Agglomeration Economies: Localisation or Urbanisation? Structural Models for More and Less Developed European Regions

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Abstract. Agglomeration economies have a heterogeneous impact on growth and development, which has been confirmed in the literature. Thus, the aim of this paper is to find precise relatedness between these externalities and the performance of regions. Structural models reveal that impact depends on development level. Both urbanisation and localisation economies are beneficial in different circumstances, but they play a greater role in developed regions. In less developed regions, growth rate is only correlated with regional urbanisation economies, including low-technology and less knowledge-intensive services, but mostly with the share of manufacturing sectors. Nevertheless, regions with higher GDP per capita have a lower share of industry sectors and a higher share of knowledge-intensive services (KIS), but also higher localisation economies within both technology-intensive and KIS market services. Therefore, there is a dichotomy in the less developed regions. Although they need urbanisation economies and a high share of industries for growth, specialised KIS and knowledge-intensive activities become crucial afterwards, when they are mature. Less developed regions are moving in the direction of the development models of more developed regions. Developed regions, in turn, can follow two types of development paths (or these paths could mutually interfere), with positive correlations of localisation and urbanisation economies with both development level and growth. One path requires a high share of high-tech sectors and knowledge-intensive activities, with urbanisation economies within manufacturing and service sectors. The second path is inverse because it requires a lower share of manufacturing sectors and a higher share of KIS and knowledge-intensive activities with localisation economies throughout all sectors, including medium-low and low-technology and service sectors.

Keywords: agglomeration economies, urbanisation economies, localisation economies, regional development, innovativeness, structural models

1. Introduction

The literature on agglomeration economies is not consistent regarding the impact of individual externalities on the regions and their development. Thus, the aim of the paper is to clarify the size and characteristics of the impact of agglomeration economies on regional growth and development levels. The paper is structured as follows. The next section explores and clarifies the theoretical foundations of agglomeration economies. The third section lays out the empirical design, including the approach, hypotheses, preparation of data and selection of the research methods. The fourth section presents and discusses the empirical results of the analysis of structural models for both more and less developed regions and the role of agglomeration economies, and the fifth offers a conclusion.

2. Theory on Agglomeration Economies

Agglomeration economies can be grouped into urbanisation and localisation economies [1]. Urbanisation economies derive from Jacobs externalities [2], which are characterised by concentrated demand, density of

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economic activity and variety and, therefore, diversity. Localisation economies derive from Marshallian economies of scale resulting from the co-locating of businesses in the same or related sectors due to a specialised labour market, suppliers and the facilitating potential of knowledge spillover [3, 4], and they induce specialisation. Although regional growth can be caused mainly by employment growth and increases in labour productivity [5], the factors which influence these causes are widely debated in the literature. Moreover, there is no consensus on which agglomeration economies play crucial roles in development [1, 6, 7]. In addition, there is strong evidence that clustering and localisation economies create regional advantages and thus growth, both on the macro [1, 8, 9] and micro [10, 11] level. We can indicate not only papers focusing on just one type of economy [3, 8, 9, 12–14] but also papers analysing the relatedness between urbanisation and localisation economies [15–17], in which urbanisation economies benefit some localisation industries and localisation economies can add to the diversification potential of urbanisation economies. Such relatedness can be found on different levels. For example, Hafner [11] observed that urbanisation economies are more crucial on the inter-industry level, while localisation economies support the hiring of a skilled workforce and technology transfer within industries. Apart from that, agglomeration economies are responsible for creating or attracting new entities to the region. Again, there is no consensus as to which type of these economies are more crucial [18], though Boschma, Minondo and Navarro [13] claim that regions diversify into new industries that are similar to existing ones. Pylak and Chaniotou [19] go further, claiming that less developed regions are path dependent and are unlikely to break away from this dependency. Thus, it is implied that the role of agglomeration economies may differ between more and less developed regions.

Agglomeration economies may differ across industries [20], especially when their knowledge-intensity [11], other functional and knowledge aspects [21], such as intangible assets [22], and population density, measured by existing different sized cities [23, 24], are concerned. Other factors like investments, knowledge workers, and R&D must also be taken into account [24] when analysing urbanisation economies. This literature review confirms the diversity and heterogeneity of agglomeration economies' impact on regions.

