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Paul Gregory

**Modelling the Structural Change of
Transition Countries**

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List of contents

List of tables

Appendix

List of figures

Modelling the Structural Change of Transition Countries

Ulrich Thießen[1] and Paul Gregory[2]

Abstract

The rapid changes in the transition economies 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 shows future sectoral growth patterns under the assumption that remaining structural distortions will continue to be removed.

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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 (Gregory and Stuart, 2001, Rosefielde, 1998, Desai, 1987). 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 Panayotopouolos, 1999).

The pace of change in the transition economies, both structural and institutional, has been rapid since 1991,[3] 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 income as the explanatory variable. 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 in such analyses, proxies for institutional characteristics. This approach yields "benchmark" equations that define a "normal" relationship between per capita income and employment shares, which differ from previous studies. Moreover, the estimations allow long-run ex-ante 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).

The paper begins with a brief methodological overview in section 2. Section 3 summarizes structural developments in the Eastern European countries under consideration, compares

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[3] On Eastern Europe see, for instance: Falceti, Lysenko, and Sanfey (2004), Fidmuc (2003), Havrylyshyn and van Rooden (2003), and the transition success indicators in the EBRD Transition reports. On Russia see, for instance, Gregory and Stuart (2001), chaps. 16-18, Schroeder (1998) and Tabata (1996).

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 section 4 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. Researchers found the estimated deviations from "normal" structures of market economies to be 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.[4] 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, the extent to which they have been removed and with what speed.

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.

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[4] Kuznets (1963), Gregory (1970), Ofer (1973), Schroeder and Edwards (1981), and more recently with limitations Döhrn and Heilemann (1996) and Raiser, Schaffer, and Schuchardt (2004).

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). The pace of structural change has been positively correlated with economic reforms; it has been most rapid in the new eastern European EU member countries. The output decline at the start of transition was generally more severe than economists had expected, and despite structural change, the output recovery took much longer than expected. Poland, the transition country with the lowest cumulative output decline of "only" 14%, was the first to recover to its pre-transition level. Also, Poland is regarded to have been a fast reformer.[5] Not surprisingly, in Table 1 (Appendix A), which compares 1991 with 2001, Poland's GDP structure in 2001 was the closest to the average of 12 high income European countries. Poland together with Latvia were even more "advanced" than the averages of the relatively poor EU countries Greece, Ireland,[6] and Portugal with lower agricultural and manufacturing output shares and equivalent shares of services.

In general, the table shows more rapid adjustments in transition countries' GDP than in labor force structures. Dividing the GDP shares by the respective labor force shares yields relative sectoral productivities, the structures of which generally became more similar. The confusing descriptive statistics in Table 1 can be compactly summarized by "distance" measures of convergence, defined as: $D_k = \Sigma_i (S_{Acci} - S_{ki})^2$, where S_{Acci} is the average share of ith sector in the new EU member countries or accession candidates and S_{ki} is the average share of the ith sector in the country group k.[7] The indicator D_k measures only the relative "distance" between the transition countries and the respective country group taking into account all sectors simultaneously.[8] 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. The absolute

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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.

[6] In the beginning of the considered 20 year period, Ireland was relatively poor but today it is among the ten EU states with highest per capita income.

[7] The deviations are squared so as to give positive and negative values the same weight.

[8] Three country groups were classified, i.e. 12 high income European countries (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, United Kingdom), 33 countries with income similar to the Eastern European countries (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), and the three formerly poorest EU countries (Greece, Ireland, and Portugal) which 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.

values of the indicator bear no meaning but their evolution and the comparison of values for different country groups is of interest.

Figures 1a and 1b in Appendix B provide distance measures for employment structure for the 8 new Eastern European EU member countries and the two accession candidates (Bulgaria and Romania), respectively.[9] Surprisingly, already by 1989 and 1990 the employment structure of the eight new Eastern European EU member countries converged towards the two reference groups, due to labor-shedding in agriculture and employment increases in some services sectors. Since the mid 1990s the convergence process appears to have stagnated.

Figure 1b shows that Bulgaria and Romania's transition resulted in increasing differences in employment structure compared to EU countries and countries with similar income.[10]

The indicator of structural deviation is a convenient, objective summary measure of the structural adjustment of Eastern European countries contrary to subjective measures such as the transition indicators produced by International Organizations. It compares changes in the "distance" between the transition economy and group averages of reference country groups. The approach does not use econometric analysis to "benchmark" the transition economy relative to some hypothetical "normal" structure as did Chenery and his associates but its results are very similar to those obtained from the following regression analysis.

4   Empirical analysis

We use panel regressions for a large group of economies to calculate Chenery-type "benchmark" sector shares for transition economies. Panel regressions were run for a maximum of 54 selected developing and developed economies to explain their sectoral employment shares.[11] For reasons of space, we report the results only of four of the total of

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[9] The International Labour Organization (ILO) provides employment data for a large number of countries and years and for 9 sectors: 1. Agriculture, Hunting, Forestry and Fishing, 2. Mining and Quarrying, 3. Manu-facturing, 4. Electricity, Gas and Water, 5. Construction, 6. Wholesale, Retail Trade, Restaurants, and Hotels, 7.Transport, Storage and Communication, 8. Financing, Insurance, Real Estate and Business Services, 9. Comm-unity, Social and Personal Services.

[10] 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.

[11] 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 ressources. 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.

nine sectors, namely two sectors whose employment shares eventually decline as income rises, i.e. agriculture and manufacturing, and two sectors whose employment shares increase monotonically with income, i.e. financial services and community, social, and personal services. These four sector shares account for an average of about 65 percent of employment in the transition economies.

The explanatory variables included standard Chenery-type variables, i.e. per capita income (Ypc), measured in purchasing power parities, and its square to account for non-linear relationships, the size of the economies proxied by population (POP), the investment ratio (Inv), and the endowment of natural resources (NR).[12] We also include proxies for "openness" (Trade), i.e. the sum of exports and imports as a ratio to GDP, human capital (HC), namely school and higher education enrollment ratios, to measure potential effects of education, and several variables to capture the effect of government policies (GP), i.e. the government consumption expenditure share, tax revenues to GDP, taxes on international trade to GDP, and military expenditure shares. We also include proxies for institutional characteristics (IC), namely economic freedom, corruption perception, and political stability. A dummy variable (D) is included to account for the 1997/98 Asian financial crisis in five countries (Indonesia, Korea, Malaysia, Philippines and Thailand).[13] The regressions include a constant for each country and a time dummy for each year (cross-section and period fixed effects model).[14] All variables were transformed into natural logarithms except the dummy, the natural resource variables, and the proxies for institutional characteristics.[15]

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[12] Agricultural resources were proxied by permenant 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.

[13] The dummy variable equals one for these two years and these five countries, and zero otherwise.

[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 1.

[15] The reasons for not transforming the institutional characteristic variables were that one of these (the index of economic freedom) had some observations that were zero, and their significance tended to be somewhat higher when not using logs. Since this was also the case regarding the natural resource variables, they were also not transformed.

Thus, the basic model is:

$$\ln(LF^i_{jt}/LF_{jt}) = a^i_0 + a^i_1 \ln Ypc_{jt} + a^i_2 (\ln Ypc)^2_{jt} + a^i_3 \ln Trade_{jt} + a^i_4 \ln POP_{jt} + a^i_5 \ln HC_{jt}$$

$$(+/-/?) \qquad (-/+/?) \qquad (+/-/?) \qquad (+/?) \qquad (+/?)$$

$$+ a^i_6 \ln Inv_{jt} + a^i_7 \ln GP_{jt} + a^i_8 NR_{jt} + a^i_9 IC_{jt} + a^i_{10} D_{Asia5, 97-98} + u^i_j + v^i_t + e^i_{jt} \quad (1)$$

$$(+/?) \qquad (?) \qquad (+/?) \qquad (?) \qquad (?)$$

where i represents the sectors, j represents the countries, u_j represents country specific effects, v_t represents period specific effects, and e_{jt} is an error term.

Specific signs of the independent variables are expected only for some sectors. The expected signs are shown in parenthesis below the variables. In most cases the signs are theoretically indeterminate. For instance, with regard to agriculture we expect a declining labor force share as per capita income rises (a positive sign for coefficient a_1 and a negative sign for coefficient a_2), while for financial services the opposite is true. Since international trade promotes adjustment of the production structure according to comparative advantage and thus rising production in the long-run in all trading partner countries, a positive sign of the trade variable is expected for sectors producing tradeable goods like agriculture and manufacturing. Country size, measured by population, is expected to have a positive effect on sectors that produce with economies of scale, for instance agriculture and manufacturing. Human capital is expected to positively influence relative employment in sectors producing skill-intensive goods and services such as manufacturing and financial services. The investment ratio may be expected to be positively related to employment shares of sectors where production is sensitive to investment such as manufacturing, possibly also agriculture and financial services. No prior expectations exist as to the effects of government policies on the employment structure. Natural resource wealth is expected to affect the employment shares of those sectors positively, which use or process these resources. Improvements of institutions may be expected to positively influence employment shares particularly of financial services and manufacturing to the extent that the development of these sectors is in the long run relatively dependent on well functioning institutions.

