Entrepreneurship and Innovation in Functional Regions

Charlie Karlsson*, Börje Johansson* and Roger R. Stough**

(*CESIS and JIBS, **George Mason University)

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ABSTRACT

The purpose of this paper is to discuss the role of entrepreneurship and innovations for economic development in functional regions and in doing that highlighting the different conditions offered for entrepreneurship and innovations in functional regions of various sizes. In conclusion, the conditions for entrepreneurship and innovations vary substantially between functional regions, since the necessary knowledge resources tend to be local and to cluster in certain regions and not others. Functional regions with a high capacity to generate new ideas, create knowledge, organizational learning and innovations are characterized as learning regions. Large functional regions offer a large market potential and a superior accessibility to knowledge and knowledge resources and they will further develop their creative capabilities due to an accumulation of innovative and entrepreneurial knowledge.

Keywords: Entrepreneurship, Innovations, Regional development, R&D, Knowledge Sources, Knowledge Flows, Knowledge Creation.

JEL Classification: R10, D21, M13, O03.
1. INNOVATION, ENTREPRENEURSHIP AND REGIONAL DEVELOPMENT

In recent decades, the world has witnessed the emergence of a global knowledge economy, in which functional (urban) regions increasingly play a role as independent, dynamic marketplaces, which are integrated with other functional regions by means of flows of information, knowledge, and commodities. Each functional region has its own specific base of scientific, technological, and entrepreneurial knowledge in the form of knowledge assets of firms and other organisations located in the region and the human and social capital associated with the region’s population. A functional region is also characterised by its education system, its ongoing knowledge-production activities in universities, research laboratories, and firms, as well as its import and export of knowledge, where all these knowledge aspects may be classified as components of its regional innovation system (Andersson and Karlsson, 2006).

The functional (urban) region is a geographical area for knowledge creation, appropriation, diffusion, and absorption, as well as for transformation of knowledge to innovations via entrepreneurial initiatives (Jaffe et al., 1993; Glaeser, 1999). A functional region can encompass these activities, because it is an arena for exploiting communication externalities (Fujita and Thisse, 2002), which requires that the spatial extent of the region must be limited so that economic actors in the region can and do exercise frequent face-to-face interaction. The functional region is also a labour market region, in which knowledge spreads as individuals change their job affiliation and place of employment (Zucker et al., 1998a).

The purpose of this paper is to discuss the role of entrepreneurship and innovations for economic development in functional regions and in doing that highlighting the different conditions offered for entrepreneurship and innovations in functional regions of various sizes. In Section 2 we discuss the role of localised knowledge for entrepreneurship and innovations in functional regions of various sizes and in Section 3 we deepen the discussion about the role of knowledge for entrepreneurship and innovation. The relationship between knowledge sources, knowledge flows and knowledge creation is highlighted in Section 4. Section 5 contains a discussion of the role of creativity for entrepreneurship and innovation, while Section 6 highlights how the conditions for entrepreneurship and innovation vary between functional regions of various sizes. Section 7 concludes.

2. INNOVATION, ENTREPRENEURSHIP AND LOCALIZED KNOWLEDGE

It is often argued that processes of innovation and entrepreneurship are prerequisites for sustainable growth of regions and that knowledge and knowledge creation are prerequisites for innovation and entrepreneurship. However, the conditions for innovation and entrepreneurship vary substantially between functional regions since knowledge and knowledge-creating activities tend to be localised and to cluster in certain regions and not others. Knowledge in the form of firm assets, such as patents, technology employed and research and development (R&D) capacity is concentrated in space to the extent that knowledge-rich firms decide to co-locate in the same region. Knowledge in the form of human capital becomes localised as a result of clustering processes, where concentrations of persons embodying knowledge and creativity attract other knowledge-intensive persons to migrate to such regions and to stay there.
Localised knowledge has a long-term influence on the future development of functional regions, and the knowledge resources of regions normally change slowly. This implies that a functional region with limited knowledge resources can accumulate substantially more knowledge only over an extended period, whereas a knowledge-rich region will tend to be knowledge rich far into the future. Thus, knowledge location patterns are quite invariant over long periods. Large urban functional regions, for example, often have a history that can be measured in centuries. There are two basic factors behind this temporal–spatial phenomenon. The first comprises the infrastructure and the amenities that operate as attractors for both firms and households, and which constitute slowly changing location attributes (Johansson and Karlsson, 1992). The second factor refers to a fundamental externality in the New Economic Geography theory. This externality can be formulated in the following way (Krugman, 1991a; Karlsson and Johansson, 2006):

