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Industrial Restructuring and Innovation Policy in Central and Eastern Europe since 1990

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1. Introduction

Until very recently, economic development in Central and Eastern European (CEE) countries² has been seen by most analysts in both academic and policy circles as a largely positive if not a very positive story. For example, at the end of 2005, *Business Week* ran a cover story titled “Central Europe – Rise of a Powerhouse”. It has become commonplace to argue that the success of CEE development is mainly due to neoliberal economic policies (liberalized markets, balanced public budget, price stability, low tax burden, and strongly market oriented reforms in all socio-economic sectors) pursued by these countries since the early 1990s. In other words, CEE countries have been poster countries for Washington Consensus policies. Indeed, as we show below, during the entire decade of the 1990s, industrial restructuring and embryonic innovation policies in CEE were largely dominated by Washington Consensus thinking. We aim to show that, **first**, these policies have been a double-edged sword: on the one hand enabling fast and furious industrial restructuring while, on the other hand, locking CEE economies into economic activities with low value added/productivity growth and thus undermining future sustainable growth. However, the impact of accession into the European Union (EU) has been equally pivotal for industrial restructuring and innovation policy making in CEE countries in the 2000s and this process can be summed up as a strong Europeanization of innovation policy in CEE. We aim to show, **second**, that also Europeanization has been largely a double-edged sword for CEE countries. Since joining the EU in 2004 or 2007, and already during the accession process, there is a strong change in innovation policies in many CEE countries towards a much more active role of the state. In this change there is a clear and strong role of EU’s structural funding, particularly the negotiations and planning that comes with it. However, these changes come with specific problems: first, there is an over-emphasis in emerging CEE innovation policies on a linear understanding of innovation (from lab to market) that is based on the assumption that there is a growing demand from industry for R&D (which is not the case because of the structural changes that took place in the 1990s via the Washington Consensus policies); and, second, increasing usage of independent implementation agencies in an already weak administrative capacity environment lacking policy skills for networking and long-term planning. We argue that such Europeanization of innovation policy in CEE, while highly positive in directing CEE to reorient economic and innovation policies towards more sustainable growth, is in its implementation often only deepening and exasperating the existing problems of networking

² In the context of this article, Central and Eastern European countries are the following ten most recent member states of the European Union: Bulgaria, the Czech Republic, Hungary, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.

and coordination. However, both Washington Consensus policies and the process of Europeanization created fertile ground for significant financial fragility to develop in CEE countries during the second half of the 2000s which contributed to the financial woes these countries experience in the current global recession. Underlying both Washington Consensus policies and the impact of the EU on CEE is the assumption that the best intellectual and policy framework to integrate CEE countries into the world economy and secure sustainable growth is a Ricardian comparative advantage framework that assumes that all economic integration are more or less symmetrical and integrative. We show that this is deeply misleading and that this misunderstanding led to deep-rooted cognitive dissonance between policies employed for industrial restructuring and innovation in CEE and actual developments taking place in the private sectors of these countries. This cognitive dissonance is also one of the key reasons why financial fragility was not recognized early enough to counteract it.

2. Methodological note

Following a broadly Neo-Schumpeterian approach, we assume that companies innovate in order to hedge their balance sheets; that is, companies innovate in order to generate revenues and outcompete their competitors, and they do so in a number of ways, e.g. by developing new or improved products, services or by introducing organizational or marketing changes, etc. (See also OECD and Eurostat 2005). In trying to hedge their balance sheets through innovations companies rely on skills and routines they have developed, or as Alfred Chandler called this, companies rely on "learned organizational capabilities" that include technical know-how, management and marketing skill, established networks etc. (Chandler 2005; also Nelson and Winter 1982). These capabilities, however, develop and evolve in a wider context that can be called a national system of innovation that can have a huge variety of features from the legal system to particularities of education and R&D. (See in particular Freeman 1974 and 1987)

We use innovation policies to denote a set of public sector efforts that aims to enable private sector upgrading in terms of technology and skills, but also in terms of a wider set of activities, such as organizational change and capabilities. In other words, innovation policies aim at changing and upgrading patterns and features of private sector learned organizational capabilities.

In what follows, we try to track the evolution of main features of CEE company-level organizational capabilities and of national innovation systems since the 1990s. These concepts serve as rough approximations and heuristic devices to organize actual historical events. We do so largely by

using stylized facts, and we are fully aware that such an approach abstracts diverse actual developments. (See also footnote 14 below) However, we hope to show that – particularly in comparison with East Asian development – CEE countries followed a similar path since 1990 and look surprisingly alike.

The following is divided into 4 parts: in the first three sections we depict the stylized facts of industrial upgrading, changes in the R&D system, and corresponding innovation policies in CEE since 1990. The final part of the essay summarizes the previous sections and draws conclusions about evolution of the main features of organizational capabilities and national systems of innovations in CEE since 1990.

3. Stylized facts of CEE industrial restructuring in 1990s

Perhaps the key assumption behind how Central and Eastern European countries should go about reforming their economies in the late 1980s and early 1990s was the belief that, as Martin Wolf argues, “new opportunities were at last opening up for developing countries to export manufactures and a range of relatively sophisticated services competitively” (Wolf 2007). Indeed, it can be argued that economists of almost all persuasions seemed to share one common view: globalization in the form of global financial markets and trade liberalization would greatly benefit CEE countries. Globalization was seen as the main factor in delivering fast economic restructuring spurred by global capital in form of foreign direct investment (FDI) inflows. This enthusiasm was largely based on the classical Ricardian assumption of comparative advantage defined, in a classic textbook formulation, as follows: “trade between two countries can benefit both countries if each country exports the goods in which it has a comparative advantage.” (Krugman and Obstfeld 2005:26) Krugman’s work in the 1990s that included economies of scale into the Ricardian framework, assumed that the mutually beneficial trade takes place between countries possessing increasing returns activities. (See Krugman and Obstfeld 2005:110-146; and Krugman 1996) Thus, as CEE countries exhibited high levels of industrialization at the end of the 1980s (comparable to East Asia), it seemed correct to assume that globalization would indeed greatly help these economies to restructure the industry and to become vastly more efficient in production through trade and increased competition. (See also Radosevic 1998 and Guerrieri 1998 for discussion).

However, the augmented Ricardian framework failed to take into account two phenomena: first, the 1990s saw the onslaught of what has been termed a new techno-economic paradigm that completely changed the nature of industrialization and essentially stripped many maturing and

increasingly foot-loose industrial activities of significant (dynamic) scale economies; second, the Ricardian framework assumes that all economic integrations are alike (integration works always through comparative advantages) and provides the same economic strategy in all contexts and at different points in time ('one size fits all'). We shall attempt to show, however, that qualitatively differing forms of economic integrations exist, some of them highly successful and some of them exactly the opposite. This phenomenon could potentially have enormous impact on how developing countries integrate into the world economy. Thus, before we discuss innovation policy in CEE since 1990, we need to very briefly explain the general impact of the new techno-economic paradigm in order to understand how CEE economies were integrated into the global economy. The latter process, in turn, is crucial for innovation policy developments during the entire period under discussion.

Carlota Perez, the author of the concept, has briefly summarized the idea of techno-economic paradigms as follows:

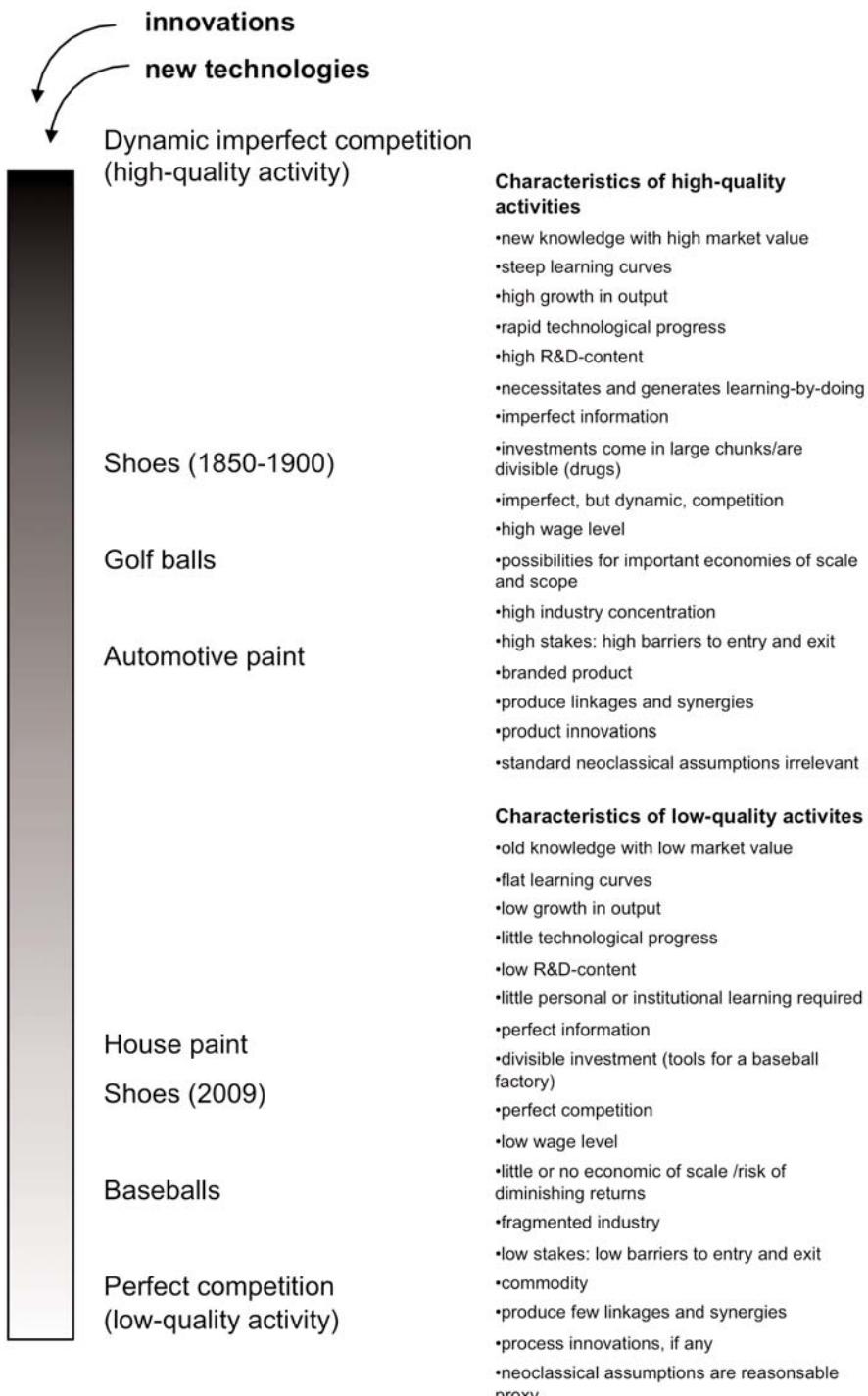
There has been a technological revolution every 40 to 60 years, beginning with the Industrial Revolution in England at the end of the 18th Century; each has generated a great surge of development, diffusing unevenly across the world from an initial core country. ... The great wealth creating potential provided by each of them stems from the combination of the new technologies, industries and infrastructures with a set of generic technologies and organisational principles capable of modernizing the rest of the economy. The resulting best practice frontier is superior to the previous one and becomes the new common sense for efficiency –a new techno-economic paradigm– that defines the guidelines for innovation and competitiveness. ... The propagation is highly uneven in coverage and timing, by sectors and by regions, in each country and across the world. (Perez 2006; see also Perez 2002)

