# 2 BACKGROUND AND OBJECTIVES OF THE PROJECT

## *2.1 Setting the agenda - Fifty years of cross-country comparisons within the new Growth Economics*

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Exactly fifty years ago, in 1953, the UN body for which I was working launched two major programmes which, as far as I can tell, initiated the empirical study of cross-country development dynamics and hence the assessment of the time forecast for one economy or group of economies to catch up with a marker economy or group - the topic of these workshops. The UN itself was path-breaking in national accounting and in the economics of development (each in consort with the OECD), from which the New Growth Economics empirically flowed, and its regional economic commissions furnished their own research and recommendations. My own Economic Commission for Europe began substantive contributions to both fields beginning in 1953, having established at the start of that year what would later be called the 'initial conditions' (UNECE, 1953). The 'Southern European Study', as it was termed, undertook to display the initial conditions and the political and economic factors which had delayed growth in a swathe of western and southern Europe, the experience of which contrasted with the rapid post-Marshall Plan expansion of the northern and eastern European economies. Surprising as it may seem in the light of today's growth ranking, Ireland and the Iberian Peninsula were on the list, which more familiarly included the Italian Mezzogiorno, Greece, Turkey, Albania, Yugoslavia, Romania and Bulgaria. The programme took eight years to complete, I myself rounding it off as the ECE emissary for Albania (1960) and Romania (1961). The second launch, 'The Investment Study', to which I contributed on the USSR, was more expeditiously accomplished, albeit in two separated parts. The first had the direct input of Richard Kahn and Joan Robinson under the direction of Hal Lary, who as the US Department of Commerce leader for the path-breaking The United States in the World Economy, had succeeded Nicholas Kaldor as the Director of the Research Division of ECE, under the overall supervision of Nobel Laureate Gunnar Myrdal, the ECE's Executive Secretary. The key innovation of the 'Investment Study' in the context of the New Growth Economics was its transnational estimations of the incremental investment-output ratio, ICOR, and its adjustment for labour input, the ICOR(L). Since its conceptual origin was the work of Roy Harrod and Evsey Domar, I could mention a 1950s conference which both attended and which attracted photographers of a real life 'Harrod-Domar function'.

In pre-electronic days there could not be the 'number-crunching' which international growth analysis would soon apply, but my reference to the ECE's initiative of the mid-1950s is an example of the innovative role in empirical economics then and since of the UN Secretariat generally. I find it proper to single out the ECE's work because the authors of the intellectual history of the UN, Ahead of the Curve (Emmerij, Jolly and Weiss, 2001, pp. 32-6) fail to mention it, concentrating rather on the development economists in UN Headquarters and allowing just a footnote that 'in the early 1950s the other pioneering document' was by Raúl Prebisch, Executive

Secretary of UN ECLA. Hans Singer's biographer similarly writes only of UN Headquarters and ECLA (Shaw, 2002, pp. 56-7).

For this Workshop, however, I am more concerned with the present and seek to describe recent and on-going work in the cross-country analysis of positive and negative growth in the half-century of the world's segmentation into the West, East and South. In a tangential historical note, I wonder out loud whether I was the first to parallel the East/West dichotomy with that of North/South -- I thought it up for an unpublished paper I wrote for a 1955 conference in Delhi: when I emerge into a more leisured phase of my retirement, I shall try to verify myself.

In this brief review of current work I take the outcome for calibration to be measured GDP or its components, such as net value-added, and the inputs to be inherited stocks among other initial conditions and economic, social and political flows. As research continues, more such flows are being adduced and more subjected to quantification. For parsimony, to use recent jargon, I take from among them the impact of education and research to economic growth, a salient example of enhanced quantification during the past half-century. Education as improving the capability of human capital was generally cited by the first generation of development economists - Arthur Lewis (1955), Simon Kuznets (1960), Theodore Schultz (1967), Ed Dennison (1967) and Gunnar Myrdal (1968) - and by the first cohort of education economists - John Vaizey (1962) and Gary Becker (1964). An early step in the growth-component context was an International Economic Association (IEA) conference of 1963 on the economics of education to which I contributed a regression analysis of educational indicators on economic output (Kaser, 1966). I think I was in advance of Hollis Chenery in combining levels of per capita GDP with time series in constant US dollars to compare the production outcomes of 12 industrialized countries 1880-1960 at similar levels. For inputs I used not only conventional measures of primary, secondary and tertiary education but also, in an attempt to measure educational quality via the opportunity cost of teaching, the wages of teachers; to allow for education to yield its fruits, I lagged inputs a decade behind outcomes. My conclusion, to which some educationalists are now independently coming, was that educational provision positively correlates with economic outcome at low levels of GDP per capita, does not at medium levels and reappears positive at higher levels. I attributed the latter to reverse causation - at low levels, education does indeed support growth, but at higher levels education is bought as a consumption good.

Had the knowledge economy (Dyker and Radosevic, 2000) come at the time I was writing, I might have considered education at upper production levels reemerging as an investment good, but the GDN study to which I shall come dispells a direct relationship. In any event the shortcoming of such straightforward regression was the lack of control for other variables. It is to the new studies with a broad gamut of inputs that I now turn.

The combination of regression analysis and growth accounting, starting with Bob Solow (1957), has already generated too extensive a literature for these few opening words, and this Workshop comprises contributors to it. For those who want a four-page concise summary to date I suggest the IMF's Abdel Senhadji (2002). Rather, I select a few which carry lessons for transition economy 'catch up' in their focus on institutions, the characteristic in which they crucially differ from market systems. I

then go on to describe some forthcoming research with participants here may not have had advance notice.

Social institutions over 250 centuries is the backdrop for Jones (2000). Observing that for thousands of years humans experienced on average little improvement in their income and consumption, but both surged ahead in the 19th Century, with a wave of innovation we term the Industrial Revolution. Taking the collective of 'ideas' as the driver of that innovation, he suggests that the larger the population, the larger the fountain of ideas, but for them to be put to use, they must interact with others - the 'knowledge spillover' - and be protected within secure property rights. Although each of those three inputs had contributed to economic growth in earlier centuries - he tabulates estimates of 'new ideas', demographic change and property protection since 25000 BC - they reached a critical mass only as the Industrial Revolution and subsequently greatly enlarged until increased wealth moderated population growth. At that stage, he postulates, the birth rate of new ideas and hence the rate of economic growth tapers off. Less speculative are studies of the 19th and 20th centuries by Pritchett (1997) and Crafts by (2000) which found growth associated with appropriate institutions and economic policies, of which secure property rights is only one facet. Reviewing a run of growth models, first Knack and Keefer (1995) and later Bleaney and Nishiyama (2002) make 'institutional quality' a significant variable.

It is, as I have remarked, essentially in 'institutions' that the centrally-planned economies differed from market systems and the macro-based 'catch up' literature is already substantial. Work at the IMF (Fischer, Sahay and Vegh, 1998) is generally perceived as a milestone, but a forthcoming paper by Crafts and Kaiser (2003) criticizes its data. Their examination of 23 transition economies yields a wide range of 'catch up' forecasts, but for the EU accession countries (both the 2004 and the 2007 cohorts) at which this Workshop is looking, they conclude that the institutional gains consequent on EU membership, if associated with TFP growth such as, at what they term 'east Asian rather than Latin American rates', should yield medium-term GDP per capita growth of around 4% annually.

Of relevance to this project are the analyses of large teams coordinated on an international scale with a broad range of variables related to growth in recent decades. I begin with the Global Development Network's project Explaining Growth, the first conspectus volume of which I, as General Editor of the IEA, have just seen into production for publication this September (McMahon and Squire, 2003). Country studies were brought into regional assessments for ten groups - Asia/Pacific, East Asia, Europe other than transition states; Eastern Europe, the Former Soviet Union, Latin America and the Caribbean, Middle East and North Africa, North America, South Asia and Sub-Saharan Africa. While the first volume concentrates on 70 developing countries over the 40 years to 2000, it makes significant comparisons with transition countries and occasional references to the two groups of industrialized economies. Among its key conclusions is one of relevance to the productivity focus of this Workshop. Pritchett (2003, p. 217) concludes that 'the contribution of education to economic growth depends not only on the supply of educated labour but also on an expanding demand for educated labour'. Demand for educated labour in turn 'depends on the evolution of technology and the dynamism of the private economy'. The GDN studies also find that regressions of growth on either investment rates or on growth of physical capital stocks conform to standard expectations, though doubt is expressed on the direction of causality - could some factor such as technological change (back to the 'ideas' thesis) drive growth and only

consequentially require more capital? They furthermore pose the puzzle that investment rates and capital stock growth show the same coefficients whether included together or singly: what is driving them in parallel?

