

Bridging KSTE and research on local determinants of entrepreneurship: a literature review

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Abstract

An extensive literature has analysed to what extent entrepreneurship and economic growth are interrelated. This paper reviews what is known about the mechanisms in which knowledge opportunities are commercially exploited at local level through the creation of a new firm. Knowledge Spillover Theory of Entrepreneurship (KSTE) suggests that new firm creation is a local endogenous response to the perspective for commercializing knowledge opportunities coming from knowledge not adequately commercialized by the incumbent firms. Next to this theory, there is a large literature that studies the local determinants of entrepreneurship, assessing the role of several local characteristics fostering entrepreneurship. Despite the presence of theories on local determinants of entrepreneurship and the acknowledged spatially bounded nature of knowledge spillovers, little attention has been paid to what extent local characteristics act as moderator effects on the exploitation of new knowledge opportunities, facilitating or hindering the entrepreneurial process. The present paper provides a literature review on the KSTE and on the local determinants of entrepreneurship. Finally an extension of the KSTE by linking the findings of research on local determinants of entrepreneurship is offered.

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1. Introduction: a literature review integrating KSTE and research on local determinants of entrepreneurship

Stimulating the entrepreneurship is one of the hottest issue in the current economic debate. This is especially true in a country, like Italy, where the economic growth is struggling to recover and the labour market is characterized by high rates of unemployment. An extensive literature has analysed to what extent entrepreneurship and economic growth are related, highlighting the positive effect of entrepreneurship on economic growth at local level (Mueller, 2006; Carree et al. 2011; Audretsch and Keilbach, 2008). Moreover, it has been recognized that new firm creation positively impacts on the labour market at local level as well as on the regional industrial structures, inducing more competition both in the industries in which the new firms operate and in other industries (Andersson and Noseleit, 2011).

A long lasting scholarly tradition has recognized the role of knowledge as input for firms' economic activities (Romer 1986, Lucas 1988). This stream of literature conceives knowledge as automatically spilling over from its source to reach other firms or perspective entrepreneurs.¹ As a reaction to such a simplistic view, more recently models were developed to better investigate the transmission and the economic exploitation of knowledge through entrepreneurship (e.g., Audretsch 1995, Acs et al. 2005, 2009; Braunerhjelm et al. 2010; Audretsch and Feldman 1999). In developing their works, Acs et al. (2005, 2009) and Braunerhjelm et al. (2010), have taken inspiration from the seminal work of Arrow (1962) which have highlighted the difference between common knowledge and economic knowledge, with only the latter being defined as commercially exploitable.

The Knowledge Spillover Theory of Entrepreneurship (hereafter KSTE, Acs et al. 2005) was developed with the aim of integrating the findings of the endogenous growth models with the original Arrow's economic knowledge definition. Specifically, the KSTE suggests that uncommercialized knowledge spills over from the sources where it has been created, being these sources both universities or incumbent firms. Since knowledge spills over from its source, it can be potentially absorbed and commercially exploited by economic agents who are not, actually the knowledge creators. In other words in the KSTE's view, knowledge spillovers act as third-party knowledge opportunities.

The KSTE conceives the conversion from available common knowledge into economic knowledge as related to the penetration of a "knowledge filter" which can be achieved both through the creation of new companies and the actions of existing companies. Specifically, the knowledge filter is intended to be the result of all the barriers inhibiting the conversion of knowledge produced by research into commercialized knowledge (Acs et al. 2009; Carlsson et al. 2009). In particular, among others, Acs and Plummer (2005) and Audretsch and Keilbach (2007) demonstrate that new venture creation is a superior method of penetrating the regional "knowledge filter" than incumbent firms, assessing the importance of entrepreneurship as conduit of knowledge. Furthermore, Audretsch and Lehmann (2005) find that there is also a spatial component in sense that geographic proximity to knowledge sources plays an important role for new firm creation. So, KSTE suggests that new firm creation is a local endogenous response to the perspective for commercializing knowledge opportunities coming from knowledge not adequately commercialized by the incumbent firms (Audretsch et al. 1995). In other words, KSTE suggests that knowledge spillover are more likely to be exploited in the same area, or at least in neighbouring areas, in which they are created. In this regards, it is worth noting that there is an extant literature that studies the local determinants of entrepreneurship, assessing the role of several local characteristics on fostering entrepreneurship.

