

Do Eastern European Regions Move Towards an Endogenous Growth Pattern? A Diachronic Perspective of Regional Success Factors

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Abstract: in the last 25 years Eastern European countries went through a process of deep transformation, facing institutional and market reforms which led them to become members of the EU. Few works have been devoted to the analysis of the success factors of regional growth in Eastern regions. This paper has the aim to fill this gap, by developing a diachronic approach with the intent to understand the evolution of the driving forces of growth in Eastern regions in different periods characterised by different institutional and economic reforms. Moreover, the analysis accounts for the industrial restructuring processes that took place in the most intense phase of transition. In both a descriptive and interpretative way, the results witness a clear tendency of Eastern regions to increasingly rely on soft elements, like knowledge and social capital, as elements able to explain their competitive advantage.

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1. Introduction¹

The fall of the Iron Curtain in 1989 belongs to modern history nowadays, and most of the consequences that this historical event brought about in the Eastern European Countries are well known, at least for what concerns their national economies. Eastern countries went through a so called post-socialist transformation process of their economies, facing institutional and market reforms, privatisation and liberalisation being the most important steps forward towards market-based economic systems. These processes took place in different times in different Eastern countries; some, like Poland, followed a shock therapy, while others implemented reforms in more cautious ways.

The literature is rich of studies dealing with the consequences of democratic reforms, and measuring the effects of privatization and liberalization on national economic growth (Bjørnskov and Potrafke, 2011; Apolte, 2011; Brunello et al., 2012; Fidrmuc, 2003), but when one comes to the effects of the transition period on regional growth, an impression of lack of knowledge emerges. The studies at regional levels in these countries focus their interest mainly on the convergence of Eastern Europe to Western countries, pointing out the evolution of regional inequalities (Artelaris et al., 2010, Monastiriotis 2011, Petrakos et al., 2011). Without neglecting the importance of the evolution of regional disparities, it is impressive that up to now, at least to our knowledge, very partial attempts have been made so far to highlight for the whole Eastern European regions the success factors of regional growth in these regions, having the identification of the driving forces of growth important normative drawbacks.

This paper has the aim to fill this gap, by pointing out the major success factors that have affected regional growth in Eastern countries since the fall of the communist regime, developing a diachronic approach with the intent to understand the evolution of the driving forces of growth in Eastern regions in different periods characterised by different institutional and economic reforms.

As far as other diachronic regional analyses are concerned, the previous literature refers either to the years subsequent to the fall of the Iron Curtain (Gorzalak, 1998) or to those aiming at investigating the effect of the accession to the EU (Lejour et al., 2009). In each of these periods, the existing studies investigate the role of specific elements in explaining regional growth rates, like the attractiveness of foreign investments (Eller et al., 2006; Resmini, 2003), the geographical proximity to western countries (Gorzalek 1998), the presence of capital cities (Kallioras and Petrakos, 2010). Finally, an extensive literature analyses the development of the regions within one single country in Eastern Europe, pointing out the national peculiarities (Traistaru et al. 2002; Gorzelak et al., 2009).

This paper enters the debate on the success factors for regional growth by adding to the previous literature a diachronic approach to the identification of the most important success factors in different periods of the last twenty years.

The approach looking at the evolution of the most important success factors in the different institutional periods allows replying to the question whether Eastern regions have moved from an exogenously driven phenomenon, mostly based on FDI attractiveness, to a more endogenous pattern of growth, led by local,

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intangible structural assets, like knowledge, trust, common rules and sense of belonging, as is the case in modern western regions. It is in fact the case that in modern economies regional growth is no longer dependent on material assets, like capital and labour. The hyper-mobility that nowadays characterises these factors reduces their geographical concentration, and shifts the elements on which competitiveness rests from the availability of material resources to the presence of immobile local resources like local culture, competence, innovative capacity; in general: knowledge (Camagni and Capello, 2009).

Moreover, in the case of Eastern regions, their economic growth patterns are strongly related to the industrial restructuring processes that take place with different intensities and different speeds, according to the institutional adjustments at national level and the regional sectoral specialization. Clearly, the restructuring process undertaken in a certain region is not independent from the endogenous assets characterizing that particular environment. Furthermore, alternative restructuring programmes have an impact on the endowment of these local factors. Our attempt is to isolate these mechanisms, keeping apart the *endowment-effect* of regional success factors from the *process-effect* of industrial restructuring programmes.

This paper takes both the evolution of success factors and the industrial restructuring processes into account in order to explain the growth patterns of Eastern regions in three different periods; the transition period (1995-2004); the accession period (2004-2007) and the crisis period (2007-2009).

The paper is structured as follows. In section 2 the three periods of time used in the analysis are briefly presented in terms of institutional changes and economic performance. In Section 3 the national and regional growth patterns are presented for the three periods. From the analysis it will be clear that there is an important role of the national component in determining regional growth, but the identification of the success factors in explaining regional growth differentials remains important. Section 4 presents a descriptive analysis identifying the main success factors identified in the different periods; the results show the capacity of Eastern regional economies to move from an exogenous to an endogenous model of growth. These results emerge from both a descriptive and interpretative point of view. Section 5 is dedicated to the competitive industrial strategies that have been put in place at the beginning of each periods, and their role in the regional growth patterns in each period. Section 6 presents an interpretative regional growth model in which both the local assets and the industrial strategies are inserted as explicative variables in explaining regional growth differentials. Some concluding remarks are contained in section 7.

2. The three institutional periods: common trends and divergences across Eastern countries

Each Eastern country adopted a peculiar strategy to manage the transition from a planned economy to a market one (Godoy and Stiglitz, 2006); each of them went through important steps in the institutional reform in different moments in time. The first important step after the fall of the Iron Curtain took place between 1994 and 1996, when all of them applied to become member of the European Union (EU) between 1994 and 1996 (Figure 1). The first institutional period included in our analysis starts in 1995, which signals the beginning of the pre-accession period and the constitution of administrative regional boundaries consistent with the European NUTS classification. We called this phase the “*transition period*”, being characterized by the deepest changes and reforms towards the EU accession, which however occurred at different times and following different rhythms from case to case.

Figure 1. The three institutional periods.

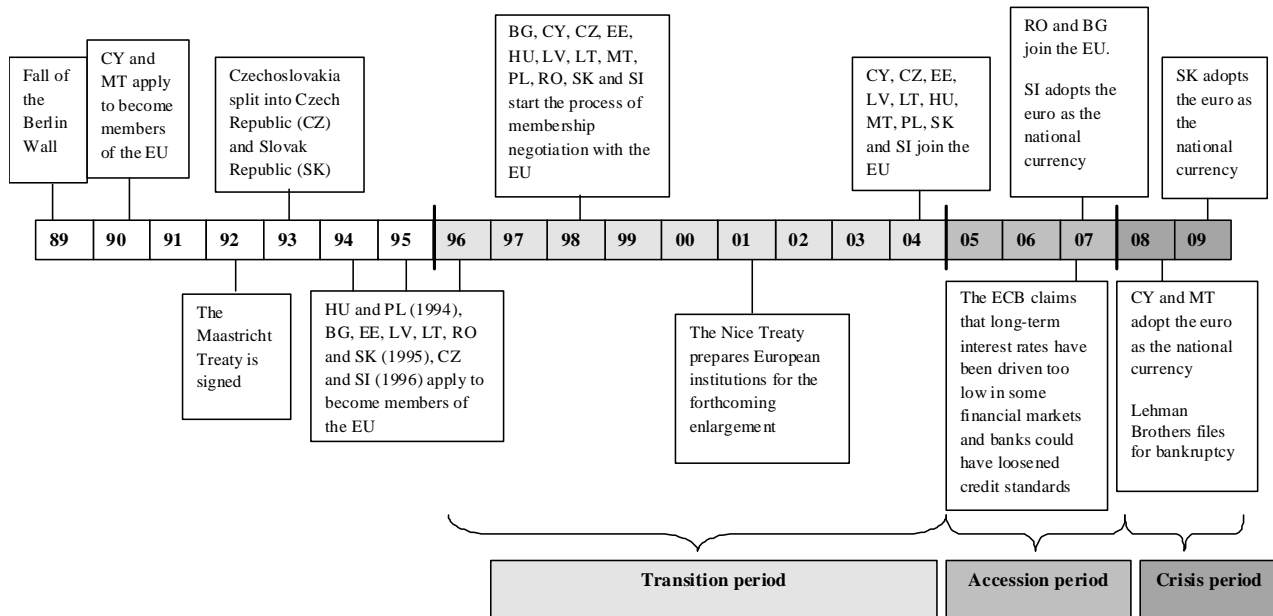


Table 1 reports some transition indicators provided by the European Bank for Reconstruction and Development (EBRD).

