Modelling the Structural Change of Transition Countries

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Abstract

The pace of change in the transition economies has been rapid since 1991, but these changes must be evaluated in a comparative context. This paper provides a comprehensive comparative analysis using a large panel data set of market economies as a reference point. We wish to establish the extent and speed with which the structures of the transition economies are converging towards other country groups ranked according to income levels. This exercise provides an alternate measure of transition “success” which is grounded in quantitative rather than subjective indicators. It also points the way to future sectoral growth patterns under the assumption that remaining structural distortions will continue to be removed. Third, it indicates the type of market economy towards which the transition economies are moving, given the uncertainty as to their “final” shape and form.

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1. Introduction

The planned socialist economies practiced centralized distribution of resources according to “planners’ preferences” (Bergson, 1964). The rigidity of material balance planning (“planning from the achieved level”), the deliberate choice of autarky, and a distinctive system of priorities created deviations from market-like resource allocations. Consequently, the patterns of resource allocation (as observed in the structure of GDP, consumer budgets, foreign trade, and so on) in the Soviet Union and Eastern Europe differed significantly from those of market economies at similar levels of development. These structural distortions contributed to the stagnation and decline of the planned economies (Desai, 1987, Gregory and Stuart, 2001, Rosefielde, 1998). The larger the deviations from normal patterns, the more difficult the transition. Indeed, transition “success” varied inversely with the proximity to and duration of the Soviet core model (Stuart and Panayotopoulos, 1999). The pace of change in the transition economies, both structural and institutional, has been rapid since 1991, but these changes must be evaluated in a comparative context. Such comparative studies were recently completed for transition economies using a single cross section of market economies to establish benchmarks for changes in the distribution of GDP (Döhrn and Heilemann, 1996) and of labor (Raiser et al., 2004, and World Bank, 2004a). These analyses used a breakdown of only four sectors and they employed either relatively few observations or only log income and its square as explanatory variables. This paper provides a more comprehensive comparative analysis using a large unbalanced panel data set of market economies, a more detailed sectoral breakdown of employment in nine sectors, and a relatively large number of potential explanatory variables, including, for the first time this has been done in analyses of structural development, proxies for institutional characteristics. This approach results in „benchmark“ equations that define a „normal“ relationship between per capita income and employment shares, which differ considerably from the results of the mentioned analyses. Moreover, the estimations are used to produce long run forward looking simulations of the structure of each of the eight new Eastern European EU member countries (Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia, and Slovenia) and of the two EU accession candidates (Bulgaria and Romania) using an innovative econometric method.

The paper begins with a brief methodological overview in section 2. Section 3 summarizes structural developments in the considered Eastern European countries, compares them with groups of market economies, and proposes a simple quantitative, aggregate “indicator of structural deviation” to measure the structural adjustment progress. Section 4 presents the panel regression analysis and uses the results both to evaluate transition progress in each of the considered Eastern European countries and to simulate their individual future structural change. Section 5 concludes.

2. Methodology: An overview

The Soviet-era literature attempted to measure the deviations of planned socialist economies from „normal“ economic structures, using the methodology pioneered by Chenery and his associates (Chenery, 1960, Chenery and Taylor, 1968, Chenery and Syrquin, 1975). This methodology used a cross section of market economies to estimate regression equations (that used per capita income, size, and measures of trade orientation), whose parameters were used to „predict“ the hypothetical structure of selected planned economies under the assumption that they „behaved“ like market economies. The estimated deviations from “normal” structures of market economies were substantial, such as the greater shares of heavy industry, the low shares of services, the high shares of food, consumption, and the underutilization of foreign trade. The transition economies, hence, started with initial conditions inherited from their socialist past, which would be expected to be removed in the course of a successful transition. One measure, therefore, of transition success would be the extent to which it could be demonstrated, first, that the structural distortions were present at the start of transition and, second, that the process of their removal was underway, and, third, the extent to which they had been removed.

There has been remarkable development in electronic data bases since the end of the Soviet era with large panels of data bases compiled by organizations such as the World Bank and the International Labor Organization (ILO) readily available (World Bank, 2004b, ILO, 2004). Moreover, the transition economies of the former Soviet Union and Eastern Europe have adopted international national income accounting standards (SNA), and it is no longer necessary to convert them to international standards. Accordingly, we are able to compare structural change in transition economies with „normal“ structures estimated from large unbalanced panel data sets. The move from single to panel cross sections does raise new

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econometric issues with respect to estimating „normal“ structures, which, admittedly, are sketched only.

3. Descriptive statistics and stylized facts

The descriptive statistics of the course of transition have been amply covered in other publications (e.g. EBRD, 2003 and 2004, World Bank, 1996, Gros and Steinherr, 2004, Fischer and Sahay, 2000). They confirm that the pace of structural change was highly positively correlated with economic reforms undertaken, it has been most rapid in the new eastern European EU member countries. However, the output decline at the start of transition was generally much more severe than economists had expected, and despite structural change, the output recovery to pre-transition period levels took much longer than expected. Not denying the problems of data reliability, Poland was the transition country with the lowest cumulative output decline of “only“ 14%, and its output was the first to recover to its pre-transition level by 1996. Also, Poland is regarded to have been a fast reformer. Thus, not surprisingly, in Table 1 (Appendix A), which shows the structural evolution of Eastern European countries during transition, Poland’s GDP structure was in 2001 closest to the average of 12 high income European countries. In fact, it is the only transition country together with Latvia, whose GDP structure in 2001 was even more advanced than the average structure of the formerly relatively poor EU countries Greece, Ireland, and Portugal in the sense that both agricultural and manufacturing output shares were already lower while the share of services was about the same.

The table shows relatively rapid adjustments in transition countries’ GDP structure and a substantially slower pace of changes in the labor force. Dividing the GDP shares by the respective labor force shares yields relative sectoral productivity, also shown in the table. Also this structure of the Eastern European new EU member countries became more similar to other European country groups with few exceptions. However, the descriptive statistics in Table 1 represent a confusing amount of information, which can be compactly summarized in an indicator of structural deviation or a „distance“ measure of convergence, as explained in the Box.

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5 By 2004 the four transition countries with highest reform grades using the EBRD (2004) transition indicators where Hungary, Estonia, Czech Republic, and Poland, in that order with minor differences.
Box

**Indicator of Structural Deviation to Measure the Structural Adjustment Progress**

In order to measure how far Eastern European countries adjusted to „normal“ standards of market economies, an comprehensive indicator was constructed. The annual deviations of the average employment structure of the new EU member countries and EU accession candidates from the average structure of a benchmark group of market economies were squared and summed.\(^6\)

The indicator is defined as: 

\[
D_k = \sum_i (S_{Acci} - S_{ki})^2,
\]

where \(S_{Acci}\) is the average share of the \(i\)th sector in the new EU member countries and accession candidates and \(S_{ki}\) is the average share of the \(i\)th sector in the country group \(k\). The indicator \(D_k\) measures only the relative “distance” between the Eastern European countries and the respective comparator country group taking into account all sectors simultaneously. The smaller \(D\) becomes, the smaller is the structural difference of the new EU member countries and accession candidates with regard to country group \(k\).

