THE PRODUCTIVITY GAP
BETWEEN EAST AND WEST EUROPE:
WHAT ROLE FOR SECTORAL STRUCTURES
DURING INTEGRATION?

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Analysis into the sources of lower levels of national productivities between Central and Eastern European economies and the European Union is scarce and lacks comparability. These sources are assessed by analysing the role played by sectoral structures. After providing a brief overview of comparative levels of economy-wide labour productivity between the EU-15 average, selected EU cohesion countries and the EU accession countries of Estonia, Poland, the Czech and Slovak Republics, Hungary and Slovenia, a quantitative account of the sectoral content of the national productivity gap is calculated. The paper develops a method to calculate the explanatory power of patterns of sectoral structures for the size of the productivity gap by hypothetically applying average EU-15 sectoral patterns on Central and Eastern European economies' sectoral productivities. Subsequently, the respective roles of individual sectors in explaining the national productivity gaps are calculated by assigning weights to sectoral productivity gaps relative to their employment shares. These results are then carefully assessed in terms of potentials and prospects for swift and complete productivity catch-up and in terms of the most efficient policies to assist productivity convergence.

Keywords: transition economies, economic development, productivity gap, EU cohesion policies, integration theory, sectoral patterns, specialisation patterns

JEL classification index: F15, O11, O57, P27

INTRODUCTION

Since the outset of transformation, Central and Eastern European countries (CEECs) have achieved a profound level of economic integration with Western European countries. Some transition economies can expect to join the European Single Market in a few years time. Levels of economic development in accession candidates are today still much lower than the average EU-15 level, so CEECs access to EU Structural and Cohesion Fund policies will most likely gain.

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The reasons that explain lower levels of economic development do not lie with only technological backwardness, institutional, managerial and organisational deficiencies but are also rooted in the sectoral specialisation patterns of the economies. Sectoral structures play an important role in economic catching up via integration: first, the pattern of sectoral specialisation can explain some of the lower levels of economic development, measured here as productivity gaps *vis-à-vis* the EU-average. Second, assuming some degree of path dependency in sectoral patterns, the emerging international division of labour can limit the prospects of complete catching up: as integration deepens, technology and skills in CEECs will improve, institutions will be reformed to match the ones in the EU (via the *acquis communautaire*) but sectoral structures might remain rigid and limit real economic convergence.

Assuming that deepening integration with the West and potential EU membership does not necessarily have to lead to complete economic convergence in all accession countries, the aim of this paper is to determine the prospects of economic catching up for selected accession countries and to assess the scope of economic policy in improving the conditions for economic development. This is not to deny that integration generally is a necessary condition for catching up in transitional CEECs via technology transfer and efficiency-improving participation in intra-industrial trade and/or specialisation. Rather, integration as a policy measure alone might prove to be insufficient. In its latest report on economic cohesion, the EU Commission takes the opinion that sectoral structures in candidate countries will prove to be decisive in the process of real economic convergence (EU 2001b, pp. 37–41). The report suggests to target EU cohesion policies towards the intermediate aim of structural change.

The approach used in this analysis is methodologically more deterministic than most related research into the structural development of CEECs (e.g. Gács 2001).[1] An example for research providing a normative account of sectoral structures by using the Clark-concept of close correlation between *per capita* GDP levels and sectoral specialisation patterns is Döhrn and Heilemann (1991, 1993). Here, sectoral differences determine the intensity and direction of future sectoral adjustment.

The selection of accession countries – in geographical order – includes Estonia, Poland, the Czech Republic, Slovakia, Hungary and Slovenia. These countries seem to be amongst the most likely candidates for EU membership in the

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[1] Here, structural patterns are compared to the ones existing prior to transition and the ones prevailing in the EU today. The analysis does not determine what patterns or what direction or what intensity of change are normatively better or worse for the process of economic catching up.

coming years. The period of analysis starts in 1995 (by then, the most profound structural breaks in prices and the allocation of employment had already taken place) and ends in 1999 with the latest comparative data available for the selected countries. For empirical reasons, this paper studies labour productivity and disregards the productivities of other factors of production, such as e.g. capital. Moreover, modernisation of the capital stock is still under way, making year-on-year comparisons difficult. This is not to neglect that an analysis of capital productivity and total factor productivity could lead to slightly different results, especially when transition countries reach higher levels of economic and technological development.

