



Introduction

Agglomeration, economic geography and regional growth

Philip McCann¹, Daniel Shefer²

¹ Department of Economics, University of Reading UK and Department of Economics, University of Waikato, New Zealand (email: p.mccann@reading.ac.uk)

² Technion, Israel Institute of Technology, Haifa, Israel (email: shefer@tx.technion.ac.il)

Over the last two decades there have been various analytical breakthroughs within the fields of economic growth, trade and economic geography which have forced analysts to reconsider how these phenomena are related. In particular, since the early 1990s there has been a widespread revival of both academic and public policy interest in the links between geography, trade and economic growth, particularly within OECD countries, and there are several reasons for this; one reason is technological, a second reason is institutional, and a third reason is analytical.

Firstly, the primary technological development which has contributed to the renewed interest in the economic impacts of geography, has been the rapid improvement in information, communications and transportation technologies. These technological advances have improved the ability of corporate and government decision-makers to coordinate either market or organizational activities across progressively larger geographical areas.

Secondly, at the same time as these technological changes have taken place, there have also been widespread institutional changes within the global and regional trade frameworks. The movements towards free-trade and integrated market areas such as EU, NAFTA, ASEAN and MERCOSUR, have meant that the tariff structures associated with national borders may be becoming progressively less important in terms of their effects in shaping a nation's economic performance (Clement et al. 1999; Yeung 1999).

Thirdly, the work of three key commentators in particular, namely Paul Krugman (1991), Michael Porter (1990), and Allan Scott (1988) has opened up discussions of the role which geography plays in economics and business matters, to a much wider academic and policy-making audience than was previously the case. Within economics, the current thinking on these issues arising out of both the new economic geography literature (Fujita et al. 1999) and also the traditional urban economics literature, generally revolves around the notion of external agglomeration economies. The existence of such localised agglomeration economies within a country is perceived to allow for a more rapid economic

growth on the part of the country as a whole. In particular, the arguments here tend to focus on the role which geographical proximity can play in the fostering, facilitating and nurturing of flows of local knowledge, ideas and innovations. However, following Marshall's (1890) original insights, although the various Krugman, Porter, and Scott arguments provide possible explanations for the scale economy and efficiency benefits of industrial clustering, it does not necessarily follow that just because there has been a recent increase in the perceived importance of these agglomeration phenomena, there has actually been any substantive recent change to the competitive conditions faced by firms or economies. For example, there have been widespread technological and institutional changes which appear largely to have reduced many aspects of spatial transactions costs, thereby potentially reducing the importance of proximity. Similarly, large cities and industrial clusters have been a longstanding feature of our economic system, so why should there be a recent focus of interest on these questions? Furthermore, it can be argued that an unequal distribution of activity is a natural outcome of a random process (Ellison and Glaeser 1997), without any recourse to arguments about economies of scale (Gabaix 1999a,b).

On the basis of these issues, we therefore face several problems with our current understanding of the relationship between agglomeration-clustering, economic geography and regional growth, each of which must be addressed. Our first question therefore relates simply to interest and justification.

Question 1. *What is the justification for the recent explosion of interest in the geography of economics? In other words, what has anything substantive actually changed since the original arguments of Isard (1956)?*

There are two responses to this question. Firstly, Glaeser (1998) argues that if we consider the changes in the transactions costs of goods-shipments alone, then, notwithstanding certain exceptions (Hummels 1999; McCann and Fingleton 1996), the general rationale for the existence of modern cities disappears. On the other hand, he argues that it is the transportation costs involved in ensuring that people have both widespread and frequent face-to-face contact across a range of individuals in order to facilitate the transfer of tacit information, which are the crucial driving force behind the generation of modern cities and industrial clusters. In other words, the overcoming of increased modern information and knowledge transactions costs is deemed to be the primary rationale underlying the existence of modern cities, and this argument explicitly assumes that the geographical costs involved in transacting these costs must have increased over recent decades. The reasons for this appear to be that the advent of new information and communication technologies have enormously increased the quantity, complexity and variety of the information and knowledge generated within the economic system, the handling and manipulation of which requires ever-increasing face to face contact. As such, information technology and face to face contact are systematically behaving more like complements rather substitutes for each other. The Porter (1990) cluster logic is also built specifically on this assumption. Therefore,

not only does the minimisation of these costs therefore become an increasingly important issue, but that the outcome of this is that we observe an increased level of firm clustering.