The GDN analysis is all macro, but the industrialized countries to which the transition economies are to catch up are accorded analysis at the macro, mezo and micro levels by the OECD Secretariat (Sykes, forthcoming). This study covers 30 years to 2000 and measures innovation as a major contributor to growth, with the other standard drivers of output growth, capital and labour. This suggests that transition economies should promote measures accentuating innovation, all within the OECD study's conditionality, that sound macroeconomic policies are pursued and that the weight of government in the economy is kept within bounds.

Finally, I mention another major cross-country growth accounting that is soon to start. With Japanese co-finance, the EBRD will in September start a major one-year project on 30 countries - its own 27 'countries of operation', Mongolia, China and, for comparative purposes, India. The field that this Workshop is tilling has many other willing farmers.

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### *2.2 Setting the agenda - the productivity gap*

Since the demise of socialism, the Central East European states on which the project focuses (namely Estonia, Poland, the Czech and Slovak Republics, Hungary and Slovenia) have by-and-large experienced higher income and productivity growth rates as compared to the average of the current EU-15, *i.e.* some real convergence can be observed for all countries of our sample.

However, upon integration into the Union, the new members still exhibit sizeable gaps in competitiveness. Measured in terms of average national labour productivity, the gaps in end 2002 range from about 80 *per cent* of the EU-15 average in the Baltic countries, to around 70 *per cent* in Poland, the Czech Republic and Hungary, and to 55 *per cent* Slovenia (value added at current prices per employment and annual average market exchange rates).

**Table 2.1 National labour productivity levels of CEECs in comparison to the average EU-15**

| | 1999 | | 2000 | | 2001 | | 2002 | |
|---|---|---|---|---|---|---|---|---|
| | in 1000 € | in % of EU-15 | in 1000 € | in % of EU-15 | in 1000 € | in % of EU-15 | in 1000 € | in % of EU-15 |
| Estonia | 19.7 | 47.0 | 22.1 | 52.0 | 24.1 | 54.5 | 25.4 | 51.0 |
| Poland | 18.1 | 40.2 | 19.8 | 41.9 | 21.3 | 44.1 | 22.3 | 44.9 |
| Czech Republic | 24.1 | 53.6 | 25.5 | 54.1 | 27.0 | 55.8 | 28.0 | 56.2 |
| Slovak Republic | 23.9 | 53.1 | 25.5 | 54.0 | 26.9 | 55.6 | 28.8 | 57.8 |
| Hungary | 23.7 | 52.7 | 25.1 | 53.2 | 26.9 | 55.6 | 28.3 | 56.8 |
| Slovenia | 27.6 | 61.3 | 29.4 | 62.4 | 30.9 | 64.0 | 32.7 | 65.6 |

Notes: PPP-corrected productivity levels, calculated as value added *per* average number of employment.
Sources: EUROSTAT (CRONOS), WIIW, National Statistical Offices.

However, the speed of real convergence was still rather low: (labour) productivity growth in the average of the six new member states together exceeded the growth rate of the average EU-15 by a mere 2.8 percentage points between 1999 and 2001. This is still much too low to expect the gap to close in the medium term: were the convergence speed to remain constant, the averaged group of new member states would catch up to 100% of the EU-15 level in only 20-25 years. This result, however, is mainly driven by the sheer size and large gap of Poland (Slovenia would in this

**Complete productivity convergence could take as long as 20-25 years...**

**...underscoring the role of economic policy assistance**

scenario be able to catch up in less than 10 years, Poland in nearly 30 years). Slow convergence in productivity restrains catch up in wages and earnings.[1]

Those disappointing prospects underscore the role that economic policy assistance can potentially play in those the new member states. To create the necessary knowledge base for the formulation of coherent and effective policy assistance is the overarching objective for research in this project.

Since the early 1990s, CEE countries have been gradually integrated into the European market (Europe agreements), and with their Union membership in May 2004 have been granted full single market status. Additionally, the new EU members received pre-accession financial support in the framework of PHARE, ISPA, and SAPARD before actual membership. Whilst those were largely governed by the EU Commission and mainly geared at institutional integration, the inclusion of CEE economies into EU industrial policy and EU cohesion policy in particular is more devolved to the competence of the member states and has a more pronounced focus on increasing competitiveness and assisting real economy catching up.

### *2.2 Specific objectives of the project*

The overarching objective of the project is to create the necessary knowledge base for the formulation of coherent and effective policy assistance with a view on the swift closure of productivity gaps.

The research project aims to assess the most important determinants of the gap between levels of productivity between individual new member states in CEECs and the average of the EU (the 'productivity gap'). On the basis of that, the project aims to assess the current approaches to accession and integration policies in terms of their effectiveness.

The overarching objective of the project is the generation of a unique knowledge base on the various determinants of lower levels of productivity in the new member states. The determinants assessed comprise macro, meso and even firm-level explanations for the productivity gap.

This newly generated knowledge was compiled with a view on the management of the accession process. Accession policy, negotiations, pre-accession strategies and EU financial and technical assistance to the candidate countries was based on a knowledge base which was heavily biased towards the issues of institutional integration. Implicitly, this approach assumed that a complete closure of the gap is possible. The unique sets of data generated in this project enabled us not only to understand much better the relevant factors which generate and which may reduce productivity gaps between individual CEECs and the EU, but also the restricting factors for a complete closure of the gap. This allowed us to suggest new weights and objectives for policy-interventions that take into account the need to address sources of productivity gap next to the institutional integration *per se*.

The objectives directly relate to the demands specified in the second call for the key action 'Improving the socio-economic knowledge base', task 7 'The challenge of EU Enlargement' and specify what the call text names in general terms "a better

[1] Needless to say that the results of such a scenario can easily be refuted by empirical evidence: in the right economic framework and with the help of well-targeted economic policies, convergence time can fall drastically as the example of Ireland in the 1990s shows.

understanding of the dynamics of the enlargement process to create a sound basis for policy making" as the overriding objective of this research task.

### *2.3 Specific benefits of the project*

The benefits that arises from the availability of the newly generated knowledge base in this research project and the assessment of the accession process are twofold. The first benefit lies in the improvement in understanding of the conditions pertaining, and changes taking place in the new member economies. This applies in particular to the determinants of the productivity gap, as well as their influence on the prospects for a closure of this productivity gap in each new member state. Second, the knowledge base generated in the project is essential for designing effective economic policy assisting swift catch-up.

Additional benefits of the project can arise from mainly two aspects: first, inclusion of participants from the new member states supported the mobilisation of the European social science research community and the enlargement of research networks towards the East. The project achieved this by granting a particular weight (in terms of personnel and finance) to co-operation partners in the new member states and by involving all participants in the proceedings of all topics of research. The second benefit was expected to arise from the establishment of the system of a User Panel for the project. This group in fact involves representatives of policy decision makers in the new members and West Europe, of industry and of their associations. Whilst we were able to engage in a dialogue between the research and policy community, this dialogue was rather infrequent and discontinuous. Mainly, this is the result of most candidates for the User Panel expressing their reservations against being associated with a research community and their policy-relevant suggestions over which they naturally have no control. The most influential contacts with Users was established with the Estonian and French governments. Those contacts led to official publications using, listing, discussing.