- Knowledge-intensive labour is attracted to functional regions where knowledge-dependent firms are located.
- Firms with knowledge-dependent activities are attracted to functional regions where knowledge-intensive labour is located.

In some regions more than in others, the externality effects of knowledge and related infrastructure can generate cumulative growth through innovation and entrepreneurship (Acs and Audretsch, 1988; Acs, 2000). At the same time, the growth process is making the co-location of knowledge-rich labour and knowledge-demanding firms and industries resilient to change. The pertinent firms remain in the functional region because of its favourable accessibility to knowledge resources and their use, and the labour force has a corresponding advantage of remaining in a functional region with favourable accessibility to knowledge-handling and knowledge-using job opportunities.

### 3. KNOWLEDGE, INNOVATION AND ENTREPRENEURSHIP

Given the critical role of knowledge and knowledge generation for innovation and entrepreneurship, it is necessary to identify the main types of knowledge used by a firm. The following four components comprise a firm’s primary types of knowledge:

- knowledge about firm routines;
- knowledge about product varieties;
- knowledge about markets and customers’ willingness to pay for different product characteristics; and
- knowledge about how to perform R&D.

Firm routines include techniques and approaches that are applied in production, administration, logistics, distribution, and transaction activities. In this way, the routines (traditionally called ‘production technique’) are a manifestation of the firm’s know-how, where the latter also includes the firm’s capability to combine product attributes of its variety of outputs. For an innovative firm, routines also comprise its procedures to improve – gradually or stepwise – its routines, to develop its product varieties, and to find new markets, that is, its entrepreneurial procedures.
The above considerations are illustrated in Figure 1.1, which emphasises that the know-how about how to develop routines is a combination of the firm’s experiences, the inflow of knowledge from outside the firm, and the firm’s know-why. In the case of a pure start-up, it is instead the entrepreneur’s experience, knowledge network and know-why that is in focus. The most important observation in Figure 1 is that the interaction between firms and entrepreneurs in a functional region can be a major generator of the region’s compound knowledge. Given the structure outlined in the figure, how do economic models describe the influence of knowledge? In orthodox theory, we identify two approaches:

- Knowledge affects (augments or amplifies) the production function of a firm, which implies that it improves the productivity of its inputs (Chambers, 1988).
- Knowledge affects the value ladder of product varieties produced by the firm (Grossman and Helpman, 1991).

In microeconomic models, knowledge is often represented by a factor that influences a firm’s production function. The latter describes how a firm transforms (i) current inputs, (ii) labour, and (iii) physical, human, and organisational capital to outputs. In its most naked form, the production function describes how labour and capital can be used to obtain output. In this case, knowledge is a factor that shifts the productivity of labour and capital upwards. Here, innovation is a very abstract phenomenon and entrepreneurship is unknown.

![Figure 1 Knowledge development of a firm](source: Karlsson and Johansson (2007).)