Secondly, further evidence in support of this argument comes from observation of international urbanisation rates, which suggests that the individual urban area has become progressively more important as a source of economies of scale. Over the last three decades, the proportion of people living in urban areas has increased in all parts of both the developed and developing world (United Nations 1997). While the reasons for this are complex, particularly in relation to the out-migration of labour from rural areas in developing economies, the widespread urbanization phenomenon in the developed parts of the world where information technologies are mostly applied, also suggests that the geographical proximity of firms and people within individual urban areas is becoming relatively more important over time. On the other hand, running somewhat counter to this argument, however, is the observation that there has been a general movement away from cities, both for SMEs and for large firms particularly in the UK and Europe, and this trend is sometime known as the 'urban-rural' shift'. However, most of these movements are to suburban locations, or to small towns close to larger urban centers. Therefore, notwithstanding these minor exceptions, increasing levels of urbanization is generally the dominant worldwide observation, even in countries with very low population densities, such as Australia and New Zealand.

Agglomeration effects, where they exist, are externality issues. By definition, this implies that they cannot be directly measured. As such, determining whether localised growth is primarily due to localisation or urbanisation effects is complex (Glaeser et al. 1992; Henderson et al. 1995). Therefore, rather indirect approaches have to be adopted, such as observing the spatial patterns of patent citations (Jaffe et al. 1993; Acs 2002), joint-ventures (Arita and McCann 2000), joint-lobbying activities (Bennett 1998), telephone usage (Gaspar and Glaeser 1998) or real-estate price movements (Gordon and McCann 2000). These various empirical techniques tend to confirm the argument that many aspects of information and knowledge spillovers are geographically constrained. However, actually identifying these effects is problematic. Observation of urban diversity patterns are often used as a proxy method for ascribing externality issues, concluding that large cities depend more on urbanisation effects and small cities depend more on localisation effects. However, we still face our second question of the agglomeration-clustering literature.

Question 2. *What role does increasing returns to scale effects of agglomeration play in economic growth, economic geography, and how do we identify such effects? In other words, what we have actually learned about agglomeration effects over the last decade that we did not already know from Hoover (1948), Isard (1956) and Lichtenberg (1954)?*

Although in principle we can accept the various Marshallian arguments suggesting that geographical proximity is highly advantageous in many cases where knowledge and information is varied and complex, empirically identifying the

critical spatial extent which defines whether a location is advantageous or not is very difficult. In the new economic geography literature it is the city which is assumed to be the critical spatial dimension. However, this is not always the case, in that a regional hinterland extending well beyond the city may be a more appropriate area of advantage (Arita and McCann 2000; Audretsch and Feldman 1996; Suarez-Villa and Walrod 1997; Cantwell and Iammarino 2002), depending on the technological regimes involved. As such, the spatial extent over which the hypothesised agglomeration benefits can be enjoyed is neither always empirically clear-cut, nor does it necessarily correspond to the accepted new economic geography theory (Fujita et al. 1999). This empirical problem is compounded in the case of the clusters literature because in the Porter model, the spatial dimension of competitive advantage is never defined. Nor is the critical geographical dimension ever specified in related literatures which embody more social rather than purely economic approaches, such as the literatures on 'new industrial spaces' (Scott 1988) or 'innovative milieux' (Shefer and Frenkel 1998), neither of which specify any particular critical geographical relationships. As such the economic consequences of locating within, adjacent to, near or quite far from a particular city are as yet not defined. Therefore we face our third question concerning the agglomeration-clustering literature.