### *2.4 Strategic impacts in terms of key challenges of the EU*

One of the key challenges of the EU in respect of EU Eastern enlargement and economic cohesion between East and West is the formulation of a coherent integration, development and accession strategy. In terms of the EU-goal of 'economic cohesion', integration of these new member states will eventually have to result in their catching up to levels of economic development predominant in existing EU members. Significant differences amongst existing members exist, and it remains unclear today not only whether the majority of newly acceded countries will persistently stagnate at low levels. It is also likely that some new member states will experience swifter progress in comparison to others. It proved to be of particular importance to the aims of the project to be able to assess the factors behind existing and possibly emerging country differences. Whilst some differences between the EU and individual new member states might always remain, the EU will only be able to profit from enlargement in terms of economic benefits, if the new members can actively participate in competition within the enlarged new market. In the adverse case, considerable transfer-costs (*e.g.* Common Agricultural Policy and structural and cohesion funds) will question the viability of the latest round of enlargement and possible future enlargements (Bulgaria, Romania, Croatia, Turkey).

Due to the focus on the aim of generation of relevant knowledge on conditions prevailing and emerging in the new members states, this research project produce

most relevant results to this key challenge of the EU. Such insights increased our understanding of the dynamics of the integration process and created the necessary sound basis for policy making and policy evaluation. The project therefore contributed to providing the necessary knowledge for an efficient and effective management of the enlargement and in particular the integration processes, indispensable for economic policy makers in both the EU and the new member states.

The project pinpointed areas where economic policy could be effective in terms of assisting the closure of the productivity gap. It also identified other areas of potential intervention, where policy would have either been ineffective or even counter-productive with respect to the aim of a swift closure of the productivity gaps. Due to the high level of disaggregation of research, such policy suggestions have been sought at specific industries and branches; due to the comparative nature of the project whereby each new member states was analysed in a parallel manner with the same questions asked and the same models and methods applied, these policy suggestions were developed at national as well as European levels.

# 3 SCIENTIFIC DESCRIPTION OF THE PROJECT RESULTS AND METHODOLOGY

The following part is dedictated to the summaries of research produced in the project during it's three year duration. The extents to which results were 'cut to size' differ between workpackages: such involving research by a single team or researcher (WPs 1, 2, 3, 5) have been summarised on 15 to 20 pages. Research involving field work in a set of teams engaged in research within their own region (WPs 4 and 6) obviously assume more space with each team having been restricted to up to 10 pages. The summary of WP 4 is additionally preceeded with a 16 page summary of comparative description of the role of FDI each partner compiled for its own country of origin. The summary of workpackage 7, the policy-workpackage, is naturally more comprehensive, and due to its largely non-empirical nature, did not lend itself to a rigorous condensation. Its description hence assumes a larger part in this report.

The workpackage-summaries are presented here in the order of their consecutive numbering, and starts with specialisation patterns, national inovation systems, technology transfer via FDI, absorptive capacities, firms-specific determinants, and finally ends with the policy-workpackage.

## *3.1 Workpackage 1*

### *EVOLVING PATTERNS OF SPECIALISATION AND EUROPEAN DIVISION OF LABOUR - BRANCH SPECIALISATION IN DOMESTIC PRODUCTION*

Research in **workpackage 1** is structured in two main parts, one on sectoral and one on industrial specialisation patterns. The method of analysis is empirical, we use available statistics to assess research questions relevant to the analysis of the determinants of the productivity gap. The research was conducted by Johannes Stephan from the IWH.

The main research questions raised include:

- What is the role of differing sectoral structures in the new member states in explaining the gaps in national productivity levels *vis-à-vis* the average EU?
- Do these sectoral differences inhibit catching up of CEECs?
- What are the prospects for productivity growth in manufacturing industry, if patterns of specialisation are assumed to determine potentials?

#### *WP 1.1 The sectoral contents of the national productivity gap*

**Specialisation patterns as determinants of productivity gaps**

The idea guiding research into the role played by sectoral patterns for an explanation of the national productivity gap is two-fold: first, intuition would suggest that productivity differences are mainly rooted in the new member states' firms commanding less sophisticated technologies as compared to such in the EU. However, national productivities (as averages over all branches in the economies assessed) can differ between two countries even if technology, management and organisational expertise and other non-structural determinants are exactly alike in both countries: sectoral or branch-specific levels of productivity differ, so that average, economy-wide productivity levels depend on the relative weights of branches with above- and below-average sectoral or branch-specific productivity

levels. We therefore expect some explanatory power for the productivity gaps to lie with sectoral structures as country-specific features.

**Specialisation patterns as limits to complete convergence**

Second, assuming some degree of path dependency in sectoral patterns, the emerging international / European division of labour can limit the scope for complete catch-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 well remain rigid and if weights of below-average productivity branches remain higher than in the EU-15, then this pattern can limit real economy convergence. In its second report on economic cohesion[1], the *EU Commission* takes the opinion that sectoral structures in candidate countries will prove to be decisive in a process of real economy convergence. The report suggests to target EU cohesion policies prominently towards the intermediate aim of structural change.

**Specialisation explains large shares of the productivity gaps in the Slovak Republic, Hungary and Slovenia...**

The first step of sectoral analysis attempts to determine the "sectoral contents" of productivity gaps between individual new member states and the average EU-15 levels in 1995 and 1999. Chart WP 1.1 depicts such sectoral contents in observed total productivity gaps for 1995 and 1999. The most prominent results are the following:

- The explanatory powers of sectoral structures for the sizes of productivity gaps are very different amongst the selection of transition economies and between the two years of observation (*e.g.* had the Slovak Republic had the same sectoral employment pattern as the economic region of the EU-15 in end 1999, then the productivity gap would have amounted to some 14 percentage points lower than is the case with the current pattern).

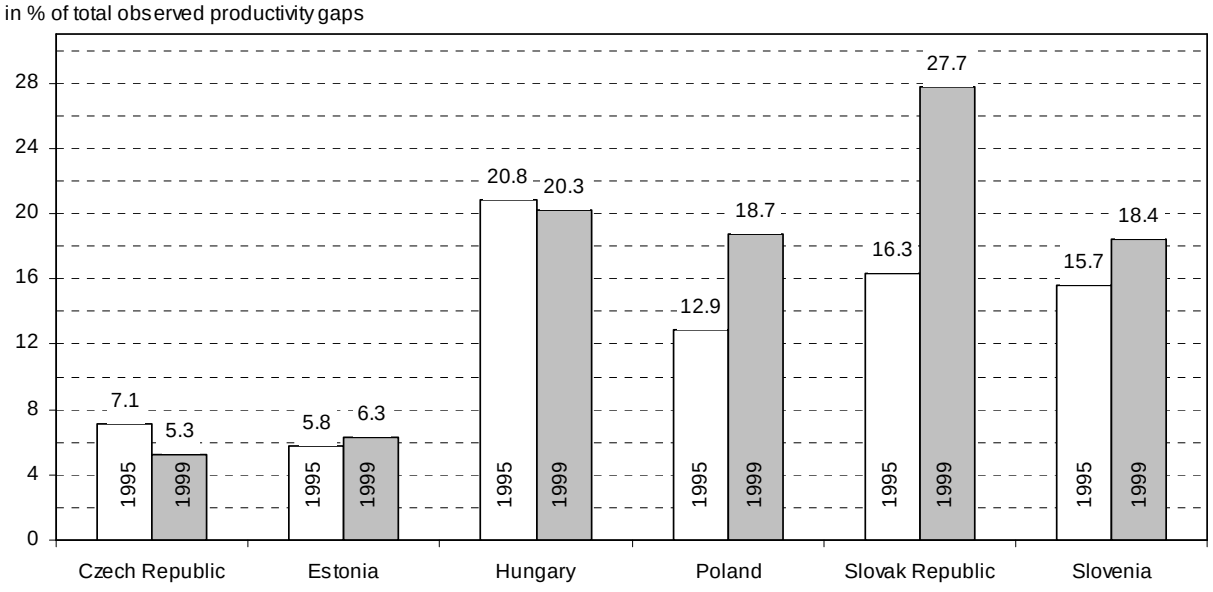



**Chart WP 1.1 The sectoral content of the national productivity gaps of CEECs *vis-à-vis* the EU-15**

Sources: EUROSTAT (CRONOS), WIIW database, National Statistical Offices of new member states and EU member states, own calculations.