Table 1. Transition indicators in Eastern European countries.

	Large scale privatization				Price liberalization				Competition policy			
	1990	1995	2004	2009	1990	1995	2004	2009	1990	1995	2004	2009
BG	1.00	2.00	4.00	4.00	1.00	2.67	4.33	4.33	1.00	2.00	2.33	3.00
RO	1.00	2.00	3.67	3.67	1.00	4.00	4.33	4.33	1.00	1.00	2.33	2.67
EE	1.00	4.00	4.00	4.00	2.33	4.33	4.33	4.33	1.00	2.00	3.33	3.67
LV	1.00	2.00	3.67	3.67	1.00	4.33	4.33	4.33	1.00	2.00	2.67	3.33
LT	1.00	3.00	3.67	4.00	2.33	4.00	4.33	4.33	1.00	2.00	3.00	3.33
CZ	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>
HU	2.00	4.00	4.00	4.00	4.00	4.33	4.33	4.33	1.00	3.00	3.33	3.33
PL	2.00	3.00	3.33	3.33	3.67	4.00	4.33	4.33	2.00	2.67	3.00	3.33
SI	1.00	2.67	3.00	3.00	3.67	3.67	4.00	4.00	1.00	2.00	2.67	2.67
SK	1.00	3.00	4.00	4.00	1.00	4.00	4.33	4.33	1.00	3.00	3.33	3.33

Table 2. GDP and employment growth in Eastern European countries.

	GDP growth				Employment growth by economic sector															
	89-95	95-04	04-07	07-09	Agriculture				Industry				Market services				Non-market services			
	89-95	95-04	04-07	07-09	89-95	95-04	04-07	07-09	89-95	95-04	04-07	07-09	89-95	95-04	04-07	07-09	89-95	95-04	04-07	07-09
BG	-7.6	8.2	14.7	6.5	-0.1	-0.5	-4.6	-1.6	-7.1	-2.1	2.6	-2.5	-2.4	2.0	5.1	2.7	-1.5	4.6	1.3	-2.3
RO	-1.3	8.7	26.9	-2.7	0.6	-4.1	-1.6	-1.2	-7.7	-2.8	-1.7	-5.1	-1.0	-2.0	5.0	2.8	2.8	1.8	0.2	0.5
EE	28.1	14.4	18.4	-7.5	-17.0	-6.6	-4.1	-11.5	-5.5	-1.0	-2.4	-6.1	0.7	-0.5	5.4	-1.5	4.5	2.8	1.5	-1.6
LV	97.0	12.7	23.5	-6.1	-6.7	-3.8	-6.4	-12.0	-11.8	-1.9	0.1	-7.7	-3.4	2.3	7.5	-3.1	-3.7	4.9	0.2	-1.2
LT	59.6	15.1	16.4	-3.7	2.0	-2.6	-11.1	-9.2	-6.8	-1.8	1.3	-7.2	0.4	0.8	6.0	0.8	-0.8	0.2	1.9	-0.9
CZ	1.2	8.5	12.8	3.8	-4.9	-5.4	-4.5	-4.6	-1.3	-0.8	2.8	-3.6	0.4	-0.2	1.5	2.5	2.7	2.0	1.6	0.9
HU	8.5	10.0	6.6	-4.1	-14.1	-4.3	-3.4	0.0	-6.3	-0.1	-0.7	-3.8	-6.7	1.1	1.7	-0.6	-4.0	5.8	-0.8	-0.7
PL	-3.4	7.5	15.0	-0.1	0.4	-4.8	-3.3	-1.7	-0.2	-1.2	4.4	-0.3	0.3	-0.2	5.4	3.1	2.6	1.0	2.7	3.3
SI	1.2	6.1	8.3	1.4	-8.9	-3.5	1.5	-2.4	-6.7	-1.7	-0.5	-4.7	-4.6	0.0	2.5	4.5	-0.6	5.1	2.1	0.3
SK	4.0	9.5	17.3	7.0	-6.2	-7.5	-3.3	-6.7	-1.3	-1.3	2.6	-4.8	3.7	2.4	5.4	3.3	5.6	3.5	0.7	1.5

Each indicator is expressed as a value between 1 and 4.3, where the former value stands for a very low level of liberalization whilst the latter describes a situation close to a pure market economy.

Table 1 shows that some countries (notably Hungary, Poland and, to a lesser extent, Slovenia) began this process immediately after the end of the socialist era.

The first EU enlargement in 2004 marks the end of the first period and the beginning of the second institutional one, named the “*accession period*” (Figure 1). Finally, the third temporal break (2007-2009) is represented by the occurrence of two distinct events. The first one refers to the further enlargement of the EU, joined by Bulgaria and Romania. The second event is represented by the generalized economic slowdown generated by the recent financial crisis. For this reason we labelled these last two years as the “*crisis period*” (Figure 1). As Table 1 shows, in 2009, with the exception of some enforcement actions still needed to reduce abuse of market power and to promote a competitive environment, all Eastern markets and trade systems were almost fully liberalized.

As a consequence of the long agenda of institutional reforms, Eastern countries had to go through a period of economic reorganization of activities. Both elements affected the national economic trends in those years. A descriptive analysis of economic performance data is reported in Table 2, which provides data on GDP growth, sectoral employment growth and productivity growth, classified according to our temporal partitioning jointly, when available, with some evidence on the earlier stage of political and economic reorganization (1989-1995).

With the exception of a few cases (Romania, Bulgaria and Poland), the road of Eastern countries to EU accession between 1989 and 1995 is marked by positive GDP growth rates. In most countries the GDP growth rate achieved more than 10%.

This evolution is the result of a sharp cut of job places in the agricultural and industrial sector, only partially compensated by the creation of new professions in the private service sector and by the public intervention. Economic growth culminated in the accession period (1995-2004), characterized by a generalized rise of GDP, this time associated with a substantial increase in service employment (Table 2).

The signals of the financial crisis are clearly visible in the more recent years, when all Eastern economies experienced a significant slowdown. The extent of this stagnation varies across countries: while in some cases (e.g. the Baltic countries) the effects are particularly severe, some others (such as Slovakia, Bulgaria, Poland and the Czech Republic) showed a greater resilience to the financial crisis (Table 2).

Our data seem to suggest a link between the speed of liberalization and the economic performance. However, this topic has been investigated by a broad literature (Beck and Laeven, 2006; Heybey and Murrell, 1999) providing contrasting findings. What is clear from our data, however, is that different economic trends characterize the three periods, and a diachronic analysis separating these three time periods is crucial.

3. Regional patterns of growth

3.1. Alternative patterns of growth

The previous section pointed out the common economic trend of Eastern countries in the last 20 years: a strong GDP growth initially associated with job cuts and, later, followed by an increase in employment.

