AGRICULTURAL LABOR ADJUSTMENT AND THE IMPACT OF INSTITUTIONS: PANEL DATA ANALYSIS

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1 INTRODUCTION

Former socialist economies underwent tremendous changes since the start of the economic reforms. Before the break-up of the economic planning system, in most of these countries, agriculture was collectivized and intersectoral movements of labor were more or less restricted. Economic reforms implied decollectivization, privatization of land and assets, adjustment of relative prices and liberalization of labor markets. However, the speed and degree of reform implementation varied tremendously across countries (see, e.g., ROZELLE, SWINNEN, 2004).

A striking observation is the significant divergence in agricultural labor use across countries over the (post-) reform period. Figure 1 presents the relative change in agricultural employment since the beginning of economic reforms up to 2008. Countries are ranked according to the World Bank index of agricultural liberalization developed by CSAKI and NASH (1998) and published for Central Eastern Europe (CEEC) and the Commonwealth of Independent States (CIS). The steepest decrease in agriculture’s share in total employment is observed in the so-called group of fast reformers. Similarly, China and Vietnam, which are examples of countries with very early decollectivization, experienced a comparable decrease of agricultural employment, albeit over a 10-year longer period. On the contrary, in several moderately and slowly reforming countries agriculture’s share in employment increased. In Armenia, Georgia, and Tajikistan agriculture’s share even increased by more than 50%.

The adjustment of agricultural labor use to new economic conditions seems to take different paths and to proceed at different speeds. Thus, the primary goal of this chapter is to examine the major reasons behind this almost unprecedented and diverse change in agricultural labor use in an econometric framework. Referring to the theory of migration, potential determinants of occupational migration from agriculture to non-agricultural sectors are explored with the help of panel-data approaches. Moreover, we investigate whether historical conditions and the current quality of institutions affect occupational migration.
Figure 1: Change of agriculture's share in total labor since start of reform

Source: Own calculations based on WORLD BANK (2012), ILO (2012), FAO (2012) and national statistics.


This chapter’s contribution to the extant literature is twofold. First, it extends previous studies by including all European and Asian countries in transition. Second, the analysis centers on indicators of the institutional environment as determinants of labor adjustment and the question whether conditional on these variables the impact of other macroeconomic variables is uniform across countries or significant differences exist.

The remainder of this chapter is organized as follows. Section 2 provides a brief overview of the existing literature on labor adjustment and the important role of institutions. Section 3 introduces the applied methodology and the data used. The first part of section 4 presents the evolution of labor adjustment over time and the second sub-section presents the results of the econometric analysis. The last section concludes.
2 Review of Literature

Previous empirical evidence points out that the agricultural sector has played and still plays two different roles in labor markets of transition countries. On the one hand, after the removal of subsidies, central planning and mobility restrictions, an outflow of surplus agricultural labor took place. Hidden unemployment in agriculture during the period of central planning has been observed in almost all countries. BRADA (1989) and JACKMAN (1994), for instance, underline this finding with comparatively high figures of hidden unemployment in Poland and Czechoslovakia. On the other hand, several studies also highlight the buffer role of agriculture, e.g., in the form of subsistence farms, in periods of high unemployment and economic uncertainty (SORM, TERRELL, 2000). This buffer role implies a reduced outflow of labor from agriculture or even an inflow into this sector. For instance, SEETH et al. (1998) describe how emerging private subsistence agriculture serves as an insurance against poverty and hunger using the example of Russia. Similar evidence is reported by BERNABÈ and STAMPINI (2009) for rural Georgia, where inflow of labor into agriculture increased after the Russian economic crisis of 1998. The authors conclude that farming acts as a social buffer in bad times, especially for unemployed and retired people.

Micro-economic empirical analyses of determinants of agricultural labor adjustment center mainly on farm household decisions and use either cross-sectional or panel micro-level data (BOJNEC, DRIES, 2005; CHAPLIN et al., 2004; BUCHENRIEDER et al., 2002 for CEEC; GLAUBEN et al., 2008; ZHANG et al., 2004; DE BRAUW et al., 2002; BROSG et al., 2007 for China).1 Important determinants of agricultural labor adjustment identified in these studies are the education level of the household members, household composition and regional characteristics. However, studies at the micro-level are of limited use in deriving nation-wide policy conclusions. Especially the impact of macroeconomic reforms and institutional change can only be quantified partially.

