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A social perspective of knowledge-based innovation: mobility and agglomeration. Introduction to the special section

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Abstract
This paper introduces the special section, which aims to shed new light on the dynamics of knowledge generation and transfer with respect to human and geographical dimensions. We first provide a review of the state of the art in the two research areas, using bibliometric techniques, with the aim of tracing the evolution of the literature. We proceed by identifying some promising areas for future research and by explaining how the manuscripts included in this special section can contribute toward bridging some of the gaps that have emerged in the literature.

Keywords Knowledge-based innovation · Regional studies · Migration · Agglomeration · Regional absorptive capacity

JEL Classification O33 · O31

1 Introduction

Scholars assume that stocks of both human capital and specialized knowledge have a positive impact on innovation and, in turn, on economic growth (Huggins and Thompson 2017). In particular, the investigation of knowledge flows and innovation across the economics, geographical and management fields has taken on a prominent role (e.g. Fujita and Thisse 2013; Arslan et al. 2014) and this debate continues to be at the forefront of academic research.

This special section aims to contribute to such a stream of literature by providing further insights into the dynamics of knowledge generation and transfer by looking at the human

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and geographical dimensions. Human movements across firms and geographical areas, as well as the concentration of knowledge and resources at different regional levels can be considered two different but related phenomena that play major roles in the domain of innovation and knowledge transfer. Both human capital and geographical proximity facilitate the transfer of knowledge, in particular the tacit one (Pavitt 1998), and foster innovation (Boschma 2005).

On the basis of such premises, two topics are considered here: the first includes mobility, which encompasses both workplace changes within or between labor markets (Coccia 2008; Eriksson et al. 2008), and migration phenomena across and within countries; the second topic is agglomeration, here considered as the spatial concentration of goods, firms, workers and knowledge (Fujita and Thisse 2013).

As far as the former is concerned, the mobility of workers plays a crucial role in knowledge diffusion and technology transfer (Dasgupta 2012; Møen 2005; Kaiser et al. 2015). Migration has recently received particular attention due to the magnitude of international flows and the relevance, in the public discussion, of the associated social aspects that have taken place in the last few decades (Arslan et al. 2014). There is a booming, albeit fragmented, literature (Lissoni 2018) that deals with the contribution of international mobility and migration to innovation. Individuals on the move facilitate the diffusion of scientific and technical knowledge, under the form of collaborations, trade secrets, private information, know-how and/or practical skills (Inzelt 2008; Hoisl 2009).

As far as the latter phenomenon is concerned, the agglomeration of economic activities is positively related to innovation and local growth through different mechanisms (Jaffe et al. 1993; Feldman 1994; Duranton and Puga 2004; Lengyel and Eriksson 2017). Firms clustered in a geographical area benefit from the increased efficiency of shared facilities, job-matching opportunities improve, and knowledge spillover from externalities of the Marshall–Arrow–Romer's type arise, which in turn favor learning and innovation. Furthermore, the agglomeration of different activities in small geographical areas increases the chances of cross-industry knowledge spillovers: such Jacobian externalities (Jacobs 1969) positively impact innovation through the recombination of existing technologies (Fleming 2001; Caviggioli 2016; Galati and Bigliardi 2017).

In this context, the role of regions (Boschma and Iammarino 2009; Frenken et al. 2012) and metropolitan areas (Glaeser et al. 1992; Belitski and Desai 2016) assumes particular relevance as geographical *loci* of innovation. Geographical proximity reinforces other forms of proximity (Boschma 2005), thus increasing the likelihood of observing collaborations within and outside the perimeter of a firm. Several studies have suggested that the quantity and quality of innovation are positively related to the results of collaborative work among scientists, inventors and organizations (Powell and Grodal 2005; Singh and Fleming 2010; Agostini et al. 2015; Bigliardi and Galati 2018).

Agglomeration and mobility tackle some common aspects. The spatial aggregation of knowledge, workers and goods, at both the regional and city level, is characterized by high rates of inter-firm mobility (Herstad and Ebersberger 2014) and mobility among workplaces, both of which are crucial for inter-firm knowledge transfer and for the competitiveness of localized economic systems (Eriksson and Lindgren 2008). Several studies have introduced the concept of absorptive capacity as a key element for firms (Cohen and Levinthal 1990; Agostini and Caviggioli 2015; Galati and Bigliardi 2019), industrial districts and regions (Miguélez and Moreno 2015) to fully exploit flows of external knowledge for innovation and growth purposes. As previously mentioned, the variety of a knowledge base

is a distinctive property of regional innovation systems (Jacobs 1969; Asheim and Coenen 2005). This diversification is particularly relevant when considering the different competences of migrant and native workers that meet and collaborate locally (Ottaviano and Peri 2005; Audretsch et al. 2010; Lee 2015).