Three comparator country groups were classified, i.e. 12 high income European countries,\(^7\) 33 countries with income similar to the Eastern European countries,\(^8\) and the three formerly poorest EU countries Greece, Ireland, and Portugal, who received relatively high net transfers from the EU as is now the case with regard to the new EU member countries. The Eastern European countries were divided into two groups, namely the eight new EU member countries and the two EU accession candidates Bulgaria and Romania, who are still considerably lagging behind the former countries.

Figures 1.1 and 1.2 (Appendix A), present this indicator with regard to the employment structure and for the 8 new Eastern European EU member countries and the two accession candidates (Bulgaria and Romania), respectively. Two prominent features of figure 1.1 are:

Firstly, already in 1989 and 1990 strong assimilations of the employment structure in the eight new Eastern European EU member countries occurred, which was mainly due to labor-shedding in agriculture and employment increases in some services sectors. Secondly, since about 1999 the assimilation process regarding the employment structure appears to have stagnated.

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\(^7\) Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, United Kingdom.

\(^8\) Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Egypt, Honduras, India, Indonesia, Iran, Jamaica, Malaysia, Mauritania, Mexico, Morocco, Nicaragua, Pakistan, Panama, Peru, Philippines, Sri Lanka, Suriname, Syria, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uruguay, Venezuela.
Figure 1.2 shows that for Bulgaria and Romania transition resulted even in increases of differences regarding the employment structure compared to EU countries and countries with similar income.\(^9\)

Although the indicator of structural deviation is an objective measure of the structural adjustment progress in Eastern European countries as opposed to subjective measures such as the transition indicators produced by International Organizations, it simply leaves out major determinants of the structure of economies. To consider even individual characteristics of the Eastern European countries, we employ a four step approach with panel data.

4. Empirical analysis: Deviations from normal or benchmark structures

In a first step panel regressions for a large group of market economies yielded “benchmark” sector shares for any income level. In a second step actual sectoral developments in the Eastern European countries were compared against these benchmarks. In a third step, and for the first time this has been done with panel data, the panel regressions were used to produce ex-post forecasts for the sector shares for each of the considered ten Eastern European countries, taking account of individual country characteristics to the extent, of course, that control variables were included in the specific regression used. Fourthly, these forecasts were extended out of sample by 10 years assuming certain developments of the explanatory variables for each country.

a) Sectoral employment share panel regressions

Panel regressions were run for at most 54 carefully selected developing and developed market economies so as to explain economically their sectoral employment shares.\(^10\) For reasons of space we limit the presentation of our results to selected four of the total of nine sectors analyzed, namely two sectors whose employment shares eventually decline permanently as income rises, i.e. agriculture and manufacturing, and two sectors whose employment shares increase permanently as income rises, i.e. financial services and community, social, and personal services. The explanatory variables in these regressions

\(^9\) This is, however, due to persistent increases in already far exaggerated agricultural employment and no employment growth in financial and some other services, and it is not due to too little labour shedding in industry.

\(^10\) Only market economies were included that do not have unusual or special characteristics, such as, for instance, a very small population (less than one million) or an extremely large share of GDP derived from extraction of natural resources. The chosen countries were: Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cyprus, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Finland, France, Germany, Greece, Honduras, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Korea, Malta, Mauritania, Mexico, Morocco, Netherlands, New Zealand, Nicaragua, Norway, Pakistan, Panama, Philippines, Portugal, Puerto Rico, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Trinidad and Tobago, Turkey, United Kingdom, USA, Uruguay, and Venezuela.
included not only all those that have been found of importance in previous such studies, i.e. the per capita income level measured in terms of purchasing power parity and its square to account for the expected non-linear relationship between per capita income and sector shares, the endowment with natural resources\textsuperscript{11} and physical capital (the ratio of gross fixed capital formation to GDP), and the size of the economies proxied by population. They also included proxies for human capital (school and higher education enrollment ratios) in order to measure potential effects of education on the employment structure, “openness” of the economies (the sum of exports and imports as a ratio to GDP) to measure effects of trade, several variables representing the potential influence of typical government policies, namely the ratios to GDP of government consumption expenditures, total tax revenues, taxes on international trade, and military expenditures, and, for the first time this has been done, proxies that represent institutional characteristics, namely economic freedom, corruption perception, and political stability. A dummy variable was considered to account for the Asian financial crisis during 1997/98 in five countries (Indonesia, Korea, Malaysia, Philippines and Thailand).\textsuperscript{12}

We used the sectoral ILO employment data described in the previous section, the data for the institutional characteristics were taken from three different sources,\textsuperscript{13} and all other data came from the world economic indicators data base of the World Bank. The regressions included a constant for each country and a time dummy for each year (cross-section and period fixed effects model).\textsuperscript{14} The longest time period covered was 1970-2001. Since, however, the data on human capital were available only with relatively large data gaps and the institutional data begin much later, the results with and without consideration of these variables are not directly comparable due to different sample periods. Given the necessity to accept different time lengths of the estimations dependent on the specification, a relatively large number of preferred regressions were obtained. Selected results are reported in Table 2, Appendix B.

\textsuperscript{11} Agricultural resources were proxied by permanent cropland per capita. Other natural resources were proxied by a resource depletion index, defined as depletion of energy and minerals, and net forest depletion, in percent of gross national income, where each type of depletion was given equal weight. A third proxy for all natural resources was also considered, namely the share of primary exports (agricultural raw materials, ores, basic metals, and fuels) in exports of goods and services.

\textsuperscript{12} The dummy variable equals one for these two years and these five countries, and zero otherwise.

\textsuperscript{13} The economic freedom index was taken from the Fraser Institute (2003); the corruption perception index was taken from Transparency International (2004); the index of political stability was taken from Kaufmann et al. (2003). Missing observations for these indices were generated, if possible, though linear interpolation but the index of economic freedom starts not earlier than 1975, the corruption perception index starts not earlier than 1980, and the index of political stability starts only in 1996. Increases in these indices mean improvements, i.e. more economic freedom and political stability, and less corruption.

\textsuperscript{14} Formal tests of each regression strongly argued in favor of the two-way fixed effects model against the model with no fixed effects: the Hausman specification test rejected consistently the random-effects model as a valid specification and the likelihood ratio test rejected consistently the hypothesis of no fixed effects. For reasons of space the estimates for country and year dummies are, however, not reported in table 2.
Tests for robustness of the estimated coefficient signs and statistical significance of the explanatory variables were performed through variations of both the included independent variables and the sample period. They confirmed that a detailed breakdown of sectors should be used, since specifications that appeared to be robust were rather different from sector to sector. Only the income variables and surprisingly some of the institutional variables were consistently significant and robust in all regressions. The sensitivity of the estimations underlines potential pitfalls when performing panel regressions and lead us to prefer parsimonious estimated models that include only variables whose estimated coefficient signs and significance appeared to be robust.

Specifically, in the regressions for *agriculture* the human resource and government policy variables were consistently insignificant, suggesting that the agricultural employment share is not influenced by education and by the considered tax and expenditure policies. The regressions show that agricultural employment declines as per capita income rises. Trade affects the agricultural employment share positively, the same is true for country size (proxied by population) and, of course, for the endowment with agricultural natural resources.

