Paper prepared for the

Third Euroacademia International Conference

Re-Inventing Eastern Europe

Berlin, 28 – 29 March 2014

This paper is a draft

Please do not cite

FDI, Growth and Structural Change in Eastern Europe

Saadet Deger[a], Somnath Sen[b] and Anca Voicu[c]

University of Birmingham[a]; Rollins College and University of Birmingham[b]; Rollins College[c]

ABSTRACT:

In this paper we look at the growth enhancement and growth retardation of major Central and East European countries (CEEC) during the last decade or so. We observe large advances in growth rates, in the early part of the 2000s, and then a rapid contraction after 2008. This rise and fall in economic growth is mirrored by the corresponding rise and fall of Foreign Direct Investment (FDI). We investigate the causes and consequences of this growth transformation through the prism of foreign direct investment. We emphasize the structural changes necessary to re-ignite growth without which the CEEC will revert back to the stagnation of the historical past.

I. Introduction.

During the last two decades, and particularly after the fall of the Berlin Wall, emerging markets have delivered astonishing growth rates (compared to their historical past) motivated by a surge in world trade, the rise of large open economies such as the BRICS (Brazil, Russia, India, China, South Africa) and the integration of some of the major economies of Europe in the mainstream of international economic life. Central and Eastern Europe countries (CEEC) as a region, has been one of the most dynamic and rejuvenated set of countries which have embraced internationalization and through trade and FDI increased growth rates and living standards rapidly. Due to the similarity of their socio-economic structures, at the start of their trade-inspired growth spurt, it is common to analyze them together; their growth patterns have common elements due to path dependency. Yet, major vulnerabilities remain particularly after the pan-European and global slowdown from 2008 onwards – often referred to as the Great Contraction. The CEEC as a group have done particularly badly in the period 2009-20012, though some positive signs (the green shoots of growth) are beginning to appear. The question is whether such growth is sustainable and continuous and what structural changes are required to make this happen. In this paper we concentrate on FDI flows and growth issues, in the context of structural change in the CEEC, and suggest policies to overcome current challenges. We believe that the prism of FDI is a useful one since it can be an indicator of technological progress via imported technology, which coupled with the creation of a domestic knowledge economy, will be able to re-ignite long term growth. We concentrate on Poland, Hungary, Bulgaria, Romania, Czech Republic and Slovakia as the earlier countries to break apart from the straitjacket of eastern trade blocs and also the core countries of the CMEA which acted as a major constraint on trade, technology and change for over 40 years. FDI flows are considered as an engine of further growth and its dynamics, in the context of trade creation, is discussed. We use the framework of endogenous growth to show the relevance of FDI in re-igniting in the earlier growth spurt, after the end of the current slowdown. Policy measures are emphasized.

Writing in 2010, Mitra et al (2010) analysed on behalf of the World Bank that "The countries in the World Bank's Europe and Central Asia (ECA) region,among all emerging and developing economy regions, are forecast to experiencethe deepest contraction as a result of the global economic recession of2008–09. This is partly due to the region's deep integration into the globaleconomy across many dimensions—trade, financial, and labor flows ---". Although the CEEC forms only a part of this group, still its fortunes were in reversal after the success of the early 2000s. In a sense the very integration which was the foundation of astounding success also became the cause of the regional downfall. We intend to investigate the relationship between integration through FDI and domestic economic growth. More importantly we suggest a course for the future, the creation or construction of the knowledge economy to re-ignite high quality and sustainable growth into the longer term future.

The paper is divided into the following sections. In Section II we give the background history, core data on growth and FDI and describe how the CEEC moved from 'boom to bust' during the last ten years. Section III discusses the fundamentals of economic theory to demonstrate what could have been the core reasons for the rise and fall of growth that occurred in the region and how the future can be shaped. In Section IV we discuss how the revival of FDI would stimulate structural change in the context of the external sector. In Section V we discuss domestic absorptive capacity, in the framework of the creation of a 'knowledge economy',which could create the domestic pre-condition for FDI and trade induced *future* growth. In Section VI we conclude briefly.

II. Background, history and data

The Soviet Union engineered the formation of the Council for Mutual Economic Assistance (CMEA, traditionally called the Comecon) in 1949, just after the War; in part this was done to discourage today's CEEC, within Eastern Europe, from participating in the Marshall Plan and thus nullify US political influence which the USSR thought was a

vital component of foreign aid. In addition, the Soviet Union wanted to form a trade bloc for itself to counteract trade boycotts imposed after World War II by the United States and by Britain and other West European countries. In principle, Comecon was organized to coordinate economic and technical cooperation between the Soviet Union and the member countries. In reality, the Soviet Union's domination over Comecon activities reflected its economic, political, and military power. In 1989, at the end of its tenure,Comecon comprised ten countries: the six original members—Bulgaria, Czechoslovakia, Hungary, Poland, Romania, GDR and the Soviet Union formed a close-knit trade organization. The main problem of this trade interdependence was that it distorted external prices since all relative prices were based on administrative rules, Soviet geo-political interests and accounting costs – rather thanmarket-determined opportunity cost based prices. As any simple Ricardian model of international trade would demonstrate, the absence of opportunity cost based pricing creates a distortion which reduces the efficiency of trade and the failure of the macroeconomy to benefit from its comparative advantage.Hence the trade 'liberation' of the CEEC countries in the 1990s unleashed the forces of trade-induced competition and productivity growth which increased both efficiency and growth in the long run. After the initial difficulties of the 1990s, partly caused by the policy controversy of the Big-bang versus Gradualism methods of implementing reforms, were resolved, the CEEC saw an amazingly impressive period of high growth rates during the first part of the 2000s, far higher than EU countries. Table 1 shows the data for 2003 to 2008.

