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Abstract

Empirical analyses show that the employment effects of start-ups are highest in agglomerations, whereas moderately congested areas exhibit only modest effects, and weak or even no significant effects could be found in rural regions. This paper will set out to show that these discrepancies arise from specific characteristics of urban areas. The magnitude of the employment effects of entry in agglomerations can, therefore, be regarded as a further kind of agglomeration benefit which has not been discussed in the literature yet. In particular, it is explained how the distinct characteristics of urban areas contribute to the emergence of high-quality start-ups that are known to cause larger employment effects than other types of new businesses. In addition, this paper argues that the relatively intense competition in urban areas further stimulates the economic effects of new business formation in agglomerations.

JEL classification: M13, O1, O18, R11

Keywords: Entrepreneurship, new business formation, regional development, entrepreneurship policy

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1. Aims and scope[1]

It is widely acknowledged that new business formation is an engine of employment and growth. Therefore, the promotion of entrepreneurial activity has become a central instrument of economic growth policy in many countries (e.g., Audretsch et al. 2006, Lundstöm and Stevenson 2005). However, recent empirical analyses suggest that the relationship between new business formation and economic development is not straightforward and that it is to a considerable degree shaped by regional conditions. Whereas many regions are able to draw substantial employment growth out of the process of new business formation, the effect may be insignificant or even negative in other regions (Fritsch and Mueller 2008, Mueller, van Stel, and Storey 2008, Stel and Suddle 2008). In particular, there is growing evidence that the regional variation of the employment effects is closely related to the degree of agglomeration of economic activity, which can be regarded as a catch-all indicator for a multiplicity of regional conditions affecting new business formation and its economic impact. The effects of start-ups on employment turned out to be much more pronounced in agglomerations than in moderately congested and rural areas, presumably due to the special characteristics of these areas (e.g., Fritsch and Mueller 2004 and 2008, Fritsch and Schroeter 2009). For an entrepreneurship policy, this implies that the promotion of start-ups in agglomerated areas will be most promising as this will be expected to produce the largest economic effects.

However, the existing literature has not yet provided a detailed explanation of the underlying reasons for the distinct employment effects of start-ups in agglomerated areas. The aim of this paper, therefore, is to fill this gap by linking the specifics of agglomerations to the employment effects of new business formation. This paper suggests that the specific characteristics of urban areas, which have been /extensively described in the literature on agglomerations economies, have a further – yet unexplored – effect on economic development. They positively affect the employment effects of new business formation in two different ways. On the one hand, they support the emergence of high-quality start-ups, which are known to induce stronger employment effects than other types of new businesses. On the other hand, they induce a higher level of competition in urban areas that reinforces

[1] I am indebted to Michael Fritsch (Friedrich Schiller University, Jena) for his helpful comments on an earlier version of this paper.

the market selection and, thus, causes stronger employment effects of new businesses in agglomerations. This paper, therefore, contributes to the explanation of regional differences on the effects of entry. But it also adds to the vast literature on agglomerations benefits by introducing and explaining a new aspect of agglomeration benefits, which becomes effective at the regional level.

The paper proceeds as followed. Section 2 provides an overview of recent empirical results on the influence of congestion on the employment effects of new businesses. Subsequently, we discuss several explanations for the impact of density on the employment effects of start-ups (section 3). Section 4 concludes.

2. The impact of density on the employment effects of new business formation- an overview of the empirical evidence

There is growing empirical evidence that the relationship between new business formation and regional development is to a considerable degree shaped by regional conditions. The degree of agglomeration, mostly measured as population density, seems to be a critical determinant in this respect (Fritsch and Mueller 2004 and 2008, Fritsch and Schroeter 2009, Mueller et al. 2008, van Stel and Suddle 2008, Baptista and Preto 2007). Fritsch and Mueller (2004, 2008) found that the effects of start-ups on employment are more pronounced in the West German agglomerations than in the moderately congested areas and even stronger than in rural regions. By applying the Almon polynomial lag procedure, they were able to identify the “wave” pattern (see figure 1) in the employment effects of new businesses as well as the impact of density on this pattern.

