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Introduction

Knowledge spill-overs, innovation and regional development

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1 Background

There is a broad diversity in regional development patterns, as documented in, for example, rich descriptive historical accounts of economic development (for example, Landes 1998; Maddison 1991, 1995; Mokyr 1990; Olson 1982). Some regions are rich, others are poor. Some regions quickly catch up with the leaders, others gradually fall behind. Questions regarding the causal factors driving these developments have been addressed with differing intensities in the course of history. In all substantial explanations, however, technological progress has featured prominently. The ability of regions to develop new technologies, to assimilate existing technologies, to effectively break vested interests aimed at keeping existing technologies in place, to organise the institutions that protect property rights, and to create innovation-prone environments, have commonly been recognised as major concerns and opportunities. The last two decades show a strong revival of the interest in economic growth and regional development. This interest emerges almost simultaneously in different, although complementary, traditions of research.

In the macro-economic tradition, the new growth theory emerged, building on seminal papers by Romer (1986) and Lucas (1988). New perspectives and theoretically satisfactory ways to analyse and explain driving forces behind technological progress were developed. An alternative to the traditional neo-classical growth theory as developed by Solow (1956) and Swan (1956) was established. There was no longer a need to rely on exogenous factors to explain long-run economic growth. In the new theories of economic growth, concepts related to knowledge development, knowledge accumulation, and knowledge diffusion feature prominently. Almost simultaneously, an empirical counterpart to this research evolved, aimed at empirically assessing the ultimate determinants of economic growth on the basis of new and rich data sources. Excellent surveys of the fruits of these research efforts can be found in textbooks by, for example,

Barro and Sala-i-Martin (1995) and Aghion and Howitt (1998). The translation of the growth theory to the dynamics of the space-economy has recently also drawn much attention. A survey of the theoretical developments from a regional economic perspective can be found in Poot and Nijkamp (1998).

In a similar tradition, but with a very explicit focus on geographical aspects, the New Economic Geography emerged. The research in this tradition focuses, among other things, on geographical clustering and specialisation patterns resulting from diverse agglomeration forces. Again, knowledge diffusion and concepts such as localised technological progress play here a prominent role. Characteristic for this literature is that it leaves economic growth as an endogenous driver largely unmodelled. We refer to, for example, Krugman (1999) and Fujita et al. (1999) for interesting surveys of the current state of affairs in this field.

In a third, mainly empirical, tradition, knowledge externalities have been empirically assessed with advanced econometric techniques, focusing on the extent to which these externalities vary across sectors and with distance. The key concept in this literature is the knowledge production function, describing the relationship between innovational output (often patents or new product announcements) and inputs in the production process of knowledge (such as university research, and industry R&D). Some prominent contributions in this field are Acs et al. (1992), Florax (1992), Jaffe et al. (1993), Feldman (1994), Anselin et al. (1997), and Varga (1998).

Jointly, these different traditions address a highly relevant and interesting range of questions on the sources and implications of economic development, with a particular view to the role of technological innovation, R&D, and education and learning mechanisms. What determines the wealth of regions? Does Information and Communication Technology imply faster transfer of knowledge? Has the relevance of distance petered out? What organisational factors are important for successful innovation strategies and the assimilation of already existing knowledge? What are appropriate econometric techniques to verify the existence of knowledge spill-overs? Can indicators of inputs and outputs of the innovation process be improved? How relevant are networks in explaining innovation success? Does the presence of universities foster regional development? This wide range of questions calls for more substantive and analytical research.

2 Contents of this issue

This special issue brings together a collection of articles illustrating the diversity in approaches addressing questions of paramount interest. All of them are selected from inspiring and popular sessions organised at various conferences of the Regional Science Association International that took place in 2000. They collectively provide a reasonably representative overview of the current state of affairs in the various approaches, and the recent developments regarding our understanding of the ultimate determinants of regional development. All contributions also illustrate various directions in which future research can be fruitfully developed.

The first paper by Breschi and Lissoni critically discusses the econometric approaches to the concept of local knowledge spill-overs. The authors' main claim is that the increasing, and more or less automatic reliance of industrial geographers upon econometric evidence on local knowledge spill-overs and theoretical concepts to support their work on industrial districts, high tech agglomerations and local innovation systems is not well placed and risks to generate conceptual confusion and to distort research agendas. In addition to surveying various differing approaches, and elaborating upon the conceptual issues arising in discussions on knowledge spill-overs, the article concludes that there is a need for further in depth research exploring how knowledge is transmitted, among whom, and at what distance.

The articles by Rodríguez-Pose and Ceh belong to the macro-economically oriented research tradition. Rodríguez-Pose focuses on whether it is worth investing in R&D in lagging regions in Europe. His article surveys the theoretical stances that have been taken in answering this question, and presents some of the aggregate empirical material that is available to analyse these questions. The article concludes that R&D investment in lagging areas may in the end be the only viable solution to prevent the technology and development gap between core and periphery from expanding. R&D investment in lagging areas are argued to prove in the long run to be a better and cheaper alternative to social transfers and to the investments in the realm of more traditional development strategies. In a sense this article provides the general macro-economic background against which all the contributions in this issue ought to be viewed.

A transatlantic and dynamic, but still rather aggregate, perspective on the issues at stake is provided by the contribution of Ceh. It aims at revealing the geography of US patented inventions in the period 1978–1998, and investigates the socio-economic factors that can contribute to explaining the pattern of regional inventive activity. The article nicely illustrates the dynamics of the development of the US spatial economic system. It concludes that 'the new economy hypothesis' identifying the southern and western parts of the US as important source points for industrial creativity that can rival the northeast is warranted, based on patent activity. While the northeast or midwest now operate in a much more competitive inventive spatial system, and are being outperformed technologically by California, Texas, and Florida combined, all regions of the country are patenting inventions more than ever before, reflecting the structural (regional) transformation of the US economy.

Organisational aspects are addressed in the contributions of Love and Roper, and Oerlemans et al. The article by Love and Roper focuses on a very specific question: they try to find out whether there is a link between plant location, agglomeration effects, and the extent of outsourcing in the innovation process. Based on data for a large sample of UK and German manufacturing plants, the authors conclude that although location factors play a role in the decision whether or not to engage in outsourcing, organisational and strategic factors turn out to be much more relevant and pervasive.

The article by Oerlemans et al. takes a slightly broader perspective on the organisational issues at stake. Based on a unique Dutch database, it theoretically and empirically elaborates on the concept of spatial embeddedness. The main conclusions from the article emphasise the importance of including linkages between firms in the analysis of innovation. The article also reveals that the complexity of innovative activities is an important reason for engaging in networks. This counterbalances arguments regarding the generic relevance of networks for understanding innovational success.

3 Conclusion and research agenda

The collection of articles in this issue illustrates the wide variety of approaches currently used in studying the determinants of the rise and decline of regions. The last two articles are a perfect illustration of the fruitfulness and relevance of detailed micro-oriented approaches which are linked up with insights from organisational theories. At the same time, they also illustrate the strong need for new data sets at very detailed levels. These data sets are required to take our understanding of the complex phenomena at stake, which are traditionally addressed in macro-oriented research traditions as illustrated by the contributions of Rodríguez-Pose and Ceh, a step ahead. The empirical and micro-oriented line of research is particularly relevant because it is likely to give rise to the most concrete policy prescriptions useful for enhancing regional economic development. It is therefore in the development and employment of new, rich and highly detailed data sets, and the revelation of the fundamental micro-economic factors behind the complex processes of development, innovation and knowledge spill-overs, that a wide variety of highly challenging tasks is still ahead of us.

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