The objective of this section is twofold. The first goal is to provide some evidence on the regional differentiation in this trend. The second one is to analyze economic trends according to the dynamics of three main variables at the same time – GDP, employment and productivity growth – that can give rise to different growth conditions according to the values that they assume. In fact, a large reduction in employment may well be associated either with a condition of reduced international competitiveness of the local productive sectors, or with a condition of wide restructuring and re-launching of local competitiveness, two situations with completely different economic meaning.

In analytical terms, it is possible to represent the economic performance of each region on a Cartesian graph, where on the *X*-axis we put the relative employment growth (REG) and on the *Y*-axis we put the relative productivity growth (RPG) (Camagni, 1991):

$$REG_r = (N^1 / N^0)_r / (N^1 / N^0)_{EU27}$$
$$RPG_r = (P^1 / P^0)_r / (P^1 / P^0)_{EU27}$$

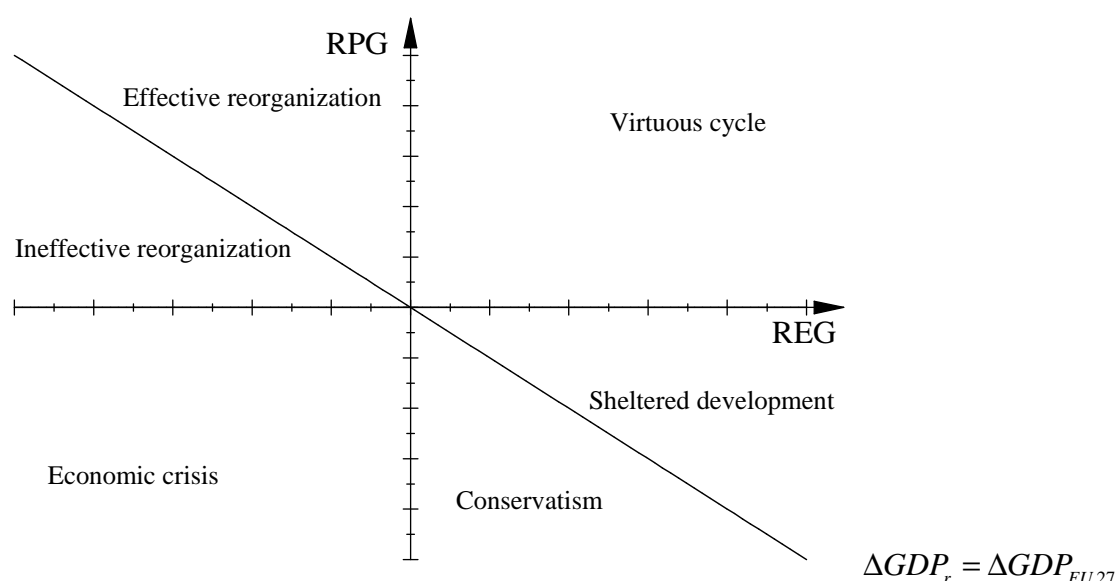
where *r* stands for the region. Initial and final periods are marked respectively with 0 and 1. *N* and *P* represent employment and productivity. The GDP growth of the areas lying on the 45° negative sloped line is equal to the European average.

Six different patterns of growth are identified (Figure 2):

- I. virtuous cycle: the higher relative productivity growth is accompanied by a good performance in both employment and output;
- II. effective reorganization: higher productivity growth is associated with severe employment cuts, leading nevertheless to good output performance;
- III. ineffective reorganization: the cut of inefficient production units generates an increase in productivity growth but a growth of output lower than the average;
- IV. economic crisis: despite the decrease of employment, productivity grows less than the average, leading to poor results in terms of GDP growth;
- V. conservatism: the increase in employment, usually generated by public investments, is associated with a poor performance in terms of productivity and GDP growth;
- VI. sheltered development: the public intervention stimulate the initial development of problematic areas, leading to a growth of output higher than the average despite the low levels of productivity growth.

Adopting this framework for Eastern regions in the three periods of analysis, Figure 3 conveys some interesting messages.

Figure 2. RPG, REG and the six patterns of regional growth.



In the transition period the vast majority of regions operated a reorganization of their economic activities leading to a good performance in terms of GDP growth with respect to the European average, obtained through a severe loss of job places - higher than the EU average - and, as a consequence, a significant rise in productivity (Figure 3a).

The distribution of regions across patterns becomes more widespread in the accession period (Figure 3b). Many areas succeeded in reaching a GDP growth higher than the EU27 average through a simultaneous improvement of productivity and employment growth rates. The Hungarian regions, on the other hand, fall in the ineffective reorganization pattern, showing a clear country-effect.

Even if most of the Eastern regions performed better than the Western countries also in the third institutional period, some of them (in particular the Hungarian regions and some Romanian areas) moved to the economic crisis quadrant (Figure 3c).

Despite a strong country-effect, our descriptive analysis shows that Eastern regions follow a broad variety of trajectories in all the three institutional periods. Moreover, the degree of resilience to the economic crisis is highly diversified. The extent of this differentiation (and, as a consequence, the need of an analysis at regional level) is showed in Table 3, reporting the deviation from the national average of employment and productivity growth rates.

Figure 3. Regional growth patterns in the three institutional periods

Figure 3a. Transition period

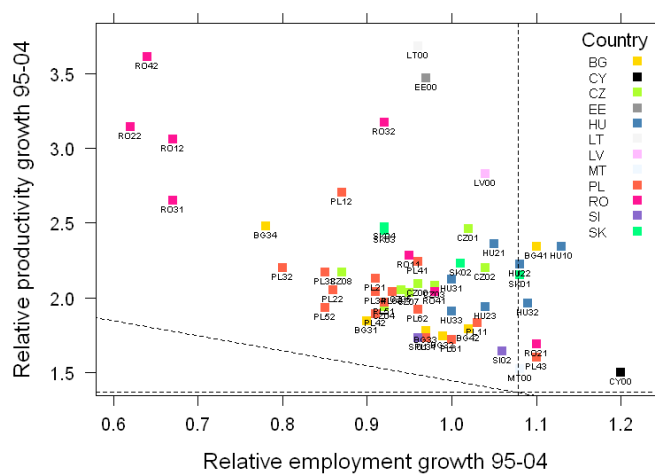


Figure 3b. Accession period

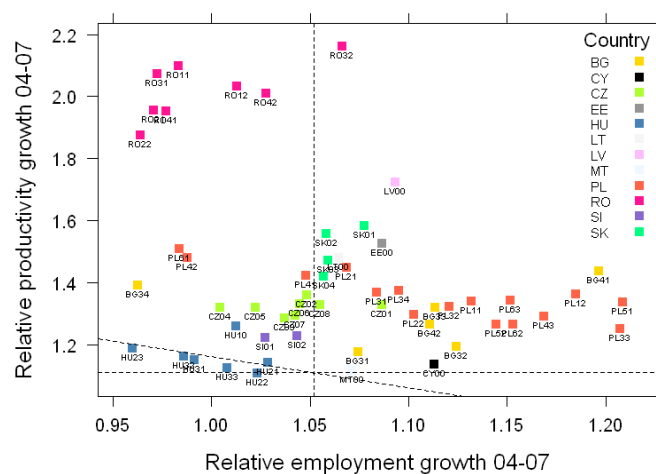


Figure 3c. Crisis period

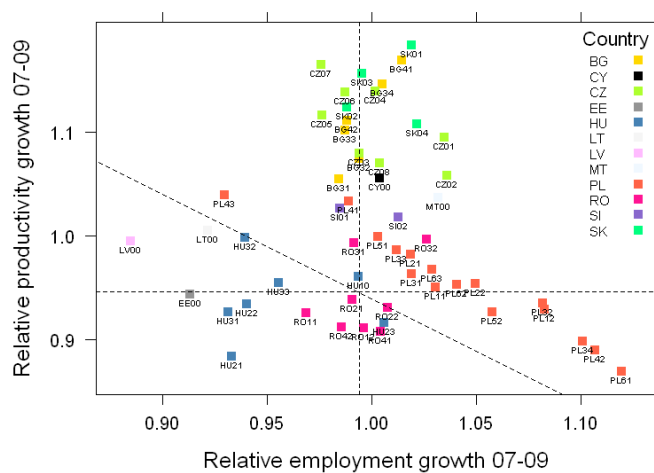


Table 3. Employment and productivity growth rates: deviation from the country means (set equal to 0) in the three institutional periods.

