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Conference Paper

Industrial Specialisation and Productivity Catch-Up in CEECs - Patterns and Prospects

43rd Congress of the European Regional Science Association: "Peripheries, Centres, and Spatial Development in the New Europe", 27th - 30th August 2003, Jyväskylä, Finland

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Stephan, Johannes (2003) : Industrial Specialisation and Productivity Catch-Up in CEECs - Patterns and Prospects, 43rd Congress of the European Regional Science Association: "Peripheries, Centres, and Spatial Development in the New Europe", 27th - 30th August 2003, Jyväskylä, Finland, European Regional Science Association (ERSA), Louvain-la-Neuve

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Industrial Specialisation and Productivity Catch-Up in CEECs

- Patterns and Prospects -

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Abstract

This paper establishes an empirical model of CEEC's industrial labour productivity growth determined by patterns of specialisation in manufacturing industries and the extent of backwardness. This model is then applied to predict potentials of productivity growth and prospects of productivity catch-up in two distinct scenarios of structural adjustment in EU accession states.

The predictions suggest that productivity catch-up will at the very least take more than two decades with Slovenia and the Slovak Republic arriving first. The Czech Republic and Hungary share similar catch-up prospects slightly more favourable as compared to Poland. The results for Estonia are bleak.

JEL: P, O

Keywords: Manufacturing industry, structural change, productivity growth, productivity gap, transition economies, catch-up

Introduction - Motivation of analysis

More than a decade since systemic change, the most advanced EU accession economies in Central East Europe (CEECs) are today well integrated into the World market in general and the European one in particular. Between industrial producers in East and West, significant production networks have evolved, not least in the form of foreign direct investments. A largely liberalised foreign trade between EU accession candidates and member countries as well as the geographical proximity between western and eastern producers and customers suggest vivid technology transfer from West to East. The high level of industrial experience in the East inherited from their industrialised past allows technology transferred from the West to be readily implemented in production in the East.

Since EU accession countries have overcome their transformational recession, labour productivity growth in CEECs' industrial sectors has impressively outpaced growth in the West. Non-the-less, large gaps between labour productivities in the two integrating regions still persist and the question arises as to what the individual country's prospects for productivity catch-up are, judged from the conditions prevailing today.

To provide an account of catching up potentials and prospects in accession candidates, the analysis focuses on the respective patterns of specialisation in the manufacturing industries of the countries assessed. The assumption is that industrial structures having emerged in the course of the process of real economy integration can explain the previous records of productivity growth and that future structural patterns can likewise determine the accession country's prospects of productivity catch-up: patterns determine prospects.

In empirical research on transition economies, this is a largely underdeveloped field despite its clear relevance, especially for the assessment of future EU structural and cohesion policy in newly admitted members.

Data and methods

Empirical analysis of industrial structures is very sensitive to the data used and the methods applied. In order to allow comparability of results across the countries assessed, most data is taken from the EUROSTAT databases: here, statistics are harmonised and allow a high level of comparability across countries. The downturn of this source is that available data is not very up-to-date: the analysis can only draw upon statistics up to the year of 1998 for 3-digit data and 1999 for 2-digit data. Some of the missing data was complemented by OECD and official national statistics. Levels of industrial labour productivities are calculated as the ratio between the sum of value added in the industrial branches of manufacturing per number of people working in these branches. Labour productivities are not corrected for the intensity of use of factors (as *e.g.* hours worked by employment), as comparable estimates for this do not exist - comparability of results across the countries analysed is deemed more important in this analysis.

The level of disaggregation in empirical studies depends on the availability of data¹: our analysis uses 2 digit NACE data for value added and employment to calculate branch productivities, and 3 digit NACE data of employment shares or, where such is not available, value added shares for the classification of branches into the taxonomy for specialisation.² In the cases of Poland and Estonia, classification into the taxonomies was carefully done with 2-digit employment figures, as here a lower level of disaggregation was not available. Of course, the price to pay was that some overlapping of branches belonging to more than one class had to be dealt with in a case-by-case manner. Exchange rates are corrected by purchasing power estimates, as we expect the currencies of CEECs to be in general rather undervalued *vis-à-vis* the EU - living expenses are clearly lower.³

1 The economic intuition behind ‘patterns and prospects’

This research is devoted to an attempt to quantify future potentials of real economy catching up for each EU accession state by use of the information conveyed by economic structures. An empirical model is developed to determine the typical relationship between economic structures and productivity growth by use of experience gathered from previous cases of real economy integration in West and East Europe. A projection of future growth potentials can best be developed at the meso-level of manufacturing industry: here, patterns of specialisation can be assessed in terms of existing comparative advantages and we can safely assume that each country will retain its country-specific features into the short to medium term future.