Question 3. *What is the critical spatial extent over which localised externalities operate? Is it a location within a city, a region or a country which is critical? In other words, what have we learned over the last decade that we did not learn from Vernon (1960) and Alonso (1964)?*

A key issue within the agglomeration-clustering literature is a lack of any agreement as to the dominant role of a city regarding the formation of new ideas, new initiatives and new firms. Some of the recent literature focuses on the idea of a 'nursery' city (Duranton and Puga 2001) in which new firms are better able to form because of the variety of agents and sectors in the immediate vicinity. Other literature focuses on the role of human capital, while other commentators stress the role of creativity in leading to new knowledge or innovations. However, how does this phenomenon relate to the continual survivability and innovativeness of firms? As yet, it is therefore difficult to identify how this is really different from the original Chinitz (1964) observation. Therefore we have our third question concerning the agglomeration-clustering literature.

Question 4. *What is the role of cities in not only the formation of new ideas, knowledge, creativity and innovation, but also in terms of the innovativeness and survivability of these new ideas and firms? In other words, what have we recently learned that we did not learn from Chinitz (1961)?*

In the standard agglomeration literature, it is assumed that firms are competitive, in the sense that they are all small relative to the market, with little or no individual market power. However, in reality, cities and industrial clusters are comprised of a range of firm types, sizes and sectors. At the same time, geographically

dispersed locations also comprise a range of firm types, sizes and sectors. Both theoretical and empirical literature suggests that selective location behaviour means that the organization of a firm is intrinsically related to the agglomeration advantages of the local area. This observation, allied with the theoretical arguments in favour of clustering described above, automatically leads us to our fifth question regarding the agglomeration-clustering literature.

Question 5. *Which types of firms will locate in which types of locations? In other words, in which cases will firms seek geographical proximity with other firms and how does this location behaviour relate to the objectives of the firm?*

The final issue relates to empirical analyses. During the last decade there have been many developments in both spatial and cross-sectional econometrics. Different econometric techniques have been used to capture agglomeration, some of which are fundamentally non-spatial in their approach (Glaeser et al. 1992; Ellison and Glaeser 1997) and some of which are explicitly spatial (Fingleton 2003) in their approach. However, there are still issues to be addressed concerning the insights gained by models based on spatial autocorrelation. In particular, and particularly related to Question 2 and Question 3 above, is the issue of spatial scale and the 'modifiable areal unit problem' (Openshaw and Taylor 1979), and the issue of the extent to which our empirical estimates are sensitive to issues of spatial and sectoral aggregation.

Question 6. *Exactly what insights have been provided by spatial econometric techniques as to the nature of clustering, agglomeration and dispersion that we did not already know from the basic empirical work of Isard (1960)?*

These various questions above indicate that there is still much for us to research in order to better identify the links between agglomeration, economic geography and regional growth. However, such phenomena cannot take place in isolation. The reason is that public policy may shape the incidences and outcomes of these relationships in various intended and unintended ways. Therefore, in many cases it is necessary to consider the relationships between public policies and economic development (McCann and Shefer 2004). In terms of agglomeration effects we therefore have a seventh question to address.

Question 7. *Exactly what is the relationship between public policy and agglomeration, and in what ways does the former contribute to or impede the latter?*

Although it is obviously possible to develop many more specific research questions, these seven rather general questions encapsulate the broad challenges we face in terms of integrating geography with economics.

The eight articles in this special issue of *Papers in Regional Science* deal with various different aspects of these problems. The articles were commissioned specifically for this issue, and all articles underwent a rigorous double blind refereeing process with international experts from five different continents. The

objective of each the articles is to deal with a major set of analytical or empirical issues and to provide insights and evidence which challenge our current thinking and points to possible avenues of further exploration.

The first three articles deal with various aspects of the issues raised in Question 2 and 3 above.

The article by Pierre Philippe Combes, Gilles Duranton and Henry Overman consider the literatures on urban systems and new economic geography to examine questions concerning agglomeration and how areas respond to shocks to the economic environment. They first propose a diagrammatic framework to compare the two approaches, and they then use this framework to study a number of extensions to the issue and also to consider several policy relevant issues.