The microeconomic production function isolates the study of knowledge to a question of the existing routines of established firms. However, it excludes important temporal phenomena by not considering the routines that are available to a firm when improving its production process or to an entrepreneur when considering starting a new firm. When such issues are at the forefront, researchers take a step into evolutionary economics. Attempts to study product and market development and new firm formation take the analyses even further into the territory of industrial dynamics and evolutionary processes (Nelson and Winter, 1982; Dosi et al., 1988).
How is it possible to take the step from the model outlined in Figure 1.1 to a model description of how knowledge affects the economy of a functional region? Obviously, such a step requires heroic efforts. Following a mainstream approach leads to a regional production-function model of the following kind:

\[ Y = F(K, L, N)A \]  
(1.1a)

\[ A = \int \dot{A} \, dt \]  
(1.1b)

\[ \dot{A} = G(\ddot{K}, \ddot{L}, \ddot{N})A \]  
(1.1c)

where \( K, L \) and \( N \) represent capital, labour and human capital employed in the production of an aggregate output, while \( \ddot{K}, \ddot{L} \) and \( \ddot{N} \) represent capital, labour and human capital employed in the production of knowledge (know-how) as signified by \( A \), where \( \dot{A} = dA/dt \) signifies the change of \( A \) per time unit. The three equations also need to be supplemented by a specification of the temporal motion of \( K, L \) and \( N \) as well as of \( \ddot{K}, \ddot{L} \) and \( \ddot{N} \). When equation (1.1c) is excluded and (1.1b) is exogenously given, we have an aggregate regional production model of the Solow type (Solow, 1994). Otherwise, the equation system represents a regional endogenous-growth model (Romer, 1994). In either case, the model outlined tries to capture knowledge interaction and creation of all actors in a functional region into equations (1.1b) and (1.1c). In particular, it disregards all knowledge flows to and from the functional region. Moreover, if one specifies the equation system for individual sectors of a regional economy, one has to consider knowledge flows between sectors (Romer, 1986).

### 4. KNOWLEDGE SOURCES, KNOWLEDGE FLOWS AND KNOWLEDGE CREATION

Innovation and entrepreneurship processes generate new products, new markets, and new routines of innovating firms as well as new firms (Nelson and Winter, 1982). The knowledge employed and applied in innovative and entrepreneurial activities has several sources in each individual case. For firms and entrepreneurs in a functional region, we can identify the following three principal sources of knowledge:

- Knowledge that originates from knowledge created in the functional region, based on R&D efforts in firms, research laboratories and universities – partly carried out as interactive processes in regional innovation systems.
- Knowledge flows between economic actors inside a functional region, due to unintended local diffusion, knowledge interaction including interaction between suppliers and customers, and movement of employees when individuals change employer, and when firms employ individuals who leave education or research organisations.
- Knowledge flows from outside the functional region based on immigration of labour and various forms of interregional interaction, imports and exports, foreign direct investment (FDI) and flows inside each company group’s internal networks (in particular inside multinational companies).

The literature offers a steady progression of methods and frameworks to examine the role of both intra- and inter-regional knowledge flows for innovation and entrepreneurship. These
approaches examine the importance of knowledge flows for a firm’s patenting, R&D efforts, innovation output in the form of novel products or more valuable export products (Gråsjö, 2006) as well as for new firm formation (Karlsson and Nyström, 2006). In these studies, the knowledge-production function has been used as a major workhorse, relating basically the knowledge inputs of firms to their innovative output in most cases measured in terms of patent applications (Varga, 1997; Zucker et al., 1998b). These studies have shown for the US that innovative firms normally are dependent on knowledge generated by local university R&D (Feldman and Audretsch, 1999). The intra-regional knowledge transfer from and exchange with universities may rely on a whole spectrum of mechanisms, such as (i) a flow of newly trained graduates from universities to industry, (ii) technological spillovers of newly created knowledge from universities to industry, (iii) industrial purchases of intellectual property from universities, (iv) university researchers working as R&D consultants or serving on company boards, (v) university researchers leaving universities to work for industry, and (vi) university researchers starting new firms. In addition, universities may create incubators, enterprise centres, and science parks to improve interaction with industry and to facilitate knowledge exchange between industry and university.

Some scholars have used the knowledge production function to discriminate between localised knowledge flows and knowledge exchange in long-distance networks (Varga, 2002; Andersson and Ejermo, 2005). At the same time, many empirical analyses emphasise that the relevant sources are local, based on R&D that takes place in the region hosting the innovative firm that makes use of the R&D results.