Determinants of intersectoral labor adjustment from a macro-economic perspective are extensively discussed and summarized by LARSON and MUNDLAK (1997). In line with traditional theories of migration, such as TODARO’S (1969) seminal work, they highlight the differences in (expected future) incomes as the driving force of intersectoral labor flows. A number of empirical findings support this hypothesis. For example, BUTZER et al. (2002, 2003) provide empirical evidence for Venezuela and several South East Asian countries that the income ratio

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1 Additionally, interregional migration in China forms a widely discussed topic in the literature. Migrants move from rural to urban regions or from poor Western to rich Eastern Chinese provinces (TAYLOR et al., 2003). For recent and extended surveys on the general subject of migration see MASSEY et al. (1993), as well as TAYLOR and MARTIN (2001).
between agricultural and non-agricultural sectors, the growth of non-agricultural employment, and the unutilized capacity in non-agriculture are the main determinants of labor flows out of agriculture.

While focusing more strongly on factors within the agricultural sector SWINNEN et al. (2005) show that important drivers of labor outflow from agriculture are decreasing agricultural prices and any development which will increase the reservation wage of agricultural workers. Furthermore, the authors find a significantly negative impact of the development of relative agricultural wages on agricultural employment. DRIES and SWINNEN (2002) observe a significant reduction in agriculture’s share in employment in relatively more developed Polish regions. This effect is even stronger in regions with a better infrastructure as well as in younger and better educated farm populations.

Although the importance of institutions, such as property rights on land, hard budget constraints, the framework for contract enforcement and access to capital, is widely acknowledged in the theoretical literature, its quantitative assessment in econometric studies is still limited. Overarching and effective land property rights are seen as necessary requirement to raise efficiency of agricultural production (LERMAN et al., 2004; SWINNEN, 1999). Applying a more formalized theoretical framework, SWINNEN et al. (2005) work out that an effective privatization with a shift from corporate farms to profit-maximizing individual farms induces several effects, some of which will reduce and some increase the employed labor in agriculture. Hence, the total effect can either be a net outflow or a net inflow of labor.

Looking at the empirical evidence, SWINNEN et al. (2005) identify three patterns of agricultural labor adjustment based on the organizational transformation of agriculture. In Estonia, Hungary and the Czech Republic, we observe a fast decline in the share of agriculture in total employment together with a moderate increase in the share of individual farms in total agricultural land. On the other hand, agricultural employment decreased less rapidly or even increased in Poland, Romania, Lithuania, Latvia and Slovenia, all countries with a significantly higher prevalence of individual farms. Finally, individual farming in Russia and Ukraine still exhibits only a minor share in total landholdings and the change in agricultural employment is at the same time limited. Moreover, DRIES and SWINNEN (2002) as well as SWINNEN et al. (2005) find agricultural employment to be reduced significantly faster with an increasing share of privatized land, which captures the effect of the introduction of hard budget constraints and decreased workers’ bargaining power. In contrast, the share of agricultural land used by individual farms has a significant positive effect on agricultural employment. The latter effect is more pronounced in low-income transition countries, where farming is used to secure food supply.
Previous studies did not account for the different ways of land privatization and institutional quality as potential determinants of labor adjustment. However, they are important for two reasons. First, tenure security on land is expected to facilitate land market development and farms’ specialization. Functioning land markets ease farmers’ exit from agriculture. Second, a low quality of the institutional environment might hamper the general economic development and farmers might stick to agricultural production to assure the household’s food supply. Consequently, the present study includes measures for nominal land ownership status at the beginning of economic reforms and current institutional quality.

3 Methodology and description of the data

3.1 Measuring labor adjustment

Based on the theoretical framework introduced by Mundlak (1978) and developed further by Barkley (1990), sectoral labor adjustments can be analyzed within a framework of occupational choice. Each individual is assumed to maximize an indirect utility function depending on personal characteristics, realized income or expected income in any other occupation, prices of consumption goods and costs of migration. The remaining lifetime utility of any individual can be derived by discounting the stream of utility for each occupation up to retirement age. Usually expected earnings and switching costs enter the maximization as most important determinants of lifetime utility (Mundlak, 2000). In case of a positive difference between the discounted indirect utility in any other occupation and the discounted indirect utility in agricultural employment a shift of occupation is expected to take place.