Table 1: Growth Rates, 2003-2008 (%)

Country name	2003	2004	2005	2006	2007	2008	Average		
							2003-2008		
Bulgaria	6.1	6.7	6.4	6.5	6.4	6.2	6.38		
Czech Republic	4.5	4.7	6.8	7	5.7	3.1	5.30		

Hungary	4.7	4.8	4	3.9	0.1	0.9	3.07		
Poland	6.5	6.7	6.4	6.5	6.4	6.2	6.45		
Romania	7.4	8.4	4.2	7.9	6	7.9	6.97		
Slovakia	5	5.1	6.7	8.3	10.5	5.8	6.90		

It was not always clear at the start of market liberalization process in the transitional economies of the CEEC that these countries would be able to achieve such accelerated growth rates. In an important book, based on the political economy of transition, Roland (2000) claims that: "Despite its victory over socialism and its important successes, capitalism has not been introduced successfully everywhere. At the beginning of the third millennium, there still remains the major challengeof bringing about prosperity and growth via well-working market institutions in the poorest (and highlypopulated) continents, countries, and regions in the world. By introducing capitalism in former socialisteconomies, the objective, one hopes, is to bring these countries, within an appropriate period of time, to levels of prosperity comparable to those of the most advanced industrialized countries" (Roland 2000, p.81). However, by the early years of the 2000s (see table 1) it was clear that these countries would not fall into the trap of stagnation common to many countries in the past and would graduate to a state of high sustainable growth.

The spurt in growth rates took place because the CEEC were exposed to international (as different from intra-regional) trade, non-distortionary prices and an ability to capitalize on their comparative advantage. This part of the narrative follows the Ricardian theory of comparative advantage. However, a more important reason for this trade induced expansion was attributable to the 'size of markets' paradigm as postulated by Adam Smith. Smith claimed in the Wealth of Nations Book I, "As it is the power of exchanging that gives occasion to the division of labour, so the extent of this division must always be limited by the extent of that power, or, in other words, by the extent of the market". Through close proximity with the EU, and through political and cultural associations, the CEEC could capitalize and capture the scale and scope economies of the

vast market size of what is the largest integrated market in the world (Western Europe). Prior to their growth spurt the CEEC were operating far below their production possibility frontier. Although allthe basic elements of growth, as proposed by Lucas (1988) and Romer (1990), were present in the erstwhile socialist economy, growth was never quantitatively high nor qualitatively good since the 1970s. In the growth surge of the early to middle 2000s, the CEEC not only grew fast but also showed a quality of growth (based on human capital, technological progress and innovative capacity) which was unprecedented in most of Western Europe.

However, things changed with the beginning of international financial crisis of 2008, which rapidly turned in to a recession in most advanced economies. Often called the Great Contraction (as opposed to the Great Depression of the 1930s, almost eight decades back), it had differential effects on different regions of the world. Large economies, often termed BRICS (Brazil, Russia, India, China, South Africa) weathered the storm well and rarely suffered negative growth rates. The other country grouping, with a nomenclature of MINT (Mexico, Indonesia, Nigeria, Turkey), also showed considerable resilience and improved their economic position. The story was totally different for the CEEC. Table 2 shows that although there are some country differences between these economies, in general (possibly with the exception of Poland) the six countries we concentrate on suffered disproportionately with a dramatic fall in growth rates.

Table 2: Growth Rates 2009-2012

Country name	2009	2010	2011	2012	Average 2009-2012
Bulgaria	-5.5	0.4	1.8	0.8	-0.625
Czech	-4.5	2.5	1.8	-1	-0.3

Republic					
Hungary	-6.8	1.3	1.6	-1.7	-1.4
Poland	1.6	4.1	4.5	1.8	3.0
Romania	-6.6	-1.6	3	3.1	-0.525
Slovakia	-4.9	4.2	3	1.8	1.025

Inward FDI flows towards these countries mirrored their growth performance. Given their comparative advantage with low cost production, highly trained workforce, large gains in productivity and knowledge based societies, FDI inflows from Western Europe flowed in substantial amounts. There was a symbiotic, bi-directional causality, and a close inter-relationship between growth and FDI which is apparent in these economies. Table 3 shows the FDI inflows into the six countries during 2000-2008. A quick comparison with Table 1 shows that these could be possible mirror images since FDI and growth rise consistently with each other during the growth expansion period.

