the trajectory suggested by the combined (I+II) arrow in figure 2. Rather they are above or below the arrow. The reason for this is that process I and II are not independent. Indeed, the organisation of labour, and its reforms, will have an impact on labour use. To understand this, and to derive the implications, we will first develop a more complex theoretical model of labour use and adjustment in transition agriculture.

The theoretical model we use is based on the seminal work on employment and wage bargaining by McDonald and Solow (1981) and its application to transition by Commander (1998). We first explain the general model and then apply it to the specific transition situation we analyse.

2.2 The general employment model

Consider a firm where decisions are made through bargaining between management and workers. The workers are concerned both with their wage and with employment. The management's objective is to maximise profits. Assuming that the firm produces one product using one input, labour, the management's objective function is:

(1) $\text{Max } Ð = p\,f(L) - w\,L$

where Π stands for the firm's profits, p is the output price, f(L) is the firm's production function, L is the level of employment and w is the wage paid by the firm. The management's indifference curves are equal to the firm's isoprofit curves, such as curve $\Pi\Pi$ in figure 4. The slope of these curves can be derived as:

(2) $\dfrac{dw}{dL} = \dfrac{pf_L(L) - w}{L}$

Isoprofitcurves slope upwards with increasing employment, as long as the wage is lower than the value marginal product of labour (VMPL). They decline when the wage exceeds the VMPL, and the maximum is reached when the wage equals the VMPL, such as in point A in figure 4. In a firm where the management alone determines employment and wages are given exogenously, the labour demand curve would be given by the maximum points of the indifference curves, i.e. the VMPL curve.

The workers are concerned with their employment and wages. Their "collective" objective function is given by the maximisation of their collective utility U:

(3) $\text{Max } U = L\,(u(w) - u(w_r))$

where u(w) is the individual utility workers derive from earning wage w and w_r is the reservation wage, i.e. the wage that can be obtained in alternative employment. Curve UU in figure 4 represents the collective indifference curve of the workers. The slope along this curve can be derived as:

$$(4) \quad \frac{dw}{dL} = -\frac{(u(w) - u(w_r))}{L u_w(w)}$$

Bargaining between workers and management will lead to the choice of an employment and wage level at the points of tangency of the management's and the workers' indifference curves. These possible outcomes of the bargaining process are located on the so-called contract curve, i.e. the line between points B and C in figure 4. Mathematically, this condition is given by:

$$(5) \quad \frac{u(w) - u(w_r)}{u_w(w)} = w - pf_L(L)$$

The exact location of the bargaining outcome on the contract curve depends on the relative bargaining powers of the two parties. The determination of the wage and employment level in this bargaining model can be represented by the maximisation of a weighted combined objective function:

$$(6) \quad \underset{w,L}{Max} \{ L [u(w) - u(w_r)] \}^{1-x} \{ pf(L) - wL \}^x$$

where ξ and $(1-\xi)$ reflect the respective bargaining powers of the management and the workers, with $\xi = 1$ for complete power with the management. Solving the first order condition with respect to employment gives:

(7) $\dfrac{w}{p} = \pmb{x}\, f_L(L) + (1 - \pmb{x}\,)\dfrac{f(L)}{L}$

This is an intuitively appealing result. The contract curve is bounded by the zero-isoprofitcurve on the one hand and the reservation wage on the other. Even if workers can decide freely over employment and wages ($\xi = 0$), they will not be able to set the wage or the employment infinitely high. The reason for this is that a hard budget constraint keeps the firm from making negative profits. The upper limit of the contract curve is therefore determined by the zero isoprofitcurve ($\Pi = 0$), i.e. point C in figure 4, where the real wage equals the average labour productivity. Furthermore, if we assume all the bargaining power to be on the side of management ($\xi = 1$), wages can still not become infinitely small. The existence of alternative employment possibilities makes that the labour supply to the firm will be zero as soon as the offered wage falls below the wage that can be obtained in other sectors or alternative jobs. The contract curve is therefore constrained by a lower bound where the reservation wage equals marginal labour productivity, or in other words, where profits are maximised given w_r, i.e. point B.

2.3   Privatisation, restructuring and employment in agriculture

Consider now how privatisation and restructuring during transition have affected agricultural employment. To start, assume that in the pre-reform period all agricultural production was produced in state or collective farms.[2] Labour use in these farms was inefficient. To account for this, we define the production function of the farms as

(8) $q = f(e) = f((1 - \gamma)L)$

with e effective labour input, L registered labour input and γ an indicator for the inefficiency of labour use, with $0 \leq \gamma \leq 1$ ($\gamma = 0$ implying efficient labour use). With $\gamma > 0$, inefficient labour use reduced the value marginal product of these farms. On the graph this means a shift of the VMPL curve to the left. Figure 5 represents the aggregate value marginal product line, VMPL (γ), with labour inefficiency γ and the associated contract curve (line ED).

Furthermore, before the reforms, authorities were concerned primarily with full employment and high wages, i.e. workers' interests. Profits were not a priority, as loss-making farms were subsidised both directly and indirectly through soft budget constraints. In terms of our model let – S represent the loss of the farm. This loss is covered by the government through a subsidy S. The pre-reform farm's profit can then be written as

(9) $\Pi = pf ((1-\gamma)L) - wL + S$

In terms of figure 5, this implies that the employment level is set beyond the zero isoprofitcurve, at point F on the isoprofitcurve $\Pi = - S$ implying labor use L_0.[3]

We will now analyse the impact of privatisation and farm restructuring . For expositional reasons, it is convenient to first analyse the impact of privatisation, and afterwards the effect of farm restructuring, although in reality both coincided in some cases.

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[2] This is a good representation of the situation in the large majority of transition countries. Exceptions are Poland, former Yugoslavia (see table 1), Laos and Myanmar (Macours and Swinnen, 2001).
[3] Notice that the soft budget constraint as in (9) does not affect the labour demand of the profit maximising firm since it does not affect marginal costs or benefits from labour use.

First, consider the impact of <u>privatisation.</u> Effective privatisation will have two effects. It will introduce a hard budget constraint for the farm and it will increase the management's bargaining power. The immediate effect of the introduction of a hard budget constraint is the shift of employment from L_0 to L_1, i.e. from point F (where the farm incurs negative profits) to point D on the zero profit curve. A further increase in bargaining power of the (now independent) management will move the equilibrium contract further down the contract curve to a point such as G with both a lower wage ($w_2 < w_1$) and a lower employment level ($L_2 < L_1 < L_0$). Hence, privatisation will have two reinforcing negative impacts on agricultural employment.

Second, <u>farm restructuring</u> affects agricultural employment during transition. Collective and state farms have been transformed into a variety of farm organisations, such as producer co-operatives, joint stock companies, limited liability companies, – all of which we will refer to as "corporate farms" – and individual (or family) farms.

The organisational restructuring contributed to improved labour management not only in individual farms, but also on many corporate farms. However, the changes in management on the latter differ widely between farms and between countries. For example, in several Central European countries (as the Czech Republic, Slovakia, Hungary) many corporate farms have undergone substantial effective restructuring. This restructuring includes both management reform and operation adjustments. These effective reorganisations are in strong contrast with farm restructuring in several FSU countries as reported by Lerman and Csaki (1997), and Sedik et al. (1999). Despite some downsizing in restructured farms, internal reorganisation has not produced deep results and according to recent surveys in the Ukraine and Russia about half the employees of farm enterprises report that no real change so far has

taken place in the "reorganised" farms. Also, most managers report that their farm enterprise continues to be committed to a life-time employment policy for its members – and do not acknowledge disguised unemployment on their farms.

To take an "average" view, assume therefore that farm restructuring has caused an improvement in labour governance such that inefficiencies in labour use have been reduced but not disappeared. In terms of our model we assume that the labour inefficiency on the corporate farms, γ^C, is lower than the initial inefficiency on the collective farms, γ^0, but still positive: $0 < \gamma^C < \gamma^0$.

It is easy to show that under a standard production function (e.g. $f(L) = Ae^{\alpha} = A[(1-\gamma)L]^{\alpha}$), an increase in labour efficiency will increase the use of labour (for $0 < \alpha < 1$)[4]. Graphically, the effect is a rightward shift in the VMPL curve and, consequently, also in the contract curve (figure 6). Ceteris paribus, the new equilibrium shifts from point G to point H and agricultural employment increases from L2 to L3.