Employment growth								
Western Europe (obs.=207)					Eastern Europe (obs.=51)			
Period	Mean	Variance	Skewness	Kurtosis	Mean	Variance	Skewness	Kurtosis
1995-2004	- 0.015	0.006	- 0.027	7.181	- 0.004	0.009	1.039	4.810
2004-2007	- 0.014	0.001	- 0.046	2.587	- 0.007	0.002	- 0.262	3.774
2007-2009	0.001	0.001	0.396	3.869	0.000	0.001	- 0.182	4.855
Productivity growth								
Western Europe (obs.=207)					Eastern Europe (obs.=51)			
Period	Mean	Variance	Skewness	Kurtosis	Mean	Variance	Skewness	Kurtosis
1995-2004	0.008	0.011	- 0.331	9.117	- 0.039	0.102	- 0.343	5.114
2004-2007	0.009	0.003	- 0.570	4.994	- 0.012	0.006	0.135	2.759
2007-2009	- 0.002	0.001	- 0.497	10.574	- 0.010	0.002	0.182	2.497

The regional deviations from the country mean are larger (especially for the productivity growth rate) than the ones observed in Western countries, even if decreasing in time. Hence, endogenous territorial factors are supposed to play an important role in determining the growth process of Eastern regions, together with national driving forces. In the next sub-section, the attention will be focused to describe whether the endowments of potential local success factors for local economies statistically differ across regions belonging to different growth patterns.

3.2. The potential success factors in regional growth

The goal of the next section is to provide a first descriptive analysis on the link between the growth patterns and some endogenous factors which, based on existing literature, are expected to promote economic growth. In this section we present the assets that are quoted in the literature as potential success factors for regions.

More in details, four groups of assets are taken into account. The elements in the first group are specific for Eastern regions, and have been highlighted by the literature as the driving elements for the development of those regions in the first years after the fall of the Iron curtain. In particular, the relative location with respect to the EU15 border and the presence of capital cities have always been interpreted as the explicative elements for positive regional growth differentials in Eastern regions. The relative location with respect to the EU15 border captures higher market potentials and growth spillovers, while capital cities measure the presence of the main economic and social assets necessary for a virtuous pattern of growth. In addition to this reasoning, the presence of foreigner direct investments was generally interpreted as an explanation for exogenous growth patterns in these regions.

The second set of variables is made up by some endogenous growth factors that come from a modern interpretation of the causes of regional growth. Neoclassical growth theory (Solow, 1957; Kaldor, 1961)

traditionally considered physical capital accumulation as the key determinant of economic development. Based on this mechanism poorer regional economies are expected to grow faster than developed regions, leading in the long-run to a catching-up process. These predictions are only partially confirmed by the broad empirical literature on this topic (Galor, 2007; Durlauf and Johnson, 1995): violations are represented by the existence of the so-called convergence clubs (Quah, 1996) or by the observed sustained growth in many developed countries and regions (Fischer and Stirböck, 2006).

In the interpretation of a modern economic pattern of growth, an important role is played by knowledge and innovation, and this represents a well-established result in economic theory. Factors directly linked to the accumulation of knowledge and innovation have therefore become the main sources of growth. Examples include the extensive literature on human capital (Lucas, 1998), on the impact of R&D investments on productivity (Bronzini and Piselli, 2009). The presence of FDI has been interpreted by this new literature as an external sources of innovation (Barrell and Pain, 1997).

In this line, a third group of elements comes from the literature that highlights the territorial conditions enabling innovation and knowledge creation to take place. Physical accessibility is traditionally interpreted as a pre condition for achieving new information and knowledge. However, even if knowledge is achieved, an innovation process cannot be replicated with the same intensity in any local environment. Knowledge accumulation is deep-rooted in the socio-economic, cultural and institutional characteristics of places, so that there are some places that are much more innovation-prone than others. Many studies have been aimed at identifying innovation enabling factors, that allow sharing ideas and knowledge, like trust and sense of belonging (Becattini, 1987; Camagni, 1995; Capello and Faggian, 2005; Iyer et al. 2005) and atmosphere-effects typical of urban areas (Pred, 1965 and 1977).

A fourth and last group of elements that can explain regional growth comes from the idea that the sectoral component of a region plays a role in explaining regional growth, as highlighted by Perloff et al. (Perloff, 1957; Perloff et al., 1960). The change in the sectoral composition can in the case of Eastern regions be an important explanatory element. Table 4 contains the data and the sources of all the territorial assets in the four groups.

3.3. Regional growth patterns and endogenous assets

In order to highlight any association between the regional growth patterns and these factors we performed an Analysis Of Variance (ANOVA) (see Appendix A for the ANOVA results). Figure 5 reports the statistically significant factors that characterize each local pattern with respect to the others. The results for the first period of analysis corroborate the findings of previous literature focused on the first stage of transition (Figure 5a). In the first period, the virtuous cycle is related to the regions close to the western border, to those hosting a capital city and to those specialized in market services and attracting high volumes of FDI. The areas associated to the less efficient pattern in terms of employment losses (the second pattern) are characterized by a specialization in traditional manufacturing, emphasising once more that a deep reorganization of the economic activities required a deep decline in employment.