Table 3: FDI Flows 2000-2008, Annual $ million

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Bulgaria	1,016	808	922	2,089	3,397	3,920	7,805	12,389	9,855
CR	4,985	5,642	8,482	2,103	4,974	11,653	5,463	10,444	6,451
Hungary	2,764	3,936	2,994	2,137	4,266	7,709	6,818	3,951	6,325
Poland	9,445	5,701	4,123	4,588	12,874	10,293	19,603	23,561	14,839
Romania	1,057	1,158	1,141	2,196	6,436	6,483	11,367	9,921	13,909
Slovakia	2,720	2,275	5,865	2,976	4,029	3,110	5,803	4,017	4,868

Source: UNCTAD, http://unctadstat.unctad.org/TableViewer/tableView.aspx?ReportId=88

Now look at Table 4. The situation dramatically reverses itself. FDI falls for all the countries, for some it picks up by the end of 2012, for others it does not. The growth contraction seen in Table 2 is mirrored in the tapering off FDI expansion that could have been the basis of earlier growth

Table 4: FDI Flows 2009-2012, Annual $ million

	2009	2010	2011	2012
Bulgaria	3,385	1,525	1,827	1,899
CR	2,927	6,141	2,318	10,592
Hungary	1,995	2,163	5,757	13,469
Poland	12,932	13,876	18,911	3,356
Romania	4,844	2,940	2,523	2,242
Slovakia	-6	1,770	2,143	2,826

It is often the case that FDI flows fluctuate over a short period of time. Hence, we calculate FDI flows with Moving Averages (MA). These are reported in Table 5. Again, the trend is clear. FDI increases strongly in the pre-2008 period and then declines precipitously in the post 2008 period, with the year 2008 being a watershed..

Table 5: FDI FLOWS (3 - year MA)

	2001	2002	2003	2004	2005	2006	2007	2008	
Bulgaria	915	1273	2136	3135	5041	8038	10016	8543	
CR	6370	5409	5186	6243	7363	9187	7453	6607	
Hungary	3231	3022	3132	4704	6264	6159	5698	4090	
Poland	6423	4804	7195	9252	14257	17819	19334	17111	
Romania	1119	1498	3258	5038	8095	9257	11732	9558	

Slovakia	3620	3705	4290	3372	4314	4310	4896	2960

	2008	2009	2010	2011	
Bulgaria	8543	4922	2246	1750	
Czech Republic	6607	5173	3795	6350	
Hungary	4090	3494	3305	7130	
Poland	17111	13882	15240	12048	
Romania	9558	7231	3436	2568	
Slovakia	2960	2211	1302	2246	

Source: UNCTAD http://unctadstat.unctad.org/TableViewer/tableView.aspx?ReportId=88

What is the relationship between economic growth and FDI in high middle income countries such as the CEEC? We believe that the causality works both ways. FDI contributes to growth via additional capital accumulation, creation of technological progress via importation of new technology and spurring innovation in an economy with high quality human capital and relatively low-cost labour force. At the same time, growth acts as an attractor for FDI and the prospects for future growth create incentives for multinational corporations to invest in the home economy both for the domestic market as well as for export promotion. Greenaway et al (2007) and Bende-Nabende et al (2003), demonstrate clearly that FDI and trade liberalization are complementary in the creation of good quality economic performance. If they work consistently together, economic conditions improve. If they decelerate together,then economic performance declines. In a sense, due to the recessionary conditions in Europe in the post 2008 period, exports fell due to the loss of European markets which grew sluggishly. At the same time FDI from capital exporting countries fell so that host countries received less inward investment from overseas. The combination of the two caused what may be termed the 'Great Downturn' in the CEEC.

III. The Theoretical Framework.

Theoretically,theneo-classicalmodel of growth (Solow(1957) canonlyexplainthepotentialeffectsofFDIonoutputastheincreasedinputofphysicalcapital,whileit regardsotherfactorsaffectingeconomicgrowthasexogenous.Sustainableeconomicgrowthcanno tbemaintainedinsteady state equilibriumsincecapitalissubjecttodiminishingreturns:technologicalprogresscouldnotbe directly encapsulatedintheproductionfunctionin theneo-classicalSolowmodel(Solow(1957))).Hence, the role of FDI in mainstream growth theory is to increase the stock of capital but subject to diminishing returns. Clearly, FDI can allow the introduction of imported technology which shifts the production function outwards, but there is no economic or market mechanism via prices that would allow us to systematically explain how exogenous technology can explain growth. Solow called this 'manna from heaven' technology and it is difficult to explain its behavior and impact effect on growth in a systematic fashion. In addition, if foreign capital (via FDI) and domestic capital (via savings) are substitutes, then the capital enhancing effect of FDI in the aggregate production function is weakened. As foreign capital flows in, domestic savings is correspondingly reduced and the growth strategy becomes consumption (demand) based rather than savings (supply) based.