Recent studies have also compared a firm’s accessibility to R&D activities in universities and other firms, where accessibility here refers to the possibility of getting in touch with R&D activities, as well as the costs of the associated contacts. A clear outcome is that the accessibility to other firms’ R&D activities has a much stronger impact on the knowledge production than the accessibility to R&D resources in universities (Andersson and Ejermo, 2005; Gråsjö, 2006). In this case, the accessibility measures imply that local knowledge flows are persistently important, whereas long-distance flows have a very small impact – except in one case. Firms that belong to a company group, can utilise the internal networks of their company group to overcome long distances. These company groups are multinational enterprises. Obviously, a multinational enterprise can locate subsidiaries in the proximity of places with specialised excellence, from which novelties can be developed and transferred through the internal networks of such enterprises (Dunning and Narula, 1995).

Evidently, the R&D efforts by an individual firm are a main factor in its knowledge production. However, the R&D resources and R&D efforts of a firm have a second motivation. Firms with a large and active R&D staff also have a large absorptive capacity with regard to external knowledge flows. Pfaffermayr and Bellak (2002) argue that this gives them an advantage in both knowledge absorption and knowledge creation. Recalling that we have concluded that knowledge flows are largely local in nature, it seems natural to conjecture that regions may improve their absorptive capacity as a consequence of hosting firms with such capacities.

Variations in institutional frameworks between functional regions generate potentially strong variations between regions as regards the opportunities for innovation and entrepreneurship. Effective institutions bring down transaction costs and thus costs associated with introducing innovations and establishing new firms. They also play an important role in improving incentives, efficiency, and rates of innovation and entrepreneurship and more generally in the definition and protection of property rights. Variations in institutional frameworks between functional regions create variations in opportunities for knowledge flows and appropriating rents from innovations and entrepreneurship.
5. INNOVATION, ENTREPRENEURSHIP AND CREATIVITY

It has been observed that the last decades of the twentieth century were characterised by a transformation from the traditional industrial society characterised by knowledge-handling activities to a C-society characterised by knowledge development and knowledge handling (Noyelle and Stanback, 1984; Andersson 1985a and b; Hall and Preston, 1988; Castells, 1989; Hall, 1990). Development of new knowledge and the handling and presentation of knowledge and information employ a steadily increasing share of the labour force and have strong spillover effects in innovative and entrepreneurial activities in manufacturing as well as service production. At the same time, the composition of infrastructure is changing. Traditional means of transportation are complemented, and partly replaced by the communication networks created by modern information and telecommunication technologies. Among the traditional means of transportation, road and air traffic have gradually achieved a more dominating role. Overall, access to material and non-material networks are becoming more critical for regional competitiveness.

The major driving force behind the observed transformation has been creative activities in a broad sense, involving not only the creation of new knowledge but also the creation of new goods and services, new firms, new artistic expressions and so on. With the emergence of the ‘C-society’, the resource base in developed economies is no longer natural resources, energy, and so on, but human capital and assets evolving through creative endeavours. However, a strong resource base in terms of human capital and non-material assets is not enough for knowledge generation, innovation and entrepreneurship to flourish. Rich import networks and a diversified flow of import products is also critical, since novelties from the world economy are important inputs in all creative processes.

During the transformation process in recent decades, many traditional industrial regions have lost their previous comparative advantages and have been forced to try to restructure to regain prosperity. Winners in the process have been regions that have been able to preserve and upgrade an existing creative milieu or to create a new one. Andersson (1985a) summarises the characteristics of creative milieus. To be creative, a regional economic milieu must be large scale but still culturally versatile, rich with profound original knowledge and competence, and characterised by good communication internally and externally for generating potentially synergetic situations (Andersson, 1985c). It must also contain a specific set of relationships of production based on a social organisation that by and large shares a work culture and instrumental goals aimed at generating new knowledge, new processes and new products (Castells, 1989). Since innovation according to Joseph Schumpeter is the result of novelty by combination, a region to be a creative milieu must also contain a large enough supply of creative individuals and teams of creative individuals to generate such combinations. This aspect has been emphasised by Florida (2002, 2005a and b) who recognises the critical role of talented individuals. This implies that the potential of different functional regions to generate innovations will be influenced by the location preferences of the individuals belonging to the ‘creative class’.

