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# PAPERS on Economics & Evolution



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# 0907

**Entrepreneurship, Evolution  
and Geography**

**by**

**Erik Stam**

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# Entrepreneurship, Evolution and Geography

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## Introduction

Entrepreneurship is a fundamental driver of economic evolution. It is also a distinctly spatially uneven process, and thus an important explanation of the uneven economic development of regions and nations. Not surprisingly, entrepreneurship is a key element of evolutionary economics (Schumpeter 1934; Witt 1998; Grebel et al. 2003; Metcalfe 2004; Grebel 2007) and has been recognized as an important element in explaining (regional) economic development (Acs and Armington 2004; Audretsch et al. 2006; Fritsch 2008). This means that the explanation of regional variations in entrepreneurship has also become an important issue. Even more so because there are pronounced differences within and between nations in rates of entrepreneurship and in their determinants (Bosma and Schutjens 2008), and these differences tend to be persistent over time, reflecting path dependence in industry structure (Brenner and Fornahl 2008), institutions (Casper 2007) and culture (Saxenian 1994) that vary widely across regions and countries, but are relatively inert over time. Introducing entrepreneurship into evolutionary economic geography means that the traditional focus on firms is complemented with a focus on individuals.

This paper is an inquiry into the role of entrepreneurship in evolutionary economic geography. The focus is on how and why entrepreneurship is a distinctly spatially uneven process. We will start with a discussion on the role of entrepreneurship in the theory of economic evolution. Next, we will review the empirical literature on the geography of entrepreneurship. The paper concludes with a discussion of a future agenda for the study of entrepreneurship within evolutionary economic geography.

## Entrepreneurship and economic evolution

‘Newcomers’ to the economy have an important role to play in the evolution of economic systems. According to Schumpeter (1942: 83) “The fundamental impulse that sets and keeps the capitalist engine in motion comes from the newcomers’ goods, the new methods of production or transportation, the new markets, the new forms of industrial organisation that capitalist enterprise creates. ... [This is a] process of industrial mutation – if I may use that biological term – that incessantly revolutionises the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism.” By creating new variations (products, processes, business models) in the economy, these innovative new firms compete with incumbent firms, which force the latter to improve or change their production, sanctioned by liquidation if this is not done successfully (Schumpeter 1934; 1942). The creation of this variation is unevenly distributed over space. Although relatively inert, this spatial distribution of variety creation itself changes over time. These new variations are thus created somewhere, but are not diffused automatically to all places and applications in which they might be of value. A less heroic, but perhaps not less important role is played by entrepreneurs in this diffusion of new variations: they fill the gaps in the market (Kirzner 1973; 1997). Introducing existing products and practices to new contexts – via

processes of generalization, differentiation, or reciprocation (see Nooteboom 2008) – can be a truly entrepreneurial effort that might even lead to radical innovations. Variety creation and diffusion are two important roles played by the entrepreneur in economic dynamics. For example, the formation of new technology based firms might serve the purpose of creating new – technology intensive - products or of diffusing (the use of) new technologies in society.

Variation and diffusion also feed each other (cf. Nooteboom 2008): the pursuit of entrepreneurial opportunities feeds further opportunities (Holcombe 2007). First, any change by one entrepreneur alters the economic environment and provides opportunities for additional adjustments by other entrepreneurs. Second, entrepreneurial activity is likely to create wealth and in that way increases the extent of the market. Third, the creation of market niches that did not previously exist provides opportunities for new entrepreneurs to enter and expand this market niche. Entrepreneurial opportunities come into being because of prior acts of entrepreneurship (cf. Metcalfe's (2002) "growth of knowledge"): "Bill Gates could not have made his fortune had not Steve Jobs seen the opportunity to build and sell computers, and Steve Jobs could not have built a personal computer had not Gordon Moore invented the microprocessor" (Holcombe 2007: 61).

Next to variation and diffusion, selection plays an important role in entrepreneurship, reflected in the fact that most new firms do not survive for a long time, and that even a smaller portion (often less than one out of ten start-ups) grows to some extent (Reynolds and White 1997; Stam et al. 2008). Selection is generated by the decisions of external resource holders to allocate their resources among these firms (Aldrich 1999; Baum and Silverman 2004). New firm formation is affected by different selection environments. Most directly there is competition in product-markets: a lack of competition might indicate an opportunity (a gap to be filled) and a constraint (with too high entry barriers). Fierce competition forces firms to produce and sell efficiently, in order to survive. For new firms that need to reach a substantial size, selection in the capital and labour market are also important. They need to attract finance and human resources in competition with other organizations that need these resources in face of limited supply. Competition is often a very local process: more distant firms are less likely to compete for the same pool of human resources or product-markets than firms in proximity (Cattani et al. 2003; Baum and Mezias 1992; Sorenson and Audia 2000).

Historically, the literature has often explained entrepreneurship as either the product of environments (like provision of venture capital, growing demand) or of personal attributes (like risk-taking propensity, need for achievement). Individuals are heterogeneously endowed with skills, knowledge, attitudes and preferences (values) which drive their motives and behaviour (Simon 1957; McFadden 2001). Environments are heterogeneously endowed with knowledge, institutions, resources and demand for products. The entrepreneurial process depends on entrepreneurial opportunities in the environment and enterprising individuals that identify and exploit these opportunities. When individuals identify an opportunity, they do not react automatically with establishing a new firm (assuming that they have the intention to start one): new firms are created with a sequence of processes like creating a legal entity, product development, financing (Carter et al. 1996). Given prospects of employment, education, and other circumstances differ across individuals, the population is heterogeneous with different individuals facing different opportunity costs when acting to exploit an opportunity they recognized. Entrepreneurship is the result of the interaction between individual attributes and the surrounding environment. This means that entrepreneurs are neither the lonely heroes that change the economy on their own, nor that they are determined by their environment: just like any other individual they most often reproduce their structural conditions, but they are entrepreneurial because they also transform these structures. The latter echoes the Schumpeterian view of entrepreneurs as the executors of transformative new combinations, and involves the pursuit of entrepreneurial opportunities, defined as "ideas, beliefs and actions that enable the creation of future goods and services in the absence of current markets for them" (Sarasvathy et al. 2003: 142).<sup>1</sup> A working definition of entrepreneurship in line with this view is "the introduction of new economic activity by an individual that leads to change in the marketplace" (see Stam 2008). This new activity