On such grounds, this Special Section is aimed at stimulating research on the elements that foster innovation activities, with particular focus on knowledge transfer, considering both spatial proximity and human capital. With the aim of providing an overarching picture on the evolution of the literature of the investigated topics, we present the results of a bibliometric analysis conducted on the two streams of literature, i.e. mobility and aggregation. The analysis provides a brief but comprehensive body of organized knowledge that will serve as a background for the articles included in this special section, as a source of inspiration for practitioners and as a guide for future research on the topic. To this end, we present suggestions for future research, showing how the contributions made by the manuscripts included in this Special Section fit into this domain.

2 Identification of the literature

The use of bibliometric techniques helps to provide a more objective alternative to qualitative reviews, because this method allows large amounts of bibliographic data to be aggregated (Agostini and Nosella 2018). Moreover, these techniques introduce a systematic, transparent and reproducible review process.

We used a combination of keywords to search the articles that deal with the themes under investigation. The database used as source of scientific publications is the "Core Collection", which is available in Clarivate Analytics' Web of Science (WoS). These searches were limited to articles in English and published in journals in the research area identified as "Business & Economics" in WoS. The queries were defined to include either the core topics of innovation, knowledge flows or spillovers, and each of the two main areas of investigation, namely mobility and agglomeration. The following search strings were applied to the "Topic" tag (TS) of WoS in August 2019:

- *Mobility and migration* "TS = (innovation OR (knowledge near/2 (management OR flow OR flows)) OR (knowledge AND (spillover OR externalit* OR "spill over" OR "spill-over"))) AND (TS = (migrant OR migrants OR immigrants OR emigrants OR migration OR immigration OR emigration OR "brain drain" OR "braindrain" OR diaspora) OR (TS = (mobility) NOT TS = (transpor* OR electric OR vehicle OR car OR automo* OR engine OR "capital mobility" OR logist* OR "innovation mobility" OR green OR ecologic* OR "urban mobility" OR wireless OR pollution OR carbon OR "mobile payment" OR smart OR transit OR rideshar* OR "ride-share" OR "ride-sharing")))".
- *Agglomeration* "TS = (innovation OR (knowledge near/2 (management or flow or flows)) or (knowledge AND (spillover OR externalit* OR "spill over" OR "spill-over"))) AND (TS = ((urbanization OR urbanisation) OR (agglomeration AND (regional OR city OR metropolitan OR urban OR district))) NOT TS = (transport* OR electric OR vehicle OR car OR automo* OR engine OR "capital mobility" OR logist* OR "innovation mobility" OR green OR ecologic* OR "urban mobility" OR wireless

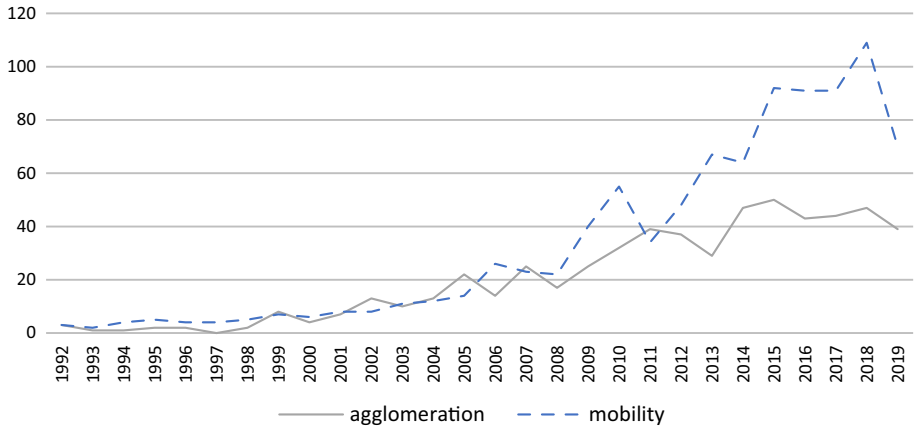

Fig. 1 Number of yearly publications dealing with the examined topics in the "Business & Economics" research area. Data retrieved in August 2019

OR pollution OR carbon OR "mobile payment" OR "mobile banking" OR smart OR transit OR rideshar* OR "ride-share" OR "ride-sharing"))".

The search strings limited the presence of false positive results by excluding confounding terms (the "NOT" part of the syntax).[1] We obtained 925 and 576 results for the "mobility" and "agglomeration" topics, respectively, and covered more than 27 years, that is, from 1992 till 2019.