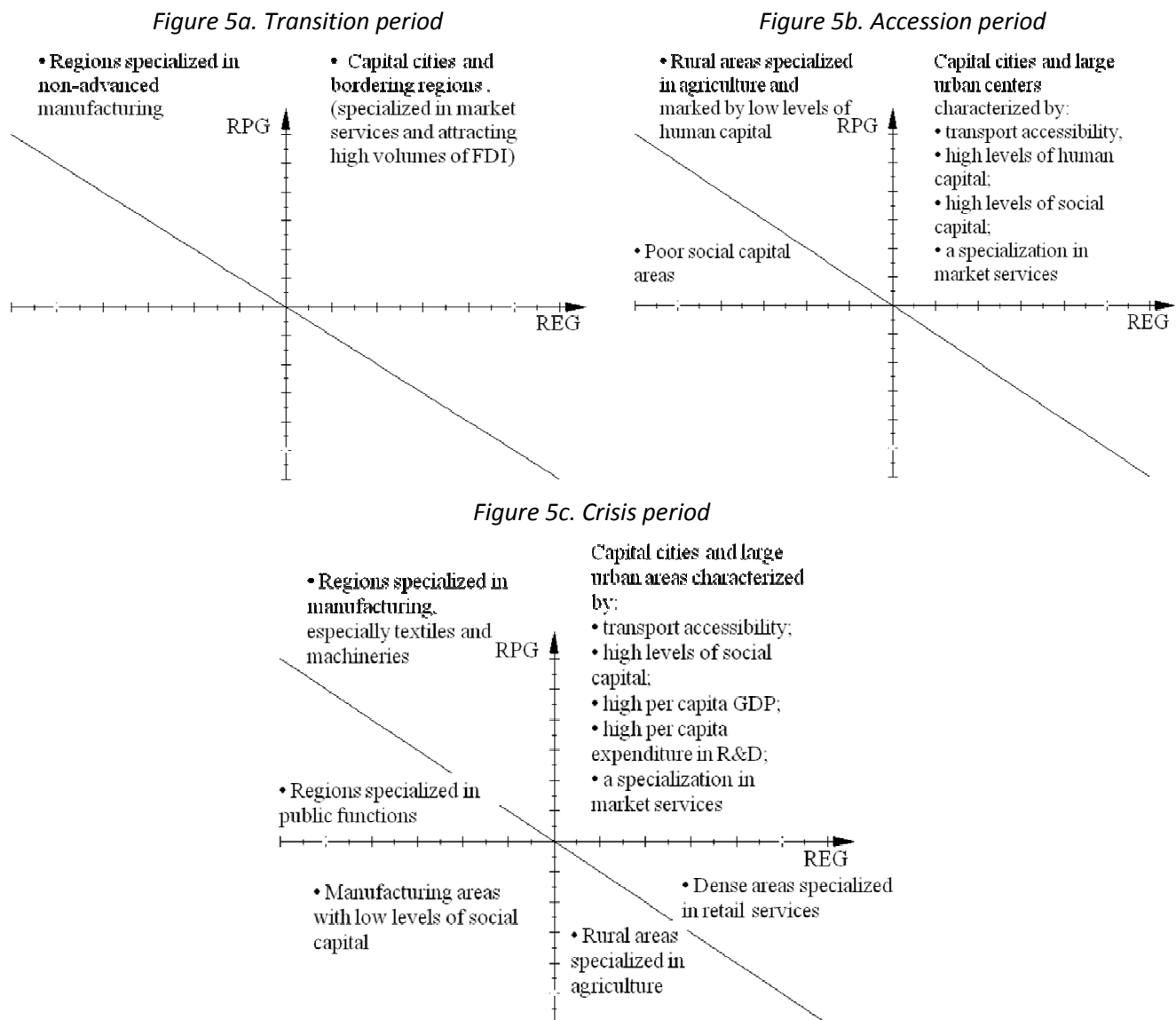
Table 4. Territorial assets: variables, sources and description

Group	Name	Description	Source	Reference
1	Capital city	Dummy equal to 1 for the regions hosting the national capital and 0 otherwise		Evidence from the EU12 is provided in Gorzelak (1996)
1	Bordering regions (Western EU)	Dummy equal to 1 for the regions sharing borders with EU15 countries and 0 otherwise		Evidence from the EU12 is provided in Gorzelak (1998)
2	High education	Highly educated professionals over manual workers	ISCO	The role of human capital on economic growth was pointed out by a broad literature (Lucas, 1998; Barro, 1991). Evidence from Eastern Europe is extremely scarce
2	Patents	Patents application to the EPO (European Patent Office) per million inhabitants	Eurostat	Several works (Bilbao-Osorio and Rodríguez Pose, 2004) focused on the role of R&D on regional economic growth. A focus on Eastern economies is provided by Radosevic (2002)
2	R&D expenditure	Per capita expenditure in R&D	Eurostat	Evidence supporting the positive effect of R&D on economic growth is reported in several works, as Bronzini and Piselli (2009) and Audretsch and Keilbach (2004)
2	FDI	Number of foreign firms based in the region per million inhabitants.	FDIRegio	Evidence from the EU12 is provided in Nicolini and Resmini (2010)
3	Population in the LUZ	Share of residents living in a LUZ	Eurostat	The variable is aimed at capturing urbanization economies
3	Rural areas	Dummy equal to 1 if the region is a rural area and 0 otherwise	ESPON	Since cities are assumed to constitute the best environment for innovation creation and knowledge diffusion (van Geenhuizen and Nijkamp, 2012), rural areas are not expected to be associated with the virtuous cycle.
3	Physical accessibility	Length of motorways per square km	Eurostat	Evidence from the EU12 is provided in Vickerman et al. (1999)
3	Social capital	Share of people interested in politics	European Value Survey	The inclusion of this regressor is based on Putnam (1993). Some evidence on the poor endowments of Eastern regions in terms of social capital is provided by Howard (2003) and Mihaylova (2004)
3	Informal knowledge (entrepreneurship)	Share of self-employment (wholesale and retail excluded) Average value 1999-2004	ESPON KIT project	Evidence on the role of Entrepreneurs on regional growth is related to the knowledge filter theory of Acs et al. (2004)
4	Sectoral specialization	Location quotient (17 branches)	IGEAT Université Libre de Bruxelles	The relationship between sectoral specialization and economic growth is a complex phenomenon involving systems of spillovers and externalities (Boschma and Iammarino, 2009). Here, its inclusion is based on the sectoral-specific degree of openness to innovation and technology.

In the accession period, despite the confirmed importance of some elements (capital cities, the specialization in market services), the link between factors and growth patterns deeply changes. Some intangible assets, such as human and social capital, are now linked to the virtuous pattern. The regions still involved in the reorganization of economic activities are mainly rural areas, marked by low levels of human capital (Figure 5b).

The last period is more complex than the previous ones (Figure. 5c). The resilience to the economic crisis is linked to the specialization in manufacturing (effective reorganization) and in retail trade (sheltered development). The regions able to combine a rise in productivity with an increase in employment are identified (in addition to the other factors) by high level of R&D expenditure. The “losers” in this phase are the areas specialized in public functions and agriculture, together with manufacturing regions with a poor endowment of social capital.

Figure 5. Regional growth patterns in the three institutional periods



Summing up, our descriptive analysis provided at least one strong message, concerning the evolution of the elements associated with each growth pattern. In the first period these factors did not include any non-tangible asset. In the next stages, however, the peculiar elements characterizing the regions in the virtuous cycle changed, becoming very similar to the ones associated to the same growth pattern in Western EU (Capello et al., 2011). In section 5 we will move beyond a descriptive analysis in order to test the role of these elements on regional economic growth.

4. Industrial restructuring and regional growth patterns

4.1. Industrial restructuring processes: a taxonomy

In the previous section we inspected the link between some local factors and regional patterns of growth. Initial endowments of some territorial assets have been associated to the six clusters identified by the classification based on employment and productivity growth rates. ANOVA results represent, in a sense, a static picture of Eastern regions at the beginning of each institutional period, so that a comparative static analysis of strategic success factors among different growth patterns and historical periods have been made possible.

Even if the analysis on potential success factors provided interesting results, it leaves part of the picture aside. In fact, regional growth patterns are not only the result of the presence of exogenous or endogenous success factors, but also of industrial restructuring processes put in place by regions, when conceived as collective agents implicitly or explicitly defining specific development trajectories. Pushed by the institutional changes, some regions have been able to put in place massive restructuring of their industries, moving away from old sectors (like the coal mining, the heavy machinery and the production of military equipment) towards modern ones, showing a strong capacity of adaptation to new market conditions; in the best cases, restructuring has also involved the change to higher value added functions, witnessing a capacity to acquire a decision making role in the national and/or international division of labour.

From what said, industrial restructuring moves along two dimensions. The first dimension concerns the reconversion towards advanced, modern and competitive sectors with respect to the ones existing during the socialist regimes. The second dimension relates to the reconversion towards higher value added functions, within the same sector or in new ones. These two dimensions lead to the identification of a taxonomy of possible industrial transformation patterns, presented in increasing order of complexity and changes caused and required by the restructuring process (Table 5):

- I. a stability in both sectors and functions, maintaining existing industrial specialization;
- II. a restructuring of functions within the already existing sectors, through a functional upgrading within the existing sectors;
- III. a reconversion of economic activities in order to face market competition keeping the same functions, generating an inter-sectoral restructuring;
- IV. a conversion towards new sectors and high-level functions, a process that lead to an inter-sectoral functional upgrading.