[1] EU (2001), *Second report on Economic and Social Cohesion: Unity, solidarity, diversity for Europe, its people and its territory*, EU Commission, Brussels.

- In 1999, the sectoral content is highest in the Slovak Republic and amounts to a share of nearly 28% in 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.

**...largely indifferent patterns in Estonia and the Czech Republic...**

- 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%. When assuming an agricultural employment share comparable to the methodology applied in other transition economies, *i.e.* a much lower share yet still significantly higher than in other transition economies, then the sectoral content would become negligible. Poland would then rank amongst the group with Estonia and the Czech Republic. The high sectoral content therefore is driven overwhelmingly by the large employment share in the agricultural sector.

**...sectoral content of Poland depends entirely on agricultural employment data**

What are the main driving sources of the sectoral contents of the other countries?

- In the Slovak Republic, enterprise-related services employ only one third of the level for the EU-15 average. This sector, however, has a particularly high level of intrinsic productivity: here, it is, on average, nearly 4 times the national average. The comparatively high 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.

**Results mainly driven by under representation of enterprise-related services in CEECs**

- In the case of Hungary, the high share of the sectoral determinant of the productivity gap can be explained by, again a low share in enterprise-related services, and additionally much higher employment shares in the agriculture and industrial sectors. In particular the former sector exhibits well below-average productivities in Hungary. Since 1995, employment shares of enterprise-related services have grown slightly at the expense of the sector of public administration.
- Also in Slovenia can the high sectoral determinant mainly be accounted for by a low share of employment in enterprise-related services and a comparatively higher share in industry. This share however, has been falling slightly while the employment share of public administration has grown.

Where those sectoral contents are significant in size, do the associated sectoral differences inhibit catching up of CEECs? Are the differences disadvantageous?

**Convergence via integration: insufficient condition or the long-term?**

Integration theory remains undetermined in respect to evolving structural patterns and their effects on the conditions of economic development (Clark[2] *versus* path dependency). The Clark-concept is typically a very long-term effect of sectoral convergence of gradually maturing market economies and exceeds the time-scope of analysis in this assessment. In the shorter term, more relevant for the analysis here, the theory of comparative advantages predicts international specialisation emerging according to patterns of comparative advantages. In this case, evolving structures

[2] C. Clark (1940), *The Conditions of Economic Progress*. London: Macmillan.

will persist for some time, giving rise to path dependency in the process of catch-up development.

**When assuming sectoral path dependency...**

The assumption underlying this analysis is that sectoral patterns in CEECs to some extent reflect country-specific features which might not vanish swiftly or might even develop some hysteresis during the adjustment process. Given this assumption, the analysis yields another dimension.

**...then specialisation patterns might limit convergence in the Slovak Republic, in Poland, in Slovenia and Hungary...**

- In the cases of the Slovak Republic, Poland and to a minor extent in Slovenia, the sectoral contents of productivity gaps have increased significantly. If emerging sectoral patterns persist or even get more pronounced, then complete productivity convergence is inconceivable in those countries even after catch up of all other determinants of lower levels of productivity. Moreover, given her high level of 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, this only due to her sectoral patterns. In such a scenario, EU Cohesion policy without consideration of sectoral structures would be inefficient for the objective of GDP *per capita* convergence. In the case of Hungary, a similar result may also apply due to the high value of the sectoral content. In those cases, the opinion taken by the *EU Commission* in its second cohesion report with respect to the necessity of employment shifts between sectors appears to be well founded.

**...but not so in the Czech Republic and Estonia**

- Only in the cases of the Czech Republic and Estonia do sectoral patterns not appear to be of a convergence-limiting kind.

*WP 1.2 The role of sectors in explaining the productivity gaps*

**Sectoral productivities and the role of sectors in explaining the national gaps**

So far, sectoral analysis was concerned with the sectoral content of the productivity gap across the whole economy. That is, analysis took into consideration sectoral specialisation patterns while not assessing levels of productivity of individual sectors. In the following, we try to assess: what role do individual sectors play in explaining national productivity gaps?

If CEECs apply in general less sophisticated technology in production, then one can expect that comparative sectors in CEECs exhibit lower levels of productivities 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. Table WP 1.1 provides an account of explanatory powers of individual sectors as a source of national productivity gaps for the selection of CEECs at the end of the year 1999.

**Industrial sectors play dominant role as source of productivity gaps in all CEECs...**

- The most obvious result of this analysis is that in all transformation economies assessed, the producing sectors of industry (C+D+E) are mainly responsible for national productivity gaps: they exhibit the highest values of the indicator (solely in the case of Poland, the agricultural sector is the quantitatively strongest source of the national productivity gap[3]).

[3] This result is driven by the above methodological difference of data on employment. Assuming again the corrected employment share, the agricultural sector would be placed behind household-related services (trade, transport and communication) in the list. The industrial sectors would then advance to the top of the list just as in the other countries assessed.

- The public administration sector (L - O)[4], the second most important source of national productivity gaps in this sample, will tend to be inflated in terms of employment in formerly socialist economies. This overmanning can, however, be expected to diminish gradually in the course of restructuring of these sectors. In the case of Hungary, nearly equal shares can be allocated to this sector as to the industrial sectors. In fact, the analysis would have ranked the public administration sector as the most important source for the national productivity gap up until 1997.

**...followed by the state-administration sector**

- The role played by household-related services (G+H+I) is probably more due to a price effect than a question of efficient allocation of resources. Typically, household-related services are not internationally tradable. With rising income and wealth, prices for such services will tend to increase, narrowing the sectoral productivity gap and the sector's role in the national productivity gap.

**Lower levels of productivity in CEEC's industries and their relative sizes mainly responsible for the national productivity gaps**

- Enterprise-related services (J+K) are to some extent tradable; in particular financial services are well integrated with the West. Intensity of competition is high, hence, productivity gaps are low. Prices for the non-tradable part of 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 with household-related services and do not count as technology-intensive.

**Table WP 1.1 The ranking of most influential sectors as a source of the productivity gap, in end 1999**

| Estonia | | Poland | | Czech Republic | | Slovak Republic | | 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 |

Notes: Share of sectoral productivity gaps, weighted by employment shares, as a fraction of the sum of all weighted sectoral productivity gaps.

Classification of sectors according to ISIC, rev. 3 nomenclature, with: A+B...Agriculture, hunting, forestry and fishing; C+D+E...industrial sectors; F...construction; G+H+I...household-related services; J+K...enterprise-related services; L - O...public administration sectors (defence; social security; education; health, social work; private households with employed persons).

Sources: EUROSTAT (CRONOS), WIIW database, National Statistical Offices of the new member states and EU member states, own calculations.

- Given this assessment of results, the analysis indicates that in the new member states, potentials for a closure of the productivity gap today predominantly lie with efficiency-improvements in industry. Indeed, industrial productivity gaps have been falling during the period of analysis in Slovenia, Estonia and Hungary but not significantly in the Czech and Slovak Republics and Poland. Given the demonstrated dominant role of industry in real economy convergence, this result suggests that the greatest shortcomings in the respective growth paths are to be found here. In the cases of Hungary and the Slovak Republic, and to a lesser extent in all other new member states, future productivity increases also depend to a high degree on a reduction of historical overmanning in public administration.

**Potentials for productivity increases in CEECs lie predominantly with efficiency-improvements in industry...**

[4] The calculation of levels of productivity in the services 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 due care.

Productivity gaps in this sector diminished in all new member states; only in the case of the Czech Republic was this improvement negligible.

- Not in all sectors have levels of sectoral productivities converged: significant increases in sectoral productivity gaps mainly occurred in the agricultural sectors of Hungary (10 percentage points), Poland (4.7) and the Slovak Republic (3.9). In all those countries, the employment share of agriculture has been falling slightly and can be expected to continue to fall, so that the role of this sector in determining the national productivity gap might also diminish slowly.