The most radical form of farm restructuring is the break-up of collective and state farms into individual farms. The shift to individual farms had several effects on labour allocation. Four key factors influenced agricultural labour adjustment with the shift to individual farms: (1) bargaining power of workers; (2) scale economies; (3) relative efficiency; (4) access to capital.

To derive the impact of a shift to individual farms on agricultural employment, we model labour demand on the individual farm as a household decision making problem. The household maximises its utility derived from consuming agricultural products (food), non-agricultural products and leisure. The income of the household that can be spend on consumption depends on the agricultural production achieved on the farm (which can either

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[4] Formally, one can derive $\partial l^*/\partial \gamma = \alpha L / (1-\gamma)(\alpha-1)$, which is negative for $0 < \alpha < 1$.

be consumed by the household or sold on the market), the level (and cost) of inputs, and (possibly) earnings in alternative employment. As with the general model, we assume labour to be the only input. The amount of labour used on the farm can consist of family labour and/or hired labour. Mathematically, the household's objective function is represented by:

$$(10) \quad \underset{c_a, c_m, c_1, l}{\text{Max}} \quad U(c_a, c_m, c_1)$$
$$\text{s.t.} \quad q^I = f^I(l)$$
$$p_m c_m = p(q^I - c_a) + w_r(l^s - l)$$
$$c_1 + l^s = T$$

with c_a, c_m, c_1, the consumption of agricultural products; non-agricultural products and leisure respectively; q^I agricultural production on the individual farm; $f^I(l)$ the individual farm production function as a function of total labour employed on the farm (l); p_m and p the price of non-agricultural products and agricultural products respectively; l^s total household labour supply; w_r the reservation wage, i.e. the wage that can be earned in alternative employment; and T total household time endowment.

To correctly separate out the impact of the shift to individual farming, we consider point H to be the point of reference, i.e. the equilibrium which includes the impact of privatisation and of corporate farm restructuring. For simplicity, we assume that all agricultural production is shifted to individual farms.

The shift to individual farms induces several effects simultaneously. For analytical purposes it is important to separate these effects. Therefore, to derive the implications for the employment of agricultural labour when agricultural production is shifted from corporate

farms, where management and workers bargain over employment and wages, to individual farms, we make the following assumptions – which we will relax afterwards.

To begin, assume (1) that there are no scale economies in agricultural production, (2) that there are no further efficiency gains from shifting to individual farming (i.e. $\gamma^C = \gamma^I$, with γ^I the labour inefficiency indicator of individual farms) and (3) that markets are perfect, e.g. there are no constraints on access to credit or capital. Under these conditions, the optimal labour allocation of the household is defined by the following condition:

(11) $p\,\partial q^I/\partial l = w_r$

Or, the production side of an agricultural household model with perfect markets, has the same solution as in the case of a profit maximising firm with full management control, i.e. labour is allocated such that the value marginal product of labour equals the market wage rate. Further, if there are no scale economies, $\partial q^I/\partial l = \partial q/\partial l$. In combination it follows that under these conditions the equilibrium will shift from point H to point I in figure 7. This would mean that the shift to individual farms reduces agricultural employment from L_3 to L_4. Agricultural employment decreases as the extra, i.e. beyond profit-maximising, employment generated by workers bargaining power in the corporate farms disappears.

Then, consider the impact of differences in efficiency in labour governance between corporate and individual farms. There is an extensive literature showing that in agriculture individual farms do better at labour management than corporate farms (Carter, 1984; Lin, 1988; Pollak, 1985; Schmitt, 1991). Hence we should expect that with the shift to individual farms labour management further improves, i.e. that $\gamma^I < \gamma^C$. This effect will cause the aggregate VMPL curve for the individual farms to shift further to the right, e.g. to VMPL(γ^I), which leads to an increase in employment from L4 to L5.

Furthermore, the improvement in labour efficiency will have additional impacts on labour use because labour will substitute for other inputs with increased labour efficiency. Thus, the direct effect of changes in efficiency are enhanced by this substitution effect.

Next, consider the impact of scale economies. Several studies show that there are no scale economies in agriculture beyond a certain minimum level which can typically be captured by a (larger) family or individual farm both in developing countries (Berry and Cline, 1979; Hayami and Ruttan, 1985) and in developed countries (Kislev and Peterson, 1991; Peterson, 1997). However, these results are typically found under relatively stable institutional conditions. There may be scale economies in transition, e.g. due to market imperfections, to the fact that available machinery and equipment are inappropriate for smaller individual farms, or because many individual farms are still too small to capture the most important scale economies. Mathijs and Swinnen (2001) find that in early transition individual farms had, on average, significantly lower scale efficiency than corporate farms in former East Germany.

To analyse this effect, assume again that there are no labour governance differences between corporate and individual farms ($\gamma^I = \gamma^C$). In this case, if scale economies exist during transition, the aggregated VMPL curve of the individual farms will shift to the left of the VMPL curve of the corporate farms, i.e. $\text{VMPL}^S(\gamma^C)$ in figure 7. As a consequence, agricultural employment will fall from L_4 to L_6.

The existence of scale economies may reflect imperfect markets. However, market imperfections, in particular capital and labour market imperfections, will have other effects as well. We will discuss labour market imperfections further and consider here capital market imperfections. There may be several effects of capital market imperfections. One likely effect is further substitution of labour for capital. If access to technology or other capital inputs is impaired by capital market imperfections it is optimal for the farm to substitute this

factor by labour. Hence, while market imperfections causing scale economies tend to lower agricultural labour employment with the shift to individual farming, the impaired access to inputs and technology in itself is likely to have the opposite effect. Effectively what happens is that with imperfections in capital (or other input) markets, the effective price of other inputs, r, increases. It is easy to derive that $\partial l^*/\partial r > 0$.

The previous has shown that the shift to individual farming is associated with several effects, some of which counteract each other in terms of their impact on agricultural employment. The existence of scale economies and the reduction of bargaining power, associated with corporate farms, tends to reduce farm employment, while the increase in efficiency and substitution effects due to improved labour governance and capital market imperfections will increase labour use in agriculture.

Third, we expect that not only the change in production organisation, but also the existing farm structure has an impact on agricultural labour adjustment during transition. Consider a situation where demand for agricultural labour declines. As a consequence, workers are being laid-off. These workers now have the choice between three alternatives: take up individual farming, find employment in other sectors, or become unemployed. Individual farmers, faced with a decrease in labour demand (due for instance to deteriorating terms of trade in agriculture) face similar alternatives: stay in agriculture as an individual farmer but earn less, find off-farm employment, or become unemployed. The option of non-farm employment depends both on the vacancies in other sectors and on one's skills. If both groups have on average similar skills, the non-farm employment opportunities for both are similar. The main difference in labour adjustment between both groups then relates to their choice between individual farming or becoming unemployed.

There are two elements why farm workers laid-off by corporate farms are more likely to become unemployed than start farming themselves, while individual farmers are more likely to stay in agriculture even when the demand for labour decreases. The possibility to start an individual farm is related to human capital endowments of the individual (farming skills) on the one hand and access to factors (land and capital) on the other. First, former state farm workers may lack both the practical and managerial experience (because they worked on specialised tasks in state farms) to start up individual farming. Furthermore, access to production factors (capital, land and machinery), needed for the exploitation of a farm is easier for an (existing) individual farmer than for farm workers. The investments necessary for the start up of a farm are less in the case where one already has a farm.

Also, social capital plays a role as workers from corporate farms (or from industry) can start a farm more easily if there exists a social connection to individual farming, e.g. because of family links because the access to land and capital becomes easier, and because of cultural and human capital links. Summarising, we can say that a high initial share of individual farming reduces the probability of agricultural labour outflow to unemployment.

3.   EMPIRICS

3.1   Data and variables

The dependent variable, AGLABOR, is defined as the percentage change in labour employed in agriculture since 1988. Agricultural labour is measured as the economically active population in agriculture and was calculated based on data from OECD (1996, 1997, 1998), OECD-AHEG, and European Commission (1996).