can be perceived in reality as a new good or service that is produced by or for the entrepreneur, and that is valued by consumers who pay a price for its property rights. This excludes non-market activities (i.e. no price mechanism and property rights involved) and mere changes of contract (i.e. no new economic activities involved). Let us give three examples of what entrepreneurship is not according to this definition (and separating it from much everyday usage of the term). First, the shift from employment into self-employment by an individual does involve a change in the marketplace, but not an introduction of new economic activity. Second, the creation and introduction of a new product in a concerted effort by a large corporation that involves exchangeable individuals also does not count as entrepreneurship. Third, the creation and execution of a new terrorist strategy in which airplanes are used as missiles (9-11 attack), involves new economic activities by a distinct group of individuals who might not be interchangeable, but does not lead to an exchange of property rights.

From a theoretical perspective, an inquiry into the role of entrepreneurship in evolutionary economic geography builds on insights from evolutionary economics, cognitive theories of innovation, social network approaches, and organizational ecology. These fields reveal large overlaps in the processes they study.<sup>2</sup>

Within evolutionary economics (individual and collective) learning processes, inheritance of routines and feedback effects play an important role. In evolutionary economics the variance in the performance of firms is explained by heterogeneity in routines (Nelson and Winter 1982; Hodgson and Knudsen 2004).<sup>3</sup> Routines can be understood as organizational skills, which cannot be reduced to the sum of individual skills, i.e. they are a collective property.<sup>4</sup> However, it is still unclear what the role of individual level skills and knowledge (an individual property) is in relation to organizational routines (a collective property). We will get back to this issue in the final section of this paper. The replication of routines takes place between firms (as carriers of routines) through various mechanisms, of which one is the creation of a firm by an employee (Klepper 2002; 2007; Klepper and Sleeper 2005) through which routines (and the knowledge embedded in them) are transferred from the parent to the newly created firm. Next to the emphasis on the replication of routines, evolutionary economics' conceptualization of economic evolution as the emergence and dissemination of novelty (Witt 2003) moves the entrepreneur as a creator and disseminator of novelty in the economy centre stage. The emergence of novelty creates variety in any evolving system, but the generation of novelty requires heterogeneous elements as inputs to the recombination process underlying it (Witt 2004). This brings us to cognitive theories.

Cognitive theories of innovation emphasise that innovation is a product of interaction between actors that have sufficiently different knowledge in order to make transformative (Schumpeterian) new combinations, but are still sufficiently proximate in a cognitive sense in order to be able to communicate at all (Nooteboom 2000). On the micro level these innovations are most likely to be realized by spin-off firms pursuing opportunities that are based on the existing knowledge base of the parent firm, but sufficiently different to exploit it outside the parent organisation. Empirical studies have shown that industries like instruments manufacturers (Audia et al. 2006) and automobiles (Carroll et al. 1996; Klepper 2002; Boschma and Wenting 2007) have emerged in this way: the successful early entrants in the automobile industry came from related bicycle producers, carriage builders, and engine manufacturers, while the successful early entrants in the instrumentation industry came for example from machine, defence, and chemicals industries (Audia et al. 2006).

Organizational ecology studies populations of organizations, focusing on how they change over time, especially through demographic processes of selective replacement – organizational founding and mortality (Carroll and Khessina 2005). The evolutionary triad of variation, heredity and selection is central in the organizational ecology approach. Organizational foundings are predicted with notions like density dependence, structural inertia, niche width, and resource partitioning (see Carroll and Hannan, 2000). Organizational density is driven by organizational foundings and affects competition and legitimacy of a particular organizational form. Organizational inertia and imprinting are important mechanisms of retention. In this field new firms are often analysed as organizational products (Freeman 1986; Audia and Rider 2006; Audia et al. 2006).

Finally, network studies emphasize the role of information acquisition and resource mobilization via social networks in the behaviour of individuals and groups. Key issues related to entrepreneurship are processes of opportunity identification and resource mobilization (Sorenson 2003; Stuart and Sorenson 2007). These literatures all take into account the role of entrepreneurship in creating something new, which is somehow related to the past, and is affected by and affects its context.

### **Regional conditions of entrepreneurship**

Entrepreneurs are hardly lone individuals who rely primarily on their extraordinary efforts and talents to overcome the difficulties inherent in the formation of a new firm. The process of starting a new firm is eminently social, as information and resources are to a large extent acquired via the personal networks of the (nascent) entrepreneur. For nascent entrepreneurs the focal choice is what kind of firm to start given their location, not so much choosing a location for a given firm (Stam 2007). The social ties of the potential entrepreneurs are likely to be localized, and induce entrepreneurs to start their firm in close proximity to their homes and to their current employers (Cooper and Folta 2000; Sorenson 2003; Stam 2007; Parwada 2008). It is a stylized fact that entrepreneurs start their firm in the region where they live and/or work. The fraction of entrepreneurs working in the region where they were born is significantly higher than the corresponding fraction for dependent workers (Michelacci and Silva 2007). A study of Portuguese manufacturing firms found that entrepreneurs were willing to accept labour costs three times higher than in alternative locations to locate the new business in their current region (Figueiredo et al. 2002).