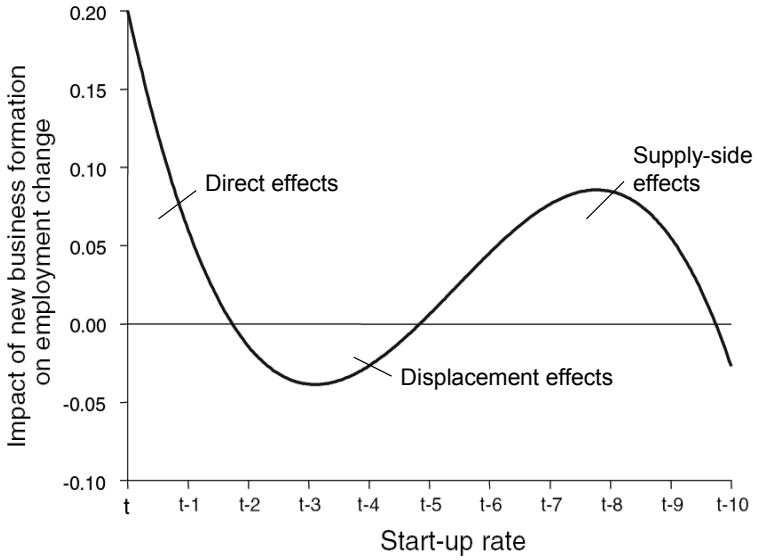


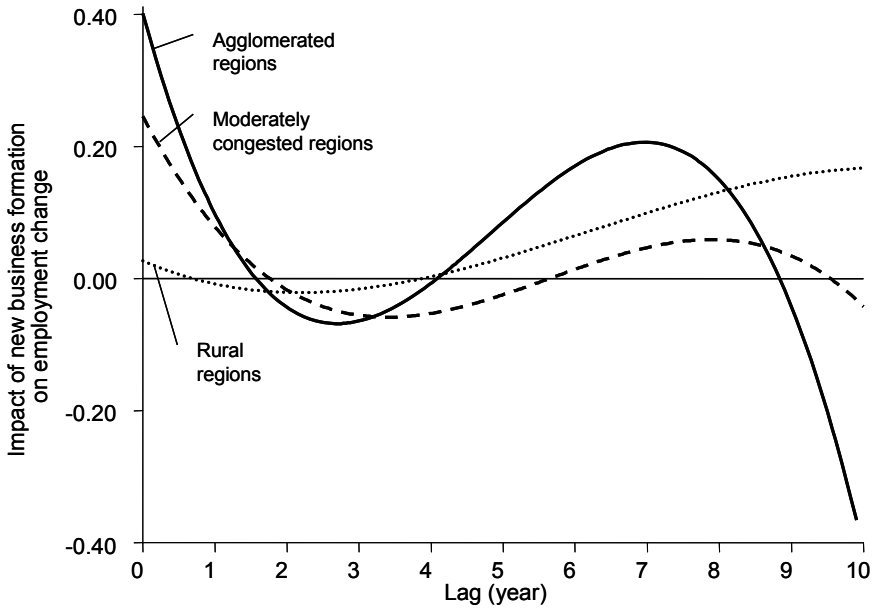
Figure 1: The effects of new business formation on employment change over time in West Germany

According to the empirical evidence, the effects of entry on regional employment are lagged and occur in three phases. In the first phase, the setting up of new businesses leads to an employment increase, obviously because extra personnel are needed to operate the additional capacities. This can be regarded as a direct employment effect of new businesses. At the same time, competition between the new and the incumbent businesses on input as well as on output markets spurs the market selection. As long as this market selection process works according to a 'survival of the fittest'-scenario, the least productive firms have to reduce their level of economic activity or must exit the market. Because such a scenario leads to a rise in average productivity, employment should decrease as far as output remains at a constant level (displacement effects). But the employment effect then may become positive again. By challenging established market positions, new businesses stimulate competition, which results in improvements in the competitiveness of the economy and finally in more output and employment (indirect or supply-side effects of new businesses).[2] They are the reason why one should expect positive

[2] The main supply-side effects induced by new businesses could be (a) securing efficiency and stimulating an increase in productivity by contesting established market positions; (b) the acceleration of structural change, e.g. incumbents are substituted by newcomers; (c) amplified innovation, particularly, the creation of new markets; and (d) a greater variety of products and problem solutions. These improvements may occur on the side of the start-ups as well as on the

employment effects of new business formation (see also Fritsch and Noseleit 2009). For the emergence of these supply-side effects, it is of critical importance that market selection works in accordance with a 'survival of the fittest' scenario. If the market mechanism forced the relatively efficient firms to exit and allowed the inefficient firms to survive, the result would be a decrease in the economy's competitiveness. After about ten years after the start-ups occurred, their effects on economic development fade away.

The magnitude of the effect in each phase as well as the total employment impact of new businesses was found to be strongly shaped by the degree of agglomeration as figure 2 illustrates. The short-term (direct) effects of start-ups as well as the long-term (supply-side) effects are much more pronounced in agglomerations. Although the negative medium-term (displacement) effects are also slightly larger than in the other spatial categories, the stronger direct effects and supply-side effects lead to a larger overall employment impact of new businesses in agglomerations. Fritsch and Mueller (2004 and 2008) hypothesize that the stronger effects of new ventures in agglomerations are, the result of a high intensity of competition as well as a high share of innovative start-ups.



Source: Fritsch and Mueller (2008)

side of the incumbents. The emergence of these improvements, therefore, does not necessarily require the newcomers to be successful and survive.