**...whereas agricultural productivity gaps have even *widened* in Hungary, Poland and the Slovak Republic**

- Economic policy in CEECs could in general be most efficient in closing the productivity gap, if focussed on industry. It however remains open whether industrial productivity growth can most efficiently be supported by structural change between industrial branches, or by technological and organisational upgrading. Foreign direct investment, closer ties in production, innovation and marketing networks spreading across the West and the member states, improvement of infrastructure as well as financial support and integration of firm-R&D and universities are the typical and well tested political measures in the latter field. Not least, such policies can also increase the flexibility of production factors to promote the kind of sectoral change in the countries, this analysis pointed out as necessary for complete productivity catch-up in a foreseeable time-frame. In respect to the structural change between industrial branches, the second part of analysis in workpackage 1 assesses the role of structural specialisation in industry for productivity catch-up.

**Sector-specific economic policy should therefore focus mainly on industry**

*WP 1.3 The prospects for productivity catch-up in manufacturing industries*

The second part of analysis in workpackage 1 focuses on specialisation structures in industry: what are the prospects for productivity growth in manufacturing industry, if patterns of specialisation are assumed to determine potentials?

**Patterns determine prospects**

The structural composition of manufacturing industry determines productivity growth during integration through two interactive channels: first, structures change in the course of economic integration. This is an aggregate effect of product or branch-differentiated firm entry and exit adjustment processes triggered by intensifying competition. This can be thought of as a Schumpeterian process of creative destruction. Second, average aggregate productivity growth from sources rooting in existing and efficiency-improving firms, like technology transfer and implementation, R&D, innovation and cost-rationalisation, also depends on structural patterns: the more firms in any given industry which belong to a class with typically high potentials for productivity growth, the larger is the base for productivity growth, the wider the potential. This can be thought of as a process of technological advancement, in the case of CEECs predominantly technological catch-up.

The analysis inductively generates an empirical model of past productivity growth determined by specialisation-patterns and the respective productivity gaps. This model is then used to estimate future prospects for productivity growth and catch up in the countries assessed (out-of-sample predictions). The model uses industrial specialisation patterns, a source of productivity growth close to the neo-classical 'natural rate', and one derived from "advantages of backwardness" [5] to predict

[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 A. Gerschenkron (1962), *Economic Backwardness in Historical*

potentials. For the future development of specialisation patterns, several scenarios have been assessed, to test the robustness of the model.

The model attempts to determine a relationship between the branch-structure of manufacturing industries, the extend of backwardness and average industrial productivity growth. The theoretical model in formal form reads:

$$\pi^i = f\left(Specialisation\ patterns^i\right) * PG^{EU/i} \quad (1)$$

This relationship was determined inductively by way of a simple linear pooled least squares regression model (OLS). The empirical model reads:

$$\ln\left(\frac{\pi^i}{PG^{EU/i}}\right) = C^i + \beta_1 \ln class\,1^i + \beta_2 \ln class\,2^i + ... + \beta_n \ln class\,n^i + \varepsilon^i \quad (2)$$

The independent variables take the form of shares of employment in various manufacturing classes, namely a labour intensive class (LI), a capital intensive class (CI), a marketing intensive class (MI), a technology intensive class (TI), and two classes signified by their qualification intensity of personnel (low: lQI and high: hQI). The dependent variable is the backwardness-corrected manufacturing productivity growth.

All variables were included in a logarithmic form to allow interpretation of coefficients as elasticities. The results of this exercise were then used to estimate future potentials for productivity growth in new member states as projections. The estimations in four scenarios have now clearly become more robust, yet the results of the out-of-sample estimation of productivity growth potentials turned out to be quite similar to the ones generated by the first model-specification.

**Table WP 1.2 Results of the regression analysis**

| | | Explanatory variables | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | ln LI | ln CI | ln MI | ln TI | ln lQI | ln hQI | constant | $R^2$ | adjust. $R^2$ |
| 1 | 72 | -1.30* | -0.64* | -2.23* | -0.21 | -0.63* | -0.10 | 16.52* | 0.82 | 0.81 |
| | | (-8.30) | (-7.17) | (-9.93) | (-1.56) | (-6.51) | (-1.26) | (9.40) | | |
| 2 | 72 | -0.52* | | -1.12* | 0.31* | -0.50* | 0.10 | 6.71* | 0.68 | 0.65 |
| | | (-4.17) | | (-6.30) | (2.45) | (-3.94) | (1.00) | (5.65) | | |
| 3 | 72 | -0.59* | | -1.11* | 0.24* | -0.57* | | 7.46* | 0.67 | 0.65 |
| | | (-6.30) | | (-6.88) | (2.18) | (-5.77) | | (11.09) | | |

Notes: Dependent variables in all regressions are the logs of backwardness-corrected manufacturing labour productivity growth.
Coefficients market * are significant at least at the 5 *per cent* error probability.
T-ratios are provided in subscripted parentheses.

Three regressions were conducted and are reported in table WP 1.2. The steps of regression exercises were conducted to arrive at an empirical model that matches our intuition and includes only those explanatory variables whose coefficients are statistically significant at least at the 5 *per cent* error probability. Regression no. 3 fulfilled those conditions and includes the variables of labour intensity, marketing intensity, technology-intensity, and low-qualification intensity branches. The explanatory power of the regression model reaches a comfortable level around 70 *per cent*, and when considering that the pool-regression was conducted between a

*Perspective: a Book of Essays*, Cambridge (Mass.), Belknap Press of Harvard University Press, or product cycle theories.

sample of transition economies from Central East Europe and West European cohesion countries, the results seem robust enough to warrant further exploration.

**Patterns of specialisation emerging in the medium term future...**

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 new member states will engage in the kind of intra-industrial trade typical for the industries of most member states. In scenario C, the structural patterns of new member 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 new member 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 polynomic trend analysis to the power of three.

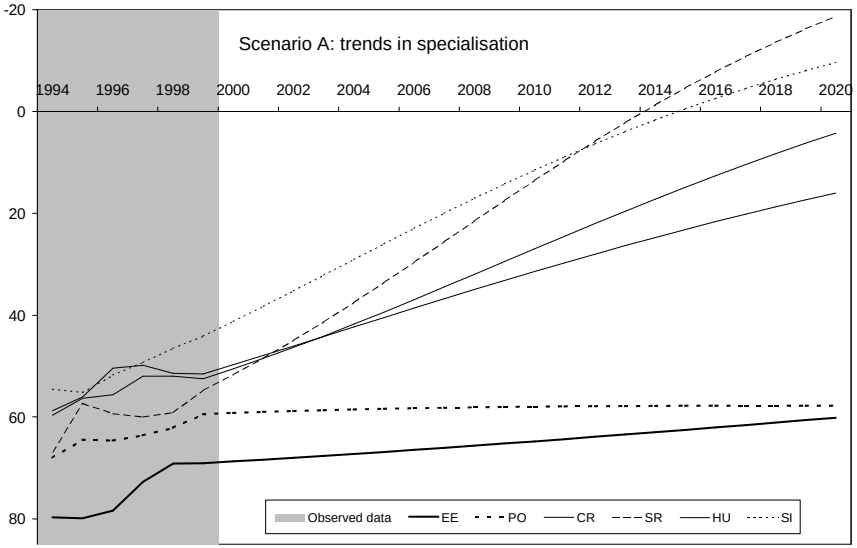
**...estimated in four different scenarios**