Creative regions can also be characterised as learning regions (see Morgan, 1997) reflecting the increasing recognition of the role of knowledge and learning as a catalyst for economic development (Knight, 1995; Cooke and Morgan, 1998). The fundamental idea here is that the competitiveness of a region is directly influenced by its ability to rapidly generate, access, understand and transform relevant knowledge into learning (Keane and Allison, 1999). The overall concept of a learning economy recognises knowledge as the most fundamental resource in the ‘C-society’ and learning therefore as the most fundamental process (Lundvall
and Johnson, 1994). Of particular importance is the degree of ‘collective learning’, which connotes a broad notion of the capacity of a particular regional creative milieu to generate or facilitate innovative and entrepreneurial behaviour by the economic agents who are members of that milieu (Camagni, 1991).

Learning regions function as collectors and repositories of knowledge and ideas, and provide the underlying environment or knowledge infrastructure that facilitates the flow and exchange of knowledge and ideas (Andersson, 1985a; Florida, 1995; Jin and Stough, 1998). The knowledge infrastructure is critical for the transformation of knowledge into learning. It consists of two major parts: (i) the physical transport, communication and interaction infrastructure, which connects nodes internally as well as with other nodes and which provides arenas for human interaction, and (ii) the knowledge networks with universities, research institutes, knowledge-intensive firms, and other centres of learning but also knowledge-generating and knowledge-handling individuals as their major nodes. The importance of the tangible infrastructure cannot be overstated in this context, since it provides accessibility to knowledge locally, intra-regionally and inter-regionally (Karlsson and Manduchi, 2001).

The comparative advantages of learning regions are based upon their capacity to generate new ideas, knowledge creation, organisational learning, and continuous improvements. Their transportation and communication infrastructure including electronic connections is globally oriented as well as providing high intra-regional accessibility to maximise knowledge flows and knowledge exchange. The human infrastructure in learning regions is based on knowledge workers, continuous improvements of human resources and continuous education and training. Their industrial governance system is based upon network organisations with mutually dependent relationships and a flexible regulatory framework. They seem to be characterised by institutional thickness (Indergaard, 1997) with a high level of interaction based on relationships of trust and reciprocity (Keeble and Lawson, 1998), and with a mutual awareness of a common purpose (Keane and Allison, 1999). At the same time, the institutional setting should not be ‘too thick’ since this would bring rigidities hindering new combinations.

A substantial part of the production in learning regions is knowledge based, with a recurrent creation of new knowledge as the main source of value and with a synthesis combining innovation, entrepreneurship, and production. Networks between firms in multi-firm companies and supplier–customer networks are critical sources that provide ideas for innovation. In particular, it is the existing and often larger firms that engage in the production of knowledge as an input for their innovation processes. Thus, these firms may outsource innovation activities to external firms including subsidiaries, while orchestrating such interaction distributes innovation efforts. The possibility of turning internal and accessible external knowledge into innovations depends on the capacity of existing firms in a region to appropriate existing learning opportunities through both own R&D and internal learning, and also by the systematic absorption of the specific knowledge externalities available in the regional creative milieu (Antonelli, 1998). However, knowledge often spills over for possible exploitation by economic agents other than those who created it. Learning regions offer economic agents better conditions than other regions to discover, evaluating, and exploit opportunities emerging as a result of knowledge spillovers through entrepreneurial actions.

Maillat and Kebir (2001) take the discussion of learning regions one step further by highlighting the processes that turn a region into a learning region. They claim that one must give the learning concept a dynamic substance. For them, learning is a process of acquisition and transformation of knowledge, which allows for permanent adaptation in the face of the uncertainty of the environment. They characterise the learning region as a dynamic and evolving region. It is dynamic because each economic actor, be it an individual, a firm, a
public organisation or a network, is in continuous interaction (directly or indirectly) with its
environment. It is evolving because each actor in the region participates in sequences of
ongoing experiments. The learning region is also characterised by three types of ongoing
processes: (i) a process of territorial implementation of innovation, (ii) a process of
territorialisation of actors, and (iii) complex learning processes. These processes occur not
only within the different regions, that is, actors interacting with each other within a region, but
also through relationships that each region fosters with other regions, that is, through cross-
border interaction of actors.