Figure 2: The effect of new business formation on regional employment according to the degree of agglomeration

Following Frisch and Mueller (2004 and 2008), van Stel and Suddle (2008) analyzed the employment effects of new business formation in urban and rural regions in the Netherlands and come to comparable findings. While the total employment impact of start-ups was found to be positive in urban regions, the effect of new businesses in rural areas turned out to be negative. Moreover, in their study on the relative importance of the different employment effects of new businesses, Fritsch and Noseleit (2008) revealed that the indirect effects, which make up the largest part of the employment contribution of start-ups, strongly vary across spatial categories, whereas the direct effects are almost equal in the different region types. The indirect effects in agglomerations and in congested areas resemble the wave-pattern of the overall effect found by Fritsch and Mueller (2004, 2008), indicating the largest effect of new firms in agglomerated areas. In contrast, the supply-side effects of new businesses in rural regions are only significant for the first year after inception and even show a negative sign. The authors assume that the spatial proximity of actors and the resulting intense competition are responsible for the greater effects of start-ups in agglomerations. By applying a cross-sectional approach, Fritsch and Schroeter (2009) found evidence that the regional variation of the employment effects of German start-ups is closely related to population density. Finally, Baptista and Preto (2007) detected that knowledge-based start-ups generate higher employment growth in gazelle regions, i.e. highly agglomerated areas displaying high shares of rapidly growing firms. In contrast, density does not influence the employment effects of non-innovative businesses. The authors suppose that greater business dynamics and agglomeration effects are especially beneficial for innovative firms, but less or even not important for non-innovative businesses.

3. Why is the influence of density so dominant?

Empirical results provide strong evidence that the pronounced regional differences in the magnitude of employment effects of new businesses are closely related to the

density of economic activity. However, the underlying reasons for this connection have not been examined in detail yet.

The benefits emanating from the concentration of economic actors have been widely analyzed in the literature as an explanation for the concentration of industries and innovation as well as for the growth of cities (for an overview, see Rosenthal and Strange 2004). Economic actors benefit from co-location because of cost savings with regard to transportation and transaction costs (Baptista 1999, Audretsch 2003, Veltz 1996). But more importantly, the proximity of economic actors facilitates knowledge spillovers and mutual learning that can be regarded as the main drivers of innovation, the engine of growth (Romer 1986, Lucas 1988). Depending on the source of agglomeration economies, one distinguishes between localization economies, emanating from the concentration of firms in one industry, and urbanization economies, i.e. externalities arising from the concentration of diverse and unrelated economic activities or from the mere city size (e.g., Ohlin 1933, Hoover 1937, Rosenthal and Strange 2004, Parr 2002). Localization economies refer to the advantages of large specialized labor markets, input-output linkages within an industry, specialized physical (e.g., transportation infrastructure) and knowledge (e.g., universities and public research institutions) infrastructure as well as intra-industry knowledge spillovers. In contrast, urbanization economies result from the scale and diversity with regard to specialized suppliers and supporting business services, labor markets, physical and knowledge infrastructure as well as knowledge spillovers among industries (Jacobs 1969, Parr 2002). In addition, some authors state that competition is a further virtue of agglomerations (e.g., Jacobs 1969, Porter 1990, Glaeser et al., 2001). It was especially Porter (1990) who underlined the importance of local competition for innovativeness and growth in agglomerations. He argues that local competition accelerates the imitation and improvement of innovations and, therefore, forces local firms to innovate. The resulting ruthless, innovation-based competition between local competitors generates competitiveness and growth. [3]

[3] Since competitors are by definition in the same industry, Porter's argumentation is based on the assumption of intra-industry externalities.

This paper suggests that the specific characteristics of agglomerations also give rise to the relatively larger employment effects of start-ups in agglomerated areas. They can, therefore, be considered as a further category of agglomeration benefits that have not been previously discussed in the literature. The urban particularities positively affect the employment effects of new business formation in two different ways. First, they foster the emergence of high-quality start-ups, which are known to induce larger employment effects than other types of new businesses. Second, they cause an intense competition that spurs the market selection and finally leads to a higher performance of the surviving firms, which is – amongst others – reflected in larger employment effects of entry in agglomerations.

The prevalence of new ventures' quality with regard to their economic effects as well as the role of agglomerations in fostering this quality is discussed in section 3.1. Section 3.2 examines how the intense competition in agglomerations contributes to the relatively large employment effects of start-ups in urban areas.