Our estimations include institutional variables, i.e. economic freedom, “cleanliness of corruption” and political stability. They show a mixed impact since more economic freedom promotes relative agricultural employment while higher political stability and reductions of corruption have the opposite effect, although the sign of the corruption variable is insignificant. This mixed result may warrant a brief discussion. One could expect that improvements in these institutions may directly promote employment in sectors that could be relatively sensitive to them, as, for instance financial services and manufacturing - which was confirmed by the regressions for these two sectors - and thereby have a negative impact on other sectors like agriculture. On this basis, the estimated negative signs of political stability and “cleanliness of corruption” in the regressions for agriculture would be plausible. That economic freedom in these regressions has the opposite, positive sign, suggests that the three institutional variables cannot be interpreted as meaning the same and they may not be aggregated but rather they have individual weight and effects. Thus, economic freedom could have a meaning similar to more liberal and intensive international trade, which has an estimated positive sign in all regressions for agriculture, whereas the other two institutional variables (“cleanliness of corruption” and political stability) could have a meaning similar to efficient government institutions, whose improvements may result in less agricultural employment due to rising employment in other sectors.
The regressions for manufacturing show that similar to agriculture its employment share eventually declines permanently as per capita income rises. Also similar to agriculture, international trade and the country size (measured by population) promote relative manufacturing employment. The latter influence may underline economies of scale effects. The endowment with natural resources has a quantitatively important negative influence, indicating that manufacturing employment does not benefit, on average, from natural resources. Surprisingly, the measured beneficial influence of education on manufacturing employment is not consistently significant and the investment ratio was consistently insignificant. All considered government policy variables (the tax and expenditure ratios) were also almost always insignificant, indicating that governments may have no or little influence on the structure through these policies. But the regressions suggest that manufacturing employment is positively and significantly influenced by improvements of the institutional variables. This has particular importance for the transition countries, because their manufacturing employment shares even in the most advanced new Eastern EU member states are still substantially above “normality” and thus the need for continuing reductions in relative manufacturing employment in these countries could be dampened through continuous improvements of these institutions.

Turning to the regressions for the two services sectors financial and related services, and community, social, and personal services (equations 3 and 4 in Table 2), it was found that very few explanatory variables have been consistently significant and had robust estimated coefficient signs: Only per capita income and surprisingly both the education level and the institutional variables were robust explanatory variables. The influence of per capita income is such that both services shares would continuously rise as income grows. The education level had a positive, consistently significant and quantitatively considerable impact on both services shares. The consistently significant influence of the institutional variables was positive for financial services and negative for community, social, and personal services. That relative employment in financial services is sensitive to improvements in institutions may appear plausible because development of this sector very much depends on reliable and credible institutions. That relative employment in community, social, and personal services is reduced by improvements in institutions is not immediately plausible. However, employment in this sector is a conglomerate of private and especially government employment, where the latter is dominating, but the data at present do not allow to split these two. To isolate relative government employment could, however, be important, if the estimated negative effect of institutional variables results, for instance, from increased efficiency and thus less relative
government employment in response to improved institutions, and given that there is no reason to assume that such improvements would reduce relative employment in personal services.

Figures 1a – 1d show the estimated relationship between the four sectoral employment shares and per capita income for the selected 54 market economies. In each figure only two benchmark equations are plotted, namely those that define the upper and lower limit of all estimated relationships for each sector. As can be seen, the consideration of institutional variables has a small but clear impact on the estimated “normal” or “benchmark” structure at a given level of per capita income.

The figures also show the long run average employment shares and per capita incomes of the 54 market economies, where for each country the longest available period was used. These long run averages are also shown for the transition countries (the 8 new EU member states and 2 accession candidates, and 16 other transition countries) but only for the period since 1990 and in some cases with only few years as dictated by data availability. The figures suggest that with higher income the structures of the countries become increasingly similar with few outliers. Finally, we see that whereas employment in agricultural, financial services, and community, social, and personal services has in most EU accession countries (represented by triangles) already come close to “normality” (Figures 1a, 1c, and 1d), the average manufacturing employment shares in several of these countries have still been considerably away from the benchmarks (Figure 1b).

b) Evaluation of structural adjustment of individual countries

The benchmark regressions can be used to evaluate the past adjustment process of the sectoral employment shares for each of the eight new EU member countries and the two EU accession candidates. Figures 2a – 2d show these individual adjustment paths, where for each country as many as available years during transition were plotted. Each point on the curves for the individual countries represents one year with the latest available year 2001 shown by a small square. The figures demonstrate a general tendency of movement towards a “normal” economic structure with few clear exceptions, especially agricultural employment in Bulgaria and Romania, which moved away from the benchmarks. Noteworthy is that in contrast to similar analyses that did not use panel data for detailed sectors and refined specifications (e.g. Raiser et al., 2004), agricultural employment in the eight new EU member countries was not

15 In order to derive the plotted curves from the panel regression output we used an average of the estimated cross-section fixed effects and an average of each considered explanatory variables over all included countries and years. The estimated period fixed effects were omitted.
consistently below “normality” and did not move further away from it but in most cases even moved along the estimated benchmark lines (Czech Republic, Estonia, Hungary, Slovakia, and Slovenia, Figure 2a). Besides the outliers Bulgaria and Romania, only Poland and Lithuania with their traditionally relatively large agricultural employment had recently apparently an interruption of otherwise successful adjustment of agricultural employment. For manufacturing we find that that all of the considered Eastern European countries reduced their exaggerated employment shares and thus moved in the expected direction but only few have already reached normality, i.e. Latvia, Lithuania, and Poland (Figure 2b). All others have employment shares considerably above the estimated benchmarks. In the most recent years for which data were available, the shares were even increasing in several countries. Also the wealthier countries among them are further away from normality than the poorer ones.

With regard to financial and related services, all countries except Bulgaria, Romania, and Lithuania were increasing the respective employment shares above the estimated benchmarks (Figure 2c). Noteworthy are the relatively steep increases in the most recent years for which data were available in Hungary, Poland, and Slovakia.

The employment shares of community, social, and personal services also developed as expected and in most cases came very close to normality with two outliers, Bulgaria and Romania whose shares are relatively low (Figure 2d).

c) Ex-post and ex-ante simulations of sector shares

In a third step individual country ex-post forecasts were performed using for each sector the two estimated benchmarking regressions selected in the previous section and shown in figures 2a-2d, which define the upper and lower limit of all estimated equations. In these regressions actual values of the explanatory variables for each of the considered ten countries were inserted. In a fourth step these forecasts were extended out of sample until the year 2015 assuming certain developments of the explanatory variables for each country. Since the regression output comprised nine sectors, of which four were presented above, we obtained nine forecasts for each of the considered ten countries, i.e. a total of 90 simulations. For reasons of space only selected individual country simulations and only for the discussed

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\[16\] To obtain from each sectoral panel regression a forecasting equation for each of the ten countries, an average value of the estimated cross-country fixed effects was used and the estimated period fixed effects were omitted. We could also try to explain the estimated cross-country fixed effects for market economies in separate regressions for each sector, which in turn would be used to forecast these fixed effects for Eastern European countries. We acknowledge that this considerable extra task could possibly improve further the estimated individual benchmarks for the considered countries and must leave it on our research agenda.

\[17\] Trends were extrapolated provided both that they exist and that this assumption is reasonable. If no trends were discernible, reasonable judgements were made about future developments, in particular the assumption of moderate continuous improvements of institutional characteristics.
four sectors are presented but all regression results and forecasts are available on request from the first author. A consistency check consisted of summing up the 9 forecasted shares for each country and for the two forecasting equations used. Surprisingly, all of these sums were reasonably close to 100 percent with most errors being less than 5 percentage points.