6. INNOVATION, ENTREPRENEURSHIP AND
SIZE OF FUNCTIONAL REGIONS

There are very substantial variations in the opportunities for innovations and entrepreneurship
in functional regions of various sizes due to the variation in their demand and supply
conditions. Regional variations in demand conditions, in terms of regional market potential
and regional demand for new goods and services, generate spatial variations in opportunities
for innovation and entrepreneurship. There is also a strong variation between functional
regions to the extent that they offer opportunities for individual economic agents to discover,
create and exploit innovations and new firms due to variations in the knowledge base,
information supply, industrial structure, company structure, infrastructure supply, institutions,
business climate, and so on. Conditions that can generate potentially synergetic situations and
support for learning are mostly available in large functional regions, i.e. metropolitan regions.

The best opportunities for innovations and entrepreneurial initiatives are offered by
functional regions with a large home market and high access to markets in other regions, that
is, large functional urban regions. Economic agents engaging in innovation and
entrepreneurship in large functional regions may take advantage of the close proximity to
concentrations of (potential) customers, that is, purchasing power, which of course could be
and often are other firms. Under certain conditions, new firms may take market shares from
incumbents if they locate near them (Hotelling, 1929). Admittedly, this gain may be short-
lived if further new firms enter, or if incumbents in the region react to this unwanted
competition. On the other hand, innovators and entrepreneurs may suffer less from the
proximity of similar firms when competition in the product market is imperfect, such that
firms supply differentiated products (Fujita and Thisse, 2002).

A third reason why large functional regions bring advantages to innovators and
entrepreneurs may be more long term. In a large region, they will generally be better exposed
to customers. Searching is costly for the customer who, ceteris paribus, will prefer to
minimise search costs by purchasing in areas of concentrated supply. This is particularly
relevant in markets with discerning potential customers with specific requirements, who wish
to search before purchasing. This applies to consumers but probably even more to other
innovative firms that have specific requirements as regards input goods and services.
Transaction costs, and in particular search costs for customers, suppliers, services and
knowledge are lower in larger functional regions (Quigley, 1998).

A fourth advantage offered by large functional regions is the positive information
externalities in such regions, through which economic agents receive signals about the
strength of regional demand by observing established suppliers’ successful trade. There are
generally large potentials for production knowledge to spill over in large functional regions,
not least because large regions are generally dense regions. Such observations also inform
about varieties of existing goods and services, and can of course trigger the development of
new varieties. The fundamental role of large functional regions in the creative process
depends in particular upon their role as communication centres due to their more developed physical infrastructure. They are centres of international communication in culture, business, politics and science. Actually, large functional urban regions are each a nucleus of numerous networks ranging from the local to the global (Nijkamp, 2003) and offer network thickness, which tends to encourage innovation and entrepreneurship, since involvement in such networks makes it easier to externalise some of the risks involved (Shapero, 1984). They also offer good opportunities to develop closely knit intra-regional communication networks within as well as between sectors of society, by offering various interaction arenas. Economies of information flows (Acs, et al., 1992) on both the demand and the supply side are greater in large functional regions than in small ones.