There are several reasons for the locational inertia of entrepreneurs. First, they can utilize their existing (local) network to seek partners, employees, suppliers, customers, advisors and investors (Zander 2004; Michelacci and Silva 2007). This decreases search costs, but it also permits them to build upon credibility and trust developed in past relationships. The behavioral matrix of Pred (1967) is relevant here, as locational inertia can also be explained by imperfect information about alternative locations and/or limited cognitive abilities to process all information available (cf. Simon's (1957) bounded rationality). Second, more normative motivations might be at play here, as some relationships involve more than rational instrumental motivations, and continuing these relationships might only be possible when the entrepreneur stays within the region. Dahl and Sorenson (2009) conclude in their empirical study of Danish entrepreneurs, that entrepreneurs appear to value proximity to family and friends not for the help that those connections might offer to their ventures but for emotional reasons. Third, they can start on a part-time basis (often being home-based) and delay full-time commitment until the venture seems sufficiently promising (part-time entry as a real option strategy: see Wennberg et al. 2007). Third, a spouse can keep a job so that income continues to flow to the family; other aspects of a founder's life can remain the same (Hanson 2003). The full energies of the entrepreneur can then be devoted to start-up.

Earlier in this paper it has been said that entrepreneurship is the result of the interaction between individual attributes and the surrounding environment. For explaining the spatial distributions of entrepreneurship, one should thus look at spatial aspects of this interaction. With geographical we mainly refer to characteristics of particular places and spatial distance between particular actors. We can start the explanation with the availability of (potential) entrepreneurs in particular places. Several perspectives are useful here: the nature and number of organizations in a region, the regional culture, and the labour market structure in a region. Key elements are the resources, abilities and preferences of individuals. The key question is why in a given (opportunity) environment some individuals are more likely to start a firm than in another environment: for example due to their willingness to incur risk, preference for autonomy and self-direction, specific human capital and experience. One important underlying factor can be found in generational effects: having an entrepreneurial family background strengthens the probability of entering self-employment. Intergenerational transmission of self-employment is an explanation for spatial differences in self-employment (Niittykangas and Tervo 2005; Vaillant and Lafuente 2007).

Another starting point represents the opportunities for entrepreneurship. From this point of view, individuals in particular environments are more likely to be entrepreneurs because the availability of opportunities encourages their exploitation by starting a firm. The sources of opportunities can be manifold: for example a growing purchasing power in the region, technological change, regulatory change.

Historical processes produce uneven spatial economic patterns, of both the characteristics of individuals and the ‘availability’ of opportunities, that condition but do not determine economic behaviour (Boschma and Frenken 2007), of which entrepreneurship is a special class. In the following sections we will review the empirical literature that relates to entrepreneurship, evolution and geography.

#### *Entrepreneurship as an organizational product*

Although some individuals become successful entrepreneurs without related prior experience, they are the exception rather than the rule. Entrepreneurs are often organizational products, i.e. they spin-off a firm from their previous employer (Audia and Rider 2005, 2006; Klepper 2001). Many entrepreneurs are characterized by ‘sectoral inertia’, i.e. they start their firm in an industry with which they already were familiar (Johnson and Cathcart 1979; Cross 1981; Storey 1982; Lloyd and Mason 1984; Vivarelli 1991). Far from the universal choice, entrepreneurial action is relatively constrained: instead of looking around to seek the most profitable opportunity, the potential entrepreneur concentrates his attention on a familiar sector (Vivarelli 1991). A person working in an industry is more likely to identify a market gap than a person without any industry experience (O’Farrell and Crouchly 1984), irrespective of the degree of industry competition and growth prospects (Storey 1982).

This prior experience (Shane 2000) and personal networks are likely to be acquired during the entrepreneur’s career in existing organizations (Agarwal et al. 2004; Gompers et al. 2005; Klepper 2001). This explains why the nature and number of organizations in a region are important determinants of entrepreneurship in a region.

Empirical research has shown that regions dominated by small and/or young firms have relatively high new firm formation rates (Johnson and Cathcart, 1979; Reynolds et al. 1994; Mason 1991; Audretsch and Fritsch 1994; Mueller 2006; Sørensen 2007). This stylised fact may be caused by several mechanisms: experiential learning, vicarious learning, competition, and entry barriers. The latter three mechanisms will be discussed in the section on industry structure. In this section we will discuss experiential learning as well as vicarious learning (peer effects). The greater the proportion of an industry’s labour force with direct experience of working in smaller firms, the more widespread the propensity for self-employment and hence the greater the propensity to start a new firm. Industries dominated by large plants would be expected to perform poorly as incubators of new business founders (Gudgin 1978: 211-12; Johnson and Cathcart 1979). Especially young organizations that were once venture capital-backed, that focused on one segment, and whose growth slowed have high ‘entrepreneurial spawning’ levels (Gompers et al. 2005). Next to direct, experiential learning (learning how to set up and grow a business) peer effects are also important here. A study by Nanda and Sørenson (2008) showed that an individual is more likely to become an entrepreneur if his or her co-workers have been entrepreneurs before. They argue that peers matter in two ways for entrepreneurship: by structuring co-workers’ access to information and resources that help identify entrepreneurial opportunities, and by influencing co-workers’ perceptions about entrepreneurship as a career choice.

Klepper and colleagues (Klepper 2001; 2002; 2006; 2007; Klepper and Simons 2000; Klepper and Sleeper 2005; Buenstorf and Klepper 2009; see also Helfat and Lieberman 2002; Agarwal et al. 2004; Dahl et al. 2003; Buenstorf and Fornahl 2009) have constructed a model in which spin-offs exploit knowledge from their parents. Firms are assumed to differ in terms of their initial competence at time of entry, which shapes long-term performance. This competence is acquired from firms in related industries and prior entrants in the same industry.

The stock of incumbents and firms in related industries in a region determine the entry rate and post-entry performance of firms in this particular industry. The differences in entry by region are not necessarily determined by differential distance to buyers and suppliers, thick labour markets, or to spill-overs between firms (more likely to be within firms, with employees spinning out afterwards). They explain the market conditions conducive to spin-offs, the types of firms that spawn spin-offs, and the relationship of spin-offs to their parents. The model is tested using detailed data on entrants in industries like automobiles (Carroll et al. 1996; Klepper 2002; 2007; Boschma and Wenting 2007), tires (Klepper and Simons 2000a; Buenstorf and Klepper 2009), television receivers (Klepper and Simons 2000b), lasers (Klepper and Sleeper 2005; Buenstorf 2007), semiconductors (Moore and Davis 2001), law firms (Phillips 2002), accounting (Wezel et al. 2006), footwear (Sorenson and Audia 2000), fashion design (Wenting 2008), and software (Buenstorf and Fornahl 2009). Their findings support the basic premise of the model that spin-offs inherit knowledge from their parents that shapes their nature at birth and their survival chances.

