



## Research paper

## New firm formation and regional knowledge production modes: Italian evidence

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## ABSTRACT

According to the knowledge-spillovers theory of entrepreneurship (KSTE), local knowledge spillovers affect entrepreneurial dynamics, because of knowledge asymmetries and uncertainty. Most of the empirical literature has tested this hypothesis using a measure of local knowledge stock. This paper is aimed at extending the framework by showing that the domains over which local knowledge spans are also important. The paper investigates the impact of the configuration of local knowledge bases on new firm formation dynamics by combining the KSTE framework with the recombinant knowledge approach. Local knowledge bases emerge from the combination of different knowledge inputs. These inputs may be closely or loosely related to one another. Technological differentiation and the relatedness degree of local competences can be interpreted as characteristics of the local knowledge base interacting with the knowledge filter and the entrepreneurial absorptive capacity. The paper proposes a taxonomy of regional modes of knowledge production and investigates new firm formation in 92 Italian NUTS 3 regions observed over the 1995–2009 time span. The results confirm that the availability of local knowledge pools is important, and show that the ‘rich integration’ mode is the configuration that favours the entrepreneurial process. Finally, the policy implications and avenues for further research are presented and discussed.

## 1. Introduction

A large amount of literature has investigated the issue of “entrepreneurship” from different perspectives. One of the reasons for this interest is the belief that the creation of new firms constitutes one of the main engines of innovation and economic growth. Entry and exit dynamics are in fact the main drivers of industry turbulence (Audretsch, 1995). Their balance and economic impact varies according to the technological regime and across the evolutionary stages of an industry’s lifecycle (Nelson and Winter, 1982; Winter, 1984).

Newborn firms are especially important in the entrepreneurial regime because they are likely to introduce innovations onto the markets, and above all radical technologies, thus contributing to economic growth (Aghion and Howitt, 1992; Wennekers and Thurik, 1999; Reynolds, 1999; Carree and Thurik, 2006; Audretsch et al., 2006).

However, the relationship between the formation of a new firm and its economic performance is not obvious, and is influenced by the economic context (Fritsch, 2013). Empirical analyses have addressed a wide range of dimensions related to the creation of new firms, in order to provide a better understanding of the factors that are conducive to

entrepreneurial activities, and to understand the influence of the formation of new firms on economic growth. As discussed extensively in Vivarelli (2013) and in Quatraro and Vivarelli (2015), microeconomic analyses focus on the impact of firm size, credit rationing, education and learning dynamics, self-employment and innovation, whereas aggregate analyses tend to examine the shaping role of regional or national characteristics, as well as the effects of the new firm formation process on regional growth (Audretsch and Fritsch, 1994; Lee et al., 2004; Feldman, 2005; Ács et al., 2009; Delgado et al., 2010; Dejardin, 2011; Audretsch et al., 2012; Bishop, 2012; Qian et al., 2013). As far as macro level drivers are concerned, previous analyses stressed the importance of economic growth and innovative potential, as well as the features of the industrial structure involved in shaping the dynamics of new firm formation (Ács and Audretsch, 1989a, 1989b; Audretsch and Mahmood, 1995; Mata et al., 1995; Geroski, 1995; Audretsch et al., 1999).

As far as the analysis of new firm formation at a regional level is concerned, the Knowledge Spillovers Theory of Entrepreneurship (KSTE) has gained momentum over the last decade. The theory was first proposed in the seminal work by Audretsch (1995), and then

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formalized by as a refinement of endogenous growth models based on knowledge spillovers (Audretsch et al., 2015). KSTE posits that entrepreneurs should be viewed as the missing link between the generation of knowledge spillovers in local contexts and their economic exploitation. New ventures in this framework grasp the technological opportunities made available in the region, and which have been left unexploited by incumbent firms.

KSTE has found empirical support in a large number of regional level analyses of the determinants of new firm formation. In line with Griliches (1992), knowledge spillovers have been proxied in these studies considering the size of the knowledge stock that is locally available. However, little attention has so far been devoted to the fact that the local knowledge stock is the result of the research efforts of heterogeneous agents, whose activities can span a wide array of technological fields. However, how the composition of local knowledge bases can influence the effects of knowledge spillovers on the formation of new firms remains a somewhat less explored issue.

This paper has the aim of attempting to fill this gap and of contributing to the ongoing debate on the relationship between the features of local economic systems and new firm formation. Our approach is new in that it provides original theoretical and empirical frameworks to help understand knowledge-driven entrepreneurship. In our work, we stress that local knowledge pools are the result of a combinatorial search activity carried out in a technological space in which combinable elements reside (Weitzman, 1998; Fleming, 2001; Fleming and Sorenson, 2001). Therefore, knowledge spillovers do not automatically generate new entrepreneurial opportunities. Basic dimensions, such as technological differentiation and the relatedness degree of local technological activities, are likely to affect the effectiveness of the transformation of knowledge spillovers into new ventures (Saviotti, 2007; Quatraro, 2010). We propose that these dimensions can qualify and extend the knowledge filter concept, i.e. the set of factors that can boost or create a barrier to the actual commercial exploitation of local knowledge spillovers (Ács and Plummer, 2005; Braunerhjelm et al., 2010). We elaborate a taxonomy of regional knowledge production modes and formulate the hypothesis that high levels of technological differentiation and relatedness reduce knowledge asymmetries and uncertainty, and are associated with high levels of new firm formation dynamics at the local level.