Thatlimitationcanbe rectifiedbyinvokingendogenousgrowththeory.Thelatterformulatedseveralendogenousfactorsi nthegrowthprocess,whichpotentiallyeffectqualityimprovementsinthelabourforceofaneconomy ,suchas,health,education,training,technologicalchange,internationaltradeandgovernmentpolic y(seeRomer(1986),Lucas(1988)).SinceitisarguedthatFDIcanleadtothecreationofnewtechnolo gies,increasedcapitalformation,thedevelopmentofhumanresources,andtheexpansionofinternat ionaltrade,itisnotsolelyitsdirectimpactonthestockofphysicalcapitalthathasthepotentialtoenhan ceoutputoritsgrowth.
Thecentralbuildingblockinthemodel,followingendogenousgrowththeory,isthatthegrowthofout putisafunctiono f capitalformation,employment,FDI,andtheindirectbenefitsthatFDIembodies,sucha s ,

humanresources development,new technologytransfer (seeSolow(1970),Lucas(1988),Romer(1990)),andthe furtheropeningupoftheeconomytointernationaltrade and the explorations of new markets.Thoseendogenousvariablesaretheninfluenced bythetruly exogenous,largely governmentpolicy but also institutional,variables.

The way FDI impacts on growth in economies like the CEEC, which are radically different from traditional developing countries and yet have structural characteristics of underdevelopment due to being under a distorted market system, can be understood by looking at a model proposed by Aghion.The Aghion model builds upon the Schumpeterian notion of 'creative destruction'. The vertical or new technology dimension to growth is provided by the theory of "creative destruction", whereby 'the innovations that drive growth by creating new technologies also destroy the results of previous innovations by making them obsolete' (Aghion and Howitt, 2008, p.86). In the process, Aghion and Howitt (2008, develop a neo-Schumpeterian model that incorporates "creative destruction". In a formal sense, the theory takes the production function:

$$Y_{it} = A_{it}^{1-\alpha} K_{it}^{\alpha}, \quad 0 < \alpha < 1$$

whereA_{it} represents a productivity parameter of the leading edge technology in industry i at time t. K_{it} is the distinctive intermediate good flow in the sector, produced with a constant input (capital) to output (flow) ratio. Y_{it} is the industry-specific output, with each added together to make total aggregate output. Each latest innovator displaces the last to augment A_{it} to become the intermediate sector monopolist, so increased firm turnover increases growth (Aghion et al., 2010).It is an endogenous growth model where 'a random sequence of quality-improving (or "vertical") innovations' produces growth. The model is born out of contemporary industrial theory in which innovation is pivotal, as it is to industrial competition.

To express this theory formally, Aghion et al. (2010) draw upon the following Schumpeterian model. In such a model, one way to generate growth is via imitating already developed technologies and the other is producing 'leading-edge domestic innovation' on

the technological frontier. The relative importance of imitation diminishes and leading-edge innovation increases closer to the frontier of world technological progress. Formally, the leading-edge innovation leapfrogs, by a multiple (γ) of its original value, the aggregate technological frontier $\bar{A}_t$ to create new parameter A_i in the innovation sector i. Imitation is the catch-up to the frontier $\bar{A}_t$. In a sector i in a country, the profit maximising innovation has productivity (or size) u_n and imitation productivity (or size) u_m. For simplicity, we drop the i subscript and think of the 'representative firm' which summed up produces the aggregate A.

The change in productivity parameter between t and t+1 is:

$$A_{t+1} - A_t = u_n(\gamma\text{-}1)A_t + u_m(\bar{A}_t - A_t),$$

Thus:

$$g_t = (A_{t+1} - A_t)/A_t = u_n(\gamma - 1) + u_m(\alpha_t^{-1} - 1),$$

where$\alpha_t = A_t / \bar{A}_t$ represents the inverse of 'distance to the frontier' (Aghion et al., 2010, p.7) and g is the growth rate

The formulae also highlight the fact that the country will grow faster the greater the distance from the frontier (the smaller is a_t), ceteris paribus. The theory also naturally leads to "appropriate growth institutions" which suggests that the growth rate is determined by whether imitation-enhancing institutions or innovation-enhancing institutions are favoured, at the opportunity cost of the other, due to differences in their relative importance with "distance from the frontier" (Aghion et al., 2010). Here it is assumed that imitation and innovation necessitate dissimilar institutions, such that there may be trade-offs, and so growth and development coincides with structural transformation.

The growth enhancement of the CEEC can be identifies with the imitation phase whereby importation of technology via FDI and the use of skilled low cost home labour created the conditions for rapid growth. In other words, he CEEC were relatively far from the world

technology frontier, (the smaller is a_t), so that rapid catch-up was a distinct possibility. As the CEEC have moved up the technological ladder, it needs to focus on innovation inducing technology and utilise FDI in sectors where such innovation is possible. Future growth will come from innovation (represented by γ) rather than from imitation of technology (parameter α).

IV. Re-orientation of FDI

The growth-FDI nexus (analysed in Table 1 – 4) produced some remarkable macroeconomic results in terms of performance and productivity. However, the situation was inherently unstable and major vulnerabilities remained. When the going was good, the expansion of world trade and investment in the early part of the century, these potential challenges remained unseen or forgotten. When trade growth was stymied and GDP growth fell or entered into a recessionary phase, these issues could not be waived away.