This is why, from a theoretical perspective, the notion of specialisation patterns and path depend development can be applied with much more confidence here as compared to the sectoral level: depending on what resources in an economy integrating with another is relatively more abundant in supply (and hence available at a lower price), will the manufacturing industry of this economy specialise on production that uses this resource most intensively. Both integrating partners adjust in terms of relative sizes of manufacturing branches to match those comparative advantages. With integrating partners being able to focus on their own strengths, their aggregate production after integration will be higher. The beneficial effects from integration will hence be largest, where patterns of scarcities and abundancies are most complementary, and hence allow a deep level of specialisation, of division of labour.

¹ This not only applies to CEECs. The EUROSTAT Cronos database on western European countries is in some cases just as incomplete. Not only is national production-related or employment data often not yet harmonised. Data at a level of disaggregation of below the 2 digit NACE level is often perceived as being too imprecise by national statistical offices to warrant their publication.

² Of course, shares calculated by employment figures will yield somewhat different results than shares calculated by value added figures. This is due to the fact that levels of productivity differ between classes of manufacturing branches.

³ This correction is to allow international comparison and is not motivated by the expectation of long-term convergence of prices and exchange rates (as in the purchasing power parity concept of some exchange rate theories).

Of course, potentials for future productivity growth depend on a multitude of factors existing today and evolving over time. However here, we assume that structural patterns of branch-specialisation contain the necessary critical amount of information needed to assess manufacturing productivity catch-up. In a way, this assumption allows us to use structural patterns as an umbrella, catching most of the explicit determinants of productivity catch-up. In short: patterns determine prospects. The assumption can be backed by a number of stylised facts:

- Manufacturing branches' productivity levels not only differ across branches in the same country, the same branches across different countries also exhibit comparable deviations from the respective countries' average: each branch typically uses different techniques and technologies in the production of value added that correspond to the respective type of product/production. Hence, in a developed manufacturing sector, each branch achieves a branch-specific productivity level, giving rise to a 'system of relative productivity levels'.

In particular, both in West and East Europe, the manufacturing branches of *e.g.* 'textiles and textile products', 'leather and leather products', and 'furniture and recycling' typically exhibit productivity levels well below the national average for total manufacturing. Branches like 'coke, refined petroleum products and nuclear fuel', 'chemicals, chemical products and man-made fibres', and 'transport equipment' on the other end of the spectrum are typically situated at the top of the list of branches with respect to their relative productivity levels in total manufacturing. The branches listed at the bottom range of branch-specific productivity levels are typically associated with a high labour intensity and are rather less demanding on the qualification of personnel, whereas branches listed at the top of the range are typically characterised as being more technology and knowledge-driven. In accession countries, this categorisation was less pronounced at the outset of integration, but with relative prices adjusting and due to the transfer from West to East of new production techniques and product technologies, the ranking of relative branch-specific productivity levels there became more comparable to the ranking in the West (and hence more pronounced).

- What is even more, this categorisation also holds in terms of growth of branch-specific productivity levels: the group at the lower margin in accession states typically achieved lower rates of growth of branch-specific productivity levels, whereas the growth rates exhibited in the branches of the second group above also outperformed the average growth rate of all branches contained within the manufacturing sector. Apparently, some branches lend themselves better to swift productivity convergence than other branches.

In some theoretical work, the effects of particular patterns of specialisation have been linked to prospects for catching up development: in Snower (1994), a distinct specialisation on low-skill branches is shown to possibly lead into a development trap.

- From the viewpoint of a manufacturing sector experiencing integration with a more developed economic area, the largest improvements in firm-level productivity can be expected to stem from technology transfer. This includes product and process technology, both in terms of technical advancement and organisational efficiency in the firm, as well as

improvements in the management and marketing of the firm. Technology is not transferred with the same speed and to the same amount across different branches: the decision of a foreign investor in typically labour-intensive branches is based on comparatively lower labour costs, hence not much technology transfer is involved. The opposite applies to branches that are typically more demanding on the qualification of personnel: to operate machinery of higher technological sophistication, personnel has to supply some minimum qualification. In branches that are marketing driven, competitiveness critically depends on factors other than technology. Investors in such branches, whether foreign or domestic, will focus on the market rather than the technological advancement of the production process. Again, the scope for technology transfer is hence limited.

On the contrary, in branches where competitiveness depends on sophisticated technology, an investor in a less developed country will strive to implement as much of the more developed foreign technology as the host country is able to absorb. Such branches will be the main channels for technology transfer, and a country with particularly strong investment activity in such branches can expect to catch up more swiftly: *i.e.* branches which can benefit most from technology transfer will also have the largest productivity growth potentials. In total: the larger the share of more sophisticated branches, the larger the base for productivity growth potentials in total manufacturing in the future.