The paper first provides a brief overview of comparative levels of national productivities between the EU-average, selected EU cohesion countries and accession countries. The focus is then on the role played by sectoral structures: first, an indicator is developed to quantify the explanatory power of patterns of sectoral structures for the size of the productivity gap. Following from there, the effect of the individual sectors on national productivity gaps is calculated. These results are carefully assessed in terms of potentials and prospects for a swift and complete catching up of productivity and in terms of the most efficient policies to assist productivity convergence.

1. THE STYLISED FACTS – THE OBSERVED PRODUCTIVITY GAP

Within the past decade, national levels of labour productivity in CEECs (in the following: productivity levels) have converged towards the levels predominant in the EU. Yet, the CEECs' levels are still significantly lower, large gaps are still prevalent.

Table 1 shows productivity levels in €1000 for 1999, calculated at annual average market exchange rates as well as at PPP-corrected exchange rates. All countries indicated have lower living expenses than the EU-15 average, hence the significantly higher figures for PPP-adjusted levels.[2] In 1999, three groups of countries amongst CEECs could be identified with similar productivity levels: Estonia and Poland rank in the lowest productivity group, Slovakia and the Czech Republic as well as Hungary in the second and Slovenia sticks out as the country

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2 In international comparative analysis, such PPP-correction is advisable. This, however, must not be confused with the concept of the purchasing-power-parity theory but is purely a method to improve comparability and is used throughout the literature. In the case of the EU, the EUROSTAT Power Purchasing Standard has been applied; for the CEECs, the PPP-estimates of WIIW were used.

with the highest productivity level. At the outset of economic transformation and integration into Western markets, productivity levels were not only much lower but also more diverse. Slovenia had always achieved higher productivity levels even before 1990; its advantage compared to its fellow accession candidates has increased even further. Throughout the 1990s, productivity levels of Hungary and the Czech Republic were more or less the same, albeit Hungary grew at a slightly faster rate. Ever since the break-up of Czechoslovakia, Slovakia's productivity level remained slightly lower than that of the Czech Republic and Hungary. Estonia started from a low level but managed to overtake Poland in 1997.

All transition economies in our sample exhibit sizeable productivity gaps *vis-à-vis* the EU-average and most of the 15 European economies (last column of the table). All of them have already surpassed Portugal, the EU member country with the lowest national productivity level. Only three, the Czech Republic, Hungary and Slovenia, command higher levels than Greece, the second poorest performing EU member country. As compared with the EU-15 at the end of 1999, Slovenia reaches more than 70%, Hungary, the Czech Republic and Slovakia more than 55% and Poland and Estonia more than 40% of the EU-average.

The comparison of CEECs with East Germany is of particular interest. This region is in effect also a transition economy. However, East Germany was inte-

Table 1

Productivity levels in the EU and the CEECs (end of 1999)

	Market exchange rates	PPP-exchange rates	
	€1000 per employees		as a % of EU-15
EU-15	41.8	41.8	100.0
East Germany	36.0	36.9	88.3
Portugal	9.8	15.1	36.1
Greece	18.4	23.7	56.7
Spain	26.1	31.9	76.3
Estonia	7.6	17.8	42.6
Poland	8.2	17.4	41.6
Czech Republic	9.8	24.0	57.4
Slovakia	8.3	22.6	54.1
Hungary	10.2	23.9	57.2
Slovenia	19.5	29.9	71.5

Note: Aggregate, economy-wide productivity levels calculated as aggregate value added per employment.
Sources: EUROSTAT, WIIW, National Statistical Offices, own calculations.

grated into the ESM and the currency-area of the West German DM already in 1990. Moreover, East Germany was integrated into the German *Länder-finanzausgleich*, a system of re-distribution of revenues to support poorer *Länder* from the budget of more prosperous ones. The country (or rather region) therefore gained access to a stable currency, a stable institutional framework and vast financial resources for investment and restructuring; these were not available in fellow transition countries. East Germany was able to nearly close up to the EU-15 productivity level within only a few years while catching up in other transition countries is generally expected to take more time. In the latest EU report on accession countries (EU 2001a), it is assumed that Poland will converge to 75% of the average EU-15 level in 33 years, Slovakia in 20, Estonia in 19, the Czech Republic in 15, Hungary in 11 and Slovenia in 1 year.