The CEEC suffered from six macroeconomic challenges during their booming period. First, the growth that did take place was consumption driven and a considerable part of this consumption was fuelled by personal or corporate debt. Consumption averaged about 80% of GDP between 2005-2008, far above the 50% in China and 66% in India – two very successful large economies in this period. Property booms in these countries reached bubble proportions (for example property prices in Bucharest, Romania rose by more than 350% during 2000 and 2007).Second, investment flows were largely financed by FDI rather than by domestic savings. Domestic investment and foreign investment, rather than being complementary became substitutes so savings rate remained permanently low – the flip side of a high propensity to consume. Low national savings were reflected in large current account deficits amounting to 7% or more as a proportion of GDP. Thirdly, trade of the CEEC was high but wholly concentrated in the EU-15 markets. Total trade (exports + imports) as a proportion of GDP had exceeded 100% by the end of 2010, but it was heavily concentrated on the EU partner countries. In particular, exports to Germany areabout 25% of total exports, but exports to the BRICS are around 18% while exports to Russia are around 7% of total exports. At a time of growth, this concentration did not matter, rather it was to its advantage. However, at a time of crisis, when diversification should have been the paramount objective of policy, the CEEC were concentrating their export

potential to a relatively shrinking market. In addition, the concentration of exports to a few industries created problems for diversification. Since much of exports were based on industries which received considerable FDI (machinery and transport equipment, manufactured goods and articles account for two-thirds of aggregate exports), the reduction in world demand during the European recessionary years hit the region hard. If we compare the CEEC to Turkey – one of the most successful economies in the first decade of the 2000s, we observe a widely diverse export profile (food, automobiles, household durables, textiles, tourism, financial services) and an export market which encompasses the EU, Middle East, Russia and Israel as its major partners.

Fourthly, domestic savings rate is still relatively low in the CEEC. It is still on average less than 20% which is far less than developing countries in their catch-up phase when per capita income converges towards its steady state equilibrium. As the Solow (1956) model predicts, an increased savings rate speeds up the transition to long run equilibrium but this mechanism was conspicuous by its absence. At the same time current account deficits needed to be financed and since financial capital inflows were not abundant, again FDI had to fill up the gap. Fifthly, the productivity gains from technological progress were predominantly driven by FDI and imported technology. When that fell, and sources of domestic investment are scarce, productivity of labour will not rise and the productivity differential with the EU-15 is widening. Thus, the low cost high productivity nexus is being broken, making it difficult to absorb similar quantity and quality of FDI in the past as was available in the past. Finally, maintenance of high growth rates, at the early stages of growth, requires a positive combination of a low capital output ratio and a high investment output ratio (in the Harrod growth model this would imply $g = i/v$, where i is the investment GDP ratio and v is the capital output ratio). The BRIC countries have an $i = 33\%$, a $v = 4$, averaging over 8% growth rate. In the CEEC, we have $i = 20\%$, and if $v = 4$ then the growth rate would not exceed 5% over the long run. In a world of high growth, where transition economies need to catch up with developed countries, this rate of growth will be too little too late.

What can be done in the rest of the current decade to attract new FDI, to improve the quality of domestic investment to enhance trade in higher value added products, to have greater

industrial productivity and to enhance the value chain of home products for exports and domestic use?

Most important here is the diversification of exports and increasing the value added of exports. This can be done via the expansion of knowledge-intensive or high human capital intensive manufacturing. This needs better quality of FDI, greater domestic innovation, raising public and private sector investments in R&D and continuing re-training of workers to increase their skills. One of the significant growth areas for the CEEC is outsourcing and offshoring (O&O) sectors where the potential for expansion is huge. Poland has already shown how FDI from India (one of the major players in the O&O sector) can transform the domestic production of such services. Other CEEC can follow this example. Second, productivity in the industrial sectors must be raised given the competition from Asian and Latin American economies. This will require more infrastructural investment and again FDI may be encouraged or subsidized to enter infrastructural markets as in China.Finally, despite the supply of high skilled and educated labor force in the CEEC, there is little room for complacency since other countries are catching up as convergence theory would predict. In sectors such and advanced manufacturing and outsourcing activities, technological progress is rapid and the opportunities for profitable 'imitation' shrinks while the potential for profitable 'innovation' expands (Aghion (2010). The region does not have outstanding research universities, post-secondary education does not encourage creative thinking and emigration may have resulted in the loss of talent via the brain-drain. There is a lot to do in high quality education provision. R&D expenditures in the CEEC average less than 1% of GDP while in East Asia it is over 1.8% while the OECD members average over 2.3%. There is no way that the CEEC can benefit from high value added FDI of the future if it does not improve its performance here. What are needed is more public and private sector investment, development of industry and urban clusters in knowledge-intensive industries, major collaboration between universities and companies as well massive state help and subsidies towards start-ups and small and medium sized enterprises in the knowledge sectors such as computer programming or gaming.

