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Spatial aspects of entrepreneurship and innovation

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1 Theoretical background

Entrepreneurship, with product and process innovation as especially important subsets, is at the core of the regional development process. But the term "entrepreneurship" can mean different things, especially in empirical studies of entrepreneurial phenomena. Among theories attempting to treat the topic with more theoretical rigour, there are three classic treatises that have stood the test of time. Joseph Schumpeter's innovation-driven theory of economic development (Schumpeter 1934), which first appeared in German in 1912 (Schumpeter 2006), focuses on disruptive innovations that cause disequilibrating shocks to the economic system as the cause of economic development and as symptomatic of dynamic capitalism. In Schumpeter's narrative, the entrepreneur is a heroic figure who singlehandedly brings about change through the introduction of new combinations of land and labour (with capital treated as a mixture of land and labour). Steve Jobs' innovation of the MacIntosh personal computer and, later, iPhone and Mark Zuckerberg's innovation of Facebook are examples that can illustrate the Schumpeterian theory, but it would be misleading to apply it to the more mundane and quantitatively numerous business start-ups and incremental innovations that are the mainstay of empirical entrepreneurship studies.

Frank Knight (1921) offered the next major work of entrepreneurial theory, where he describes the entrepreneur as anyone who exercises judgment and shoulders non-probabilistic uncertainty (i.e. "Knightian uncertainty") when making future-directed decisions. The key distinction is between the maximizing approach typical of much formal economic theorizing and decision-making that cannot be optimized because the future states of the world cannot be known—not even the number of possible future states can be known. Thus, the entrepreneurs must exercise a non-quantifiable

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type of decision-making for which the most appropriate term is "judgment". Unlike Schumpeter, Knight does not distinguish between entrepreneurial and capitalist functions. The founder of a firm who judges that she can revolutionize the world with the help of a new pathbreaking technology and the venture capitalist who judges that the innovation is a good bet are both entrepreneurs in the Knightian sense—both exercise judgment in the face of Knightian uncertainty.

The final classic treatment is associated with Israel Kirzner (1973) and uses an approach that is more congenial to economists accustomed to general equilibrium theory. In fact, we can think of Kirznerian entrepreneurship as a complement to the maximizing framework of neoclassical economics. Entrepreneurship arises because of economic agents' imperfect information of interlocal and intertemporal price differences. Only entrepreneurs who are *alert* to such differences reap entrepreneurial profits. These profits are costless at the point of entrepreneurial discovery, and yet at the same time those entrepreneurs with location-specific or industry-specific knowledge are more likely to activate their alertness *and* thus take advantage of profitable opportunities to sell outputs at a higher price than the input costs (Andersson 2005). Like Schumpeter before him, Kirzner (ibid.) makes a strict separation between the entrepreneurial and capitalist functions. Individuals only earn profits in their role as "pure entrepreneurs".

While all three classic theories are pathbreaking theoretical achievements, they are not all equally serviceable as the theoretical basis for empirical studies. Schumpeter's theory confines itself to innovations that revolutionize a key industry such as the automobile or assembly-line production, while Kirzner's assumes exogenously given consumer preferences, technology, resource availability, and property rights. Andersson (2017) argues that only Knightian entrepreneurship theory provides a useful theoretical foundation of the subject matter of most empirical entrepreneurship research. The actions of disruptive and incremental innovators, new business start-ups, venture capitalists, and business angels all conform to the notion that the entrepreneur is a profit-seeking agent who exercises non-maximizing judgment under conditions of Knightian uncertainty.

The main weakness of the Knightian approach is its silence on the systemic features associated with either equilibration—as in Kirzner—or disequilibration—as in Schumpeter. Andersson (ibid.) therefore complements Knightian theory with Roger Koppl's notion of *system constraints* (Koppl 2002; Koppl and Whitman 2004). Economic action will be equilibrating along the lines of Kirznerian theory if competition is atomistic and market institutions are stable. If we are dealing with a monopoly, as is the case with non-incremental innovations, or if *Big Players* have the power to engage in discretionary institutional disruptions, systemic effects become uncertain, and Schumpeterian disequilibration becomes the most likely outcome.

