1 Introduction

Agricultural employment is much more important for income generation in Central and Eastern Europe's rural areas than it is in the EU-15. On the eve of EU-enlargement, it is thus an important question how agricultural employment in these areas will develop in the future, as on this development, economic and social well-being in Central and Eastern Europe depends to a large extent.

It is a common assumption that through increasing agriculture's productivity, income in rural areas increases as well. This might *ceteris paribus* hold, yet there is another question which is not addressed very frequently: It is the question of distribution of these productivity gains. There seems to be a lack of awareness of distribution effects at policy level, as so far, agricultural policies aim mainly at the improvement of productivity, and only to a lesser extent at its distribution.

Productivity growth (or decrease) is distributed via factor markets, i.e. capital, land – and labour markets. As a consequence, how productivity changes in a certain sector affect employment severely affects the distribution of welfare in the respective sector and a region as a whole. In recent times, there is strong evidence that, at least in developed economies like the EU-15, productivity gains in agriculture do not positively affect employment in the sector. It is rather the case that such productivity gains are going alongside with losses on the employment side. Figure 1 shows this development.

Figure 1 Agricultural employment and production in the EU

Source: European Commission (1997)

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While in the twenty years from the mid-seventies to the mid-nineties, agricultural production has increased by about 25 percent, during the same period, agricultural employment has decreased by more than fifty percent. Similar findings can be drawn from the New German Länder, which, after reunification, went through a quick process of transition and EU-integration. Here, we can see for example, that in the agricultural enterprises (mainly the former collective farms), employment went through a sharp decrease in the first five years after reunification, while after that period, employment seemed to be more or less stable with a slightly downward trend (REINSBERG ET AL. 2002). During the second period, production showed a slightly upward trend, after a slight decrease in the first period. If we look at the respective developments in the EU-15, Eastern Germany and the Central and Eastern Europe accession countries and candidates, we can see a picture that is at first glance diverse, but shows some similarities (Table 1).

Table 1 Percentage change of production and agricultural employment in Europe

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>EU-15</td>
<td>+5</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>East Germany</td>
<td>-4</td>
<td>+10.0</td>
<td>-3.0</td>
</tr>
<tr>
<td>Accession countries</td>
<td>-9</td>
<td>+3.5</td>
<td>+2.5</td>
</tr>
<tr>
<td>(Period 90-99)</td>
<td></td>
<td></td>
<td>-2</td>
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The negative net effect of agricultural development on employment in the EU-15 has already been discussed. In East Germany, also a negative effect can be observed, even stronger than in the EU-15, yet with a certain consolidation after the first shock. In the accession countries, there is less of a shock in the first period, and a recovery in the second, which is still not strong enough to avoid an overall negative effect. It seems like in East Germany and the accession countries, we are looking at the same phenomenon, yet with different intensities.

These developments have a strong impact on employment and social security in rural areas. In Eastern Germany, for example, of the about 850,000 people that were employed in agriculture at the end of the GDR-period (by 1990), only less than 20% were left in the sector after the adjustment process by 1995. Already during the first adjustment phase from 1990 to 1991, 14% changed their profession, more than twenty percent took their retirement or early retirement, about 12 percent joined a government employment program (mainly by receiving further education), and more than 17% were unemployed, while only about 35 percent remained in agriculture, with more than 50% (18% of the total) of them only part-time employed (MEHL 1999). In Poland, studies show a similar picture: Of all the people that were formerly employed in government farms in Northern Poland, by 1998, only about 12% were further employed in these agricultural enterprises. The rest was unemployed (24%), retired due to age or inability to work (36%), and only 28% had found other employment, of which about one third (or 8% of total) being casual labourers or self-employed (HALAMSKA 1999).