There is a clear lesson from these simulations, which consider each country’s individual circumstances to the extent, of course, that explanatory variables are considered in the equations: The deviations from normality found in the previous section are generally slightly exaggerated for agriculture and financial services and even underestimated for manufacturing, while quite correct for community, social and personal services.

The reasons for these corrections are that the eastern European countries differ in several respects from the average of the market economies. Specifically, regarding agriculture and manufacturing the corrections are due to the relatively high degrees of openness (except Poland and Romania), whose positive effect on the forecasted employment shares is somewhat dampened by the relatively small country sizes measured by population (except Poland and Romania). In the regressions for financial services these variables were not included, so that the corrections for this sector are due to generally somewhat higher educational levels and somewhat lower levels of the institutional characteristics (except the political stability indicator) of the Eastern European countries relative to the average of market economies. This resulted in relatively broad corridors of the individual sector forecasts for the ten Eastern European countries.

Thus, regarding agriculture, the actual past employment shares of most Eastern European countries have either been within the corridor of the two ex-post forecasts or rather close to it. The only outliers with very substantial overemployment were Latvia, Lithuania, and, of course, Bulgaria and Romania, but not, as is often argued, Poland. As an example, Figure 3a shows for Poland, that the individualized forecast shows much less overemployment than when using the unadjusted benchmark lines of Figure 2a. Figure 3a and the following ones incorporate the ex-ante forecasts. For all ex-ante simulations the real per capita income growth assumption was 4.5% annually until the end of the forecast horizon 2015. Each point on the curves in the graphs represents one year. The midpoint of the forecasted corridor in 2015 may be interpreted as the most likely respective sector share in that year. In addition to the other assumptions this implicitly assumes that all remaining distortions from the former planned economy period would be eliminated by 2015 so that by then there is no systemic
difference any more between the ten Eastern European countries and the group of 54 market economies. Also, an implicit assumption is that there are no bottlenecks in labor qualifications or other reasons, which cause frictions of labor movements from shrinking to growing sectors. A dotted line indicates the potential evolution of sector shares and connects the last available actual combination of sector share and per capita income in 2001 with the midpoint of the forecasts for 2015.

As an example for the four countries whose agricultural employment was even above the individualized forecasts (Latvia, Lithuania, Bulgaria, Romania), Figure 3b shows for Romania relatively high ex-post simulated “normal” employment shares of about 13-15% for the first decade of transition, which decline very slowly during the future. This is 3 percentage points higher than when using the unadjusted benchmark regressions.

Manufacturing is the sector where the individualized forecasts yield the largest corrections of the unadjusted benchmark lines. These simulations suggest that the latter are underestimating the deviations from normality for the countries Estonia, Latvia, Lithuania, Slovakia, Slovenia, and Bulgaria. For the other countries (Czech Republic, Hungary, Poland and Romania) the individualized ex-post simulations largely confirm the overemployment suggested by the unadjusted benchmark lines.

As examples for the two groups, Figures 3c and 3d, respectively, show the results for Estonia, it belongs to the first group, and the Czech Republic, which belongs to the second group. Also shown are forecasts for Poland (Figure 3e), because Poland is the only country of all ten, where the simulations suggest no further decline in relative manufacturing employment but rather continuous moderate increases. This is due to Poland’s already relatively low employment share and its relatively large population. The latter should have a beneficial impact on the competitiveness of manufacturing through better exploitation of economies of scale than smaller countries may achieve.

The individualized simulations for financial services suggest that all countries, except Lithuania, Bulgaria, and Romania, had employment shares that developed within or very close to the forecast corridor and not, as was suggested by the unadjusted benchmark regressions (Figure 2c), substantially above it. The reasons for this are that financial services employment is significantly and positively influenced by educational levels and by the quality of institutions, so that the generally relatively high educational levels in the Eastern European countries compared to the average of market economies, and their past somewhat lower institutional qualities (except political stability) resulted in relatively broad forecast corridors.
As examples, Figures 3f-3h respectively, show the simulations for the Czech Republic, Hungary, and Slovenia. Slovenia has already the largest financial services sector of the ten countries which is projected to continue to grow strongly, as all others too.

For the large sector community, social, and personal services the individualized ex-post simulations of normal employment shares do not deviate much from the unadjusted benchmark regressions. The ex-ante simulations show substantial relative employment growth in this sector. As an example, Poland is shown (Figure 3i).

Although the simulations consider individual characteristics of each of the ten Eastern European countries, the forecasted shifts in labor are very similar in all of these countries (with the mentioned exception of slightly increasing Polish manufacturing employment).

In sum, these simulations show to what extent labor will shift from:
- agriculture,
- manufacturing (Poland is the only exception),
- mining and quarrying,
- electricity, gas and water, and
- transport, storage, and communication,
to the following sectors:
- some increases in construction\(^{18}\),
- wholesale and retail trade, restaurants and hotels,
- financial services, real estate, and related services,
- community, social, and personal services (which includes government).

Table 3 provides the average of the simulated sectoral shifts during 2001 to 2015 for the eight new Eastern European EU member countries and all ten considered Eastern European countries. As sector shares in 2015, the midpoint of the two forecasts for each sector and country was used.

\(^{18}\) Eastern European countries have relatively high investment shares, which are estimated in “normal” market economies to significantly and positively influence the construction employment share, and investment ratios are assumed to remain at their relatively high levels in all Eastern European countries. Therefore in the simulations relative employment in construction is growing in all countries.
Table 3
Simulated changes of sectoral employment shares during 2001-2015 in Eastern European countries
(Average changes in percentage points)

<table>
<thead>
<tr>
<th>Sector</th>
<th>EEU 8 1/</th>
<th>EEU 10 2/</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Declining sectors:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>-5.4</td>
<td>-9.5</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>-0.6</td>
<td>-0.7</td>
</tr>
<tr>
<td>Manufacturing 3/</td>
<td>-4.1</td>
<td>-3.3</td>
</tr>
<tr>
<td>Electricity, gas and water</td>
<td>-1.1</td>
<td>-1.1</td>
</tr>
<tr>
<td>Transport, storage, and communication</td>
<td>-1.8</td>
<td>-1.4</td>
</tr>
<tr>
<td><strong>Growing sectors:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>1.7</td>
<td>2.0</td>
</tr>
<tr>
<td>Wholesale and retail trade, restaurants and hotels</td>
<td>1.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Financial services, real estate, and related services</td>
<td>4.5</td>
<td>4.8</td>
</tr>
<tr>
<td>Community, social, and personal services (including government)</td>
<td>3.9</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Sum of all changes or forecast error</strong></td>
<td>-1.7</td>
<td>-2.0</td>
</tr>
</tbody>
</table>

1/ Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia.
2/ EU 8 plus Bulgaria and Romania.
3/ With the exception of Poland whose manufacturing employment share is expected to grow moderately up to the forecast horizon as explained in the text.
Source: Own calculations.

Table 4 shows the simulated average employment structure of the considered eight and ten Eastern European countries in 2015 and compares it with the average employment structure in 2001 of the former 15 EU member countries prior to the EU Eastern Europe enlargement. The table shows that only by 2015 the average structure of the Eastern European countries will be very similar to the current structure of the former EU 15 countries. However, since in 2015 the former EU 15 countries will have experienced further declines of relative employment in agriculture and manufacturing, and increases in relative employment of services, it will take many more years for Eastern European countries to become structurally similar to Western Europe.