The paradigms describe how technological change and innovation of a given period are most likely to take place: organizational forms and finance that are conducive to innovations, what technological capabilities and skills are needed etc. Accordingly, the new ICT-based techno-economic paradigm, coming to full force in the 1990s, has engendered key changes in production processes in almost all industries (including many services and agriculture): outsourcing and the resulting geographical dispersion of production functions. This is based on significantly enhanced technological and organizational capabilities in introducing "modularity" into production processes and networks (Berger 2006). These changes have enabled very fast growth in FDI inflows into developing countries as well as industrialization (e.g., in terms of growth rates of manufactured and high-tech exports), at least on the surface, in many developing countries.

Consequently, particularly in the late 1990s it seemed as if the Ricardian gamble was paying off for CEE: technology-intensive exports were growing, and catching-up seemed relatively likely (see for empirical data and discussion, e.g., Landesmann 2000; Hotopp, Radosevic and Bishop 2005).

However, in many cases the outsourcing activities do not exhibit the same dynamics that used to be associated with them in the originating countries: fast and sustained productivity growth, raising real wages, forward and backward linkages, but rather the opposite. (See for detailed discussion and data, e.g., Palma 2005, Cimoli, Ferraz and Primi 2005, Tiits et al 2008) The underlying cause why so many policy analysts and economists missed what is going on in these activities is hidden in the very nature of modularity in production. What is statistically captured as a high technology product may in reality be very different in nature: it can be touch screens for iPhones or it can be assembled mobile phones for any brand mobile producer. Both show up as high technology statistics, yet the former is a product at the beginning of its life cycle and the latter has clearly reached maturity. Indeed, when iPhone was introduced in 2007, Balda AG was the only company in the world able to produce the high number of innovative touch displays used by Apple in iPhones (Business Week 2007). This is manifestly not the case in mobile phone assembly as such. Thus, the key assumption of comparative advantage trade models and theories fell away: even if high technology exports have been growing in developing countries, this does not mean that we deal with similarly dynamic sectors with significant increasing returns (See also Krugman 2008a). Due to changing techno-economic paradigm, integrating CEE (and other developing countries) has become in many ways an increasingly asymmetrical matter. In fact, the CEE countries seem to have specialized in activities that exhibit the 'low quality' characteristics in a dynamic Quality Index of Economic Activities in Figure 1.

Figure 1. The Quality Index of Economic Activities



Source: Reinert 2007.

Yet, from 1990 up to today policy environment for industrial restructuring and innovation in CEE assumes the opposite: CEE integration is based on symmetrical integration. Partially this was so because of the assumptions implicit in the Ricardian model, partially the actual statistics looked misleading (high technology bias) and most actors involved were engaged in reasonably high levels of wishful thinking. In fact it may be argued that Europe's relation to its own periphery shows very similar characteristics of asymmetry that the world economy as a whole does to the global periphery (Reinert 2006). This may mean a tendency towards factor-price polarization rather than factor-prize equalization.

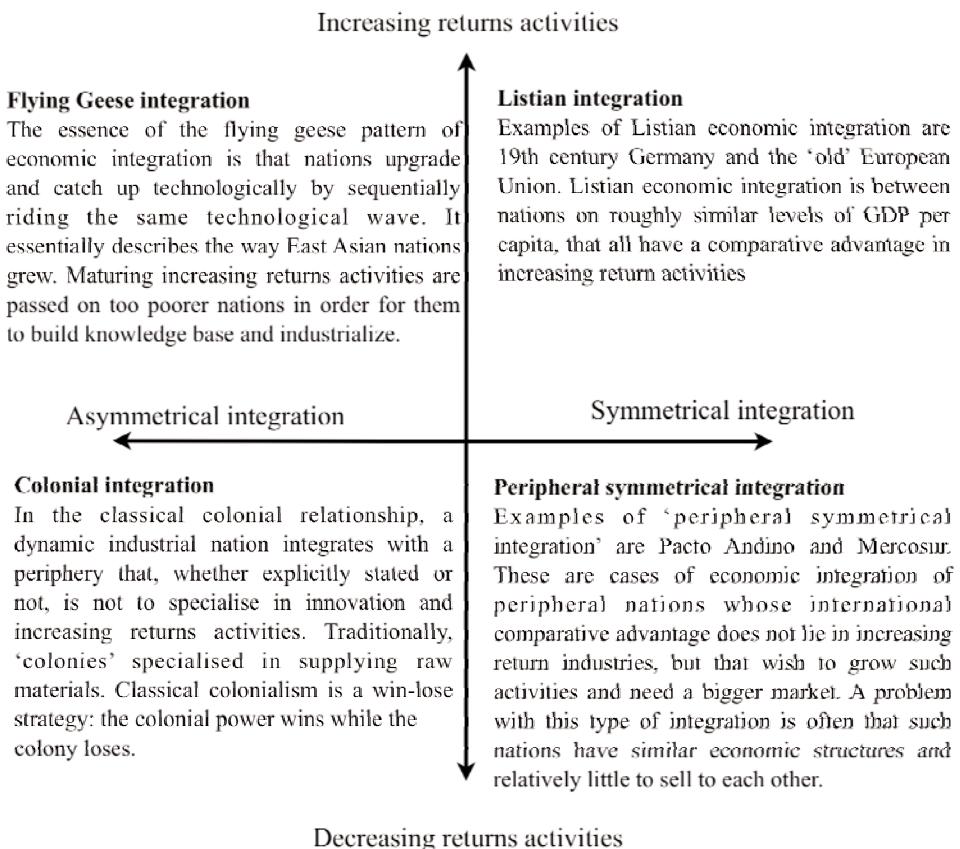
It can be argued that much of the pre-Smithian history of economic thought is filled with treatises trying to understand why certain types of trade with certain regions bring beneficial results and other types do not, i.e. being concerned with the dangers of asymmetrical integration. The clearest early statement of this theory is found in the first pages of Charles King's three-volume work (1721), a compilation of works published in the previous decade, which was to enjoy unique authority for decades. It is important to note that his theory is based on a possible discrepancy between the interest of the merchant and the interest of the nation itself: "There are general Maxims in Trade which are assented to by every body. That a Trade may be of Benefit to the Merchant and Injurious to the Body of the Nation, is one of these Maxims." (1721:1) This is, of course, very different from the later teachings of Adam Smith, who assumes an automatic harmony of interests between merchant and nation. In King's scheme, the normal pre-Smithian scheme, the vested interests of some economic actors will coincide with those of the nation-state – mainly those of the manufacturers – while the vested interests of other economic actors will be at odds with the interests of the nation-state.

The pre-Smithian taxonomy of 'good' and 'bad' trade was based on the observation of the obvious urban bias of economic development that was found everywhere in Europe. The taxonomy is based on the fundamental understanding that economic development is activity-specific, at any point in time available in some economic activities rather than in others. Development was seen as a goal created by increasing returns and innovations in manufacturing and not in agriculture, where stagnant productivity, diminishing returns and monoculture, and absence of synergies prevented growth (see as examples Botero 1590, Serra 1613 & 2009, and Reinert 2007 for in-depth discussions).

As a continuation of King's principles, and with the experience of 300 more years of economic history, we can establish the taxonomy – based on 'ideal types' – of economic integrations (see Figure 2). There are two main types: symmetrical free trade areas (i.e., integration among nations at a similar

level of economic development and economic sophistication), and asymmetrical free trade areas (i.e., integration of nations with widely different economic structure at different levels of development).

Figure 2: Taxonomy of Economic Integrations



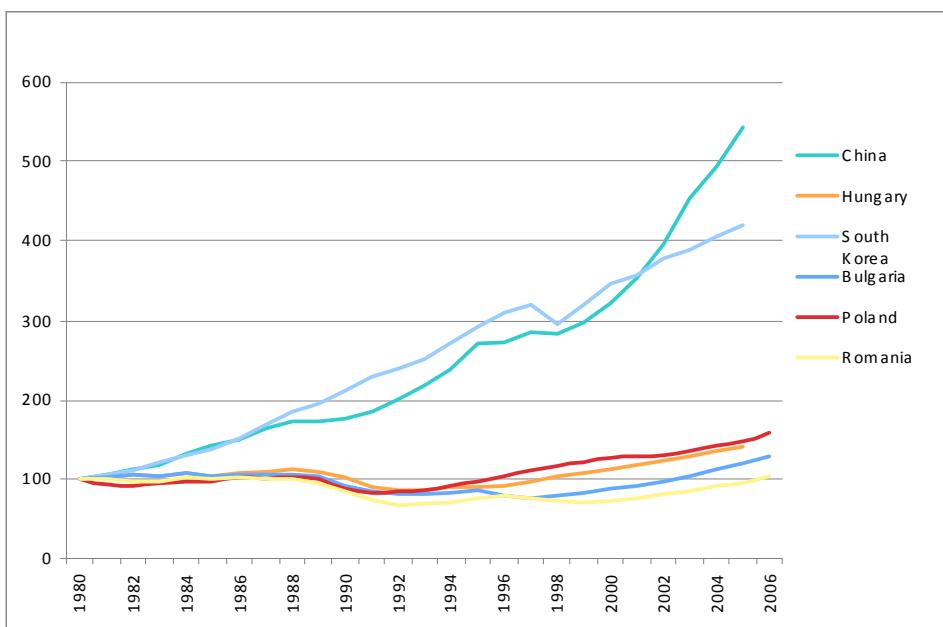
Source: Reinert and Kattel 2007, modified.