This shows clearly the adjustment's effect on income distribution in rural areas. A majority of people is unemployed after the shocks, while the negative employment effects seem to be higher than the negative production effects, which implies a negative distribution effect. Especially the numerous cases of early retirement also underline the social dimension of the adjustment process. But also, structural adjustment in the agricultural sector is affected: In Poland, numerous agricultural holdings of a size between one and two hectares exist; the reason for this is that a smallholder with above one hectare of land is entitled to pension benefits, while a holder of more than two hectares of land is not entitled to unemployment benefits.
This certainly affects structural adjustment, as many small holders will sit on their land instead of giving way to adjustment and necessary farm growth. Further, many smallholders seem to fall back on subsistence agriculture as for example in the case of Hungary, an advanced country in terms of privatisation and liberalisation. Here, agricultural production has decreased by 30% since the beginning of transition, while the marketed surplus has decreased by 46%, which indicates an increase in subsistence production.

All the above mentioned examples in their singularity provide reasons for a closer look at the effects of income change and income distribution in the agricultural sector of transition countries. If proof is found that structural adjustment reduces employment in agriculture and hence in rural areas, there is clear necessity for a stronger emphasis on distribution policies vs. efficiency enhancing policies. The major question is therefore: If structural adjustment is induced by external shocks and is aiming at increasing productivity, what effect does it have on employment?

The paper will try to look behind the linkage between post-transition structural adjustment and its impact on labour markets and hence distribution of income by assessing the relationship between production and employment in the agricultural sector of Central and Eastern European accession countries. The next section of the paper is dedicated to some theoretical and methodological remarks. Thereafter, we will discuss the empirical results concerning labour demand in the agricultural sector, and the impact on wealth distribution the respective demand functions have. A last step will be to discuss ways to more equally distribute productivity gains without losing economies of scale.

2 Theoretical and methodological remarks

There are different approaches to assess labour demand (defined as the demand for the factor labour by enterprises on labour markets). Micro-economic approaches basically consider labour as one component in a production or cost function, with interrelationships between the factors included in the function (CHAMBERS 1988). This implies that labour can hardly be assessed separately from the other factors. Yet, when taking into account that labour and capital markets are linked through productivity, they can be assessed separately, assuming that capital in an industry determines total factor productivity and therefore also labour productivity, which in turn determines labour demand. Thus, labour demand can be reduced to being a function of production and productivity, especially when assuming that real wages are constant (FELDERER AND HOMBURG 1991). The assumption of constant real wages can be dropped when using value added of a sector instead of gross productivity, as this figure reacts to (or depends on respectively) changes in factor costs. Then, finally, employment can be reduced to a function of production expressed as value added of a sector. This has, however, the disadvantage that substitution effects between labour and other factors, namely land and capital, cannot be quantitatively assessed like it would be possible in a production function approach. Yet the former approach, hereafter referred to as the reduced approach, has the advantage that data requirements are lower, as only production values, as well as land and labour are integrated into the analysis, and capital can be dropped. It is yet well suitable to detect the effects of a sequence of exogenous shocks (price and cost changes) and structural adjustment, defined as a change of factor input ratios within a sector, on respective sectoral labour markets by allowing negative overall coefficients of the function when assessing developments over time. In the common production function approach, such negative coefficients would indicate a growth of production value with at the same time a substitution of labour through

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1 It has to be pointed out that especially capital stocks and their development during transition are difficult to assess, as their validation is subject to many legal and political distortions, as well as to problems of estimating the real value of assets.
the other factors, induced by changing factor cost ratios, and implying an outperforming of
the (positive) growth effect by the (negative) substitution effect. The reduced approach
catches these two birds with one stone, yet with the disadvantage of being unable to further
separate the effects of growth and substitution. This problem can be solved by separating
short term effects from long term effects, assuming that in the short run changes in factor em-
ployment are due to exogenous shocks (changes in output values), whereas in the long run,
changes in factor employment are due to both changes in output values and changes in factor
costs and hence indicate structural adjustment. Under this assumption of a temporal sequence,
both short term and long term coefficients can be positive, yet the net effect depends on their
ratio. If the short term effect is higher than the long term effect, it can be assumed that the
sum of both effects yields a negative change in labour employment while the output either
increases or decreases.