#### *Industry structure*

New firm formation across regions can be explained by differences in the regional composition of industries and by differences in one particular industry in specific regions. The latter would indicate that there are context-specific differences affecting entrepreneurship rates, while the former would indicate that the explanation should largely be sought in the specific industry structure of the region. The industry structure of a region affects the overall new firm formation rates in a region, as industries differ in their degree of contestability (entry barriers) and the extent to which entrepreneurial opportunities emerge (e.g. many in business services and few in mining).

Sometimes both the industry structure and the regional context are favourable for new firm formation in a region; this can for example be found in the South-East of the UK, which has both a favourable industry mix (especially construction, service, and finance and related sectors) and favourable local conditions. In contrast, regions like Northern Ireland, Scotland and Wales suffer from a combination of both an unfavourable industry mix and unfavourable local conditions for new firm formation. Often the industry mix component dominates the local conditions component in statistical analyses of determinants of regional firm formation rates (Fotopoulos and Spence 2001).<sup>5</sup>

Several mechanisms related to the industry structure can be at work in a region, that produce something that academics and policymakers like to call a cluster (Martin and Sunley 2003). Two important concepts connected to clusters are localization economies and related variety. The first concept has a long history in the academic literature (Marshall 1890; Hoover 1948; Chinitz 1961; Malmberg and Maskell 2002), while the second one is only recently recognized in evolutionary economics (Frenken et al. 2007) and organizational ecology (Audia et al. 2006).

Localization economies involves agglomeration economies resulting from the concentration of the same or similar activities: e.g. benefits resulting from the local access to a specialized work force or the specialized reputation of a locality, while related variety emphasizes the positive effects (on entrepreneurship, innovation) of the co-presence of different but related industries or organizational populations. Regions that have a concentration of organizations of a certain kind (in a specific industry) tend to generate a relatively large number of new organizations of that same kind. This pattern has been shown for industries in general (Armington and Acs 2002), and for specific industries like footwear (Sorenson and Audia 2000), accounting (Cattani et al. 2003), biotechnology (Stuart and Sorenson 2003), computer workstations (Sorenson 2005), motorcycles (Wezel 2005).

There are several reasons for why industrial clusters foster entrepreneurship (Audia and Rider 2005; Rocha 2004). Clusters provide established relationships and better information about opportunities. They open up niches of specialization due to the low degree of vertical integration. Clusters foster a competitive climate and strong rivalry among firms that impose pressure to innovate due to the presence of close competitors. They provide role models with the presence of other firms that have

“made it” (see Fornahl 2003; Vaillant and Lafuente 2007), and a cultural environment where establishing one’s own business is normal and failure is not a social stigma. Clusters provide access to physical, financial, and commercial infrastructure; easing the spin offs of new companies from existing ones. Especially because potential entrants will know how the local industry functions and have the technical skills to operate in it.

Industry localization may have negative effects on new firm formation: increased concentration and vertical integration raise entry barriers (Beesley and Hamilton 1994). The shift in the direction of the effect of localization on new firm formation might be explained by the life-cycle stage of the industry: in the early stages geographical concentration has positive effects (or is even driven by new firm formation; see Feldman 2001; Feldman and Francis 2003; Feldman et al. 2005), while in late stages (stagnant or even declining markets, and increased relevance of scale economies) the negative effects dominate. Spatial concentrations of activities in mature industries might still have high new firm formation rates (still cognitive effects and low barriers to entry), but high levels of competition (and decreasing demand) lowers the performance of these entrants (Sorenson and Audia 2000). This means that there is still industry localization, but there are no localization economies anymore.

### *Urbanization*

Urban areas have important advantages for entrepreneurship. Population density has been found to positively affect entrepreneurship (Reynolds et al. 1994; Wagner and Sternberg 2004). Some authors have argued that this positive effect of population density (most emphasized in big cities) might be a temporary phenomenon: the resurgence of big cities in the 1990s is connected both to a reduction in the negative social interactions (e.g. crime) and to an increase in positive social interaction (Glaeser and Gottlieb 2006). However, urbanization and its most straightforward indicators population size and density cover many mechanisms, which might have different weights and values in different contexts. This is for example reflected in the large heterogeneity in entrepreneurship rates in world cities (Acs et al. 2008). Advantages stemming from high population density include the relative ease of access to customers as well as the inputs required (capital, labour, suppliers) to produce the goods or services. The classical ‘incubation hypothesis’ in urban economics states that persons aspiring to go into production on a small scale have found themselves less obviously barred by a high cost structure at the centre of the urban area than at the periphery (Hoover and Vernon 1959: 47; Chinitz 1961; Dumais et al. 1997). In addition, cities provide contexts in which serendipitous meetings are more likely to occur than in less densely populated areas (Jacobs 1969); these serendipitous meetings increase the likelihood of new opportunities and collaborations that might trigger the emergence of a new firm. Urban density also improves the likelihood of getting into contact with more skilled individuals in the same or related knowledge domains: learning from these more skilled peers stimulates human capital accumulation in urban environments (Glaeser 1999) and might lead to the creation and recognition of better quality entrepreneurial opportunities. This human capital effect on opportunities is strengthened by the relatively high concentration of universities and research centres in urban areas, that produce new scientific and technological knowledge that has also been recognized as an important source of entrepreneurial opportunities (Audretsch et al. 2006; see also the section on “growth in knowledge”). The risk of starting a business in urban areas is also relatively low due to the abundant employment opportunities, which function as an occupational buffer for the entrepreneur when the firm fails. Urbanized areas are often concentrations of educated individuals with business experience in their early and middle adult years,<sup>6</sup> and in that way they are a source of entrepreneurs (Glaeser 2007). Urban areas have important advantages for the demand for entrepreneurship (especially in retailing), as they contain demand for a rich variety of services and consumer goods (cf. Glaeser et al. 2000; Glaeser 2007). Urbanization positively affects diversification of consumer demand. This latter phenomenon is central in flexible specialization theory (Piore and Sabel 1984), which explains such trends in terms of the breakup of the mass market for standardized goods and services and the consequent emergence of a variety of smaller niche markets capable of exploitation by new or small

businesses. This diversification is, next to urbanization, also directly driven by growth in overall demand.