Of course, the notion of branch-specific productivity levels and of branch-specific potentials for future productivity catch-up are assumptions that have so far not been tested empirically. Further support in favour of these assumptions can only be derived from field studies which are amongst the objectives of other research conducted in the project.

Accepting those assumptions, we can, already at this high level of aggregation, generate an intuition for which accession country's manufacturing sector could be expected to contain the largest potentials, hence to catch up the fastest and which might be expected to consume more time. To generate a more reliable and quantifiable picture of respective productivity growth potentials in manufacturing sectors of accession countries, we develop a simple empirical model that essentially takes a production (supply-side) viewpoint of manufacturing industries. The model aims to quantify the potential for average manufacturing productivity growth determined by the particular composition of the manufacturing sector in relative shares of individual branches (the structural pattern).

2 The empirical model of productivity growth determined by specialisation-patterns and the extent of backwardness

The development of the model proceeds in two steps: first, a generalisable, nomological rule for the relationship between patterns and prospects in manufacturing industries catching up *via* integration is set up by way of a regression analysis. Here, structural patterns and observed productivity growth rates are regressed in a cross-country panel analysis of accession states between 1994 and 1999, a period which characterises the time of gradual real economic integration. To add credibility to the model, further experience with real integration of Portugal, Greece and Spain was considered for the years between 1973 and 1985. That period

corresponds to the decade or so prior to complete real integration, as manifested by full EU membership. Of course, the amount of experience considered in the development of this model is still limited, hence generalisability is also restricted. Moreover, our model is restricted by virtue of the assumptions made to manufacturing industries catching up to such industries in more developed or even matured market economies *via* real economy integration.

In a second step, scenarios for possible future developments of structural patterns are projected by recourse to the resource-based view, in which integration partners tend to gradually specialise on production in which they can make use of comparative advantages. If we are able to determine the prospects contained in past and existing structures, and if we are able to project future patterns of specialisation, then this model could generate an idea on the prospects of manufacturing sectors of individual accession countries to catch up in terms of productivity (out-of-sample projection).

The description of structural patterns therefore has to bridge a gap between two opposing objectives: on the one hand, the estimation of the relationship between structural patterns and structure-specific prospects improves in terms of robustness with falling levels of aggregation. The more precise the description of a manufacturing branch (*i.e.* the lower the level of aggregation), the more confidence we can have in our assumption that a particular branch can be associated with branch-specific productivity growth potentials. Consider *e.g.* the two-digit manufacturing branch of ‘transport equipment’: it contains several heterogeneous three-digit (sub-)branches, including ‘manufacturing of bicycles’ and ‘manufacture of aircraft’. From a production side perspective, it is plain to see that those two branches will contain quite different potentials for productivity growth.

On the other hand, however, structural patterns at the same time have to lend themselves to a projection of future patterns evolving in the short to medium term. While it is not possible to predict with sufficient confidence the development of relative sizes of every 3-digit manufacturing branch, the development of sizes of classes of branches, grouped by class-criteria that correspond to the resource-based view on structural patterns (comparative advantages), can more robustly be projected.

The model therefore has to strike a good balance between homogeneity on the one hand (low level of aggregation), and predictability of future structural patterns on the other hand (higher aggregation). Such balance can be found in a suitable taxonomy: the new WIFO-taxonomy unambiguously groups together 3-digit manufacturing branches into homogeneous classes: each manufacturing branch is allocated to only one class (*i.e.* classes are free from overlaps) and according to the class-criterion that is best fulfilled by the branch. Typically, each branch will contain some of each of the features which are characteristic of classes, but it forms part of the class for which the branch exhibits the highest proximity to the criterion (cluster analysis). This taxonomy groups manufacturing branches in classes of three dimensions: first, “comparative cost advantages stemming from exogenous and location dependent factors such as relative endowment with capital and labour”; and second, “firm-specific advantages stemming from targeted investment in intangible assets such as advertising and R&D” (Peneder, 1999, p. 10). The third dimension classifies industries according to labour skills (*ibid.*, p. 29-34).

Amongst the most prominent features, manufacturing industries in European transition economies typically share a high intensity of manual work, technology gaps in terms of production and products, and they tend to achieve lower prices in particular for products which are marketing driven. The criteria used in this model hence include ‘labour intensive’ (LI), ‘marketing intensive’ (MI), ‘technology-intensive’ (TI), and ‘low-qualification intensive’ (IQI). The latter category is a cross-sectional one and includes all branches which can be considered to employ mainly less qualified labour, and not included in either of the other classes.⁴