We will further follow the reduced approach and consider labour demand solely as a function
of production (here defined as the value added within a sector).

\[ L_D = f(Y) \] (1)

As we want to assess both long term and short term productivity effects on labour demand,
we consider two different types of production terms as possible proxies: Overall production
value and land productivity. For the long term effect, we assume that it is induced by both
growth and shrinkage in land use and capital stocks respectively. As for the two proxies,
when farms grow (shrink) through acquiring (abandoning) land, land productivity might be
the same, while overall production increases (or decreases). When capital is invested or dis-
invested, both land productivity and total production might change. As total production Covers
both changes in land and capital allocation, while land productivity covers only the latter, we
decided to use total production as a proxy for long term changes through structural adjust-
ment. Table 2 shows the selection criteria.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Relationship between shocks, structural adjustment and productivity figures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue</td>
<td>Featuring in</td>
</tr>
<tr>
<td>(1) Short term shocks (price, yield change)</td>
<td>Land productivity, Overall production value</td>
</tr>
<tr>
<td>(2) Structural adjustment: Farm size (area)</td>
<td>Overall production value</td>
</tr>
<tr>
<td>(3) Structural adjustment: Capital stocks</td>
<td>Land productivity, Overall production value</td>
</tr>
</tbody>
</table>

Source: Own depiction

For the short term effect, we consider land productivity as the proxy of choice, assuming that
short term shocks like harvest failures or price shocks have a strong impact on land productiv-
ity. These occurrences will certainly also affect total production, yet it would be more difficult
to separate structural adjustment effects from erratic short term effects through total produc-
tion.

\footnote{Consider an iso-output line with decreasing rates of substitution between factors. A change in factor price ratios would induce a substitution effect, leaving the output constant but reducing employment of one factor in favour of the other. An increase in production at constant factor prices would yield more employment of both factors. A combination of both effects would yield primarily unknown employment ratios, as these depend on the impact of the positive growth effect vs. the negative substitution effect.}
The functional form is
\[ f(x) = x^a \] which is iso-elastic\(^3\). We do this by estimating the coefficient of a double-log-function\(^4\).

\[ \ln y = a \ln x + e \] where \(a\) is the elasticity of (2) and \(e\) denotes the error term.

The estimation is done for both the long term production as
\[ L_D = Y^a \] with \(Y\) the total production in the agricultural sector and the short term (land) productivity
\[ L_D = y^a \]

The databases used are World Bank time series data for seven countries Latvia, Estonia, Poland, the Slovak Republic, Hungary, Romania, and Bulgaria. These countries were selected for their time series availability for the variables for at least nine years without gaps in the series. Data for the Czech Republic were taken from the Agro census of the Czech Republic; data for the New German Laender were taken from the German Agrarbericht (BMVEL, various editions).

3 Empirical findings

The empirical findings depicted in Table 3 show broad similarities. This was not to be expected, as one would assume that the possibly different structures in the agricultural sectors of the different countries might have an impact on labour demand. Yet, this is not the case. Short term elasticities, which we assume to reflect the reaction on price, cost and erratic yield change seem to be quite high, mainly between 0.8 and even as high as 1.4. This reflects the sharp adjustment during the first years of the transition, but also later shocks like harvest failures and further price adjustments. The high short term elasticities show the severity of the initial shocks. In a gradual adjustment, one would expect short term elasticities to be lower than long term elasticities, as in the longer run, factors are commonly expected to be more flexible and mobile than in short term.