There are two further, essentially mixed types of integration: First, the welfare colonialism type of integration. The term "welfare colonialism" was coined by anthropologist Robert Paine, who described the economic integration of the Arctic population into Canada (1977: esp. 1-52), and may partly well be applied to the integration of the Saami people in Norway. The essential features of welfare colonialism are: 1) the classical colonial drain is reversed, the net flow of funds is to the colony rather than to the mother country; and 2) the native population is integrated in a way that destroys their previous livelihood, and they are put on the dole. Second, there can also be an integrative and asymmetrical type of economic integration. This is a type of economic integration that differs from the classical colonial ver-

sion above in that it attempts to integrate the asymmetrical partners – countries at different levels of economic development – into a welfare state. If we look at the way CEE countries have been integrating into the European Union, it can be argued that this process is largely failing under this heading in terms of economic integration. We base this judgement on three fundamental stylized facts that can be observed in CEE development since the 1990s:³

First, while CEE and other key developing countries experienced an exhilarating rise in FDI and exports, there is a stunningly obvious divergence in income growth between Asian economies, on the one hand, and CEE economies on the other hand (Figures 3 and 4). While China and Korea have seen their GDP per capita multiplied at least 4 times since 1980, CEE economies have struggled throughout the last decades to stay above the 1980 level.⁴

Figure 3: GDP per person employed, index (1980 = 100), 1980-2006.⁵



Source: World Bank WDI Online database.

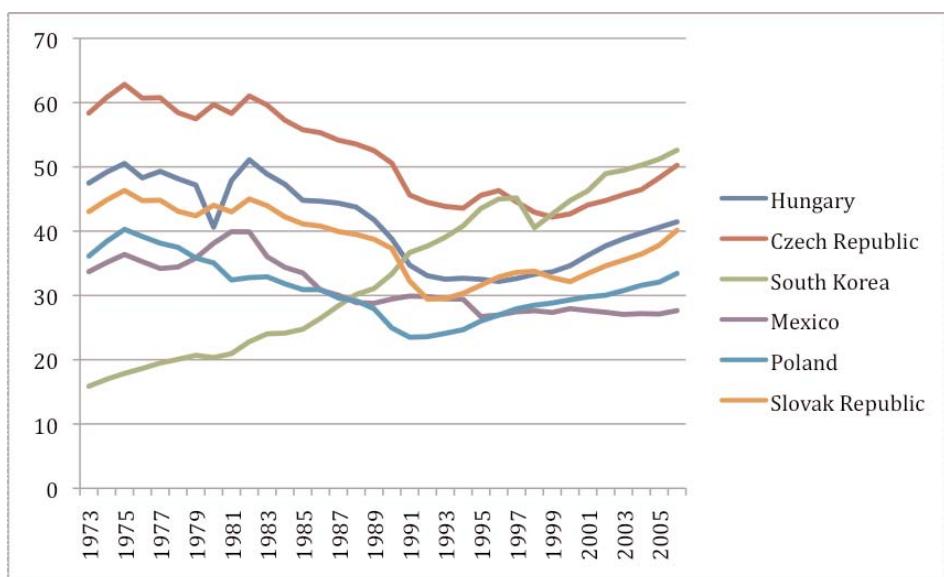
³ For more detailed arguments, see Reinert and Kattel 2007, and Tiits et al 2008.

⁴ According to the World Bank's calculations, the recession many former Soviet republics experienced during the 1990s, and are still experiencing, is worse than the Great Depression in the USA and the World War II in Western Europe (both recovered considerably quicker). In fact, for example, "even if Ukraine managed to grow steadily at 5 percent a year, starting in 2002, it would take until 2017 to regain its previous peak – implying a transformational recession of more than a quarter of a century at best." (World Bank 2005) Of course, the financial meltdown that reached many CEE countries starting in 2008 will certainly significantly prolong the process of catching-up.

⁵ Data is not available for all CEE economies.

As Guerrieri argued already in 1998, the East Asian economies "have surpassed Eastern Europe in many industries, not only in traditional product groups, but also in more technologically sophisticated sectors" and this is particularly so in "R&D-intensive (science based) sectors". (1998:20) While CEE countries' share in world trade grew from 0.73% in 1980 to 0.95% in 1995, East Asia's share grew in the same period from 3.80% to 10.83%. (Guerrieri 1998:29)⁶ This trend is particularly pronounced for science based industries: CEE grew from 0.29% to 0.39% in the period from 1980 to 1995, East Asian economies grew from 4.83% to staggering 17.82%. (1998:38)

Figure 4. Income and productivity levels relative to the United States: GDP per capita, 1973-2006.



Source: OECD databases.

Particularly after the fall of the Berlin Wall, most CEE and other former Soviet economies saw deep dives in their growth rates and in industry as well as service sector value added. It took more than a decade for most CEE countries to reach the growth and development levels of 1990; many, however, still severely lag behind their development levels of 1990.⁷ (Tiits et al 2008)

⁶ Guerrieri counts under CEE Hungary, Poland, Czech and Slovak Republics; under East Asia Singapore, Korea, Taiwan and Hong Kong.

⁷ For instance, countries like the Ukraine, Moldova, and most central Asian countries fell from middle income economies to poor countries and by now represent failed or fragile economies; see further Reinert, Amaïzo and Kattel 2009.

The main reason behind such a deep dive was, **second**, rapid deindustrialization and primitivization of industrial enterprises (Reinert 2007, Chapter 5) or even the outright destruction of many previously well-known and successful companies (see also Mencinger 2007; Landesmann 2000; Rodrik 1992). This happened because of the way Soviet industrial companies, and the industry in general, were built up and ran in a complex cluster-like web of planning and competition.⁸ (On corresponding Soviet R&D system, see below in the next section). A sudden opening of the markets and abolition of capital controls made these industrial companies extremely vulnerable. The partially extreme vertical integration that was the norm in such companies meant that if one part of the value chain ran into problems due to the rapid liberalization, it easily brought down the entire chain. However, foreign companies seeking to privatize plants were almost always interested in only part of the value-chain (a specific production plant, infrastructure or location) and thus privatization turned into publicly led attrition of companies and jobs.⁹ Liberalization of markets and prices meant that for many domestic companies demand was cut down, and thus companies with the highest relative fixed costs to variable costs (these tend also to be the technologically most advanced ones) were hit the hardest as their balance sheets worsened very quickly. If a company had a lot of machinery and equipment to be amortized, i.e. there have been recent investments into upgrading, then it is particularly harshly hit if its demand drops and if it is under financial stress because of liabilities to newly founded banks. Thus, by definition, the most advanced industries were hit by rapid liberalization first and also the hardest.¹⁰ The last sector to survive is subsistence agriculture. This is called the Vanek-Reinert effect¹¹ and it could be observed in the unification of Italy in the 19th century, in Latin America in the 1980s, and again in the 1990s in CEE and other post-Soviet countries. One underlying cause was the particular nature of industrialization of CEE economies. In the last instance this process creates outward migration. The sequence may be described as de-industrialization, de-agriculturization, de-population.

Third, such a drastic change made it relatively easy to actually *replace* Soviet industry: with the macroeconomic stability and liberalization of markets, followed by a rapid drop in wages, many former Soviet economies

⁸ Radosevic 1999 is a good overview, see esp. 287-289; also Chandler 1993. For studies of Soviet industry, see Berliner 1976, Bergson 1978, and case studies like that of Skoda by Margolius and Meisl 1992, of East Germany's industry by Stokes 2000, and of Czech industry by Kosta 2005. For case studies on company level transition to capitalism, see Radosevic and Yoruk 2001.

⁹ Frost and Weinstein 1998, and Young 1994 offer excellent examples of how Western companies such as ABB, Gerber and others privatized CEE companies.

¹⁰ For instance, Radosevic shows how in higher-end computers, "where domestic demand is not growing and where finance requirements are high, the ex-socialist producers have closed down in all CEEC." (1999:299, also 303)

¹¹ First articulated in Reinert 1980.

became increasingly attractive as privatization targets and outsourcing of production (we will return to policies in the next section). Indeed, one of the most fundamental characteristics of CEE industry (and services) since 1990 has been that the majority of companies have actually engaged in process innovation (e.g. in the form of acquisition of new machinery) in seeking to become more and more cost-effective in the new market place.

In sum, the key to understand why CEE seem to stand still or even fall behind when compared to Asian economies such as South Korea is the way many industrial companies were integrated into the world economy in the 1990s. CEE strongly embraced the idea of FDI-led restructuring which worked, however, in a highly specific way because of the simultaneous change in the techno-economic paradigm, and brought specialization at the lower end of the Quality Index and the value chain with grave difficulties of upgrading and, most importantly, strong enclavization, de-linkaging and primitivizing tendencies. The key why FDI-led strategies worked in such a way lies in a historic coincidence of techno-economic paradigm change and the onslaught of Washington Consensus policies taking place more or less at the same time. CEE countries were essentially flooded with FDI that was seeking to set up activities without significant increasing returns and this turned the integration of CEE into European and global markets into an asymmetrical but integrative type of integration. However, crucially, as we will show in the rest of the essay, the specific nature of CEE integration plays virtually no role in CEE innovation policies during the entire period from 1990 until today. Or to put it differently, the nature of CEE integration into global markets was mistaken to be a symmetrical and integrative type and the innovation policies followed from this assumption.

