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EU-Integration and Development Prospects of CEECs

The Productivity-Gap and Technological Structural Change

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Abstract

The discussion paper is an analysis into the effects of integration of Central East European (CEE) economies into the World market in general and the economic region of the European Union (EU) in particular.

Despite acknowledging that there is no alternative to integration for CEE economies as a condition *sine qua non* for catch-up development for transition economies, the paper embraces the possibility of integration itself resulting in the peripheralisation of the weaker integration partner against the core of the EU. By assessing the structural impact of the integration process up until now on the development of the productivity gap between individual transition economies and the average of the EU, the paper aims at determining which transition economy can be expected to benefit from further integration into the international division of labour, and for which some (structural) political support can enhance the conditions for the closure of the productivity gap.

Following a theoretical review of integration theories, the paper analyses structural change at branch-levels for the Czech Republic, Hungary and Poland in four classes of comparable technological sophistication and concludes that solely Hungary's development since 1992 indicates sufficient potentials for further productivity increases to expect the economy to benefit from further integration. In the cases of the Czech Republic and Poland, the analysis carefully suggests specific structural policy-measures.

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Keywords: Integration Theory, Technological Development, Structural Change, R&D-Intensity, Catch-up Development

Contents

Introduction

Not least since the Copenhagen summit in June 1993 first officially invited the Visegrád-four to submit their applications for European Union membership to thereby engage into a new round of an eastern enlargement of the European Union (EU), the economic profession engaged in extensive research into the effects of integration for both partners. Dominated by the orthodox conceptualisation of economic integration as a matter of economic welfare, most research dealt with the potentials for efficiency gains and the intensification of foreign trade, concluding that integration would be advantageous for all partners. In particular, most economists from Central East Europe treat an early EU membership as a preferential condition of economic development in their region. A scenario in which an unprotected, early integration of transformation economies might result in a divergence of levels of economic development between the EU and its new members, i.e. their peripheralisation, never advanced to the forefront of the agenda of EU membership for CEECs. Few theory-guided research has so far been published on the possible dangers of an early or premature integration, overburdening the current state of competitiveness of the transformation economies in Central East Europe. Yet, the obvious experience which can be drawn not least from the East German case of a shock-integration of a transformation economy highlights that such a scenario of premature integration has to be taken seriously: the possibility of a European 'Mezzogiorno' in the East is just as relevant as the widely-acknowledged possibility of a German 'Mezzo-giorno'[1] in the East.[2]

Having just concluded an era of autarky from the western world, there however cannot be an alternative in the long term for CEECs to integration into the world economy in general and the EU in particular. They do have, however, an alternative over the speed and structural components of further steps of integration, namely the point of time of fixing exchange rates within ERM (and eventually EMU), as well as further liberalisation and deregulation of markets (leading to intensifying competition with respect to the flow of goods and factors) and the intervention of the state in favour of competitiveness of domestic producers (industrial policy). Premature integration would describe a scenario in

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1 Refer to e.g. Hall and Ludwig (1993), Hallett and Ma (1993), Kammerer (1991), Kaser (1998a and 1998b), Nolte and Sitte (1995).

2 In particular, the malaise of the East German example of catch-up development cannot be attributed exclusively to the revaluation of the GDR-mark vis-à-vis the German Mark of the Federal Republic: whilst a normal revaluation changes the relation between external prices and domestic costs only, the German monetary union altered all prices and costs simultaneously and to a comparable extent (Stephan 1999).

which the economy is not granted sufficient time to fit itself for the complete overhaul of virtually all conditions determining the processes of production, investment and consumption, that is not least to fit itself for intensified competition, be it to accommodate catch-up in terms of productivity or a gradualisation of the necessary structural adjustment.

The paper is organised as follows. An excursus into the theory of economic integration with particular reference to the peculiarities CEECs is necessary to debunk some of the over-optimistic assumptions with respect to the integration of CEECs into the EU. A critical analysis of integration theories and their application on the cases of CEECs highlights the paramount importance to be attached to the respective levels of productivity between the CEECs and the EU, as well as their development. In particular, this part leads to the underlying hypothesis of the paper: a sufficiently low and narrowing gap between the respective productivity levels of integration partners is a condition *sine-qua-non* for integration to be development enhancing, i.e. to allow *per capita* incomes to converge. This is essentially a structural argument (evolving international division of labour) and is concerned with the size of potentials for further productivity increases as determined by the pattern of branch specialisation of domestic production (quite independently of technology-import and diffusion). Because it is beyond the scope of the paper to actually be able to quantify the minimum level of the productivity gap that is necessary to postulate that integration will be development enhancing, the focus will be on whether integration so far has already led to a partial closure of the gap or rather not. In the case of stagnation despite the quite significant extent of integration and time that passed until today, the paper assumes that further integration cannot be expected to improve the conditions for catch-up development.