The only exceptions to the rule of the empirical findings, and hence the only findings that confirm the above mentioned theory of long term elasticities being higher than short term ones are the agro-enterprises in East Germany, where short term reactions seem to be quite low. This can be explained by the structure of employment contracts in this area: Contracts are long term and often linked to the tenure of enterprise shares, as they often feature in land rental to the enterprise, and in the holding of co-operative shares by the employee. The situation in family farms is different. Here, short term shocks show a strong impact on labour employment, as here, mainly seasonal harvest workers are either employed or dismissed due to price expectations and yield. These results also show the stability of the model assumptions, as they seem to well reflect the situation on the ground.

It is also of interest that in the south-eastern European countries like Bulgaria and Romania, short term labour demand reacts as quickly as or even quicker than in other countries. The same holds for Poland. This challenges the myth of agriculture being a buffer in times of crises, and agricultural activities being kept up despite their declining profitability (ABELE ET AL. 2001). Maybe it is rather land tenure that is constant, and agriculture is abandoned and revisited once it provides higher income perspectives. This could explain why land transactions in these countries have been rather low in the last decade of the 20\(^{th}\) century (SCHULZE AND

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\(^3\) As elasticity is \(f'(x) \cdot x / f(x)\), we calculate the elasticity of this function as \(e = ax^{a-1} \cdot x / x^a = a\)

\(^4\) The function is estimated without a constant, using SPSS statistical software.
Tillack 2001), further, it is complementary to the above mentioned statement that e.g. in Poland, agricultural holdings are kept up in order to benefit from social security schemes, and it would also explain the high short-term flexibility of labour. It also means that many agricultural workers in the accession countries seem to have short term employment contracts (seasonal workers) and seem to be only temporarily employed (or self-employed), e.g. for harvests.

Long term demand for labour, i.e. production elasticity is also quite homogeneous with values between 0.2 and 0.5 and no exception this time. This means that long term structural adjustments have only slight and slow effects on labour, at least through the transition period. For these cases, it means that the initial shocks (which have been due to a benefit/cost ratios change and were as described above short term) leading to a high cut in employment have not been counterbalanced by the following structural adjustment. This is due to the fact that in every country, except for Eastern German agro-enterprises, short term demand reactions are much higher than long term reactions.

Table 3  Labour demand elasticity

<table>
<thead>
<tr>
<th>Country</th>
<th>Labor demand elasticity of land productivity (short term elasticity)</th>
<th>Labor demand elasticity of production (long term elasticity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estonia1</td>
<td>0.7500</td>
<td>0.2200</td>
</tr>
<tr>
<td>Latvia1</td>
<td>0.9900</td>
<td>0.2600</td>
</tr>
<tr>
<td>Poland1</td>
<td>1.4100</td>
<td>0.3700</td>
</tr>
<tr>
<td>New German Laender (family farms)2</td>
<td>0.8200</td>
<td>0.3300</td>
</tr>
<tr>
<td>New German Laender (agro-enterprises)2</td>
<td>0.0627</td>
<td>0.4400</td>
</tr>
<tr>
<td>Czech Republic2</td>
<td>1.2700</td>
<td>0.5000</td>
</tr>
<tr>
<td>Slovak Republic1</td>
<td>0.8900</td>
<td>0.2600</td>
</tr>
<tr>
<td>Hungary1</td>
<td>0.9600</td>
<td>0.2700</td>
</tr>
<tr>
<td>Bulgaria1</td>
<td>1.1500</td>
<td>0.3100</td>
</tr>
<tr>
<td>Romania1</td>
<td>1.3500</td>
<td>0.3600</td>
</tr>
</tbody>
</table>

1 Production expressed as value added in constant (1995) USD.
2 Production expressed as Gross sectoral product in current local prices. Here, the assumption of stable wages holds.

Source: Own calculations. Data: WORLD BANK, CZECH REPUBLIC, BMVEL.

4 Conclusions and outlook

It has been shown in the previous chapter that the phenomena described in the first chapter of the paper, the sharp employment decline in the first five years of transition and the slow and insufficient (in terms of employment recovery) consolidation process in the second half of the nineties can be explained by the differential of short term and long term elasticity of labour demand: The reaction on short term shocks is much higher than the reaction during long term structural adjustment, and so is the impact on labour employment, yielding a long-term negative net effect on employment and therefore negative distribution of productivity gains among factor owners over time.