We use sectoral ILO employment data, the data for the institutional characteristics were taken from three different sources,[16] and all other data were drawn from the World Development Indicators data base of the World Bank. The longest time period covered was 1970-2001. Since 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 these variables, are not directly comparable due to different sample periods. Given the different time periods for various specifications, a relatively large number of regressions were performed, and selected results are reported in Table 2 in Appendix C.

5 Discussion of some results

5.1 Sectoral employment share panel regressions

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 more detailed breakdown of sectors (more than agriculture, industry, and services) is appropriate, since specifications that appeared to be robust differed 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 of panel regressions and lead us to prefer parsimonious estimated models that include only variables whose estimated coefficient signs and significance are robust.[17] Arguably, the employment shares are jointly determined: If the manufacturing shares increases, e.g. this will have implications for the other shares. Thus, the equations reported in Table 2 could be jointly estimated in a system of equations, e.g. as SURE regressions. But since our main goal was to produce ex-post forecasts for employment shares of individual eastern European countries as accurately as possible to use them for ex-ante forecasts, and since the specifications with the best

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[16] 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.

[17] Recently, and in the context of empirical studies on FDI, Blonigen and Wang (2004) pointed to potential estimation problems when pooling data for heterogenous country groups. This is a further qualification of our results. To mitigate such potential problems we control für cross-country heterogeniety through use of dummies for each country and year. In addition, FDI studies have to use relatively poor data at the country level, which contributes to the sensitivity of results of these studies. By contrast, our study uses highly aggregated variables where measurement issues are less serious.

forecasting power differ from sector to sector, we performed sector specific regressions. Despite this, the sum of the forecasted sector employment shares for each country and year was close to 100 percent, i.e. most errors were smaller than 5 percentage points.

The results were very satisfying as shown by the high explained portion of the total variation, the high joint significance of the independent variables in all regressions, and the generally high significance of individual explanatory variables, except in the regressions which are based on relatively short time periods. Also the estimated signs of the coefficients were consistent with prior expectations.

Specifically, in the *agriculture* regressions for 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, corruption perception, and political stability. For agriculture 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 corruption perception 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 (corruption perception 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.

9

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, Appendix C), 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

10

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 2a – 2d, Appendix D, 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.[18] 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. We also see that employment in agriculture, financial services, and community, social, and personal services has in most EU accession countries (represented by triangles) already come close to "normality" (Figures 2a, 2c, and 2d) but the average manufacturing employment shares in several of these countries have still been considerably away from the benchmarks (Figure 2b).

5.2 **Evaluation of structural adjustment of individual countries**

The benchmark regressions are used to evaluate the adjustment process of the sectoral employment shares for each of the eight new EU member countries and the two EU accession candidates.[19] Figures 3a – 3d, Appendix E, show these individual adjustment paths, where for each country as many years as available during transition were plotted. Each point on the

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[18] 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.

[19] Only two benchmark equations are plotted, namely those that define the upper and lower limit of all estimated relationships for each sector. In order to derive the benchmark curves from the panel regression output we used an average of the estimated cross-section fixed effects and an average of each considered explanatory variable over all included countries and years. The estimated period fixed effects were omitted.

curves for the individual country 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. In contrast to similar analyses that do 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 consistently below "normal" and did not move further away from normal. In some cases agricultural employment moved along the estimated benchmark lines (Czech Republic, Estonia, Hungary, Slovakia, and Slovenia, Figure 3a). Besides the outliers of Bulgaria and Romania, only Poland and Lithuania with their traditionally relatively large agricultural employment, both recently experienced an interruption of otherwise successful adjustment of agricultural employment.

For manufacturing we find that all of the Eastern European countries reduced their exaggerated employment shares and moved in the expected direction but only Latvia, Lithuania, and Poland have achieved "normality" (Figure 3b). All others have employment shares that are still considerably above the estimated benchmarks. In the most recent years for which data were available, the shares even increased in several countries with the wealthier countries among them moving further away from "normality" than the poorer ones.

Financial and related services provide the most dramatic results (Figure 3c). Past studies of the Soviet period show a gross relative underproduction of services, especially financial services, although they would include traditional services like employment in the state savings bank system. The surprising result is that except for Bulgaria and Romania, the Eastern European countries already by 1990 had relatively normal employment shares in financial services. Thereafter, they experienced rather steep increases above the estimated benchmarks, except Lithuania, as capitalist-like services were introduced.

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 3d).

5.3 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 4a-4d, Appendix F, 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.[20] These forecasts were extended out of sample - in a fourth step - until the year 2015. An annual real per capita GDP growth rate of 4.5 % was assumed starting in 2004, and trends of the explanatory variables were extrapolated for each country.[21] 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 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 year and for the two forecasting equations used. As already mentioned, 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

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[20] 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.

[21] Trends were extrapolated provided both that they exist and that this assumption is reasonable. Specifically, the negative population growth trend in most countries was not extrapolated but it was assumed that there is a slow bottoming out and then the population stays constant. Also the deterioration of some institutional characteristics in many countries was not extrapolated but it was assumed that this is stopped with EU membership (in the case of the accession candidate Romania the deterioration is assumed to bottom out within 3 years) and followed by modest improvements. Growth of openness, which was quite volatile and different among the countries but showed a substantial long run trend increase was assumed to amount to 2% annually. The indicator of human capital, which showed a trend improvement in all countries but at very different rates from year to year, a modest continuous improvement of .5% annually was assumed.

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 4a, Appendix F, shows for Poland, that the individualized forecast shows less overemployment than when using the unadjusted benchmark lines of Figure 3a, Appendix E. Figure 4a, Appendix F, 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 4b, Appendix F, 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.

14

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 4c and 4d, Appendix F, 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 4e, Appendix F), 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 (shown in Figure 3c), 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 4f-4h, Appendix F, 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 4i).

15

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,[22]

- 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 Europan countries. As sector shares in 2015, the midpoint of the two forecasts for each sector and country was used.

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[22] 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)

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

1/ Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia.
2/ EU 8 + 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 European enlargement. The table shows that only by 2015 the average structure of the Eastern European countries would be very similar to the *current* structure of the former EU 15 countries. However, since in 2015 the structure of the former EU 15 countries will have changed with 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)

Sector	EEU 8 /2	EEU 10 /3	Memorandum item: EU 15 in 2001 4/
Agriculture	4.40	4.90	5.10
Mining and quarrying	0.21	0.25	0.25
Manufacturing	18.80	18.80	17.80
Electricity, gas and water	0.81	0.82	0.70
Transport, storage, and communication	6.13	6.21	6.60
Construction	8.80	8.50	7.80
Wholesail and retail trade, restaurants and hotels	18.20	18.30	18.70
Financial services, real estate, and related services	11.60	10.90	12.40
Community, social, and personal services (including government)	29.30	28.70	30.60
Sum of all changes or forecast error	98.30	97.40	99.90

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 + Bulgaria and Romania.
4/ 15 EU member countries prior to the EU Eastern European enlargement.
Source: Own calculations.

6　　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.