2. SECTORAL DETERMINANTS OF THE PRODUCTIVITY GAP

The reasons behind the significantly lower levels of productivity in the CEECs as compared with many EU member states are manifold. They include lower levels of technology, a less developed institutional framework, lower intensity and quality of organisational as well as management expertise and the patterns of specialisation in the international (mainly European) division of labour.[3]

Intuitively, the productivity gap between the CEECs and the EU predominantly reflects the fact that the transition economies use less sophisticated technologies, in quantity and/or in quality. Indeed, there can be little doubt that firms in CEE, on average, apply less or lower levels of technology as compared with the West and hence exhibit lower levels of productive efficiency in the use of factors at firm level. Nevertheless, there are already some firms, which, by having invested into the latest technology or having benefited from the transfer of the latest technology from the West, can even outpace comparable firms of the West in terms of productivity. Technology levels or even technological development in the CEECs are very difficult to grasp in terms of empirical statistical analysis[4] directly. The focus of this paper is on sectoral structures: first, the sectoral analysis

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[3] In this respect, a three-year research project, which concentrates on the same sample of countries and their determinants of the productivity gap relative to the EU, studies all these reasons. The project is co-ordinated at the IWH. Results and proceedings will be made available to the scientific community on the project web-page at www.iwh-halle.de/projects/productivity-gap.

[4] Earlier attempts to calculate technological advance in CEECs by using the *growth accounting* method, based on the estimation of a production function, proved to be insufficiently robust. Not least, available data for capital stocks from national statistical offices were at times dubious and certainly not comparable (Stephan 1999).

presented here identifies the extent to which national productivity gaps are rooted exclusively in sectoral specialisation patterns. If such patterns reflect comparative advantages, i.e. if some degree of path dependency can be assumed, then those results will give account of the extent of future productivity convergence to be expected in each accession country. Second, structural analysis yields a quantitative account of the respective roles played by individual sectors in determining the national productivity gap and its development. Such insight is indispensable when assessing efficiency of economic-policy options that aim at assisting swift convergence of national productivity levels according to the cohesion approach taken by the EU Commission (see EU 2001b).

2.1. Specialisation and the sectoral content of the productivity gap

Transformational recession and restructuring with the fall in industrial output accompanying it, as well as the high employment shares of agriculture and low shares of services in the CEECs suggest that the productivity gap is somewhat rooted in the sectoral patterns of transition economies. In the assessment of the EU Commission, the productivity gap can mostly be explained by diverging structural specialisation patterns (EU 2001b). Gaps of average national productivity levels between two countries can arise even if all respective sector-specific productivity levels are equal, i.e. even if technology levels have caught up and corresponding firms would be equally productive. One country achieves a higher level of productivity, if it has higher (employment) shares in sectors with intrinsically higher levels of sectoral productivity relative to other sectors. This is the essence of sectorally determined productivity gaps.

What is the extent to which the productivity gaps of individual CEECs *vis-à-vis* the EU-15 average are rooted in the respective sectoral pattern? The average, national productivity level π of a country is defined as the sum of each product of sectoral productivity levels π^i and employment shares α^i of sectors i:

$$\pi = \sum_i \left(\pi^i \alpha^i \right) \tag{1}$$

The productivity gap between an individual country in CEE and the average EU-15 level $\overline{\pi}_{CEE/EU}$ is then calculated as:

$$\overline{\pi}_{CEE/EU} = \pi_{EU} - \pi_{CEE} = \sum_i \left(\pi^i_{EU} \alpha^i_{EU} \right) - \sum_i \left(\pi^i_{CEE} \alpha^i_{CEE} \right) \tag{2}$$