4. Disintegration of the Soviet R&D system in transition

However, in order to fully appreciate the changes in policy and their impact on innovation and economic development in general, we shall give a very brief overview of Soviet science and technology, and research and development system, and how these were initially influenced by the transition process.

Perversely mirroring the above-described cluster-like characteristic of Soviet industrial activities, the R&D system was based on similar vertical integration of R&D into specialized institutions: "Under socialism, most technical change was pushed from one institutional sector ... which was essentially a grouping of R&D institutes and other related activities ... This sector involved in activities far beyond R&D including design, engineering and often trouble-shooting activities." (Radosevic 1999: 282) These institutions were usually also the originators and carriers of patents and forms of intel-

lectual property rights. (*Ibid.*: 285) This means that the Soviet-style R&D system had very low level of company in house R&D. (Radosevic 1998: 80-81) Industrial conglomerates were effectively cut off from various potential learning and feedback loops; production and actual innovation (in particular in the form of new products and processes) took place in different institutions, both however highly concentrated and integrated. Thus, in general the system was highly linear and supply-based.

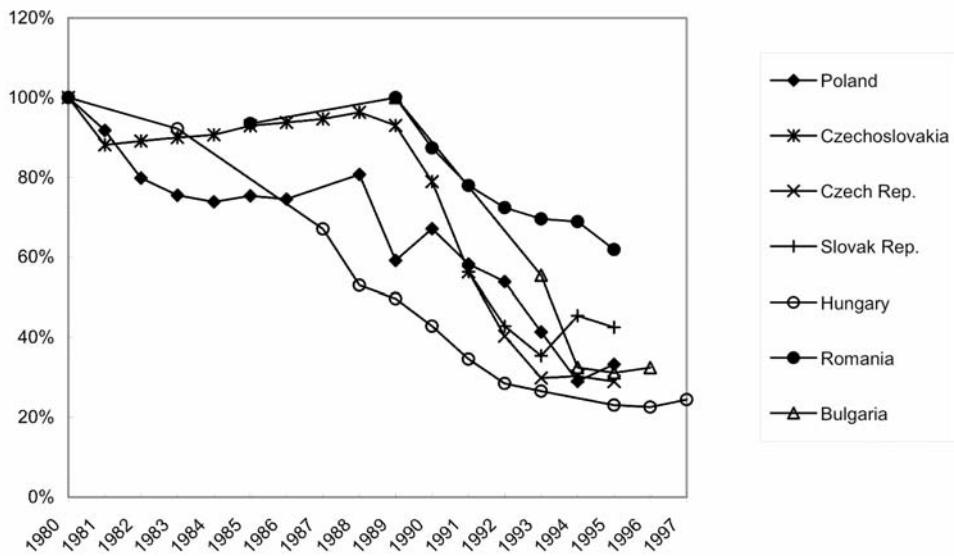
The R&D institutes concentrated often on 'grey' literature (manuals and the like) and overwhelmingly on mechanical engineering, which means that mostly these R&D capacities had little if any experience with competitive environment and imperfect competition prevalent in technologically and innovation-driven markets. These characteristics together with the Vanek-Reinert effect led in transition to "the fast marginalization of once hyper-developed R&D; the collapse of industrial demand for R&D; changes in industry demand for R&D; polarization of the R&D spectrum; and a changing institutional landscape." (Radosevic 1998: 84)

Indeed, the once complex tasks of engineering, designing and similar tasks were very rapidly replaced by significantly simpler commodified support activities as many companies were wiped out, privatized or restructured. The former R&D institutes could have played a key role in bridging academic research with industry needs as they were essentially the only existing link between the two. With the collapse of the institutes system, the link between academy and industry became, as Radosevic suspected in 1998, the weakest link in the CEE R&D system. (1998: 90) Indeed, in "conditions of high uncertainty and prolonged privatization, the intangible assets and know-how of industrial institutes, primarily embodied in R&D groups, probably erode much faster than production skills in industry." (1998: 100)

Massive onslaught of FDI, in particular since the second half of the 1990s and privatization of enterprises gave foreign enterprises a key role in industrial restructuring and innovation. This, in turn, only reinforced the severing of linkages between former R&D institutes and the enterprise sector. (See also Radosevic 1999: 297).

This change can be seen in all basic S&T and R&D data. The rapid decline in R&D employment after 1990 took on partially enormous proportions with employment dropping by a third or more in CEE as shown in Figure 5. (Radosevic 1998: 86; also Meske 1998)

Figure 5. R&D personnel in CEE countries, 1980-1997; 1980 = 100.¹²

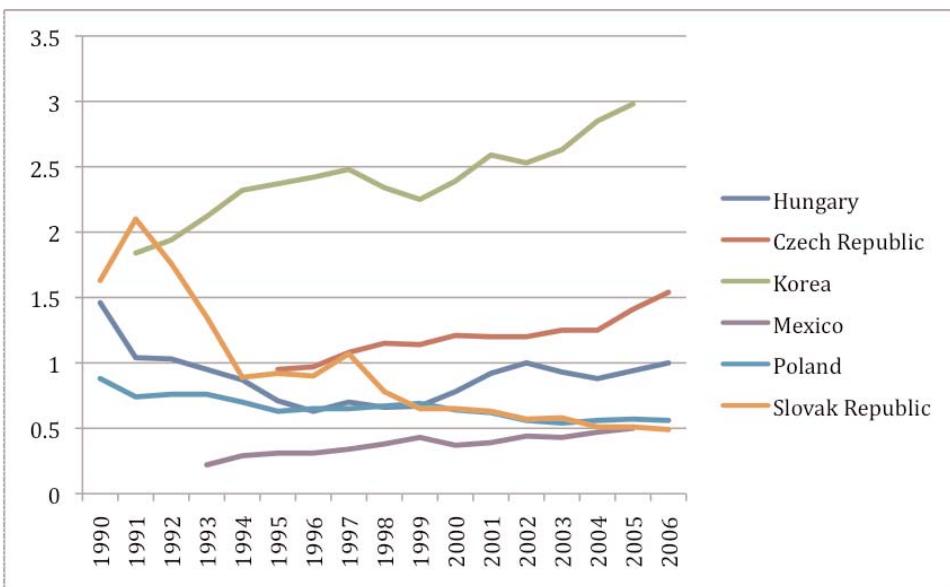


Source: Meske 1998.

In particular when compared to East Asia's developments over the same period, CEE transition in the 1990s is in many ways a lost decade in terms of basic R&D indicators. In Figures 6-8, South Korea is used as a proxy for East Asian countries and Mexico for Latin America. The Figures show that CEE countries converge with Latin American trends and not with East Asian ones.

¹² Meske 1998 brings similar figures with similar tendencies also for the Baltic states, Russia and other former Soviet republics.

Figure 6. General Expenditure on Research and Development as % of GDP, 1990-2006.

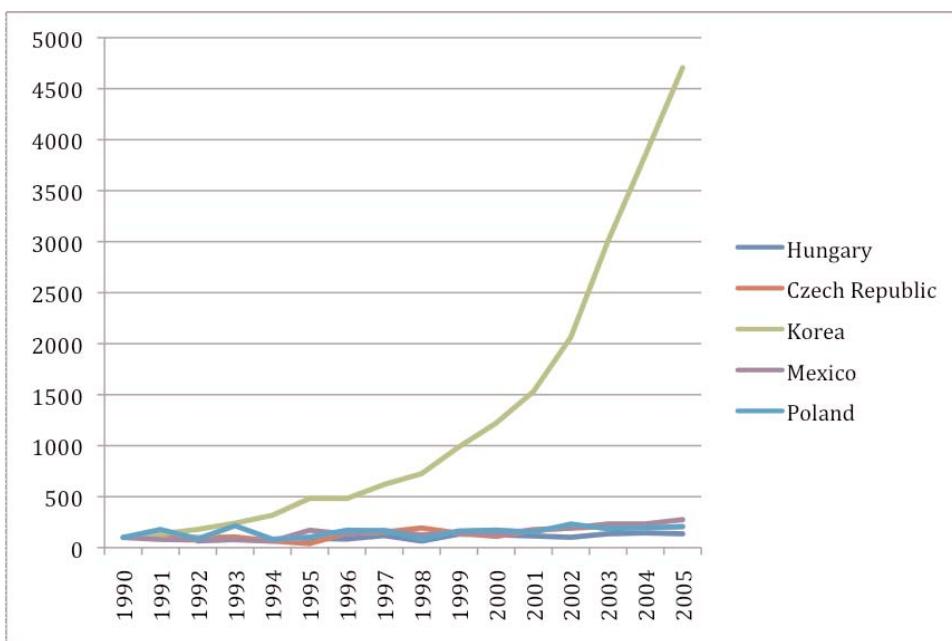


Source: SourceOCED database.

The decrease in GERD from 1990 onwards until the end of the decade coincides, as we will show below, with big divides in CEE innovation policies. With the beginning of the accession negotiations and increasing funding from the EU, CEE countries' investments into R&D start to increase while the preceding decades mirror the ideas of Washington Consensus policies that market initiatives (also in form of R&D investments) are more important and efficient than public sector intervention.