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Appendix A: Table 1

Table 1

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

	Sectoral shares in GDP, in percent				Sectoral shares in total employment, in percent				Relative sectoral productivity (GDP share/employment share)			
	Agriculture	Manu- facturing	Market- oriented services 1)	Community and social services	Agriculture	Manu- facturing	Market- oriented services 1)	Community and social services	Agriculture	Manu- facturing	Market- oriented services 1)	Community and social services
Panel A: 1991												
Eastern European countries:												
Czech Republic	5.5	28.5	36.1	12.3	8.6	31.5	24.7	23.2	0.64	0.91	1.68	0.53
Estonia (GDP and productivity: 1993)	11.4	19.0	41.0	16.6	18.9	25.0	24.4	20.2	0.72	0.88	1.54	0.71
Hungary	8.5	21.5	39.2	17.9	11.1	26.1	28.5	25.4	0.76	0.82	1.65	0.70
Latvia (GDP and productivity: 1992)	17.6	28.2	39.1	8.4	17.9	25.5	25.5	19.7	0.88	1.18	1.60	0.41
Lithuania (GDP: 1993; Labor force and productivity: 1997)	12.5	19.4	34.9	21.1	20.5	18.4	27.7	23.8	0.61	1.05	1.48	0.88
Poland (GDP and productivity: 1992)	7.1	28.0	31.9	17.4	25.4	24.7	19.0	19.0	0.28	1.21	1.76	0.93
Slovakia (1994)	7.0	25.4	45.6	12.7	10.0	26.9	26.2	24.9	0.70	0.94	1.85	0.51
Slovenia	5.7	38.5	33.3	17.0	8.2	39.0	26.9	17.3	0.69	0.99	1.48	0.98
Unweighted average of the 8 new Eastern European EU countries	9.4	26.1	37.6	15.4	15.1	27.1	25.4	21.7	0.66	1.00	1.63	0.71
Bulgaria	14.6	29.0	24.6	20.4	19.5	30.6	19.0	20.3	0.75	0.95	2.24	1.01
Romania	22.5	22.5	20.4	16.2	29.8	31.3	19.2	11.2	0.76	0.72	1.06	1.45
Russia	14.0	31.6	23.5	11.7	13.9	26.4	25.3	21.8	1.01	1.19	0.95	0.54
Averages of market economy groups:												
12 high income European countries 2)	3.2	20.1	43.9	22.3	5.2	21.2	33.1	31.8	0.65	0.95	1.52	0.71
Greece, Ireland, Portugal	8.8	20.1	41.3	20.2	17.8	20.9	29.2	23.0	0.50	0.97	1.78	0.88
26 market economies with income similar to the Eastern European EU countries (1993) 3); GDP and productivity: 9 countries 4)	11.2	22.7	34.3	17.5	23.5	16.1	26.9	25.1	1.48	1.31	1.67	0.83
Panel B: 2001												
Eastern European countries:												
Czech Republic	4.3	27.0	41.0	15.2	4.7	27.6	31.9	24.3	0.93	0.98	1.37	0.62
Estonia	5.8	18.7	48.4	16.6	6.8	23.0	34.9	25.9	0.85	0.81	1.56	0.64
Hungary (GDP and productivity: 2000)	4.2	24.8	43.0	19.3	6.1	24.4	34.1	26.4	0.66	1.04	1.54	0.71
Latvia	4.8	14.9	51.3	19.0	14.8	15.9	33.6	26.6	0.33	0.94	1.81	0.72
Lithuania	7.1	20.5	40.7	20.7	16.2	18.1	28.6	28.1	0.44	1.13	1.77	0.74
Poland	3.8	19.2	44.0	19.5	18.8	20.1	28.8	22.0	0.20	0.95	1.57	0.88
Slovakia	4.7	22.3	16.0	49.0	6.1	25.9	30.4	26.7	0.77	0.86	1.82	0.60
Slovenia	3.1	26.8	38.9	21.2	5.1	28.9	33.2	23.5	0.60	0.93	1.28	0.90
Unweighted average of the 8 new Eastern European EU countries	4.7	21.8	40.4	22.6	9.8	23.0	31.9	25.4	0.60	0.96	1.59	0.73
Bulgaria (GDP and productivity: 2000)	15.4	16.0	34.3	24.8	26.9	19.4	25.3	20.1	0.58	0.80	2.21	1.21
Romania	13.1	16.6	33.8	22.0	41.6	19.0	17.4	14.3	0.31	0.87	2.24	1.54
Russia	7.0	17.8	41.5	12.9	6.7	16.7	28.3	39.7	0.78	1.07	1.15	0.43
Averages of market economy groups:												
12 high income European countries 2), (GDP and productivity: 199	2.2	19.3	46.8	22.3	3.5	17.9	37.0	34.1	0.61	1.06	1.36	0.67
Greece, Ireland, Portugal (2000)	4.9	20.6	44.0	20.9	12.4	17.9	35.3	23.5	0.40	1.15	1.53	0.90
26 market economies with income similar to the Eastern European EU countries (2001) 3); GDP and productivity: 9 countries (1999)	8.9	19.7	38.1	19.2	20.5	14.6	32.2	24.2	0.69	1.25	1.76	0.79

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, Surinam, Thailand, Trinidad and Tobago, Turkey, Uruguay, Venezuela.

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

Source: Authors calculations.

Appendix B: Figures 1a – 1b

Figure 1a
Structural Deviation Indicator: Employment
Deviations of the structure of 8 new eastern EU countries from certain country groups 1982-2001
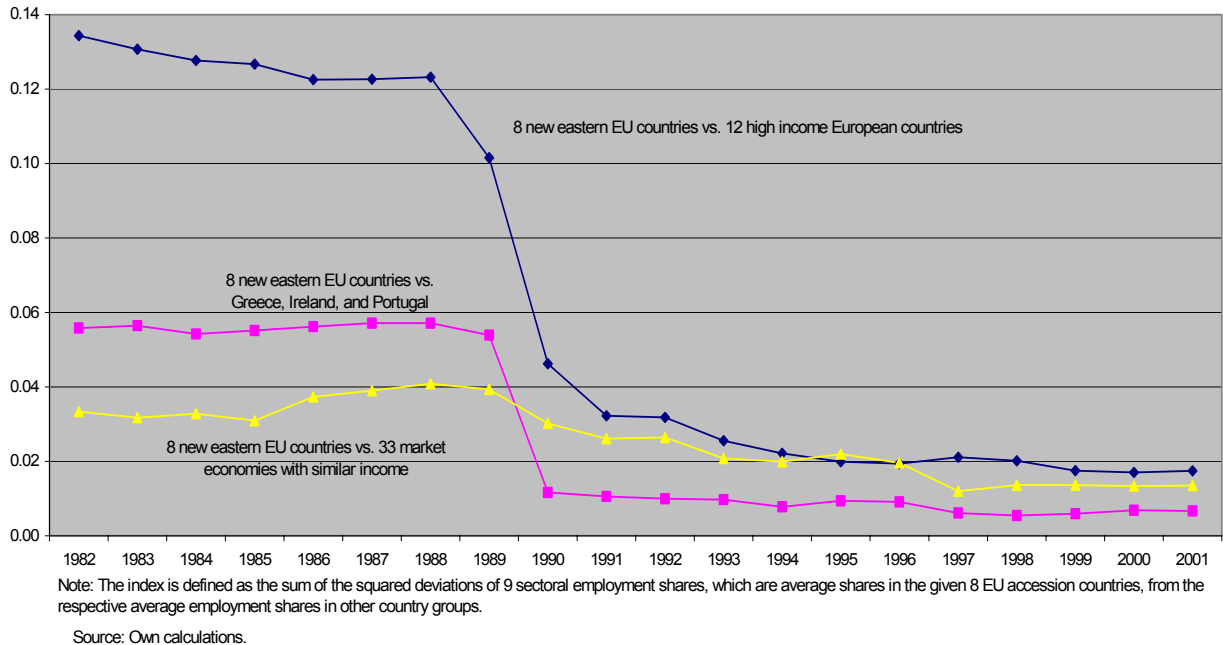
Note: The index is defined as the sum of the squared deviations of 9 sectoral employment shares, which are average shares in the given 8 EU accession countries, from the respective average employment shares in other country groups.
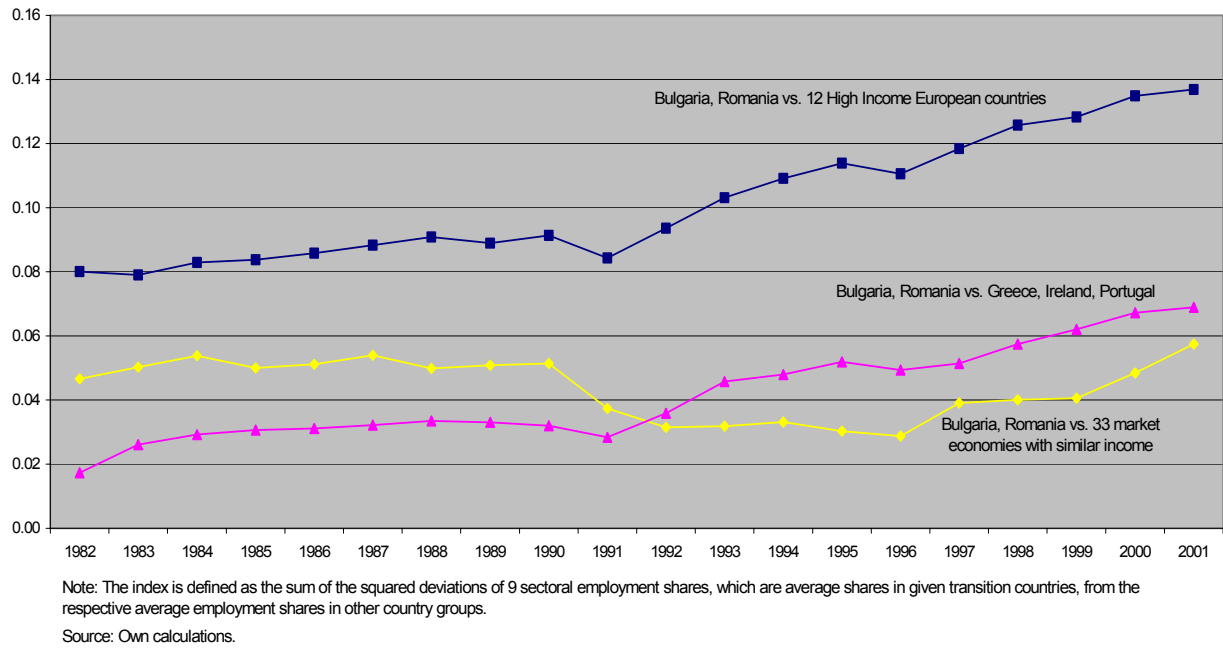
Source: Own calculations.

Figure 1b
Structural Deviation Indicator: 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.