### *Culture*

Culture is important in the explanation of spatial variation in entrepreneurship via its effect on the attitude and values that people acquire. Social psychologists have claimed that an individual's attitudes and traits are not inherited but are developed in interaction with the social environment. Perceptions about the desirability of becoming an entrepreneur are formed and revised given the set of information available to each person (Lafuente and Salas 1989; Saxenian 1990). Culture is a property of groups, and it seems that especially national (Uhlener and Thurik 2007), and to a lesser degree regional cultures (Davidsson and Wiklund 1997) have significant effects on new firm formation. These cultures can change over time, but they tend to be very persistent (Beugelsdijk 2007).

The existence of a number of entrepreneurs in a region also legitimizes the activities of nascent entrepreneurs (Kristensen 1994). Differences in culture in that way affect the level to which people aspire and think about becoming an entrepreneur, which is an important phase in the process of starting a firm. One example of this is the fear of failure that might deter people from starting a new firm (Arenius and Minniti 2005; Vaillant and Lafuente 2007). Cognitive theories have proposed that individuals acquire information and skills by observation of (entrepreneurial) activities by others, that might trigger and enable their choice for an entrepreneurial career (Forbes 1999; Zander 2004; Minniti 2005).<sup>7</sup>

Distinct local cultures can have effects on different types of entrepreneurship. For example a 'self-employment' and a 'career' life mode have different positive effects on entrepreneurship, while a 'wage-earner' life-mode has a clear negative effect on entrepreneurship (Illeris 1986). In the self-employment life-mode the dominant job-related motivation is to own the means of production and control the production process. This culture is carried over from generation to generation, and is most frequently found in rural areas characterized by independent and self-reliant small-scale farmers, artisans and small business owners. It is rare in areas dominated by large-scale operations. The dominant value in the wage-earner life-mode is the sale of one's labour at the highest possible price in order to maximize the utility of one's leisure time. Such individuals are unlikely to set up new businesses, except when they are 'forced' by unemployment. This life-mode is likely to be most common in regions characterized by a narrow industrial base and dominated by large externally owned firms. Finally, the dominant value of individuals with a career life-mode is the advancement of their career. They are likely to be well-educated and working in large private or public sector organizations. They will start their own businesses if this becomes the best way in which to benefit from their skills, knowledge and expertise. These businesses are often technologically advanced, innovative and with good marketing capabilities. Career mode entrepreneurs are often concentrated in large metropolitan areas and smaller attractive cities (Savage et al. 1988). This career life-mode resembles the life-mode of the so-called creative class to a large extent. The creative class consists of individuals with relatively high levels of creativity in their work. A spatial concentration of creative class has been shown to positively affect new firm formation rates (Van Aalst et al. 2006; Lee et al. 2004; Marlet and Van Woerkens 2007). Indirectly, amenities in regions ('quality-of-place': Florida 2002) affect new firm formation rates, by attracting the creative class.

### *Growth in knowledge*

New knowledge created at universities and research centres generates opportunities for entrepreneurship, especially in high tech industries. Often these organizations are not able to fully recognize and appropriate the ensuing opportunities to commercialize that knowledge. Knowledge workers in these organizations respond to opportunities generated by new knowledge with starting a new firm, and in this way appropriate the expected value of their endowment of knowledge (Acs et al. 2005; Audretsch et al. 2006; Zucker et al. 1998; Feldman 2001; Kirchhoff et al. 2007).<sup>8</sup> Geographic proximity to these sources of new knowledge is an asset, if not a prerequisite, to entrepreneurial firms

in accessing and absorbing spillovers from universities and research centres (Audretsch and Lehmann 2005a,b; Audretsch and Feldman 1996; Audretsch and Stephan 1996; Audretsch et al. 2005). The most relevant spatial scale where these spillovers take place is not clear, as these knowledge spillovers are said to extend up to approximately 10 km (Baldwin et al. 2008), 50 (Anselin et al. 1997), 75 (Varga 1998), 145 miles (Woodward et al. 2006) or even 300 km from their source of origin (Botazzi and Peri 2003). The temporal scale on which these processes take place might also range from a few months to several decades: major breakthrough inventions like the discovery of the DNA were followed by substantial entrepreneurial activity only decades later (and often in other places than the context of invention, Cambridge (UK) in this instance). Another mechanism, the creation of embodied knowledge, via education and learning by doing, also takes multiple years, and possibly at multiple locations.

The degree to which technological change promotes new firm formation (in high tech industries) depends on the institutional environment. The institutional setting affects the nature of technical labour markets, venture capital markets, and the structure of buyer-supplier ties that are highly relevant for the incentive constraints and appropriability constraints acting on incumbent and start-up firms respectively (Chesbrough 1999; Casper 2007). For example institutions enabling a fluid labour market, a well developed venture capital market, and loose buyer-supplier ties allow new firms to rapidly assemble and deploy experienced engineering talent, and move quickly to commercialize advanced technology. Cross-country research has shown that this latter situation can be found in the US, in contrast to Japan (Chesbrough 1999), and cross-regional research found for example that Silicon Valley was much more conducive to new technology based firms than Route 128 (Massachusetts) for similar reasons (Saxenian 1994; Kenney and Von Burg 1999). The institutional environment also affects the opportunity costs involved in leaving a (relatively secure) job at a university or research centre for self-employment (cf. Feldman 2001). The institutional environment thus acts as a mediating factor between investments in the knowledge base of a society and the knowledge spill-overs exploited by entrepreneurs.

