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The dynamics of agglomeration processes and their contribution to regional development across the EU

Research Memorandum 2013-10

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The Dynamics of Agglomeration Processes and their Contribution to Regional Development across the EU[1]

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Abstract
A closer look at the spatial distribution of industrial sectors in a country shows that there is a persistent trend for industries to cluster in certain regions in order to benefit from agglomeration advantages. It is therefore important to analyse how industrial agglomerations evolve over time and the extent to which agglomeration processes have an effect on lagging regions, in particular in central and eastern countries (CEECs) in Europe. The existence of industrial agglomerations has been broadly analysed in many advanced economies, such as the USA, Japan and Western Europe, but less so in the less developed parts of Central and Eastern Europe. The present paper aims to gain new knowledge on agglomerations in non-Western European countries in general, and in lagging regions in particular. Many transition economies provide intriguing cases from this point of view, as for several decades they have experienced an economic development that was governed by a centralized industrialization policy. Hence, in the present study, we explore the issue of industrial agglomeration and its link to economic growth in the less developed regions in Eastern Europe. First, we present various theoretical arguments, and subsequently we offer empirical evidence as to why we may expect a positive relationship between industrial agglomeration and regional growth. Focusing on the 2-digit industries of 268 regions during the period 2001-2007 in the EU27, this paper aims to explain the emergence of industrial agglomerations in the past years across CEECs compared with the EU15. In order to obtain a more detailed picture of the sectoral and local effects on the number of employees, a shift-share analysis was carried out. This investigation was succeeded by a regression analysis to identify the forces at work. This study allows us to trace the manner in which agglomeration forces can improve regional development within the EU.

Key words: agglomeration economies, regional growth, geographic concentration, shift-share analysis, regression model

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Introduction

It has long been known that economic activities are unevenly distributed across space (Tobler, 1970). A large body of literature on economic geography has evolved which attempts to explain why there is a strong tendency for industries to cluster in particular regions in order to exploit the locational dynamics generated by agglomeration forces. Following this approach, agglomeration processes, the spatial concentration of economic activities in a specific field in a certain region connected through diverse sorts of liaisons (from knowledge spillovers to the use of a common skilled labor market), are increasingly perceived as paramount to comprehend the economic power or competitiveness of a region. With this background, it seems vital to explore how industrial agglomerations have developed over time and the extent to which agglomeration assets can provide a meaningful economic contribution to the catching-up regions of central and eastern countries (CEECs) and to Western countries as well. Despite the fact that the phenomenon of industrial agglomeration has been thoroughly examined in many advanced economies such as the USA, Japan or Western Europe (De Groot et al. 2009), our aim here is oriented toward the less developed areas of Eastern Europe. Hence, the present study can be perceived as making a significant addition to the knowledge about agglomeration in non-Western European countries in general, and in lagging regions in particular. CEECs seem to present an ideal setting for studying this topic, especially because they have endured a long economic development period of several decades, which was influenced by socialist industrialization. Before 1990, these countries were subjected to a central planning system and most economic activities, including location choice, were decided by the central government, which was considerably influenced by political considerations. Under the planned economy, many CEECs faced severe barriers to an efficient geographical allocation of economic activities across their regions as compared with other regions in the EU15, especially because they were confronted with the legacy of a planned economy that determined locations for economic activity on the basis of political decisions, without due regard to economic efficiency. The changing economic environment in CEECs after 1990 permits us to examine the relationship between industrial agglomerations and regional growth. Hence, in the present paper, we focus our attention on examining the issue of industrial agglomeration and its link to economic growth in the less developed regions of Eastern Europe.

We aim to investigate which industrial agglomerations in which regions have grown fastest between 2001 and 2007, and why. To shed light on this topic, we disclose theoretical arguments and secondary empirical evidence for why we should have reasonable expectations about finding a positive connection between agglomeration and economic growth. Focusing on the 2-digit industrial sectors of 268 regions at the NUTS2 level from 2001 to 2007 in the EU27, the aim of this paper is to explain the changes regarding the evolution of industrial agglomerations in the past years across CEECs compared with Western Europe, i.e. the EU15. Specifically, in order to provide a more integrated image of the local and sectoral implications for the growth of the number of employees in each sector and region, a standard shift-share analysis will be used as a tool for the regional selection of key leading industries. Once completed, the analysis will provide a evidence-based representation of the dynamics of employment growth and decline, which makes it useful for targeting industrial agglomerations capable of providing regional growth within the EU. Lastly, based on a regression analysis, in which we include several explanatory variables that may have an impact on regional development, we will in the concluding part of this paper elucidate the manner in which agglomeration assets can improve regional development across the EU.

The remainder of this paper is organized as follows. Section 2 presents the theoretical background and some selected empirical evidence related to the relationship between agglomeration processes and regional development. Section 3 offers an overview of the data set while Section 4 is dedicated to describing the methodology used for our empirical analysis. Next, Section 5 presents the results of our econometric analysis of the agglomeration effects on regional development across the EU. Section 6 concludes.