3. Research design

3.1. General approach

Agglomeration economies can be analysed in two ways. Localisation economies, following Henderson, Kuncoro and Turner [25] and Jofre-Monseny [16], can be reflected by an industry's regional employment level, and urbanisation economies are measured by the remaining employment level. This approach is appropriate when analysing separate industries, but when an entire region is under consideration, the Herfindahl-Hirschman Index (HHI) shows the intensity of competition, which is one of the most popular indexes for this purpose [26]. When E_s stands for employment in sector s, and E_{all} stands for employment in all sectors, HHI will be given by:

$$HHI = \sum_s \left(\frac{E_s}{E_{all}} \right)^2 \tag{1}$$

HHI shows both localisation and urbanisation economies in the region, because the higher the index, the more specialised (in a lesser number of sectors) a region is (which reflects the localisation economies). Conversely, the lower the index, the more even the share of every sector (which reflects the urbanisation economies). HHI indexes will be counted not only for the entire regional economy but also for groups of sectors: high-tech, medium-high-technology, medium-low-technology, low-technology, KIS market services and less knowledge-intensive services (sectors available in Eurostat databases). Thus, we can measure agglomeration economies in specific regional activities. It should be noted that HHI takes values in the range: $\langle \frac{1}{n}; 1 \rangle$, where n stands for the number of sectors in the regional economy (see equation 1). Therefore, the range of HHI values for different indexes vary and re-scaling of HHI is necessary:

$$HHI' = \frac{HHI - \frac{1}{n}}{1 - \frac{1}{n}} \tag{2}$$

After re-scaling (equation 2), *HHI '* takes values from a range $\langle 0;1 \rangle$ regardless of the number of sectors. Value 0 means all sectors have exactly the same share in the economy, and value 1 means the region has just one sector in the economy. For a group of sectors, *HHI* measures just the internal localisation/urbanisation economies of sectors in the group; thus, it is necessary to jointly analyse *HHI* and the share in the economy of the given group. However, separating *HHI* from the sectors' shares in the economy will allow for a thorough examination of the impact of both economies on growth.

3.2. Hypotheses

Based on the literature review, we can make the following two hypotheses:

H.1. If a region is less developed, the impact of agglomeration economies on the region is lower, *which would confirm their path dependency.*

H.2. Agglomeration economies depend on different variables, including knowledge-intensity, and thus cause different regional performances, *which would confirm their heterogeneity.*

3.3. Data and measurement

The subject of the study is a set of 15 input (independent) variables describing the structure of groups of industries and agglomeration economies, in terms of their knowledge-intensity [11, 18], for 282 European regions, along with a set of 36 output variables (dependent) showing population density [23, 24], economic performance [1, 8, 9], regional innovativeness and employment growth rate [24] for these regions. We used Eurostat structural business statistics and other Eurostat databases. Missing data were imputed by a k-NN algorithm. We utilised the average of each variable for the period from 2008–2011. Then, using a cluster analysis, we isolated two groups of regions with similar output variables. Further, by canonical analysis, we were able to determine structural models of the relationships between dependent and independent variables for each group.

4. Empirical Results

The application of the cluster analysis revealed two main groups of regions, which are compared in Fig. 1. Developed regions are high-tech and market KIS, information and communication, professional and scientific activities focused. Interestingly, developed regions are decreasing employment levels in high-tech manufacturing and services in favour of other service sectors. Developed regions achieve the highest levels of innovativeness indicators and economic performance except in growth rates of GDP, GVA and compensation. Unfortunately, none of the groups differ from the level of HHIs. Developed regions are a little more diversified than less developed regions, especially when less KIS is concerned, but they are trying to specialise within market KIS sectors.
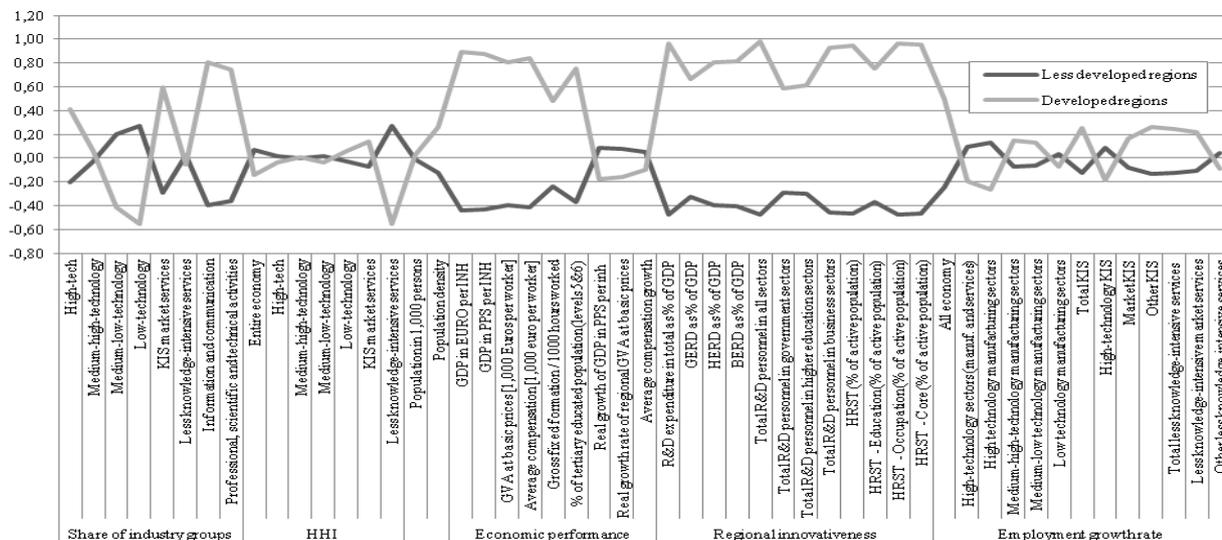