### *Financial capital*

Liquidity constraints are an important factor disabling entrepreneurs to realize their business opportunities (Evans and Jovanovic 1989; Holtz-Eakin et al. 1994). This is especially relevant for large new firms that require relatively large-scale investments for their initial activities. Small scale firms can often be financed with bank loans or the support of the entrepreneur's family and friends. The entrepreneur's own housing is shown to be the single most important source of collateral for bank loans (Black et al. 1996). Indirectly, fluctuations in the local housing market could thus affect the availability of financial capital for new firms. New firms that require large-scale investments are more likely to enter the venture capital market. Providers of venture capital not only provide financial capital, but also knowledge of developing a business (in a particular industry). The provision of financial capital in general is more likely to be bounded to national scales, while the provision of venture capital is often constrained to regions (Gibbs 1991; Zook 2002). The supply of venture capital is not distributed evenly across regions. For example the venture capital market in the USA is highly concentrated (both in supply and investments) in the east and west coasts of the country (Sorenson and Stuart 2001; Powell et al. 2002), and in the UK it is highly concentrated in the Southeast, in and around London (Mason and Harrison 1999, 2002; Martin et al. 2005). This uneven regional distribution has also been found in other countries (Martin et al. 2002). Venture capital markets are a relatively recent phenomenon and often co-evolve with other investment intensive industries in particular regions (see Braunerhjelm and Feldman 2006). The uneven regional distribution of venture capital means that in regions far away from these centres entrepreneurs might be discouraged to start capital-intensive firms. The assumption is that spatial proximity may be necessary for the formation of a venture capital relationship and that it makes monitoring of investments easier. Face-to-face contacts between the entrepreneur and the venture capital provider are necessary to identify the value of the new business and the involvement in business affairs by the venture capital provider. These contacts are hard to initiate and sustain over a large distance (Mason and Harrison 2002; Stuart and Sorenson

2001; 2003). Recent evidence shows that most of these contacts cannot easily be maintained over a longer distance via telecommunication: this can be used as a complement to face-to-face contacts, not as a substitute (Fritsch and Schilder 2008).

### Summary and research agenda

In the prior sections we have reviewed the empirical literature that relates to entrepreneurship, evolution and geography. The industry structure of a region revealed to have consistent effects on the prevalence of entrepreneurship in a region. This covers both the nature of the activities as well as the characteristics of the organizations (size and age). Regional and national culture conditions the preference for entrepreneurship. Another important factor for entrepreneurship is the expanding knowledge base of a region, which increases the number of technological inventions to be commercialized by new firms. Urbanization is also likely to affect entrepreneurship, as it generally improves access to resources and increases diversification of demand. Finally, the relatively abundant supply of (venture) capital is likely to lower the barriers to develop a new business, and might lure firms (and employees) to capital rich regions. Even though there is a substantial tradition now on studying the spatial aspects of entrepreneurship, many opportunities for improving insights in this are still not exploited. For example, there are currently much less studies on the dynamics in entrepreneurship and complex systems in regional contexts than relatively static studies on the spatial distribution of entrepreneurship in short periods of time. A few research opportunities are discussed, which deal with the nature and measurement of the phenomenon to be explained (entrepreneurship) and the explanatory mechanisms.

Until now, most empirical studies on entrepreneurship have taken new firm formation or self-employment as indicators of entrepreneurship. The advantage of this is that these indicators are widely available in census data or large scale surveys. The disadvantage is that these indicators are too broad, but also too narrow to capture the pursuit of entrepreneurial opportunities. They are *too broad*, because we know that the majority of founders has no motivation to innovate or grow their firm (Vivarelli 2007; Santarelli and Vivarelli 2007; Stam et al. 2008; Stam and Wennberg 2009). This means that future research should use more specific indicators that better capture the phenomenon that is theorized to have an effect on economic development. Traditional (neo-classical) frameworks have been shown to be relevant to analyse the occupational choice between wage earning and self-employment<sup>9</sup> and the entry of new establishments in general. Neo-classical theories have not been able to deal adequately with the innovation and motivations involved in entrepreneurship (cf. Bianchi and Henrekson 2005). The latter issues are key in evolutionary economics, and thus provide opportunities for evolutionary economic geography. Different types of entrepreneurship require different types of explanations. Let us take two extremes: the self-employed entrepreneur out of necessity and the ambitious and technologically innovative high-growth start-up. High rates of necessity self-employment are positively affected by high levels of unemployment, which is often driven by decreasing levels of general demand, and maturing industries, and is more likely for low skilled young and old individuals.<sup>10</sup> On the other hand, high rates of ambitious and technologically innovative high-growth entrants is stimulated by high levels of investment in knowledge, abundant supply of informal investors and venture capital, fluid labour markets and loose buyer-supplier ties. In addition, these firms are most likely to be started by mid-career highly educated (male) individuals. These two explanatory narratives show that entrepreneurship is affected by a multitude of factors, and that different types of entrepreneurship are driven by different mechanisms.

The traditional indicators are also *too narrow*, because there might be entrepreneurship in existing firms ('intrapreneurship') that escapes most data collection efforts in census data and large scale surveys. This is unfortunate because the effects of these types of entrepreneurship might match or perhaps even overshadow the effects of the majority of independent firms, because intrapreneurs are likely to have much better access to resources, which improves the success chances of their initiatives. They also face a selection environment within their employer's organization that might one the hand

weed out unrealistic market entries, improving the success chance of entrepreneurial initiatives, but on the other hand it might be a too conservative environment, killing off initiatives that might really add value on the long term (but perhaps also cannibalizing the current profit generating activities of the mother firm).<sup>11</sup> In a theoretical perspective, intrapreneurship might be reflected in decisions to set up new product divisions within existing firms, an important element of ‘branching processes’ as described in Frenken and Boschma (2007). This also connects to a Penrosean theory of firm growth by diversification related to the knowledge base of the firm (Penrose 1959; Stam et al. 2006).