Theoretical background and empirical evidence

The importance of industrial agglomerations in achieving regional economic growth has long been discussed in the field of regional science and urban economics. There are reasonable motives to believe that a strong connection exists between the agglomeration of economic activities and the economic growth of a region. Economic growth may be stimulated by the agglomeration of industrial activities through the contribution of, for instance, a higher degree of knowledge spillovers and larger local producer and consumer markets. The underlying principles for the phenomenon of agglomeration of economic activities in space can be explained by a rich

body of literature that took off with Alfred Marshall's work in 1890 entitled *Principles of Economics*. Since then, an important surge has taken place in the literature dedicated to this topic.

Furthermore, it is important to emphasize that this spatial concentration comes about mostly because of *agglomeration economies*. The term "agglomeration economies" denotes all economic benefits accruing to firms belonging to an agglomeration: reduced production costs, presence of advanced and specialized services, presence of a skilled labour force, broad and specialized intermediate goods markets, and so on. Hence, agglomeration economies represent "an engine of growth" (Romer, 1986; Lucas, 1988). These particular advantages specific to agglomerations are often categorized as so-called *localization economies* and *urbanization economies*. Concretely, the term "localization economies" refers to efficiencies that arise from the concentration of firms in the same sector, while "urbanization economies" implies efficiencies that accrue from the agglomeration of various kinds of activities in a given region. In the vocabulary of recent researchers, these two types of economies are denoted by the headings *Marshall–Arrow–Romer (MAR) externalities* and *Jacobs externalities* (Glaeser et al., 1992). Specifically, 'MAR externalities' refer to knowledge spillovers generated among companies agglomerated in a single spatially concentrated industry. Additionally, Porter highlights the relevance of localization economies, sustaining the conviction that knowledge spillovers in geographically agglomerated industries foster growth. Unlike the MAR approach, the Jacobs framework defines diversity as a crucial source of agglomeration economies, arguing that the most valuable knowledge transfers come from outside the own industry. As a result, it is the variety and diversity of the geographical concentration of different industries that promote growth, rather than the concentration of a single industry. However, all these divergent approaches are extremely appealing, because they try to explain why regions characterized by agglomeration exhibit higher growth rates than regions without such valuable features.

Considering these, the phenomenon of regional growth is strongly connected to the existence of agglomeration economies, namely, positive agglomeration effects that result from the spatial concentration of industries, such as advantages from a specialized labour market, specialized intermediate products and knowledge spillovers. While the literature on (endogenous) economic growth (see Aghion and Howitt, 1998) tends to ignore the influence that the agglomeration of economic activities may have on economic growth – focusing on other

drivers of economic growth, such as technological development driven by the accumulation of knowledge, capital accumulation and institutions – the emergence of the models of the "new economic geography" revived the scientific interest in the determinants of agglomeration and its consequences for economic activity. Commencing with the study by Krugman (1991), this line of literature perceives the presence of transportation costs in combination with factor and/or firm mobility and congestion costs as the vital driving force behind the level of agglomeration in the economy. Recently, these two strands of literature have been integrated into a robust theoretical framework. Baldwin and Forslid (2000), Baldwin et al. (2001) and Fujita and Thisse (2002) all integrated insights from the endogenous growth literature (Romer, 1990) and the new economic geography literature (Krugman, 1991) into a model that considers both agglomeration and economic growth. A complete overview of these sorts of models is provided in a survey paper by Baldwin and Martin (2004). In a nutshell, these models imply that agglomeration has a positive impact on growth, and that the growth rate of the economy as a whole is highest in a steady state with economic activity agglomerated in one region only. Following this approach, agglomeration seems to have several advantages for both consumers and producers that lead to favourable conditions for economic growth. A larger market size and a higher degree of knowledge spillovers are both examples of features of agglomerations that may stimulate economic growth. On the other hand, it must be specified that there might be obstacles on the road to regional development based on industrial agglomeration, especially because of sclerotic industrial agglomeration (too many small firms) and a reduced technological level (a lower limit of the high-tech sector) (Ciccone and Hall, 1996).

Despite these theoretical backgrounds, the empirical link between agglomeration and economic growth has attracted little interest in the empirical literature on economic growth. Two of the first studies to shed light on this relation were provided by Ciccone and Hall (1996) and Ciccone (2002). These studies estimated the relationship between economic activity, measured by total factor productivity, and agglomeration, quantified by employment density, for the USA at the state level (Ciccone and Hall, 1996) and for five European countries at the regional level (Ciccone, 2002) and discovered a positive contribution of agglomeration (both in the region itself and in neighbouring regions) on economic activity.

More recently, two other papers (Sbergami, 2002; Crozet and Koenig, 2005) have estimated the effect of agglomeration, measured by the dispersion of economic activity within a

region, on economic growth, measured by GDP per capita. Sbergami (2002) performed a growth regression analysis for a panel of six European countries and twelve years, adding an index for agglomeration, and discovered a negative impact of agglomeration even after correcting for other potential determinants of economic growth. On the contrary, Crozet and Koenig (2005) discovered a positive effect of agglomeration at the regional European level. Clearly, there is a need for a solid empirical study of the forces at work. And this will be the main task for the remaining part of this paper.