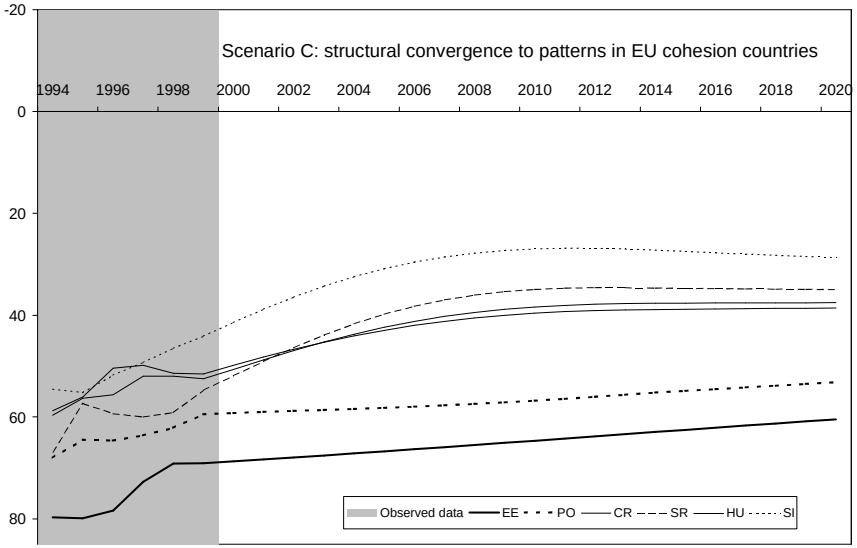
Charts WP 2.2 to WP 2.5 plot the resulting developments of manufacturing productivity levels for each scenario in *per cent* levels of the EU-15 average (to estimate future EU-15 average manufacturing productivity levels, a constant annual rate of growth of 2.77 *per cent* was applied; this rate corresponds to the observed average growth rate in the period 1994 to 1999).

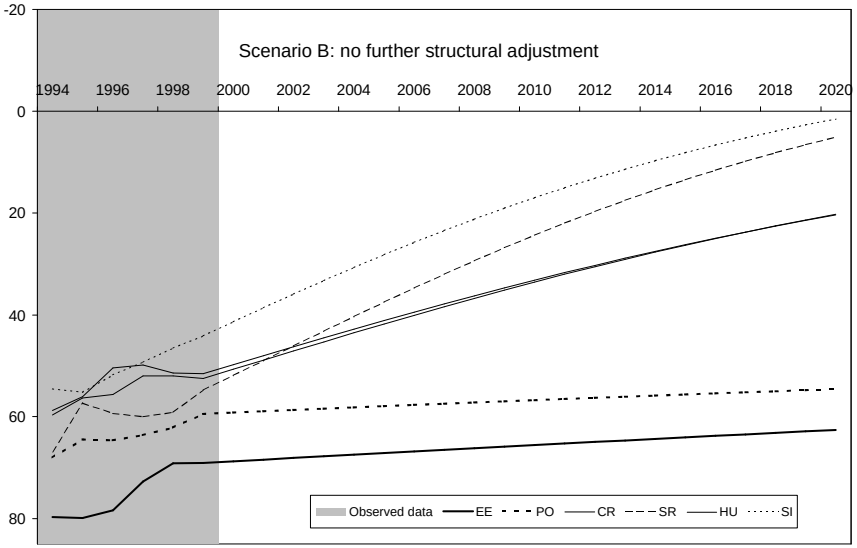
**Results in the four scenarios**

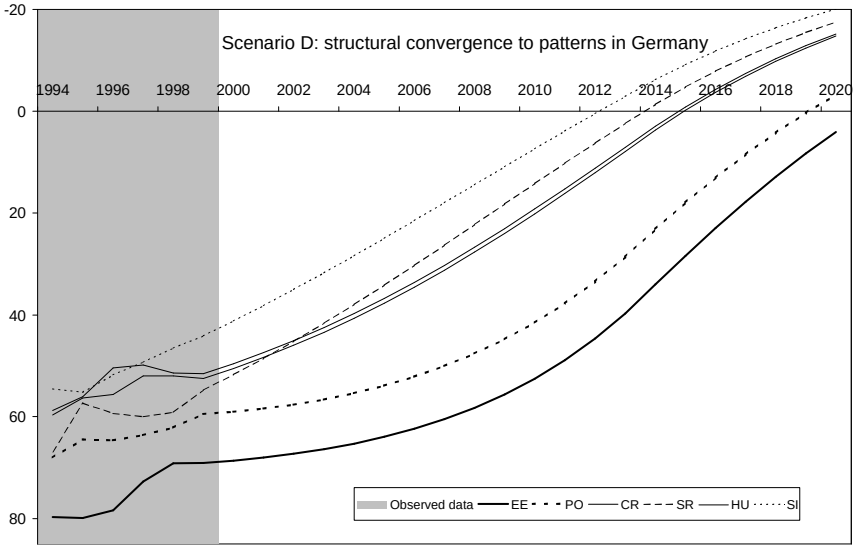
The most important results to be highlighted pertain to scenario A, because, according to the resource-based concept, this is the most likely outcome of structural adjustment. If structural trends of the past were to persist into the short to medium term future, then Poland and Estonia are projected to achieve the lowest manufacturing productivity growth, resulting in Poland in fact in near-stagnation of the productivity gap. The Slovak and Slovenian manufacturing sectors on the other extreme are projected to achieve the highest productivity growth rates, *i.e.* the fastest productivity convergence (by 2014 and 2015). Prospects in Hungary and the Czech Republic are slightly less favourable yet much better than for Estonia and Poland with productivity convergence to 75 *per cent* of the EU-15 average manufacturing productivity level as early as by the years of 2009 and 2011 respectively.

The results in scenario B are comparable to the ones of scenario A, albeit less pronounced: apparently, (or estimation of) the direction and intensity of future trends of sectoral change within the Slovak and Hungarian manufacturing sectors serve to improve the prospects of productivity catch up much more than is the case for Slovenian and Czech manufacturing respectively. The results for Poland remain unchanged, whereas the prospects for Estonia improve with future sectoral change.




**Charts WP 1.2 - WP 1.5: Projections of future manufacturing productivity growth potentials, in gaps as *per cent* of average EU-15 levels**

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 the new member states 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. 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 less favourable prospects 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 the new member states are already, in terms of our model, more preferable than in EU 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 slightly 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 till take place.

The empirical model established significant differences in productivity growth prospects amongst the group of most advanced new member states: 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 the new member states and the old 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 sectoral 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 the new member 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.

### *3.2 Workpackage 2*

*EVOLVING PATTERNS OF SPECIALISATION AND EUROPEAN DIVISION OF LABOUR - VERTICAL AND HORIZONTAL PATTERNS OF INTRA-INDUSTRIAL TRADE*

Research in workpackage 2 is focussed on the relation between trade structures and productivity differences. The perspective is here the increasing dominance of intra-industrial trade (IIT), and particularly, of its both components horizontal (HIIT) and vertical (VIIT) trade. The research was conducted in collaboration between Hubert Gabrisch and Maria-Luigia Segnana.

According to the literature, vertical intra-industrial trade reflects productivity gaps between the same industries, and is explained by the comparative advantages of one side in producing a higher quality of a differentiated good by using advanced technology, physical and human capital. Workpackage 2 tests a model of a product-quality-cycle to assess determinants of vertical and horizontal intra-industrial trade structures.

A new statistical approach is used. Because trade models assume free trade, the analysis is conducted in two panels, one with liberalised trade items (panel A) and one with goods to which some restrictions still applied (panel B). The Europe Agreements produced a clear divide between liberalised and non-liberalised tradeables (this distinction was most pronounced during the period 1993-1997).

The main research question focuses on: what potentials for productivity catch-up can be inferred from the analysis of trade structures emerging between the EU and her new member states? The first step in answering this question includes a descriptive analysis of the emerging trade structures between 1993 and 1997. The most important results read as follows:

**Trade between the EU and CEECs is dominated by IIT...**

- Intra-industrial trade gained importance in industrial trade between the EU and CEECs (measured with adjusted *Grubel-Lloyd* indices). Intra-industrial trade appears to be most important in the Czech Republic with indices values of over 0.7 and the relatively least important in Poland and Slovakia with values of less than 0.4. In all countries, the importance of intra-industrial trade exhibits a increasing trend between 1993 and 1997 (table WP 2.1).