V. Domestic absorptive capacity and imported technology

In a world of high competition, and stare sponsored capitalism as in China, Korea, Russia and Japan (in the past), what can the CEEC do differently to create new avenues of growth, increase the quality of the growth experience, in addition to the quantitative increases in growth rates, and attract FDI which will be complementary to its domestic economy. We believe that the CEEC should concentrate on innovation, moving closer to the world and EU technological frontier, attracting higher and better quality FDI, creating an enabling environment through human capital and physical infrastructure and constructing a modern 'knowledge-based' economy. To understand the nature of this type of economy we utilize a set of new indices provided by the World Bank to see how the CEEC fare in terms of ranking and dynamics of the so called knowledge economy.

The core idea of theKnowledge Assessment Methodology (KAM) 2012, a benchmarking tool created by the Knowledge for Development Program by the World Bank, is utilised for assembling World Bank (2012) cross-country data and creating an aggregate index for the so called Knowledge Economy. KAM quantifies the 4 Knowledge Economy pillars of the World Bank from whose data set of 146 variables of structural and qualitative indicators available the indices are constructed. The data has been normalised by the World Bank (2012) on a scale of 0 to 10 in comparison with all other countries (World Bank, 2012), and it is these data that are used in the following Tables to demonstrate where the CEEC should be heading in the next decade or so. Essentially the KEI (and the narrower KI) quantifies the economic and institutional environment in a knowledge economy and asks whether such an environment is conducive for knowledge (education, innovation, information technologies) to be used for economic development, growth and structural change.

The variables that serve as proxies for the 4 pillars of the Knowledge Economy framework, are summarized by the World Bank as follows:

- "An economic and institutional regime to provide incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship;
- An educated and skilled population to create, share, and use knowledge well;

- An efficient innovation system of firms, research centers, universities, consultants and other organizations to tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new technology;
- Information and communication technology to facilitate the effective creation, dissemination, and processing of information."

The Appendix sets out the schematic framework culled from the World Bank website. It is self-explanatory and gives us the variables considered important for the KEI and KE indices. For the 3 pillar Knowledge Index (KI), it is an aggregation over indices for: education (which itself is the sum of average years of schooling, secondary and tertiary enrolment); innovation (sum of indices for royalty payments, patent counts and publications of scientific journal articles); ICT (which is the sum of indices for telephones, computers and internet usage). The Knowledge Economy Index (KEI) adds to the KI, the Economics and Institutional Regime Index, which again is the sum of the indices for tariff and other trade barriers, regulatory quality and the rule of law. The composites, KI (average of three pillars) and KEI (average of 4 pillars, the three KI variables plus economic and institutions index) are scaled to a maximum of 10 and reported by the World Bank. We have data for 2012 and 2000 which are reported for the CEEC countries Tables 6 and7. We also provide the ranks of these six countries placed among the top 30 countries in the world. Over the first decade of the 2000s, these six countries have consistently been in the top 30, a group populated by the advanced nations of the world such as Western Europe, Australasia and North America. To provide a comparative estimate, we also give Tables 8 and 9 which provide similar data for the top 10 countries as a means of comparison.

The Tables below demonstrate that the CEEC have all the basic domestic ingredients to create a Knowledge Economy based on top quality FDI, diversified export structure and human capital based growth. Although the absolute values of the indices have not changed much, the fact that they consistently are in the top 30 in the world testifies to their strength and resilience over the 2000-2012 period. Further two of these countries, Czech Republic and Hungary, are in the range of 8.0 to 8.9 which places them among the most advanced nations of the world. To compare, in 2012, the USA had a KEI of 8.77 and a KI of 8.29; Japan had a KEI 8.28 and a KI of 8.52 (see Appendix for sources). Even the least performers in the region, Bulgaria and Rumania have relatively high index and have maintained their position of 29th and 30th through the growth contraction era. This bodes well for the future.

Often the productivity of FDI and its capability to generate high quality growth is reduced by domestic absorptive capacity. If the domestic economy does not have the pre-requisites to absorb high quality foreign technology or resources, then progress is halted and growth falls back. There are many instances where growth has started and then fallen back as the economy transits from low to middle income to upper middle income. This phenomenon termed the middle income trap could have affected the CEEC. However, they have all passed above that trap level. The issue now is to foster better growth (rather than simply higher growth). The way to do this and for the region to join the level of prosperity and development of the EU overall is to create the Knowledge Economy. But for this to be successful, it needs the domestic economy to be well developed and with the capability to absorb international funds, knowledge and technology. By using the KAM Methodology we find that the CEEC are ready domestically to follow that path towards re-igniting growth.

VI. Conclusion

We conclude briefly. We believe that the European orientated export strategy, coupled with the importation of capital and technology via FDI, served the CEECs well at a time of European and global expansion. But, by 2010 it was clear that the strategy was not working since it was fragile in the ace of European recession. Thus, the rise and fall in both growth and FDI seemed inevitable. We suggest structural changes and policy orientation such that the CEECs reduce their dependency on Europe, become more of global players and construct a stronger 'Knowledge Economy' which would have more relevance in the coming decades. The strength of the domestic absorptive capacity, as shown by the World Bank Knowledge indices, in the CEECs demonstrates that it is a feasible proposition.

