

ATTEMPTS TO ESTIMATE THE SOURCES OF AGGLOMERATION ECONOMIES IN IASI METROPOLITAN AREA

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Abstract:

The paper tries to estimate the sources of agglomeration economies in Iasi Metropolitan Area, concluding that there is potential to benefit from the advantages generated by agglomeration economies throughout the metropolitan area, as a result of the forces of attraction and diffusion of prosperity which characterise the urban agglomeration. We support the idea that, at the level of such metropolitan alliance, the entire area can benefit from the effects of agglomeration economies, expanding the area of cluster-generating opportunities.

Key words: *agglomeration economies, metropolitan area, agglomeration mechanisms*

JEL classification: *R10, R11*

INTRODUCTION

Currently, agglomeration economies are understood as those gains or advantages obtained by companies and other economic actors (individuals, in their capacity as workers, consumers) due to their physical proximity to other firms, workers and consumers, proximity which is not available, at least to some degree, to other locations. Marshall's externalities are a main element in the urban economics studies that seek to explain the existence and growth of metropolitan areas.

In spatial policy-making, it is important to assess the impact of geographic distance on agglomeration economies. More specifically, up to what distance do companies benefit from their physical vicinity to other firms and workers? Are benefits felt over a distance of 50 km, or within a range of only 20 kilometers? What role does commuting time play? Do firms enjoy productivity benefits from increasing the number of providers in their immediate vicinity, or do they require an increase in the number of suppliers throughout the city or the region?

These are questions whose answers depend on the precise mechanisms through which agglomeration economies and the industry as a whole operate (MIER, 2009). Agglomeration economies resulting from sharing the local labor pool seems to depend on the number of workers from the commuting perimeter. Productivity gains from market access or intermediate goods will depend, most likely, on the transport mode of the merchandise.

Literature did not progress on clarifying these issues, and many of the available estimates are based on assumptions that suffer from limitations imposed by political or administrative purposes of research (MIER, 2009). To determine the geographical area within which these effects operate, researchers have used concentric rings representing the commuting distance or time to the cluster. Rosenthal and Strange (2003) concluded that, in the case of the United States, the workforce in a given industry located within a mile, is the biggest attraction for new companies, an effect which drops dramatically with distance. For the UK, Rice, Venables and Patacchini (2006) used concentric distance rings and discovered that most of the productivity benefits lie within the range of the 80-minute ring.

Also, scientific literature paid modest attention to the dynamic or static nature of agglomeration economies, whether they translate into economic growth and, therefore, into additional future revenue (dynamic externalities), or into a productivity increase and present revenue (static externalities) (MIER, 2009). Also, the sectoral incidence of agglomeration economies (either of localization or urbanization) is a problem that remains unsolved. As Rosenthal and Strange (2004) mentioned, the numerous and excellent studies on productivity tell us about the existence of agglomeration economies and their impact on industry, location and time, but they do not tell us much about the sources of agglomerations. Hence, in what follows, without claiming to be exhaustive, we will try to outline the sources of economic gains from agglomeration in Iasi Metropolitan Area. Also, we support the idea that at the level of a metropolitan alliance, the entire area can benefit from the effects of agglomeration economies, expanding the area of cluster-generating opportunities.

WHAT ARE AGGLOMERATION ECONOMIES?

Research on economic agglomerations enjoys a long tradition that starts from the studies of Alfred Marshall (1920). He considers three types of externalities that are essential in grouping industrial activities: availability of inputs and specialised services; labour market; exchange of information and technology diffusion.

Marshall's externalities play a central element in urban economics studies that seek to explain the existence and growth of metropolitan areas. Their inclusion in later models allowed urban economists to consider the economy as a "system of cities" (Fujita, Krugman and Venables, 1999). However, assuming that productivity growth goes hand in hand with increasing concentration, this would lead to an unrealistic result - the existence of a single city that groups all the economic activities of an economy. In fact, the growth of cities is limited by *diseconomies* associated to agglomerations. This is also demonstrated by Henderson (1974) (after Xu, 2005) who, in an article preceding the theory of systems of cities, built a model where externalities of scale are the driving force behind the agglomeration of firms, which is counterbalanced, at equilibrium, by the opposite force of agglomeration-related diseconomies, manifested in the households. Subsequently, the term *agglomeration economy* was coined to describe external gains that firms can obtain by grouping themselves into space (Catin, 1991).

Currently, agglomeration economies are understood as those gains or advantages obtained by companies and other economic actors (individuals, in their capacity as workers, consumers) due to their physical proximity to other firms, workers and consumers, proximity which is not available, at least to some degree, to other locations. The general idea behind this concept is that the operating environment has a positive impact on firm productivity.