Notwithstanding the presence of this latter strand of literature and the spatially bounded nature of knowledge spillover, little attention has been paid to what extent local characteristics act as moderator effects on the exploitation of new knowledge opportunities, facilitating or hindering the

¹¹¹ In particular, Audretsch and Feldman (1999) refer to knowledge spillover as knowledge "developed for any particular application (that) can easily spill over and be applied to different use and applications". From now on, when referring to knowledge spillover we will consider this definition.

entrepreneurship. In fact, while several studies have assessed the role of distance in the process of knowledge transmission (Döring and Schnellenbach 2006), no previous academic has provided a theoretical model that jointly considers the results of the two literatures which are the focus of this work: KSTE and research on the local determinants of entrepreneurship.

Therefore, to date these literatures have never been formally linked. Since the aim of the present review is to investigate to what extent the phenomenon of new firm creation has been studied by previously scholars with reference to the local characteristics which may impact on the conversion of knowledge into economic knowledge, a twofold reviewing effort is provided. Specifically, literature review is provided both for KSTE and for previous research on local determinant of entrepreneurship. Finally an extension of the KSTE by linking the findings of research on local determinants of entrepreneurship is offered.

The present work has both academic and practical relevance. By jointly considering these two (up to now) separate literatures would open new potential research directions on the topic of entrepreneurship, stimulating new academic interests. Moreover, an interpretation of the phenomenon of new firm creation that explains the possibility that a local area has to exploit knowledge opportunities which already owns with the characteristics of the local area itself, would be an important input for policy-makers.

2. Research Methodology

Due to its aim, this reviewing effort must be fuelled by two different literatures: KSTE and research on local determinants of entrepreneurship. Specifically, first a review of the works within KSTE is provided. Second, a survey on the previous researches on the local determinants of entrepreneurship is presented.

1. Knowledge Spillover theory of entrepreneurship (KSTE):

In order to, provide a review of the previous contributions of KSTE, a three step process methodology is used to identify relevant papers.

- a. Searching papers: for title/abstract/keywords using the online database Scopus, by combining the keywords cited in the seminal papers of the KSTE literature. In detail: two are the seminal papers considered for this strand of literature due to their fundamental contribution to KSTE.
 - I. Audretsch (1995), as this was the first attempt to assess the role of knowledge spillover on fostering the entrepreneurship acting as an input for the new firm creation.
 - II. Audretsch and Lehmann (2005), as this was the first attempt to link the findings of KSTE with the spatial dimension of knowledge spillover highlighting the mechanisms through which knowledge spillover are actually transmitted.

Therefore, the search queries has been constructed using the keywords indicated on these seminal works (the list of keywords is reported in appendix) which were combined using the logic operators available on Scopus.com such as “AND, OR”. In particular, every query will be built with this structure: (“input 1” or “input2”) AND (“output1” OR “output2”), with:

input1: a keyword which meaning is one input of the entrepreneurship among those that are referred to the aim of this work (i.e. “knowledge spillover”)

input2: a synonymous of the input 1, being also one of keywords (i.e. “knowledge”)

output1: a keyword which meaning is one output of the exploitation of the knowledge through entrepreneurial activities (i.e. “entrepreneurship”)
output2: a synonymous of the output 1, being also one of keywords (i.e. “new firms”).

- b. Exclusion: a series of characteristics that led to an exclusion of some papers from the list are defined. In detail:
 - I. Works written in languages other than English will be removed
 - II. Given the choice of the seminal papers, a temporal exclusion criteria is considered. From the total list of papers We dropped all the works which were published before 1995, unless their title contains this exact combination of words: “knowledge spillover theory of entrepreneurship”, if any.
 - III. In order to consider only the established state of the art, conference papers will be not taken into account.
- c. Selection: a list of selection criteria is defined. Whether a paper will not offer contribution to at least one of the following themes, it will be dropped from the list of analysed paper.
 - I. Related to the creation of new firm established in order to commercially exploit knowledge opportunities generated by universities
 - II. Related to the creation of new firm established in order to commercially exploit knowledge opportunities generated by incumbent firms

The resultant list of papers has been organized in a database in which we codified: author name(s), article title, year published, journal of publication, data used, dependent variable(s), independent variables and findings. The papers will be also classified according to the source of knowledge considered - universities or incumbent firms.