The empirical articles in this special issue are all examples of analyses of processes that illustrate the spatial and temporal effects of numerous uncertainty-bearing judgments of individual entrepreneurs. The explicit theoretical frameworks are different, but there is an underlying unity in the sense that what the authors observe are different from the profit-maximizing or utility-maximizing behaviours that are the mainstay of analyses that make use of comparative statics.

While all contributors take a spatial perspective, they make use of several different research programmes in economics. Banczyk and co-authors adopt the psychological assumptions of behavioural economics, while Hårsman et al. adopt a more mainstream approach. Andersson and Johansson, meanwhile, extend the conventional production function approach by introducing spatial factors and intra-firm interactivity. Gordon and Cho's treatment of supply chains of ideas and products in space makes use of a Hayekian spontaneous-order understanding of the economy. Desmarchelier and Zhang use an explicitly evolutionary treatment of the economy, while the final paper by Lai and co-authors applies Coasean and other new institutional theories to illuminate spatially situated entrepreneurial processes.

2 Entrepreneurship in space

Entrepreneurship and innovation are fundamental drivers of economic evolution and prosperity (Metcalfe 2004), yet they are highly concentrated in certain locations, which is an important explanation for the uneven economic development of regions and nations (Acs and Armington 2004; Bosma and Schutjens 2008). This spatial difference tends to be persistent over time, reflecting path dependence in industry structure (Chinitz 1961; Glaeser et al. 2015), institutions (Casper 2007), and culture (Saxenian 1994).

To account for the geographical concentration of economic activities in general, studies from economic geography and urban economics have pointed to reduced transport costs, a larger labour pool, and knowledge spillovers as the main explanations for spatial differences (Marshall 1890; Jacobs 1969; Krugman 1991; Rotemberg and Saloner 2000; Combes and Duranton 2006). While these contributions are useful, we still need new theories, since entrepreneurial and innovative activities are much more concentrated than production, employment or population (Carlino and Kerr 2015), suggesting the presence of additional mechanisms. Moreover, the existing conceptualization of knowledge externalities is rather mechanical: typically, economists assume that knowledge spillovers happen naturally among people and organizations in geographical proximity with one another, while they simplify or neglect the nature of the learning process. It is only evolutionary economists that focus on the specifics of individual learning and interpersonal transmission of knowledge, but these treatments are overwhelmingly non-spatial.

The mainstream neglect is not surprising, as neoclassical economists have for the most part tended to pay scant attention to theories and—until recently—empirical studies of real-world entrepreneurial processes. This neglect has much to do with the focus on equilibria that characterized most twentieth-century economics. However, drawing on the classic entrepreneurship theories of Schumpeter, Knight, or Kirzner, there is now a cross-disciplinary community of scholars that have expanded and refined these earlier contributions. For the most part, these theoretical contributions—both old and new—contend that new firm formation, innovation within existing firms, and processes of research breakthroughs in science and technology all constitute entrepreneurial actions, since they all give rise to development paths that are incompatible with intertemporal equilibria. Following this line of reasoning, there is

now a variegated empirical research programme that pays attention to the processes and consequences of entrepreneurship and innovation (Babina and Howell 2018).

Despite these achievements, several areas remain under-researched. There are numerous questions that still lack a definitive answer. Here are three examples: What determines the location choices of entrepreneurial firms and people? What is the nature of the interactions that generate distance-attenuated ideas and spillovers? How do institutional or cultural arrangements amplify or discourage knowledge externalities? After all, spatial differences in entrepreneurship and innovation are consequences of individual location choices as well as interpersonal interactions within localities, which alludes to the need, in this type of research, for an interdisciplinary approach encompassing the core social and behavioural disciplines, including economics, political science, psychology, and sociology.

To help fill a few of these gaps, this special issue of the Annals of Regional Science contains a selection of theoretical and empirical contributions. The first two contributions that open this issue investigate the decision-making processes on location and occupation choice that are essential to form entrepreneurial regions. The work of Banczyk and colleagues proposes a behavioural economic model which theorizes how people's relocation decisions to other cities can be poorly made, resulting in under-mobility and consequent losses in individual utility and social welfare. They further examine how cities and their regional context might mitigate this problem by improving information as inputs into choice and by redesigning the choice architecture to embed effective choice heuristics into city search and match databases. It is noteworthy that insights from psychology are virtually never invoked in the urban economics literature, and thus, this article breaks new theoretical ground.