More concisely, economies of agglomeration are defined by all the advantages determining businesses and individuals to come together. An individual firm enjoys an increasing productivity when neighbouring firms increase their production, or when the number of specialised workers increases, or the number of potential consumers in the area. Spatial proximity can also facilitate the diffusion of ideas and knowledge, enhancing creativity and the innovative capacity of firms.

Agglomeration economies are divided into two types (Hoover, 1948, Krugman, 1991; Malmberg, 2009): *localisation economies*, which describe these advantages as a result of the spatial grouping of similar or related firms under the shape of industrial clusters, and *urbanisation economies*, which refer to the benefits obtained from the localisation of a firm in a large and dense urban area.

RECORDS REGARDING THE NATURE AND SCALE OF AGGLOMERATION ECONOMIES

The impact of agglomeration economies on productivity – the output produced by a given input – has been the object of several empirical studies, especially in Anglo-Saxon literature after 1970 (Catin, 1991).

Empirical studies estimating productivity gains in urban areas most often use an aggregate production function of a metropolis (Eberts, McMillen, 1999), which takes into account capital, labour, public infrastructure and other variables. Most empirical studies based on the production function model found a positive relationship between production and economies of agglomeration. But results differ according to the size of the estimated parameters.

Many of these studies estimate productivity across industries using an industry-specific production function. Sveikauskas (1975) shows, based on a database regarding the American metropolis, that industrial productivity increases by 6% if the urban population doubles. Henderson (1986) uses data from the U.S. and Brazil to assess the nature and extent of external economies of scale in manufacturing industries, while Catin (1991) examines the relationship between industrial productivity gains and economies of agglomeration in the French regions.

On the other hand, a number of studies have attempted to prove the positive relationship between urban productivity and *city size (dimension)*, i.e. number of inhabitants, starting from an aggregate production function at urban level. The results of studies in American urban economies have demonstrated the positive effect of population size on productivity (Moomaw, 1981, 1985), as productivity was sometimes 8% higher (Segal, 1976) than the city expansion rate.

Descriptive analyses of agglomeration economies suggest that firms located in urban areas benefit from a productivity increase not only due to population density, but also due to *the density of economic activities*. Density refers to the intensity of labour, physical and human capital in relation with physical space (Xu, 2005). The effect of density on productivity can have two causes: the existence of transport costs and the specialisation of production.

In the first case, if the transportation costs of goods in the production cycle increase with distance, the technology for the production of all goods in a geographical area is characterized by increasing returns, i.e. the ratio between output and input increases with density. In the second case, the increased density of economic activities in a geographical area allows specialisation. Therefore, if there are externalities due to physical proximity, the density fosters productivity growth.

The works of Ciccone and Hall (1996) and Harris and Ioannides (2000) are part of the few empirical studies that attempted to test the impact of *employment density* on productivity. The first uses data regarding economy in general, and the second, regarding the American metropolis; both found a positive effect of employment density on productivity.

It is interesting to note that recent evolutionary theories suggest that if agglomeration economies generate or not increasing returns, this depends on the evolution of the industry life cycle. To support this claim, specialists (Potter and Watts, 2011) have re-examined Marshall's trinity of agglomeration economies in the metropolitan areas where he had discovered them, concluding that the results of econometric regression models are in contrast with Marshall's observations. Thus, during the final stages of the industry life cycle, economies of agglomeration decrease the economic performance of firms, with a negative impact on the economic development of metropolitan areas in question.

THE SOURCES OF AGGLOMERATION ECONOMIES IN IASI METROPOLITAN AREA

Currently, cities are in a new phase of development, in which, after concentrating and structuring their urban suburbs, they are expanding and start including in their growth process other adjacent areas, forming socio-spatial entities named after their enrolment scale, *metropolitan areas* or *metropolitan regions*. These include the city that generates interdependence and settlements that support these processes through mutual relations.

Historically speaking, Iasi Metropolitan Area is the first entity of its kind in Romania, established in 2004, when the city and its surrounding 13 municipalities became partners in planning and implementing an integrated development plan, through the establishment of the Association of Iasi Metropolitan Area.

The metropolitan area requires a partnership approach in the medium and long term development. This partnership aims at offering new opportunities for housing, recreation and relaxation for all citizens of the region, investments and business opportunities more consistent than the ones a city can provide, location for academic and advanced research institutions which act in support of this development. At the same time, it is the only one able to address and to efficiently solve environmental problems, able to mobilise and raise funds for an infrastructure network, able to favour a sustainable territorial development for all satellite towns.