We applied bibliometric techniques to the identified papers to trace the evolution of the bodies of literature on mobility and agglomeration, while avoiding the subjective perspective of the researchers, which could have biased the analyses (Tranfield et al. 2003). The bibliometric approach makes it possible to map the scientific area through the establishment of intellectual linkages among different units of analysis: in our case, the presence of keywords provided by the authors and by WoS.

We divided the sample into three groups on the basis of the year of publication of the papers, with the aim of highlighting potential changes in the relative relevance and interconnections of the sub-topics: from 1992 to 2010, from 2011 to 2014, and from 2015 to 2019. Each period accounts for about one third of the sample.

The data were processed, by means of the VOSViewer software (version 1.6.11), to assess the co-occurrence of keywords and the network of linkages. The most frequent co-occurrent keywords were selected: the minimum threshold of co-occurrences was 10 for each theme and period, except for the most recent period with reference to the mobility topic, where the minimum threshold was 17 to account for the larger size of the sample. This analysis has been aimed at unveiling the most relevant and interrelated topics in the field, thus providing insights into the underlying conceptual structure (Callon et al. 1983).

The VOSViewer output charts are reported below in Figs. 2, 3, 4, 5, 6 and 7.

[1] The presence of false positive results cannot be completely ruled out. To improve the accuracy of the results, further filtering criteria could be applied, such as a one-by-one screening of the abstracts and of the journal titles.

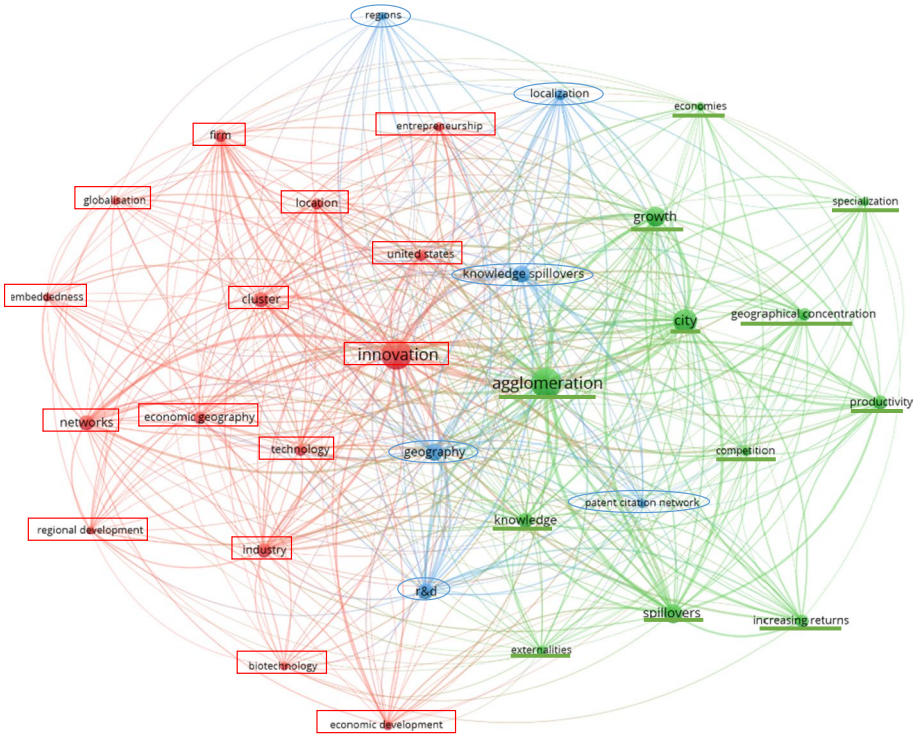

Fig. 2 Co-citation of the cited references (minimum number of citations of a cited reference: 10) in the "Agglomeration" stream for the years 1992–2010

3 An evolving literature

The research streams that deal with mobility and agglomeration have developed over time, and the number of articles has increased rapidly (Fig. 1), with the last 4 years accounting for around one third of the whole production. The literature on mobility has in particular recently boomed, compared to the research on agglomeration.

Based on an analysis of the co-occurrence of the keywords in the sampled papers obtained by the VOSViewer software and displayed in Figs. 2, 3, 4, 5, 6 and 7, it is possible to advance some considerations regarding the relationships between the subtopics that have emerged in the two macro themes and compare their evolution. The figures show the keywords that belong to the same cluster with the same-shaped nodes.

The first period (1992–2010) shows a limited overlapping between the literature on the topic of "agglomeration" and that on the topic of "mobility". Indeed, although far from the *mobility* focal node, the keyword *agglomeration* appears as one of the interconnected nodes. In the subsequent periods, the mobility and agglomeration research streams have gained more distinct identities, and fewer than 10 articles that included both terms as keywords have been found. Mobility and agglomeration have both shown an increase in the complexity of the network in the last period, thus suggesting the emergence of a variety of different research topics.