One important reason why creative activities are concentrated in large functional regions is that these regions offer physical proximity, which facilitates the integration of multidisciplinary knowledge that is tacit and therefore ‘person embodied’ rather than ‘information embodied’ as well as allowing the rapid decision-making needed to cope with uncertainty (cf., Patel and Pavitt, 1991). Due to urbanisation economies, these regions also offer diversity, that is, economies of scope, in information, skills, knowledge, competence, producer services and other inputs, is crucial in creative, innovative and entrepreneurial processes. This diversity advantage is fundamental since these processes are critically dependent upon knowledge, which is complex and perhaps tacit in nature (Jaffe, et al., 1993). This advantage includes access to a large pool of well-educated and specialised labour (Marshall, 1920), particularly specialised workers in accounting, law, finance, advertising and various technical fields. This reduces the costs for innovation and for starting up and expanding new businesses (Krugman, 1993). Furthermore, densely populated agglomerations are conducive to a greater provision of non-traded inputs, since their service infrastructure is more developed. Such inputs are provided both in greater variety and at lower costs in large functional regions (Krugman, 1991b and c).

Generally speaking, the larger and richer the functional region, the larger the number of potential innovators and entrepreneurs, since economic agents in such regions are better educated, have more varied work experience, and so on. We may even assume that large and rich functional regions offer increasing returns in the acquisition of innovative and entrepreneurial skills due to more effective and numerous interactions in denser areas (Glaeser, 1999; Desmet, 2000).

The implications of the above discussion are far-reaching. Since larger functional regions afford larger opportunities and higher capacity for innovation and entrepreneurship and a higher probability of successful innovation and entrepreneurship, these regions will experience a long-term build up of innovative and entrepreneurial knowledge. This will stimulate future innovation and entrepreneurship. Furthermore, innovators and entrepreneurs are change agents who also shape regional economic environments and institutions. They develop resources and relationships that further their own interests as well as the interests of potential innovators and entrepreneurs, through the creation of a positive local environment for innovation and entrepreneurship (Feldman, 2001). Good conditions for innovation and entrepreneurship in large functional regions stimulate potential innovators and entrepreneurs, often well-educated people, in smaller regions to move to larger regions. When more potential innovators and entrepreneurs gather in large functional regions, conditions for innovation and entrepreneurship improve due to increased supply and increased availability of relevant knowledge. This will further induce innovation and entrepreneurship as well as further in-migration of potential innovators and entrepreneurs from smaller regions. In this sense the spatial behaviour of potential innovators and entrepreneurs generates a dynamic cumulative spatial concentration process.
However, the effects of innovation and entrepreneurship go much further, since they involve the introduction of new products and new processes in the market. Accordingly, they provide a major challenge to incumbent firms and encourage them to improve product quality and services, or to reduce prices or go out of business. This implies that innovation and entrepreneurship play a fundamental role in the renewal of the economies of functional regions by strengthening competition and initiating competitive processes that often lead to the creative destruction of existing modes of production.

7. CONCLUSIONS

The purpose of this paper is to discuss the role of entrepreneurship and innovations for economic development in functional regions and in doing that highlighting the different conditions offered for entrepreneurship and innovations in functional regions of various sizes. A major claim in this paper is that the conditions for entrepreneurship and innovations vary substantially between functional regions, since the necessary knowledge resources tend to be localised and to cluster in certain regions and not others. One basic reason is that knowledge-intensive labour is attracted to regions where knowledge-dependent firms are located and vice versa. Knowledge is central since it both augments the production function of firms and affects the value ladder of product varieties of firms. The knowledge used by firms do come from its own R&D activities, it flows and spills over from other R&D performing agents and its flows from outside the region via immigration of labour and flows of imports of knowledge and innovations. However, knowledge by itself is not enough for entrepreneurship and innovations to emerge. There is also a need for a creative element which bridges the demands of customers with the potentials provided by available knowledge. Functional regions with a high capacity to generate new ideas, create knowledge, organisational learning and innovations are characterised as learning regions. There are many reasons why the best conditions for learning and thus for entrepreneurship and innovations are offered by large functional regions. They offer a large market potential and a superior accessibility to knowledge and knowledge resources. Thus, creative activities tend to be concentrated in large functional regions and as a result these regions will further develop their creative capabilities due to an accumulation of innovative and entrepreneurial knowledge. This strong tendency for creative, entrepreneurial and innovative activities to cluster in large functional regions opens up interesting and critical questions about how to develop medium-sized and small functional regions in a knowledge society but that is an issue for another paper.

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