Of course, *a priori*, we do not know the actual sizes of class-specific productivity growth potentials, but intuition can lead us some way to generate hypothesis on the direction of a relationship. The precise relationship is assessed in the first step of the model: manufacturing productivity growth is a function of the structural pattern within the manufacturing sector, corrected by the actual extent of backwardness. The latter is derived from Gerschenkron’s concept of ‘advantages of backwardness’, in which it is assumed that productivity growth will be faster in ‘backward’ countries than in countries at the contemporary technological frontier, as here, the scope for technology transfer is greater.⁵

$$\mathbf{p}^i = f(LI^i, MI^i, TI^i, IQI^i) * PG^{EU/i} \quad (12)$$

This relationship is assessed by way of a cross-country pooled least squares panel regression: The dependent variable, productivity growth \mathbf{p}^i of the manufacturing sector of accession country i , is regressed against the structural pattern described by the shares of classes of labour intensive branches, marketing intensive branches, technology intensive ones, and branches which are intensive in employing low-qualification personnel, and finally the extent of backwardness, proxied by the size of the productivity gap *vis-à-vis* the average EU-15. The model therefore regresses a flow variable against a group of stock variables. The regression was conducted in logarithmical form, so that the estimated \mathbf{b} - values, corrected with the normalised productivity gap, can be interpreted as elasticities. The empirical form of formula 12 then reads:

$$\ln\left(\frac{\mathbf{p}^i}{PG^{EU/i}}\right) = C^i + \mathbf{b}_1 \ln LI^i + \mathbf{b}_2 \ln MI^i + \mathbf{b}_3 \ln TI^i + \mathbf{b}_4 \ln IQI^i \quad (13)$$

The data used in the regression analysis include annual full-time equivalent employment shares of three digit manufacturing branches grouped in the above four classes. In the cases of Poland

⁴ From theoretical experience, we would expect the class of ‘capital intensive’ branches to also be considered. However, this class does not provide a sufficiently homogeneous relationship with productivity growth: in the panel of EU cohesion countries, a correlation analysis suggested a significant positive relationship, whereas in the panel of EU accession countries this correlation was significantly negative. Hence, this class was not considered here.

⁵ Available technology can be implemented via imitation. Backward countries have the advantage of being able to improve their performance without having to invest into own innovations. See Gerschenkron (1962), or product cycle theories. In fact, Landesmann/Stehrer (2002) find evidence for this backwardness-effect in accession candidates.

and Estonia, comparative three digit employment data was not available and had to be estimated by use of (incomplete) national data. In all other accession countries, comparative data was available from EUROSTAT. The sums of shares of all classes in respective countries amount to some 70-90 *per cent* of total manufacturing employment. The remaining employment not considered could not be classified into either of the four classes and are mainly employed in capital intensive branches.

The annual rates of growth of manufacturing productivity and the productivity gaps between individual accession countries and the average EU-15 were calculated by use of EUROSTAT data on value added and employment in manufacturing sectors. In the case of productivity growth, some adjustment of data was necessary: Hungary experienced a near-crisis in 1995, the Czech Republic did in 1997. Those crises and associated reductions in value added growth (and hence also in productivity growth) are independent of structural patterns and clearly exogenous to our model. The productivity gap correction factor was normalised to one and takes values smaller than one for backward countries.

In all accession countries, three year moving averages of data were used to iron out the largest fluctuations which were particularly strong for productivity growth rates. In line with the assumed model, the regression was restricted to estimate a common constant for all countries: despite possible country-specific conditions, the model is geared towards determining the relationship between the structures and productivity growth of an integrated, yet still backward manufacturing sector regardless in which country.

3 The results of the pool-regression analysis

The results of this regression exercise confirm the expected directions of relationships between classes and manufacturing productivity growth (see table 1): in fact, a larger share of labour intensive branches is associated with lower productivity growth rates for the whole manufacturing sector, the same sign appears for marketing driven branches and low-qualification branches. Only in the case of technology-intensive branches would larger shares result in higher productivity growth rates.

Table 1 Results of the regression analysis

Variable	Coefficient	t-Statistic
C	8.09 (*)	6.48
LI	-0.39 (*)	-2.31
MI	-1.62 (*)	-5.71
TI	0.50 (*)	2.96
IQI	-0.66 (*)	-4.01

Note: Included observations: 12; total panel: $n = 72$; $R^2 = 0.71$ (*), adjust. $R^2 = 0.69$ (*).
All results are significant at least at the 5 *per cent* error probability.

The highest elasticity of changes to the structural pattern turned out to concern the group of marketing-intensive branches: if, in a given manufacturing sector, the share of such branches were to grow by 1 *per cent*, total manufacturing productivity growth would turn out to be 1.6

per cent lower as compared to the period before that structural change. The lowest elasticity is recorded for labour intensive branches with 0.4.

The first indication of the quality of the regression model is provided by a comparison of estimated manufacturing productivity growth rates (inner-sample) and observed values. In fact, some deviation exists: in the case of Poland and the Czech Republic, observed growth rates exceed estimated rates by some 18 to 19 *per cent*, and in the case of Slovenia, the cumulated rates of growth between 1994 and 1999 calculated by use of the regression results exceed observed rates by some 1.7 percentage points, or some 20 *per cent*. Deviations in the other countries are much lower from 5 to 10 *per cent*.