The structural reforms discussed in section 2 are captured by three variables. The impact of privatisation is captured by the variable PRIV, measured as the change in the share

of land in private ownership since 1988. PRIV is expected to have a negative impact on AGLABOR.

The impact of the shift to individual farms is captured by DINDIV, which measures the change in the share of agricultural land used by individual farms since 1988. Agricultural land in private ownership and agricultural land in individual farms are calculated based on Swinnen (1994), Swinnen et al. (1997), OECD reports, East European Agriculture and Food, and national statistics.

The effect of the initial farm structure is captured by the variable INDIV, which measures the share of agricultural land used by individual farms.[5] INDIV is expected to have a positive impact on AGLABOR.

The empirical model includes a set of additional factors that are expected to have affected labour adjustments during transition. First, in most transition countries price and trade liberalisation has induced dramatic adjustments in relative prices. It induced a decline in the relative price of agricultural output over inputs. Graphically, this implies a shift of the VMPL curve, and thus of the contract curve, to the left. It is easy to see that agricultural employment will decrease as a result, independent of whether production takes place on corporate or individual farms.

This price liberalisation effect is captured by the variable PP/IP, representing the change in terms of trade. PP/IP is the percentage change in the ratio of producer prices over input prices in agriculture since 1988. The producer price index and input price index were taken from OECD (1999) and national statistics. PP/IP is expected to have a positive impact.

Furthermore, price and trade liberalisation has induced changes in the relative price of labour vis-à-vis other inputs, causing substitution between labour and other inputs. For example, less labour will be employed if agricultural wages increase relative to the cost of

other inputs. WAGEIP represents the change in relative input prices. WAGEIP is the percentage change in the ratio of agricultural wages over the input price index since 1988. Data on agricultural wages are from ILO (1997) and national statistics. WAGEIP is expected to have a negative impact on AGLABOR.

Employment in agriculture is also influenced by changes in other sectors of the economy which affect the reservation wage for labour employed in agriculture. The reservation wage for agricultural employment may increase due to for example, the growth of labour demand in the previously non-existing service sector. Inversely, the reservation wage may fall as economic reforms cause unemployment in other sectors.

The proxy variable to capture this effect is RELWAGE, measured as the change in the wage in agriculture relative to wages in the rest of the economy since 1988. Data on wages are from ILO (1997) and national statistics. RELWAGE is expected to have a positive effect on AGLABOR as a decrease of the relative wages in agriculture induces labour to flow out of agriculture.

The reservation wage is also affected by labour market or social policies, such as government-set minimum wages (either explicitly, or implicitly through unemployment, or more general, social welfare benefits). The introduction (or increase) of a minimum wage or welfare payments above the market wage has a similar effect as the increase in reservation wage due to growth in other sectors: agricultural employment will be lower with higher social welfare benefits. (Obviously, there will be a difference in what happens with labour that leaves agriculture).

Since social security benefits tend to be more generous in higher income countries, we use INCOME as a proxy for the extent of social security benefits. INCOME is the annual average per capita income level, measured as GNP per capita (US$ PPP) (table 1). Data are

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[5] There is no problem of collinearity between the variables INDIV (level) and DINDIV (change).

from World Bank (1999). We expect a negative relationship between AGLABOR and INCOME.

3.2 Regression model

We first estimated the following model (model A):

$$(12) \quad AGLABOR_{jt} = \alpha_0 + \alpha_1 PRIV_{jt} + \alpha_2 DINDIV_{jt} + \alpha_3 INDIV_{jt} + \alpha_4 PP/IP_{jt} + \alpha_5 WAGEIP_{jt} + \alpha_6 RELWAGE_{jt} + \alpha_7 INCOME_{jt} + \varepsilon_{jt}$$

where j refers to country j, t refers to year t, the α's are the coefficients and ε_{jt} is the error term.

The model is estimated with annual data between 1988 and 1995 from the seven transition countries for which the necessary data were available: Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia, and Slovenia.

3.3 Results and discussion

The first column of table 2 presents the least squares regression results of model A. The sign of all estimated coefficients is consistent with our theoretical hypotheses, and all coefficients are significant, and most highly significant.

The negative coefficient of PRIV is consistent with our hypothesis that privatisation has introduced hard budget constraints and reduced government and worker influence in labour allocation, causing reductions in employment.

The positive coefficient of DINDIV indicates that the gains in labour efficiency and substitution effects caused by the shift to individual farming were more important than the associated loss of scale economies due to transition and market imperfections. This is consistent with the argument from Mathijs and Swinnen (1998) that the shift to individual farming itself will only occur when the benefits of this shift (gains in efficiency) are larger

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than the costs (losses due to scale economies and market imperfections). Therefore, the factor which has a positive effect on agricultural employment has to be stronger than the factor with a negative effect on employment in order for a shift to individual farming to occur. This argument is consistent with our empirical result that the shift to individual farming has caused an increase in labour employment in agriculture.

However, this argument also suggests a potential estimation problem due to partial endogeneity of the DINDIV variable. There might be country-specific factors not included in the model that are correlated with both DINDIV and AGLABOR. For example, Mathijs and Swinnen (1998) have shown that initial technology and farm productivity are important determinants of farm individualisation.

In order to investigate potential endogeneity, we use two different instruments for DINDIV in two two-stage least squares (2SLS) estimations: models B and C. In model B DINDIV is instrumented with the man-to-land ratio as an indicator for initial labour intensity and technology, and a dummy which takes the value of one for Slovenia and Poland to further capture the different initial conditions in terms of private farming in these countries. In model C, we use an alternative instrumental variable (IV) estimation, using the lagged value of DINDIV as instrument. Comparing the results of models A, B, C, we conclude that accounting for possible endogeneity of DINDIV has little impact on the coefficients. A Hausman test for the two IV estimations confirms that the OLS estimates are consistent. The Cook-Weisberg test for heteroskedasticity and the Shapiro-Wilk test for normality of the errors also gave the desirable results for all models.

INDIV has a positive and highly significant coefficient. Labour outflow is less from individual farms than from corporate farms, because of differences in access to land and other assets, and in skills and opportunity costs for corporate farm workers compared to those employed on individual farms. This conclusion is reinforced by evidence from Poland where

labour adjustments have varied widely between regions. The most important cause is differences in initial farm structure: former state farm employees have left agriculture after being laid-off, while employment has declined much less on the small individual farms (Dries and Swinnen, 2001). In some regions with large unemployment, agricultural employment has even increased but only on individual farms, and mostly by people with family relations to the existing farm providing them with access to land, inputs, and a minimum level of human and social capital (Leiprecht, 1999). Hence, the often heard statement that agriculture played a "buffer role" during transition seems to apply more to the small-scale individual farm sector, than to the former state farms.

The PP/IP and WAGEIP coefficients confirm that price adjustments following price and trade liberalisations have induced important labour adjustments. Labour has left agriculture following price liberalisation and subsidy cuts as these have reduced the demand for agricultural labour. The results also confirm that changes in the relative cost of inputs have affected labour allocations and that substitution effects have been important. This is consistent with results from Rozelle et al. (1998) and Macours and Swinnen (2001) that labour substitution for capital inputs has been important in transition countries with strongly increasing prices for capital inputs relative to farm labour.

The RELWAGE coefficient is consistent with the argument that changes in other sectors, affecting the relative wage, have affected labour use in agriculture. However, the estimated coefficient is less significant than the other variables. Also here there is a potential estimation problem due to country-specific unobservable missing variables. Therefore, column 4 in table 2 reports the estimations of model D which includes country fixed effects.[6] The coefficients of PRIV, PPIP and WAGEIP are robust in the two specifications and remain

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[6] Since INDIV is a linear combination of the country fixed effects and DINDIV it has to be omitted in the estimation of the fixed effects model.

highly significant, while the coefficient of DINDIV is less robust but remains consistent with the argument above. However, the estimated impact of RELWAGE in the fixed effects model is zero. This indicates that the positive coefficient for RELWAGE in models A-C may also measure differences between countries.

This suggests that country-specific structural factors are important in determining the extent to which growth in other sectors translates into employment opportunities for labour employed in agriculture (or vice versa). These structural factors may include both differences in institutions, policies, and administrative regulations which affect labour allocations and differences in market characteristics and labour skills.