The work of Hårsman et al. develops a new theoretical framework for deriving and analysing the income return to entrepreneurship by means of Lazear's model of occupational choice. Based on data for individuals with an MSc in Electrical Engineering in three parts of Sweden, the authors calibrate the income return to self-employment (a specific type of entrepreneurship) and wage employment. They find that the income returns to self-employed individuals hiring at least one other person are highest in the Stockholm region and lowest in the least urbanized regions—presumably reflecting various agglomeration benefits. However, with few exceptions, the average income is lower for self-employed than for wage-employed individuals in all regions, which illustrates the inapplicability of the income maximization approach in dynamic entrepreneurial contexts.

The theoretical article by Andersson and Johansson calls into question classic microeconomic theory, where a firm is depicted as a "black box". In the classic model, a finite number of externally purchased inputs are transformed into a finite number of outputs to be sold in the market(s), without much attention to firms' internal workings or their possible interactions with the environment. Andersson and Johansson motivate their extension of conventional microeconomic models by pointing to the remarkable growth in the number of production units in multilocation firms such as IKEA, Walmart, and Apple. While logistics and operations research scholars have studied aspects of this phenomenon, very little has been done in economics. In this paper, they specify how internal interdependencies within firms can also be modelled with the help of a spatial CES framework.

Moving beyond interdependence within organizations, the forth contribution by Gordon and Cho concerns the interdependencies along supply chains for things and supply chains for ideas: the former involve transactions, while the latter can be via transactions and/or realized positive externalities. Specifically, all supply chains have geographical dimensions, and firms' decisions on what to make versus what to buy as well as where to buy, from near or far, all have significant impacts on the spatial distribution of entrepreneurship and innovation. In this case, cities that encourage localized supply chain relationships at reasonable cost can continue as "engines of growth". Firm location data for various sectors in the Los Angeles metropolitan area support the authors' arguments.

The fifth contribution by Desmarchelier and Zhang examines how interactions among agents through social networks can contribute to the success of a particular type of geographical region—the industrial cluster. While much has been said about how spatial proximity and interactions among a variety of actors (e.g. firms, universities, venture capitalists, R&D centres) within clusters generate positive externalities, these virtuous phenomena are limited in time, since clusters and regions can become obsolescent and decline. Drawing on data on innovative networks of three French or Belgian clusters over a 10-year period, Desmarchelier and Zhang find that clusters' growth patterns are anything but smooth and that low assortativity and preferential attachment among agents can constitute safeguards against cluster decline. These observations support the idea of non-deterministic life cycles, which implies that clusters can rekindle their growth after a period of pronounced decline.

The final contribution by Lai and co-authors employs a new institutional approach to shed light on an understudied form of entrepreneurship: the creation of new land boundaries in an urbanizing area, with examples from Hong Kong. The key argument is that the boundary of landed property becomes more contested as land becomes more valuable because of the increase in agglomeration economies associated with urbanization. Boundary disputes that are resolved through the courts are especially common in areas that are neither completely urbanized, where such disputes have already been resolved, nor completely rural, where boundaries are deemed less important due to low land values. Indeed, this is an illustration of the principle that the surplus of the expected value of a new property right over the expected transaction costs of its creation and maintenance determines the likelihood of a new property right emerging. As Webster and Lai (2003) have shown in a seminal contribution, an urbanizing region, as an example of economic development, is always accompanied by the entrepreneurial creation of new property rights and, consequently, an increasingly complex economy.

3 Final remarks

The articles in this special issue show the richness of topics that scholars can pursue when adopting a dynamic entrepreneurial approach to spatial phenomena. The regional economy never stands still; it is in continuous evolution as new property rights over land are created, new firms are formed and funded, and product and process innovations enter markets, whether local or global, for the first time. This issue also shows that spatial studies of entrepreneurial processes can be analysed with several empirical

methods. Standard econometrics, agent-based modelling, detailed case studies, and experimental techniques can all add to our understanding of the evolution of cities and regions over time.

Collectively, the articles that make up this issue also point to the value of allowing for paradigmatic pluralism and interdisciplinarity. Not only is the profit orientation of economic agents a relevant analytical starting point, but psychological patterns among producers and consumers, political and legal institutions, and the cultural tendencies of populations all have a bearing on the evolution of real-world cities in continuously developing and complexifying societies.

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