Data

Our empirical analysis considers EU regions, over the period 2001 to 2007. The full sample of regions includes 268 NUTS2–level regions. Cyprus, Estonia, Latvia, Lithuania and Malta are considered to be one-region countries. The data on EU regions are taken from Eurostat's regional database, which is based on the Eurostat regional time series. The database is constructed across three main dimensions: industrial sectors, regions and years. The measures of the degree of spatial agglomeration are based on employment data. Due to the fact that comprehensive data are limited, we chose 2001 as the initial year for our analysis, approximated as the average over 2000 to 2002. Concerning the year 2007, this was the last year available. The regional employment data distinguish between 47 industries based on a 2-digit sector classification sector, which, in turn, is based on the statistical classification of sectors in the European Union in 2006.

Moreover, to provide a more complete indication of the data used in the empirical section of this paper, a detailed definition of the variables and descriptive statistics used in the econometric analysis is reported in Table 1.

Methodology

A regional economy incorporates various industries with distinctive economic potentials. Taking into consideration the fact that industries represent an important basis of a region's economy, any growth or decline in each of these industrial sectors impacts on the global growth of the economy. An investigation into the economic growth by sector of a certain region helps researchers and policy makers in facilitating better decision making and problem solving. The dynamic and changing regional economies have been attracting the interest of many researchers

(Knudsen, 2000). Given the fact that diverse sectors affect the economic growth of a particular region differently, comprehending the comparative advantage of these specific sectors becomes vital in the development decisions of the region (Deming, 1996). Thus, it seems crucial to determine the competitiveness of a particular region in economic development endeavours. The identification of the comparative advantage of various sectors becomes more important in lagging regions than in the developed regions. This is the reason why Central and Eastern European countries seem to present a good setting for this analysis.

Table 1. Definition and descriptive statistics of the variables used in the empirical analysis

Variable	Name	Description	Descriptive statistics		
			Mean	Median	S.D.
Initial employment	AV2001	Average number of employees in a sector in 2001 (approximated as the average over 2000 to 2002)	11368.78	2976	28514.3
Concentration employment	CONCENTR	Location quotient, 2001	1.30	0.76	5.41
Diversity	REGDIV	One minus the Hirschman–Herfindahl index of the sectoral distribution, 2001	0.9	0.06	0.91
Population density	POPDENS2001	Population per km², 2001	365.92	137.1	874.63
GDP per capita	GDP2001	Regional gross domestic product (PPS per inhabitant), 2001	18705.27	18900	7764.07
Human capital	STUDRATE2001	Students (ISCED 5-6) at the regional level – as % of the total country–level students (ISCED 5–6) in 2001	45.8	44.65	23.8
Country capitals	CAPITAL	Dummy for regions that contain a national capital	0.06	0	0.24
Competitiveness effect	Competitiveness effect	The difference between the actual change in employment and the employment change to be expected, if each industrial sector grows at the national rate.	-248.32	0	9000

Legend: S.D. stands for standard deviation
Source: compiled by the authors

In the framework of regional economic growth studies, all kinds of methods – like optimization techniques, shift-share analysis, economic base studies, input–output analysis, and benefit–cost analysis – have been used by regional scientists (Selting and Loveridge, 1994). Even though each model implies certain variations in measurement, precision, accuracy and complexity, each procedure has been utilized as an important compass for policy makers and researchers in their attempt to find the best solutions to regional issues (Hustedde et al. 2005). Shift-share analysis, in particular, compared with the other methods, is a widely used technique for the analysis of regional economies, in which empirical analyses are substantially limited by difficult access to data (Knudsen, 2000).

Consequently, shift–share analysis (Dunn, 1960) has become a popular instrument in regional analysis. Its wide usability stems from its facility to capture significant changes in the variables under consideration. Stevens and Moore (1980) advanced one important factor to account for its popularity: the procedure is technically incomplex. Shift-share analysis requires relatively modest amounts of data that are generally accessible, making the resulting analysis prompt and reasonably accurate (Nazara and Hewings, 2004). In the standard framework, shift-share analysis decomposes a region's sectoral growth into three effects over a certain period. In this paper, employment will be used as the variable of interest to illustrate this shift-share decomposition. These three distinct effects are: (1) the *national growth effect (NE),* which is the part of the change in total employment in a region ascribed to the rate of growth of employment at the national level; (2) the *industrial mix effect (IM),* which is the amount of change the region would have experienced if each of its industrial sector had grown at the national rate, less the national growth effect; and (3) the *competitive effect (CE),* which is the difference between the actual change in employment and the employment change to be expected if each industrial sector would grow at the national rate. The sum of these three effects gives the actual change in total employment within a region over a considered time period.