This interpretation is consistent with empirical evidence presented in Swinnen et al. (2000) which shows that in the Czech Republic a substantial amount of labour outflow from agriculture has been employed in other sectors of the economy, while in Poland most labour outflow has gone into unemployment and remarkable growth in the other sectors since 1992 has had relatively little impact on agricultural employment, mostly due to lack of skills and low education of people employed in Polish agriculture. Such structural impediments increase the costs of moving between sectors and as a consequence, the impact of growth in the rest of the economy on agricultural employment is constrained.

To the extent that the structural constraints are policy-related, one could expect that these will change over the course of transition as the reforms will affect them. To test whether this has occurred, in model E we introduce an interaction term of RELWAGE with an index of market liberalisation, LIB, which is calculated by de Melo et al. (1996). This variable measures the overall liberalisation of the economy.[7]

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[7] The liberalisation index is an aggregate indicator of liberalisation of internal markets (domestic prices and state trading policies), of external markets (foreign trade regime and current account convertibility), and of private sector entry (privatisation of small-scale and large-scale enterprises and banking reform) (de Melo et al., 1996).

One should expect that with increased liberalisation of the overall economy the integration between sectors and markets improves and that labour allocation will better reflect intersectoral differences in incentives. The results of Model E in table 2 are consistent with this hypothesis. At low levels of liberalisation the RELWAGE coefficient dominates and the total impact of RELWAGE on the use of labour in agriculture is zero or even negative, indicating that wages in other sectors have no effect on labour allocation in agriculture because of a variety of structural and regulatory constraints. However, as the liberalisation of the economy increases, which is reflected in the highly significant interaction term, and as such regulatory and institutional constraints presumably reduce, an increase in relative wages in other sectors has a positive effect on the outflow of labour. On average, the net effect of RELWAGE becomes positive with a liberalisation index above 40%, a level which was reached by all countries in the analysis, excluding Romania, by 1991.

The hypothesis that higher income countries, with more developed social welfare systems, have a stronger outflow of labour from agriculture is consistent with the negative and significant sign of the INCOME coefficient. The coefficient of INCOME is insignificant in the fixed effects model since the income differences are picked up by the country dummies in the fixed effects model. The highest income countries (Czech Republic, Hungary, and Slovakia) have a negative sign. Hence, these results are consistent with our hypothesis.

4.   DISCUSSION

These results suggest that agricultural labour adjustments during transition were caused by a combination of factors, including initial conditions (such as the pre-reform farm structure, structural adjustment-type changes following price liberalisation and subsidy cuts, and institutional reforms affecting property rights and production organisation. Price and trade liberalisation induced a decline in terms of trade, reducing the demand for labour in

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agriculture in all CEECs. This reduction in demand was offset by an increase in demand due to increasing prices for other inputs vis-à-vis wages.

Institutional reforms of factor markets and enterprise restructuring strongly affected labour adjustments. The outflow of labour is strongest in countries such as Czech Republic, Slovakia and Hungary (CSH) where large-scale corporate farms have remained dominant in agriculture. The shift to individual farms is much stronger in transition countries such as Romania and Albania, countries which experienced an inflow or preservation of the labour force in agriculture during the first years of transition. The break-up of the collective and state farms in labour-intensive agricultural production systems in these countries induced strong gains in labour efficiency. These efficiency gains have reduced the outflow of labour from agriculture.

In contrast, reformed collective and state farms with management less influenced by the state or by employees have laid off a large share of workers, beyond those that voluntarily left the farms for other employment. Moreover, the difference between CSH versus Poland and Slovenia can be attributed to this factor. Both Poland and Slovenia are characterised by a domination of small family farms, even pre-reform. These structures have reduced the outflow of labour, and −as mentioned above− regional variations in these countries are consistent with this argument.

Furthermore, in low income transition countries such as Romania and Bulgaria, agriculture and household farming provides food and social security, in contrast to countries such as Czech Republic, Slovakia and Hungary where the state provides more extensive social security and unemployment benefits, pensions etc. This household security further limits the outflow of labour from agriculture in these poor countries with more individual farms.

Institutional reforms of the labour market have also played a role. The effect of changes in the rest of the economy depends on structural and institutional impediments which constrain the incentives for agricultural labour to move to other sectors. Liberalisation of the overall economy is necessary for this factor to affect agricultural labour reallocation. This pull-effect on agricultural labour is therefore stronger in the more liberalised economies of the Czech Republic, Slovakia, Hungary, Poland and Slovenia.

However, overall the impact of this pull factor has been relatively modest in the early years of transition. For example, the outflow of labour from agriculture was similar in the Czech Republic, Hungary, and Slovakia, although unemployment was much lower in the Czech Republic (around 3% until 1996) than in Hungary and in Slovakia (both over 10% for most of the period). In all these countries the importance of large scale farms remained very high during the period considered here and lay-offs by these farms have played a major part. Similarly, regional data for Poland indicate that there is no negative correlation between regional unemployment levels and the outflow of labour from agriculture (Dries and Swinnen 2001). However, there is a strong positive correlation between the regional outflow and the importance of the former state farms in the region.

Ad hoc empirical evidence suggests that alternative employment opportunities seemed to have primarily affected whether labour laid off from the large farms has become unemployed, as in Poland, which was characterised by very high unemployment during transition: more than 16% by 1994, or employed in other sectors, as in the Czech Republic where a large share of the former agricultural employees found other jobs during the early years of transition, both in urban and rural areas (OECD, 1999).

5.   TOWARDS A GENERAL EXPLANATION

While the results discussed above are obtained from a restricted set of countries, we believe that the conclusions are more generally valid and can be used for explaining the adjustments in other transition countries as well. Among the thirteen transition countries in figure 3, we can distinguish several "labour adjustment paths". To start, we focus on the countries that all start from a similar initial condition of less than 10% of land used by individual farms at the outset of the reforms (see table 3), i.e. a situation represented by point A in figure 2.

One path is followed by, among others, the Czech Republic, Estonia, and Hungary (CEH). In these countries transition has first induced massive agricultural labour shedding while much of the large scale corporate farms continued to dominate agriculture (see fig 8a). This is illustrated by the country positions at year 4 of the transition: on average agricultural employment had fallen by almost 50% while corporate farms continued to use 75% of land. Only in a second transition phase there is a significant shift to individual farms: more than 50% of the land is now used by individual farms while labour shedding continues but at a reduced rate.

Figure 8b illustrates the very different path followed by countries such as Romania, Lithuania, and Latvia (RLL). In these countries there is an immediate and dramatic shift to individual farms, while labour use increases on average in agriculture. After 4 years individual farms use 65% of the land and labour use has increased by 8% on average. In the second transition phase, the shift to individual farming continues to increase, albeit slower, and there is a turnaround in labour use: employment in agriculture falls in all countries (on average by 10%).

The difference in adjustment paths is due to a combination of initial conditions and reform policies. In terms of initial conditions, CEH has a higher level of development than

RLL (reflected in higher income and lower share of agriculture in employment). The labour intensity in agriculture is higher in RLL. More labour intensity causes a shift to individual farms because it both reduces the disruption costs and potential scale diseconomies of farm restructuring and increases the benefits of shifting to an organisation with better labour management.   Concerning reform policies, government regulations have been more conducive to the move to individual farms in RLL than in CEH. In particular in Latvia there was a strong government policy directed at breaking up the collective farms which were seen as bastions of communism (Rabinowicz, 1997), while in Romania the shift to individual farming occurred partly spontaneous with collective farm members breaking up the collective farms and forcing governments to follow with regulation. Liberalisations have a more negative effect on terms of trade, especially after four years, but wages fall considerably further than other input costs in RLL than in CEH. Both price effects have opposite impacts on the relative labour outflow.

Hence both initial conditions and reform policies have contributed to a greater shift to individual farming in RLL than in CEH, which in turn has contributed to a stronger outflow of labour in CEH than in RLL. These factors complement the stronger reduction in labour reallocation constraints by stronger and earlier liberalisation of the economy in CEH than in RLL (see table 3).