Assuming an economy with two sectors, agriculture and non-agriculture, and a mutually exclusive character of occupations, aggregated shifts between sectors are defined as sectoral labor adjustment.\(^2\) We quantify this movement by the difference of growth rates in total and agricultural employment and use this measure as dependent variable in our econometric analysis. More specifically, the labor adjustment rate \((m)\) is calculated as the difference between

\(^2\) Any aggregated approach neglects part-time farming, which forms a non-negligible part of agricultural households’ activities also in transition countries (e.g., Chaplin et al., 2004; Buchenrieder, 2005). The measure applied in this chapter will therefore understate the ”true” sectoral labor allocation as long as off-farm occupations are not recorded as an individual’s main economic activity in official statistics and overstate labor adjustment whenever households continue to engage on household plots besides any registered main non-agricultural employment. However, lack of individual employment data which are consistently comparable over all transition countries limits the use of other concepts.
growth rates of total labor \((L)\) and agricultural labor \((L_A)\). The adjustment rate can be interpreted as relative to the size of the agricultural sector:

\[
m = \frac{L_t - L_{t-1}}{L_{t-1}} - \frac{L_{A_t} - L_{A_{t-1}}}{L_{A_{t-1}}} = n - n_A
\]

where \(n\) is the growth rate of total labor and \(n_A\) designates the growth rate of agricultural labor. In the absence of migration, the natural growth rates of agricultural labor and total employment are assumed to be equal. This measure has been suggested first by Mundlak (1978) and has been used in econometric analyses by Butzer et al. (2002, 2003) focusing on Venezuela and Southeast Asian countries, respectively. The measure suffers from one limitation that has to be kept in mind. Due to the assumption of equal growth rates of agricultural and total employment, a drop in total employment leads by definition to a hypothetical migration into agriculture as long as \(|n| > |n_A|\). As almost every transition country has been characterized by over-industrialization under central planning (Raiser et al., 2004), (virtual) immigration into agriculture will be caused by the downsizing of the industrial sector. However, we assume that results will be potentially affected in the same way across all countries.

In previous studies, labor market transformation is usually assessed using shares of sectoral employment. Based on the theory of structural change and economic development and the related empirical work by Chenery and Taylor (1968) and Raiser et al. (2004) compare sectoral change in employment shares for 22 transition countries. The simulations by Raiser et al. (2004) reproduce the observation of over-industrialization during central planning. Interestingly, employment in agriculture at the beginning of the transition was clearly lower than predicted by the benchmark. However, the authors do not undertake any further econometric analysis of changes in the distortion index\(^3\) and its determinants. Dries and Swinnen (2002) as well as Swinnen et al. (2005) focus on the development of agricultural labor’s share, more specifically on the annual percentage change of labor employed in agriculture since the beginning of economic reforms. As the measure is of cumulative nature it might create inconsistencies in a panel of countries with a different length of reform period. The annual measure of occupational migration employed here allows differentiating a slowly progressing structural change over a long period from a short-run high labor outflow.

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\(^3\) The distortion index is a measure of the overall distance of an economy from a market economy with the same per capita income. An index of zero indicates a situation of no distortions.
3.2 Determinants of agricultural labor adjustment

Previous literature provides a range of determinants that possibly impact occupational choice at an aggregated level. Starting from the theoretical framework proposed by Larson and Mundlak (1997), labor flows are a function of the ratio of incomes in non-agriculture to that in agriculture, the size of the originating sector and the rate of population growth. The relevance of the income ratio is supported by earlier theoretical models of migration, such as Todaro’s seminal work (Todaro, 1969; Harris, Todaro, 1970; Zarembka, 1970), where rural-urban migration is understood as a mechanism to equalize expected marginal earnings in agriculture (rural) and non-agricultural (urban) sectors. Institutions that limit intersectoral mobility may restrict this equalization. A prominent example is the hukou household-registration system in China which restricted people’s movement from rural areas to cities at the end of the 1970s, despite the dominance of agricultural production in rural regions.

Lack of individual and internationally comparable wage rates, as well as the high relevance of unpaid family work in agriculture requires us to approximate wages by an average productivity measure. Thus, the ratio of value-added per worker in non-agricultural sectors to value-added per worker in agriculture is expected to be one of the main determinants of occupational migration in our empirical analysis. Relatively high earnings in non-agricultural sectors will foster labor outflow from agriculture.

Furthermore, following the theoretical literature one should expect migration to increase with the relative magnitude of agricultural labor, which constitutes the source of supply (Harris, Todaro, 1970; Zarembka, 1970). A higher share of agricultural employment constitutes a larger pool of potential labor moving to other sectors. Unemployment forms another key determinant. On the one hand, a high unemployment rate might slow down structural change by lowering expectations with respect to potential earnings in non-agricultural sectors. On the other hand, high unemployment imposes a threat to new entrants into employment, thus lowering the growth of total employment. Todaro’s model stresses the combination of wage differences and the probability of finding employment in urban areas. The impact of the intersectoral ratio of value-added per worker will thus decrease as the unemployment rate increases.