2. Local determinants of entrepreneurship

The second strand of literature that is relevant for the aim of this work consists of the researches on local determinants of entrepreneurship. In particular, within the boundaries of this heterogeneous literature, the focus is on the studies that have assessed the role of local characteristics which may impact on the conversion of knowledge into economic knowledge through entrepreneurship. To date, the determinants of which we wish to assess the effect are: local financial system, local social capital, local creativity since these local characteristics have been investigated by several scholars that have highlighted their positive effect on the entrepreneurship at local level.

Even if we wish to replicate a three step process methodology used for the research of KSTE works in order to identify the relevant papers for the literature on the local determinants of entrepreneurship, at this time no exclusion criteria are provided, yet.

3. Surveying the two literatures

This paper presents a literature review intended to integrate the findings of two different research strands: KSTE and research on the local determinants of entrepreneurship. In so doing, the ultimate goal of the present work is to shed a light on the regional characteristics which may act as moderators on local entrepreneurship, which according on KSTE is enabled by knowledge spillover. Specifically, we argue that regional characteristics may facilitate or hinder the exploitation by perspective entrepreneurs of knowledge spilling over from sources such as universities and incumbent firms to fertilize territories. To the best of our knowledge, there are no attempts to assess the role of the (potential) interaction effects between regional characteristics and

knowledge spillover on the new firm creation at the local level. While several studies have assessed the role of distance in the process of knowledge transmission (Jaffe et al. 1993; Döring and Schnellenbach 2006), no previous academic has provided a framework that jointly considers the results of the two literatures which are the focus of this work: KSTE and research on the local determinants of entrepreneurship. Therefore, quite surprisingly, to date these literatures have never be systematically integrated. The only exception is the recent contribution of Plummer and Acs (2012), with which the authors wish to offer an interpretation of KSTE as a regional model of entrepreneurship by linking the exploitation of knowledge spillover through entrepreneurship with the localized competition.

So, since it has not been developed a unique literature to investigate to what extent local characteristics can facilitate or limit the possible exploitation of knowledge spillover through entrepreneurship, the present review has two literatures as inputs. To this purpose, we organize this literature review as follow. First, a review of the works on new firm creation within the KSTE framework is provided. Second, a survey on a subset of previous researches of the local determinants of entrepreneurship is presented. Finally, an attempt to bridge KSTE and research on local determinants of is offered, highlighting also how such an integration offers insightful .