Part 2 provides an empirical picture of the actual size and development of the productivity gap between some CEECs and the average of 15 EU economies. Part 3 serves to explain the reasons for a focus on endogenous sources for productivity increases in this paper. The empirical analysis in part 4 finally assesses past technological structural change in CEECs and attempts to interpret the results in terms of potentials for future productivity increases, hence the chances that further integration into the EU will yield favourable results, convergence in *per capita* income levels.

1 Excursus into Integration Theory with Reference to the Peculiarities of CEECs

When concerned with the topic of economic integration and its effects on all integration partners, the economic profession predominantly concentrates on basically three main

strands of integration theories: one is Ricardo's notion of 'comparative advantages'. It focuses on productivity differentials both between different products in one economy and between the domestic economy and the world market. It grants economies that suffer from relatively higher production costs ('absolute' disadvantages) a 'competitive' advantage for some products (beginning with the highest productivity products) by way of a downward adjustment of a foreign trade-determined exchange rate (which governs the process of specialisation by balancing the aggregate values of exports and imports): the exchange rate of the economy dominated by absolute disadvantages will devalue to transform absolute disadvantages of some products into competitive advantages. 'Comparative' advantage involves a double comparison: one of relative prices, i.e. between goods in one economy, and second between the domestic price and the one on the world market for each good. Integration serves to deepen specialisation, and welfare benefits for all integration partners lie with the benefits of specialisation. The application of Ricardo's concept of comparative advantages on the case of CEECs is however riddled with the problem that it crucially depends on the assumption of a 'neutral' exchange rate which adapts to the changing pattern of international trade. CEECs typically use exchange rate policy to support monetary stabilisation, exchange rates therefore tend to be overvalued, incapable of balancing aggregate values of imports and exports. Furthermore, the exchange rate is not solely governed by foreign trade of goods and services, but also by cross-country capital movements. CEECs typically experience capital import surpluses (portfolio and foreign direct investment) effecting higher exchange rates than required to balance imports and exports. Current account deficits are the result and recurrent foreign trade deficits increase foreign indebtedness.

What we can infer from the concept of 'comparative advantages' is that integration will increase welfare in all integrating partners compared to a scenario of autarky, but only if exchange rates are sufficiently downwards adjustable as called for by Ricardo's concept. The concept, moreover does not extend from this comparative-static analysis. It remains open, what effects the pattern of specialisation is likely to have in a more dynamic view.

This is the focus of the Heckscher/Ohlin theory. It assumes that specialisation through foreign trade is governed by relative factor endowments, as each economy specialises on the production that uses more intensively abundant production factors. Usually, this concept is used to allot CEECs the labour-intensive, low wage fraction of production in the international division of labour of an enlarged European economy. The Samuelson/Stolper-argument, i.e. the contention that such specialisation will lead to converging factor prices (thereby constituting economic convergence via integration) is a result of the assumption that the capital-intensive economy suffers from higher production

costs of labour-intensive products, because wages per interest rates are higher compared to the relative wage-interest costs in the labour-intensive economy. Following foreign trade and specialisation, the price for labour-intensive products will converge upwards in the labour-intensive economy and downwards in the capital-intensive economy. Given equal productivities, wages will equalise. If productivities differ, however, and more specifically, as soon as the price disadvantage of the capital-intensive economy for the labour-intensive product disappears, the factor price equalisation-case does not hold any more

A further problem with this concept is rather a 'strategic' one: an economy that specialises on labour-intensive production may find itself trapped in an unfavourable position of international division of labour, in which only little potentials for productivity increases exist. Productivity levels therefore can be expected to diverge, and the factor price-equalisation mechanism will at some point fail. A model backing this case, can be found in Snower's concept of a 'low skill, bad job-trap' (1994). It shows that an economy, specialising in low-wage production may find it increasingly difficult to upgrade the quality of jobs it is generating and hence may prove unable to further close the productivity gap *vis-à-vis* higher developed economies. A formal analysis is provided to describe the possible scenario of a vicious circle of low productivity, deficient training, and inefficient skilled jobs. Assuming, as suggested by Snower, that 'low skill jobs' go hand in hand with low remuneration (i.e. wages, earnings *and* profits), his theoretical concept can already consistently explain the inability of an economy to catch up in terms of per capita income, when specialising according to the criterion of relative factor scarcities.