Table 4
Simulated average structure of Eastern European countries in 2015 1/
(Average sectoral employment shares in percent)

<table>
<thead>
<tr>
<th>Sector</th>
<th>EEU 8 2/</th>
<th>EEU 10 3/</th>
<th>Memorandum item: EU 15 in 2001 4/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>4.4</td>
<td>4.9</td>
<td>5.1</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>0.21</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>18.8</td>
<td>18.8</td>
<td>17.8</td>
</tr>
<tr>
<td>Electricity, gas and water</td>
<td>0.81</td>
<td>0.82</td>
<td>0.7</td>
</tr>
<tr>
<td>Transport, storage, and communication</td>
<td>6.13</td>
<td>6.21</td>
<td>6.6</td>
</tr>
<tr>
<td>Construction</td>
<td>8.8</td>
<td>8.5</td>
<td>7.8</td>
</tr>
<tr>
<td>Wholesale and retail trade, restaurants and hotels</td>
<td>18.2</td>
<td>18.3</td>
<td>18.7</td>
</tr>
<tr>
<td>Financial services, real estate, and related services</td>
<td>11.6</td>
<td>10.9</td>
<td>12.4</td>
</tr>
<tr>
<td>Community, social, and personal services (including government)</td>
<td>29.3</td>
<td>28.7</td>
<td>30.6</td>
</tr>
<tr>
<td><strong>Sum of all sector shares</strong></td>
<td>98.3</td>
<td>97.4</td>
<td>99.9</td>
</tr>
</tbody>
</table>

1/ Underlying this average structure are simulated employment shares in 2015 for each country which were the midpoint of two forecasting equations as explained in the text.
2/ Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia.
3/ EU 8 plus Bulgaria and Romania.
4/ 15 EU member countries prior to the EU Eastern European enlargement.
Source: Own calculations.
5. Concluding remarks
The analysis suggests that the use of regressions to define benchmark equations of a „normal“ relationship between per capita income and sectoral employment shares is tricky and subject to pitfalls that may lead to false conclusions especially when the benchmarks are used to evaluate structural progress in transition economies and to judge which sector has overemployment and which has underemployment. Our estimates are merely a first attempt to use as much data as are available, including institutional country characteristics, and suggest that only few and different explanatory variables for each sector are robust for market economies. The period for which our institutional variables are available is relatively short and thus the estimates which include them cannot satisfy demands for only long run empirical analysis over several decades. Accepting this qualification, the institutional variables appeared to be of significance in tests using the data we have: Better institutions appear to promote growth of financial services and manufacturing at the cost of agriculture and community, social, and personal services (including government). An additional attempt of us to refine the benchmarks derived from market economies was to consider individual characteristics of the Eastern European countries such as openness, country size, educational levels, and institutional characteristics. Our approach suggests that their structure is less far away from normality and with few exceptions as would be judged when using benchmarks that are not adjusted for these individual characteristics. The exceptions include the countries Bulgaria and Romania, but also the sector manufacturing, for which it was found that six countries (Estonia, Latvia, Lithuania, Slovakia, Slovenia, and Bulgaria) have indeed considerable overemployment (even when controlling for income and all other individual characteristics), which is even larger than suggested when using unadjusted benchmarks. However, the simulations also suggest that it will take many years until the individual Eastern European countries have employment structures that are similar to the adjusted benchmarks, and it will take much longer than an additional decade until the average employment structures of Eastern and Western European countries become similar. This estimated and perhaps surprisingly slow adjustment indicates that contrary to arguments often made, transition is not over for many years to come and structural distortions inherited by the Eastern European countries continue to be present and to be a burden for them. In other words, Eastern European countries differ from Western European ones not only on account of their still substantially lower per capita income, but also because they still have to cope with distortions of their employment structure, which no Eastern European country was able so far
to largely eliminate, and thus it is difficult to argue that the countries should have been able to eliminate them. A policy implication may be that this analysis corroborates arguments justifying the current transfers from the EU to these countries not only on grounds of their relatively low per capita income, but also to still ease the adjustment to a „normal“ structure.
References

Bergson, A. (1964), The Economics of Soviet Planning, Yale University Press.


World Bank (2004b), World Development Indicators. Washington D.C.


### Appendix A:

Table 1

Comparison of economic structures of Eastern European countries with averages of market economy groups, 1991 and 2001, unless otherwise indicated