4 Medium-term prospects for productivity growth and catch-up

This allows us to use the results for the second step of the projection exercise. Future structural patterns are calculated in four different scenarios. The first, scenario A, represents what the resource-based view on specialisation would suggest: past trends in structural change between the four classes are extrapolated into the future by way of a logarithmical trend analysis. This assumes that structural adjustment is more intense at the outset of integration and gradually abates with deepening real economy integration. Scenario B assumes that the patterns of specialisation as they have emerged nearly one decade after integration began represent final patterns - no further changes are made to the sizes of class shares here.

Scenarios C and D assume structural convergence scenarios: it is perceivable that in line with technological catching up, the industries of accession countries will engage in the kind of intra-industrial trade typical for the industries of most member states.⁶ In scenario C, the structural patterns of accession states by 2014 converge to the patterns that prevailed in EU cohesion countries some decade after their own individual EU membership. This scenario is motivated by the fact that both groups of countries share common productivity gaps during their respective times of accession, they also share their main comparative advantage of lower labour (unit) costs. Finally, scenario D assumes that structural patterns in accession states will converge to patterns observed today in Germany. Despite the fact that this last version can be held to be the least realistic, it does help to put the results of the other scenarios into perspective. For both convergence scenarios, the convergence paths were estimated by use of a polynomial trend analysis to the power of three.

Table 2 provides an overview of average rates of manufacturing productivity growth projected by the model in each scenario. Charts 1 to 4 plot the resulting developments of manufacturing productivity levels for each scenario in *per cent* levels of the EU-15 average (to estimate future EU-15 average manufacturing productivity levels, a constant annual rate of growth of 2.77 *per*

⁶ For an assessment of structures in trade between the industries of EU accession and members states, refer to Gabrisch / Segnana (2001). The results however do not suggest structural convergence. Rather, a distinct pattern of vertical intra-industrial trade emerging between East and West would indicate the emergence of distinct specialisation patterns across the criterion of product quality (interpretable in the framework of the product-cycle concept).

cent was applied; this rate corresponds to the observed average growth rate in the period 1994 to 1999).

The most important results to be highlighted pertain to scenario A, because, according to the resource-based concept, this is the most likely outcome of structural adjustment. If structural trends of the past were to persist into the short to medium term future, then Poland is projected to achieve the lowest manufacturing productivity growth with on average 3 *per cent* over the period 2000 to 2014. The Slovak manufacturing sector on the other extreme is projected to achieve the highest productivity growth rates averaging 8.4 *per cent* per year. In the framework of our model, we can conclude that the potentials for catching up in terms of manufacturing productivity are lowest for Poland and highest for the Slovak Republic. Prospects in Estonia with projected annual growth rates of some 4 *per cent* are only slightly better than in Poland, catching up would still be extremely slow considering that the manufacturing productivity level of the EU-15 average is a moving target with assumed growth rates of 2.8 *per cent* per year. The Czech Republic is projected to catch up with annual average rates of 5.8 *per cent*, and Hungary and Slovenia with annual rates averaging some 6.6 *per cent*.

Table 2 Projected manufacturing productivity growth rates in accession candidates, between 2000 and 2014

	Scenario A	Scenario B	Scenario C	Scenario D
Estonia	4.0	3.7	3.9	8.4
Poland	3.0	3.3	3.5	7.5
Czech Republic	5.8	5.5	4.1	7.7
Slovak Republic	8.4	7.0	4.7	8.4
Hungary	6.6	5.6	4.2	7.8
Slovenia	6.6	6.0	4.2	7.2
EU-15	2.8	2.8	2.8	2.8

In terms of potentials of catching up to EU-15 levels, the model suggests that the Slovak Republic could reach 75 *per cent* of the EU-15 average manufacturing productivity level as early as by the year of 2007 (see chart 10). Because Slovenia already achieved the highest productivity levels, growth rates of only 6.6 *per cent* per year would suffice to let the country's manufacturing sector catch up to 75 *per cent* of the EU-15 average already by 2005. Hungary is projected to reach that threshold some time around 2011 and the Czech Republic around 2014. Prospects for catching up as projected by our model are bleak for Poland and Estonia.

The comparison of results for scenarios A and B provides another interesting insights: were structures to remain at their patterns of 1999, then our model would actually project slightly higher growth rates in Poland as compared to the scenario in which past structural change describes a trend into the future. In fact, this would suggest that structural adjustment in Poland appears to, in our model, dampen future prospects of the country to see its manufacturing sector catch up in terms of productivity. For all other countries, assumed future structural adjustments in manufacturing sectors result in our model in accelerating productivity growth rates: here, the direction of structural adjustment so far improved the countries' prospects for high future productivity growth rates.