The sectorally determined productivity gap $\overline{\pi}_{\text{CEE/EU}}^{\text{Sectoral}}$ can be quantified by comparing the actually observed productivity gap with a hypothetical gap which would emerge if sectoral patterns between CEECs and the average EU-15 would be equal (note the use of EU-15 employment shares in the first term of the right side of equation 3.2):[5]

$$\overline{\pi}_{\text{CEE/EU}}^{\text{Sectoral}} = \overline{\pi}_{\text{CEE/EU}}^{\text{Hypothetical}} - \overline{\pi}_{\text{CEE/EU}}^{\text{Observed}} \tag{3.1}$$

$$\overline{\pi}_{\text{CEE/EU}}^{\text{Sectoral}} = \left(\sum_i \left(\pi_{\text{EU}}^i \alpha_{\text{EU}}^i \right) - \sum_i \left(\pi_{\text{CEE}}^i \alpha_{\text{EU}}^i \right) \right) - $$

$$- \left(\sum_i \left(\pi_{\text{EU}}^i \alpha_{\text{EU}}^i \right) - \sum_i \left(\pi_{\text{CEE}}^i \alpha_{\text{CEE}}^i \right) \right) \tag{3.2}$$

This sectoral productivity gap is then related to the total of the observed productivity gap to show the percentage share of the sectoral content in the national productivity gap (equation 4):

$$\widetilde{\pi}_{\text{CEE/EU}}^{\text{Sectoralsh are}} = \frac{\sum_i \left(\pi_{\text{CEE}}^i \alpha_{\text{EU}}^i \right) - \sum_i \left(\pi_{\text{CEE}}^i \alpha_{\text{CEE}}^i \right)}{\sum_i \left(\pi_{\text{EU}}^i \alpha_{\text{EU}}^i \right) - \sum_i \left(\pi_{\text{CEE}}^i \alpha_{\text{CEE}}^i \right)} \tag{4}$$

The *Figure* below depicts the sectoral contents of observed total productivity gaps in 1995 and 1999, i.e. the extent to which the national productivity gaps are rooted in the respective patterns of specialisation.

The explanatory power of the sectoral structure for the size of the productivity gap is very different among the selected transition economies and between the two years of observation: if Slovakia had the same sectoral employment pattern as the EU-15 in the end of 1999, then the productivity gap would have been some 14 percentage points lower than with the current pattern. The sectoral content of Slovakia's productivity gap therefore amounts to a share of nearly 28% in

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[5]   This is not to imply structural convergence in a normative manner of methodology. Rather, this method calculates a hypothetical level which will never be achieved given today's technology.
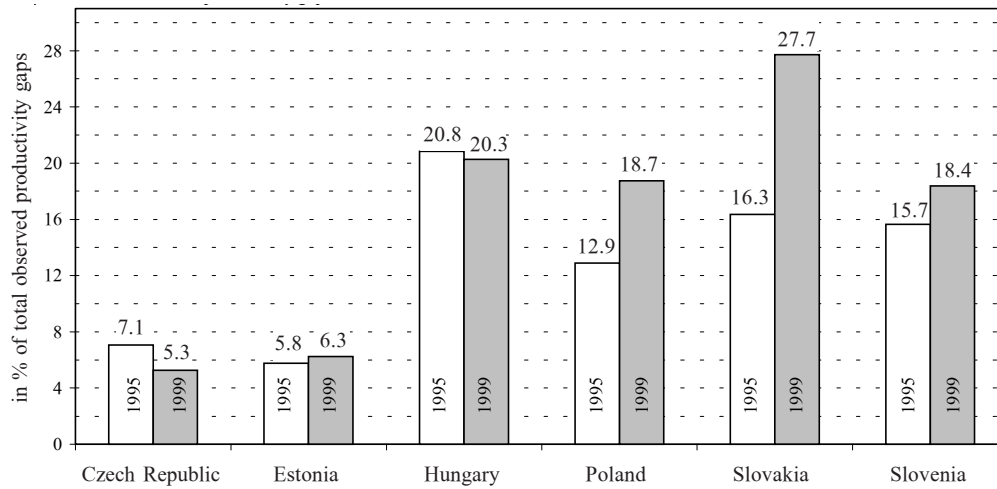
Sectoral contents of the national productivity gaps of the CEECs (1995 and 1999)