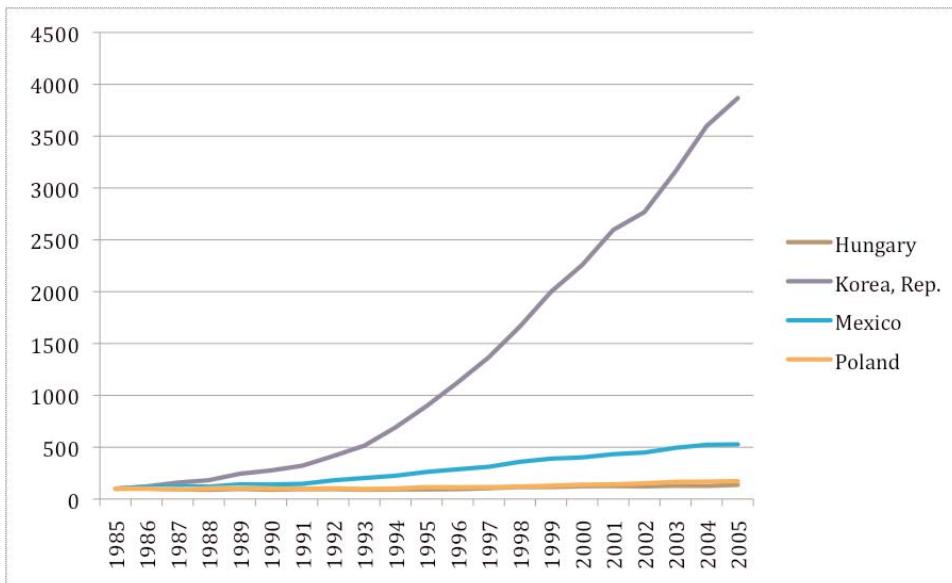
Figures 7 and 8 indicate very similar tendencies in patent applications and scientific publications in CEE compared to East Asia and Latin America. While CEE and Latin America are more or less flatlining since 1990 or 1985 respectively, South Korean development is qualitatively highly different.

Figure 7. Patent application at European, US and Japanese patent offices, 1990-2005; 1990 = 100.



Source: SourceOCED database

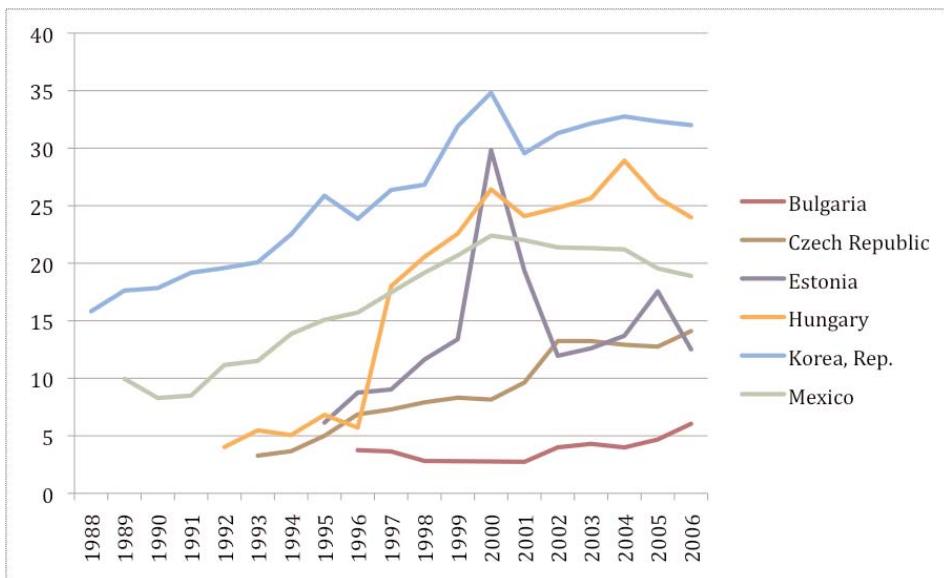
Figure 8. Scientific and technical articles, 1985-2005; 1985 = 100.



Source: World Bank WDI Online database.

Against this background the significance of rapid increase in high technology exports also in CEE countries becomes clearer (Figure 8). In high technology exports CEE and Latin America are clearly following the same path as East Asian economies.

Figure 9. High technology exports as % of all manufactured exports, 1988-2006.



Source: World Bank WDI Online database.

Yet, dissonance between disintegrating R&D system, much slower catching up pace and rapidly growing high tech exports are perhaps the best indicator of how importantly the change in techno-economic paradigm and the rise of modularity and outsourcing production changed the perception of what is happening in CEE countries. As we will see in the next section, innovation policy in CEE was a key driving factor in initiating changes in the R&D system and also cementing the perception of high-tech based growth.

5. Innovation policy in CEE since 1990

If we look at the CEE innovation policy developments since 1990, we can divide these into three rather distinct periods:

- 1) Killing the Geese, 1990-1998;
- 2) Harmonization with the EU 1998-2004;
- 3) Awakening, since 2004.

Killing the Geese, 1990-1998

The flying geese metaphor (see above, Figure 2) for economic integrations first appears in a 1935 article by Kaname Akamatsu published in Japanese. His views became known to the West in his 1961 article in *Weltwirtschaftliches Archiv*, and during the 1980s Japanese economist and foreign minister Saburo Okita propagated the concept. The essence of the flying geese pattern of economic integration is that nations upgrade and catch up technologically by sequentially riding the same technological wave. It essentially describes the way East Asian nations grew.¹³

To illustrate the process, follow a product: a hairdryer is produced in Japan and exported to the rest of the world. When Japan upgrades its technology and wage level, the production of hairdryers passes on to Korea and is exported from that country. As Korean production after a while also gets more sophisticated, the production of simple hairdryers passes on to Taiwan, where the phenomenon is again repeated. Hairdryer production moves on to Malaysia and Thailand, and finally to Vietnam. On the way all nations have increased their wealth and upgraded technologically, based on the same product.

We argue that CEE countries followed essentially the opposite strategy of killing the geese: trying to restructure their economies, and in particular industries, through a very rapid replacement (not gradual upgrading) of Soviet style companies.¹⁴ This pattern is extremely different from the very successful integration of Spain into the EU starting in 1986: The strategy towards Spain was based on a gradual reduction of tariffs aiming at assuring the survival of the *existing* Spanish industrial sector, including the activities with a high score on the dynamic Quality Index of Economic Activities (Figure 1). The EU integrated with Spain in a way that provided a Schumpeterian creative destruction that upgraded the existing industrial sector. In contrast, the EU strategy towards the CEE countries – certainly partly as a result of the market *triumphalism* following the fall of the Berlin Wall – created a form of ‘destructive destruction’: the high value ('high quality') sectors were destroyed and were replaced by low value added sectors.

¹³ The model builds on Friedrich List's stages of integration. Its dynamics are similar to Michael Porter's stages of national development (Porter 1990) and to Ray Vernon's life-cycle theory of international trade (Vernon 1966) and to Jane Jacobs' import-replacing development of cities (Jacobs 1984).

¹⁴ It is clear that we are abstracting here from the actual policy developments in CEE. Drahokoupil 2007 offers a very interesting way to group different strategies followed by CEE countries in the 1990s: “The competition states in the Visegrád four can be called *Porterian*, aiming at attracting strategic FDI through targeted subsidies ... The Baltic competition states can be called *macroeconomic stability-driven neoliberal states with monetary institutions at their core*. ... Finally, Slovenia has developed a distinct type of competition state, which can be characterized as *balanced neo-corporatist*.” (2007: 90).

The CEE story is similar to that experienced by Mexico in its integration with its Northern neighbors in NAFTA (see Cimoli 2000). The ‘destructive creation’ in financial markets added an additional blow to the peripheral countries both in the EU and NAFTA. In both cases the adjusting factor is outward migration: the comparative advantage of the periphery becomes the export of its people.

As we argued above, together with the change in the techno-economic paradigm, Washington Consensus policies (trade and capital account openness, increasing reliance on foreign direct investments and exports to drive growth, low inflation, balanced public budgets and generally rolled back state) were the key behind the fast and furious restructuring of the economies that CEE countries experienced in the 1990s. The Washington Consensus policies were considered by many CEE countries as *the* innovation and industrial policy measures and in essence there were no other policy initiatives.¹⁵ During the 1990s innovation policy proper was considered as secondary to transition related concerns (Mickiewicz & Radosevic 2001: 10). Indeed, innovation, R&D or generally science and technology policies and funding schemes intact during this period were carry-overs from the socialism times and were rapidly disintegrating, as we showed above. In many ways this was a period of ‘no policy policy’. The demand from the market was supposed to be the key driver of changes in R&D and innovations – and their funding. Rather, CEE countries were enjoying productivity growth mainly in the realm of “reallocations” that turned out to be only of highly temporary nature (Radosevic 2002a: 355; Radosevic 2006). This also suggests, as we argue above, that innovation in CEE during the 1990s is mainly about equipment and the mastery of production capabilities, and is not related to R&D (Radosevic 2006: 37-38).

During this period, almost all economic policy capacity building was directed towards macro-economic skills (at central banks, ministries of finance, also think tanks). This was greatly helped by the advice and assistance from the Washington institutions such as the World Bank and IMF, but also from OECD and the EU. Policy networking, coordination and cooperation were almost completely ignored. As there were no innovation policies proper, there was also essentially no institution building in this area.

Coupled with the change of techno-economic paradigm, Washington Consensus policies emphasizing FDI-led growth have created for CEE a truly toxic situation where initially liability destruction was strong and quick but

¹⁵ As Weissenbacher 2007 argues, Hungary, Poland and Yugoslavia had experiences of dealing with IMF already during the 1980s, when they borrowed money from it and applied standard austerity programs (2007: 71-71).

followed by slow asset creation. Thus, “the failure of the Consensus reform policies lies in the fact that they provided support for the ‘destruction’ of inefficient domestic industry, but failed to provide support for the ‘creative’ phase of ‘creative destruction’ of a real transformation of the productive structure through higher investment and technological innovation.” (Kregel 2008)

In sum, the Washington Consensus or the killing the geese period (up to late the 1990s) left CEE countries with an almost completely changed economic and industrial structure that is deeply different and much less skill- and technology intensive than the previous structure. This explains fast growth but also the not- catching-up with the Asian economies in terms of productivity and income growth as the productivity growth in CEE in the 1990s goes back to significantly decreased employment in industry (see Landesmann 2000). In addition, there was essentially no innovation or industrial policy and policy making competencies and institutional development centred around macro-economic realm, networking, coordination and cooperation were almost completely ignored.