<table>
<thead>
<tr>
<th>Sectoral shares in GDP, in percent</th>
<th>Sectoral shares in total employment, in percent</th>
<th>Relative sectoral productivity (GDP share/employment share)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Market-</td>
<td>Community</td>
</tr>
<tr>
<td></td>
<td>manufacturing services 1)</td>
<td>services</td>
</tr>
<tr>
<td></td>
<td>Agriculture</td>
<td>Manu- oriented and social</td>
</tr>
<tr>
<td></td>
<td>Community</td>
<td>services</td>
</tr>
<tr>
<td></td>
<td>Market-</td>
<td>Agriculture</td>
</tr>
<tr>
<td></td>
<td>manufacturing services 1)</td>
<td>Manu- oriented and social</td>
</tr>
<tr>
<td></td>
<td>Community</td>
<td>services</td>
</tr>
<tr>
<td></td>
<td>Market-</td>
<td>Agriculture</td>
</tr>
<tr>
<td></td>
<td>manufacturing services 1)</td>
<td>Manu- oriented and social</td>
</tr>
<tr>
<td></td>
<td>Community</td>
<td>services</td>
</tr>
<tr>
<td>Eastern European countries:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>5.5 28.5 36.1 12.3 8.6 31.5 24.7 23.2 0.64</td>
<td>0.91 1.68 0.53</td>
</tr>
<tr>
<td>Estonia (GDP and productivity: 1993)</td>
<td>11.4 19.0 41.0 16.6 18.9 25.0 24.4 20.2 0.72</td>
<td>0.88 1.54 0.71</td>
</tr>
<tr>
<td>Hungary</td>
<td>8.5 21.5 30.2 17.9 11.1 26.1 28.5 25.4 0.76</td>
<td>0.82 1.65 0.70</td>
</tr>
<tr>
<td>Latvia (GDP and productivity: 1992)</td>
<td>17.6 26.2 39.1 8.4 17.9 25.5 25.5 19.7 0.86</td>
<td>1.16 1.60 0.41</td>
</tr>
<tr>
<td>Lithuania (GDP: 1993; Labor force and productivity: 1997)</td>
<td>12.5 19.4 34.9 21.1 20.5 18.4 27.7 23.8 0.61</td>
<td>1.05 1.48 0.88</td>
</tr>
<tr>
<td>Poland (GDP and productivity: 1992)</td>
<td>7.1 28.0 31.9 17.4 25.4 24.7 19.0 19.0 0.28</td>
<td>1.21 1.76 0.93</td>
</tr>
<tr>
<td>Slovakia (1994)</td>
<td>7.0 25.4 45.6 12.7 10.0 26.9 26.2 24.9 0.70</td>
<td>0.94 1.48 0.85</td>
</tr>
<tr>
<td>Slovenia</td>
<td>5.7 38.5 33.3 17.0 8.2 33.0 28.9 17.3 0.69</td>
<td>0.99 1.48 0.86</td>
</tr>
<tr>
<td>Unweighted average of the 8 new Eastern European EU countries</td>
<td>9.4 26.1 37.6 15.4 15.1 27.1 25.4 21.7 0.66</td>
<td>1.00 1.63 0.71</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>14.6 29.0 24.6 20.4 19.5 30.6 19.0 20.3 0.75</td>
<td>0.95 2.24 1.01</td>
</tr>
<tr>
<td>Romania</td>
<td>22.5 22.5 20.4 16.2 29.8 31.3 19.2 11.2 0.76</td>
<td>0.72 1.06 1.45</td>
</tr>
<tr>
<td>Russia</td>
<td>14.0 31.6 23.5 11.7 13.9 26.4 25.3 21.8 1.01</td>
<td>1.19 0.95 0.54</td>
</tr>
<tr>
<td>Averages of market economy groups:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 high income European countries 2)</td>
<td>3.2 20.1 43.9 22.3 5.2 21.2 33.1 31.8 0.65</td>
<td>0.95 1.52 0.71</td>
</tr>
<tr>
<td>Greece, Ireland, Portugal</td>
<td>8.8 20.1 41.3 20.2 17.8 20.9 29.2 23.0 0.50</td>
<td>0.97 1.78 0.88</td>
</tr>
<tr>
<td>26 market economies with income similar to the Eastern European EU countries (1993) 3); GDP and productivity: 9 countries 4)</td>
<td>11.2 22.7 34.3 17.5 23.5 16.1 26.9 25.1 1.48</td>
<td>1.31 1.67 0.83</td>
</tr>
<tr>
<td>Eastern European countries:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>4.3 27.0 41.0 15.2 4.7 27.6 31.9 24.3 0.93</td>
<td>0.98 1.37 0.62</td>
</tr>
<tr>
<td>Estonia</td>
<td>5.8 18.7 48.4 16.6 6.8 23.0 34.9 25.9 0.85</td>
<td>0.81 1.56 0.64</td>
</tr>
<tr>
<td>Hungary (GDP and productivity: 2000)</td>
<td>4.2 24.8 43.0 19.3 6.1 24.4 34.1 26.4 0.86</td>
<td>1.04 1.54 0.71</td>
</tr>
<tr>
<td>Latvia</td>
<td>4.8 14.9 51.3 19.0 14.8 15.9 33.6 26.6 0.33</td>
<td>0.94 1.81 0.72</td>
</tr>
<tr>
<td>Lithuania</td>
<td>7.1 20.5 40.7 20.7 16.2 18.1 28.6 28.1 0.44</td>
<td>1.13 1.77 0.74</td>
</tr>
<tr>
<td>Poland</td>
<td>3.8 19.2 44.0 19.5 18.8 20.1 28.8 22.0 0.20</td>
<td>0.95 1.57 0.88</td>
</tr>
<tr>
<td>Slovakia</td>
<td>4.7 22.3 16.0 49.0 6.1 25.9 30.4 26.7 0.77</td>
<td>0.96 1.82 0.60</td>
</tr>
<tr>
<td>Slovenia</td>
<td>3.1 26.8 38.9 21.2 5.1 26.9 33.2 23.5 0.60</td>
<td>0.93 1.28 0.90</td>
</tr>
<tr>
<td>Unweighted average of the 8 new Eastern European EU countries</td>
<td>4.7 21.8 40.4 22.6 9.8 23.0 31.9 25.4 0.60</td>
<td>0.96 1.59 0.73</td>
</tr>
<tr>
<td>Russia</td>
<td>4.9 20.6 44.0 20.9 12.4 17.9 25.3 21.1 0.68</td>
<td>0.80 2.21 1.21</td>
</tr>
<tr>
<td>Averages of market economy groups:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 high income European countries 2)</td>
<td>2.2 19.3 46.8 22.3 3.5 17.9 37.0 34.1 0.61</td>
<td>1.06 1.36 0.67</td>
</tr>
<tr>
<td>Greece, Ireland, Portugal</td>
<td>4.9 20.6 44.0 20.9 12.4 17.9 25.3 21.1 0.68</td>
<td>1.15 1.53 0.90</td>
</tr>
<tr>
<td>26 market economies with income similar to the Eastern European EU countries (2001) 3); GDP and productivity: 9 countries (1999)</td>
<td>8.9 19.7 38.1 19.2 20.5 14.6 32.2 24.2 0.69</td>
<td>1.25 1.76 0.79</td>
</tr>
</tbody>
</table>

1) Sum of three services sectors from the ILO labor force data bank: Wholesale, Retail Trade, Restaurants and Hotels; Transport, Storage and Communication; and Financing, Insurance, Real Estate and Business Services.

2) Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, United Kingdom.

3) Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Egypt, Honduras, India, Indonesia, Malaysia, Morocco, Mexico, Nicaragua, Pakistan, Panama, Philippines, Sri Lanka, Suriname, Thailand, Trinidad and Tobago, Turkey, Uruguay, Venezuela.

4) Argentina, Jamaica, Malaysia, Mexico, Morocco, Thailand, Trinidad, Turkey, Venezuela.

Source: Authors calculations.
Figure 1.1
Structural Deviation Index: Employment
Deviations of the structure of 8 EU Accession countries from certain country groups 1982-2001

Note: The index is defined as the sum of the squared deviations of 9 sectoral employment shares, which are average shares in the given 8 EU accession countries, from the respective average employment shares in other country groups.
Source: Own calculations.

Figure 1.2
Structural Deviation Index: Employment
Deviations of the structure of Bulgaria and Romania from certain country groups 1982-2001

Note: The index is defined as the sum of the squared deviations of 9 sectoral employment shares, which are average shares in given transition countries, from the respective average employment shares in other country groups.
Source: Own calculations.
## Appendix B: Regression output