The industrial transformations depicted above are different in their nature and effects. The first reflects a situation in which regions are unable to react to changes and remain linked to historical specialization

patterns, with the risk to be locked into old production processes, losing productivity and employment in the long run.

A different case is a region able to move towards higher phases of the production chain within its specialization sector. This process preserves regional specialization (especially in terms of value added), generally at the expenses of job losses, but guarantees a process of modernization and a higher level of competitiveness of the local economy.

The third restructuring process reflects a region moving away from old industrial production processes, in old sectors, and changing towards advanced, modern and competitive sectors with respect to the existing ones during the socialist regimes, at the expenses, at least in the short run, of high unemployment rates; in the long run, however, modernization turns out to be fundamental for keeping a competitive role in the international division of labour. This strategy is expected to be shaped by those regions not characterized, at the beginning of the transition period, by a strong specialization in any specific sector, but also to those areas specialized in production processes which can easily be converted into neighbour (and higher value added) activities.

Table 5. Taxonomy of possible industrial restructuring processes

	Increase in high-level functions	Stability or decrease in high level functions
Sectoral change	IV Inter-sectoral functional upgrading Reconversion process towards new sectors and high-level functions.	III Inter-sectoral restructuring Reconversion process towards new sectors and similar (or lower) functions.
Sectoral stability	II - Functional upgrading Reinforcement of the sectoral specialization increasing high-level functions.	I – Sectoral specialization Reinforcement of the sectoral specialization keeping the same functions.

If this sectoral restructuring process is accompanied also to a functional upgrading, the employment rate is associated to increases in productivity, and therefore to long term competitiveness. This process may be associated to the fact that the shift from a planned economy to a market one implies the emergence of new sectors and products. An example is represented by market services such as financial intermediation, real estate and other business activities, not existing in the socialist period.

The intent of our study now on is to empirically identify which regions in Eastern countries have followed which restructuring process. Once they are identified, the interest is to try to understand which local characteristics these regions have in common, and which are the economic effects associated to these groups of regions.

4.2. Identifications of the regional industrial behaviour

In order to identify the industrial restructuring processes each region has gone through in Eastern countries, two indicators are built, with the aim to capture the two dimensions of regional restructuring. Since most of the deepest changes took place between the fall of the Iron Curtain and the first EU enlargement, our measures refer to this period.

Following Affuso et al. (2011), the sectoral restructuring can be measured by the so called Lawrence index (LI):

$${}^{1995-2004}LI_r = \frac{1}{2} \sum_j \left| \frac{{}^{2004}VA_j^r}{{}^{2004}VA^r} - \frac{{}^{1995}VA_j^r}{{}^{1995}VA^r} \right| \quad (1)$$

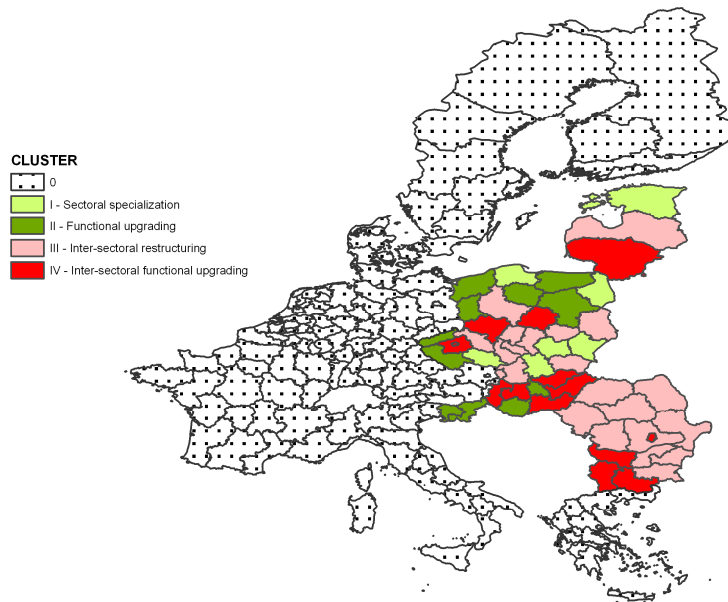
where VA represents the value added (but it could be another economic variable, like employment), r is the region and j is the manufacturing sector. Equation 1 measures the sum of the difference in the share of each sector in a time span (between 1995 and 2004), multiplied by $\frac{1}{2}$ to guarantee a range between 0 and 1 of the index. The index is built for both the manufacturing and the service sectors separately.

The second dimension has been estimated by looking at the absolute difference in the share of high value added workers with respect to population, as follows:

$$FC = \left(\frac{Professional_{04}^r}{Population_{04}^r} - \frac{Professional_{96}^r}{Population_{96}^r} \right) \quad (2)$$

Due to data availability, this second index has been calculated only within the period 2004-1996. The two indicators have been built for the whole regions of Eastern countries and the results are presented in Map 1.

Map 1. Industrial restructuring processes in Eastern regions



A first interesting result is that each country presents a number of industrial restructuring processes; therefore, no clear country-specific pattern emerges. Functional upgrading occurred in most of the capital

cities and bordering (with the EU15) regions, but also in central Poland, a small part of Bulgaria and in the whole Hungary.

An ANOVA on regional structural characteristics of regions belonging to the different restructuring processes allows showing which structural characteristics are in common to regions belonging to a particular restructuring process. The results of this exercise show that liberalisation and privatisation led to a reconversion of local activities in many regions, especially in old industrial ones. From the map, one can easily understand that the most populated typology is the “inter-sectoral restructuring”. This group is characterised by regions not specialized in manufacturing activities, with low levels of R&D (Table 6); these lead to the interpretation that in this group are probably included most of the regions which experienced a transition from agricultural to industrial activities.

Table 6. Characteristics of regions at the beginning of the restructuring process (1995): results from ANOVA

	Increase in high-level functions	Stability or decrease in the existing functions
Sectoral change	IV - Inter-sectoral functional upgrading Higher presence of capital cities Higher population density Higher R&D/GDP Higher FDI/Population High specialization in manufacturing activities	III - Inter-sectoral restructuring Lower R&D/GDP Higher level of social capital Low specialization in manufacturing activities
Sectoral stability	II - Functional upgrading Higher per capita GDP Proximity to Western countries	I - Sectoral specialization

A completely different profile is related to the regions that belong to the inter-sectoral functional upgrading restructuring. This process is mostly linked to regions hosting a capital city, attracting the most intense volumes of FDI and investing in R&D (Table 6). Functional upgrading is typical of those regions close to the western borders and marked by higher levels of per capita GDP, while no specific characteristics emerges that can identify regions keeping their sectoral specialization.

An interesting question is the identification of the economic effects of these restructuring processes. Through an ANOVA on ex-post economic indicators calculated from 2004 onward and on the regional growth patterns, some descriptive results are obtained, and presented in a synthetic way in Table 7.

Table 7. Ex-post economic indicators (after 2004): results from ANOVA

	Increase in high-level functions	Stability or decrease in the existing functions
Sectoral change	IV - Inter-sectoral functional upgrading	III - Inter-sectoral restructuring
Sectoral stability	II - Functional upgrading Effective reorganization pattern between 2004 and 2007 GDP growth higher than the average between 2007 and 2009	I – Sectoral specialization Virtuous cycle between 2004 and 2007

The sectoral change, irrespective of the functional evolution, is not associated with any particular growth pattern. What describes an economic change is the functional change. In fact, the functional upgrading

process is related to the reorganization pattern in the transition period and to a higher (compared with the other kinds of restructuring processes) GDP growth rate in the crisis phase. This witnesses a pay-off of the courageous strategy of functional evolution especially in the period of economic downturn. Instead, a strategy of maintenance of the status quo leads to a positive reward in years immediately after the transition period, not maintained in the long run. In fact, this industrial strategy is associated to a virtuous pattern of both productivity and employment growth, only in the years immediately after the most intense phase of industrial restructuring.