Harmonization with the European Union, 1998-2004

While EU’s importance for CEE countries economic policies was visible already during the early 1990s, the change that increased EU’s impact considerably was the beginning of accession talks with most CEE countries in 1998 and later. Indeed, Havlik et al. 2001 argue that the adoption of the EU *acquis communautaire* has had a much stronger impact on the modernization of CEE industry than the official (often rudimentary) innovation policy during the 1990s. The introduction of new regulation (usually with significantly higher safety, health and other standards) meant that CEE industry “was forced to choose whether to modernize their products and production facilities rather drastically, to subject themselves to mergers with bigger players with greater economies of scale, or to close down altogether”. (See Tiits et al 2008: 76-77) However, while harmonization with European standards is a distinct driver of changes in the private sector and also in legal infrastructure, it is also important to note that such harmonization made outsourcing and relocation of production much easier. On the one hand, the harmonization process was a continuation of restructuring processes that started during the previous period and were even significantly enforced. On the other hand, through so-called pre-structural funding and its management, many CEE countries started to develop first strategic documents and policies related to innovation and R&D proper.

The EU played a considerable role in setting the criteria for accession into the Union and actively participated in building up capacities to meet these

criteria already since the early 1990s (Bruszt 2002: 121; also Bruszt and McDermott 2008). This is expressed in particular by the EU financial aid through the PHARE programme that became the key instrument of the harmonization period and also the first wave of Europeanisation. PHARE was launched in 1989 as EU's financial instrument to assist the CEE countries (initially only Hungary and Poland) in their political and economic transition from a centralised communist system to a decentralised liberal democratic system. In its initial phase, PHARE remained a project-based financial assistance scheme: it paid for inputs, rather than for results in terms of effective adoption and implementation of the *Acquis* (Martens 2001: 37; Grabbe 2006: 80-81).

As PHARE was reformed profoundly during 1990s, also the grasp of the EU became stronger: 1) PHARE was expanded to additional 11 countries eligible for support, and 2) PHARE's goal as the EU's main financial instrument for support changed considerably: away from transition issues and economic restructuring towards support of the accession process (Martens 2000; Martens 2001; Bailey & de Propis 2004). As a result, since 1998 (through the Accession Partnerships) PHARE can be considered as a legal basis to secure transposition of the *Acquis* in deeper scale and scope (Martens 2000: 5).¹⁶

In the late 1990s, due to the progressive decentralization of the PHARE management structures as well as EU requirements for creation of regional and local institutions to administer the EU funds after the accession, a system of implementation agencies linked to the National Funds was created and pursued in CEE (EC Regulation 1266/99; Commission Decision on the Review of the PHARE Guidelines for the period 2000-2006; Grabbe 2006: 82). This marks the first step in CEE towards managing economic policy, and thus innovation and industrial restructuring in a distinctly different manner from the previous period where the free market and external forces were seen as key drivers of change. However, it is also important to see that these newly established agencies are mostly for managing external funding, policy creation and respective capacity building play almost no role in these agencies. Yet, this decentralization and in particular the existence of autonomous state agencies have been seen as a positive feature in state-market relationships due to multi-level accountability (Bruszt 2002), but also due to the ability of this kind of policy-making system to reflect and affect adequately the dynamic, global and technology-driven economy (e.g. Goldsmith & Eggers 2004; for Central and Eastern European countries, see

¹⁶ In 2000, PHARE's support was extended to economic and social cohesion and institutional capacity building (preparation for management with structural funds) (PHARE Annual Report 2001).

here Drechsler 2004). However, the compartmentalized and structured nature of EU support (PHARE Consolidated Summary Report 2007) on the one hand, and the lack of tradition of partnership and inter-institutional coordination and cooperation between administrative levels on the other hand, meant that most positive effects of such agencies were not reaped and that they created in some cases more difficulties and problems than they solved (ESPON 2005).

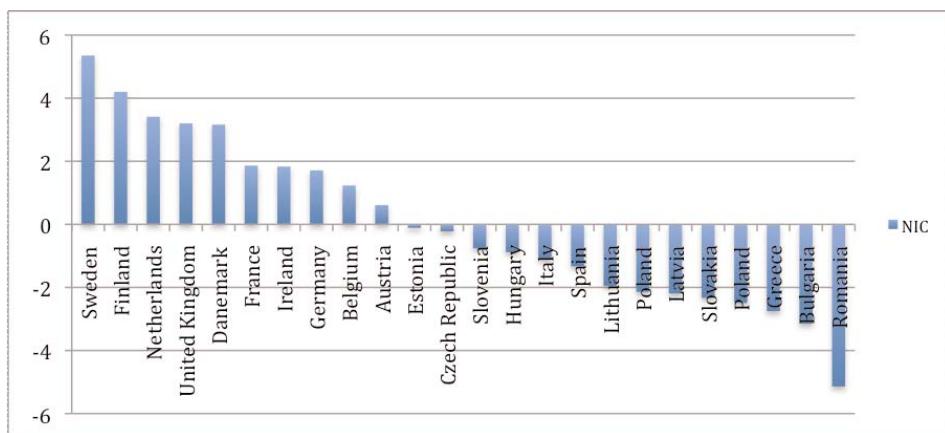
In addition, due to considerable time pressure – harmonizing the legal infrastructure and preparing for accession in 6 years – meant that adoption of EU's legal infrastructure was done hastily and without much attention to local context. (PHARE Consolidated Summary Report 2004; PHARE Consolidated Summary Report 2007; see also Schimmelfennig & Sedelmeier 2004; Goetz 2001).

The need for implementation capacity was in particular relevant in the areas where the *Acquis* was not specific and well defined and where implementation of *Acquis* needed complex and relatively well developed public administration systems with a high degree of strategic policy development capacities (PHARE Consolidated Summary Report 2004; PHARE Consolidated Summary Report 2007; see also Martens 2001: 40 and Martens 2000: Annexes). This was compounded by the fact that labor- and resource intensive sectors forming most of the CEE industry were the ones most affected by the *Acquis* (see Havlik et al. 2001; Havlik 2005: 123). Thus, CEE industry went through another restructuring process that was again led by external factors and again local context played little if any role in policy considerations.

In sum, in many ways the harmonization with the EU rules is a period where policies supported the restructuring of the industry that began in the 1990s under the Washington Consensus policies; on the other hand, during this period EU's influence on funding and administrative schemes brought creation of novel governance structures that play up to today key part in innovation policy in CEE.

However, if we look at what Radosevic calls “national innovation capacities”, then these were by 2000 clearly underdeveloped in all CEE countries compared to the ‘old’ member states (Figure 10; Radosevic 2004).

Figure 10. National Innovation Capacity (NIC) index for EU member states, 2000.¹⁷



Source: Based on Radosevic 2004.

Thus, the disintegration of the R&D system that began with the transition was still in full force during the harmonization period. And while it can be argued that by 2000, the CEE economies and in particular their innovation capacities grouped these countries into two groups of stronger and weaker performers (Radosevic 2004: 660), most CEE economies start to recover from the transition losses by 2000 (see Figures 3 and 4 above). However, in particular with increasing flows of FDI into CEE and growing high technology exports, the recovering was interpreted as imminent catching up or convergence with the 'old' Europe. This misconception became the key driver of innovation policies in CEE from 2004 onwards.

Awakening, since 2004

While harmonization with the EU legal infrastructure was important both in terms of the actual changes it brought to industry and in terms of policy implementation agencies that were created to manage EU's financial help, the key changes in innovation policy proper came with EU structural funding¹⁸ that

¹⁷ The index is built from 4 sub-indexes that are in turn based on the following data (in parenthesis): Absorptive capacity (Expenditures in education in % of GDP; S&E graduates (% 20–29 population); Population with 3rd level education; Participation in life-long learning; Employment medium/high-tech manufacturing; Employment high-tech services); R&D supply (Public R&D expenditures (% GDP); Business R&D expenditures (% GDP); R&D personnel per labour; EPO high-tech patents; USPTO high-tech patents; Resident patents per capita); Diffusion (Training enterprises as % of all enterprises; CVT in % of labour costs of all enterprises; ISO 9000 certifications per capita; Internet users per 10,000 inhabitants; PC per 100 inhabitants; ICT expenditures (% GDP); Demand (Stock market capitalization in % GDP); Domestic credit provided by banking sector; Share of FDI in GDP; Share of trade in GDP; Index of patent rights; Registered unemployment). (Radosevic 2004)

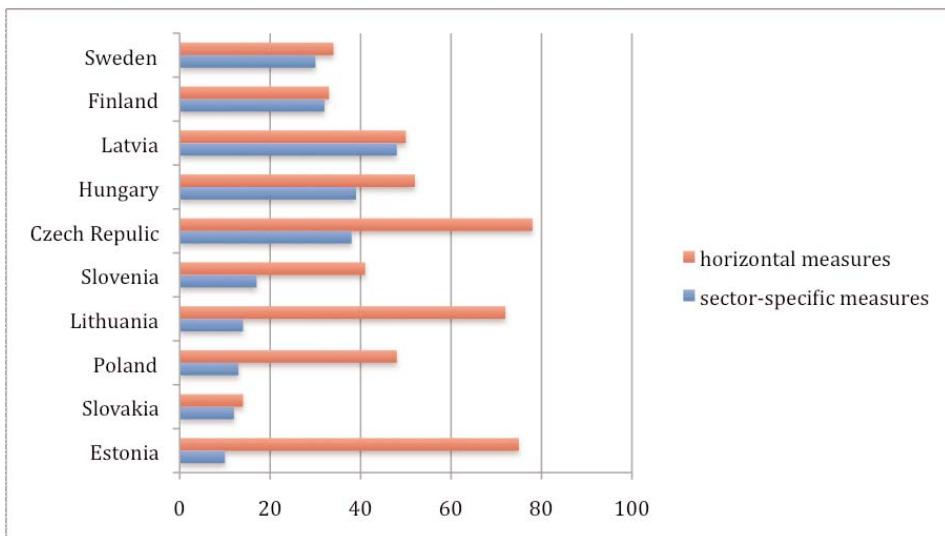
¹⁸ For a general overview, see the EU's official homepage for structural funding, http://ec.europa.eu/regional_policy/funds/prord/sf_en.htm.

started in 2004 and is set to continue at least until 2013. Indeed, as we will see below, the EU structural funding significantly changed both the policy content and implementation. However, as we will also see below, the key problems that emerged during the harmonization period (low networking, weak administrative capacity, coordination and cooperation problems) have been in fact deepened during the current period.