Fig. 1: Characteristics of two groups (selected by cluster analysis) in terms of the average value of each input (share of industry groups and HHI) and output (population density, economic performance, innovativeness and employment growth) variable.

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In the next step, we applied a canonical analysis to determine the role of agglomeration economies in the development of regions in both groups. Fig. 2 presents the three most important pairs of canonical variates regarding the growth and influence of agglomeration economies in less developed regions. The most influential endogenous variables on development and innovativeness are correlated with knowledge-intensive sectors variables, including shares of KIS market services (0.47), information and communication (0.51), and most significantly, professional and scientific activities (0.78). Also, the more urbanisation economies within less KIS (–0.42), the higher the level of development and innovativeness. These endogenous variables play a positive role in more dense regions. However, the higher these input variables are, the lower the growth in GDP (–0.53) and GVA (–0.31). The higher the growth—measured by the real growth rate of GDP (0.44), GVA (0.25) and compensation (0.60)—the higher the shares of manufacturing sectors (see the second pair of canonical variates), both high- and low-technology-intensive. Services are correlated inversely, so their higher shares decrease growth, especially when less KIS is concerned (–0.49). Significantly, urbanisation economies on the regional level are inducing growth (–0.39), as is urbanisation within low-technology manufacturing sectors (–0.28) and less KIS (–0.20).
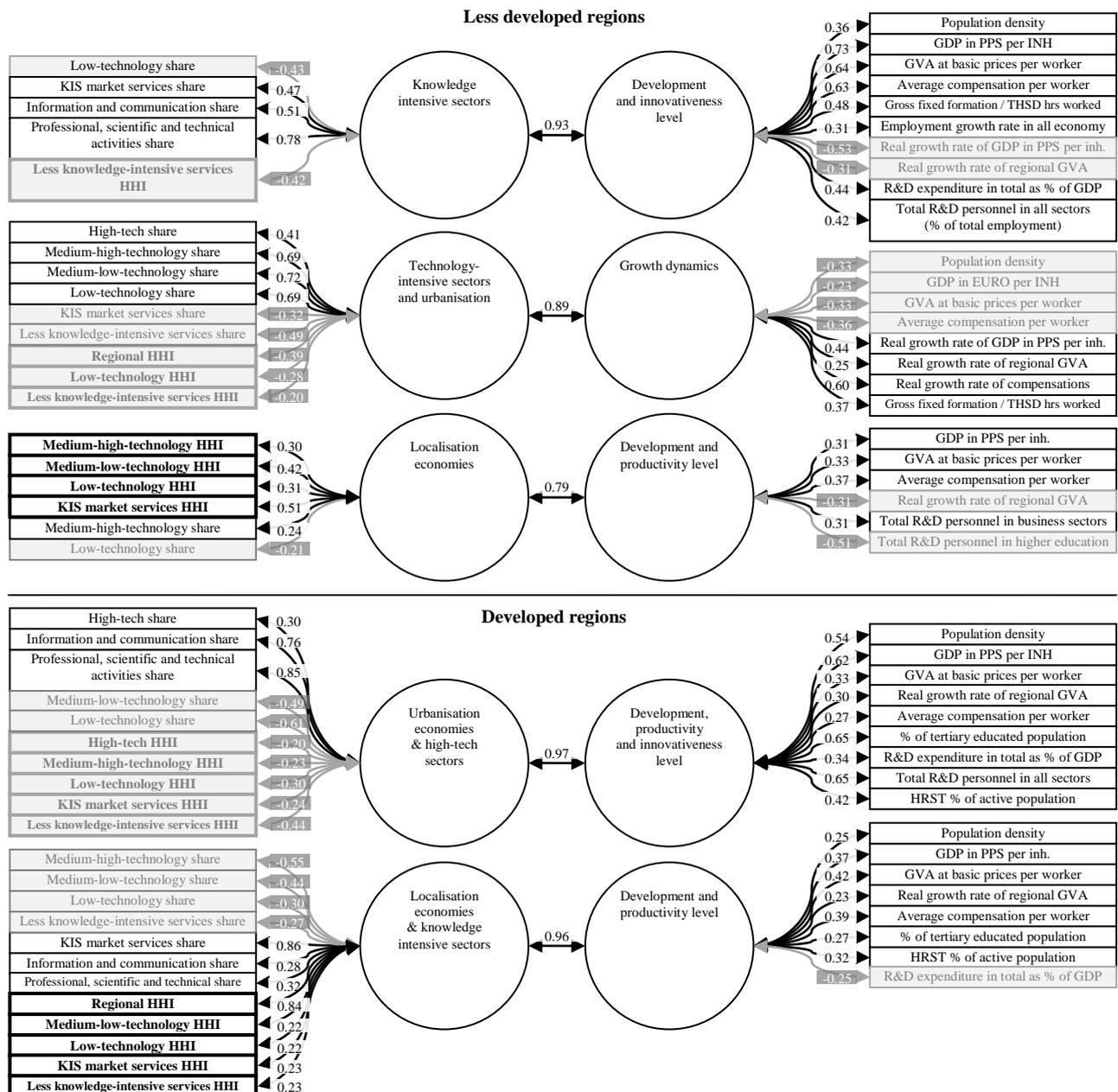