23

Appendix C: Regression output

Table 2
Panel Regression Results of Sectoral Employment Share Functions

Equation:	(1a)	(1b)	(1c)	(1d)	(1e)	(2a)	(2b)	(2c)	(2d)	(2e)
	Dependent Variable: Natural Logarithm of the Share of Employment in:									
Independent Variables:	-		Agriculture		-	-		Manufacturing		-
Sample period	1975-2001	1975-2001	1975-2001	1980-2001	1996-2001	1975-2001	1990-2000	1980-2001	1980-2001	1996-2001
Constant	-24.547	-25.235	-27.339	-23.488	-30.718	-14.384	-10.780	-14.252	-13.101	-18.770
	(-10.634)***	(-10.058)***	(-10.162)***	(-9.548)***	(-1.725)*	(-12.212)***	(-2.489)**	(-12.084)***	(-11.132)***	(-3.466)***
ln (real per capita GDP)	2.152	2.313	2.248	2.706	2.801	1.666	2.029	1.599	1.363	2.976
	(4.264)***	(4.296)***	(4.0415)***	(5.678)***	(1.415)	(6.723)***	(3.028)***	(6.569)***	(5.659)***	(3.085)***
(ln real per capita GDP)^2	-0.147	-0.156	-0.1577	-0.178	-0.181	-0.0775	-0.0918	-0.071	-0.055	-0.151
	(-4.934)***	(-4.892)***	(-4.752)***	(-6.413)***	(-1.646)*	(-5.409)***	(-2.416)**	(-5.017)***	(-3.959)***	(-2.923)***
ln (Trade)	0.325	0.338	0.263	0.172	0.1456	0.194	0.187	0.191	0.197	0.269
	(5.976)***	(5.938)***	(4.270)***	(3.585)***	(0.895)	(8.656)***	(4.775)***	(8.352)***	(8.913)***	(5.772)***
ln (Population)	0.822	0.815	0.972	0.633	1.043	0.195	0.153	0.186	0.163	0.083
	(4.916)***	(4.676)***	(5.112)***	(3.914)***	(1.048)	(2.645)**	(0.692)	(2.510)**	(2.164)**	(0.419)
ln (Human resources) 1/							0.056			
							(1.566)			
ln (Gov. consumption expenditures/GDP)							-0.112			
							(-3.760)***			
ln (Gov. military expenditures/GDP)							0.0397			
							(1.575)			
ln (Taxes on international trade)/GDP							-0.034			
							(-1.429)			
Asia financial crisis dummy 2/	-0.195	-0.187	-0.138	-0.107	-0.001	-0.016	-0.010	-0.015	-0.001	-0.078
	(-2.276)**	(-2.145)**	(-1.579)	(-1.787)*	(-0.002)	(-0.531)	(-0.306)	(-1.306)	(-0.031)	(-3.547)***
Agricultural resources 3/		0.0078	0.007	0.009						
		(2.561)**	(2.137)**	(3.072)**						
Natural resource endowment excluding agricultural resources 4/		-0.0082	-0.0047	-0.007						
		(-1.851)*	(-1.446)	(-1.900)*						
Natural resource endowment including agricultural resources 5/						-0.320	-0.454	-0.315	-0.374	-0.091
						(-5.413)***	(-3.130)***	(-5.415)***	(-6.338)***	(-0.574)
Economic freedom 6/			0.0660					0.0112		
			(3.353)***					(1.546)		
"Cleanness of corruption" perception 7/					-0.0026				0.013	
					(-0.984)				(2.694)***	
Political stability 8/						-0.136				0.052
						(-2.014)**				(2.560)**
adj. R^2	0.947435	0.946425	0.944482	0.976259	0.965526	0.903987	0.939044	0.912784	0.920815	0.957491
S.E. of regression	0.241111	0.24424	0.243671	0.163683	0.193413	0.087119	0.067992	0.084377	0.079763	0.053223
Akaike info criterion	0.065061	0.0941	0.094473	-0.692184	-0.270669	-1.964384	-2.376477	-2.023678	-2.131258	-2.849004
F-Statistic of the joint significance of all regressors	243.4644	227.9488	205.1448	441.8734	144.4812	115.1904	87.17371	123.5403	125.9051	112.91
Countries	54	53	52	51	54	53	45	52	51	53
Observations (unbalanced sample)	1131	1093	1021	848	324	960	359	915	840	310

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 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). The variable attains the value one for these two years and these five countries, and zero otherwise.

3/ Proxy for agricultural resources: permanent cropland per capita.

4/ 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.

5/ Share of primary exports (agricultural raw materials, ores, basic metals, fuels) in exports of goods and services.

6/ The index increases with a higher level of economic freedom.

7/ The index increases with less corruption.

8/ The index rises with a higher level of political stability. It is available for almost all countries but only for th years since 1996.

Source: Authors calculations.

Table 2, concluded.
Panel Regression Results of Sectoral Employment Share Functions

Equation	(3a)	(3b)	(3c)	(3d)	(4a)	(4b)	(4c)	(4d)
	Dependent Variable: Natural Logarithm of the Share of Employment in:							
	-	Financial Services,		-		Community, Social		-
		Real Estate				and Personal Services		
Independent Variables:		and Related Services						
Sample period	1975-2000	1975-2000	1980-2000	1996-2000	1975-2000	1975-2000	1980-2000	1996-2000
Constant	1.668	-3.185	-3.327	-5.874	-0.312	-0.322	-1.155	-1.329
	(-0.681)	(-1.623)	(-1.604)	(-1.236)	(0.300)	(-0.302)	(-0.957)	(-0.260)
ln (real per capita GDP)	1.234	-0.845	-0.546	1.758	-0.651	-0.661	-0.328	0.172
	(2.261)**	(-1.838)*	(-1.163)	(0.843)	(-2.673)**	(-2.651)***	(-1.184)	(0.152)
(ln real per capita GDP)^2	-0.051	0.0872	0.058	-0.103	0.044	0.045	0.023	-0.021
	(-1.606)	(3.252)***	(2.173)**	(-0.891)	(3.096)***	(3.069)***	(1.405)	(-0.335)
ln (Trade)	-0.121							
	(-2.286)**							
ln (Population)	-0.701							
	(-4.144)***							
ln (Human resources) 1/	0.165	0.107	0.143	0.154	0.227	0.251	0.173	0.046
	(4.409)***	(1.873)*	(3.602)***	(3.145)***	(4.006)***	(4.203)***	(3.168)***	(0.606)
Economic freedom 2/		0.036				-0.018		
		(2.213)**				(-1.907)*		
"Cleanness of corruption" perception 3/			0.021				-0.009	
			(2.335)**				(-2.135)*	
Political stability 4/				0.098				-0.0214
				(2.233)**				(-0.625)
adj. R^2	0.960104	0.959345	0.97249	0.98253	0.939357	0.937716	0.95779	0.978869
S.E. of regression	0.146958	0.151493	0.120026	0.09117	0.079165	0.079759	0.065225	0.041275
Akaike info criterion	-0.888204	-0.82634	-1.282621	-1.712502	-2.121452	-2.102946	-2.492398	-3.302937
F-Statistic of the joint significance of all regressors	210.1277	204.0079	279.4522	194.6096	130.5325	122.7731	164.6495	165.7891
Countries	54	52	50	54	54	52	50	54
Observations (unbalanced sample)	618	586	513	211	578	551	477	218

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 curruption.
4/ The index rises with a higher level of political stability. It is available for almost all countries but only for th years since 1996.
Source: Authors calculations.