Table 6: Knowledge Index, CEEC Countries (2012)

Rank/Country	KEI	KI	Economic Incentives	Innovation	Education	ICT
17/Czech Republic	8.14	8.0	8.53	7.9	8.15	7.96
18/Hungary	8.02	7.93	8.28	8.15	8.42	7.23
22/Slovakia	7.64	7.46	8.17	7.3	7.42	7.68
27/Poland	7.41	7.2	8.01	7.17	7.76	6.7
29/Romania	6.82	6.63	7.39	6.14	7.55	6.19
30/Bulgaria	6.8	6.61	7.35	6.94	6.25	6.66

Source: World Bank; for definitions of KEI and KE see Appendix

Table 7: Knowledge Index, CEEC Countries (2000)

Rank/Country	KEI	KI	Economic Incentives	Innovation	Education	ICT
19/Hungary	7.81	7.81	7.81	8.03	8.17	7.25
23/Czech Republic	7.46	7.56	7.18	7.5	7.56	7.62
25/Poland	7.23	7.3	7.04	6.86	8.11	6.92
27/Slovakia	7.03	7.2	6.51	7.08	7.06	7.46
29/Bulgaria	5.89	6.44	4.25	5.76	7.31	6.24
30/Romania	5.66	5.73	5.46	5.24	6.37	5.56

Source: World Bank

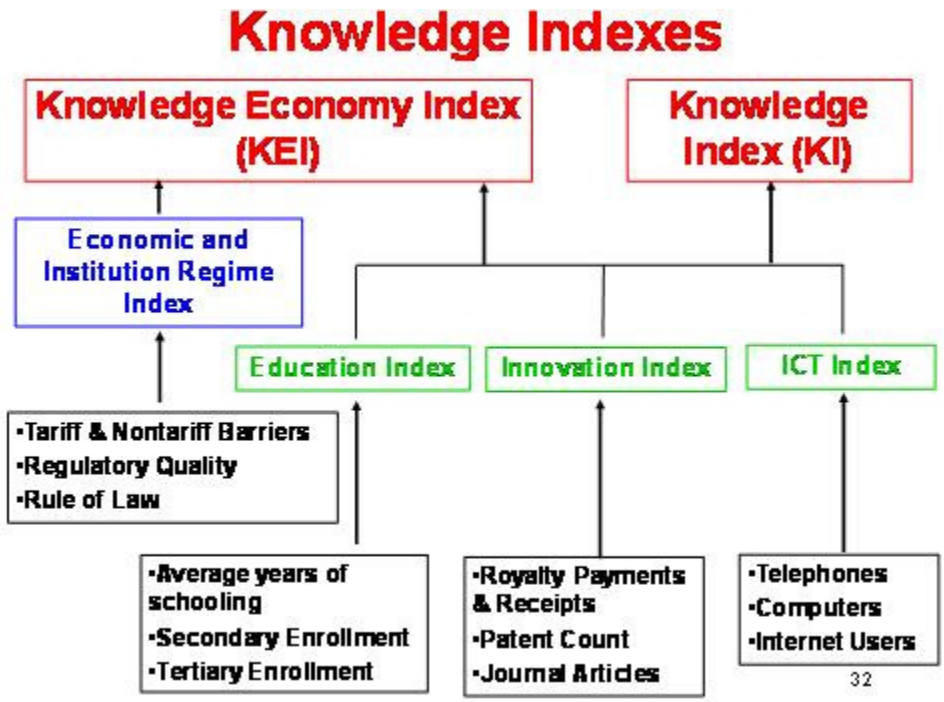
Table 8: Knowledge Index, Top 10 in the world (2012)

Rank/Country	KEI	KI	Economic Incentives	Innovation	Education	ICT
1/Sweden	9.43	9.38	9.58	9.74	8.92	9.49
2/Finland	9.33	9.22	9.65	9.66	8.77	9.22
3/Denmark	9.16	9.0	9.63	9.49	8.63	8.88
4/Netherlands	9.11	9.22	8.79	9.46	8.75	9.45
5/Norway	9.11	8.99	9.47	9.01	9.43	8.53
6/Germany	8.9	8.83	9.1	9.11	8.2	9.17
7/Switzerland	8.87	8.65	9.54	9.86	6.9	9.2
8/Ireland	8.86	8.73	9.26	9.11	8.87	8.21
9/UK	8.76	8.61	9.2	9.12	7.27	9.45
10/Belgium	8.71	8.68	8.79	9.06	8.57	8.42

Table 9: Knowledge Index, Top 10 in the world (2000)