Since our study is concerned with regional employment in the European Union, let us denote the rate of variation of employment in sector *i* (i=1,…, S) in region *j* (j=1,…,R) by the following expression:

$$r_{ij}=\left(E_{ij}^{t'}-E_{ij}^{t}\right)/E_{ij}^{t} \qquad (1)$$

The sectoral rate of variation for *i* is:

$$r_i = \left(\sum_j E_{ij}^{t\prime} - \sum_j E_{ij}^{t}\right) / \sum_j E_{ij}^{t} \quad (2)$$

while the global rate of variation within the EU employment is:

$$r = \left(\sum_{i,j} E_{ij}^{t\prime} - \sum_{i,j} E_{ij}^{t}\right) / \sum_{i,j} E_{ij}^{t}, \quad (3)$$

where:

$E_{ir}^{t\prime}$ represents employment in sector i of region j in the last year of the analysis; and

E_{ir}^{t} represents employment in sector i of region j in the base year of the analysis.

The three components of the shift-share analysis are formulated as:

$$NE_{ir} = E_{ij}^{t} r \quad (4)$$

$$IM_{ir} = E_{ij}^{t}(r_i - r) \quad (5)$$

$$CE_{ir} = E_{ir}^{t}(r_{ij} - r_i) \quad (6)$$

Although shift-share analysis is heavily used in regional studies, there seems to be a general consensus that while the method is a useful way to conduct an initial analysis of regional growth, it is not an end in itself. Its purpose is more that of a framework for further analysis. In order to attain more fundamental explanations of the differential growth among various regions, a deeper examination is needed of the factors relevant to the competitiveness effect. Hence, while shift-share analysis identifies the industrial agglomerations in which a region has a competitive advantage (benefit), it cannot reveal which of the region-specific factors account for the competitiveness (disadvantage). Thus, agglomeration analysis using the shift-share technique provides useful information about the regional economy’s strengths and weaknesses. However, as we specified previously, these are just the first steps. A causal model is needed as well. Consequently, shift-share analysis is useful for analysing historical employment patterns and identifying their causes through a regression analysis defined by a linear regression denoted by the next equation:

Competitiveness effect=$\alpha + \beta_1$•AV2001+β_2•CONCENTR +β_3•REGDIV+β_4 •POPDENS2001+β_5 •GDP2001+β_6•STUDRATE2001+β_7 •CAPITAL +ε (7)

Consequently, the second step in our study is based on a regression analysis, in which we include certain factors as explanatory variables that can make an important contribution to regional development, such as: the level of wealth (GDP per capita), urbanization (population density), human capital (level of education), labour force size (number of employees) and a geographical variable used as a dummy variable (countries' capitals). As other potential factors affecting economic growth in European regions, we also pay attention to regional industrial concentration (C_{irt}) calculated by using the location quotient and regional economic diversity (D_{rt}) calculated as an inverse Hirschman–Herfindahl index across regions. These measures read as follows, in relation to industry *i*, region *r* and time *t*:[2]

$$C_{irt}=\frac{L_{irt}/L_{i*t}}{L_{*rt}/L_{**t}} \quad (8)$$

$$D_{rt}=1-\sum_i (L_{irt}/L_{*rt})^2 \quad (9)$$

The location quotient represents a simple measure for determining the extent to which an industry is concentrated in an area relative to a larger benchmark region. The rationale underlying this index is that if the location quotient of an industry is greater than 1, the industry is "over-represented" in the case study region in comparison with the benchmark region. If the location quotient is less than 1, the activity is "under-represented" in the region. Moreover, regarding the inverse form of the Hirschman–Herfindahl index, it should be noted that we chose to write *one minus* the Herfindahl index of regional concentration of employment across sectors, to indicate the following direction of influence: the inverse Herfindahl index has a *higher* value for *higher* diversity. The empirical findings of our investigation will be given in the next section.

[2] We use *L* for total employment. An asterisk (*) denotes a summation over the index it replaces.

Empirical results

In this section we present the results from the shift-share projections of regional economic growth and from the regression analysis applied to our data set.

Using the shift-share method helped us in providing an overview of the contribution of industrial agglomerations to regional economic growth between 2001 and 2007. By focusing our attention on the regional shift or competitiveness effect, which is perhaps the most important component of shift-share analysis, the presence of a region's leading and lagging industries can be highlighted. The regional shift effect reflects the amount of additional regional employment that results from the concentration of a specific sector in a certain region. For those industrial agglomerations in which the region has a positive impact, the region exhibits a competitive advantage. In the next figures (see Figures 1-3), we map out the values of the competitiveness effect in some selected industries (i.e., computers, textiles, and R&D sectors), by presenting the additional number of employees in those regions where the industrial agglomerations outperformed their counterparts or not at the European scale from 2001 to 2007.