Appendix D: Figures 2a-2d

Figure 2a
Sectoral Employment Share of Agriculture in 54 Market Economies and Transition Countries
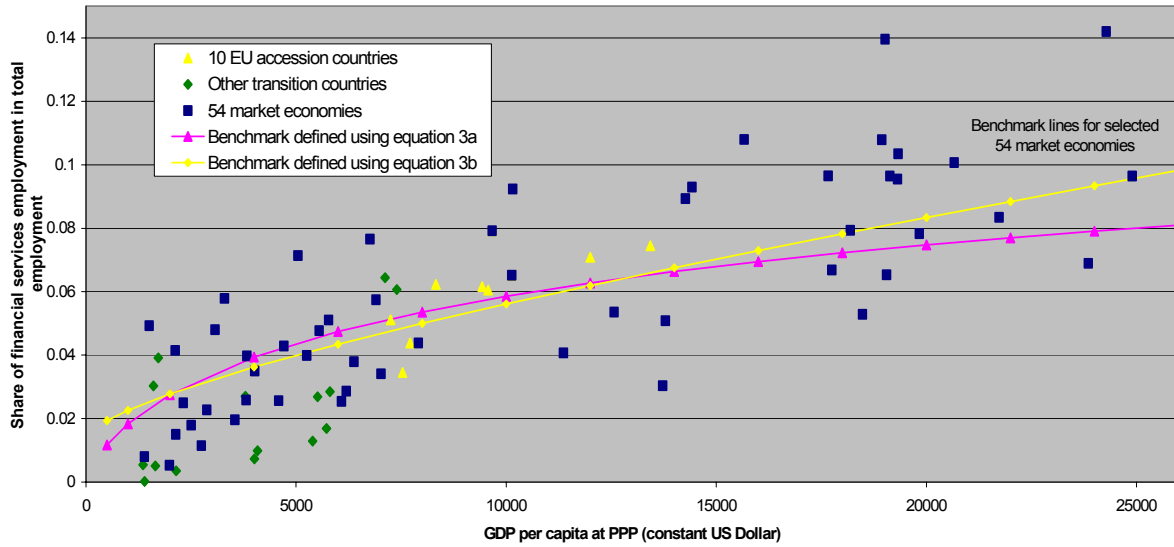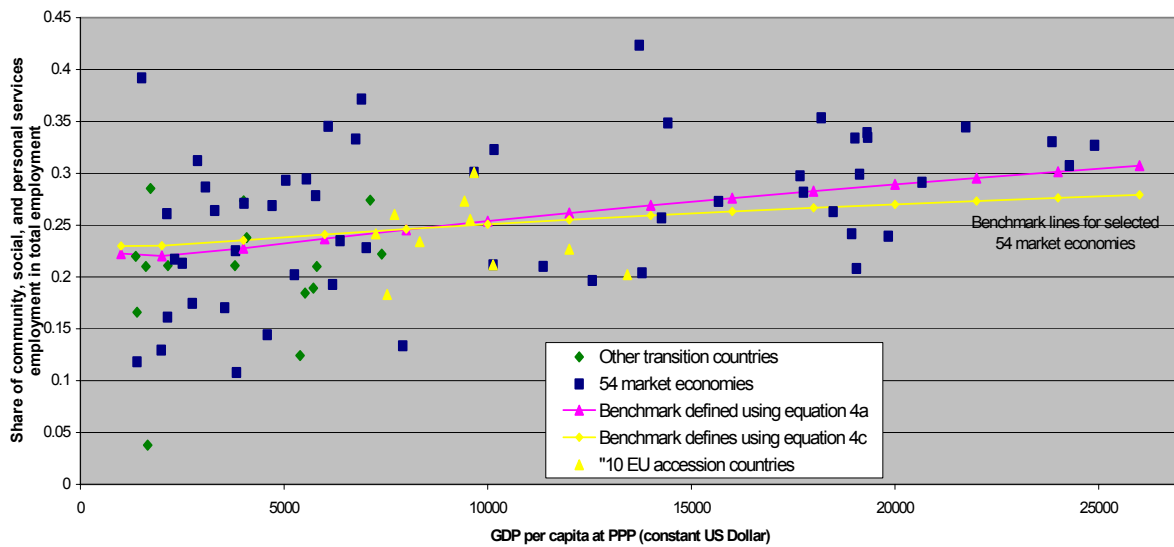**(long run averages 1/)**
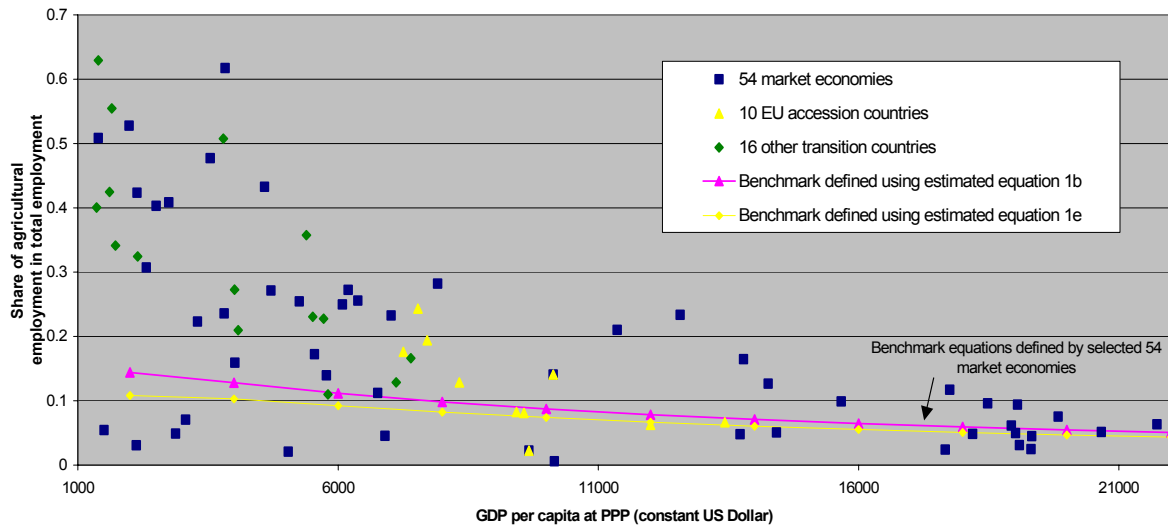
1/ For market economies the averages include at least 10 years. Malta and Cyprus are both market economies and EU accession countries.
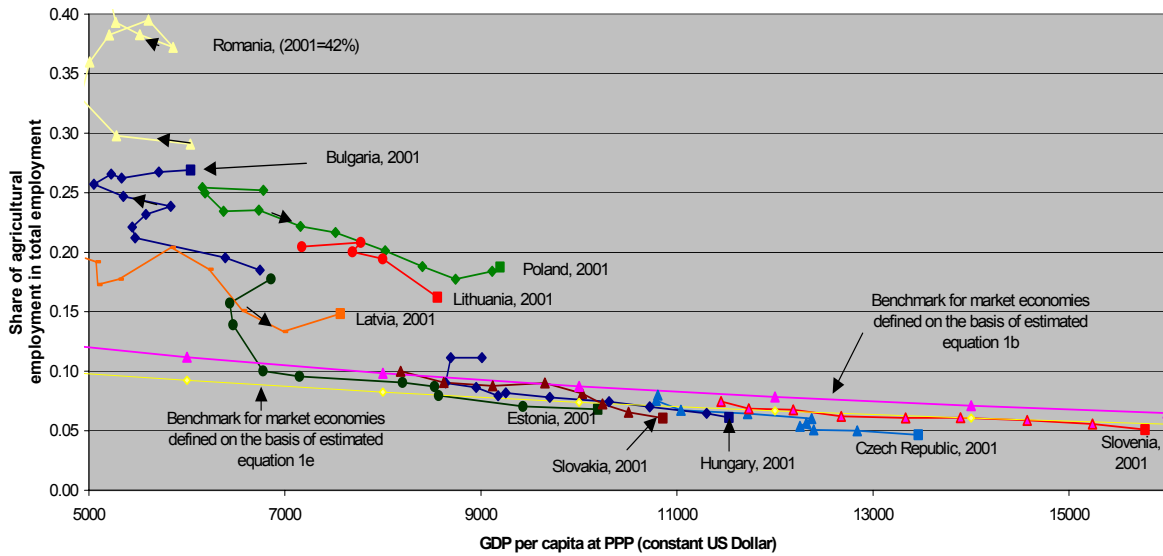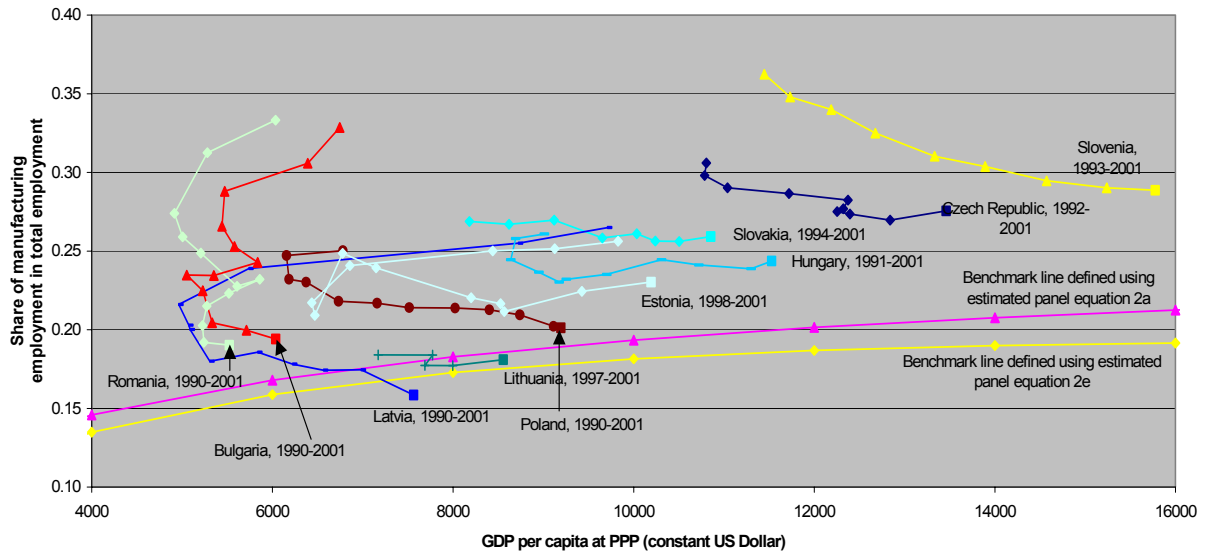Source: Own calculations.