According to most of the studies in the KSTE literature, our analysis has focused on the patterns of new firm formation in the high-technology (HT) and medium-high-technology (MHT) sectors, in the Italian NUTS 3 region context (i.e. the “provincial” level) over the 1995–2009 period. This choice is appropriate for our analysis for various reasons. First, the close relationship between the entrepreneurial process and local economies calls for focus on a rather narrow definition of region, but large enough to statistically represent a region of knowledge spillovers (Audretsch and Lehmann, 2005). Second, the Italian economy appears to be stuck in mature industries, and is significantly lagging behind, from a technological viewpoint, compared to most of the other advanced countries (Quatraro, 2009a, 2009b).

The results of the analysis are in line with KSTE and confirm that knowledge spillovers trigger the creation of new firms in local contexts. Moreover, when the composition of local knowledge bases is taken into account, the econometric analysis shows that the degree of technological relatedness and differentiation of the technological domains in the region have a positive effect on the formation of new firms, with the impact of differentiation in the related technological domains being stronger than that in the unrelated ones. This provides support for the hypothesis that high levels of technological relatedness mitigate the impact of knowledge asymmetries and uncertainty.

The rest of the paper is organized as follows. Section 2 discusses the theoretical bases that underpin the relationship between new firm formation, local innovation and recombinant knowledge, while Section 3 outlines our hypotheses. We present the research design and describe the data, the variables and the methodology in Section 4 while we

present the results of the econometric analysis in Section 5. Finally, Section 6 offers some concluding remarks and policy implications.

## 2. New firm formation, KSTE and recombinant knowledge

### 2.1. Spatial dynamics, entrepreneurship and KSTE

The investigation of the determinants and effects of entrepreneurship has mainly focused on the geographical dimension of this phenomenon. On one hand, empirical studies have pointed out the positive impact of new firm formation on regional growth and competitiveness (Audretsch and Fritsch, 1996; Fritsch and Schindele, 2011; Fritsch, 2013).

On the other hand, compelling evidence has emerged concerning the spatial dynamics of new firm formation and the enabling role of local factors. Variables such as population density, population growth, skills and human capital levels of the labor force have been found to positively affect entrepreneurial activity at the regional level (Reynolds et al., 1994).<sup>1</sup> Other studies have instead stressed the importance of the local availability of venture capital, supportive social capital, research universities and support services for entrepreneurship (Feldman, 2001).

In this framework, and in line with the works by Porter (1998) and Saxenian (1994, 1999), special attention has been paid to agglomeration economies and local externalities as the driving forces behind the geographical distribution of entrepreneurial dynamics (Breshanan et al., 2001; Feldman, 2001, 2005). Lee et al. (2004) extended the notion of Jacobs externalities to investigate the importance of social diversity and creativity on the formation of new firms. Audretsch et al. (2012), considering the Marshallian intuition, showed that the local environment shapes the process of entrepreneurship, particularly in terms of regional regimes grounded in accumulated entrepreneurial culture. Similarly, Delgado et al.'s (2010) empirical analysis pointed out the impact of knowledge externalities and agglomeration on regional entrepreneurial dynamics. Stam (2007) argued that the interlinking between the features of local clusters and the location choices of newborn firms evolves over a firm's lifecycle, so that some local aspects, such as the availability of an established network of relations, are more important in the early stages, while others are more important in the later stages.

KSTE deals with the contextual variables that influence entrepreneurship, and in particular points out the importance of local knowledge spillovers, not only for the competitiveness of new ventures but also for the very process of new firm formation (Audretsch et al., 2015).

This theory is elaborated as a refinement of endogenous growth models, in which knowledge spillovers are considered as key drivers of sustained growth. Spillovers exist because knowledge is an in-appropriable and non-rival commodity, so that the aggregate economic impact of knowledge production is larger than the firm-level impact (Arrow, 1962b; Griliches, 1992). KSTE criticizes the way knowledge is conceptualized in new growth theories, according to which the economic impact of knowledge spillovers is automatic and ubiquitous. This criticism is based upon Arrow's (1962a) argument, according to which not all produced knowledge is economically useful. Knowledge that is produced in local contexts and which spills over third parties needs substantial efforts and the commitment of resources to be transformed into productive knowledge. Prospective entrepreneurs can play a key role in this process, by taking advantage of the profit opportunities engendered by the local knowledge that is left unexploited by incumbents (Ács et al., 2009).

The reasons why some knowledge stays untapped, and hence

<sup>1</sup> The Regional Studies journal published a special issue on “Regional Variations in New Firm Formation” in 1994, where empirical papers that had investigated these aspects by focusing on European evidence were presented.

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