It is mainly to the credit of the 'New Trade Theories' and 'New Growth Theories' that the possibility of detrimental effects of economic integration have entered the theoretical agenda. The strength of these theories lies in their ability to explain what determines convergence or divergence of levels of economic development as consequences of the process of integration. Favourability of integration stems primarily from specialisation of economic regions on particular groups of economic activity, giving rise to internal and external scale economies, agglomeration advantages, optimisation of transport costs, as well as acceleration on the learning curve. To reap significant scale economies, specialisation has to be deep. Eventually, foreign trade between equal partners (the criterion being similar levels of productivities) involves the shift from inter-industrial trade between vertically integrated own-producers (as predominant in transition economies) to intra-industrial trade between horizontally interacting producers. Typically, however, intra-industrial trade tends to deepen existing strengths and regional concentration. Agglomeration advantages in firm-clusters can serve as 'head-start' in competition against emerging competitors (either newly set up firms or firms new to the regional market due to

integration). Conditional to the decision on (re-)location is the already existing level of development (quality of labour force, level of productivity, infrastructure, etc.) and a sufficiently large home market. The process of restructuring following integration therefore is to some extent governed by "a strong arbitrary accidental component to international specialisation" (Krugman 1991, p. 9), i.e. by what he termed the 'historical accident'.

Until today, the economic profession remains rather hesitant in considering the possible effects described by these theoretical concepts when assessing expectable effects of future integration in general and the integration project of CEECs in particular (for exceptions, see e.g. Gabrisch/Werner 1998, Riese 1996, Tichy 1997). This despite the fact that in reality, integration projects not always led to convergence but often enough also clear divergence.[3] The conclusions to be drawn from these concepts is that integration does not by itself constitute a sufficient condition for the equalisation of factor prices and convergence of *per capital* income levels, hence levels of economic development.

Clearly, the historical conditions work to the detriment of CEECs against the EU (refer to Tichy 1997 for a comprehensive analysis). Whilst they would probably command a sufficiently large market when embracing intensified integration amongst themselves (concept of a 'double-fold integration': Hölscher/Stephan 1997 and Dangerfield 1999), large differences in the quality of produce and productivity hamper the deepening of intra-industrial trade.[4] Hence, further steps of integration of CEECs into the EU at the current state of affairs might well be to the detriment of development prospects in CEECs. Positive effects of further integration hinge first on the extent of future productivity increases (closing the gap between the levels in the EU and the ones in CEECs), and additionally on a sufficiently low exchange rate to grant CEECs a competitive edge for their enterprises to sustain intensifying competition.

What we can learn from the above assessment are basically two insights: first, theories of integration do not necessarily predict welfare gains for all integration partners. Rather, an alteration of a few assumptions to more realistic conditions can yield the opposite effect of integration. Integration, therefore, is not *per se* a guarantee for economic convergence, but also contains the danger to actually effect economic peripheralisation. Further extensions and/or specifications to match conditions in the economies involved in the integration

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[3] Whilst Barro/Sala-i-Martin (1991) make their case that, in the aggregate of all integration projects, integration itself has yielded a convergence coefficient (ß) of some 2 per cent, their analysis of poorer regions in the EU proves on the contrary that divergence has grown.

[4] Research trying to identify the extent and development of intra-industrial trade between CEECs and the EU come to the conclusion that until today, trade between CEECs and the EU exhibit strong signs of persistent inter-industrial trade (Gabrisch/Werner 1998).

process are therefore necessary to generate more realistic information on expectable effects of integration. Second, the criterion of a sufficiently low productivity gap determines to a significant extent the favourability of integration where catch-up in terms of economic development rather than peripheralisation is the eventual goal.

With respect to the integration project of CEECs, these theoretical assessments allow us to assume that the extreme of premature integration of transformation economies might result in the smaller and weaker partners being peripheralised against the EU. Favourability for individual transition economies depends primarily on the actual size and development of the productivity gap.

2 The Size and the Development of the Productivity Gap

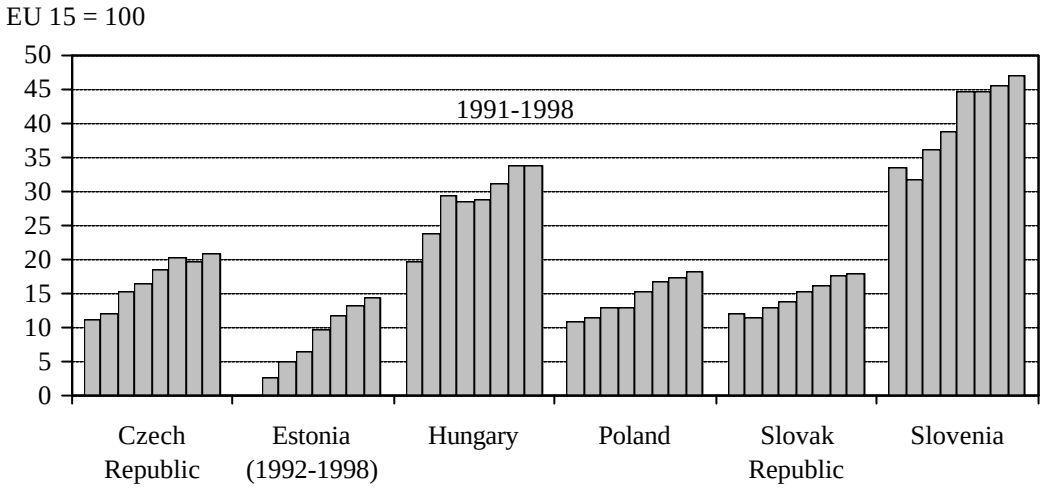
This paper focuses on the sufficiently robust stylised fact derived not least from the German experience, namely that the productivity gap[5] appears to be a persistent phenomenon in the special case of transformation economies. At least in the German case, the persistency of this gap may prevent economic catch-up in terms of income per capita: within a monetary union, competitiveness predominantly depends on the level of efficiency in production (hence productivity), as prices and costs can be expected to converge. Aggregate national income in the region disadvantaged by the lower level of productivity will have to correspond to the productivity gap. For as long as the economies in East Central Europe use their exchange rate pegs in favour of monetary stabilisation, the mechanism from the monetary union case holds here as well: aggregate national income per capita, the usual measure for the level of economic development, and hence the target for catch-up development, can only rise at the same speed as productivity increases. The closure of the productivity gap advances to a condition *sine qua non* of catch-up development.