Figure 2b
Sectoral Employment Share of Manufacturing in 54 Market Economies and Transition Countries
(long run averages 1/)
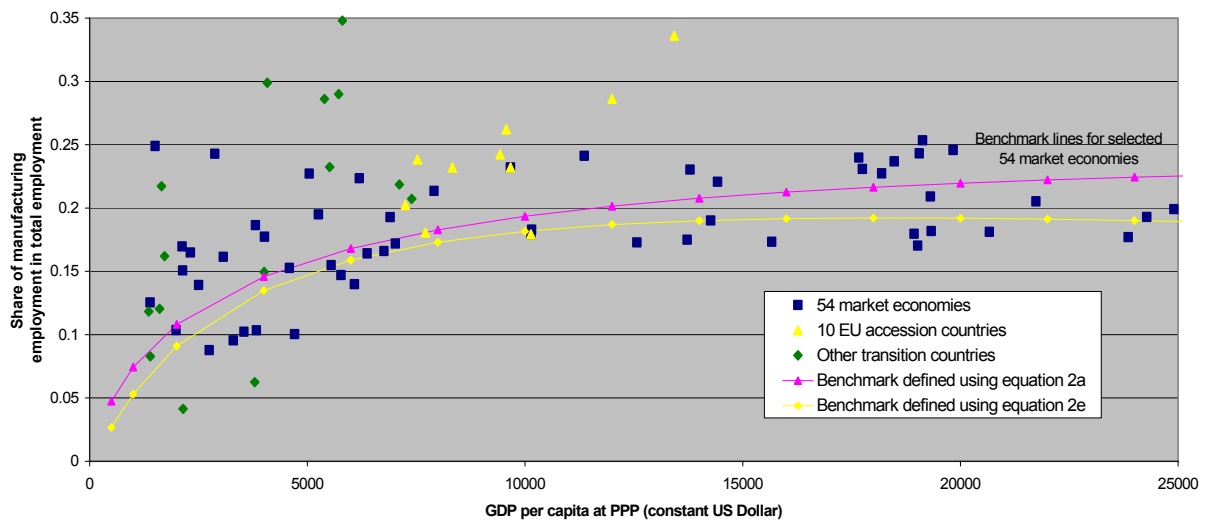
1/ For market economies the averages include at least 10 years. Malta and Cyprus are both market economies and EU accession countries.
Source: Own calculations.

Figure 2c
Sectoral Employment Share of Financial and Related 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 2d
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.

Appendix E: Figures 3a-3d

Figure 3a
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 3b
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 3c
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/
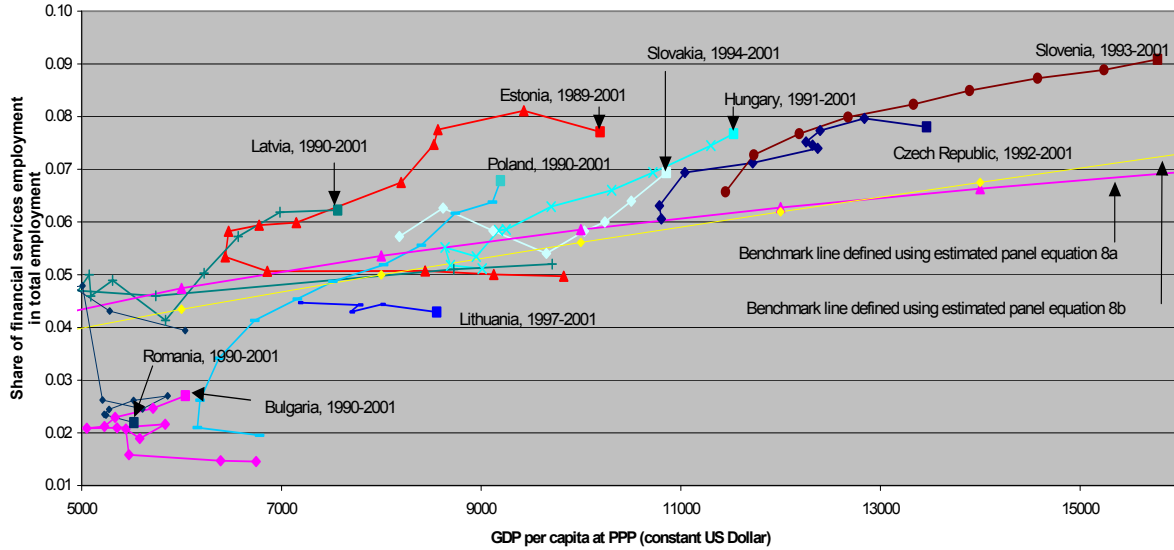
1/ The squares give the last available year 2001. The lines that lead to the squares show the evolution of the employment share with each dot representing one consecutive yearly observation.
Source: Own calculations.

Figure 3d
Sectoral Employment Share of Community, Social, and Personal Services in
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.