the observed productivity gap. The gaps of Hungary, Poland and Slovenia in 1999 can also be explained to a large extent (around 20%) by their respective sectoral patterns whilst the sectoral determinant does not contribute significantly to explaining the productivity gaps of Estonia and the Czech Republic *vis-à-vis* the EU (some 5–6%). The result for the latter countries incidentally corresponds to the sectoral content of the productivity gap between East and West Germany (IWH 2000, p. 61). In the case of Poland, the results have to be interpreted with caution, most of the sectoral content calculated might be due to a particular empirical distortion in the agricultural employment share of nearly 28%.[6] When an agricultural employment share comparable to the methodology applied in other transition economies is assumed, i.e. a much lower figure yet still significantly higher than in other transition economies, the sectoral content will become negligible. Poland would then rank in the same group as Estonia and the Czech Republic. The high sectoral content therefore is driven overwhelmingly by the large employment share of the agricultural sector.

[6]   Employment data in official Polish statistics distinguish less clearly between former occupation of unemployed persons and mere ownership of agricultural land. Already during the socialist era, a large share of agricultural land was owned privately. Especially during the transition crisis and the sharp decline of industrial employment, many former industrial workers, having been laid off, tried to make a living by subsistence farming. In other transition economies, unemployed workers with an industrial employment history do not enter agricultural employment statistics.

What are the main driving forces of the sectoral content in the other countries? In Slovakia, enterprise-related services exhibit only one third of employment as compared with the EU-15. These have particularly high levels of intrinsic productivities: on average, their level of productivity is nearly 4 times the national average in Slovakia. The immense growth of the sectoral content between 1995 and 1999 cannot be explained by employment shifts between sectors only, employment shares did not change that much. Rather, sectoral productivities grew particularly fast in enterprise-related services, i.e. the sectors which drive the high level of the sectoral content. In the case of Hungary, the high share of the sectoral determinant of the productivity gap can be explained by, again, a low share of enterprise-related services, and additionally much higher shares of agriculture and industrial sectors in employment. Agriculture, in particular, has well below average productivity in Hungary. Since 1995, the share of enterprise-related services in employment has grown slightly at the expense of employment in public administration. In Slovenia the high sectoral determinant is also explained mainly by the low share of enterprise-related services in total employment and a comparatively higher share of industry. The share of industry, however, has been falling slightly and that of public administration has grown.

2.2. Sectoral structures and the prospects for real economic convergence

Integration theory seems to leave unresolved the problem of evolving structural patterns and their effects on the conditions of economic development: one strand of theory assumes that technological development is typically correlated with structural patterns. This is the essence of "logistic growth path" concepts, the Clark concept or the Chenery hypothesis, which link the level of economic development and sectoral productivities to sectoral structures and hence average, economy-wide productivity levels (concept first raised by Clark (1940), see e.g. Cornwall and Cornwall (1994), and in an application to transition economies: Döhrn and Heilemann (1991, 1993), Mickiewicz and Żalewska (2001)). But this is typically a very long-term effect in gradually maturing market economies and exceeds the time-scope of analysis in this assessment. Still, potentially some sectoral convergence of the CEECs to the structures of more advanced economies in the EU can be expected as a very long-term trend.[7] In the case of CEECs, differing structures will persist for some time, giving rise to path dependency in the process of catching up. According to the factor-price-equalisation theorem, relative prices adjust in the process of specialisation to allow integrating partners to converge in terms of *per capita* income. It remains disputable, however, whether

the notion of factor-price-equalisation holds in reality; or at the very least, in what time span this equalisation will take effect. In reality, as this analysis could indicate, structural differences go some way in explaining differences in levels of economic development – and in the short term, the explanatory power of structural differences can even grow in the process of intensifying integration. A further strand of theory assumes that specialisation patterns are not unidirectional, rather structural change or adjustment can make one or several detours (which not even prolong the time used for complete adjustment once income levels have converged – cf. the so-called "turnpike models").

The assumption underlying this analysis is that the development of sectoral patterns in the course of intensifying integration with the EU will show some degree of path dependency. Sectoral patterns in the CEECs reflect to some extent country-specific features, which might not vanish swiftly or might even develop some hysteresis during the adjustment process: the development of human capital is a long-term process and a pattern of specialisation in the knowledge and skill capital of an economy will not be subject to swift changes; investment in new capital will tend to reflect the field of activities, the technological level of sophistication, etc. predominant in the economy.