Rank/Country	KEI	KI	Economic Incentives	Innovation	Education	ICT
1/Sweden	9.65	9.73	9.42	9.72	9.67	9.79
2/Netherlands	9.34	9.36	9.27	9.53	9.03	9.53
3/Denmark	9.32	9.36	9.15	9.52	8.99	9.63
4/Switzerland	9.28	9.14	9.7	9.9	7.56	9.95
5/Norway	9.25	9.3	9.12	9.0	9.68	9.21
6/ Finland	9.22	9.12	9.5	9.68	8.31	9.37
7/Ireland	8.9	8.82	9.13	9.0	8.76	8.7
8/UK	8.89	8.83	9.06	9.38	8.11	9.02
9/Austria	8.88	8.65	9.58	8.83	7.34	9.18
10/Belgium	8.86	8.98	8.51	9.1	9.25	8.57

Appendix



Derived from World Bank website:

http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/KFDLP/EXTUNIKAM/0,,menuPK:1414738~pagePK:64168427~piPK:64168435~theSitePK:1414721,00.html

References:

Aghion, P., and Howitt, P.W. (2008), *The Economics of Growth,*Cambridge, Massachusetts. MIT Press.

Bende-Nabende,A.,Ford,J.L.,Santoso,B.,andSen,S.,2003."TheInteractionbetweenFDI,Outputandthe Spillovervariables:Co-integrationandVARAnalysesforAPEC1965-1999".*AppliedEconomicsLetters10*,165-172.

Greenaway,D.,Sapsford,D.,andPfaffenzellerS.(2007):"ForeignDirectInvestment,EconomicPerformanceandTradeLiberalization";*TheWorldEconomy*;30,pp.197-210.

Lucas,R.(1988):"OntheMechanicsofEconomicDevelopment";*JournalofMonetaryEconomics*;1988;22;pp.3-42.

Mitra, P., Marcelo Selowsky, M., and Juan Zalduendo, J. (2010), *Turmoil at Twenty:Recession, Recovery, and Reform in Central and Eastern Europe and the Former Soviet Union*, Washington DC, The World Bank.

Roland, G. (2000): *Transition and Economics. Politics, Markets, and Firms.* Cambridge, Massachusetts. MIT Press.

Romer,P.(1986):"IncreasingReturnsandLongrungrowth";*JournalofPoliticalEconomy*;1986;99(3);pp.500-521

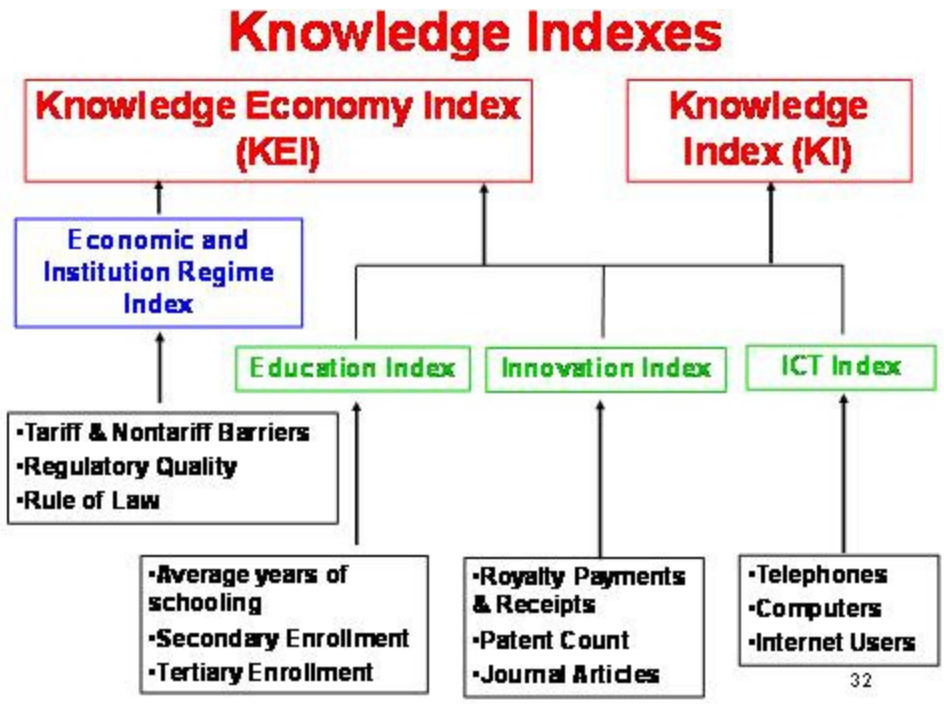
Romer,P.(1990):"EndogenousTechnologicalChange";*JournalofPoliticalEconomy*;98,PartII;S71-S102.

Solow,R.(1955):*GrowthTheory:AnExposition*,NewYork:OxfordUniversityPress.

Solow,R.(1957):"TechnicalChangeandtheAggregateProductionFunction"*ReviewofEconomicsandStatistics*;39;pp.312-320

Solow,R.(1970):*GrowthTheory:AnExposition*,NewYork:OxfordUniversityPress.

Appendix.



Derived from World Bank website:

http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/KFDLP/EXTUNIKAM/0,,menuPK:1414738~pagePK:64168427~piPK:64168435~theSitePK:1414721,00.html