Chart 1 provides an overview of the respective sizes of productivity gaps of six selected economies in Central East Europe against the average productivity level in the 15 EU economies. For reasons of comparability, the respective levels of productivity were converted into the common currency of ECU at average annual market exchange rates

[5] The properties of this gap have been analysed at length by the Institute for Economic Research Halle (IWH). The results can be found in numerous recent articles in "*Wirtschaft im Wandel*". In general, the gap is estimated to have narrowed from some 65 to 70 per cent down to slightly less than 40 per cent within only a few years but stagnated henceforth.

(due to the under or overvaluation of CEEC-currencies, some distortion of results are possible).

Chart 1 Closing the Productivity Gap



Note: Productivity approximated by GDP per total employment.
Source: Eurostat, *Europäische Wirtschaft* No. 65, WIIW Database, own calculations.

All economies show dear signs of increasing average productivity levels, relative to the simultaneous increase in the EU economies, i.e. definitely a closing of the gap. The levels, however, remain significantly far apart and no intra-CEEC convergence can be observed so far: Slovenia and Hungary exhibit the highest levels, reaching 47 and 34 per cent respectively of the average EU level in end 1998. The Czech and Slovak Republics and Poland show very similar levels and trends. Their gaps are significantly higher, some 20 per cent of the EU average. Estonia, showing the biggest productivity gap, started from an extremely low level in 1992, was able to increase its average labour productivity at the highest rates within this sample and today compares with the second group comprised of the Czech and Slovak Republics and Poland. This picture clearly shows that significant further productivity-increases are necessary to achieve levels comparable to the average of economies in the EU. With respect to integration theories, this supports the case that the particularity of a sizeable productivity gap definitely needs to be addressed in the set of assumptions.

3 The Focus on Endogenous Productivity Increases

What appears to command paramount importance with respect to the determination of effects of further integration, lies with the size and development of the productivity gap. Several factors determine the development of the average productivity level: first, the

productivity gap in CEECs can be held to be a result of the less advanced transition economies using inferior technology in across-the-board production. Hence, the transfer of technology from East to West through foreign direct investment and the imitation of high-tech produce from the West can improve productivity levels. It remains however uncertain, whether the productive entities in the CEECs are actually able to absorb such foreign and as yet unknown, hence unincorporated technology (absorptive capacity) and whether the installation of such will produce sufficient externalities to allow other producers to benefit (diffusion).

The second factor stretches beyond such across-the-board improvements of production or product technology but is rather concerned with increases in average productivity-levels through structural change: intensifying integration will trigger structural adjustment processes, thereby assigning CEECs a particular position within the international division of labour relative to the EU. The evolving pattern influences the potentials for future productivity increases: a specialisation of CEECs on branches with relatively lower technological sophistication can be associated with lower potentials for productivity increases and vice versa.

An association of productivity growth and structural change can be found in the theoretic literature in the context of 'logistic growth path' models (e.g. Cornwall and Cornwall, 1994). Usually aimed at the long term, these models describe a typical connection between the productivity level and the pattern of structural specialisation. Applied to short term structural change, this concept is able to describe how structural change in the integration process entails *endogenous* productivity increases, a task ventured by the most recent literature of New Growth Theory (e.g. Grosman and Helpman).

The transformation economies in Central East Europe still enjoy considerable potentials for structural change, as their own era of autarky gave rise to and cemented a specific structure of production and specialisation. Whilst such heritage today burdens the economies in Central East Europe, the newly emerging patterns, following the dissolution of the old ones, entail the chance to embrace structural change as an engine for endogenous productivity increases (Schumpeter's concept of 'creative destruction').