Russia and Ukraine form a third path, one of little adjustment (see fig 8c). After 8 years of transition, the absence of some basic reform conditions in both countries constrains major adjustment in either labour use or organisation. Initially, agricultural labour increased in Russia as poverty induced subsistence farming as a form of food security (Seeth et al. 1998). While employment has fallen somewhat since, a considerable amount of surplus labour is still employed on large scale former collective and state farms in Russia and Ukraine. The lack of effective privatisation and land reform constrains restructuring and the

development of individual farming as well as the incentives and ability of managers to change labour management (Lerman and Csaki, 1997; Sedik et al. 1999; Macours and Swinnen, 2000). Furthermore, employment practices by the farms, such as payments in kind instead of money wages, increase the obstacles for workers to move to other areas or sectors (Friebel and Guriev, 2000).

Putting the paths together, as in figure 9, suggests several additional hypotheses. First, it appears that the CEH and RLL paths are gradually converging towards the long-term equilibrium as suggested by point B. This in itself is an important point in the light of the debate of where the agricultural restructuring would lead to in transition countries. Second, Poland and Slovenia, two countries which started with a very different organisational structure as agriculture was dominated by small-scale family farming during Communism, fit remarkably well on the RLL path. Relatively slow labour shedding in both countries has reduced the agricultural labour force with about 20% over the first 8 years of transition. The need for continued restructuring and reforms to increase the efficiency of farms is likely to induce important further reductions in the labour force in Poland and Slovenia (Sztanderska and Piotrowski, 1999), which would shift their position towards the long run equilibrium along the RLL path.

It is uncertain still what way Russia and Ukraine will go. Comparing their situation with the conditions which induced the other countries to go either way, suggests that they have features of both paths. In terms of their level of development they are closer to RLL, and more so now than at the beginning of transition. However, in terms of labour intensity and government regulations, they are even further removed from the RLL characteristics than the CEH countries. However, without a significant shift in government policies on land reform and farm transformation, restructuring will remain constrained and they may remain stuck close to where they started.

5.   CONCLUSIONS

Reforms have strongly affected agricultural employment in transition countries but in remarkably different ways.   In countries such as Hungary and Estonia labour use in agriculture has declined dramatically. In others (e.g. Poland and Slovenia) it has decreased to a lesser extent and in some (e.g. Romania and Russia) agricultural employment increased during transition.

This paper provides an explanation for the differences in labour adjustment during transition. We show that several adjustment paths can be identified and that the differences are due to a combination of variations in initial conditions and differences in reform policies and effects. The extent of price distortions and subsidies under the communist system has affected wage and price adjustment during transition and the resulting effect on labour use in agriculture when prices were liberalised and subsidies cut. Reform policies that had a strong influence on labour adjustment were, besides price and trade liberalisation, privatisation of production factors, farm transformation policies, and the set of general reform policies which liberalised factor markets and removed obstacles for improved factor allocation and mobility throughout the whole economy. Surplus labour outflow from agriculture is stimulated by these liberalisation policies and by the privatisation of the farm assets as they improve incentives and remove constraints for optimal factor allocation and structural adjustment.

The shift to individual farms, which was especially strong in labour-intensive production systems with low labour productivity in agriculture, has reduced the outflow of labour from agriculture by improving farm governance and labour efficiency, although this effect was mitigated by losses in scale economies due to disruptions and market imperfections in transition. In general, labour outflow was considerably lower on individual farms than on corporate farms, due to a combination of factors related to human capital, access to finance and physical capital, and social capital.

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Table 1: Pre-reform[a] situation of agriculture and development, and change in agricultural labour use during the first five years of transition

	Pre-reform share of agr. in total employment (%)	Pre-reform share of agr. in GDP (%)	Pre-reform share of land in indiv. farms (%)	Pre-reform GNP per capita (PPP $)	Change in agr. labour after 5 years of reforms (%)
Czech Rep.	10	6	1	8600	-46
Hungary	18	16	13	6810	-56
Poland	26	12	76	5150	-15
Slovakia	12	9	2	7600	-50
Albania	49	32	3	1400	-3
Bulgaria	18	11	14	5000	2
Romania	28	14	14	3470	14
Slovenia	12	4	83	9200	-5
Estonia	12	18	4	8900	-44
Latvia	16	22	4	8590	-8
Lithuania	19	28	9	6430	12
Belarus	19	23	7	7010	-9
Russia	13	15	2	7720	6
Ukraine	20	25	6	5680	4

[a] Pre-reform: 1989 for CEECs and 1990 for FSU
Source: see section 3.1, OECD (1999) and national statistics

Table 2: Regression results

Dependent variable	A AGLABOUR			B AGLABOUR			C AGLABOUR			D AGLABOUR			E AGLABOUR		
No. of observations	47			47			47			47			47		
	OLS			2SLS[a]			2SLS[b]			OLS			OLS		
	Coefficient	t-value		Coefficient	t-value		Coefficient	t-value		Coefficient	t-value		Coefficient	t-value	
Intercept	6.0962	1.00	***	6.7225	1.09		5.6516	0.92		-20.5215	-050		14.3859	2.26	**
PRIV	-0.4716	-6.09	***	-0.4577	-5.77	***	-0.4814	-6.07	***	-0.4505	-6.18	***	-0.3591	-4.37	***
DINDIV	0.6521	3.25	***	0.5451	2.31	**	0.7280	3.04	***	0.3247	1.25		0.7295	3.89	***
INDIV	0.1725	2.59	***	0.1911	2.72	***	0.1594	2.26	**	-			0.0844	1.27	
PP/IP	0.4643	5.32	***	0.4795	5.37	***	0.4534	5.08	***	0.5083	4.73	***	0.4591	5.69	***
WAGEIP	-0.4819	-5.14	***	-0.5092	-5.13	***	-0.4625	-4.64	***	-0.5401	-3.66	***	-0.3723	-3.91	***
RELWAGE	0.2956	1.96	*	0.2712	1.76	*	0.3130	2.03	**	-0.0253	-0.15		-0.6807	-1.80	*
RELWAGE*LIB	-			-			-			-			1.6814	2.78	***
INCOME	-0.0032	-3.89	***	-0.0034	-3.97	***	-0.0031	-3.66	***	0.0016	0.39		-0.0036	-4.66	***
Po	-			-			-			22.3766	1.02		-		
Hu	-			-			-			-12.5541	-0.83		-		
Cz	-			-			-			-14.9436	-2.39	**	-		
Sk	-			-			-			-9.2821	-0.68		-		
Ro	-			-			-			18.5159	0.75		-		
Bu	-			-			-			16.1720	0.71		-		
R^2	0.8228			0.8215			0.8221			0.8769			0.8525		
Adj R^2	0.7910			0.7894			0.7902			0.8334			0.8214		

[a] DINDIV instrumented with initial labor intensity and Poland/Slovenia dummy.
[b] DINDIV instrumented with lagged DINDIV.

Table 3: Initial conditions[a] and reforms in CEECs and FSU

	CEH	RLL	RU
Initial Conditions			
Land in individual farms (%)	6	9	4
Share of agr. in employment (%)	13	21	17
GNP per capita (PPP $)	8100	6160	6700
Labour intensity (Pers./ha)	0.11	0.13	0.08
Reforms			
Exit costs due to govt. regulations[b]	2.3	1.7	3.0
Land Reform	Restitution[c]	Restitution[d]	Distribution in shares
After 4 years			
PRIV	63	63	9
LIB	87	76	46
PP/IP	-28	-51	-71
WAGEIP	-26	-65	-86
After 8 years			
PRIV	85	73	11
LIB	93	84	74
PP/IP	-50	-60	-75
WAGEIP	-24	-43	-83[e]

[a] Pre-reform: 1989 for CEECs and 1990 for FSU

[b] Indicator taking the value of 1 to 3

[c] Land reform in Hungary also included distributions in kind and sales for compensation bonds

[d] Romania also distributed land in kind

[e] Due to insufficient data for Ukraine, WAGEIP average for RU 8 years after the start of the reforms refers only to Russia

Source: see section 3.1, Macours and Swinnen (2001), Mathijs and Swinnen (1998), Swinnen (1999) and national statistics for FSU.