These are descriptive results that need further interpretative analyses in order to confirm a cause-effect linkage between restructuring processes and economic performance. In order to analyse such a relationship, a regional growth model is presented and estimated in the next section, where regional growth rates are explained through both structural assets and industrial reconversion processes.

5. Regional growth and success factors: an interpretative analysis

The findings described in the previous sections pointed out a strong association between the regional patterns of growth, some endogenous assets and the industrial strategies. Moreover, these connections are not stable across institutional periods. The aim of the present section is to test these results in a regional growth model. By pooling the data employed in the ANOVA analysis, a three-period panel was built. The dependent variable is represented by the regional average yearly GDP growth rate in each institutional period. The set of predictors (measured at the beginning of each institutional period) includes a subset of the variables summarised in Table 4.

The choice of the regressors crucially depends on the availability of NUTS2 data for all the three institutional periods in which the analysis is partitioned.

As a first step a simple regional growth model was estimated through multiple linear regression, in which the explanatory variables belong to the first three groups of variables stemming from the literature quoted in Section 3.2. Sectoral specialization is here captured in dynamic terms through the taxonomy presented in Section 4.2.

The first group comprehends those factors which played a major role in fostering economic growth, according to the previous literature on Eastern EU countries. They comprehend the capital cities (*capital_city*), regions sharing their borders with Western EU (*border_region*), the flows of foreign investments (FDI)³. Concerning this last regressor, one issue draws attention. It involves the potentially endogenous relationship between FDI and economic growth. Several works (Carkovic and Levine, 2005) raised this concern: FDI may promote GDP growth which, in turn, could attract further FDI. Holland and Pain (1998), for instance, studied the determinants of FDI in Central and Eastern Europe, claiming that the extent of trade linkages with the advanced economies and the proximity to the EU15 countries have significant effects on the level of foreign investments. It is worth noting that all these studies did not investigate the topic from a regional perspective. It seems reasonable to assume firms' internationalization strategies to be influenced by country-specific characteristics, such as the overall quality of institutions (Wei, 2000), fiscal policies (Desai et al., 2004) and the extent of market liberalization (Blonigen, 2005).

³ Sources of data, jointly with a more detailed description of the variables are available in Table 4.

Hence, in a regional framework the endogeneity bias could be expected to be weak. Nevertheless, the treatment of potential endogeneity has been explicitly addressed as suggested in the literature (Li and Liu, 2005). FDI volumes have been regressed on the set of predictors for regional growth. The residuals of the model are used as a proxy for foreign investments in the equation (3).

The second group of variables covers those factors that are seen to be directly related to modern growth, namely human capital and, more in general, knowledge accumulation, as suggested by the literature discussed in section 3.2. Human capital is measured as the share of skilled professionals over the annual workers employed in the region (*high_educ*). Knowledge and innovation are captured by the per capita patent application (patents) submitted to the European Patent Office (EPO) and by the entrepreneurship index (*informal_knowl*).

Finally, the third group captures those territorial elements that are innovation enablers, as social capital (measured as the share of people interested in politics, *social_cap*), physical accessibility to an area (*accessibility*) and the presence of urbanization economies, measured as the share of residents leaving in a LUZ (*LUZ*).

Therefore, the model takes the following form:

$$\Delta GDP_{tr} = \beta_0 + \beta_1 capital_city_{tr} + \beta_2 border_region_{tr} + \beta_3 LUZ_{tr} + \beta_4 accessibility_{tr} + \beta_5 FDI_{tr} + \beta_6 social_cap_{tr} + \beta_7 high_educ_{tr} + \beta_8 patents_{tr} + \beta_9 informal_knowl_{tr} + \alpha_t + \gamma_C + \lambda_s + u_{tr} \quad (3)$$

where t is the institutional period, r the NUTS2 region ($r = 1, \dots, 51$) and a_t represents a time dummy. In order to control for the unobserved homogeneity within countries (section 2), a country fixed effect (γ_C) is added to the model specification. Finally, a set of dummies (λ_s) identify the four alternative industrial restructuring processes that can explain the regional growth patterns, once controlled for multicollinearity with other explicative variables. Alternative restructuring programmes can in fact depend, on the one hand, on the territorial assets available in the region and, on the other hand, they can affect the endowments of these endogenous factors in the medium and long-term. To overcome the risk of multicollinearity in our model, Variance Inflation Factor (VIF) has been estimated across the model for the different periods. Results are reported in Table 8, which show that, despite the positive correlation of some predictors, the degree of multicollinearity is not present in the model.

Estimation results are reported in the first column of Table 9. Model [1] includes all the regressors summarized in equation (3), but the dummies identifying the alternative industrial restructuring programmes, which are added in model [2]. It is worth noting (Table 9) that the results of these first two model specifications are fully comparable. Capital cities performed better than the other areas, confirming the conclusions already contained in the literature (Gorzela, 1998). The effect of FDI on economic growth is positive, consistently with the previous findings on the same topic (Resmini, 2003). The time dummies show that, taking the transition period as a reference, the most intense growth occurred immediately after the first accession wave, whilst the slowdown in the crisis period is clearly visible. A spatial autocorrelation test on the residuals was performed separately on the three cross-sections. Moran's I are reported in Table 9. Results fail to reject the null hypothesis that there is zero spatial autocorrelation in the residuals of the estimated models.

Table 8. Multicollinearity diagnostics: Variance Inflation Factor

Variable	1st period	2nd period	3rd period
Capital city	3.26	2.12	2.23
Bordering regions (Western EU)	1.34	1.63	1.57
Population in the LUZ	2.49	2.84	2.98
Transport accessibility	1.33	2.88	2.83
FDI	1.89	1.19	1.28
Social capital	1.73	2.18	2.34
High education	1.42	3.83	3.57
Patents	2.44	2.47	2.82
Informal knowledge	1.41	1.53	1.54
II – Functional upgrading	3.07	2.32	2.38
III – Inter-sectoral restructuring	2.98	2.76	2.77
IV – Inter-sectoral functional upgrading	2.87	2.21	2.20

The limitation of this approach is that it provides an “average” measurement of the role of each local factor on the economic growth between 1995 and 2009. Our descriptive analysis suggested, however, that some of these factors are associated to the economic development only under specific institutional conditions. In the earlier stage of transition, for example, endogenous factors apparently played a minor role. To further investigate this issue three models have been estimated.

Starting from model [2] interactions between the regressors and the three time dummies were added. More precisely, model [3] includes interactions between the predictors and the first time dummy (the one for the transition period). For each variable, the third column of Table 8 reports the sum of the coefficient and the interacted one, i.e. the net effect of that particular factor on economic growth in the first phase. The same holds for the fourth and fifth columns in Table 8, reporting the net effects in the accession period (model [4]) and in the crisis (model [5]) respectively. These findings allow a better understanding of the mechanisms sketched out in the previous sections.

The main findings can be summarised as follows:

- The positive result of capital cities occurred in the transition and accession periods, while they performed worse than the other regions in the crisis phase. This evolution may reflect the relative specialization of these areas in financial intermediation activities. Interestingly, this last institutional period is marked by the clear emergence of second rank cities, captured by the share of people living in a LUZ.
- Soft endogenous assets (human capital and informal knowledge) do not foster the regional economic performance in the first two institutional periods. They start to hasten economic growth in a more advanced stage of development. This evidence confirms what pointed out in section 3, suggesting the emergence of economic growth mechanisms similar to the ones observed in Western Europe.
- The impact of FDI, positive and statistically significant only in the crisis period, could seem unexpected, at least compared with the previous literature on Eastern countries. Nevertheless, since the variable employed in the analysis has been instrumented, the results in the first two periods suggests a poor absorptive capacity of Eastern regions. The positive coefficient in the last phase, on the other hand, points out the better performance of multinational companies compared

with the domestic ones. This result is reasonable as multinational companies sell their products worldwide, being less affected by the crisis than the others.