The second article by Bernard Fingleton examines the performance of two competing non-nested models of regional wage variations in Great Britain, one which is motivated by the Solow-Swann neoclassical growth model which assumes constant returns to scale, the other by new economic geography theory which assumes internal and external increasing returns. The analysis shows that the neoclassical model does not reject the new economic geography specification, but the converse is not true and the model with a basis in new economic geography has significantly superior explanatory power. This article also explicitly addresses issues raised by Question 6 above.

The third article by Masahisa Fujita and Tomoya Mori presents an overview of the recent development in the new economic geography (NEG) literature, and discusses possible directions of its future development. Since there already exist several surveys on this topic, the authors focus on the selected features of the NEG approach which are important, but yet have attracted insufficient attention, as well as on some recent refinements and extensions of the framework.

The next three articles deal with the issues raised by Question 4 above.

The fourth article by Christopher Berry and Edward Glaeser focuses on the relationship between human capital and urbanisation. Evidence suggests that cities with initially higher skill levels have become relatively more skilled over time. This tendency appears to be driven by shifts in the demand for skilled labour as there is an increasing wage premium for such labour. Their article develops a model to account for this trend whereby within urban areas, skilled entrepreneurs innovate in ways that employ other skilled people, and the empirical analysis suggests that this tendency has increased over time.

The fifth article, by Roland Andersson, John Quigley and Mats Wilhelmsson investigates the spatial distribution of creativity and the production of new knowledge by analyzing commercial patents granted in Sweden between 1994 and 2001 from a panel of one hundred labor market areas which encompass the entire country. The analysis confirms the importance of human capital and research facilities in stimulating regional patent output, and importantly, their results also document the importance of agglomeration and spatial factors in influencing creativity. In addition, their quantitative results suggest that the urbanization of Sweden during the 1990s had an important effect upon the aggregate level of patent activity in the country, leading to increases of up to five percent in aggregate patents.

The sixth article by Philip McCann and Jaakko Simonen employs a unique micro-econometric dataset to identify the links between Finnish innovation behaviour, inter-firm R&D cooperation and the economic geography of regional labour markets. The empirical analysis suggests that in addition to firm-specific issues being important for innovation, the nature and variety of inter-firm or inter-organisation cooperation also plays a key role in innovation. However, once we control for these effects, the geographical spread of labour, rather than the localisation of labour markets, appears to be associated with innovation.

In the seventh article, Daniel Shefer and Haim Aviram deal with the issues raised by Question 7 above. In their article they investigate the role played by agglomeration economies which needs to be considered in the economic evaluation of transport projects. Major mass transit projects are expected to generate substantial new induced traffic. This development will most likely enhance the agglomeration forces at work in major urban concentrations and can lead to an upward shift in the production function of the metropolitan area, thus generating substantial additional benefits for the transport project. Using an example from Israel, the article therefore discusses the methodology required in order to estimate the benefits derived from the agglomeration economies which are induced by such a transit system.

The eighth article by José Pedro Pontes and John B. Parr responds to the issues raised in Question 5 above. This article develops a classification of the locational patterns of firms with economies of scale and scope present, in order to cast light on the location of the multiplant or multinational firm. It is concluded that the single-plant firm prevails when spatial economies of scale and scope are pronounced, while multiplant firms emerge when spatial economies of scale and scope are weak. However, the vertical multinational firm is to be found when transportation costs on the finished good are low, whereas the horizontal multinational firm emerges when these costs are high. The vertical multinational thus appears as the limit in the evolution of the market structure for most consumer goods.

Taken together, these eight articles provide insights into many different aspects of the relationship between agglomeration, economic geography and regional growth. The methodologies employed here include critical reviews of the literature, analytical modeling, empirical testing, and simulation techniques, and the material presented here clearly demonstrates that our understanding of these various phenomena has undergone enormous strides over the last fifteen years. Even a cursory comparison between the literature of the 1970s and today would suggest that this is so. These articles also demonstrate, however, that for regional scientists there are still many fundamental theoretical and empirical questions and challenges which lie ahead if we are to further develop our understanding of the role played by agglomeration and clustering in economic growth and development.

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