The main interest of this chapter, however, is to investigate the impact of a country’s institutional environment on labor flows. It is widely acknowledged that laws, regulations, and the structure of contracts constrain agents’ daily behavior and decision making. Obviously, the choice and timing of certain reforms influences the emerging new institutional environment. For instance, the establishment of full private property rights through privatization is expected to stimulate interest of the new owners in securing their property rights.
Full ownership of land as a production factor is characterized by the right to use it for production purposes, to offer it as collateral, and to sell it. Hence, KOESTER and BRÜMMER (2006) interpret the strong persistence of cooperatives and collective farms and the widespread existence of household plots in Belarus, Russia, and Ukraine as an indication of an incomplete transfer of property rights. However, the choice of land privatization strategies and the speed of reforms are influenced by historical conditions. SWINNEN (1999) postulates that land ownership status under central planning ("post-collectivization ownership" in what follows), the time under communist legacy and ethnic issues determined the path of decollectivization as well as privatization of state owned land. MUKAND and RODRIK (2005) argue that governments and their electorates aim at imitating the policy of a successful neighbor. In our case, their model predicts that countries closer to the European Union are more likely to implement a market economy and allow functioning land markets than countries further away. Summing up, the countries in our sample share some common historical and geographical characteristics. Those characteristics probably cause endogeneity in the econometric analysis. The sample is therefore divided into two subsamples, based on the nominal post-collectivization land ownership status, as suggested by SWINNEN (1999).

At the same time, the implementation of reforms and the improvement of markets is expected to lower the transaction costs of exchanges (NORTH, 1991). Subsequently, lower transaction costs are expected to result in a higher employment of capital relative to labor and/or a higher prevalence of long-term agreements if, for instance, property rights are clearly defined and effective. This hypothesis is backed up by a variety of empirical studies highlighting the economic growth and investment promoting effect of a high-quality institutional environment. Measures of reforms and institutional quality might change from one year to the next. Therefore, such indicators have to be included in the model as explanatory variables. Summing up, faster reforms and a high institutional quality are expected to foster occupational change.

Political intervention into agriculture before the introduction of the first economic reforms varied substantially across the previously centrally planned countries ranging from implicit taxation of agricultural production in East Asia to implicit subsidization in CEEC and CIS. Additionally, liberalization of prices proceeded very differently in the respective countries (ROZELLE, SWINNEN, 2004). As discussed above, relative competitiveness of agriculture depends on price relations. Therefore, we control for the impact of relative prices’ adjustment. Obviously, a more favorable development of agricultural prices should limit the outflow of labor.

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4 See ARON (2000) for a detailed critical survey.
3.3 Econometric framework: Data and specification

3.3.1 Data

To calculate the measures of occupational migration, annual sectoral labor data are taken from WORLD BANK (2012), FAO (2012), ILO (2012), and UNECE (2012) and are completed with information from national statistical yearbooks. Data are available for 30 transition countries in Europe and Asia. Employment in agriculture refers to people who have their principal activity within agriculture, hunting, forestry and fishing. Starting in 1989, most transition countries linked their national classification to international standards. The ten new EU member states within the group of transition countries implemented EU regulations and aligned their national statistical systems during the 1990s. In general, possible measurement errors due to problems with the statistical system are expected to become minimal over time. Moreover, BUTZER et al. (2002: 246) show that measurement errors in agricultural employment have only very limited impact on the estimated migration series.

Our econometric analysis starts from a base specification in which we control for intersectoral income differences, the relative size of agricultural labor force, unemployment, development of relative prices, and a country’s level of economic development. This base specification relies on previous empirical analyses not specifically focusing on transition countries (e.g., MUNDLAK, 1978; BARKLEY, 1990; BUTZER et al., 2002, 2003). As noted above, the base specification is estimated for two subsamples. The first subsample includes all countries with nominal post-collectivization private ownership on land. The second subsample covers all countries with no formal private ownership status on land under central planning. A complete list of countries is provided in footnote 5.

Testing for the impact of time-varying variables will be done in subsequent step-wise extensions of the base specification. Much of the debate in the literature focuses on the speed of economic reforms, contrasting gradualism (e.g., China)

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5. The included countries in the first subsample (nominal private post-collectivization ownership) are Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Poland, Romania, then Serbia and Montenegro, Slovakia, and Slovenia. The second subsample (no private post-collectivization ownership) includes Albania, Armenia, Azerbaijan, Belarus, China, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Mongolia, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and Vietnam.