As we can see from the map in Figure 1, the Eastern European regions that have a competitive advantage in computer and related activities are especially the countries' capitals, such as Bucharest, Budapest, Warsaw and Prague. This aspect is not very surprising considering that these big cities have developed a large amount of ICT activities that have helped to boost the economic development in these areas. Thus, this sector seems to represent a part of the economy in which Eastern European countries have been particularly successful in developing true pockets of regional strength that employ significant numbers of people. Concerning Western Europe, the regions that manifest a competitive effect in this sector are Düsseldorf and Köln in Germany, Pays de la Loire, Bretagne, Provence-Alpes-Côte d'Azur in France, and Comunidad de Madrid in Spain.

In the next map (see Figure 2) we can observe which regions present a competitive effect in textiles. As we can easily observe from the above map, the regions that have a significant competitive effect in textiles are Łódzkie and Wielkopolskie in Poland and Lombardia in Italy. These results confirm the flourishing textiles industries in these two Polish regions, particularly around the end of the century. Furthermore, the region of Lombardia is famous for its fashion industry from Milano. *Per se*, many European regions seem to have a competitive advantage in

textiles, the only exceptions being a few regions from Romania, Hungary, Slovakia, France and England.

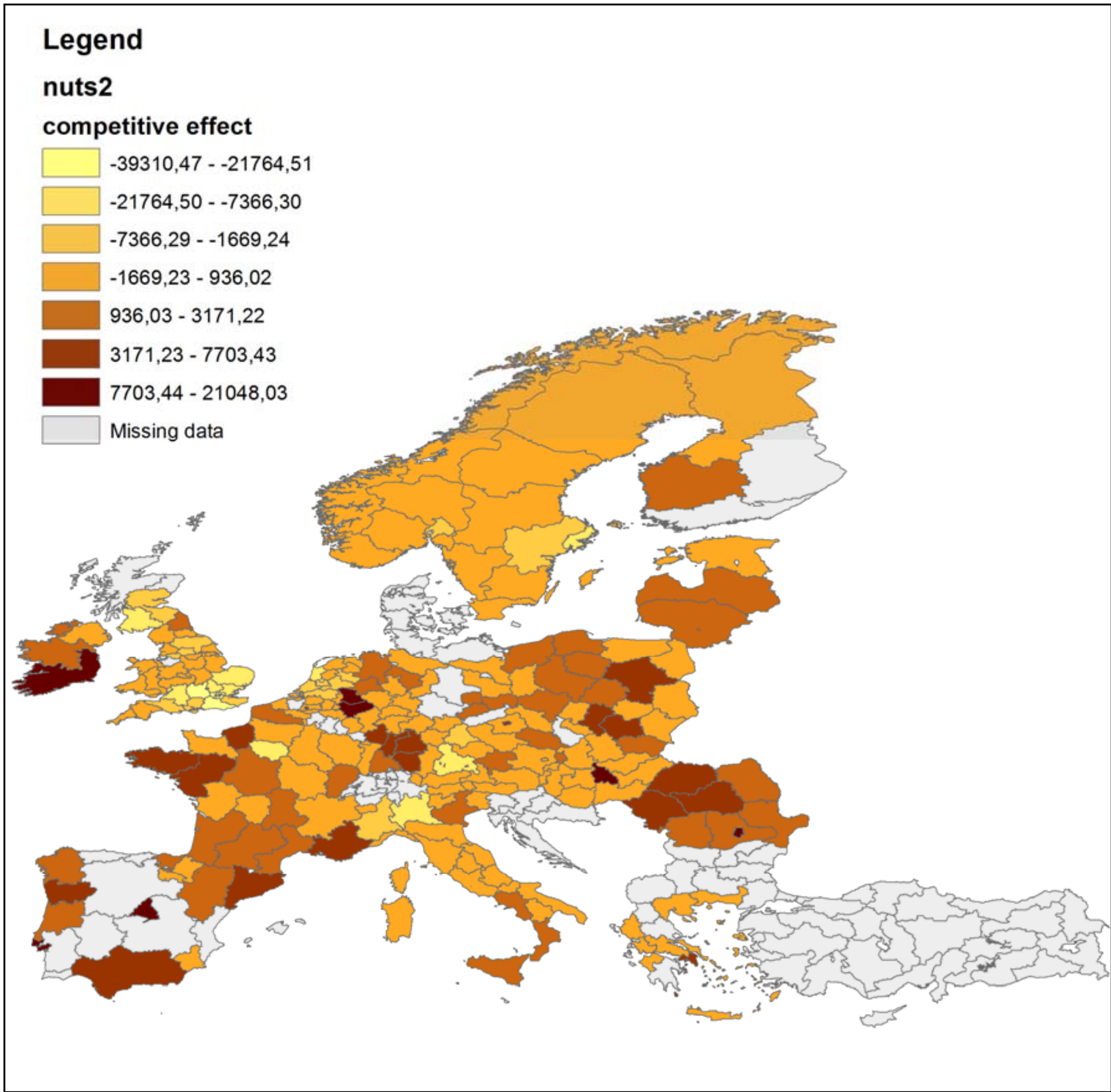

Figure 1. Competitive effect of European regions in computer and related activities
Source: compiled by the authors based on the shift-share results

The next map (Figure 3) provides a geographical representation of the European regions that have a competitive advantage in another important sector: research and development (R&D). Figure 3 shows clear differences between Eastern and Western Europe regarding the competitive effect that regions have in R&D. Specifically, the EU15 regions seem to possess a clear competitiveness advantage compared with their peers in the EU10. Partly, this is categorically a reflection of lower investments in this sector across Eastern European regions. However, given

the traditional relative strength of many of the EU10 countries in their education system, it is still an indication that the inheritance of a high skill level in these economies cannot be taken for granted.