In addition to Marshall's sources of agglomeration economies - links between intermediate and final goods providers, labour market interactions and knowledge spillovers – there have been highlighted three micro-foundations that contribute to the cluster: entrepreneurship, opportunities/ positive feed-back, cultural affiliation (Clipa, 2012). Wishing to separate the micro-theoretical foundations from the mechanisms that produce them, Duranton and Puga (2004) distinguish three types of micro-foundations of agglomeration economies based on three mechanisms: sharing, matching and learning. In the following sections of the study, we are attempting at identifying the sources of agglomeration economies for Iasi Metropolitan Area.

Firstly, the metropolitan market favours *highly specialised products and services provided by vendors and suppliers*. Location of suppliers in geographical agglomeration is beneficial both for them, as they earn more due to their spatial proximity in relationship with other suppliers, and for their clients, who benefit from easy access to a wide range of products and services. Increasing interaction between suppliers and buyers can provide more efficient and faster solutions to technical problems or changes of demand that may arise.

Secondly, the Metropolitan Area perimeter creates *a labour market characterized by diversification and specialisation*, supported by the concentration of a variety of companies in these locations. Workforce is young, professional, highly qualified, diverse and affordable. Workers find it useful to be in such a place where they can meet a large number of employers, because it decreases the risk of not finding a job and they are also offered increased opportunities for advancement. Investing in skills is, therefore, a priority. At the same time, employers receive a diverse, specialized, highly qualified local labour pool, which they can easily access when initiating or expanding their business.

Thirdly, agglomeration economies arise as a result of *knowledge spillovers*. Iasi Metropolitan Area has many residents and business opportunities to learn from each other and from the environment around them. On one hand, it creates multiple opportunities for face to face contacts that facilitate knowledge sharing. On the other hand, workers can change jobs more easily, taking with them valuable knowledge and firms are able to learn more easily from business partners.

Fourthly, empirical research has shown that *entrepreneurship* plays an important role in the formation and development of clusters, while being supported by them. Entrepreneurship includes the availability of individuals to form new businesses, as well as the willingness of existing businesses owners to be receptive to new ideas, which translates into willingness to face risks. Big cities have more entrepreneurs or more media that favour their existence than small towns, and this explains their development.

Entrepreneurship is eminently local. Individuals initiate businesses based on previous experience and interests, based on business knowledge and local contacts or family connections, aspects which can be found in the Metropolitan Area, as well.

Fifthly, the range of *opportunities* available to any site, given by the existing economic activities, will influence the agglomeration economies obtained by companies when placing themselves in that location. Besides the general advantage of proximity to other producers, economies of agglomeration emerge due to the consumption opportunities offered by the local market. It is, for example, the attraction that increased demand from large urban centres exert on companies, the effect of increasing the competitiveness of companies which are pressured to innovate and to improve product quality. Among existing opportunities we can include the natural resources available in a particular location, referring here to the proximity to natural amenities such as navigable rivers, seas etc., or to the proximity to natural resources that favour some industries (mining and ore extraction, metals), and climate.

The Metropolitan Area is no exception. Territorial cooperation at multiple levels and areas and access to development provide conditions for developing markets. Telecommunications, technological and business infrastructures ensure a friendly environment for local-business development and attract new businesses. Physical accessibility of the area is of high quality, diverse and evolving (airport expansion).

Iasi Metropolitan Area benefits from opportunities arising from its geographical position on the EU border with the Republic of Moldova. In support of this aspect are the plans to develop the infrastructure and to cooperate at technical level, which are initiated by the North-Eastern Region, the Metropolitan Area and the partner districts across the Prut. The Metropolitan Alliance, through its multiple resources and potential, holds the strongest position in the region (North-Eastern Region and Moldova, in general). For an integrated approach regarding developing partnerships, members of the Metropolitan Area initiated a partnership development plan, on medium and long term, with the member-counties of the region.

Also, the Metropolitan Area is the depository of various sets of cultural, artistic, scientific, and traditional and tourism values, which are a unique attraction in Moldova and Romania.

Sixthly, a cornerstone of agglomeration economies, perceived within the Metropolitan Area as well, is the *cultural affiliation of individuals* - economic actors (consumers, workers, entrepreneurs, owners, managers), but also citizens, members of a community who belong to a certain religion and tradition. Empirical evidence on the role of culture on urban development are based on a series of qualitative studies showing that social relations between economic actors and cultural characteristics of specific locations sketch the economic behaviour - trust, cooperation, risk taking, disseminating information - with a major role in the formation and development of clusters.

The local communities within Iasi Metropolitan Area are open and educated, preserving their values and traditions. Moreover, service quality, research and development facilities, cultural, artistic and historical values and a long tradition in academic education, place Iasi Metropolitan Area in a leading position in Moldova.