6. The categories correspond to the major divisions A and B in the third revised version of the International Standard Industrial Classification (ISIC) and major division 1 in the second revision of the ISIC. Processing of agricultural products beyond levels required for primary markets, marketing through cooperatives and field preparation involving construction work like terracing are excluded from agricultural activities in the ISIC nomenclature.

7. For a more detailed description of changes in national statistics and reliability of data the interested reader is referred to WORLD BANK (1996) and UNECE (2000).
with shock therapy (e.g., Estonia). The EBRD transition indicator (EBRD) is used to control for the impact of the speed of general economic reforms. An increasing occupational migration due to faster economic reforms would support the "restructuring hypothesis". The general level of institutional quality is approximated by two measures: an indicator of contract-intensive money (CIM) first proposed by CLAGUE et al. (1999) and a composite indicator of good governance (WGI) first assembled by KAUFMANN et al. (1999) and continuously updated by the WORLD BANK. CIM is defined as the ratio of non-currency money to the total money supply and reflects the ability of firms to raise capital and the reliance on third-party enforcement. The composite governance indicator WGI pools subjective indices for six dimensions of governance: voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and corruption from various sources.

With respect to intersectoral income differences, most authors use average sectoral income per worker instead of marginal income due to data limitations. Wages are thought to be less informative due to the existence of other additional pecuniary and non-pecuniary income components. On the other hand, the use of sectoral income may suffer from politically induced price differences between agriculture and non-agriculture. Another source of measurement error may be a differing informal sector’s share in both agriculture and non-agriculture. Finally, SCHMITT (1989) points to a measurement error of sectoral labor productivity due to non-agricultural output produced by workers officially recorded as agricultural labor. Unfortunately, sufficient means of correction are lacking. However, it is assumed that especially the latter mentioned source of measurement error will vanish with the progress of decollectivization and restructuring of old-type cooperatives. Hence, the income ratio between non-agricultural sectors and agriculture (IR) is calculated as the ratio of respective sectoral value-added per worker and is expected to have a positive impact on annual migration. The ratio of agricultural to non-agricultural labor force (LR) controls for the impact of the labor pool in agriculture as the sending sector. To approximate for a change of relative prices the ratio between the GDP deflators for agriculture and for the aggregated non-agricultural sector is interpreted as Terms of Trade (TOT).

To reflect the uncertainty with respect to finding a new employment outside agriculture, the unemployment rate (Unemp) is introduced as an explanatory variable. Officially registered unemployment figures are thought unreliable for the early transition period. Therefore, we use an approximation of the

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8 Unfortunately, the two Asian countries China and Vietnam had to be excluded from specifications comprising the EBRD index due to data unavailability.
unofficial unemployment rate here. The variable is calculated as the ratio of the employment-to-population ratio and the labor force participation rate.

CHENERY and TAYLOR (1968) as well as RAISER et al. (2004) show that economic wealth of a country is a significant determinant of structural change. Therefore, GDP per capita is included as an explanatory variable (GDPpc): higher GDP per capita is expected to lead to higher migration out of agriculture. Furthermore, this variable is thought to cover remaining unobserved characteristics that might affect labor adjustment.

Sources for all the explanatory variables and descriptive statistics are presented in Table 1 for the two subsamples (nominal private land ownership and no private land ownership).

Table 1: Definitions, sources and descriptive statistics of the variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Code</th>
<th>Mean (Standard Deviation)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migration rate (Eq. (1))</td>
<td>m</td>
<td>1.020 (0.083)</td>
<td>ILO, WORLD BANK, FAO, UNECE, national statistics</td>
</tr>
<tr>
<td>Ratio between non-agricultural and agricultural GDP per worker</td>
<td>IR</td>
<td>1.785 (0.898)</td>
<td>UN (2012)</td>
</tr>
<tr>
<td>Ratio between agricultural and non-agricultural labor force</td>
<td>LR</td>
<td>0.204 (0.154)</td>
<td>ILO, WORLD BANK, national statistics</td>
</tr>
<tr>
<td>Ratio of employment-to-population ratio and labor force participation rate</td>
<td>Unem</td>
<td>0.149 (0.100)</td>
<td>ILO</td>
</tr>
<tr>
<td>GDP per capita (logged)</td>
<td>GDPpc</td>
<td>3.930 (2.709)</td>
<td>WORLD BANK (2012)</td>
</tr>
<tr>
<td>Contract-intensive money [percentage points]</td>
<td>CIM</td>
<td>0.855 (0.063)</td>
<td>IMF</td>
</tr>
<tr>
<td>World Governance Indicator [1 – low quality, 10 – high quality]</td>
<td>WGI</td>
<td>5.474 (1.150)</td>
<td>WORLD BANK (2013)</td>
</tr>
</tbody>
</table>
3.3.2 Specification