Given this assumption, the analysis yields another dimension: in the cases of Slovakia, Poland and to a minor extent in Slovenia, sectoral contents of the productivity gaps increased significantly. If such developments reflect patterns of specialisation emerging in the medium to long-term and if those patterns persist or even get more pronounced, then complete productivity convergence is inconceivable in those countries even if all other determinants of productivity improve. With a sectoral content of the productivity gap of some 28% and a current productivity gap of some 46%, Slovakia could experience some form of a "barrier" to real convergence at a level of 87% of the EU-average even if e.g. technology caught up completely to Western standards. Given the high level of Slovak unemployment, the country might not even be able to surpass the threshold of 75% of average EU-15 GDP *per capita* income in the medium term to qualify for EU Structural Fund policies (only due to the specialisation patterns). In the case of Hungary, a similar result may also apply due to the high value of the sectoral

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[7]   Research into whether the CEECs converge towards sectoral and branch structures in the EU
       concluded: (a) sectoral patterns appear to converge in all transition economies discussed here,
       and Slovenia and Estonia shows the slowest structural convergence (Mickiewicz and Zalewska
       2001, p. 20), (b) at a deeper level of disaggregation within manufacturing (2-digit NACE),
       Poland, the Czech Republic, Slovakia and Slovenia show shrinking structural deviation from
       the most advanced EU countries, while Hungary appears to converge neither towards the richer
       EU countries nor the EU-south patterns (Landesmann 2000, p. 26) and therefore could develop
       a distinctively complementary specialisation pattern in the international division of labour.

content, although in Hungary some small reduction in the sectoral share of the productivity gap can be observed. Only in the Czech Republic and Estonia do sectoral specialisation patterns not appear to be of a convergence-limiting kind.

2.3. Sectoral productivity gaps: the role of sectors

So far, sectoral analysis was concerned with the sectoral content of the productivity gap across the whole economy. That is, the analysis took into consideration sectoral specialisation patterns while not assessing the levels of productivity of individual sectors. In the following, the paper focuses on sectoral productivity gaps and the respective role the sectors play in explaining the national productivity gap. Again, the comparison is drawn against the average EU-15 levels. However, this average is not used as a "technology frontier area" to assess potentials for productivity growth in individual sectors, but rather as a realistic benchmark to be achieved in terms of real economic convergence.

If the CEECs use less sophisticated technology in production (in general), then one can expect that the respective sectors in the CEECs reveal lower levels of productivity than in the EU. Such sectoral productivity gaps are not only significantly different in size but also in their relative weights within each economy assessed. Individual sectoral productivity gaps are defined according to the same method as the national productivity gaps (from equation 2):

$$\overline{\pi}^i_{CEE/EU} = \pi^i_{EU} - \pi^i_{CEE} = \left(\pi^i_{EU}\alpha^i_{EU}\right) - \left(\pi^i_{CEE}\alpha^i_{CEE}\right) \tag{5}$$

In order to provide a quantitative account of the role played by each sector in determining the national productivity gap, our analysis assigns respective weights in terms of employment shares to the sectoral productivity gaps. The indicator $\widetilde{\pi}^i_{CEE/EU}$ denotes the percentage share of a sector as a source of the productivity gap:

$$\widetilde{\pi}^i_{CEE/EU} = \frac{\overline{\pi}^i_{CEE/EU}}{\overline{\pi}_{CEE/EU}} = \frac{\left(\pi^i_{EU}\alpha^i_{EU}\right) - \left(\pi^i_{CEE}\alpha^i_{CEE}\right)}{\sum_i \left(\pi^i_{EU}\alpha^i_{EU}\right) - \sum_i \left(\pi^i_{CEE}\alpha^i_{CEE}\right)} \tag{6}$$

The first term in equation (6) calculates the sectoral productivity gap (as defined in equation 5) and its respective weight in total employment. This is then related to the average, economy-wide productivity gap to show the relative explanatory power of sector i in explaining the national productivity gap (the sum of all $\widetilde{\pi}^i_{CEE/EU}$ equals 100).