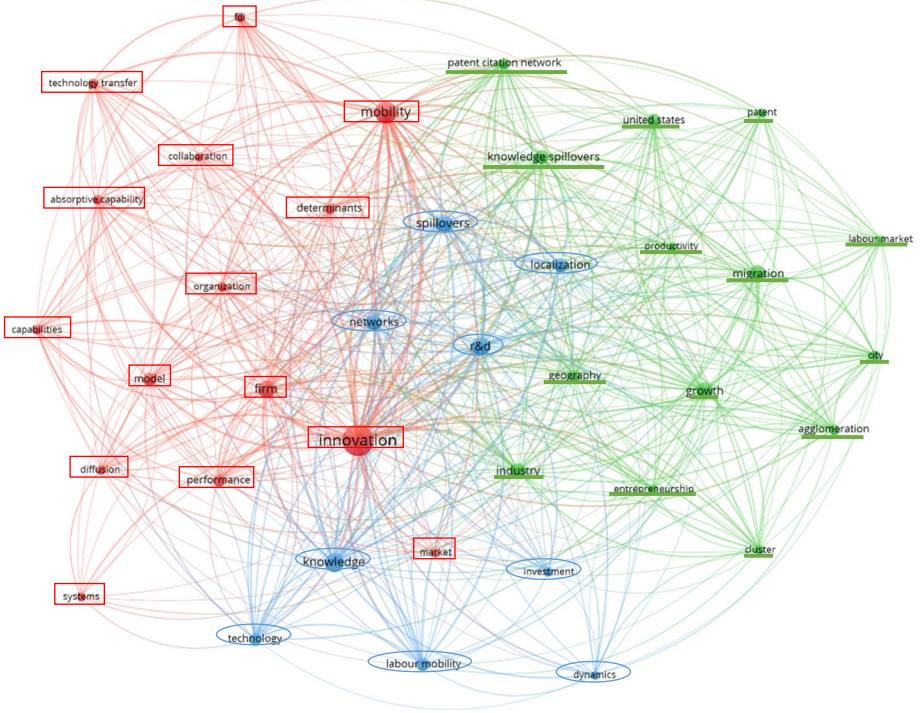

Fig. 3 Co-citation of the cited references (minimum number of citations of a cited reference: 10) in the "Mobility" stream for the years 1992–2010

The research area that deals with mobility has increasingly focused on migration, which represents the fastest growing topic within this research stream. Not only has the bulk of research on mobility and migration increased, in terms of published articles, but several other subtopics have also emerged, especially in the latter period, thus suggesting that the complexity of the theme is increasing, and several new paths of interconnected research are gaining the interest of scholars. The variety of subtopics, such as migration and entrepreneurship (Liu et al. 2019), the role of highly skilled individuals (Cappelli et al. 2019), internal migration (Bernela et al. 2018), and the employed analysis techniques (e.g. patent data, panel samples and econometric specifications) have increased in the years 2015–2019. The analysis of the keywords for this latter period has highlighted how scholars approach the topic from a wider perspective that focuses not only on mobility, innovation or knowledge flows, but also on the social elements of the phenomena at stake, e.g. education (Wixe 2018), diversity (Andersson et al. 2019) and inequality (Aghion et al. 2018).

Overall, the graph in Fig. 3 shows that, in the first period, the stream of literature on "mobility" revolved around two main keywords that represent two distinct poles, namely *mobility* and *innovation*. They belong to the same group (i.e. box-shaped nodes) where keywords that are closer to *innovation* seem to point to studies focused more on *performances* at the *firm* level, whereas keywords that are closer to *mobility* are also linked to the topic of *collaboration,* which is related to *technology transfer,* and where the concept of *absorptive capacity* may play a relevant role. However, at the very center of the graph, i.e. in between mobility and innovation, albeit in a different group of keywords (i.e. circle-shaped nodes),