A panel data estimator seems to be appropriate for our analysis for mainly two reasons. First, taking simple averages of the annual rate of adjustment will ignore important cross-country differences of this measure’s development over time. Second, countries follow different economic and agricultural policies and they may use different technologies. Panel data estimators allow capturing all these difficult to observe characteristics in a country-specific variable. The measure of labor adjustment $m_{it}$ (see Eq. (1)) will be explained by a vector of explanatory variables $X_{it}$, the unobserved country-specific variable $\nu_i$ and an error term $\epsilon$ (Eq. (2)). To take into account a possible delay in individual occupational decisions following changes of macroeconomic conditions, all explanatory variables enter Eq. (2) with their one-year lagged values ($X_{it-1}$):

\[
(2) \quad m_{it} = \beta X_{it-1} + \nu_i + \epsilon_{it}
\]

There are two reasons for limiting the econometric analysis to the period after the start of economic reforms. First, measurement errors might have been higher under central planning, for instance pre-transition data might suffer from the inclusion of social services provided by collectives for their employees. Second, political reforms led to the break-up of the Soviet Union, Czechoslovakia and Yugoslavia. Most data concerning the successor states are only available after their emergence. The data covers up to 28 years with most of the countries starting in 1990.

The econometric analysis starts from a base specification. Subsequently, indicators of the speed of economic reforms and the quality of the institutional environment are added.

4 Results of Empirical Analysis

4.1 Descriptive analysis

Figure 1 above presents cumulative changes in labor. A closer look reveals that the average rate masks significant intertemporal differences between and within countries. Four countries – Czech Republic, Romania, Poland and China – are depicted as typical examples and their annual migration rates are plotted in Figure 2. The average annual adjustment rate of four per cent in the Czech Republic is highly influenced by the development shortly after 1990 when up to 20 per cent of agriculture’s labor force left the sector in only one year. The pre-reform period (1981-1988) is characterized by an adjustment rate close to zero. Similar examples of a high labor outflow after the beginning of economic reforms are Estonia and Hungary. Figures for Estonia peak at 28 percent of agricultural labor force in 1995 and figures for Hungary reach even 36 percent in 1992. In the global context, annual adjustment rates higher than five percent
of agricultural employment are quite uncommon: this follows from the averages obtained by MUNDLAK (2000) for a large cross-country sample over the second half of the twentieth century.

On the contrary, Romanian data indicate a flow from non-agricultural occupation to agriculture after 1989 of up to 10 per cent of agricultural employment in one year (1992). A sustained period of migration from agriculture to non-agriculture emerged only after 2001. Yet the labor flows into agriculture as observed in Armenia (31 percent in 1992), Georgia (21 percent in 1992) and Moldova (18 percent in 1993) are even more exceptional at an international scale.

**Figure 2:** Annual agricultural labor adjustment for selected transition countries (1979-2008): China, Czech Republic, Poland, and Romania

Source: Own calculations based on WORLD BANK (2012), ILO (2012), FAO (2012) and national statistics.

Poland, as a third example, experienced an increasing labor flow out of agriculture but not such a sharp shift in the adjustment rate in the early half of the 1990s. Rates higher than 5 per cent of sector’s labor force occur for Poland only in the years 1994 to 1999. One possible explanation may be the largely different production structures. In Poland, private farm households had already dominated agriculture before the break-up of the planned economic system, whereas agriculture in Czechoslovakia and Romania was characterized by large cooperatives. Therefore, in Poland there was no immediate and large scale release of labor from collective farms as could be observed in the Czech Republic (or in East Germany).
Finally, China experienced a large decrease of agriculture’s share in total employment since 1978 (Figure 1), whereas the annual adjustment rates were mostly positive (Figure 2), though comparatively low (2% of agricultural labor force). This may also have been influenced by restrictions on regional movements, which were quite pervasive in China.