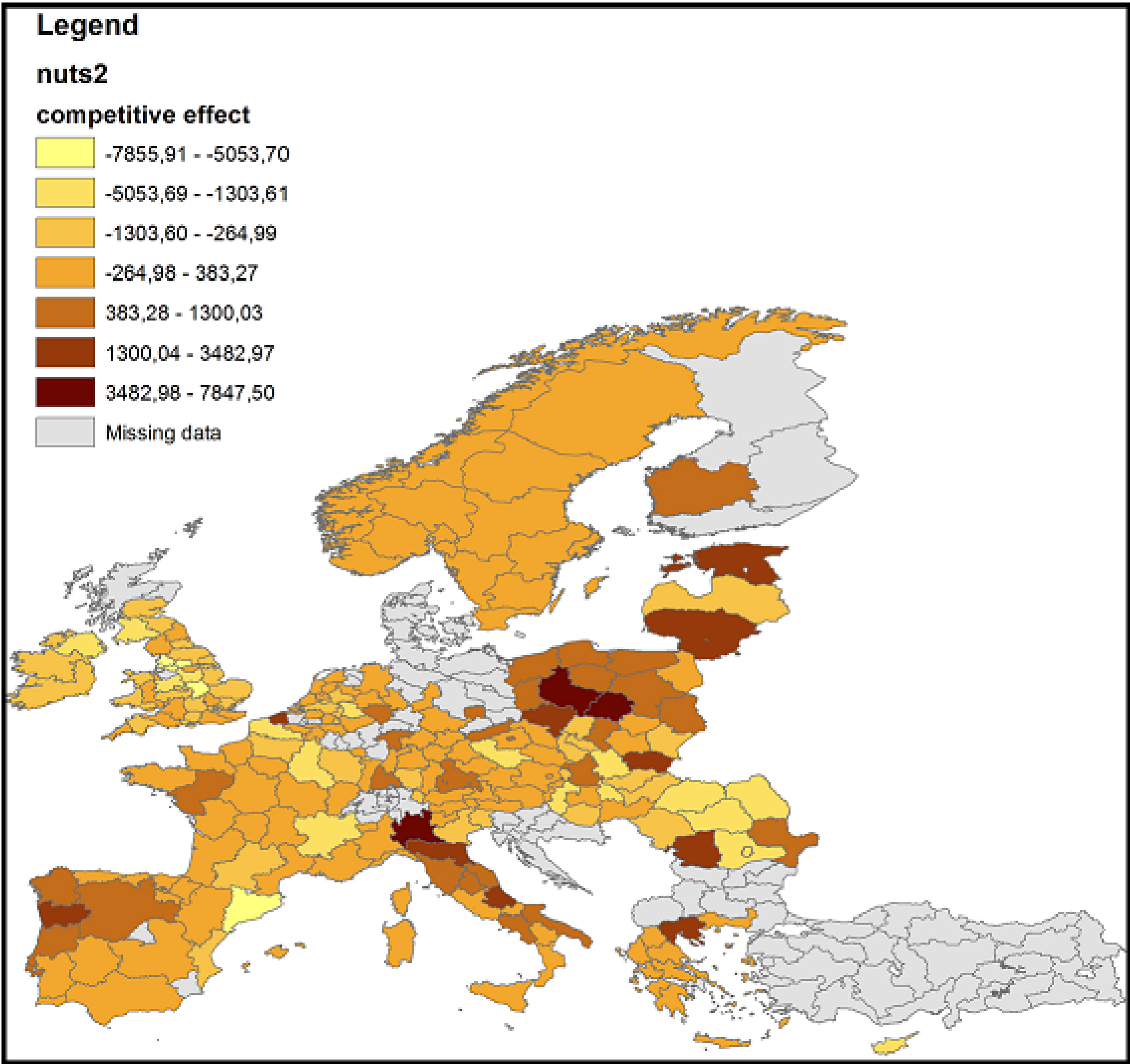

Figure 2. Competitive effect of European regions in textiles
Source: compiled by the authors based on the shift-share results

Overall, these data indicate the structural changes in the EU10 compared with those in the EU15, shifting employment towards agglomeration categories that have been traditionally under-represented (e.g., computer and related activities), that provided easy opportunities for new companies (e.g., textiles) and that leveraged the existing profile of competitiveness strengths and weaknesses (e.g., research and development). The overall changes in employment at the regional level by agglomeration category have been the result of any new individual industrial

agglomeration that outperformed its European counterpart or not during the expansionary period, 2001-2007.