This discussion of too broad and too narrow indicators of entrepreneurship makes clear that it does not make sense to talk about *the* geography of entrepreneurship. Different explanatory frameworks are needed to explain different kinds of entrepreneurship. Likewise, existing theoretical frameworks – e.g. organizational ecology, social network, and evolutionary economics – do not provide complete explanations for all kinds of entrepreneurship. In order to improve our insights in the spatial variations of entrepreneurship, we need to specify the type of entrepreneurship that is of importance for the research question at hand, so we can match it with the related theoretical framework and empirical indicators.

The studies reviewed share a quantitative, static and rather deterministic orientation, which is in contrast to a more dynamic orientation that is central in evolutionary approaches.<sup>12</sup> In evolutionary approaches the role of agency and interaction with (evolving) selection environments are emphasized. This agency is affected by and affects several ontological layers, ranging from the cognitive abilities of entrepreneurs to macro-economic and environmental shocks (see Fuller and Moran 2001). Entrepreneurs are agents who are conditioned by, and sometimes change or even initiate, complex adaptive systems. These systems are situated in particular geographic contexts, and emerge, grow and decline over time. Complex systems that are currently well-known because of their high levels of entrepreneurship, for example the high tech clusters in Silicon Valley and Cambridge, are located in regions that were dominated by agriculture and low levels of entrepreneurship some decades ago. The supply of venture capital is created by co-evolutionary processes in which the emergence of entrepreneurial communities strengthen (for example due to serial entrepreneurs that have sold their businesses and reinvest their money in new ventures as business angel or venture capitalist) and is strengthened by the development of a venture capital community. The latter often follows the emergence of a cluster, not the other way around (Feldman and Francis 2003; Orsenigo 2006). In addition, the institutional infrastructure that supports entrepreneurship also often emerges as a product of a critical mass of entrepreneurship in a particular industry or set of related industries. The growth of these industries – by both the indigenous creation of new firms and the attraction of subsidiaries – is then reinforced by this institutional structure (Keeble et al. 1999; Garnsey and Heffernan 2005). These virtuous cycles of development can turn into vicious circles once congestion effects become more strongly and are not offset by the agglomeration economies created in the region. In such a dynamic approach a focus on industry structure is turned into a focus on industrial dynamics. Spatial concentration (or its absence) of an industry is not only an outcome of a process of industrial evolution, but also affects an industry’s further evolution (Boschma and Frenken 2006). This recursive relationship has, at least, three dimensions (Hannan et al., 1995; Stuart and Sorenson, 2003; Boschma and Wenting, 2007; Van Wissen, 2004). First, geographical concentration of industrial activities can generate agglomeration economies fostering start-ups and innovation and, possibly, the birth of a related industry in the region. Second, geographical concentration of firms increases the level of competition and makes exits of firms raise the average fitness of routines. Third, spatial concentration of firms can also affect the opportunities of collective action as such initiatives are more likely to emerge among proximate agents that can more effectively control opportunistic behaviour.

Most studies on entrepreneurship in evolutionary economics have focused on spin-offs, implicitly focusing on producer entrepreneurship. However, there are indications that user-entrepreneurship is also an important category of entrepreneurship (Von Hippel 2005; Shah et al. 2006; Shah and Tripsas 2007). More research on user entrepreneurship is needed, also to acquire better insights into the

implications of this phenomenon from the demand side. For example, many early user start-ups in the windsurfing industry were based in Hawaii and California, because these two states, where wind, wave, and temperature conditions made windsurfing a particularly exciting and enjoyable activity, had many early users (Shah, 2005). User entrepreneurship involves entrepreneurship in user communities, but also innovations resulting from differences in individual perceptions (or imaginations) on the part of consumers. The latter relates to individuals' desires for distinction (an important aspect of the cultural industries, and in fashion (Chai et al. 2007) ) or could emerge out of necessity (to solve particular user problems). Evolutionary economics' focus on the supply side of new variety generation, neglects the question of why consumption will not be satiated (cf. Witt 2001).

Studies on entrepreneurship in (evolutionary) economic geography are dominated by the firm and the industry as units of analysis. This is in contrast with the focus in entrepreneurship studies: the individual (entrepreneur). Traditionally, evolutionary economic geography regards firms as the agents of change (Boschma 2004; Frenken and Boschma 2007), while this paper has shown that entrepreneurs should at least be incorporated as additional change agents, using firms to pursue the opportunities that they have identified. Future studies should think through and analyse how firms emerge and what the role of individuals play in this. Individuals with their own (spatial) biographies, that include their prior knowledge and networks which condition the spatial organization of the activities they initiate with their businesses (cf. Hanson 2003). Evolutionary economics has often made analogies on the level of the firm (routines, organizational capabilities (Nelson and Winter 1982), absorptive capacity (Cohen and Levinthal 1990) ) that have been derived from individual level concepts (skills, memory).<sup>13</sup> Take the examples of skills-organizational capabilities. When an individual starts with efforts to exploit an entrepreneurial opportunity, the nature of this opportunity and the probability of successful exploitation is likely to depend on the prior knowledge (Shane 2000), skills (human capital: Ucbasaran et al. 2006), and networks (Stuart and Sorenson 2007) of the entrepreneur. Once a successful firm has been created, the importance of the prior knowledge and skills of the entrepreneur is likely to be superseded by the organizational capabilities (including the absorptive capacity) of the firm. These organizational capabilities are more than the sum of the skills or its employees: they are emergent properties. It has been assumed that spin-offs directly inherit routines from their parent (Klepper 2006; Dahl and Reichstein 2007), however, this is unlikely as most spin-offs are started by one or a few entrepreneurs, and are thus not started as multi-person organizations that directly inherit or copy the routines from the parent organization. An important empirical question from an entrepreneurship point of view is whether individuals<sup>14</sup> that are able to create a successful firm in one place are also able to create a multi-locational entity that becomes less dependent on their skills, prior knowledge, and to what extent their vision is still driving the development of the firm, for example in overcoming the information distortions that arise in multi-person, multi-locational organizations (cf. Witt 1998). Once external shareholders own (parts) of the firm, the question is what kind of consequences this has on the spatial organization of the firm (cf. Stam 2006; 2007). The decreased ownership share of the founder (or even exit), makes the firm – and its spatial organization - more sensitive to the capital market as a selection environment.