Figure 1: Change in agricultural employment in the CEECs (1989-1995)
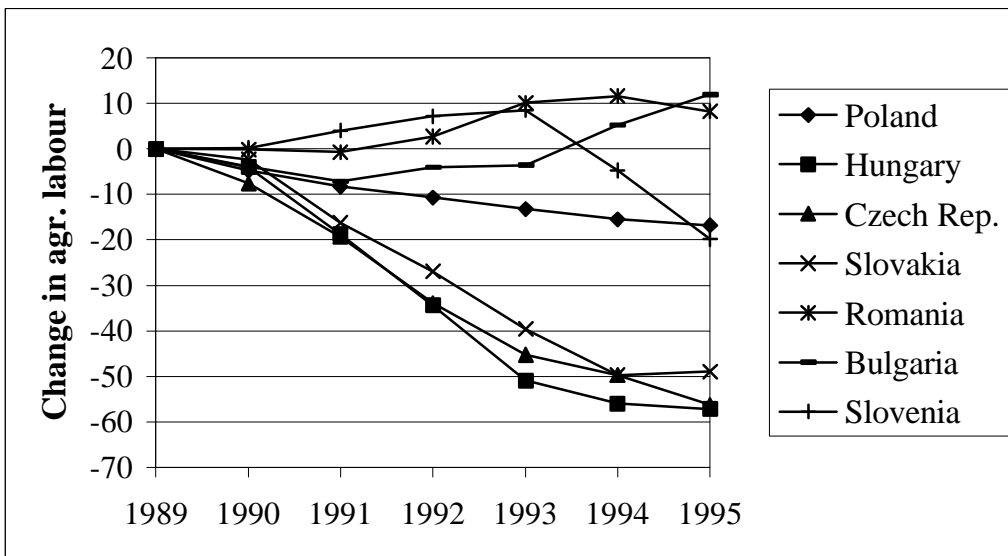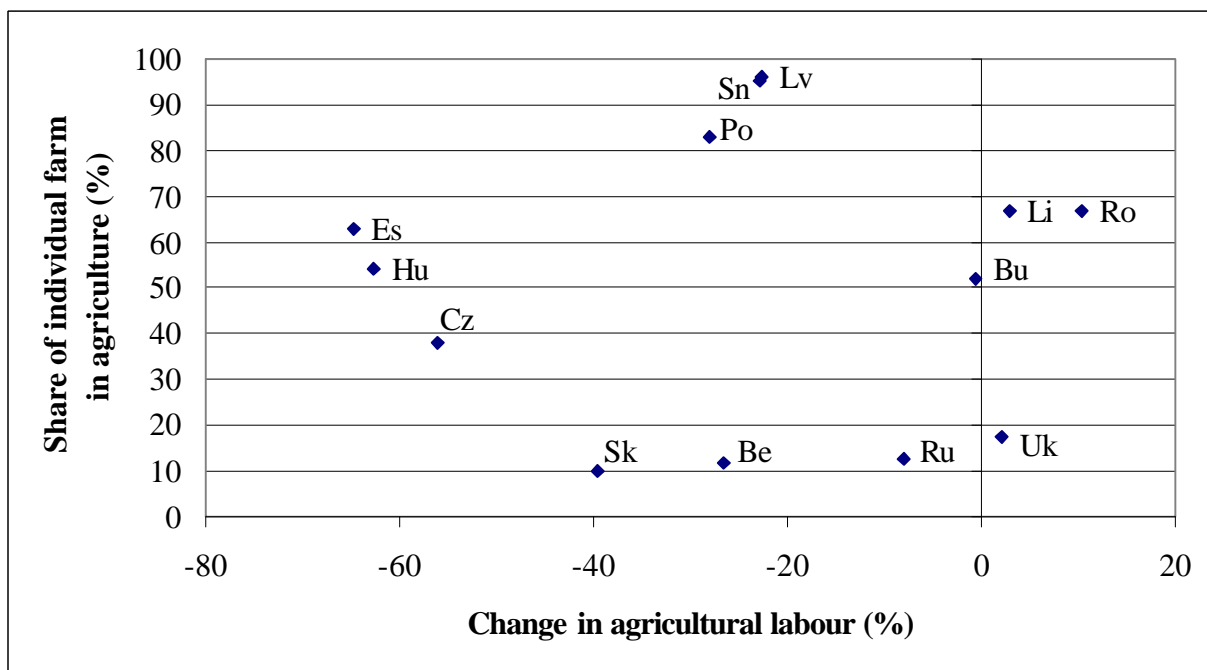