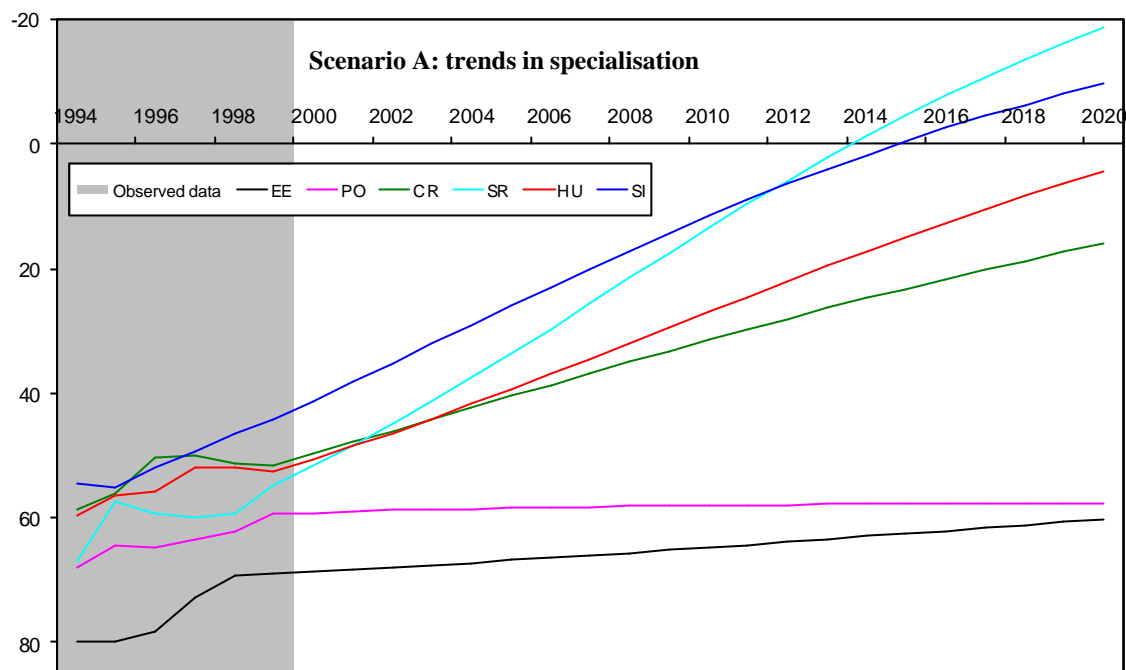


Chart 1 Projected development of productivity gaps in scenario A in per cent of the average EU-15 level, 2000 - 2020

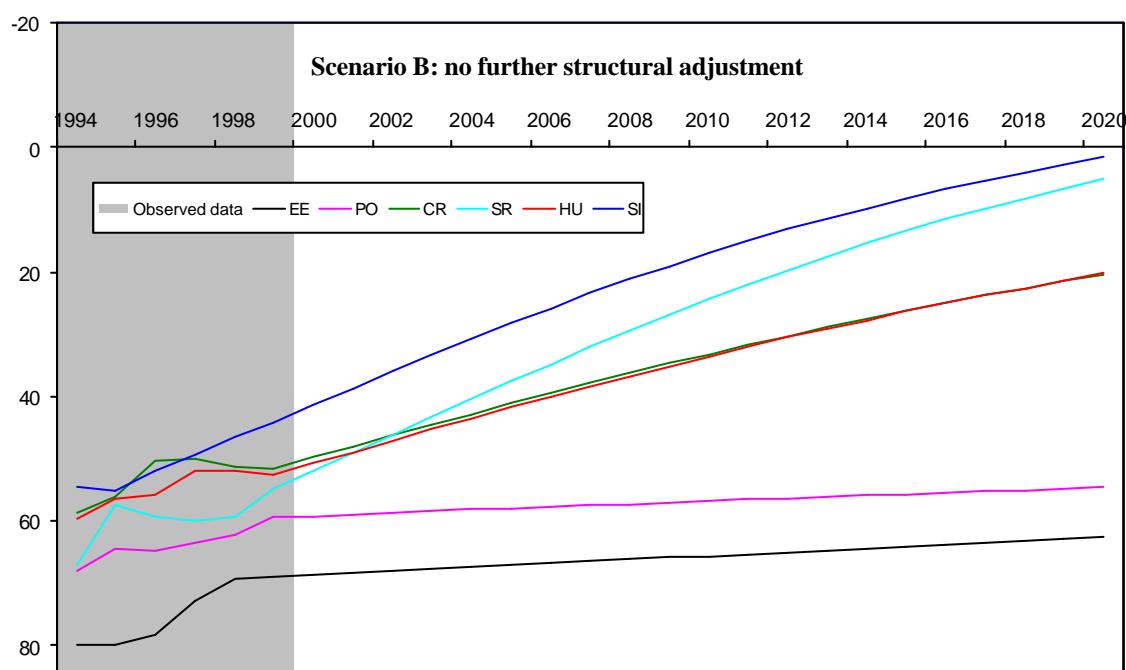


Chart 2 Projected development of productivity gaps in scenario B in per cent of the average EU-15 level, 2000 - 2020