The question is now whether these findings can help to forecast the future development of employment in the framework of the EU-enlargement. This is difficult, as the present approach is (due to the lack of appropriate data) still a very partial one.

We may discuss the possible future in two scenarios as follows:

Scenario 1: The further structural adjustment scenario. Here, employment effects will be rather low, due to the fact that investments may rather substitute labour through capital and
land. This is shown by the fact that long term (structural adjustment) elasticities are in most cases far below one. In total, this may have a negative impact on income distribution in rural areas, as growth induced by structural adjustment will go to the landlords and to the capital owners rather than to their employees. This also holds for CAP subsidies that are rather asset than commodity based, e.g. direct payments.

Scenario 2: The (positive or negative) external shock scenario: Such developments, affecting short-term benefit/costs ratios may strongly affect labour demand. Factors affecting the benefit/cost ratio may be the exposure to post-enlargement in- and output price changes. This scenario also holds for commodity based subsidies of whatever kind. Here, we have to consider that there is a possibility of blowing up subsidized employment in Eastern European agriculture. On the other hand, with negative shocks inducing long-term structural adjustment, we will have the same long term (negative) effects on income distribution as in Scenario 1.

In the long run, labour might be replaced by capital and land in both scenarios, as it seems to have been the case already after the initial shocks. Long term productivity gains will only be to a minor extent generated through higher employment, so that productivity gains will rather benefit land and capital owners than labourers. But this stage of development (like it is in the EU) is not yet reached in Eastern Europe. Probably it will be fostered when opportunity costs of labour increase further and thus higher wages reduce the value added. Then, the structural adjustment will be smoother in terms of labour market effects, as labour will have the opportunity of migrating towards other sectors.

In both of the above described scenarios, growth in other sectors is required to foster structural adjustment in agriculture, as the expected negative net effect of employment has to be absorbed. This is a requirement not only for income distribution. As we have seen from the examples given in the first section, loss of employment in the agricultural sector also has severe social consequences, as obviously, alternative employment is not at hand. This leaves many relying on social security and early pensions, and probably in poor living standards. It even has consequences for structural adjustment and growth in the agricultural sector, as many of those who are likely to be disadvantaged by any adjustment process will stick to their land, as examples from Poland show, and thus hamper structural adjustment.

The only immediate solution to the labour market problem without having employment opportunities in the other sectors at hand would be enabling small farmers to participate in growth while retaining their small scale structure. One example of how this can be done has been observed by the authors during explorative studies in Hungary; where small scale farmers are engaged in contracts of sharecropping, and they deliver their produce to larger agro-enterprises, like for example vegetable exporting businesses. However, these out-grower schemes still have to be assessed with respect to their effect on equity. Only 10 percent of the production value remain with the farmers, while the holding company, which has built up the green houses and equipped them with high technology, receives the remaining 90 percent of the harvest value. The share cropping contract can be terminated after only one season, which again implies high short term elasticity of labour demand. This also indicates that the bargaining power of the farmers is very low. Furthermore, cheap seasonal labour crosses the border from Romania. Another practice, which comes closer to a win-win-situation, is reported by Varga and Biró (2001). New owners of small land parcels who have no access to machinery agree upon a so called cultivation contract with the successor of the former agricultural production cooperative. Here, the land is cultivated by the large scale farmer, while the small scale farmer takes over the related costs and reaps the yield. In this case, the landowner receives a remuneration which can be up to two and half times higher than the usual fixed land leasing rate. However, the landowner has to pay all production costs, even in the case of harvest failure. This indicates that here again, equity effects (including the implications of risk-sharing) have yet to be assessed.
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THE WORLD BANK: Statistical Databases.