Fig. 2: Structural models of agglomeration economies relatedness with output variables for both developed and less developed regions (chosen pairs of variates). Note: shaded boxes stand for negative values, bold boxes stand for HHI.

Localisation economies (specialisation) within sectors are reflected in the third and fourth pair of canonical variates. The former pair of canonical variates refer to HHI of regional, medium-high technology and less KIS, but localisation economies are correlated with only a very few insignificant output variables like higher value of compensation or gross fixed formation; thus, we will not investigate them further. The latter pair combines higher values of medium- and low-technology HHI (0.30–0.42) and KIS market HHI (0.50) with higher values of GDP (0.31) and GVA (0.33) and average compensation (0.37). These higher output variables are also correlated with a higher share of medium-high-technology sectors and a lower share of low-technology sectors. Nevertheless this variate is not correlated with innovativeness variables apart from a higher total of R&D personnel in business sectors (0.31) and a lower total in higher education sectors (–0.51). In developed regions, there are two main pairs of canonical variates referring to both urbanisation and localisation economies, which are positively correlated with development level and growth dynamics. The higher the urbanisation level in high-tech (–0.20), medium high-tech (–0.23), low-technology (–0.30), market KIS (–0.24), less KIS (–0.44) sectors and share of high-tech sectors (0.30), the higher the output variates are, for example, concerning GDP (0.62) and GVA (0.33) levels, GVA growth (0.30), compensation level (0.27) and certain innovativeness indicators: R&D expenditures (0.34), total R&D personnel share (0.65) and HRST (0.42). Conversely (see the second pair of canonical variates), higher localisation economies within the entire region (0.84), medium-low-technology (0.22), low-technology (0.22), market KIS (0.23), less KIS (0.23) and shares in market KIS (0.86), information and communication (0.28), professional, scientific and technical activities (0.32) result in a higher GDP level (0.37), GVA level (0.42), average compensation (0.39) and real GVA growth rate (0.23). The correlation coefficients, however, are lower than in the first pair of canonical variates. Nevertheless, nearly all input endogenous variables are positively correlated both with development level and growth dynamics.

5. Conclusion

The analysis revealed that there is no simple answer as to what kind of economies are better for growth. Both urbanisation and localisation economies are beneficial in different circumstances, but they play a greater role in developed regions. Thus, hypothesis H.1 is fully confirmed. In less developed regions, growth rate is correlated only with regional urbanisation economies, including low-technology and less KIS, but mostly with the share of manufacturing sectors. Nevertheless, regions with higher GDP per capita have a lower share of industry sectors and a higher share of KIS, which is confirmed in the literature [see for example: 27], but also higher localisation economies within both technology-intensive and KIS market services. Therefore, we claim there is a dichotomy in less developed regions. Although they need urbanisation economies and a high share of industries for growth, specialised KIS and knowledge-intensive activities become crucial afterwards, when they are mature. Less developed regions are moving in the direction of the development models of more developed regions. Developed regions can follow two kinds of development paths (or these paths could mutually interfere), with positive correlations of localisation and urbanisation economies with both development level and growth. One path requires a high share of high-tech sectors and knowledge-intensive activities, with urbanisation economies within manufacturing and service sectors. The second path is inverse, requiring a lower share of manufacturing sectors and a higher share of KIS and knowledge-intensive activities with localisation economies throughout all sectors, including medium-low and low-technology and service sectors. Thus, hypothesis H.2 is also fully confirmed.

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