The aim of the empirical part 4 of this paper is to assess the relative potentials of future productivity increases between the Czech Republic, Hungary and Poland as determined by the emerging pattern on branch-specialisation.[6] Assuming that R&D in enterprises increase

[6] So far, empirical data could only be used from these economies and for the periods of 1991 to 1998 (1992 to 1998 in the case of Hungary). Further research extending the selection of transition economies, the period of analysis as well as further disaggregation of branches will follow in the near future.

the potentials of productivity growth via product and process innovation, then branch-specific levels of 'technological sophistication' (measured in R&D-intensities) can provide the necessary criterion for the relative sizes of potentials of productivity growth of the respective branches. Hence, by looking at the respective patterns of specialisation emerging today, as well as past R&D expenditure at branch levels, this method can inform about the relative size of potentials of individual CEECs to close the productivity gap via 'technological structural change'.

This rather innovative approach could not only provide policy makers with the necessary information to conduct integration and development-consistent economic policies, but also helps to determine whether a specific economy can be trusted to benefit from further integration by assessing past achievements in such structural change in relation to the current state of affairs.

4 R&D-Intensities and the Pattern of Technological Structural Change

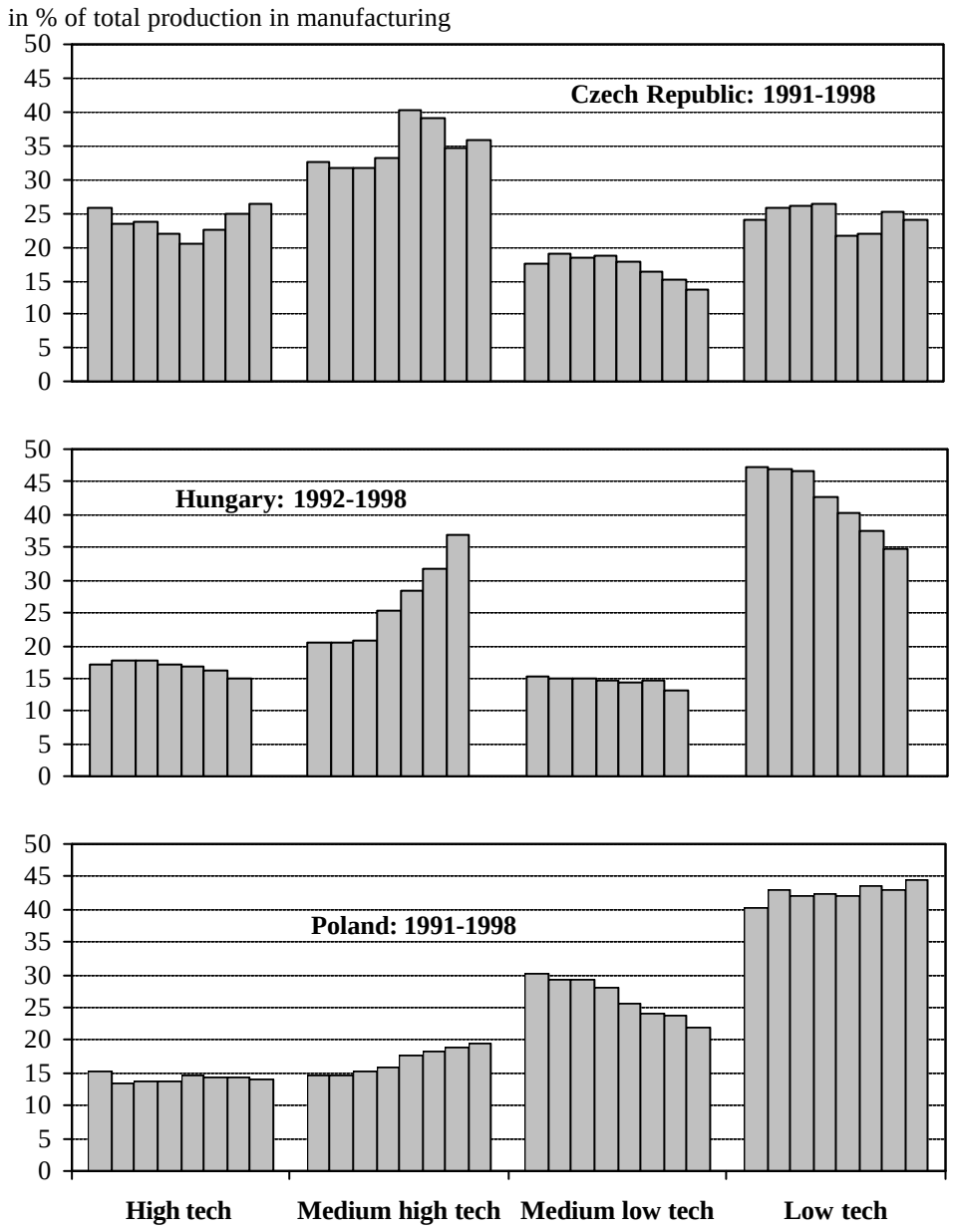
As criterion of branch-classification for the analysis of technological structural change, the analysis applies the measure of R&D-intensities. R&D-intensities are calculated according to the method suggested by the OECD (1992, p. 125) and concern exclusively the manufacturing sector of the economy, as here the nexus between structural change, R&D-driven technology, and productivity growth or potentials thereof can be assumed to be most direct.