CONCLUSIONS

Iasi Metropolitan Area benefits from agglomeration economies from all the six micro-foundations discussed in scientific literature: the provision of highly specialised products and services, a diverse and specialised labour market, knowledge spillovers, entrepreneurship opportunities, cultural affiliation of individuals.

The micro-foundations presented above emphasize that there is potential to take advantage of agglomeration economies throughout the Metropolitan Area, because of the force of attraction and diffusion of prosperity exercised by the urban agglomeration. These are some arguments in favour of Iasi Metropolitan Area, seen as a development engine for the North-Eastern Region. Also, we support the idea that within Metropolitan Alliance, the entire area can benefit from economies of agglomeration, expanding the area of cluster-generating opportunities. Empirical evidence of these assumptions is subject for further research.

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BIBLIOGRAPHY

1. Catin, M. (1991), Economies d'agglomération et gain de productivité, *Revue d'économie régionale et urbaine* 5.
2. Ciccone, A., Hall, R. (1996), Productivity and the density of economic activity, *American Economy Review*, Vol. 86, No.1.
3. Clipa, R.I. (2012), Foundations and Mechanisms of Agglomeration Economies, *Review of Management and Economic Engineering*, Vol. 11, No. 3(45),pages. 23-34.
4. Duranton, G. and Puga, D. (2004), Microfoundations of Urban Agglomeration Economies, in Thisse, J. F. and Henderson, J. V. (eds.), *Handbook of Urban and Regional Economics*, Vol. 4, North Holland.
5. Eberts, R.W, McMillen, D.P. (1999), Agglomeration economies and urban public infrastructure, in E.S. Mills & P. Cheshire eds. *Handbook of Regional and Urban Economics*, Vol III, Amsterdam: Elsevier-North Holland.
6. Fujita, M., Krugman, P. & Venables, A. (1999), *The Spatial Economy: Cities, Regions, and International Trade*, MA: The MIT Press.
7. Harris, T., Ioannides, Y. (2000), *Productivity and metropolitan density*, Tufts university disussion paper series.
8. Henderson, J.V. (1974), The sizes and Types of Cities, *American Economic Review* 64, pages 640-656.
9. Henderson, J.V. (1986), Efficiency of resource usage and city size, *Journal of Urban Economics*, 19, pages 47-70.
10. Hoover, E.M. (1948), *The Location of Economic Activity*, New York: McGraw-Hill.
11. Krugman, P. (1991), Increasing returns and economic geography, *Journal of Political Economy*, 99(3), pages 483–499.
12. Malmberg, A. (2009), Agglomeration, *International Encyclopedia of Human Geography*, pages 48-53.
13. Manchester Independent Economic Review (MIER) (2009), *The Case for Agglomeration Economies*, Available from <http://www.manchester-review.org.uk/> Accessed: 2012-02-07.

14. Marshall, A. (1920), *Principles of Economics*, Macmillan, London.
15. Moomaw, R.L. (1981), Productivity and city size: a review of the evidence, *Quarterly Journal of Economics*, 96, pages 675-688.
16. Moomaw, R.L. (1985), Firm location and city size: reduces productivity advantages as a factor in the decline of manufacturing in urban areas, *Journal of Urban Economics*, 13, pages 525-545.
17. Potter, A. & Watts, H.D. (2011), Evolutionary agglomeration theory: increasing returns, diminishing returns, and the industry life cycle, *Journal of Economic Geography* 11 (2011), pages 417-455, doi:10.1093/lbq004.
18. Rice, P., Venables, A.J. and Patacchini, E. (2006), Spatial determinants of productivity: Analysis for the regions of Great Britain, *Regional Science and Urban Economics*, Elsevier, vol. 36(6), pages 727-752, November.
19. Rosenthal, S. and Strange, W. (2003), Geography, industrial organization and agglomeration. *Review of Economics and Statistics* 85(2), pages 377-393.
20. Rosenthal, S. and Strange, W. (2004), Evidence on the Nature and Scale of Agglomeration Economies in J. F. Thisse and Henderson, J. V. (eds.), *Handbook of Urban and Regional Economics*, Volume 4, North Holland.
21. Segal, D. (1976), Are there returns to scale in city size?, *Review of Economics Statistics*, 58, pages 339-450.
22. Sveikauskas, L.A. (1975), The productivity of the cities, *Quarterly Journal of Economics* 89, pages 393-414.
23. Xu, Z. (2005), Economies d'agglomération : taille, densité des villes chinoises, *Economie du développement et de la transition*, journées de l'AFSE, CERDI, Clermont-Ferrand, 19-20 May.