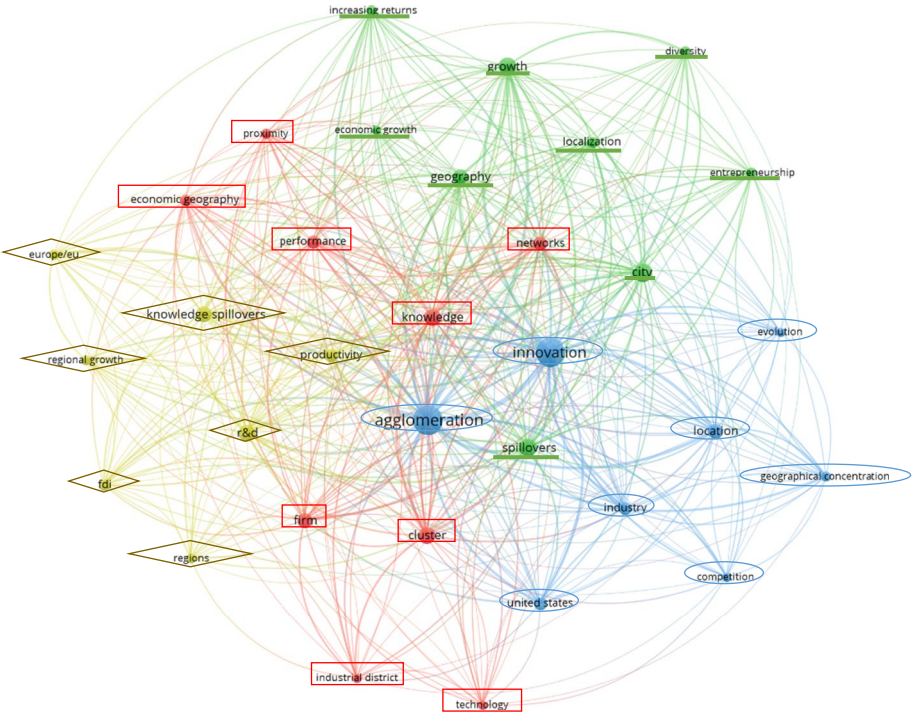

Fig. 4 Co-citation of the cited references (minimum number of citations of a cited reference: 10) in the "Agglomeration" stream for the years 2011–2014

we find the keywords *network* and *spillovers,* which help explain the core issues addressed at the beginning of this stream of research. Overall, this group seems to tackle the role of R&D and investment, and it is interesting to notice that the keyword projected furthest toward the right part of the graph is *localization*. The line-shaped nodes in fact refer to keywords that recall the *geographical* stream of literature, including specific countries, such keywords as *city*, *industry* and *cluster*, and above all, *migration* and *agglomeration*.

In the second and in the most recent periods (see Figs. 5, 7), we have witnessed an increasing polarization around three main keywords, i.e. *mobility*, *innovation* and *migration*, as well as the emergence of some new keywords that point to the social side of the phenomenon (e.g. *social network*, *human capital*) and to alternative ways of referring to the same phenomenon (e.g. *brain drain*).

As far as the agglomeration theme is concerned, in the first period, the main areas of research revolve around the broad topic of innovation (box-shaped nodes) and around the keywords *agglomeration*, *city* and *growth* (line-shaped nodes), as can be seen in Fig. 2. Here, all the groups seem to be geography-oriented, which reveals the theoretical roots on whose basis this stream has developed. It is no coincidence that the keyword *geography* is at the very core of this graph. In this stream, the aspect related to *performance* does not seem to be addressed at the beginning, and it only appears in subsequent periods (see Figs. 4, 6). Even in this case, there seems to be an increase in the complexity and interconnectedness of the literature network on agglomeration in recent years. Furthermore, the emergence of new subtopics seems to anticipate the timing shown for the mobility research