3.1 Knowledge Spillover Theory of entrepreneurship (KSTE)

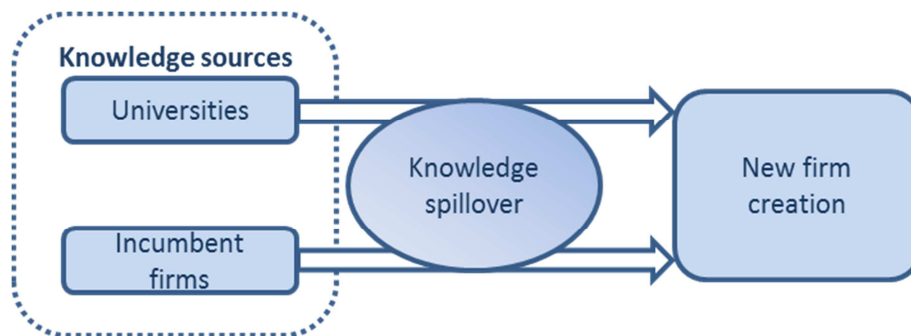


Fig. 1

The role of knowledge in the economic system has been studied since the beginning of the second half of the last century when Arrow (1962) highlighted the effect of knowledge on the economic growth. His work was the starting point for the development of the endogenous growth models (Romer 1986, Lucas 1988), which have explicitly considered knowledge as a production in input in addition to labor and capital. One of the most relevant critiques to these models, however, is that they conceive knowledge as automatically spilling over from sources where it has been created (e.g., large companies, universities) to other firms or to perspective entrepreneurs who then use it to innovate or to create new ventures (Audretsch and Keilbach 2007; Acs et al. 2009). Indeed, while in his seminal contribution Arrow (1962) aforementioned that there is a difference between knowledge and economic knowledge with only the latter being commercially exploitable, the endogenous growth models have not taken into account this knowledge distinction. In order to combine the contribution of the endogenous growth models with the original conception of economic knowledge of Arrow, in the last decades, contributions within the stream of KSTE have focused on how knowledge is transformed in economic knowledge (Audretsch 1995, Acs et al. 2005, 2009; Braunerhjelm et al. 2010). These contributions have identified entrepreneurship as the key mechanism for this translation. More in detail, the KSTE suggests that entrepreneurship is a superior method of penetrating the regional “knowledge filter” than incumbent firms (Acs and Plummer 2005; Audretsch and Keilbach 2007). In the following, the previous works on KSTE are presented according to the source of knowledge they consider - universities or incumbent firms - as illustrated in Fig.2.