**Table WP 2.1 Adjusted *Grubel-Lloyd* indices of intra-industry trade between EU-15 and selected CEECs**

| | | Panel A+B | Panel A | Panel B |
|---|---|---|---|---|
| Czech Republic | 1993 | 0.584 | 0.823 | 0.565 |
| | 1997 | 0.711 | 0.848 | 0.567 |
| Hungary | 1993 | 0.377 | 0.648 | 0.375 |
| | 1997 | 0.438 | 0.772 | 0.377 |
| Poland | 1993 | 0.291 | 0.957 | 0.175 |
| | 1997 | 0.382 | 0.992 | 0.243 |
| Slovakia | 1993 | 0.312 | 0.890 | 0.264 |
| | 1997 | 0.376 | 0.875 | 0.270 |

Note: Data for EU-15 1993 include data for Austria, Sweden and Finland from 1995.
Source: EUROSTAT, own calculations.

**...and particularly high in liberalised trade**

- Intra-industrial trade shares turned out to be particularly high in liberalised trade of panel A. This is particularly pronounced in the cases of Poland and Slovakia, where trade in panel A is nearly completely between the same industries (at a 4-

digit SITC-level) and the share of intra-industrial trade in panel B of goods with some restrictions still applying is below 30 *per cent*.

By decomposing intra-industrial trade into its horizontal and vertical components, and by comparing branch-specific trade balances with their respective shares of vertical trade, analysis can determine what kind of advantages trading partners make use of, *i.e.* either cost or quality advantage. The underlying assumption is that in vertical intra-industrial trade, the produce of trading partner can be characterised by either quality or price advantages. The results of this analysis include:

**IIT between EU and CEECs is largely of a vertical nature**

- Whereas horizontal intra-industrial trade is dominant in trade between current EU member states, intra-industrial trade between the EU and new member states is largely of the vertical kind (table 4). In EU-CEEC trade and between 1993 and 2000, the share of vertical intra-industrial trade in fact increased, and the share of horizontal intra-industrial trade actually fell. The dominance of the vertical component is particularly pronounced in liberalised trade (panel A), a result that raises a question concerning the usual assessment of FDI and its structural effects.

**The EU enjoys a competitive advantage in quality , whereas CEECs in prices**

- The EU enjoys a quality advantage in intra-industrial trade with the new member states, whereas CEECs mainly rely on cost advantages (derived from a model of relative unit values and industry-specific trade balances). In particular, these patterns have intensified, suggesting diverging specialisation structures within industries (chart 3).

The second step of the analysis explains what can be expected on the basis of the hitherto development. By use of a particular version of a vertical intra-industrial trade model, analysis attempts to explain emerging trade structures between the EU and CEECs in the two panels and to assess the weights of determinants of intra-industrial trade in its two components. Amongst the determinants, analysis considers in particular a set of country-specific determinants, amongst which are income gaps and income distribution differences between trading partners.

The basic assumption of analysis is that productivity differences between trading partners are a reflect of specialisation patterns in vertical intra-industrial trade, *i.e.* in trade between the same industries, but with goods of differing qualities. Analysis of determinants of vertical trade structures provides insights into the potentials for catch-up of income and productivity.

The model used in this analysis (Flam-Helpman, 1987) distinguishes between three determinants of vertical intra-industrial trade: the relative wage level of countries involved, reflecting differences in technology, factor endowment and human capital, income and income distribution. The idea of the model is that, if one country possesses an comparative advantage in producing a higher quality, a change of one of the three determinants mentioned above induces producers to transfer the production of the low-quality good to the other country and to focus on the production of the high-quality good (giving rise to a quality-product-cycle).

The results of several versions of regressions (including and excluding fixed effects, income distribution, GDP data according to exchange rates and purchasing power parities, adjusted and unadjusted *Grubel-Lloyd* indices) suggest:

**In liberalised industrial trade mainly (panel A), a product-quality - cycle could be identified...**

- The product-quality-cycle model explains vertical intra-industrial trade, that is, the importance of relative income/wage differentials and overall demand differences. It cannot, however, sufficiently explain horizontal trade, as expected. These

results are particularly pronounced for the liberalised part of industrial trade (panel A).

**Table WP 2.2 Adjusted *Grubel-Lloyd* indices of vertical intra-industry trade between EU-15 and selected CEECs**

| | | adjusted *Grubel-Lloyd* indices | | | IIT = 100 | | |
|---|---|---|---|---|---|---|---|
| | | IIT | HIIT | VIIT | IIT | HIIT | VIIT |
| Intra - EU trade | 2000 | 0.98 | 0.60 | 0.38 | 100 | 60.9 | 39.1 |
| Trade EU - CEECs | 1993 | 0.45 | 0.08 | 0.37 | 100 | 18.1 | 81.9 |
| | 2000 | 0.59 | 0.09 | 0.50 | 100 | 16.0 | 84.0 |

Note: IIT ... intra-industrial trade, VIIT ... its vertical component, and HIIT ... its horizontal component.

- There is, however, no confirmation of a direct link between differences in income distribution and VIIT, neither in panel A nor in panel B. This result contradicts findings of empirical work on other parts of the world. However, the data set used requires some significant improvements that could yield better results in further tests.

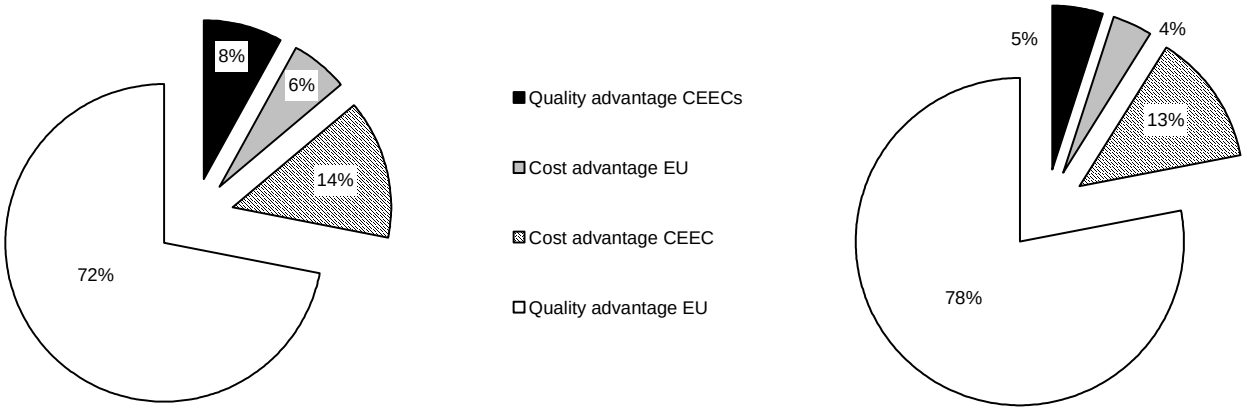



**Chart WP 2.1 Distribution of vertical intra-industrial trade on quality and cost elements in trade between the EU and CEECs and one group, 1993 and 2000**

The concept of a 'quality-product-cycle' includes implicitly an evaluation of catch-up possibilities in terms of productivity and income. The product cycle includes a process through which the productivity gap may not be (completely) closed. Catching up may not be possible. However, the existence of a product-quality-cycle in trade between unequal partners does not exclude 'technological upgrading', as imported technology always implies higher levels as compared to indigenous technology. In this respect, it will be important to analyse the role of FDI and technology policy. It is a striking fact, that most FDI inflows into the EU candidate countries occurred in panel A, the fraction of intra-industrial trade where the product-cycle hypothesis has been tested most successfully. Then, FDI could contribute to an upgrade in terms of technology and income, but may not necessarily be sufficient for economic catching up.

**...hence attracting FDI could prove to be less efficient as compared to supporting technological development**

In terms of economic policy, the main conclusion would be that strengthening the role of technology policy in the new member states could probably be more efficient as compared to attracting FDI. The assumed influence of income distribution did not play a relevant role in this analysis, hence re-distributive policies are predicted to not contribute significantly to improving catching up potentials. Finally, the analysis suggests that pure reliance on a cost comparative advantage (*e.g.* via wage costs) could effect an intensification of vertical intra-industrial trade structures, giving

support to the persistent product-quality-cycle, already suggested in the analysis of the recent past.