29
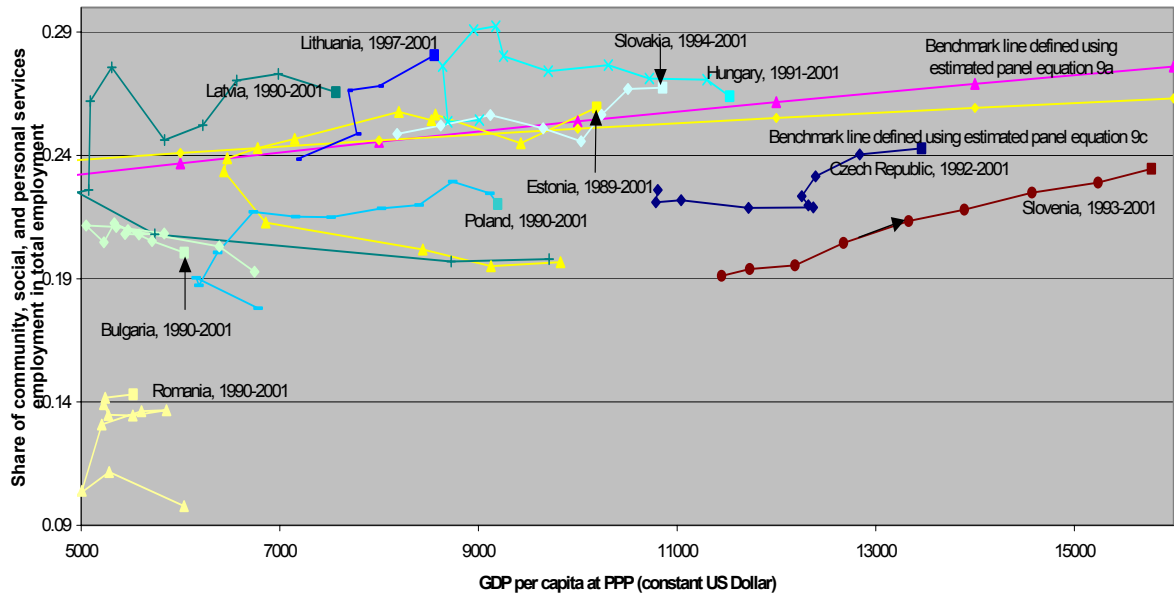
Appendix F: Figures 4a-4i

Figure 4a
Adjustment path of the Employment Share of Agriculture in Poland:
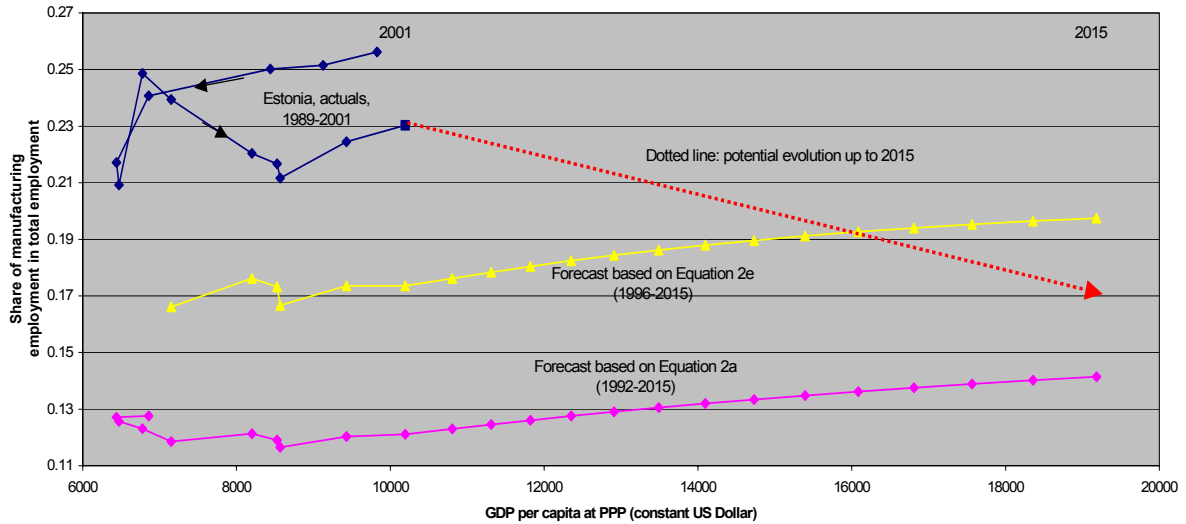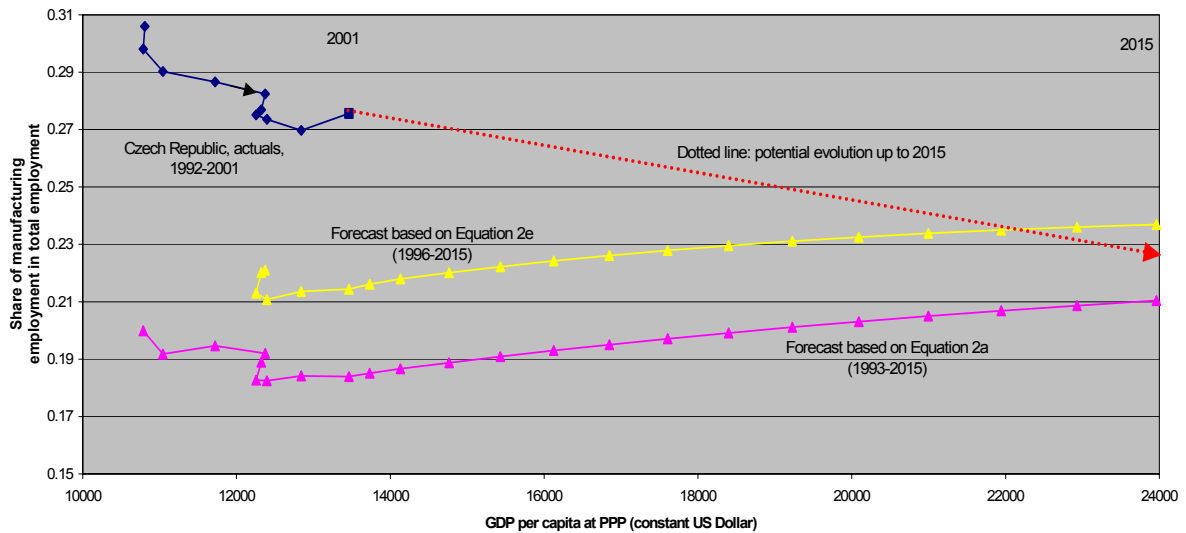**Actuals and Forecasts 1990-2015 1/**
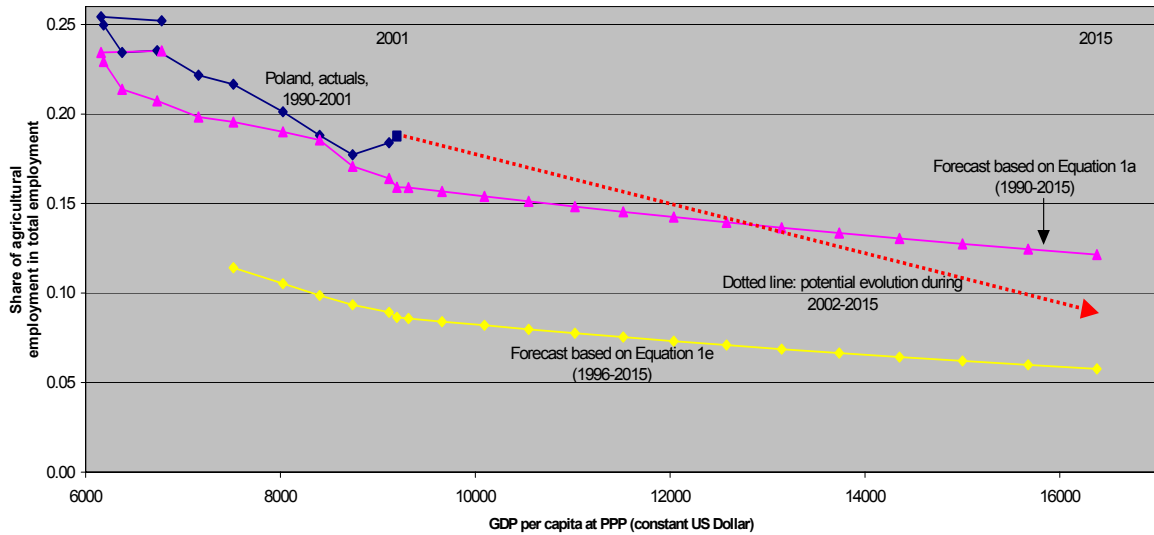
1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.
Source: Own calculations.

Figure 4b
Adjustment path of the Employment Share of Agriculture in Romania:
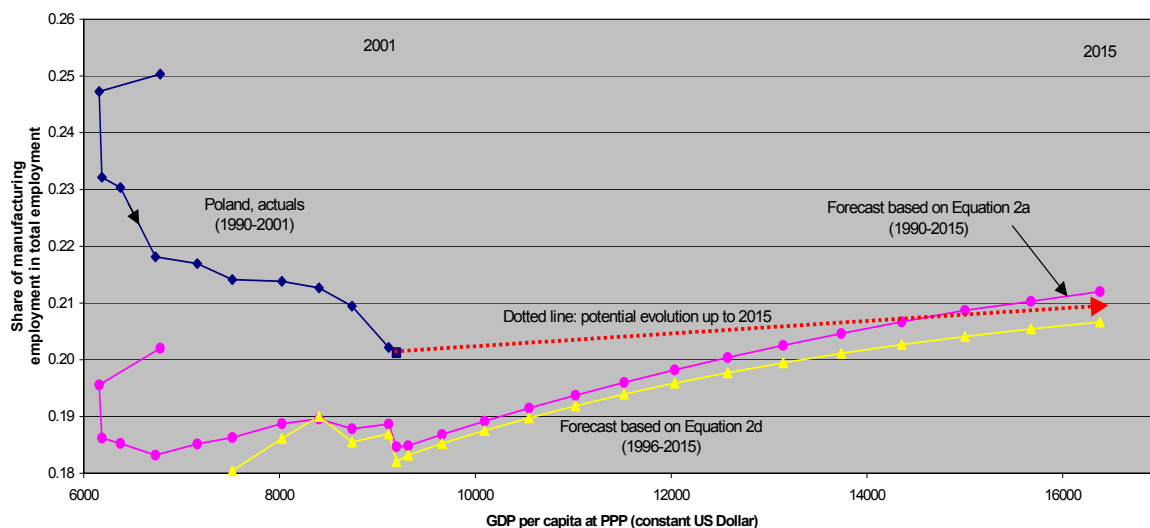**Actuals and Forecasts 1990-2015 1/**
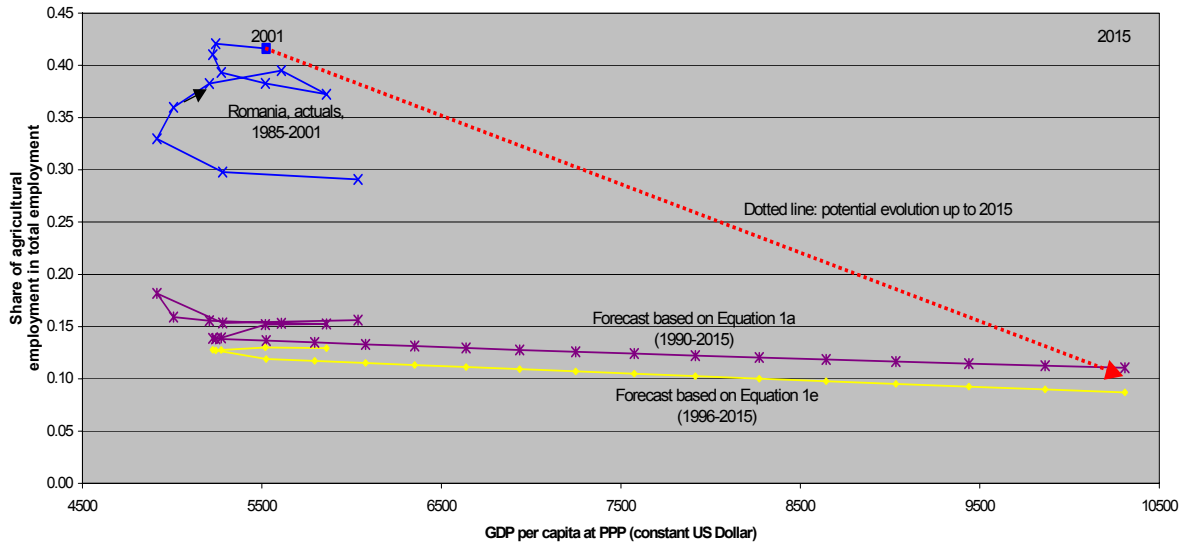
1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions are explained in the text.
Source: Own calculations.