In following the contention of the OECD that industry-specific R&D-intensities in the West exhibited significant instabilities, i.e. that industry-branches frequently switched between the classes of high technology, medium technology and low technology, four rather than three categories were considered in order to provide branches at the margins between classes with an own classification. The table in the annex provides a list of ISIC two-digit branches in the three selected economies of the Czech Republic, Hungary and Poland together with their individual R&D-intensities and their subsequent classification.

Technological structural change can then be identified as shifts of relative weights of these classes in total production, in other words: a pattern of specialisation in the manufacturing industry towards higher or lower technology branches. According to the theoretical reflections outlined above, the assumption is that a growing share of the high technology and medium-high technology classes (at the expense of the medium-low technology and low technology classes) - as positive technological structural change - inherently increases

the potentials for future productivity increases, hence potentials for catch-up in terms of income per capita.

Chart 2 Technological Structural Change in the Czech Republic, Hungary and Poland - 4 Classes of Manufacturing Branches



Source: OECD (1997) and National Statistical Offices, own calculations.

Chart 2 depicts the development of relative shares of classes between the years of 1991 (for Hungary: 1992) up until 1998. Undoubtedly, the Czech Republic accumulates the highest shares in the two classes of high and medium high technology combined. On a more dynamic view, however, not much structural change over the period of time

observed can be diagnosed; there has been some mild shift in shares from branches of medium low to branches of medium high technological sophistication: the sum of the shares of the two branches of higher technological sophistication increased by a mere 3.8 percentage points. Despite the opening of the economy to foreign competition and despite the Czech Republic having undergone the typical 'transformational recession' and subsequently strong economic growth, structural adjustment in manufacturing has been comparatively remote. More or less the same is true for Poland, albeit involving slightly more dynamics. While the medium low class contracted by 8.1 points (3.8 points in the case of the Czech Republic), the medium high class expanded by 4.9 percentage points (Czech Republic: 3.2). Some of this contraction in the Polish case, however, did not occur to the advantage of a class in higher technological ranking, but rather benefited the low technology class: while in the Czech Republic, technological structural change involved a specialisation away from medium low tech branches towards medium high ones, it is the medium high as well as low tech classes that gained in Poland - an ambiguous picture. In general, however, the structure of Poland's manufacturing industry features a clear dominance for branches of lower technological sophistication, the combined shares of the two lower technology classes amounts to approximately two thirds.

Quite to the contrary, however, Hungary exhibits strong positive technological structural change between 1992 and 1998: starting off in 1992 with a clear bias for the two classes of lower technological sophistication, this picture had reversed by 1998, when the combined shares of the two higher classes reached 52 per cent of the total of manufacturing industrial sales (an increase of 14.5 percentage points). Hungary's technological structural change in the manufacturing industry essentially involved a specialisation away from branches of low technological sophistication towards such of medium high technological sophistication. The latter class increased its share by 16.5 percentage points, while the low tech class contracted by 12.6 points. The two classes of high and medium low technology merely stagnated.

The development of branch shares in total manufacturing sales within the individual technology classes discloses what branches have been causal to the decline or rise of shares in different classes (see the table on the following page). The relative decline of the medium low technology class in the Czech Republic, the most obvious technological structural change in that economy, can mainly be attributed to coke, refined petroleum and nuclear fuels (ISIC 23), which lost 2.6 percentage points in shares between 1991 and 1998. Growth in the medium high class was driven mainly by basic metals (ISIC 27) and fabricated metal products (ISIC 28), together gaining 1.6 points.[7] Rubber and plastic

[7] Interestingly, the classification of the OECD for the average of all OECD economies allocates both ISIC 27 and 28 to the low technology class. In the Czech case, the higher classification is due to

products (ISIC 25), allocated in Czech's high technology class, grew by 2.1 points, this was alleviated though by a reduced share of machinery manufacturing (ISIC 29), which fell by 2.4 points.

In the case of Poland, the declining share of the medium low class was effected by coke, refined petroleum and nuclear fuels (2.8 points), as was the case in the Czech Republic, as well as basic metals, which fell by 2.3 points. The increase in the share of the medium high technology class can be attributed mostly to the manufacture of motor vehicles and trailers (ISIC 34), increasing by 4 percentage points. No significant increase or decline can be observed in the individual branches of the Polish high technology class.