Table 1

Authors year_Journal	Source of knowledge	Data	Dependent variable(s)	Independent variable(s)	Main findings
Baptista and Mendoça 2010 <i>Annals Regional Studies</i>	University	Knowledge- based start-ups entering in the period 1992–2003 in Portugal.	n. of new startups	n. of higher education institutions n. of students enrolled in higher education institutions n. of graduates n. of universities	Manufacturing sector: important role is played by the absorptive capacity - n. of graduates and students in engineering fields. Services: in addition of the absorptive capacity, even the knowledge sources (n. of universities) are found to have a positive and significant effect. No differences are found to be significant in different fields of education.
Harhoff 1999 <i>Economics of Innovation and New Technology</i>	University	Startup created for 1989-1993 in Germany	-n. of startups in hi-tech sectors -n. of startups in other sectors	-R&D employees in private firms -Scientific personnel in non- University research laboratories -Scientific Personnel in Universities	Regional availability of a well-developed "knowledge infrastructure" is positively related with NFF in high-tech sectors while it has weaker effect on the NFF in other sectors; heterogeneous industry structure support the formation of new hi-tech firms
Bania, Eberts, Fogarty 1993 <i>The Review of Economics and Statistics</i>	University	Startup rate 25 SMSAs for 1976-1978 in US	New firm formation rate	Universities R&D expenditure n. of universities Share of scientists and engineering workforce	Clear influence of the role of state in the development of the US microelectronics industry. The pipeline between university research and NFFR at local level is weak
Kirchhoff, Newbert, Hasan, Armington 2007 <i>Entrepreneurship Theory and Practice</i>	University	New firm birth at LMA level for 1990-1999 in US	n. of new business formation	University R&D expenditure	In a given geographical region new firm formation is positively related to university R&D expenditure growth in employment is positively related to new firm formation in a geographical region
Woodward, Figueiredo, Guimarães 2006 <i>Journal of Urban Economics</i>	University	All new openings in each US County for 1997-2000.	n. of new high- technology manufacturin g plants	Weighted university R&D	Science and engineering R&D positively affects decisions to open new high-tech plant in counties The marginal effect of the R&D activity of university doesn't have significant role in augmenting the firm's location near the academic institution. So it is not important the growth of amount in R&D activity in fostering the new firm creation around university Spillover effects are geographically limited (up to 145 miles)
Bonaccorsi, Colombo, Guerini, Rossi-Lamastra 2012 <i>Working paper</i>	University	New KIFs established in Italy at Nuts3 level. Source: Movimprese directory	n. of new firm in 2010	-Balassa Index -Spatial weighted variables	Public research in basic sciences have a significant effect on new firm creation only in R&D intensive sectors; University specialization in engineering and applied science has a significant effect on: local entrepreneurship in PNS and SDS industry local entrepreneurship in services.
Acosta, Coronado, Flores 2011 <i>Small Business Economics</i>	University	n. of new in 36 local areas from 2001 to 2004 in Spain	n. of new businesses in high-tech sectors	- n. patent - n. graduates - research activities	Among the various explanators, the only University output found as significant and positive is the n. of graduate
Audretsch, Lehmann, Warning 2005 <i>Research Policy</i>	University	281 firms which made an IPO in Germany for 1997-2000	Distance from the new firm to the closest university	n. of publ. in natural sciences (NS) n. of publ. in social sciences (SS) n. of students in NS n. of students in SS University location	Only SS research have a positive and significant effect on the likely for a firm to locate near the universities Only for human capital in NS have a positive and significant evidence on the firm's decision to locate in the proximity of a university
Bonaccorsi, Colombo, Guerini, Rossi-Lamastra 2012 <i>Working paper</i>	University	Firm created in Italy at Nuts3 level. Source: Movimprese directory	n. of new knowledge intensive firms (KIFs)	- scientific publications - academic patent - n. of graduates - quality of the different universities (low and high quality university).	Codified knowledge in academic patent has a wider rage effect compared to the scientific publications and n. of graduates. Only high quality university have a positive and significant effect on the new firm creation rate at local effect
Audretsch and Lehmann 2005 <i>Research Policy</i>	University Incumbent firms	281 firms which made an IPO in Germany for 1997-2000	n. of firms located closest to universities	- Amount of regional R&D expenditure - n. of students in natural sciences (NS) and social science (SS) - Articles published in NS and SS - Dummy variable indicating technical university	The knowledge spillover entrepreneurship varies dependently to the type of knowledge or the industry context
Argminton and Acs 2002 <i>Regional Studies</i>	University Incumbent firms	Establishments in US at LMA level using LEEM database	Average annual firm birth, divided by the labour force	Share of college graduates Industry density	LMAs with high share of college graduates are much more likely to have an higher rate of new firm formation rate. There is evidence to the fact that LMAs with higher industry density show higher new firm formation rate.
Acs, Braunerhjelm, Audretsch, Carlsson 2009 <i>Small Business Economics</i>	Incumbent firms	Data for 19 OECD countries for 1981 - 2002	Share of self- employed people in the OECD countries	-Knowledge stock: accumulated annual R&D flows -n. of patents	-an increase in the stock of knowledge have a positive impact on the degree of entrepreneurship - the more efficient incumbents are at exploiting R&D (using patent), the smaller the effect of a given knowledge stock on entrepreneurship - entrepreneurial activities decrease under higher regulations, administrative barriers (public expenditures in relation to GDP)
Todd Gabe 2003 <i>Growth and Change</i>	Incumbent firms	Businesses opened for 1996-1999 in Maine (US)	n. of business opened per county- industry from 1996 to 1999	-n. of establishments per county- industry in 1995 -% of county's businesses in 3- digit SIC / % of US businesses in the same category in 1995 -age and size of incumbent firms	County-industry's size (n. of incumbents and its relative concentration to the U.S. economy) have a significant and positive effect on new business openings. Furthermore a support to the evidence of the importance of Marshallian externalities on fostering new business creation is provided.