Table 2 provides an account of explanatory powers of individual sectors as a source of national productivity gaps for the selected CEECs at the end of 1999. The most obvious result of the computation is that in our sample of transformation economies, mainly the producing sectors of industry (C+D+E) are responsible for national productivity gaps: they constitute the highest values of the indicator (the only exception is Poland, where agriculture is the largest contributor to the national productivity gap[8]). These results are explained by the high productivity gaps amongst all industrial sectors in combination with their high relative weight in the economies.

The dominant role of industrial sectors as a source of the productivity gap is particularly pronounced in the case of Slovenia, where over 50% of the national gap is caused by mining, manufacturing and electricity, gas and water supplies. Although the industrial sectors' productivity gap had diminished significantly (by almost 10 percentage points between 1995 and 1999), much smaller productivity gaps in other sectors and an exceptionally high share of industrial employment account for this dominant role. The Czech Republic and Slovakia find nearly 40% of their national productivity gaps caused by the industrial sector: in both countries, industrial productivity gaps remained by and large unchanged between 1995 and 1999. The lowest industry source for the national productivity gap is found in Hungary and Estonia, the latter reveals a more evenly distribution of sectoral sources in general. In both cases, the industrial sectors' productivity gap fell by some 5 percentage points during the period of analysis.

In formerly socialist economies, public administration (L–O)[9], the second most important source of national productivity gaps in this sample, will tend to be inflated in terms of employment. This overmanning, however, is expected to diminish gradually in the course of restructuring of public administration. In the case of Hungary, nearly equal shares can be allocated to public administration and the industrial sectors.[10] In fact, until 1997, the analysis would have ranked the public administration sector as the most important source of the national productivity gap. The productivity gap of the service sector fell by 6 percentage points

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[8] This result might also be driven by the statistical registration of unemployed land-owners as small-scale farmers (see footnote 6). Again, if an adjusted share of agricultural employment is assumed, the agricultural sector would rank behind household-related services (trade, transport and communication) in the list. In this case, industrial sectors would advance to the top of the list just as in the other examined transition countries.

[9] The calculation of productivity levels in the service sectors in general and the state administration sector in particular is methodologically problematic due to the determination of prices and output. Results therefore have to be interpreted with care.

[10] Hungary is the only transition economy in our sample to experience growth in the employment share of industry following de-industrialisation during the transitional crisis.

Table 2

Ranking of the most influential sectors as a source of the productivity gap
(end of 1999)

Estonia		Poland		Czech Republic		Slovakia		Hungary		Slovenia	
Sector	$\tilde{\pi}^i$	Sector	$\tilde{\pi}^i$	Sector	$\tilde{\pi}^i$	Sector	$\tilde{\pi}^i$	Sector	$\tilde{\pi}^i$	Sector	$\tilde{\pi}^i$
C+D+E	**31.9**	A+B	**40.6**	C+D+E	**39.2**	C+D+E	**38.1**	C+D+E	**34.5**	C+D+E	**51.5**
L–O	25.9	C+D+E	23.5	L–O	20.7	L–O	**29.2**	L–O	**32.1**	G+H+I	20.1
G+H+I	19.7	L–O	14.8	G+H+I	20.3	G+H+I	14.4	G+H+I	20.6	L–O	12.7
A+B	8.2	G+H+I	12.2	J+K	11.5	F	10.1	F	7.1	F	7.4
F	7.3	J+K	5.8	F	6.3	A+B	8.4	A+B	4.7	J+K	6.4
J+K	7.0	F	3.0	A+B	2.0	J+K	0.0	J+K	1.0	A+B	1.9

Note: Share of sectoral productivity gaps are weighted by employment shares, and given as a fraction of the sum of all weighted sectoral productivity gaps. Classification of sectors accord to ISIC, rev. 3 nomenclature.
Sources: EUROSTAT, WIIW, National Statistical Offices, own calculations.

between 1995 and 1999 while its share in employment did not change. The largest fall of the service sector's productivity gap was experienced in Slovakia – 12 percentage points – where the state-administration sector accounts for nearly 30% of the national productivity gap.