### Table 2: Panel Regression Results of Sectoral Employment Share Functions

<table>
<thead>
<tr>
<th>Equation</th>
<th>(1a)</th>
<th>(1b)</th>
<th>(1c)</th>
<th>(1d)</th>
<th>(1e)</th>
<th>(2a)</th>
<th>(2b)</th>
<th>(2c)</th>
<th>(2d)</th>
<th>(2e)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Independent Variables:</th>
<th>Agriculture</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>Manufacturing</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln (real per capita GDP)</td>
<td>2.152</td>
<td>2.313</td>
<td>2.248</td>
<td>2.706</td>
<td>2.801</td>
<td>1.666</td>
<td>2.029</td>
<td>1.999</td>
<td>1.363</td>
<td>2.976</td>
</tr>
<tr>
<td>ln (Trade)</td>
<td>0.325</td>
<td>0.338</td>
<td>0.263</td>
<td>0.172</td>
<td>0.1466</td>
<td>0.194</td>
<td>0.191</td>
<td>0.197</td>
<td>0.163</td>
<td>0.063</td>
</tr>
<tr>
<td>ln (Population)</td>
<td>0.022</td>
<td>0.015</td>
<td>0.072</td>
<td>0.063</td>
<td>0.103</td>
<td>0.196</td>
<td>0.153</td>
<td>0.185</td>
<td>0.163</td>
<td>0.063</td>
</tr>
<tr>
<td>ln (Human resources)</td>
<td>0.822</td>
<td>0.815</td>
<td>0.972</td>
<td>0.056</td>
<td>0.056</td>
<td>0.056</td>
<td>0.056</td>
<td>0.056</td>
<td>0.056</td>
<td>0.056</td>
</tr>
<tr>
<td>ln (Gov. consumption expenditures/GDP)</td>
<td>0.325</td>
<td>0.338</td>
<td>0.263</td>
<td>0.172</td>
<td>0.1466</td>
<td>0.194</td>
<td>0.191</td>
<td>0.197</td>
<td>0.163</td>
<td>0.063</td>
</tr>
<tr>
<td>ln (Gov. military expenditures/GDP)</td>
<td>0.325</td>
<td>0.338</td>
<td>0.263</td>
<td>0.172</td>
<td>0.1466</td>
<td>0.194</td>
<td>0.191</td>
<td>0.197</td>
<td>0.163</td>
<td>0.063</td>
</tr>
<tr>
<td>ln (Taxes on international trade)/GDP</td>
<td>0.022</td>
<td>0.015</td>
<td>0.072</td>
<td>0.063</td>
<td>0.103</td>
<td>0.196</td>
<td>0.153</td>
<td>0.185</td>
<td>0.163</td>
<td>0.063</td>
</tr>
<tr>
<td>Economic freedom</td>
<td>0.066</td>
<td>(3.363)**</td>
<td>-0.008</td>
<td>(0.531)</td>
<td>-0.016</td>
<td>0.013</td>
<td>(2.589)**</td>
<td>-0.016</td>
<td>0.013</td>
<td>(2.589)**</td>
</tr>
<tr>
<td>Political stability</td>
<td>0.066</td>
<td>(3.363)**</td>
<td>-0.008</td>
<td>(0.531)</td>
<td>-0.016</td>
<td>0.013</td>
<td>(2.589)**</td>
<td>-0.016</td>
<td>0.013</td>
<td>(2.589)**</td>
</tr>
</tbody>
</table>

| R² | 0.809 | 0.809 | 0.809 | 0.809 | 0.809 | 0.809 | 0.809 | 0.809 | 0.809 | 0.809 |
| S.E. of regression | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 |
| Akaike information criterion | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 |
| F-Statistic of the joint significance of all regressors | 243.4644 | 227.9488 | 206.1448 | 206.1448 | 206.1448 | 206.1448 | 206.1448 | 206.1448 | 206.1448 | 206.1448 |
| Countries | 54 | 53 | 52 | 52 | 51 | 53 | 45 | 45 | 51 | 53 |
| Observations (unbalanced sample) | 1131 | 1039 | 1021 | 948 | 948 | 324 | 900 | 399 | 915 | 840 |

### Notes:
- Pooled Least Squares method with cross-section fixed effects (dummies) and period fixed effects (dummies) is used on the assumption that the explanatory variables are exogenous. Both the joint cross-section and the joint period fixed effects were in each regression highly statistically significant.
- T-statistics in parentheses. * indicates statistical significance of the respective variable at the 10 percent level; ** indicates significance at the 5% percent level; *** indicates significance at the 1% percent level.
- 1/ Sum of primary, secondary, and tertiary school enrollment ratios from World Bank Development Indicators.
- 2/ Dummy variable representing the financial crisis shock during 1997 and 1998 in 5 Asian countries (Indonesia, Korea, Malaysia, Phillipines, Thailand).
- 3/ Resource depletion index: Depletion of energy and minerals, and net forest depletion, in percent of gross national income, and each type of depletion given equal weight.
- 4/ Share of primary exports (agricultural raw materials, ores, basic metals, fuels) in exports of goods and services.
- 5/ The index increases with a higher level of economic freedom.
- 6/ The index increases with less corruption.
- 7/ The index rises with a higher level of political stability. It is available for almost all countries but only for the years since 1996.
- Source: Authors calculations.
Table 2, concluded.
Panel Regression Results of Sectoral Employment Share Functions

<table>
<thead>
<tr>
<th>Equation</th>
<th>(3a)</th>
<th>(3b)</th>
<th>(3c)</th>
<th>(3d)</th>
<th>(4a)</th>
<th>(4b)</th>
<th>(4c)</th>
<th>(4d)</th>
</tr>
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<tbody>
<tr>
<td>Dependent Variable: Natural Logarithm of the Share of Employment in:</td>
<td>Financial Services,</td>
<td>Real Estate and Related Services,</td>
<td>Community, Social and Personal Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent Variables:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.668</td>
<td>-3.185</td>
<td>-3.327</td>
<td>-5.302</td>
<td>-0.312</td>
<td>-0.322</td>
<td>-1.155</td>
<td>-1.329</td>
</tr>
<tr>
<td>(t)</td>
<td>(-0.681)</td>
<td>(-1.623)</td>
<td>(-1.604)</td>
<td>(-1.236)</td>
<td>(0.300)</td>
<td>(-0.302)</td>
<td>(-0.957)</td>
<td>(-0.260)</td>
</tr>
<tr>
<td>ln (real per capita GDP)</td>
<td>1.234</td>
<td>-0.845</td>
<td>-0.646</td>
<td>1.758</td>
<td>-0.661</td>
<td>-0.328</td>
<td>0.172</td>
<td></td>
</tr>
<tr>
<td>(t)</td>
<td>(2.261)**</td>
<td>(-1.838)*</td>
<td>(-1.633)</td>
<td>(0.843)</td>
<td>(-2.673)**</td>
<td>(-2.651)**</td>
<td>(-1.184)</td>
<td>(0.152)</td>
</tr>
<tr>
<td>ln (real per capita GDP)^2</td>
<td>-0.051</td>
<td>0.0872</td>
<td>0.058</td>
<td>-0.103</td>
<td>0.045</td>
<td>0.023</td>
<td>-0.021</td>
<td></td>
</tr>
<tr>
<td>(t)</td>
<td>(-1.606)</td>
<td>(3.252)**</td>
<td>(2.173)**</td>
<td>(-0.891)</td>
<td>(3.066)**</td>
<td>(3.068)**</td>
<td>(1.405)</td>
<td>(-0.335)</td>
</tr>
<tr>
<td>ln (Trade)</td>
<td>-0.121</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln (Population)</td>
<td>-0.701</td>
<td>(4.409)*****</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln (Human resources) 1/</td>
<td>0.165</td>
<td>0.107</td>
<td>0.143</td>
<td>0.154</td>
<td>0.227</td>
<td>0.251</td>
<td>0.173</td>
<td>0.046</td>
</tr>
<tr>
<td>(t)</td>
<td>(4.409)*****</td>
<td>(1.873)*</td>
<td>(3.602)*****</td>
<td>(3.145)*****</td>
<td>(4.006)*****</td>
<td>(4.203)*****</td>
<td>(3.168)*****</td>
<td>(0.606)</td>
</tr>
<tr>
<td>Economic freedom 2/</td>
<td>0.036</td>
<td>0.036</td>
<td>(2.213)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t)</td>
<td>(4.409)*****</td>
<td>(1.873)*</td>
<td>(3.602)*****</td>
<td>(3.145)*****</td>
<td>(4.006)*****</td>
<td>(4.203)*****</td>
<td>(3.168)*****</td>
<td>(0.606)</td>
</tr>
<tr>
<td>&quot;Cleanliness of corruption&quot; perception 3/</td>
<td>0.021</td>
<td>0.021</td>
<td>(2.335)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t)</td>
<td>0.088</td>
<td>(2.223)**</td>
<td>(2.223)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Political stability 4/</td>
<td>0.098</td>
<td>0.098</td>
<td>-0.0214</td>
<td>-0.0214</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t)</td>
<td>(2.233)**</td>
<td>(2.233)**</td>
<td>(-0.265)</td>
<td>(-0.265)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adj, R²</td>
<td>0.960104</td>
<td>0.959345</td>
<td>0.97249</td>
<td>0.96253</td>
<td>0.939357</td>
<td>0.93716</td>
<td>0.96779</td>
<td>0.978869</td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.146658</td>
<td>0.151493</td>
<td>0.120026</td>
<td>0.09117</td>
<td>0.079165</td>
<td>0.079759</td>
<td>0.065225</td>
<td>0.041275</td>
</tr>
<tr>
<td>Akaike info criterion</td>
<td>-0.888204</td>
<td>-0.82634</td>
<td>-1.282621</td>
<td>-1.712502</td>
<td>-2.12452</td>
<td>-2.12846</td>
<td>-2.492398</td>
<td>-3.302397</td>
</tr>
<tr>
<td>F-Statistic of the joint significance of all regressors</td>
<td>210.1277</td>
<td>204.0079</td>
<td>279.4522</td>
<td>194.6096</td>
<td>130.5325</td>
<td>122.7731</td>
<td>164.6495</td>
<td>165.7891</td>
</tr>
<tr>
<td>Countries</td>
<td>54</td>
<td>52</td>
<td>50</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>50</td>
<td>54</td>
</tr>
<tr>
<td>Observations (unbalanced sample)</td>
<td>618</td>
<td>586</td>
<td>513</td>
<td>211</td>
<td>578</td>
<td>551</td>
<td>477</td>
<td>218</td>
</tr>
</tbody>
</table>