3.2 Local determinants of entrepreneurship

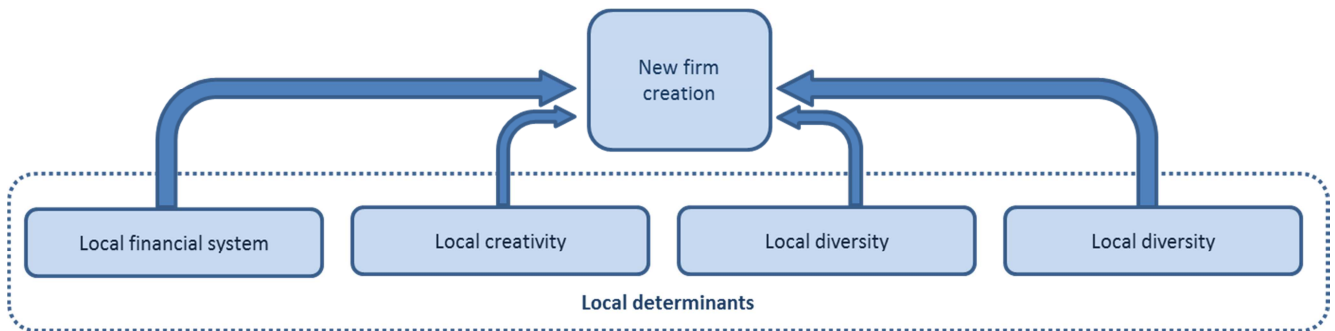


Fig. 2

Within the boundaries of the extensive literature on the local determinants of entrepreneurship (see Malecki 2009 for a recent review), the attention of the present article is on previous works having assessed the role of local characteristics on fostering local entrepreneurship. In particular, the focus here is on the local characteristics which may impact on the conversion of knowledge into economic knowledge. To date, the local characteristics here considered as potential moderator effects positively affecting the entrepreneurship are: local financial system, local social capital / local creativity.

First, Guiso et al. (2004) suggest that a well-developed local financial system promotes the creation of new firms. Following their results showing that real beneficiaries of a local financial development are small firms and perspective entrepreneurs, we expect to find several previous contributions having investigated the role of different financial agents (e.g banks, venture capitalist, business angels, crowdfunding platform) to provide credit to support new firm creation at local level. Therefore, a review on the subset of the research on local determinants of entrepreneurship related to the investigation of the financial system investigated as a determinant of local entrepreneurship will be provided.

Second, there are several works having assessed the positive effect of some characteristics such as creativity or diversity on the entrepreneurship (Piergiovanni et al. 2011, Bieri 2010, Lee et al 2004). In particular, this latter stream of literature demonstrates that areas with a higher level of creativity , would have higher new firm creation's rate. So, a reviewing effort on the previous works of the research on local determinant of entrepreneurship related to the analysis of the degree of creativity at the local level is investigated as a determinant of local entrepreneurship will be developed.

Thirdly, Lee et al. (2004) highlight that local areas with a higher level of diversity perform higher rate of firms. In particular these authors argue that , given the same opportunity, persons with different mind-set would assess to it different relevance, depending on their background and their characteristics. Consequently, a reviewing effort of the previous works having investigated to what extent diversity plays a role in fostering entrepreneurship is provided.

Table 2

Authors Year Journal	Local determinant	Data	Dependent variable(s)	Independent variable(s)	Findings
Bieri 2010 <i>Industry and Innovation</i>	Creativity	New entrants in each US county for 1997-2000	n. of new high-tech firm creation rate at regional level	Creative class index	The results confirm the importance of university-based R&D activity on the locational choice of knowledge based firm.
Lee., Florida, Acs 2004 <i>Regional Studies</i>	human capital diversity creativity	New establishment created at MSA/PSA level (1997-1998) and LMA level (1994-1996)	n. of new firm created in a period (1994-1996 for the LMSA, 1997-1998 for the MSA)	-Bohemian Index -Melting Pot Index -Gay Index -share of graduated population	Regions that are open and creative and with graduated people enjoy more dynamic entrepreneurship. Indeed, both creativity as well as diversity exhibit a positive and significant effect on the new firm creation of the service sector. Furthermore, human capital has always positive and significant effect.
Piergiovanni, Carre, Santarelli 2011 <i>Small Business Economics</i>	Creativity	Data for 103 Italian provinces over the period 2001–2006	Relative rate of growth of employment (per province)	-rate of growth of the n. of firms in creative industries -share of creative firms in the population of all non-agriculture firms active in the region -incremental growth of the stock of trademarks and registered designs and models by province	Italian university system construction is quite ineffective in fostering economic growth.
Guiso, Sapienza, Zingales 2004 <i>The Quarterly Journal of Economics</i>	Financial development	Data on Italian firm over the period 1982–1990	Degree of financial development: it measures how easy it is for an individual to borrow at a local level	-n. of total branches -fraction of branches owned by local versus national banks -n. of savings banks -n. of cooperative banks per million inhabitants	Financial development enhances the probability an individual starts his own business, favours entry of new firms, increases competition, and promotes growth.