Summarizing, the occupational change might be driven by two different general developments. First, it encompasses the actual change of occupation of previous workers. Rapid restructuring of agricultural cooperatives or state enterprises and the imposition of hard budget constraints resulted in high dismissals of agricultural workers, which characterizes the situation in the Czech Republic in 1990-93. On the other hand, the collapse of the non-agricultural sector and the increased access to agricultural land led to a high inflow of labor into agriculture in Romania over the first half of the 1990s. Second, the fact that new young entrants into the labor market prefer the non-agricultural sectors over agriculture results in a more continuous sectoral change in employment. This is more likely to describe the developments in Poland and China, where sectoral change has been driven to a large extent by demographic developments (PANG et al., 2004).

**Figure 3:** Development of intersectoral income ratio over time


The calculated income ratios, non-agricultural GDP over agricultural GDP per worker, vary within a broad range from 0.5 to 7.2. Whereas the CIS countries exhibit income ratios below two in 1990 and 1991, they increased significantly over the sample period and reached relatively high levels above three in Tajikistan, Georgia and Turkmenistan. Non-CIS countries show a higher variation of income ratios already at the beginning of the sample period. Within CEEC, the income ratios are below two over the last decade except for Poland, Bulgaria, Romania, Macedonia, Slovenia and Croatia. These countries, plus Albania, exhibit still the highest share of agricultural employment in CEEC. Whereas they already started from a rather high level, Asian transition countries experienced increasing income ratios. Output per worker in non-agricultural sectors in monetary terms is more than five times the agricultural GDP per worker in China and Mongolia over the last decade. These results are comparable with estimates for developing countries in Asia and Latin America (LARSON, MUNDLAK, 1997). Only African countries show higher income differentials between the non-agricultural sector and agriculture. A comparison of the income ratio at the beginning of economic reforms and the last available year is presented in Figure 3.

4.2 Results of the econometric analysis

A base specification is estimated first, and the institutional variables are subsequently included stepwise in the specifications to quantify their impact. The relatively high correlation between some of the explanatory variables reduces their usefulness in one single specification. Results of all specifications are reported in Table 2.

The Hausman test leads to a rejection of the random-effects model. Therefore, in all specifications unobserved characteristics exist which are highly correlated with the labor adjustment rate. Time dummies would account for common shocks and thus reduce the bias due to cross-section dependence. However, time-fixed effects turn out not to be jointly statistically significant at conventional levels in all specifications.

Whereas the estimated coefficient of the income ratio ($IR$) points to a positive and statistically significant effect on labor adjustment for the first subsample, the estimated coefficient is much smaller and statistically not different from zero in the second subsample. Although the estimated coefficient of the labor ratio ($LR$) is larger in the first subsample, it is not statistically significant. For countries with no private ownership under central planning, the estimated coefficient points to a higher intersectoral migration in countries with relatively more people employed in agriculture. However, the effect is not linear as shown by the interaction effect between both variables. For the second subsample the estimated coefficient suggests a decreasing influence of $LR$ given a constant intersectoral income difference and vice versa.
Higher unemployment (Unemp) reduces the labor adjustment process for countries in the second subsample but has no effect on occupational migration in the first subsample. These results are partially in line with findings by Mundlak et al. (1989) as well as Mundlak and Coeymans (1993) who find a depressing effect of unemployment on migration for Argentina and Chile. However, our estimates suggest that agriculture’s role as labor shading sector in times of high unemployment is only relevant for a subset of countries. It seems plausible that countries of the FSU and Asia are characterized by less developed social security systems. Consequently, the buffer role of agriculture becomes much more relevant compared to the Central European countries. The interaction effect of unemployment and income ratio is not statistically significant. Whereas the development of relative prices (TOT) seems to have no effect on occupational migration in the first subsample, it turns out that improving agricultural terms of trade slow down occupational migration in the second subsample. The result partly contradicts findings by Swinnen et al. (2005) who obtain an adjustment accelerating effect of decreasing agricultural terms of trade for six CEE countries controlling for country fixed effects. Those six countries belong exclusively to this chapter’s first subsample.

The indirect effect of post-collectivization ownership status might work via different ways. For instance, most countries with no nominal private ownership introduced a new legal framework governing ownership of land within the first half of the 1990s. In China agricultural land is still state owned. The choice of decollectivization strategies is highly likely to depend on nominal post-collectivization ownership. Restitution of land might allow a faster restructuring of former cooperatives than issuing land shares on paper. Furthermore, the first subsample coincides largely with the group of transition countries which joined the European Union in 2004 and 2007. Therefore, external incentives to implement functioning markets for land, labor, credit and other agricultural inputs have been high. The sample size does not allow disentangling the specific influence of those channels.