*WP 1+2 Amalgamation of workpackages 1 and 2*

**Technical progress in amalgamation of results for WPs 1 and 2**

The amalgamation effort of results for workpackages 1 and 2 therefore proved to be much less straight forward than expected. Never-the-less, some interesting indication of how to read domestic specialisation patterns and foreign trade specialisation patterns in terms of potentials for productivity growth were found. In particular, the results of the simultaneous assessment of domestic and foreign trade specialisation was used to refine the results generated in WP1 on the potentials for future manufacturing productivity growth.

**"Learning-by-exporting" vs "self-selection"**

This analysis started from the assumption that small, less developed and open economies would typically experience their foreign trade sectors as engines for productivity growth as predicted in the development literature. This concept of export-led growth corresponds to the micro-level theory of "learning-by-exporting": here, firms accumulate experience from exporting which then lead to product and production improvements. The opposite alternative concept of "self-selection" would envisage firms maturing on the domestic market with the most competitive ones successfully exporting their domestically tested produce. This concept, however, appears less relevant for our new member states, mainly due to their typical export orientation which result from westward integration and their usually smaller domestic markets. The distinction underlying the two concepts is obviously the direction of causality.

If, in the export-led concept, technology transfer (from spread effects) is typically most pronounced between comparable (industrial) branches, then one could hypothesise that productivity growth is fastest, where the pattern of foreign trade specialisation closely mirrors the specialisation displayed by domestic production. This hypothesis was tested empirically.

**Table WP 1+2.1 Differences in specialisation patterns between domestic production and foreign trade**

| | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|
| Estonia | 14.0 | 13.8 | 13.5 | 13.3 |
| Poland | 22.0 | 22.1 | 22.3 | 22.4 |
| Czech Republic | 13.7 | 16.5 | 19.2 | 22.0 |
| Slovak Republic | 22.3 | 26.5 | 30.8 | 35.0 |
| Hungary | 21.3 | 23.0 | 24.8 | 26.5 |
| Slovenia | 24.7 | 24.3 | 23.8 | 23.4 |

Notes: Difference indicators measured as EUCLID-deviation index. Original values for 1995 and 1998, values for 1996 and 1997 are extrapolated.
Sources: EUROSTAT (CRONOS), WIIW, National Statistical Offices.

In a first step, the degree of correspondence between domestic and foreign trade structures was assessed by use of a standard deviation-measure (EUCLID) for each of the six new member states. Here, the focus was on manufacturing industries: most tradeables are in fact to be found in manufacturing, and trade in (unprocessed) agricultural produce can be expected to be heavily distorted by the effects of European Common Agricultural Policy on prices and volumes. Differences between specialisation patterns in domestic production and foreign trade are presented in table WP 1+2.1. In the second step, the EUCLID-deviation indices are correlated with their corresponding industrial productivity growth rates (because normal distribution cannot be assumed, a non-parametric correlation analysis was conducted). The

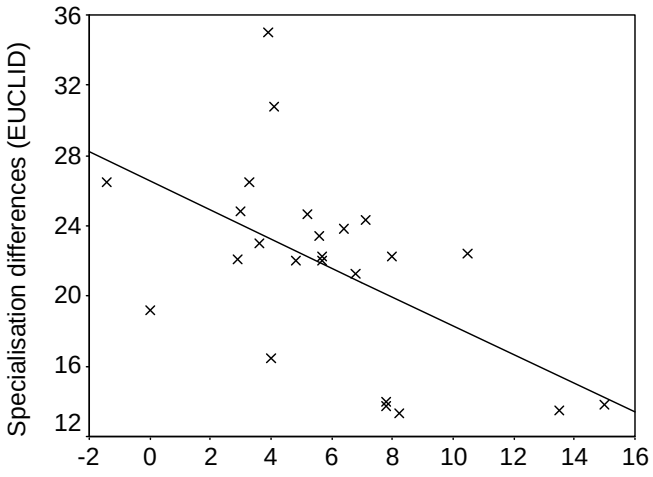
results of this correlation exercise suggest that there is a statistically significant negative and linear relationship between the EUCLID-indices and productivity growth with a coefficient of -0.55 (with an error probability of less than 1 *per cent*). Chart WP 1.1+2 provides a graphical account of this correlation.

The same test was conducted for a comparison of skill-intensity differences as an alternative to specialisation differences. The resulting correlation also turned out to be statistically significant and negative with a correlation of -0.60 (again with an error probability of less than 1 *per cent*), lending further support to the hypothesis.

The above hypothesis was therefore tested positively for our selection of the new member states for the years of 1995 to 1998: if manufacturing productivity growth in CEECs is in fact driven by exporting, then productivity growth is fastest, where the pattern of foreign trade specialisation closely mirrors the specialisation displayed by domestic production. From this follows that the higher the proximity between the structure of domestic production and of exports and the faster the convergence of those two structures, the better the prospects for future industrial productivity growth.

**The amalgamation effort can serve as a way to refine the potentials estimated in WP1**

Returning to table WP 1+2.1, we could conclude that -in this analysis-, Estonia appears best suited for fast industrial productivity growth, displaying the lowest diversion indices and a (albeit weak) structural convergence trend. However, when considering that the Estonian manufacturing sector is highly concentrated on a small number of branches, this result becomes somewhat weaker. In the analysis of growth potentials by assessment of domestic specialisation patterns only, Estonia's potential was the weakest. This result can now carefully be corrected somewhat upwards.




**Significant negative relationship between specialisation differences and industrial productivity growth**

**Chart WP 1+2.1 Scatter diagramme between specialisation differences and industrial productivity growth in CEECs, 1995 - 1998**

Sources: EUROSTAT (CRONOS), WIIW, National Statistical Offices, own calculations.

**As a result, Estonia, Poland and the Czech Republic can be assessed slightly better than was the case in WP1...**

Poland was also assigned a weak potential for industrial productivity growth in the analysis of WP1. In this analysis, Poland's prospects appear slightly better: diversion indices are below average and have remained largely unchanged throughout the period of observation. However, Poland has large home market and hence our assumption of export-led growth and the implied direction of causality for productivity growth roots from foreign trade to domestic production is weaker. Still, we can

conclude that prospects for Polish manufacturing from WP1-analysis can also be corrected upwards slightly.

In the cases of the Czech and Slovak Republics, the structural differences between domestic production and foreign trade increased markedly between 1995 and 1998. In the Slovak Republic, the index is additionally much higher than in any other of the countries assessed. Those results would suggest a rather pessimistic assessment of future industrial productivity growth potentials for the Slovak Republic, and slightly better ones for the Czech Republic. However, the vast growth of the deviation indices are in both countries mainly due to increases in technology-driven industries. This is particularly pronounced for the Slovak Republic, shedding a more positive light on growth prospects for both countries in general and the Slovak Republic in particular.

**...the Slovak Republic and Slovenia slightly worse...**

In the analysis of WP1, the Slovak Republic achieved particularly high potentials for future productivity growth, the Czech Republic rather average potentials. The results of the latest analysis therefore suggests to correct the very positive assessment for the Slovak Republic somewhat downwards, and the assessment for the Czech Republic slightly upwards. Hungary displays slightly above-average deviation indices and a mild increase of those during the period of observation. This result corresponds well with the results from WP1. In both cases, Hungary's prospects for future industrial productivity growth are not spectacular, yet positive. Slovenia displays a weak structural convergence trend between domestic and foreign trade specialisation, and the deviation level is marginally below-average (also a small country, its manufacturing industry displays an only weak concentration). This would assign the country a slightly less preferable potential for future industrial productivity growth as compared to the analysis of WP1. The amalgamation effort can serve as a way to refine the potentials estimated in WP1. As a result of this, Estonia, Poland and the Czech Republic can be assessed slightly better than was the case in WP1, the Slovak Republic and Slovenia slightly worse. The new analysis does not suggest to alter the assessment for Hungary.

**...the new analysis does not suggest to alter the assessment for Hungary**