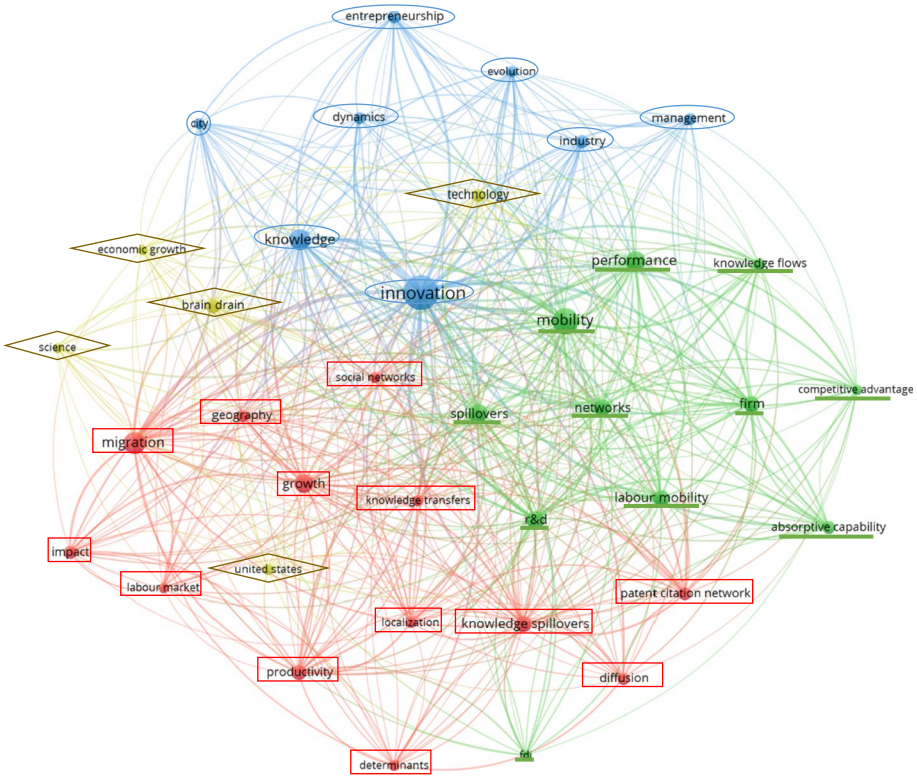

Fig. 5 Co-citation of the cited references (minimum number of citations of a cited reference: 10) in the "Mobility" stream for the years 2011–2014

area, as in the case of the articles on *diversity*, which were already highlighted for the years 2010–2014 (e.g. Neffke et al. 2011). It is also interesting to notice that in both this stream and in the mobility-related one, the *policy* keyword only emerges in the latter period, which suggests the implications that studies in these areas can have on society.

The analysis on the geographical scope of the identified studies shows that the literature on mobility starts by preponderantly investigating the US in 2011-14 (Dasgupta 2012) and then its geographical scope has expanded by including the European Union and China in the latter period (Tzeng 2018). The shift in attention from the US (1992–2010 period) (Ellison and Glaeser 1997) to the EU and China (2015–2019 period) also characterizes the agglomeration literature (Guastella and Timpano 2016; Zhang 2016; Fu 2019). Data availability and unification with the EU level of fragmented studies at the country level could have fostered the increasing presence of European-based papers. The potential drivers of the increase in works on China could be related to the more centric role played by the Chinese market in the economic scenario and to such characteristics as the internal urbanization phenomena, the introduction of government policies and other particular local features that make it an idiosyncratic case.

With respect to the unit of analysis, studies at the city level are more frequent in the agglomeration research area, whereas there still seems to be room for investigating urbanization with respect to mobility and migration, although some recent works have

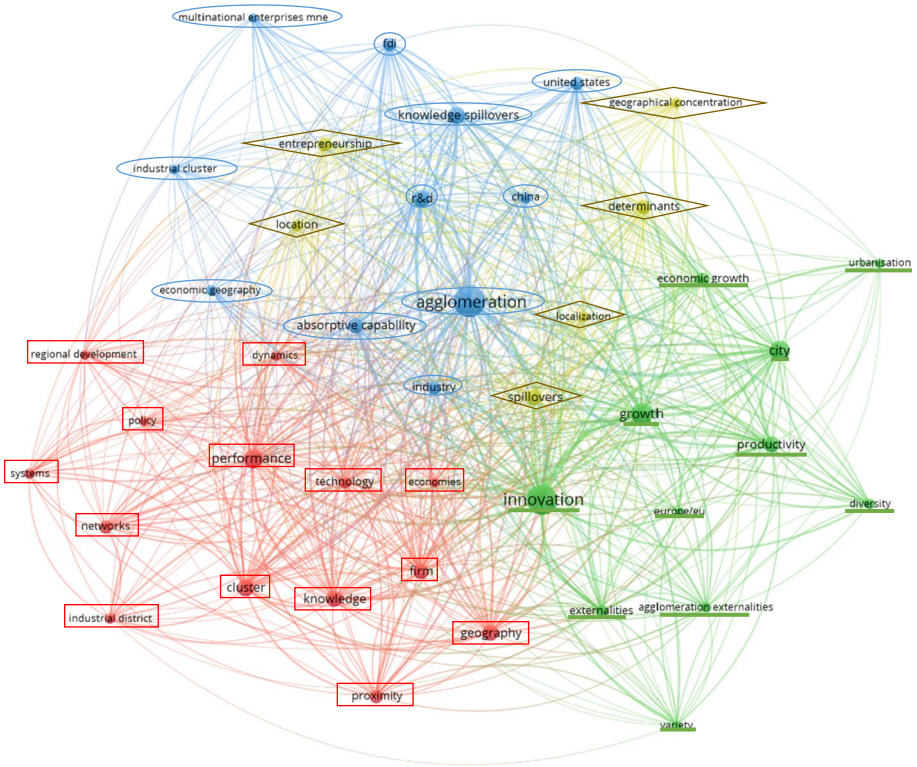

Fig. 6 Co-citation of the cited references (minimum number of citations of a cited reference: 17) in the "Agglomeration" stream for the years 2015–August 2019

started to tackle this issue (Betz et al. 2016; Mukherji and Silberman 2018). An overview of the graphs on the agglomeration literature reveals that the scope of investigation has evolved from a city level in the first period, to a wider variety of investigation units (industrial district or cluster, region, multinational enterprises) in the subsequent periods. Interestingly, the policy dimension started to gain importance in the years 2015–2019.