The right-hand part of Table 2 (columns 4-9) present results of additional specifications controlling for the impact of time-varying indicators of the institutional environment. All but one estimated coefficients turn out to be not significantly different from zero. Only for the second subsample the coefficient of EBRD suggests a higher adjustment rate with advances in macroeconomic reforms. However, the quantitative impact appears to be rather small. Estimated coefficients of the base model remain rather stable. Although institutional quality might affect investment decisions and economic growth as shown in various studies (e.g., Méon, Sekkat, 2005), our results don’t support evidence of a direct relationship with labor adjustment.
Table 2: Determinants of labor adjustment

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Base model</th>
<th>Impact of time-varying institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private ownership</td>
<td>No private ownership</td>
</tr>
<tr>
<td>Constant</td>
<td>0.916***</td>
<td>1.078***</td>
</tr>
<tr>
<td>$IR_{t-1}$</td>
<td>0.085**</td>
<td>0.020</td>
</tr>
<tr>
<td>$LR_{t-1}$</td>
<td>0.415</td>
<td>0.123**</td>
</tr>
<tr>
<td>$IR_{t-1} \times LR_{t-1}$</td>
<td>-0.101</td>
<td>-0.019*</td>
</tr>
<tr>
<td>$TOT_{t-1}$</td>
<td>-0.083</td>
<td>-0.066**</td>
</tr>
<tr>
<td>$Unemp_{t-1}$</td>
<td>-0.127</td>
<td>-1.105***</td>
</tr>
<tr>
<td>$IR_{t-1} \times Unemp_{t-1}$</td>
<td>0.051</td>
<td>0.058</td>
</tr>
<tr>
<td>$GDPpc_{t-1}$</td>
<td>-0.003</td>
<td>0.007</td>
</tr>
<tr>
<td>CIM</td>
<td>-0.041</td>
<td>0.007</td>
</tr>
<tr>
<td>EBRD</td>
<td>0.008</td>
<td>0.013*</td>
</tr>
<tr>
<td>WGI</td>
<td>0.20</td>
<td>0.21</td>
</tr>
<tr>
<td>N/Countries</td>
<td>156/10</td>
<td>315/19</td>
</tr>
</tbody>
</table>

Note: Coefficients significant at the 1 %, 5 %, and 10 % level of significance are indicated with ***, **, and *, respectively. The displayed $R^2$ (within) measures only the contribution of the explanatory variables without the unobserved country-specific effects. Employment-to-population ratio data are missing for Serbia-Montenegro. EBRD transition indicator not available for China and Vietnam. CIM index not available for Uzbekistan.
5 Conclusion

Transition countries of Central and Eastern Europe, the former Soviet Union as well as East Asia have chosen different ways to transform their agricultural sectors from a planned to a market economy. The adjustment of agricultural labor force partly reflects these different approaches with increasing labor use in some countries and a sharply declining employment in agriculture in others. In this chapter, a labor adjustment rate is calculated for a panel of 30 transition countries over the last two decades. Very high annual rates of labor flow out of agriculture, as in Hungary, Estonia or Czech Republic, as well as significant flow of labor into agriculture, as in Armenia, Georgia and Tajikistan, are quite unique on a global scale. Potential determinants of the labor adjustment rate are estimated in an econometric panel data framework, which, in addition to economic determinants, also includes the indirect impact of historical conditions and the influence of the current institutional environment.

Results of fixed-effects estimations reveal that determinants of occupational migration differ significantly between countries that had nominal post-collectivization private ownership on land and countries with no private ownership. More specifically, economic drivers like income differences between agriculture and non-agriculture seem to facilitate outflow of labor from agriculture in a subsample of countries with nominal private ownership of land under central planning. Unemployment acts as a determinant that keeps or even attracts labor into agriculture in CIS and Asian transition countries. Additionally, the existence of statistically significant country specific unobserved effects justifies the choice of panel data approaches. Surprisingly, current institutional quality or speed of economic reforms seem to have no direct effect on occupational migration.

The finding of significant differences between subsamples does not indicate a direct impact of post-collectivization ownership status. Such a historical characteristic affects several aspects ranging from the legal framework to mental models of private farming, which might lead to different adjustment paths.

References


In der Schriftenreihe *Studies on the Agricultural and Food Sector in Transition Economies* werden durch das IAMO Monographien und Tagungsberichte herausgegeben, die sich mit agrarökonomischen Fragestellungen zu Mittel- und Osteuropa beschäftigen. Wissenschaftlern, die in diesem Bereich forschen, steht die Schriftenreihe als Diskussionsforum offen.

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Ayal Kimhi, Zvi Lerman

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