Source: see section 3.1

Figure 2: Impact of institutional reform on farm organisation and labour use in agriculture (simple model)
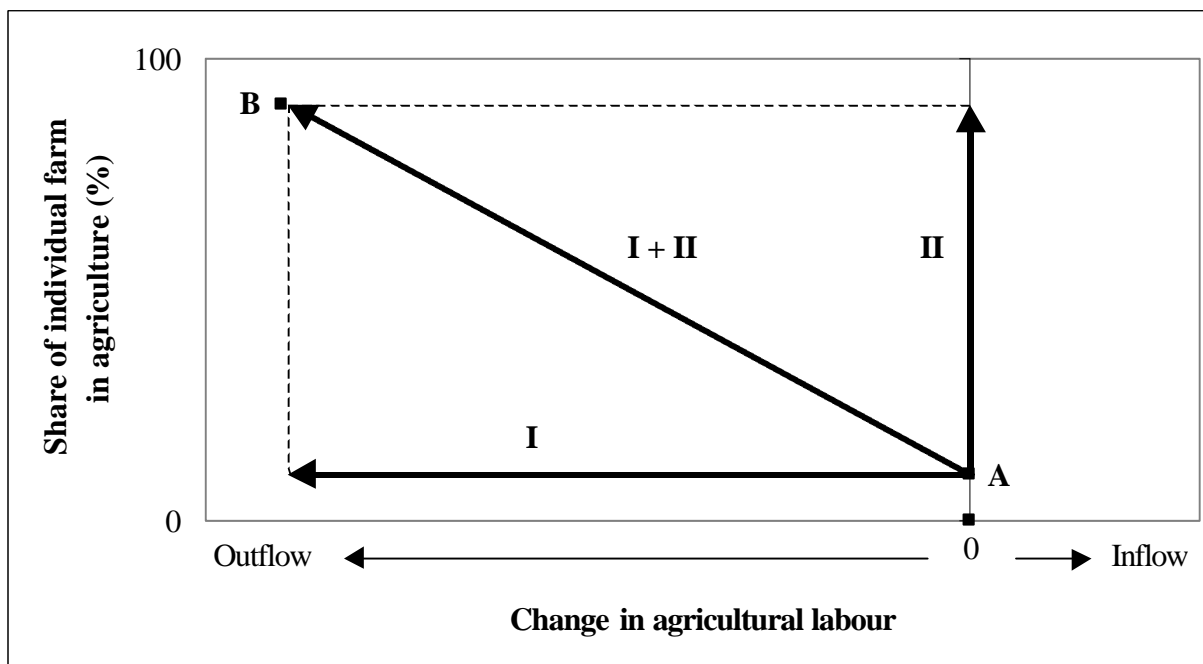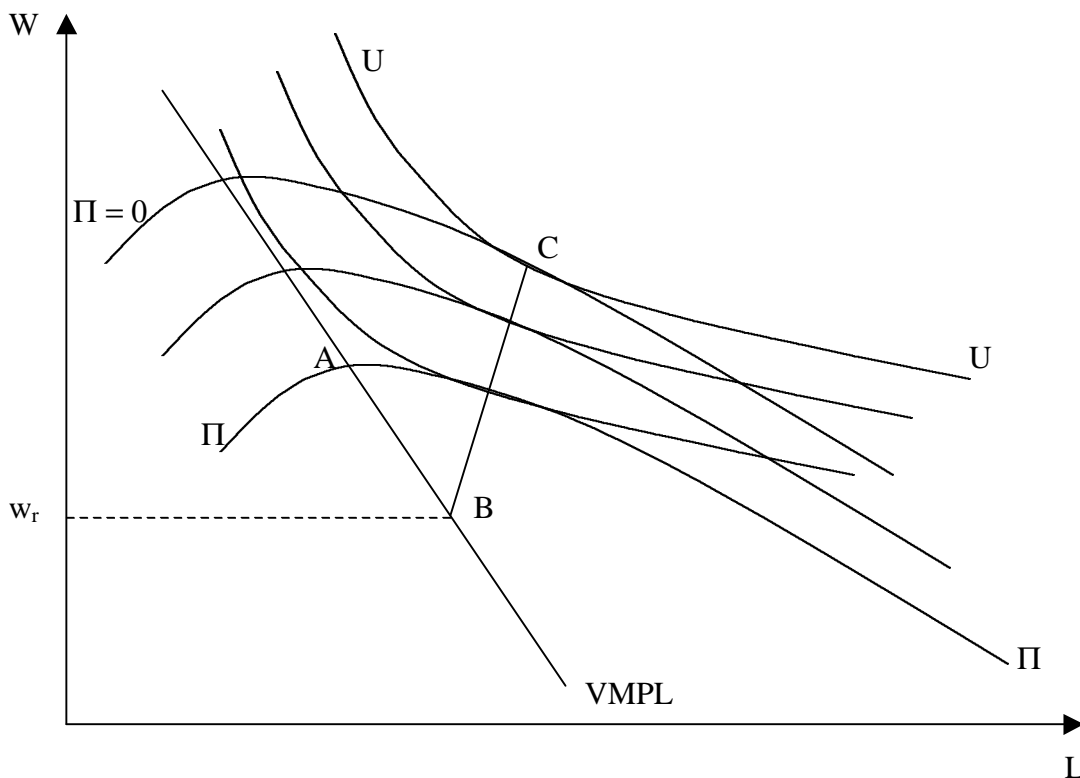
Figure 3: Change in labour allocation and organisation in agriculture for 13 transition countries 8 years after the start of the reforms
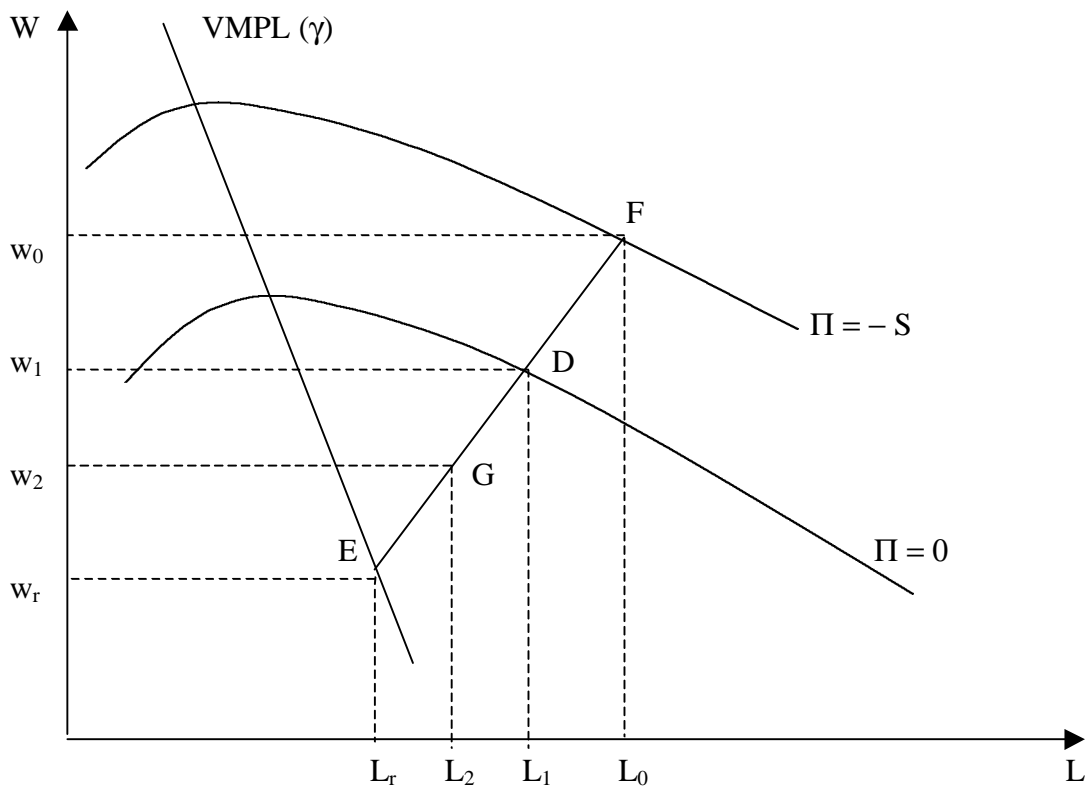

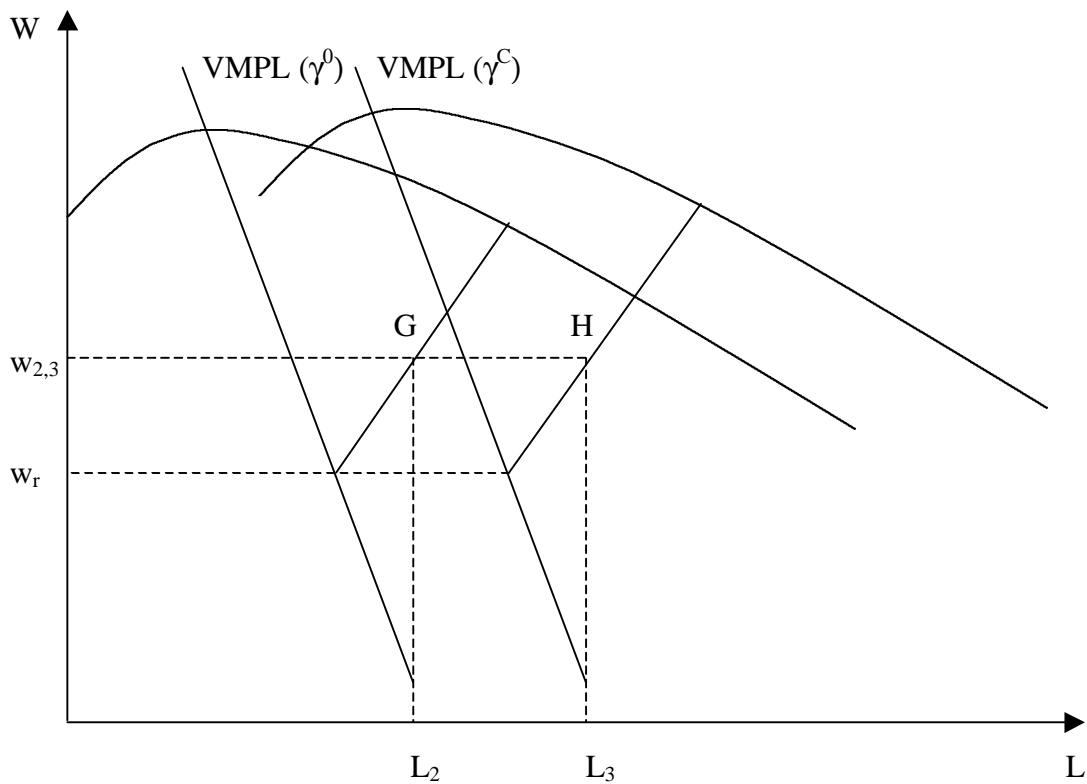Source: ILO (2000), OECD (1999), Csaki and Nash (1997), Csaki and Lerman (1999) and national statistics
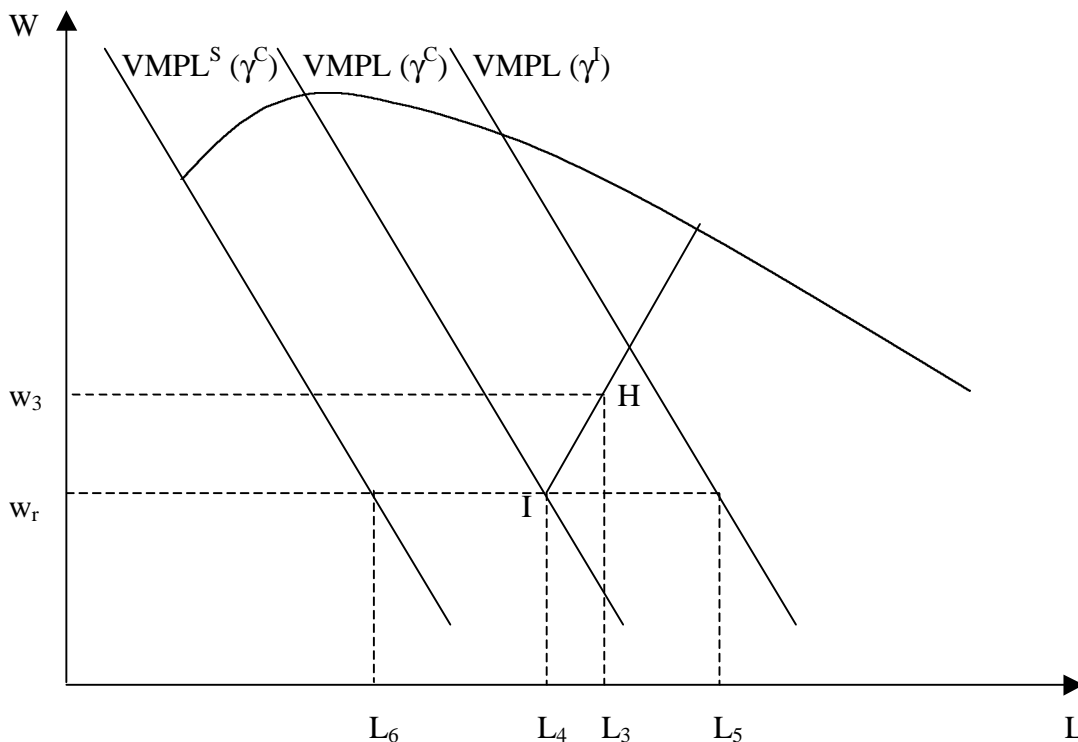
Figure 4: The general model of labour allocation