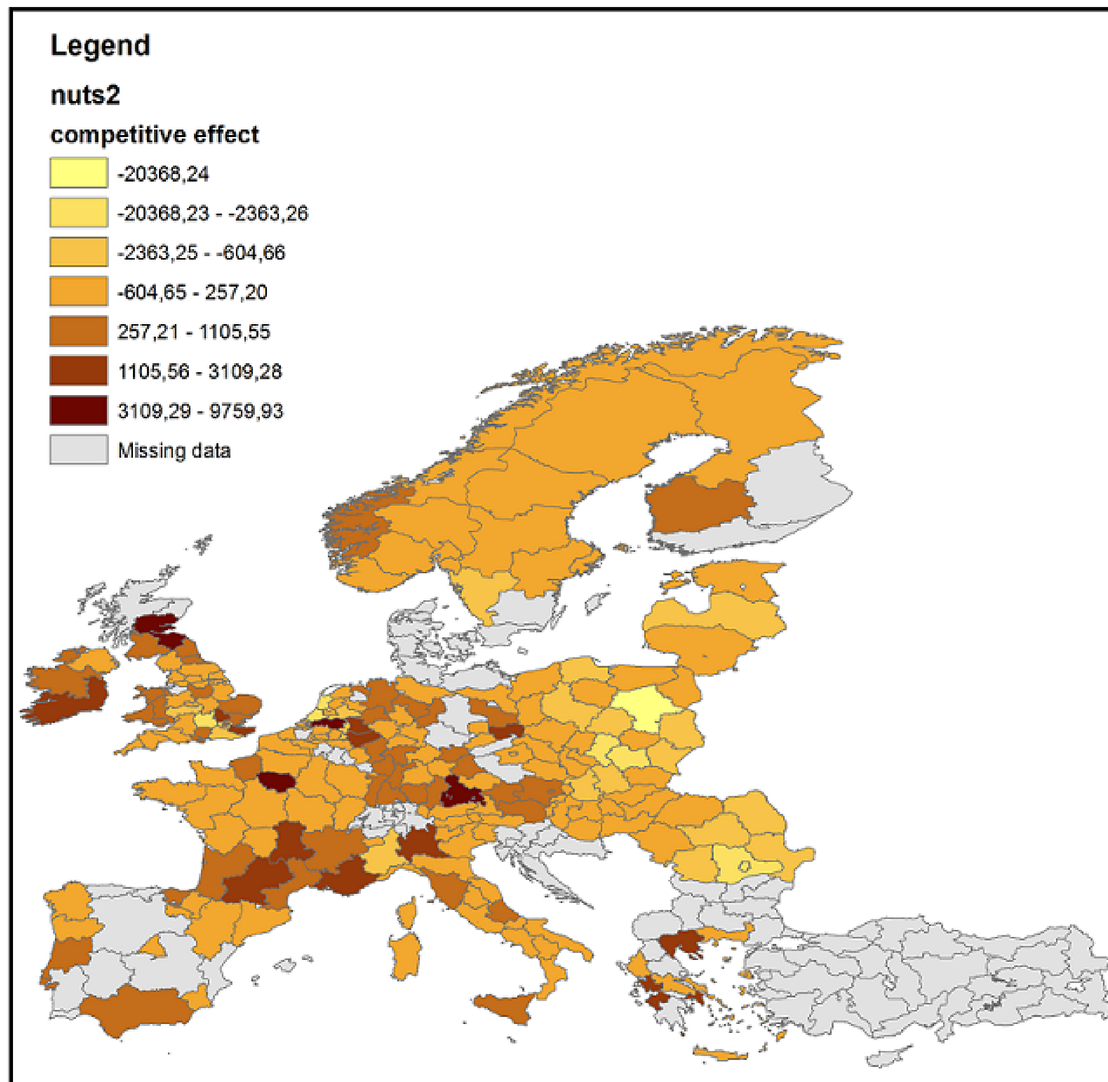

Figure 3. Competitive effect of European regions in research and development
Source: compiled by the authors based on the shift-share results

As stressed in the previous sections, the shift-share technique helped us to conduct an exploratory study. For a stepwise and complete examination, this 'crude tool' is next used in combination with a causal regression analysis to determine which factors explain a region's economic strength. To fulfil this explanatory objective, we estimated two regression equations for both Western and Eastern Europe, in which we used as a dependent variable the

competitiveness effect obtained from the shift-share analysis. The main results of our regression analysis for Western Europe can be observed in Table 2.

Table 2. Main results for Western Europe

Dependent: competitiveness effect			
	coeff.	**t-values**	**p>|t|**
AV2001	-.1996553	-43.58	0.000
CONCERTR	1.577.384	1.95	0.051
REGDIV	7.902.416	2.05	0.040
POPDENS2001	-.0854669	-0.27	0.787
GDP2001	.0230771	0.48	0.630
STUDRATE2001	11.745	1.18	0.239
CAPITAL	1707.60	1.98	0.048
Constant	-6723.487	-1.96	0.050
Observations	1891		
R^2	0.51		

Source: authors' calculations

As we can see from the above table, initial employment has a significant negative effect on employment growth, which means: he higher the initial number of employees, the lower relative regional growth.