The key content for many innovation policy initiatives in CEE emerging after the accession was the underlying assumption that similarly to 'old' European countries, also the new members need to overcome the so-called European paradox (good basic research, low commercialization of the research results).¹⁹ This is mostly due to miscued policy transfer from the EU to the member states (See also INNO-Policy TrendChart Country Reports 2006 and 2007). Accordingly, innovation and R&D policies emerging in CEE in the mid-2000s were based on a linear understanding of innovation. Innovation is seen as something close to science and invention, and that there is a more or less linear correspondence between scientific discovery and high innovation performance; and that innovations behave like Nokia's mobile phones and thus search for the latter became the holy grail of CEE innovation policy. Thus, CEE innovation policies emerging in early and mid 2000s tend to concentrate on high technology sectors, on commercializing university research, technology parks for start-ups and similar efforts (Radosevic 2002a: 355; Radosevic & Reid 2006: 297; also INNO-Policy TrendChart Country Reports 2006 and 2007 for comprehensive overviews of CEE countries' policies and challenges). In contents, an overwhelming number of policy measures concentrate upon innovation programmes and technology platforms (Reid and Peter 2008). At the same time, the CEE emerging innovation policies are characterized by their horizontal nature: policy measures typically do not specify sectors but are rather open to all sectors. (See Figure 11) Arguably, this has to do with the way CEE policy makers understood EU state aid regulations (Reid and Peter 2008). We argue that this has to do with both a general neo-liberal outlook (i.e. let the Ricardian comparative advantage work through markets rather than to rely on government interventions through priorities etc) carried by most CEE policy makers by the early 2000s and also their particular skills that concentrated into macro-economic areas. (See also Drahokoupil 2007)

¹⁹ An excellent discussion of the paradox is Dosi, Llerena and Labini 2005.

Figure 11. Innovation policy measures in CEE, sector-specific measures vs horizontal measures.²⁰



Source: Based on Reid and Peter 2008.

Figure 11 also shows that compared to their EU neighbors CEE countries have typically significantly more innovation policy measures (especially if deflated by the size of respective economies). This can be interpreted as a growing fragmentation of the policy arena between multitudes of measures and implementation agencies.

In addition, as a majority of CEE measures are financed through EU structural funds, these instruments are mostly competition and project based. Interestingly, CEE countries exhibit significantly more innovation policy measures than the 'old' member states that. These aspects – project based implementation, multitude of horizontal measures – point to high fragmentation of the entire innovation policy field as well as to lack of policy priorities or the ability to set the latter. It is also evidence of the strongly market-driven understanding of innovation that is at odds with the underlying assumption that innovation policies need to alleviate the 'European paradox'. That is, a typical CEE innovation policy measure aims to commercialize a certain R&D result, typically in a high-tech area, but the result and thus the initiative have to come from the market. This, however, has scarcely any justifications in reality: first, CEE R&D systems and their performance

²⁰ Sector-specific are policy instruments that deal with one sector (e.g. biotechnology) only; horizontal measures are allocated to multiple sectors or do not specify any sector at all. See for details Reid and Peter 2008.

disintegrated heavily during the 1990s and fell noticeably behind East Asia; second, this was complemented by the strong specialization into the low-end of various value-chains, meaning that the demand for R&D and skills remains relatively low.

However, particularly since mid 2006 and 2007 there is a noticeable change towards including existing (low/mid-technology and outsourcing) industries into innovation policy making. In some countries, for instance Estonia, EU accession triggered a very significant policy change which brought innovation policy onto the agenda very strongly; in others, for instance in Slovenia and Hungary, the changes in policy focus occurred earlier and were more vocal. However, the changes were and are often accompanied by relatively little increase in actual funding and, as importantly, by relatively little public attention and discussion of policy strategy. (Tiits et al 2008; also INNO-Policy TrendChart Country Reports 2006 and 2007)

The impact of the European Commission (EC) in creation of these policies and in influencing their content has been enormous. One of the best ways to follow how the EC negotiated with the accession countries, and influenced innovation policy after the accession, is to follow the so-called negotiating mandates (essentially communications and feedback from the EC about the accession countries' plans how and for what to use the EU's structural funding). These documents are not public, thus we will quote here from various negotiating mandates in a way that countries will remain anonymous. All quotes pertain to 2004-2006 documents.

Example 1:

the Commission distinguishes three core areas of intervention [that are needed]:

- business infrastructure, improvement of institutional structure for business development and improvement of facilities for technology transfer and co-operation mechanisms between research departments and industry in order to boost the innovation capacity of the private sector and to increase the added value and labour productivity;
- active labour market policies in order to reduce the gap between (qualitative) demand and supply on the labour market and to upgrade the training infrastructure in order to adapt to demands on the labour market in a flexible way;
- upgrading of the quality of transport, environment and other technical infrastructure.

Example 2:

The description of the priorities is insufficiently selective. Formulation of objectives, priorities covers a very wide “sector of interests” and do not define priority (preferential) needs and solutions.

...

Therefore the EC recommends the **** authorities to seek for further reduction of priorities and prioritization of actions.

Example 3

The current structure of Priorities does not seem to reflect the real needs of the business sector. There is e.g. very little said on the development of research environment, facilities, and infrastructure and there are only a few references to investment in research infrastructure. No clear measure is foreseen on how to establish links between R&D and Industry, though the importance of this type of relationship is stressed.

Example 4

In this regard, the NDP is effectively silent on the country's use of Foreign Direct Investment as an element of its industrial policy and makes no reference to industrial specialization and emergence of clusters where **** may have a competitive advantage.

Example 5

One of the most prominent features in the structure of the **** economy is the wide disparity that exists in sub-regional development. ... The NDP does not analyse this as a separate entity, and this is needed.

Example 6

As well as a national strategy for catching up, a comprehensive approach is needed to provide more favourable conditions for employment creation, by, for example, improving the functioning of the labour, product, and housing markets, especially in areas of high unemployment.

These examples stem from different negotiating mandates and different countries, but it is noticeable that most of them are distinctly similar in the following aspects:

- 1) The EC goes to great lengths to emphasize the need to manage both creation of new knowledge (through FDI and knowledge transfer as well as through domestic industry and R&D) but also the alleviation of obvious negative effects of the rapid restructuring that took place in the 1990s (addressing regional strong imbalances, need for active labour market policies etc).
- 2) One of the biggest problems in EC mandates seems to be low administrative capacity in the then accessing countries (from analytical capabilities to financial management problems); in particular long-term strategic management issues are emphasized. Indeed, this is perhaps the key problem in the emerging CEE innovation policy framework. (See more below)
- 3) Next to providing funding for various activities that should enhance upgrading, the EC stresses the need for 'function markets' in various areas. This development is paralleled in the way the Lisbon strategy was transformed around 2005 from a clearly Schumpeterian innovation-oriented strategic framework into very wide strategic guidelines that seek to deepen EU's common market and see in the latter (that is, in the increased competition) main driver for innovation and growth. (See Reinert and Kattel 2007)

It is also evident that at least among some experts in the European Commission there were growing doubts over the entire nature of CEE integration. That is, while the overall assumption of symmetrical integration still holds, there are obviously some areas where CEE countries have suffered during the integration process and accordingly need specific measures to remedy this.

In terms of implementation, the trend initiated during the harmonization period through creation of financial and management agencies has been intensified with the structural funds. (See INNO-Policy TrendChart Country Reports 2006 and 2007 for an overview) It is fair to say that the problems with these agencies that started during the harmonization period are partially deepened since 2004. Indeed, it can be argued that most problems summarized above in CEE innovation policies in one way or other go back to the institutional framework of agencies. Almost all CEE innovation policy implementation problems go back to very weak and disorganised actors, coordination problems are rampant in policy design and implementation (see also Radosevic 2002a: 355). On the one hand, there is a clear separation of policy responsibility between education/science and innovation/industry on the ministerial level and its delivery system (Nauwelaers & Reid 2002: 365; also see INNO-

Policy TrendChart Country Reports 2006 and 2007). On the other hand, this kind of fragmented policy-making system has in its turn resulted in the lack of inter-linking and cooperation between different innovation-related activities and actors such as research organisations, government and industry (see INNO-Policy TrendChart Country Reports 2006 and 2007).

While the creation and role of innovation policy agencies is praised in very positive terms by the official European Innovation Progress Report (2006: 65), we argue that precisely this agentification is at the root of many CEE innovation policy problems.

The main driver behind the engagement of agencies in policy-making is believed to be in the specific knowledge and expertise carried by these agencies (so-called “best of breed” providers) (Goldsmith & Eggers 2004: 29), but also the agencies’ ability to be more in touch with certain specific circumstances and environment, and hence also with the needs of clients (“increased reach”) (Goldsmith & Eggers 2004: 28, 34). Due to its emphasis on efficiency, this kind of innovation policy implementation model favors outsourcing of programme management and is generally highly market friendly as signals from the market are believed to be best policy guide (see European Innovation Progress Report 2006: 65-66). However, many CEE countries have seen their economies massively restructured during the 1990s that resulted, as we saw above, in an economic structure oriented towards outsourcing and low value added activities or sectors where networking and linkages are naturally very low. Indeed, under the circumstances where the ICT-led paradigm is enforcing de-agglomeration effects upon such economic structures and where macro-economic competencies in policy making have been a priority throughout the previous decade, most CEE countries have almost no experience in creating long-term policy frameworks that deal with networking, sectoral upgrading and so on. Thus, it is clear why the EC went to such great lengths to influence what the CEE countries are doing with the EU structural funding. It is, however, also clear that to create implementation agencies into such a situation is bound to complicate the problems. Indeed, agentification in these kinds of circumstances does not foster networking practices, but rather may cause severe problems in policy design and implementation as agencies are by definition at arm’s length to government offices. Such tendencies tend to cause instability in a system as a side effect (see here case studies about the old member states by Pollitt et al. 2004). That is why the issue of agentification and particularly in innovation policy has been heavily raised by OECD in one of its latest reports (2005). Besides fragmented policy coordination together with goal congruence, contorted oversight, communication meltdown, capacity shortages and relation instability (for the most fundamental overview in these issues, see OECD 2005; but also Goldsmith & Eggers

2004), the delegation of public authority may be seen as a way to shift the responsibility away from government, and hence cause severe accountability problems. Indeed, as the EC's impact on CEE innovation policy making, while probably the key force in shaping these policies, is largely unofficial (the negotiating mandates we quoted from are not public, nor are they discussed in the respective parliaments), the accountability problem may become more and more important.