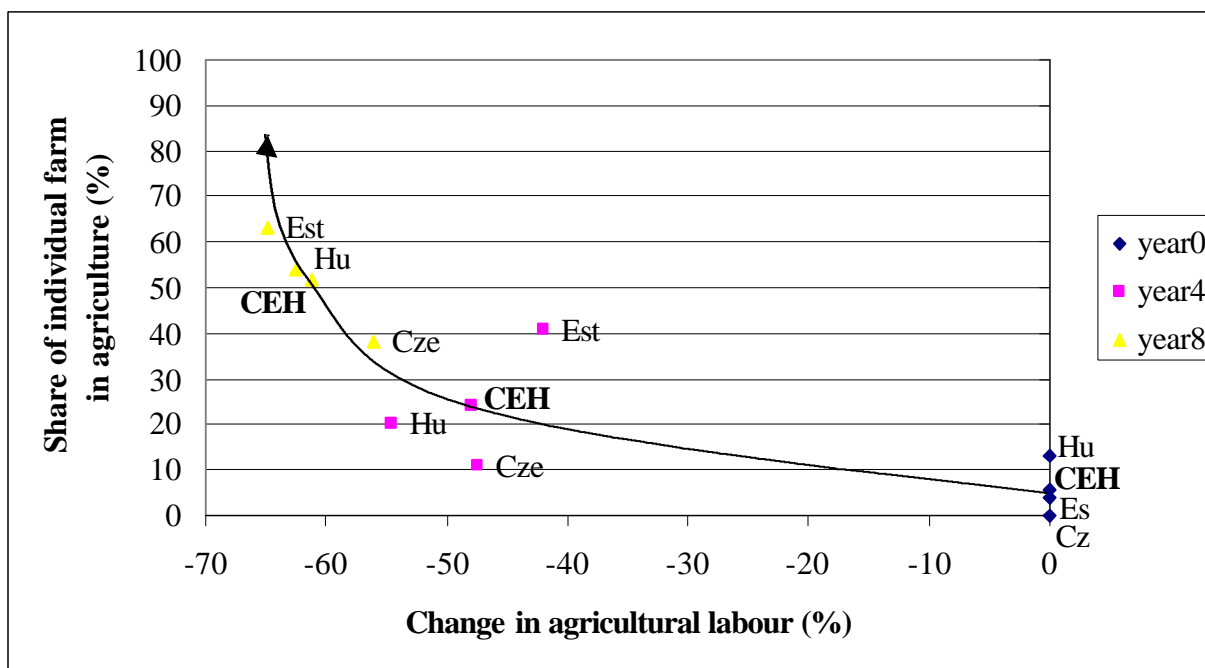**Figure 5: Privatisation and agricultural employment**

Figure 6: Efficiency improvements and agricultural employment

Figure 7: Individual farming and agricultural employment

Figure 8a: Change in agricultural employment and institutional reforms 0, 4 and 8 years after the start of the reforms: path 1 (CEH)[a]
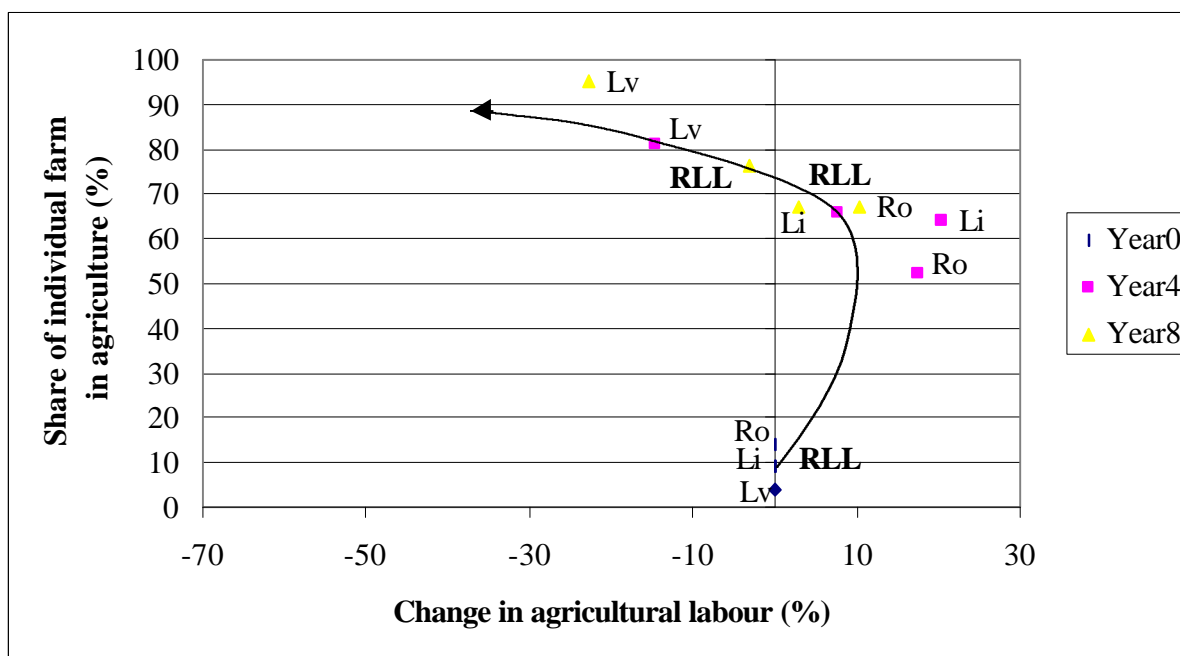

[a] start of the reforms in CEEC = 1989, in FSU = 1990
  CEH = average for Czech Republic, Estonia and Hungary
Source: see section 3.1, ILO (2000), OECD (1999), Csaki and Lerman (1999) and national statistics

Figure 8b: Change in agricultural employment and institutional reforms 0, 4 and 8 years after the start of the reforms: path 2 (RLL)[a]

[a] start of the reforms in CEEC = 1989, in FSU = 1990
  RLL = average for Romania, Latvia and Lithuania
Source: see section 3.1, ILO (2000), OECD (1999), Csaki and Lerman (1999) and national statistics

Figure 8c: Change in agricultural employment and institutional reforms 0, 4 and 8 years after the start of the reforms: path 3 (RU)[a]

[a] start of the reforms in FSU = 1990
  RU = average for Russia and Ukraine
Source: national statistics

Figure 9: Putting the paths together

Source: see section 3.1, ILO (2000), OECD (1999), Csaki and Nash (1997), Csaki and Lerman (1999) and national statistics