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The knowledge production–regional economic growth complex: a framework and topics for future research

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Abstract This note presents an introduction and framework for the papers that make up the special issue. In addition, it makes some suggestions for future research.

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During the past decades, there has developed a substantial literature on R&D, knowledge production, innovation, and economic growth (the knowledge production–economic growth complex). In his seminal paper on hybrid corn, Griliches (1958) laid the foundation for this complex.¹ The theory on the knowledge production–growth complex has developed into the new growth theory which further specifies the relationships between technology production, technology spillovers, innovation, scale effects, increasing returns to scale and long term growth. Moreover, it endogenizes various variables, notably knowledge production (see amongst others Romer (1986, 1990)).

The knowledge production–economic growth complex has an even longer history in the regional economics literature; it finds its basis in Marshall's (1890) theory of agglomeration economies and the industrial district. This theory starts from the assumption that technology spillovers are so important for firms that they have an incentive to locate in each other's proximity so that they can interact and

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¹ See also amongst others Griliches (1973), Hulton (1975), Scherer (1982), Solow (1988), Jaffe (1989), Jaffe and Trajtenberg (1993), Audretsch and Feldman (1996), and Anselin et al. (1997).

exchange information.² Jacobs (1969) and Richardson (1978) further developed the theory of agglomeration economies and pointed out that geographical proximity facilitates interactions among researchers, technicians and entrepreneurs which stimulates new innovation and its diffusion. Koo (2005) argues that the relationship between spillovers and agglomeration is endogenous in the sense that the agglomeration of firms in industrial districts leads to the development of localized innovation networks which facilitates the diffusion of innovation and new technologies. In their turn, information spillovers reinforce the rate of technological development, which attracts more firms, which leads to further agglomeration, which leads to further spillovers, etc. This applies in particular to industries where R&D is powerful and complex.

In spite of its long tradition in regional economics and other regional sciences, there still exist several areas in the field of the knowledge production–economic growth complex that are under-researched. This applies amongst others to the specification of the innovative firm, its characteristics and behaviour. For instance, Spilling (2004) points out that the “innovative firm” is usually viewed as one standard type of firm and that innovation activities undertaken in firms are regarded as going through a highly similar process. Little attention has been paid to the differences in the ways firms organize their research processes and the impacts of these differences on innovation. Spilling distinguishes three types of innovators, i.e. the R&D based innovator, the competition based innovator and the supplier based innovator. The three types are in line with Lundvall’s (1992) view that the user–producer relationships are crucial to innovating firms but emphasize differences in the contacts in the innovation process.

The present special issue aims to contribute to the further development of research on the knowledge production–economic growth complex. It is made up of five papers that address various aspects of the complex that are relatively under-researched.

Relatively little attention has been paid so far to the relationship between ownership and control structures of a company on the one hand and its innovative performance on the other. In their paper “Ownership structure and innovation: Is there a real link?” Raquel Ortega-Argiles, Rosina Moreno and Jordi Surinach Caralt analyze the impacts of various characteristics of firms including the degree of ownership concentration, control structures and debt financing on R&D expenditure and R&D output in a sample of Spanish manufacturing industries for the year 2001.

Corporate ownership does not only impact on innovative activities but is also a major determinant of regional autonomy. If a subsidiary enjoys a high degree of independence and is allowed to act as a local player it may participate in innovation networks and decide on its technological and product development locally. On the other hand, in the case of limited independence a subsidiary’s decisions on R&D expenditure and participation in local innovation networks may be strongly limited by its parent company. It goes without saying that variations in subsidiaries’ regional autonomy have far reaching consequences for amongst others the regional labor market, regional investments and regional growth. Olivier Crevoisier and Frederic Quiquerez address this topic in their paper “Inter-regional corporate

² In addition to an exchange of information, labor pools and intermediate input suppliers are important additional elements of Marshall’s “industrial districts.”

ownership and regional autonomy: The case of Switzerland.” They present several control indices and analyze ownership structures in terms of control of firms from the own and from other regions at a national and international level for a data set of Swiss companies. Moreover, they relate the ownership structures to the various economic specializations of the Swiss regions.

Another important component of regional autonomy that plays a crucial role in regional economic growth including decisions on investments in R&D and technological development that has received little attention in the regional science literature so far is the structure of the banking sector. Although a theoretical general economics literature on the link between financial development and economic performance has developed (see amongst others Pagano (1993) and Levine (1997)), the empirical evidence on the role of financial intermediaries in the growth process is still highly incomplete. This applies in particular to the regional level. Stefano Usai and Marco Vannini address this problem in their paper “Banking structure and regional economic growth: lessons from Italy.” They examine the role that specific categories of banks have played in the context of regional economic growth in Italy for the period 1970–1993.

As observed above, agglomeration of innovations is a crucial component of an industrial district in the sense that it facilitates interaction among researchers, technicians and entrepreneurs. However, the empirical evidence on geographical and sectoral clusters of innovation as well as its development over time is still scarce. In their paper “Geographical and sectoral clusters of innovation in Europe” Rosina Moreno, Raffaele Paci and Stefano Usai analyze the development of specialized regional clusters in Europe in terms of relative regional production specialization and interregional technology spillovers for the period 1978–2001.

The relationship between geographical proximity and innovative performance is further analyzed by Martin Andersson and Olof Ejermo in their paper “How does accessibility to knowledge sources affect the innovativeness of corporations? Evidence from Sweden.” They present measures of accessibility within and between enterprises across regions and analyze the relationship between an enterprise’s innovativeness and its accessibility to own knowledge sources, the knowledge sources of other enterprises and to universities.

Suggestions for further research

Although it has a long tradition in regional sciences, there are several reasons to intensify research on the knowledge production–regional economic growth complex and to develop new paradigms. One reason for this is the outcome of technological change itself. In the traditional models of the knowledge production–regional economic growth complex accessibility is defined in terms of the potential of face-to-face interaction as determined by geographical or time distance between regions. However, in the light of the development of a vast range of modern communication media such as Internet, the notions of face-to-face interaction and accessibility need to be reconsidered and redefined. Particularly, the impacts of these changes for the knowledge production–regional economic growth complex need to be assessed.

Another reason for intensification of research in this area is the increasing demand from policymakers. For instance, the European Union's ambition to become the most competitive economy in the world, as formulated in the Lisbon Agenda, requires a substantial increase in knowledge production and innovation. This, in its turn, can be boosted by research on the knowledge production–(regional) economic growth complex.

A third reason is the changing institutional context in which this kind of research has taken place. Whereas the typical institutional framework for most research on the knowledge production–regional economic growth complex used to be the national state made up of regions with local or national players, the new playing field is increasingly international or global with both nations and regions as constituting units and international or global players. The free movement of goods and, to a more limited extent, people at the continental level of e.g. the enlarged European Union and North American Free Trade Association and globally in the context of the World Trade Organization as well as the rapid growth of developing countries like China and India, have opened the possibilities for large scale outsourcing and off shoring. The analysis of the impacts of these developments for the knowledge production–(regional) economic growth complex is still in its infancy. Research on topics in this field poses both methodological, theoretical and empirical challenges. In this context further research is also needed on the role of intermediaries.

To sum up, in spite of its long tradition in regional science there exists a most challenging, urgent and highly policy relevant research agenda on the knowledge production–(regional) economic growth complex.

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