The role played by household-related services (G+H+I) is probably better explained by price effects than by some inefficient allocation of resources. Typically, household-related services are not internationally tradeable. As income and wealth increase, prices of such services will tend to rise, narrowing the sectoral productivity gap and the sector's role in the national productivity gap. Indeed, the sectoral productivity gap has narrowed significantly: Estonia experienced the biggest drop of 15 percentage points but also in other accession countries some 6–8 percentage points of narrowing of gaps could be observed. Enterprise-related services (J+K) are to some extent tradeable; in particular financial services are well integrated into the West. The intensity of competition is high, hence, productivity gaps are low. Prices of non-tradeable enterprise-related services (mainly to be found in real estate, renting and business activities, K) will tend to be lower due to the same reason as for household-related services (these service sectors do not count as technology-intensive).

Given the above interpretation of results, the analysis indicates that in accession countries the potential to close the productivity gap predominantly lies with efficiency-improvements in industry. Indeed, industrial productivity gaps have fallen substantially during the period of analysis in Slovenia, Estonia and Hungary but not so in the Czech Republic, Slovakia and Poland. In the latter country group of transition countries, productivity improvement in industry could not outgrow those in the EU. Given the demonstrated dominant role of industry in real economic convergence, this result suggests that the greatest shortcomings in the respective growth paths are to be found here. In the case of Hungary and Slovakia and to a lesser extent in all other accession countries, future productivity increases also depend to a high degree on the reduction of historical overmanning in public administration. Productivity gaps in this sector diminished in all accession countries; only in the Czech Republic was this improvement negligible.

Not in all sectors have levels of sectoral productivities converged: *increases* in sectoral productivity gaps mainly occurred in the agricultural sectors of Hungary (10 percentage points), Poland (4.7) and Slovakia (3.9). However, in these countries, the employment share of agriculture has been falling slightly and can be expected to fall somewhat further, so the role of this sector in determining the national productivity gap might also diminish slowly.

3. SUMMARY AND SOME ECONOMIC-POLICY CONSIDERATIONS

Levels of labour productivity in EU accession countries of Central and Eastern Europe are lower than those of the EU-15 average; the most prosperous transition countries reach levels comparable to Greece and Spain, and productivity levels of all accession candidates in the sample exceed the level of Portugal, the poorest performing EU member state.

The analysis could provide ample evidence that structural patterns in the sectoral composition of economies play a relevant role in Hungary, Slovakia and Slovenia. In Slovakia and to a lesser extent in Slovenia, the explanatory power of sectoral specialisation patterns has even increased significantly. These results suggest that the prospects for complete real economic convergence could be evaluated less optimistically in those countries as compared with the Czech Republic and Estonia, if we assume that such structures prevail during a process of path-dependent catching up in the medium term. With respect to economic policies geared towards assisting a swift process of economic catching up, the results would suggest that promoting technological development alone could prove to be insufficient in those countries. Rather, measures aiming at increasing the flexibility in the re-allocation of production factors to promote sectoral change could be a decisive factor in Hungary, Slovakia and Slovenia. Here, the opinion taken by the EU in its latest cohesion report (EU 2001b) appears to be well founded. The assessment of Poland depends entirely on the view taken with respect to agricultural employment. If it were as high as quoted in national statistics, then complete real economic convergence would depend strongly on sectoral changes that reduce agricultural employment to the benefit of industry and services.

The analysis into the most important sectors, which determine national productivity gaps, established that in all accession countries closing the productivity gap lies predominantly with efficiency-improvements in industrial sectors. Further, in Hungary, Slovakia and Estonia reduction of the historically high employment in the public administration sector (e.g. the social security system) is also required. Such change will largely depend on the ability of governments to execute socially painful reforms of the state administration and social systems. Reforms might prove to be especially difficult in Hungary, where the formally well developed social security system had been significantly downsized in the austerity programme of March 1995. It is a question of the future whether accession countries will be able to introduce reforms of their state administrations whilst retaining a socially acceptable level of social security.

Economic policy in the CEECs could in general be most efficient in closing the productivity gap, if it was focused on upgrading technology and enhancing organisation-efficiency in industry via technology transfer and indigenous research

and development. Foreign direct investment, closer ties in production, innovation and marketing networks spreading across the West and the East, improvement of infrastructure as well as financial support and integration of university and enterprise R&D are typical and well tested political measures in this field. Not least, such policies can also increase the flexibility of production factors to promote the kind of sectoral change that this analysis pointed out as necessary for complete productivity catching up.

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