Finally, the focus on the perspective of absorptive capacity appears earlier in the mobility theme. It is possible to notice a different consideration of the role of absorptive capacity in the mobility and agglomeration research literature over time. Although this topic has been investigated in the mobility literature since the early nineties, when the first studies on the subject were conducted, manuscripts on the role of absorptive capacity only began to appear later within the agglomeration literature. This can be attributed to the evolution of the research on the absorptive capacity concept itself: at the beginning, the concept was established and implemented at an individual and firm level, and only after the development of studies on knowledge, innovation and agglomeration at the regional level, did it also assume a regional declination, which led to the introduction of the regional absorptive capacity construct in the agglomeration literature (e.g., Anwar and Nguyen 2014; Lau and Lo 2015; Miguélez and Moreno 2015).

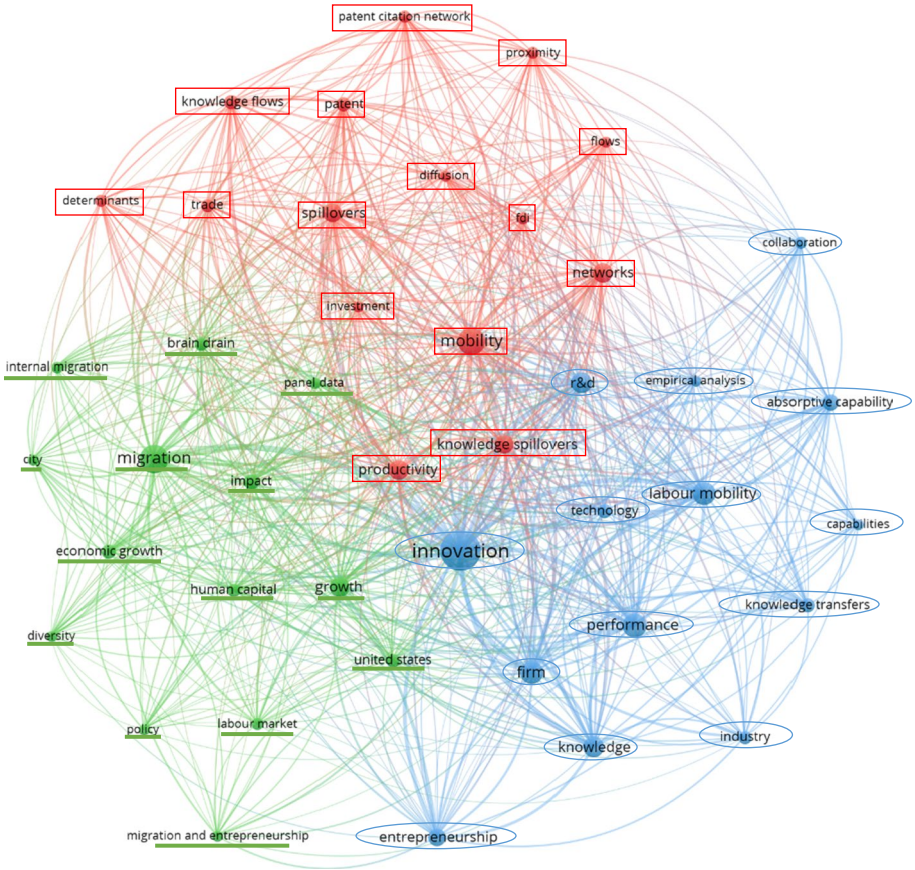

Fig. 7 Co-citation of the cited references (minimum number of citations of a cited reference: 17) in the "Mobility" stream for the years 2015–August 2019

4 Avenues for future research and the manuscripts in the special section

The graphs (Figs. 2, 3, 4, 5, 6, 7) show that some topics are currently underdeveloped or less connected to the network of the core topics. We hereafter highlight, among the others, four main avenues of interest for future research.

The first stream of research that calls for further analyses pertains to the city level perspective of the focal *agglomeration* and *mobility* topics (and migration in particular). The knowledge transfer mechanisms that arise in small regions and metropolitan areas require further analyses to explore the role of firms, human capital and policies in the relationship with diverse types of innovation activities. Moreover, the direction of such a relationship can be studied two ways: on the one hand, companies, workers and institutions can act as drivers of regional growth; on the other hand, the metropolitan areas or local clusters can act as attractors of innovative firms and highly skilled individuals, thereby reinforcing the previous direction of the relationship.