On the other hand, regional employment growth seems to be strongly influenced by localization and urbanization economies. Both concentration and diversity have a positive significant effect on growth. This evidence basically means that employment growth is faster in regions where there are industrial agglomerations in a specific sector, but also in regions where there are agglomerations among industries. These findings imply that both MAR knowledge externalities and Jacobs externalities are likely to occur in Western Europe. Overall, these regions might enjoy intra-sectoral spillover effects, but also inter-industrial externalities.

Moreover, in our regression analysis concerning Western Europe, more urbanized regions do not outperform than populated regions, the coefficient of population density being insignificant. Neither the high degree of welfare nor the level of education seem to have a major impact on regional growth, the coefficients of both GDP per capita and study rate having no significance.

On the contrary, Western Eueuropean countries' capitals seem to have a significant positive effect on regional growth. These results are not surprising taking into consideration the fact that the most dynamic evolution of positive spillovers accrues in these developed metropolitan areas.

The estimation results for Eastern Europe are summarized in the table below (see Table 3). As we can observe from this table, regarding the first explanatory variable, we face here the same situation as in the Western-European case. Also for Eastern Europe, initial employment has a significant negative effect on employment growth; consequently, the higher the number of employees, the lower relative regional growth.

Table 3. Main results for Eastern Europe

Dependent: competitiveness effect	**coeff.**	**t-values**	**p>|t|**
AV2001	-.2348645	-12.91	0.000
CONCENTR	-12.0438	-0.47	0.637
REGDIV	41252.73	3.03	0.003
POPDENS2001	2.160225	1.94	0.053
GDP2001	-.3414208	-3.67	0.000
STUDRATE2001	60.98411	2.87	0.004
CAPITAL	-229.9311	-0.10	0.918
Constant	-34252.79	-2.65	0.008
Observations	798		
R^2	0.24		

Source: authors' calculations

On the contrary, regarding the MAR and Jacobs frameworks, things seem to be different in the East. First of all, concentration in a specific industry has an insignificant effect on regional growth, meaning that intra-industrial spillovers are less relevant to a region's growth. These findings imply that employment growth is faster in regions caracterized by an agglomeration among various industries and those that have a more competitive local sectoral structure. Overall, inter-industrial spillovers appear to be very important for employment growth; the coefficient of our diversity is in this case significant.

Furthermore, for Eastern Europe, more urbanized regions seem to outperform less populated regions, the coefficient of population density being significant. A reasonable

explanation for this result is likely the dynamic exchange of knowledge spillovers that occur in denser regions.

Regarding the level of GDP per capita, this variable seems to have a significant negative effect on regional growth. This is because poorer regions tend to develop more rapidly than wealthy regions.

Another important variable that exhibits a significant positive impact on regional growth is the level of education. A higher rate of students in tertiary education seems to demonstrate a favorable effect on regional employment growth because the labour force in Eastern Europe is cheap and at the same time considerably productive.

Regarding the last independent variable, it appears that Eastern-European capitals do not exert a significant impact on regional growth. How can we explain this intriguing result? It seems plausible that the negative externalities associated with major metropolitan areas such as congestion, higher housing prices and intense competition outweigh here the positive effects.

Conclusions

In the present paper, we have sought to explore the interconnection between industrial agglomeration and regional growth across the EU, paying special attention to less developed regions from Eastern Europe. We have carried out an explorative analysis on the basis of theoretical arguments, references to the literature, and a series of empirical investigations focused on interesting cases in Europe. Clearly, the quality of the data on which the latter examinations are based leaves much to be desired.

Based on a shift-share analysis, our study was able to identify those industrial agglomerations that seem to outperform others in various regions during the period 2001 to 2007, these particular regions thus having a competitive advantage. Because the shift-share method does not account for the prominent factors responsible for a region's growth, we resorted at the end to regression analyses for both Western and Eastern Europe. Here, we discovered that both MAR and Jacobs externalities have a positive impact on regional growth in the case of Western European regions. On the other hand, our findings revealed that intra-industrial spillovers are insignificant for Eastern European regions, while inter-industrial spillovers seem to make a major contribution to regional growth in this part of Europe. Moreover, urbanization and the level of education proved to have a positive impact on regional growth in the East and an

insignificant influence in the West. Another interesting result was the positive effect of Western European countries' capitals on regional growth, while Eastern-European capitals seem to be less relevant in this context.

We conclude that our outcome is of special interest, because it concerns situations from Central and Eastern Europe that are considerably different from the common case-study material found in the literature, which is generally centred on developed Western economies. Of course, much supplementary work is necessary to offer a more robust clarification of the important questions raised in the present study.

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