Thus, to sum up, while with the introduction of structural funds and through strong influence from the European Commission, CEE innovation policies are significantly changing since the mid-2000s, there are also serious problems that emerged with this trend. First, as we argued, the emerging innovation policies tend to be based on rather linear understanding of innovation (from lab to market) whereas most CEE countries are specialized into low end production activities virtually void of any research and with low demand for high skills; in addition, the R&D system as such has been under constant pressure since the transition and its performance has been clearly lacking. Thus, CEE innovation policies tend to solve problems not existing in the respective economies. Second, through creation of innovation policy implementation agencies (for structural funding and beyond), the innovation policy landscape is fragmented and previous problems in policy creation (lack of strategic skills and capacity, networking and coordination non-existent) and implementation (competitive grant-based programming that relies on market signals without being able to follow set priorities and goals) are only deepened. One can argue that the innovation policies emerging in the process of Europeanization are based on the assumption that policy design and implementation follow a public-private partnership model, yet in reality CEE countries singularly lack the ability to implement such a model, and what is more, actual developments in industry seem to suggest that such a model is particularly ill-fitted to the CEE context.

In addition, there is an essential problem that CEE economic and innovation policy making ignored throughout the 1990s and 2000s in devising policies to deliver economic restructuring and growth. A stable macro-economic environment envisioned to enable FDI inflow – in which CEE were indeed spectacularly successful – also encouraged massive private foreign lending (mostly through foreign banks settling into CEE markets that borrowed in foreign currency). This drove in particular since the mid 2000s consumption and real-estate booms in all CEE countries (see e.g. Fitch 2007a, 2007b and 2007c; see also Krugman 2008b in this context). Indeed, most CEE countries are highly dependent on foreign investments and private borrowing and thus they were caught in a macroeconomic dead end with appreciating exchange rates, negative current account balances and growing private indebtedness. This led to increased financial fragility through

deteriorating balance of payments account and left CEE countries starving for new foreign lending and investments that however stopped in the aftermath of the global financial meltdown in 2008. In essence, CEE industrial restructuring and innovation model became a giant Ponzi scheme. As global, especially inner-EU demand slows, so do CEE exports and by early 2009 most CEE currencies have seen massive drops in their value and foreign investors seem to flee en masse (see also Fitch 2009). At the same time, in particular Central European countries such as Slovakia, Hungary and the Czech Republic have achieved high levels of integration with the EU: merchandising exports in worth of up to 60% of GDP goes in these countries to the EU (IMF DOTS database). Debt deflation looks very likely. Fragmented innovation policy seen, inherited from the accession into the EU, paralyses CEE countries' policy inaction as there seems to be no serious policy evaluation capacity present and coordination problems prevent quick reaction to a radically changed environment.

Conclusion

It is important to note how two key variables have shaped what kind of companies thrive in CEE: the new techno-economic paradigm (including a new 'common sense' as to the creation, organization, and management of knowledge in companies) and the global macroeconomic environment created by the Washington Consensus policies. These two variables also shape what kind of innovations take place in many CEE companies and have had a huge impact on local education, R&D, and S&T. Thus, the neo-liberal policies of the 1990s were a double-edged sword delivering a very fast industrial restructuring, but also leaving CEE economies with a primitivized economic structure, locked into low value added activities with a low score on the dynamic Quality Index of economic activities. Drawing on the parallel between 'old' EU vs. CEE in Europe and US vs. Mexico in NAFTA, the CEE a sense provided a low-skilled/low increasing returns *maquila* sector to 'old' EU just as Mexico did to the US. In both cases – in the CEE and in Mexico – the loss of the traditional diversified and potentially highly linkaged industrial sector provided incentives for outward migration. This migration was directed toward the areas with an industrial sector exhibiting higher quality activities from a dynamic Schumpeterian point of view. In both cases the surge of China made it very difficult – both for NAFTA and the EU – to create a win-win flying geese pattern of sequential industrial upgrading with its industrial periphery.

The influence of the European Union, first through accession talks in the form of a harmonization of legal infrastructure and creation of first innovation policy implementation agencies and later massively through structural funds, is equally a blessing in disguise. It has brought, on the one hand, cre-

ation of the first long-term innovation policies in CEE, which are, on the other hand, poorly tailored to local circumstances and implemented in a way that only made the situation worse.

Table 1 summarizes the main developments in CEE innovation policies since 1990.

Table 1. Changes in innovation policy models²¹

Period	'Soviet' system	Washington Consensus	Europeanization
Main perspective	Public sector main R&D provider Public institutes as source of innovation	Private sector main R&D provider Economic restructuring as source of innovation	Overcoming 'European paradox': commercialize research
Policy regime	Linear supply model	Linear demand model	Public private partnership model
Knowledge origin and diffusion	Top-down	Bottom-up	Networks
Key policy elements	Selective and centralized supply R&D policies	No policy policy FDI and increased competition	Horizontal and demand oriented R&D policies Commercialization
Governance	Public institutions and companies	Privatization, creation of independent agencies	Agencies

The Washington Consensus policies, helped by the techno-economic paradigm changes, pushed the CEE economies onto a very different track of economic integration (an asymmetrical and integrative one) than initially envisioned by the overwhelming majority in the developing community and CEE policy makers: Ricardian comparative advantage was supposed to help restructure CEE economies and lead to symmetrical and integrative integration. In fact, we would argue that the greatest benefits from trade are a result of a large division of labour in activities with a large potential for innovation and subject to increasing returns (Reinert 2007). In this perspective, both CEE and Mexico specialized in the 'wrong' comparative advantage, locking them into technological dead-ends. In such a setting successful R&D projects are very difficult to match with the existing productive sectors: poor peripheral countries are in fact likely to subsidize R&D that materialize as innovations and increased added value in the core 'old' industrial countries.

²¹ This builds on Cimoli, Ferraz and Primi 2005.

The EU accession initially only deepened the path dependencies of specialization into the lower end of value chains through the harmonization process. The accession proper, following in 2004, brought policy advice from the European Commission that often assumed that the industrial restructuring had been mostly successful and that CEE is by now a smaller version of the 'old' EU. This, however, is largely misleading and also the European Commission shows signs of recognizing this misconception about CEE development and it pressurizes CEE countries to adopt a much more active role of the state in economic restructuring and innovation policies, in particular through structural funding.

Thus, we can summarize CEE industrial restructuring as evolution in organizational capabilities and national system of innovations into two rough periods, the 1990s and the 2000s (the period of harmonizations from 1998-2004 can be seen here as a transitional period that carries over many features into the next period and yet also paves way for the new period). Table 2 summarizes this evolution.

Table 2. Evolution of organizational capabilities and national innovation systems in CEE in the 1990s and 2000s.

	Main features of organizational capabilities	Main features of national innovation system
1990s	<ul style="list-style-type: none"> - Productivity increases through slashing liabilities and employment; - Replacement of products and machinery; - Foreign ownership provides key access to management and marketing know-how and production networks; - Modularity in production enhanced by ICT paradigm and harmonization with the EU regulations 	<ul style="list-style-type: none"> - Privatization programs and other measures to attract FDI; - Emphasis on macro-economic stability; - Erosion and partial disintegration of the previous R&D system; - Harmonization of legal environment with EU requirements; - Prevalence of macro-economic policy skills; - Policy initiatives assume symmetrical integration of CEE into global economy
2000s	<ul style="list-style-type: none"> - Contract work for European companies; - Process innovations prevail through cost-cutting initiatives, new machinery; - Marketing and brand creation for home markets in certain industries (media, food); - Speculative real-estate activities 	<ul style="list-style-type: none"> - Increasing fragmentation of policy arena through agencies that results in strong coordination problems; - Growing mismatch between R&D system, high-tech biased innovation policy and actual industry needs; - Increasing foreign lending and consumption booms that result in financial fragility

We showed that integration into the EU has brought a clear change into the innovation policy environment. Since joining the EU in 2004 or 2007 respectively, and already during the accession talks, there is a strong but almost not publicly discussed change in innovation policies in many CEE countries towards a much more active role of the state. In this change there is a clear and strong role of EU's structural funding, particularly negotiations and planning that come with it. However, these changes come with specific problems: first, there is an over-emphasis in emerging CEE innovation policies on linear innovation (from lab to market) that is based on the assumption that there is a growing demand from industry for R&D (which is not the case, because of the structural changes that took place in the 1990s), and, second, increasing usage of independent agencies in an already weak administrative capacity environment lacking policy skills for networking and long-term planning. We argued that such Europeanization of innovation policy in CEE, while highly positive in directing CEE to reorient economic policies towards more sustainable growth, is in its implementation often only deepening and exasperating the existing problems of networking, clustering and coordination.

Both key phases in industrial restructuring of CEE industry and evolution in respective policies, Washington Consensus and Europeanization respectively, created in enforcing each other's negative impacts (specialization into low-end production and policy fragmentation and weak administrative capacity) heavy financial fragility for CEE countries on the brink of global financial crisis in 2008. As the crisis unfolds in 2009, it becomes clear that CEE economies are particularly vulnerable to global recessions and the reasons lie with the development model chosen by these countries since the 1990s. 'The chickens are coming home to roost': past mistakes are returning with a vengeance. The key task CEE countries face now – apart from surviving the gathering tsunami in and around these countries – is to bring about a new indigenous form of capitalism with significantly less financial fragility and much more sustainable organizational capabilities and much changed national innovation systems.

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