The second research path regards emerging themes connected to social aspects (e.g. education, inequality) that have started to gain relevance in the latter period. This type of investigation should focus on the mobility of individuals (within and across geographical borders) and explore the potential changes in the local community and the challenges posed by the increasing urbanization and migration flows with respect, for example, to the access to education and work opportunities, precariousness and inequality.

The third avenue of research could rely on the increased availability of data and favor multi-country studies that make global comparisons possible. Although previous studies have mainly analyzed the effects of mobility and agglomeration in single countries, future research could adopt a cross-country perspective.

Finally, notwithstanding the long-standing emphasis of economic geographers on migration as a prominent way of transferring knowledge, we have noted very few studies on how mobility and migration issues are related to entrepreneurship: this research area could be further explored in the future.

In the following sections, we present how the two manuscripts included in this special section have contributed toward bridging some of the gaps that have emerged from the analysis of the literature.

4.1 Agglomeration: urbanization, composition effect, and innovation rates

The first article included in the special section contributes to the first identified research stream: it focuses on the agglomeration and innovation activities of firms in a metropolitan area. The agglomeration of firms positively affects innovation performance across different geographical units of analysis, that is, clusters, districts, cities or regions (e.g. Sedgley and Elmslie 2004; Andersson et al. 2005; Carlino et al. 2007; Naz et al. 2015).

Innovative firms can actively choose to locate or relocate in specific areas that provide a favorable environment for their business (Baptista and Swann 1998) or necessary resources, such as knowledge (Feldman 1994). However, this could affect the distribution of innovative firms in a given geographical area. For example, innovative firms could be overrepresented in large urban areas. If this occurs, the studies that have observed and claimed that large urban areas are characterized by high innovation rates for aggregation reasons, without considering this phenomenon, could be inaccurate.

Niebuhr et al. (2019) labeled this phenomenon as the "composition effect", recognized its importance in explaining innovation disparities between regions, and started their study by claiming that the "composition effect" is not well understood. Through their paper, they provide new evidence on the relative importance of composition versus agglomeration effects for the (regional disparities in) innovation output of firms by disentangling the impact of the two channels. Their findings support the idea that a firm's characteristics are more important than the regional context in explaining differences in innovation outputs. In line with the recent studies on the correlation between agglomeration and the persistence of firm level innovation (Tavassoli and Karlsson 2018), the work calls for future research that could further investigate whether the differences in the distribution of highly innovative establishments can be explained entirely by considering composition effects or whether some of these firms do in fact benefit from localization economies.

4.2 Mobility: opportunity-driven entrepreneurship

The second article included in the special section deals with both the first and the fourth calls for research proposed above: urbanization and the impact of mobility and agglomeration on entrepreneurship.

In the last few years, several scientists have investigated entrepreneurship from a regional perspective, and have overemphasized the endogenous processes of entrepreneurship and innovation development (Acs et al. 2013; Huggins and Thompson 2014; Stam 2015; Nicotra et al. 2018). If it is true that entrepreneurial opportunities are mainly concentrated in specific sites that possess well-functioning entrepreneurial ecosystems, it is also true that this phenomenon depends largely on the individuals who exploit these opportunities. Starting from the work of Saxenian (2002), the phenomenon of "migrants as entrepreneurs" is increasingly being viewed as one of the sources of regional economic revitalization and social restructuring (Greenwood and Hunt 1984; Jokela 2009; Murakami 2014; Lee 2015; Frederiksen et al. 2016). The roots of this phenomenon are grounded in the idea that the mismatch between non-local knowledge and local embeddedness in entrepreneurship could provide interesting results in terms of innovativeness.

The study of Fu (this issue) investigates this aspect by focusing on migrants who move internally within national boundaries. It explores the interrelation between spatial mobility and entrepreneurship and suggests that spatial mobility provides intra-country migrants with multi-location knowledge and networks that can be used to exploit entrepreneurial opportunities. The study in particular highlights a higher prevalence of opportunity-driven entrepreneurship for migrant entrepreneurs and shows that mobility experiences outweigh local personal networks in terms of promoting the likelihood of starting an opportunity-based business. Consequently, Fu stresses that the entrepreneurial value of non-local knowledge and a migrant-targeted entrepreneurial policy should be acknowledged by policymakers in a knowledge economy that has the aim of promoting productive entrepreneurship.

The study also opens up the way toward two main areas of future research. First, future studies could consider a complete set of facilitating factors in city regions by systematically differentiating between endogenous and exogenous factors for regional entrepreneurship. Second, it could be important to test the relationship between spatial mobility and opportunity-driven entrepreneurship within contexts of both advanced economies and emerging economies, as it is plausible that many regional factors, such as direct foreign investment and availability of talents, are not fully brought into play.

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