Note: Pooled Least Squares method with cross-section fixed effects (dummies) and period fixed effects (dummies) is used on the assumption that the explanatory variables are exogenous. Both the joint cross-section and the joint period fixed effects were in each regression highly statistically significant. T-statistics in parentheses. * indicates statistical significance of the respective variable at the 10 percent level; ** indicates significance at the 5 percent level; *** indicates significance at the 1% percent level.

1/ Sum of primary, secondary, and tertiary school enrollment ratios. In equations 3 it is the tertiary education enrollment ratio, because this had a consistently higher significance.
2/ The index increases with a higher level of economic freedom.
3/ The index increases with less corruption.
4/ The index rises with a higher level of political stability. It is available for almost all countries but only for the years since 1996.
Source: Authors calculations.
Appendix C: Figures 1a - 3i

**Figure 1a**
Sectoral Employment Share of Agriculture in 54 Market Economies and Transition Countries
(long run averages 1/)

- 54 market economies
- 10 EU accession countries
- 16 other transition countries
- Benchmark defined using estimated equation 1b
- Benchmark defined using estimated equation 1e

1/ For market economies the averages include at least 10 years. Malta and Cyprus are both market economies and EU accession countries. Source: Own calculations.

**Figure 1b**
Sectoral Employment Share of Manufacturing in 54 Market Economies and Transition Countries
(long run averages 1/)

- 54 market economies
- 10 EU accession countries
- Other transition countries
- Benchmark defined using equation 2a
- Benchmark defined using equation 2e

1/ For market economies the averages include at least 10 years. Malta and Cyprus are both market economies and EU accession countries. Source: Own calculations.
Figure 1c
Sectoral Employment Share of Financial and Related Services in 54 Market Economies and Transition Countries (long run averages 1/)

Figure 1d
Sectoral Employment Share of Community, Social, and Personal Services in 54 Market Economies and Transition Countries (long run averages 1/)

1/ For market economies the averages include at least 10 years. Malta and Cyprus are both market economies and EU accession countries. Source: Own calculations.
Figure 2a
Adjustment path of the Employment Share of Agriculture in Eastern European new EU member countries and EU accession candidates during transition 1/

1/ The small squares give the last available year 2001. The lines that lead to the squares show the evolution of the employment share with each dot representing one consecutive yearly observation.
Source: Own calculations.

Figure 2b
Adjustment path of the Employment Share of Manufacturing in Eastern European new EU member countries and EU accession candidates during transition 1/

1/ The squares give the last available year 2001. The lines that lead to the squares show the evolution of the employment share with each dot representing one consecutive yearly observation.
Source: Own calculations.
Figure 2c
Sectoral Employment Share of Financial Services, Real Estate, and Related Services in Eastern European new EU member countries and EU accession candidates during transition 1/

Figure 2d
Sectoral Employment Share of Community, Social, and Personal Services in Eastern European new EU member countries and EU accession candidates during transition 1/

1/ The squares give the last available year 2001. The lines that lead to the squares show the evolution of the employment share with each dot representing one consecutive yearly observation.
Source: Own calculations.
Figure 3a
Adjustment path of the Employment Share of Agriculture in Poland: Actuals and Forecasts 1990-2015 1/

0.00 0.05 0.10 0.15 0.20 0.25
Share of agricultural employment in total employment

GDP per capita at PPP (constant US Dollar)

Poland, actuals, 1990-2001
Forecast based on Equation 1a (1990-2015)
Dotted line: potential evolution during 2002-2015

2001 2015

1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.
Source: Own calculations.

Figure 3b
Adjustment path of the Employment Share of Agriculture in Romania: Actuals and Forecasts 1990-2015 1/

0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45
Share of agricultural employment in total employment

GDP per capita at PPP (constant US Dollar)

Romania, actuals, 1985-2001
Forecast based on Equation 1a (1990-2015)
Dotted line: potential evolution up to 2015

2001 2015

1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.
Source: Own calculations.
Figure 3c
Adjustment path of the Employment Share of Manufacturing in Estonia
Actuals and Forecasts 1993-2015 1/

1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.
Source: Own calculations.

Figure 3d
Adjustment path of the Employment Share of Manufacturing in the Czech Republic:
Actuals and Forecasts 1993-2015 1/

1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.
Source: Own calculations.
Figure 3e
Adjustment path of the Employment Share of Manufacturing in Poland: Actuals and Forecasts 1990-2015 1/

Poland, actuals (1990-2001)

Forecast based on Equation 2a (1990-2015)

Dotted line: potential evolution up to 2015

1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.

Source: Own calculations.

Figure 3f
Adjustment path of the Employment Share of Financial Services, Real Estate, and Related Services in the Czech Republic: Actuals and Forecasts 1992-2015 1/

Czech Republic, actuals, 1992-2001

Forecast based on Equation 3a (1994-2015)


Dotted line: potential evolution up to 2015

1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.

Source: Own calculations.
Figure 3g

1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.
Source: Own calculations.

Figure 3h
Adjustment path of the Employment Share of Financial Services, Real Estate, and Related Services in Slovenia: Actuals and Forecasts 1993-2015 1/

1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.
Source: Own calculations.
Figure 3i
Adjustment path of the Employment Share of Community, Social, and Personal Services in Poland:
Actuals and Forecasts 1990-2015 1/

1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.

Source: Own calculations.