Table Branches Gaining and Losing from Structural Specialisation

		Specialisation gainers	Specialisation losers	
Czech Republic	+ 2.1	Rubber and plastic products	Coke, refined petroleum and nuclear	
	+ 1.6	Basic metals, fabricated metal	fuels	- 2.6
		product	Machinery manufacturing	- 2.4
Hungary	+ 11.4	Motor vehicles and trailers	Food products and beverages	- 9.7
	+ 7.2	Office, accounting and	Chemicals and chemical products	- 6.6
		computing machinery	Coke, refined petroleum and nuclear	
	+ 4.4	Radio, TV and communication	fuels	- 5.0
Poland	+ 4.0	Motor vehicles and trailers	Coke, refined petroleum and nuclear	
	+ 1.6	Publishing and printing	fuels	- 2.8
	+ 1.5	Rubber and plastic products	Basic metals	- 2.3

Note: figures are percentage points change of relative shares in total manufacturing sales.

In Hungary, structural change not only involves a clear specialisation towards branches of higher technological sophistication, but is also more dynamic than in Poland or the Czech Republic: the marked decline in shares of the low technology class in Hungary can be attributed nearly exclusively to the relative decline in the manufacture of food products and beverages (ISIC 15), which lost 9.7 percentage points. The immense increase in shares of the medium high technology class is due to motor vehicles (11.4 percentage points), as was the case in Poland, as well as office, accounting and computing machinery (ISIC 30), which grew by 7.2 points. Within the same class, however, the share of coke, refined petroleum and nuclear fuels fell by 5 percentage points. Were this branch to be counted as a medium low technology industry (in the Czech Republic and Poland as well as in the OECD, this branch belongs to the medium low technology class), the positive technological structural change in Hungary would be more obvious still. Within the high

higher initial R&D expenditure, probably reflecting the necessary technological upgrading of the old industrial capacities. In general, there are some marked differences in some classifications between OECD and CEE economies as there are differences between CEE economies.

technology class, the radio, TV and communication equipment industry (ISIC 32) increased its share by 4.4 percentage points. At the same time, however, the 6.6 points decline of the share of chemical industry (ISIC 24) effected the modest decline of the aggregate share of the high technology class.

The results of this analysis indicate marked differences between the three economies. Hungary's pattern of technological structural change involves a clear and strong specialisation towards branches of medium high technological sophistication at the expense of branches of low technological sophistication. According to the assumptions made in the paper, this would indicate that Hungary can expect to bear significant potentials for future productivity increases: while branches that grew with the highest rates have also experienced high R&D expenditure in relation to sales, it is branches with only little R&D effort in relation to sales which grew the least or contracted most. Short term potentials for productivity increases can therefore be expected to be sizeable. In particular, all specialisation gainers can be considered branches of medium high and high technological sophistication also in OECD economies. Assuming that the Hungarian technology-classification will in the medium to long term converge to today's OECD classification (as industries develop, they will exhibit typical intrinsic R&D intensities which depend solely on the industry rather than the economy they are situated in), then medium to long term prospects for productivity increases are good as well. Economic transformation and integration of the Hungarian economy up until now effected this clear pattern of structural change that can unambiguously be considered a favourable pattern of specialisation in international division of labour. If further integration deepens that specialisation pattern, then the prospects for a productivity catch-up are good.

This clear picture cannot be inferred from the analysis of the Czech Republic. Here, the pattern of specialisation is not as clear as in the Hungarian case and less pronounced. Moreover, the branches which gained most in the course of structural change would be considered medium low and low technological industries in OECD economies. Given, however, that branches of higher technological sophistication combine the highest shares in manufacturing production in the Czech Republic as compared to Hungary or Poland, the prospects for future productivity increases in the short term are not too bleak. With intensifying integration, longer tem potentials for productivity catch-up through structural change, however, are rather low. It could be held that further integration without some structural policy could allocate the manufacturing industry of the Czech Republic an unfavourable position in the international division of labour which could prevent economic catching up. Structural policy could favour for example branches like office, accounting and computing machinery (ISIC 30), electrical machinery and apparatus (ISIC 31), radio,

TV and communication equipment (ISIC 32), medical, precision and opticals, watches and clocks (ISIC 33) as well as the chemical industry (ISIC 24), as these branches are already of relevant size and enough R&D effort had gone into these branches to support a classification as medium high tech industries. With respect to the longer term prospects, these branches would also be considered high and medium high tech industries according to the OECD experience. These branches have experienced only modest growth until today albeit growing shares in total manufacturing, and are therefore specialisation gainers.

The picture for Poland is different from the ones for Hungary and the Czech Republic yet: accumulating the lowest share of branches of higher technological sophistication in manufacturing amongst the panel analysed in this paper, technological structural change does in fact exhibit a clear trend favouring medium high tech industries at the expense of medium low tech ones. However, also the share of low tech industries clearly grew. Just as ambiguous is the picture inferred from the table: the classification according to OECD experience of specialisation gainers in Poland ranges from medium high to low tech industries, the ones for Polish specialisation losers, however, would also be considered medium low and low tech industries in OECD economies. For Poland, the analysis would therefore suggest that long term prospects of future productivity catch-up through structural adjustment are quite positive, while short term potentials for productivity increases due to today's specialisation pattern are rather low. Here again, there is a case for structural policy accommodating positive structural effects of further integration: the motor vehicles and trailers manufacturing industry (ISIC 34) is the biggest specialisation gainer, was classified as a medium high tech industry for Poland and would be a medium high tech industry in OECD economies, and has a relevant size. The same is true for electrical machinery and apparatus; radio, TV and communication; and medical, precision and opticals, watches and clocks; although the latter might still be too small an industry in Poland to be counted as 'strategic' industry.