A relatively unexplored element of entrepreneurship is the exit of (young) firms (cf. Wennberg 2009). Firm exit is often regarded as clear consequence of selection on a product market. However, once we take the aspiration levels and job market opportunities of the entrepreneur into account, the story becomes more complex. Entrepreneurs with relatively low aspiration levels may stay on with their firm for a long time, even though its performance may be regarded as sub optimal (Gimeno et al. 1997). On the other hand, individuals with relatively high aspiration levels might decide to close down their business even when it is a viable economic entity, because they can earn a much higher income as a wage earner. These aspiration levels and alternative job markets are likely to be determined by the regional culture and labour market. Until now, we know very little about these mechanisms.

One of the traditional roles of entrepreneurs has been the one of broker between formerly unconnected communities. Bridging two formerly unconnected networks (a so-called structural hole) might provide

information benefits to the broker, who might take an entrepreneurial role when she exploits the opportunities that are provided with this information (Burt 2000). Migrant entrepreneurship emphasizes the spatial aspect of this broker role, especially in the recent literature on Argonauts (Saxenian 2006). More insights into the role of these entrepreneurial migrants in creating and exploiting knowledge flows between particular (place bound) communities in advanced capitalist economies and developing economies is needed, both on the micro-level processes involved, as well as the effects on the innovativeness and development of the connected (and disconnected) communities. This can be a fertile meeting ground for entrepreneurship studies, international business studies, and economic geography (cf. Yeung 2009). More in general, the traditional focus of evolutionary economic geography on advanced capitalist economies has left many opportunities to be pursued for analyzing the spatial aspects of entrepreneurship in transition and emerging economies. This road not taken is even more relevant as recent evidence suggests that entrepreneurship is a more important driver of economic growth in transition and emerging economies than in advanced capitalist economies (Stam et al. 2007).

Entrepreneurship is a phenomenon that has become increasingly important as a driver of economic growth in advanced capitalist economies, but also in transition and emerging economies. Economic geography has already built a tradition in analyzing the spatial distributions of entrepreneurship (focusing on the regional level of analysis), and evolutionary economics has recently (re)discovered entrepreneurship as a key element of industrial dynamics (focusing on the firm and industry level of analysis), while network approaches have proven to be valuable in the explanation of the behaviour of entrepreneurs. If these approaches are combined in a dynamic perspective and also include the very micro level of the entrepreneur, the macro institutional conditions and the levels in between, they will deliver a very powerful approach for understanding wealth creation on multiple levels and multiple time scales.

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## Notes

<sup>1</sup> Here is a straightforward connection to evolutionary economics, defined as ‘that body of economic theory in which the transformation of already existing structures and the emergence and possible spread of novelties are investigated’ (Foss 1994: 21).

<sup>2</sup> See for the overlaps of evolutionary economics and social network theory Sorenson (2003), of organizational ecology and social network theory Aldrich (1999) and Audia et al. (2006), and of organizational ecology and evolutionary economics Boone and Van Witteloostuijn (1995), Geroski (2001) and Van Wissen (2004).

<sup>3</sup> Evolutionary economic geography describes economic development by changes in the time-space distribution of routines (Boschma and Frenken, 2003, 2006). This means that the firm rather than the locality is the unit of analysis. The shift from territory to firm resonates a more general reorientation in economic geography from territorial analysis of endowments or institutions to firm analysis of routines and competencies and their embeddedness in the local and global economy (Maskell, 2001; Boschma, 2004; Wrigley et al., 2005).

<sup>4</sup> The related concept of competences has even been aggregated from the firm to the regional level (Lawson 1999).

<sup>5</sup> Glaeser (2007) for example found that industry mix and demographic composition (age (older), education (skilled) ) are the most important determinants of the heterogeneity in self-employment rates across space.

<sup>6</sup> For individuals the probability of *preferring to be self-employed* is strongly decreasing with age, while the probability of *being self-employed* is strongly increasing with age (Blanchflower et al. 2001).

<sup>7</sup> See also the section on the organizational production of entrepreneurship.

<sup>8</sup> A strong science base is not a sufficient condition for an entrepreneurial region to occur. There are multiple regions where a strong scientific base has failed to spawn entrepreneurship (e.g. Ithaca (Cornell) and New Haven (Yale)). A recent study on new firm formation in the Netherlands (Bosma et al. 2007) also did not find a relation between the presence of a university and high levels of new firm formation. The authors explain this with a general lack of knowledge transfer from universities in the Netherlands.

<sup>9</sup> Most clearly demonstrated in situations of rising unemployment: this lowers the opportunity costs for self-employment, other things equal (Creedy and Johnson 1983; Evans and Leighton 1990).

<sup>10</sup> As self-employment essentially reflects an occupational choice, the numbers of self-employment might be stimulated by changing labour market regulation and fiscal regimes without any structural change of the economy at all: lowering employment protection and increasing income tax for employees are two institutional changes that are likely to lower the opportunity costs of self-employment. This might have indirect effects on more innovative forms of entrepreneurship as this lowers the inertia of incumbents, but also lowers the incentives of incumbents to invest in their human resources.

To some degree, self-employment brings us back to a Coasian framework, as the decision for individual actors comes down to whether they join a firm with an employment contract (hierarchy) or transact as a firm on a market.

<sup>11</sup> The latter situation is likely to give rise to a spin-off firm.

<sup>12</sup> This focus on more static approaches is to some extent explainable by the difficulty of collecting data over longer time spans. There have been more long-term studies in organizational ecology and evolutionary economics, most often based on archival data, but these studies largely focus on single populations/industries, not on whole communities or regions.

<sup>13</sup> The traditional focus within evolutionary economics on the firm level concept of routines, can be complemented with the individual level concept of skills, and the environmental level concept of institutions (see for example the recent discussion on this in Boschma and Frenken 2009).

<sup>14</sup> This might also involve an entrepreneurial team, adding another unit of analysis in between the individual and the multi-person firm organisation.

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