Since the literature on local determinants of entrepreneurship is wide, the current description of this present section is just a first attempt to select some fundamental factors that may be extended, taking into account also other factors.

4. Conclusion

The aim of the present paper is to investigate how the likelihood of conversion of *knowledge* into *economic knowledge* (Arrow 1962) through new firm creation has been studied by previously scholars with reference to the local characteristics. Given the fact that, to date, a unique literature having studied the relation between local characteristics and the conversion of *knowledge* into *economic knowledge* is not available, the reviewing effort has been twofold. First, a review of the extant literature having investigated to what extent new knowledge fosters entrepreneurship, within KSTE, has been provided. Secondly, within the various extant literature on local determinants of entrepreneurship, a review of paper having investigated the role of a subset of local characteristics (local financial system, local creativity, local diversity) has been reported.

As a result analysis carried out, this final section wish to offer an extension of the KSTE. More in detail, the final purpose of the present work is to bridge the KSTE with the findings on local determinants of entrepreneurship. In so doing, a new conceptual framework highlighting the potential further directions resultant from the link of is offered. In particular, as illustrated in **Fig. 3**, it offers a new perspective related to what extent, regional characteristics facilitate or hinder the exploitation of new knowledge opportunities provided by both universities and incumbent firms.

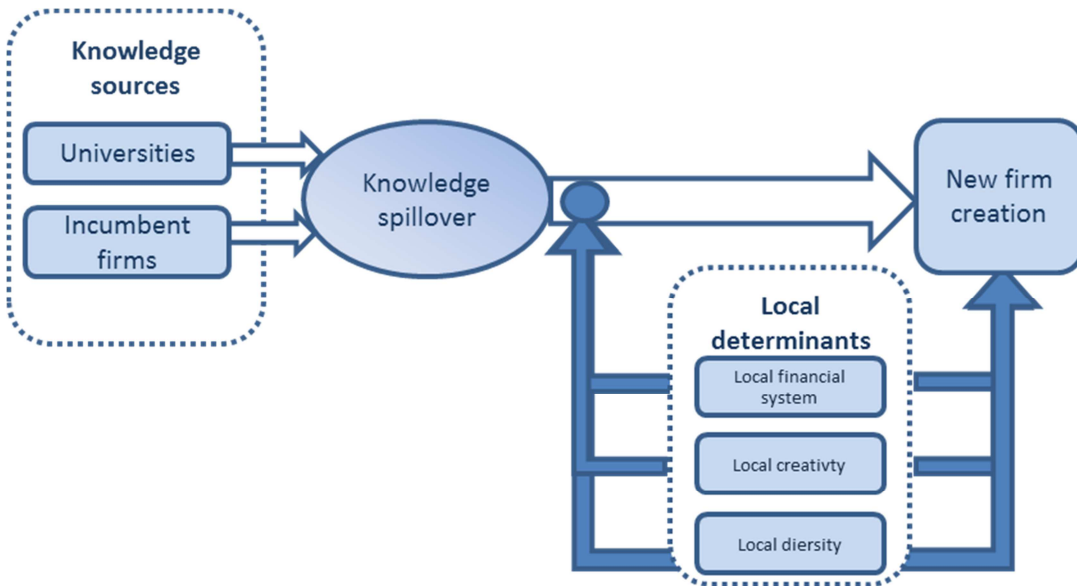


Fig. 3

By linking the findings of the research on the local determinants of entrepreneurship to the KSTE, We open new potential research directions on the topic of entrepreneurship. Moreover, as it is represented in Fig. 3, this interpretation of the phenomenon of local entrepreneurship would be able to explain the chances that a local area has to commercially exploit the knowledge opportunities which already owns, with the characteristics of the local area itself. In doing so, We wish offer a new regional prospective to the KSTE which can serve as input for policy-makers, mostly at regional level. Indeed, knowing the moderator effect of local characteristics on the exploitation of the knowledge opportunities locally disseminated, would allow policy-makers to leverage on these local characteristics in order to increase the rate of entrepreneurship.

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