The analysis of this paper might still be considered too unsophisticated to warrant such specific policy advice. Yet, the analysis does indicate that the selected branches of manufacturing industry would be good candidates for structural policy, as they could increase the potentials of their economies to improve the prospects for a closure of the productivity gap. Future research could disaggregate further and assess alternative criteria for the selection of strategic industries. This, however, remains beyond the scope of this paper. Also of interest for future research could be the attempt of an actual quantification of 'potentials for future productivity increases' by using west European economies as benchmark.

Conclusions

Various historical events of premature integration call on the economic profession to engage into further research into both positive and negative effects of integration. Too little effort had so far been invested into determining under what conditions integration can be hazardous to the weaker partner, despite the undisputed gains in terms of intensified trade (division of labour) and efficiency in the allocation of resources.

The review of contemporary integration theory suggested to focus in that respect on productivity, or the closure of the productivity-gap, as a condition for the favourability of further integration and intensified competition. Endogenous productivity increases can be promoted by way of structural change, favourably one which involves a specialisation of domestic economic activity on higher technology branches involving high R&D intensities.

The paper applies the OECD-method of branch-classification according to the criterion of R&D intensities to assess past developments and the current state of affairs. The analysis not only shows that the size of the productivity-gap is sufficiently large to assume significant 'advantages of backwardness' in potential 'qualitative' economic growth. The analysis also comes to the conclusion that with respect to the prospected EU-membership, integration might well be premature as yet for Poland and the Czech Republic. Some structural policy in both economies could improve the conditions for catch-up development via integration. Solely the Hungarian case exhibits simultaneously a promising as well as intensifying extent of specialisation in branches involving higher technologies and can thus be expected to benefit from further intensification of competition by way of integration.

Table: Average [1] Empirical R&D Intensities [2] and technological classification [3] for Manufacturing Industries in the Czech Republic, Hungary and Poland

Manufacturing industry	ISIC	Czech Republic		Hungary		Poland	
		R&D Intensities	classification	R&D Intensities	classification	R&D Intensities	classification
Food products and beverages	15			0.038	low	0.024	low
Tobacco products	16			0.025	low		
	15+16	0.038	low				
Textiles	17			0.045	low		
Wearing apparel, dressing and dyeing of fur	18			0.005	low		
	17+18	0.295	medium low				
Tanning of leather, luggage, handbags, harness, footwear	19	0.259	medium low	0.042	low		
	17:19					0,195	medium low
Wood and cork	20	0.016	low	0.000	low		
Paper and paper products	21			0.036	low		
Publishing and printing	22			0.000	low		
	21+22	0.064	low			0,038	low
Coke, refined petroleum products and nuclear fuels	23	0.181	medium low	0.346	medium high	0.132	medium low
Chemicals and chemical products	24	0.972	medium high	1.953	high	0.812	medium high
Rubber and plastic products	25	1.068	high	0.323	medium high	0.378	medium high
Other non-metallic mineral products	26	0.240	medium low	0.115	medium low	0.119	medium low
Basic metals	27			0.192	medium low	0.221	medium low
Fabricated metal products	28			0.078	low	0.089	low
	27+28	0.411	medium high				
Machinery, n.e.c.	29	1.162	high	0.251	medium low	1.012	high
Office, accounting and computing machinery	30			0.159	medium low	0.117	medium low
Electrical machinery and apparatus	31			0.319	medium high	1.008	high
Radio, TV, communication equipment	32			1.095	high	1.371	high
Medical, precision and opticals, watches and clocks	33			1.189	high	0.497	medium high
	30:33	0.899	medium high				
Motor vehicles, trailers and semi-trailers	34			0.304	medium high	0.497	medium high
Other transport equipment	35			0.038	low	1.666	high
	34+35	2.704	high				
Furniture, other manufacturing, n.e.c.	36	0.386	medium high	0.035	low	0.017	low

Notes: 1) Averages: 1992-1998 for the Czech Republic, 1993-1996 for Hungary and 1994-1996 for Poland. Only for these years, comparable R&D data was available.

2) R&D Intensities have been calculated as sector-specific R&D expenditure as a percentage of total domestic sales.

3) Classification margins: High technology for > 1.000 and 1.000 ≥ medium high ≥ 0.300 and 0.300 > medium low ≥ 0.100 and low technology for < 0.100.

Sources: OECD Basic Science and Technology Statistics 1997, Central Statistical Offices, own calculations.

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