Table 9. GDP growth and regional success factors: regression results

Model specifications	All periods		Net effect in the institutional periods		
	With no dummies [1]	With industrial restructuring dummies [2]	Transition [3]	Accession [4]	Crisis [5]
<i>Traditional Eastern regions variables</i>					
Capital city	0.034***	0.038***	0.036***	0.085***	-0.053**
Bordering regions (Western EU)	0.003	0.005	-0.005	0.003	0.010
Population in the LUZ	0.008	0.004	-0.009	0.002*	0.030***
FDI	0.539*	0.496*	1.530	0.474	0.642**
<i>Innovation and knowledge accumulation</i>					
High education	0.006	0.007	0.072	-0.045**	0.060*
Patents	-0.892	-0.970	-0.266	0.364	-0.825
Informal knowledge	-0.008	-0.022	-0.087*	0.061	0.084**
<i>Innovation and knowledge enabling factors</i>					
Physical accessibility	0.080	0.024	0.219	-0.408	1.056
Social capital	0.029	0.033	-0.113	0.056	0.046
Country fixed effects	Yes	Yes	Yes	Yes	Yes
<i>Time periods</i>					
Period 1 (transition period)				-0.061***	0.079***
Period 2 (Accession period)	0.024**	0.023***	0.004		0.100***
Period 3 (Crisis period)	-0.032***	-0.032***	-0.053**	-0.090***	
<i>Industrial restructuring process dummies</i>					
II – Functional upgrading		0.011	-0.004	-0.027***	0.016**
III – Inter-sectoral restructuring		0.006	-0.009	-0.006	-0.003
IV – Inter-sectoral functional upgrading		0.003	0.007	-0.013	-0.008
Constant	0.029***	0.011***	0.042*	0.013	0.033***
Observations	153	153	153	153	153
Adjusted R-squared	0.649	0.650	0.629	0.754	0.705
Moran's I (1 st period)	-0.047	-0.044			
Moran's I (2 nd period)	-0.049	-0.047			
Moran's I (3 rd period)	-0.049	-0.048			

*** p<0.01, ** p<0.05, * p<0.1

- Sectoral restructuring plays a role in regional growth of Eastern regions, but this role is different according to the period of time analysed. Taking the first restructuring process (sectoral specialization) as a reference, in the transition period none of the processes had a relationship with

the economic performance. As the sectoral changes are measured between 1995 and 2004, they are not surprisingly able to explain growth in the same period. In the accession period functional upgrading (without sectoral change) led to the lowest payoff in terms of economic growth, probably registering the costs of the functional transformation (unemployment, reconversion of service activities, etc..). In the crisis phase, on the other hand, functional upgrading emerged as the winning process, being resilience typical of regions able to increase the presence of decision-making functions. The same does not apply for those regions in which a process of inter-sectoral functional upgrading occurred, probably because this kind of transformation requires a longer time to be completed and to impact economic growth. This result apparently confirms what outlined in the previous results, i.e. the role of soft territorial assets (such as those characterizing high-level functions) when facing an economic downtrend.

6. Conclusions

This paper was a first attempt to shed light on how much Eastern regions have moved towards a so called endogenous growth, based on modern and intangible assets like formal and informal knowledge, rather than exogenous resources. Moreover, the paper highlighted the role of the industrial restructuring processes on regional growth patterns.

In both a descriptive and interpretative way, the results witnessed a clear tendency of Eastern regions to move from an exogenous to an endogenous pattern of growth relying more and more on local elements, like knowledge, as factors able to explain their competitive advantage.

Positive regional growth differentials are related to regions that are able to face deep qualitative reconversion processes, exploiting productivity increases in higher value functions and sectors. The crisis of capital cities in the general period of downturn and the simultaneous emergence of second-rank towns can be interpreted in this sense. Moreover, innovation and knowledge accumulation did not occur, at least in the first two institutional periods, through foreign investments.

These findings convey important policy messages. In the last 20 years, most of the public interventions and programmes, especially at the European level, were aimed at reducing the gap in the transport and communication infrastructures between Eastern and Western countries. Moreover, European public strategies are at present devoted to increase R&D activities to foster the competitiveness of Europe as a whole, driving the continent out of the “productivity gap” with its major trade partners (EC, 2010). These kinds of policies and strategies seem however to be not so efficient, once the impact of accessibility and R&D are assessed on regional growth.

Our results in fact suggest that policies should be devoted to the reinforcement of some non-tangible assets characterizing each regional environment.

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Appendix A. ANOVA results.

A.1. Transition period

Variable	Cluster mean		F
	I	II	
Capital city	0.56	0.16	8.24***
Bordering regions	0.44	0.11	6.97**
FDI	0.35	0.16	4.68**
<i>Sectoral specialization: location quotient</i>			
DI – Other non-metallic mineral prod.	0.88	1.50	3.93*
DJ – Basic metals	0.61	1.07	3.03*
DK – Machinery and equipment	0.52	0.95	4.45**
H – Hotels and restaurants	1.15	0.62	7.03**
J – Financial intermediation	1.23	0.83	5.78**

*** p<0.01, ** p<0.05, * p<0.1

A2. Accession period

Variable	Cluster mean			F
	I	II	III	
Capital city	0.33	0.10	0	5.81**
LUZ	0.44	0.31	0.24	5.39**
Transport accessibility	1.10	0.51	0.32	6.02**
High education	0.81	0.43	0.45	5.50**
Social capital	0.32	0.26	0.16	8.66***
<i>Sectoral specialization: location quotient</i>				
AB - Agriculture	2.43	3.70	2.8	4.02**
G - Distribution	1.33	0.99	0.77	10.76***
J – Financial intermediation	0.74	0.42	0.37	12.94***
K – Real estate, renting and business activities	0.65	0.56	0.60	4.58**

*** p<0.01, ** p<0.05, * p<0.1

A3. Crisis period

Variable	Cluster mean						F
	I	II	III	IV	V	VI	
Capital city	0.36	0.08	0.5	0.14	0	0	5.06**
LUZ	0.47	0.36	0.41	0.21	0.10	0.39	6.43**
Rural areas	0.14	0.38	0.50	0.43	0.75	0.17	5.05**
Transport accessibility	0.96	0.67	0.56	0.57	0.49	0.59	3.70*
Social capital	0.31	0.28	0.27	0.20	0.23	0.30	4.42**
Per capita GDP	0.98	0.71	0.64	0.64	0.45	0.67	7.96***
R&D expenditure	0.64	0.38	0.54	0.29	0.10	0.16	3.13*
<i>Sectoral specialization: location quotient</i>							
AB - Agriculture	1.71	3.81	2.77	3.89	6.06	2.50	13.23***
D – Manufacturing activities	1.19	1.35	1.03	1.53	1.19	1.10	5.35**
DBDC – Textiles and leather	1.57	2.91	2.10	2.83	2.78	0.93	4.81*
DK – Machinery and equipment	0.78	1.17	0.67	0.79	0.56	0.69	10.08**
G - Distribution	1.29	0.95	1.22	0.84	0.76	1.70	8.62***
J – Financial intermediation	0.76	0.47	0.51	0.37	0.31	0.70	8.54***
LMNOP -	0.75	0.67	0.88	0.69	0.65	0.85	2.87*

*** p<0.01, ** p<0.05, * p<0.1