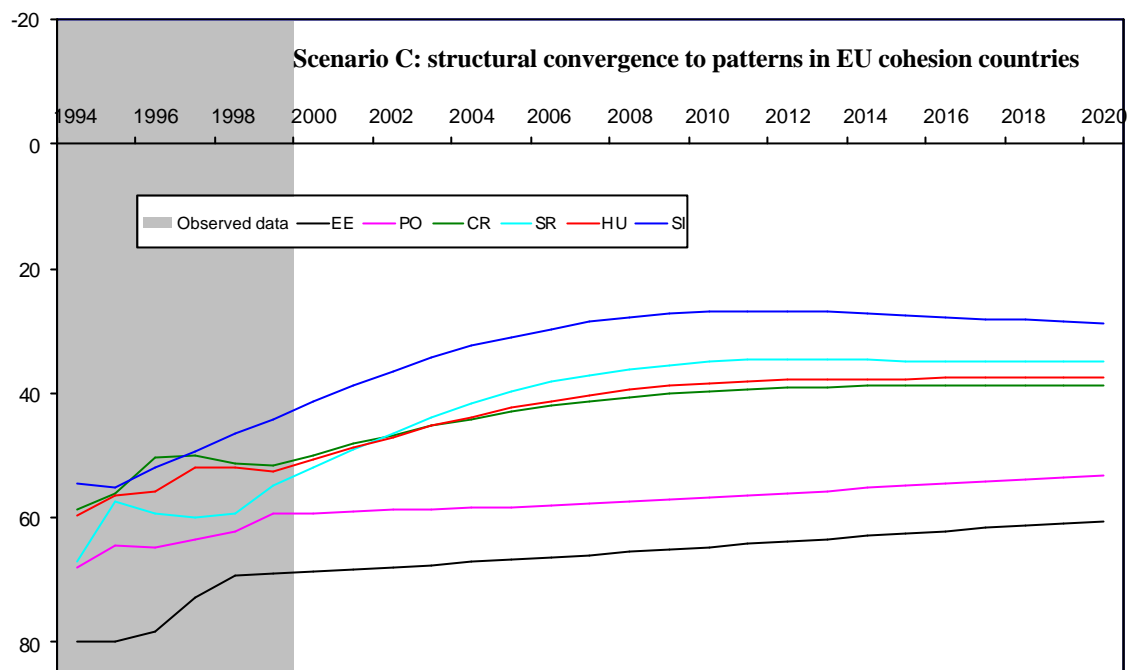


Chart 3 Projected development of productivity gaps in scenario C in per cent of the average EU-15 level, 2000 - 2020