Figure 4c
Adjustment path of the Employment Share of Manufacturing in Estonia
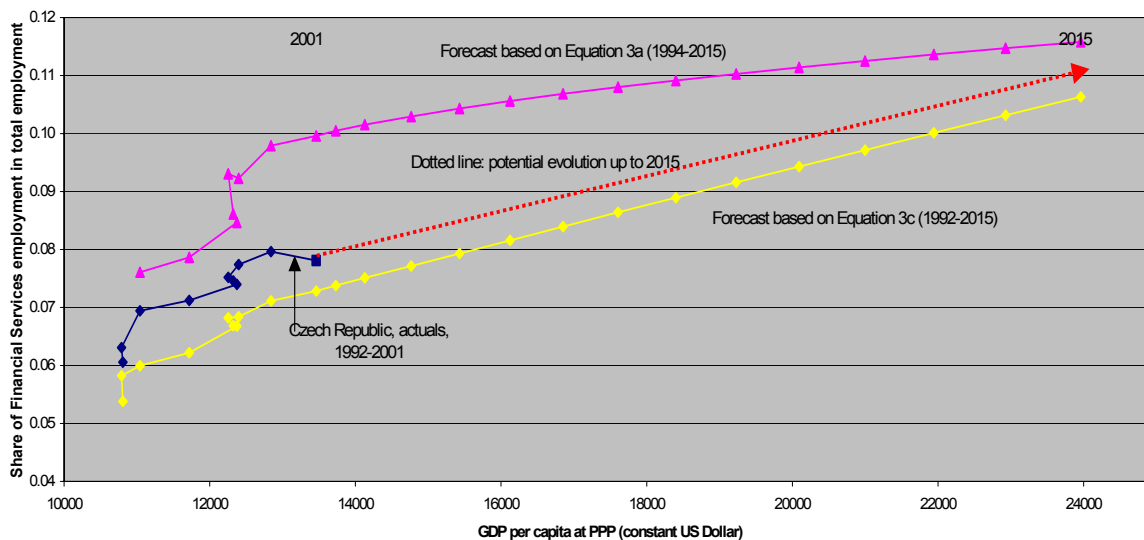**Actuals and Forecasts 1993-2015 1/**

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 4d
Adjustment path of the Employment Share of Manufacturing in the Czech Republic:
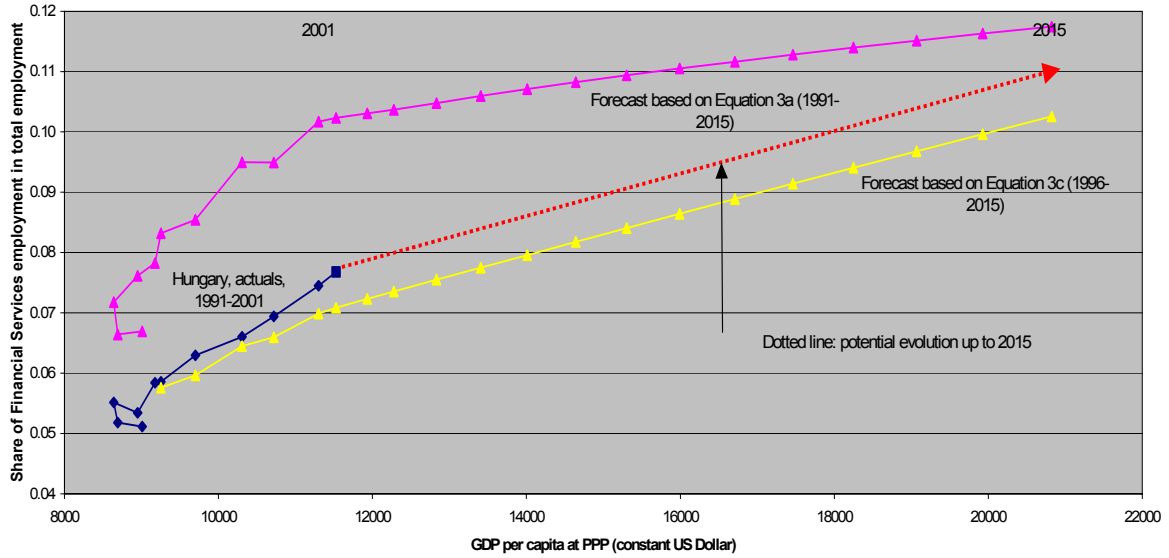**Actuals and Forecasts 1993-2015 1/**

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.

31

Figure 4e
Adjustment path of the Employment Share of Manufacturing 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.

Figure 4f
Adjustment path of the Employment Share of Financial Services, Real Estate, and Related Services in the Czech Republic: Actuals and Forecasts 1992-2015 1/
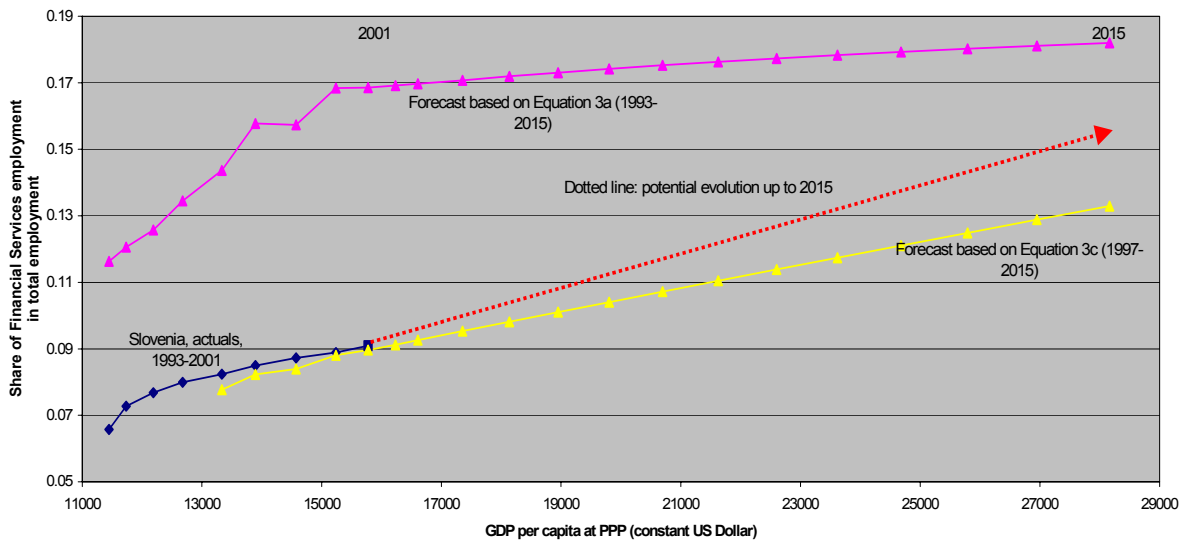

1/ The last available year 2001 is indicated by a square. The lines show the evolution of the employment share with each dot representing one consecutive yearly observation until 2015 in the ex-ante forecasts. The latter assume annual per capita real GDP growth of 4.5% starting in 2004. Additional assumptions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

Figure 4g
Adjustment path of the Employment Share of Financial Services, Real Estate, and Related Services in Hungary:
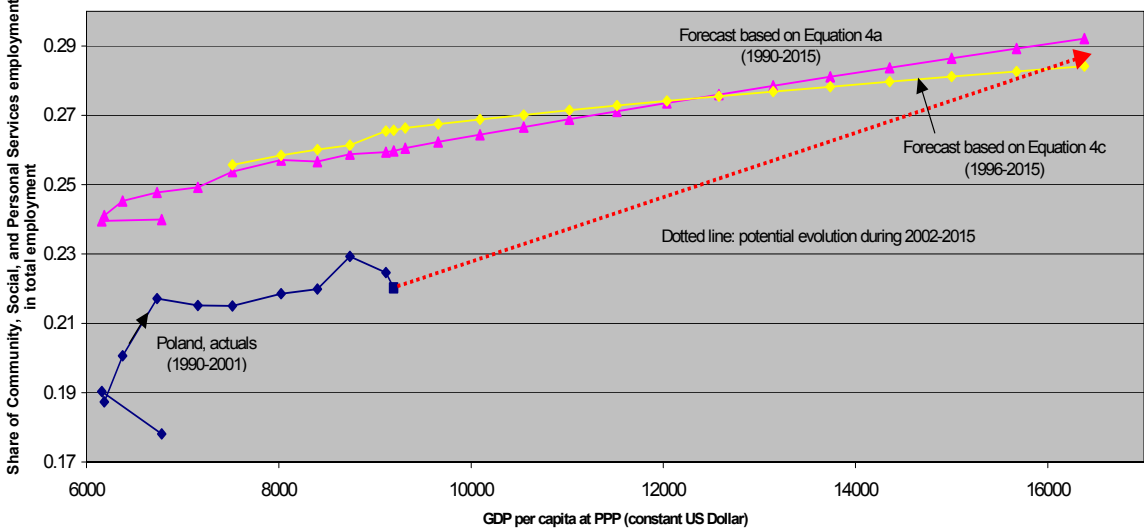**Actuals and Forecasts 1991-2015 1/**

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 4h
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.

33

Figure 4i
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.