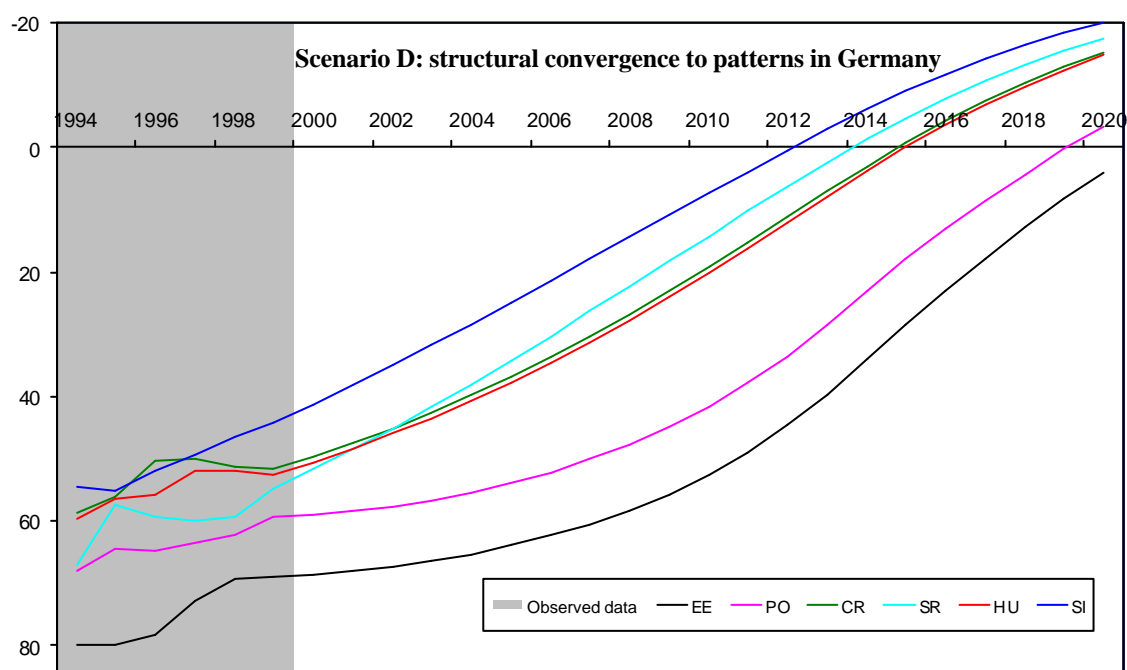


Chart 4 Projected development of productivity gaps in scenario D in per cent of the average EU-15 level, 2000 - 2020

Between all scenarios, projected growth rates are highest in the ‘convergence to Germany’ scenario D. This is not surprising, because in particular technology-intensive branches exhibit much smaller shares in accession countries as compared to the German pattern: the shares of technology intensive branches would grow at the expense of all other branches, in particular low qualification branches. Only in the case of the Slovak Republic are rates for scenario D not higher than in other scenarios, which is of course due to the fact that past trends let structural patterns in the Slovak Republic come closer to the ones in Germany, extrapolation of past trends already describes a path of structural convergence. The countries that would benefit most in terms of our model here from structures converging to such in Germany would be Estonia and Poland. In both countries, the projected rates of manufacturing productivity growth would more than double in size. Subsequently, projected trajectories of productivities in accession candidates allow much faster closure of gaps in this scenario: all accession candidates of our sample are projected here to exceed the 75 *per cent* threshold within our period of analysis. All countries assessed with the notable exception of Estonia are projected to catch up completely by 2020, Estonia only a couple of years later.

Also of little surprise are the results for scenario C, the ‘convergence to cohesion countries’ scenario: all countries (bar Poland) are projected to achieve lower rates of manufacturing productivity growth if structural patterns of today were to converge to patterns that prevailed in EU cohesion countries some decade after their own individual membership in the European Union. Apparently, structural patterns in accession candidates are already, in terms of our model, more preferable than in cohesion countries after most profound structural adjustments *via* integration were complete there. Only in the case of Poland would a delinearisation of structural patterns to the ones in EU cohesion countries lead to higher projected growth rates. The projected development of productivity gaps in chart 12 hence imply stagnation for all countries except for Estonia and Poland, where some moderate catching up could still take place.

Conclusions

This analysis attempted to estimate future productivity growth potentials and prospects of productivity catch-up in the manufacturing industries of EU accession states. An empirical model was estimated, using structural patterns and the extent of backwardness (in terms of the size of the productivity gap vis-à-vis the EU-15 average) as determinants of productivity growth. The results are presented for two scenarios with distinct assumptions concerning structural adjustment in the process of deepening integration and intensifying competition.

In such a methodological framework, the empirical model established significant differences in productivity growth prospects amongst the group of most advanced EU accession candidates: the prospects are clearly best for the Slovak Republic, and in particular even better than in Slovenia. Starting from a lower level as compared to Hungary, the Czech Republic and Poland, the Slovak Republic is predicted to surpass those countries in their catching up processes. This is especially pronounced in the first of the two scenarios, assuming the emergence of a distinct pattern of specialisation between EU accession and member states.

The worst productivity potentials and prospects are predicted for Estonia. Estonia not only starts from the lowest level of labour productivity in 1999, but its structural composition of manufacturing industries and the associated trends also grant the country the lowest estimated productivity growth rates. Poland also performs poorly in both scenarios of the estimated model. The Czech Republic is predicted to perform better, however clearly worse than Hungary.

If patterns of industrial structures in manufacturing determine potentials for industrial labour productivity growth and if structural patterns up until 1998 determine a trend of specialisation within the common integration area which can be extended into the future, i.e. if patterns, or more precise: trends, exhibit hysteresis, then the empirical model predicts that productivity catch-up in accession states will take much longer than two decades. A productivity level of some 75 per cent of the EU-average is achieved in the case of Slovenia well before 2010, in the Slovak Republic, and Hungary slightly after 2010, and in the Czech Republic around 2018. The conditions prevailing in Estonia and Poland suggest that even a level of 75 per cent will not be reached in this kind of time-frame.

With more data being made available and with the generation of more experience in the real economy adjustment processes of economic transition emerging, the empirical model suggested in this paper will gain in terms of predicting power. Already now, the model is surprisingly robust for most of the countries assessed, lending support to the qualitative results generated.

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