3.1. Structural characteristics of agglomerations and their effect on the quality of start-ups

The quality of new businesses may be determined by such factors as the qualification of the entrepreneur, the amount and quality of resources that are mobilized for the new business, the marketing strategy that is pursued as well as the quality and the innovativeness of the supplied goods and services. In other words, the quality of new businesses reflects the challenge they impose on incumbents to implement improvements in order to stay competitive. Therefore, high-quality start-ups are likely to induce larger direct and, more importantly, larger supply-side effects than other new ventures. Empirical results suggest that ambitious, i.e. innovative and growth oriented entrepreneurship, predominantly occurs in dense areas (Bosma 2009). In addition, agglomerations show a relatively higher share of start-ups in knowledge-intensive and high-tech industries than moderately congested and rural areas (Audretsch et al. 2006, Bade and Nerlinger 2000). As these start-ups are likely to impose a greater challenge on incumbents to implement improvements than other start-ups, they can be regarded as *innovative or high-quality start-ups*.

There is growing empirical evidence that the effects of new businesses on subsequent employment change strongly depend on the quality of the entrants (Baptista et al. 2008, Baptista and Preto 2007 van Stel and Suddle 2008, Falck 2008, Metzger and Engel 2006, Fritsch and Schroeter 2008). In their study on direct effects of new firms in West Germany, Engel and Metzger (2006) proved that the cohorts of superior-tech and high-tech business experience by far the strongest positive employment development, followed by those in technology-intensive services and non-technical consulting. In contrast, the employment development in entry cohorts in low-tech industries is much weaker and even declines three years after inception. Considering the total effect of new businesses, Baptista and Preto (2007) showed that the effect of knowledge based firms on subsequent employment development is substantially larger than for other firms. Furthermore, van Stel and Suddle (2008) found the employment development caused by new ventures to be the largest for new businesses in manufacturing industries. Fritsch and Schroeter (2009) could detect significant effects of start-ups only in manufacturing but not in services. Assuming that start-ups in manufacturing are of a relatively higher quality due to higher entry barriers in terms of minimum efficient size and capital intensity, these findings further support the hypothesis that the magnitude of the employment effects is strongly determined by the quality of start-ups.

Therefore, supposing that high-quality start-ups impose a greater challenge on incumbents than non-innovative start-ups, the higher share of such new businesses in agglomerations may be responsible for the more pronounced effects of new business formation in these regions (see also Mueller 2006). However, this leads to the question why innovative start-ups are more frequent in agglomerations than in other types of regions.

In explaining this, I follow the view that entrepreneurship is a process of perceiving opportunities and transforming them into innovative products and processes that create economic value and growth (Shane 2000, Shane and Venkatarakan 2001, Shane and Eckhardt 2003). Accordingly, the number and the quality of new businesses should vary across regions depending on the pool of innovative opportunities as well as on the quantity and quality of resources available to use these opportunities (Shane 1996, Acs and Armington 2004). I argue that because of their specific characteristics, agglomerations offer relatively better

conditions for the creation, dissemination, and exploitation of innovative opportunities than moderately congested and rural areas. Empirically, this is reflected in a higher share of high-quality start-ups, which are in turn responsible for the relatively large employment effects of entry in urban areas. The advantages of agglomerations in this respect accrue from the combination of a broad knowledge base, a great diversity of economic activities, a strong and diverse local demand, a rich resource base, and the proximity of actors that fosters knowledge spillover.

Knowledge base

New knowledge is a major source of entrepreneurial opportunities (Acs and Varga 2005). A region's potential to generate, explore, and exploit new knowledge strongly depends on its knowledge base, i.e. the knowledge and competences embodied in science and research institutions (e.g., universities and other research establishments), in private sector firms as well as in the regional workforce (van Winden et al. 2007). Empirically, the knowledge base is reflected by the regional level of human capital and the stock of creative capital (van Winden et al. 2007) as well as by search activities related to science and technology. Agglomerations show a relatively higher knowledge base than moderately congested and rural areas for several reasons.

Human capital, traditionally measured as years of schooling, percentage of skilled labor, or share of highly-educated employees tends to be concentrated in agglomerations (Glaeser 1999). Empirical studies suggest a positive relation between measures of human capital and entrepreneurial activity in a region (Audretsch and Feldman 2004, Anderson et al. 2005; Acs and Armington 2004). Human capital increases the knowledge stock, the cognitive capabilities, and the skills of individuals (Schultz 1959, Becker 1964, Mincer 1974) which are crucial for the entrepreneurial process. For example, people with a higher level of human capital are more likely to create new ideas, to gain information about market niches, and to posses the skills necessary to run a business. Therefore, people with a quantitatively or qualitatively higher human capital endowment are assumed to be better at creating, perceiving, and exploiting entrepreneurial opportunities (Shane 2000, 2005). This relation was also confirmed for high-quality start-ups (Baptista and Mendoca, Audretsch et al. 2006, Storey and Tether 1996). For example, Baptista and Mendonca (2007) found

regional start-ups rates of knowledge-based manufacturing and service firms to be strongly influenced by the regional number of students and graduates, while the educational level of the regional workforce only impacted the start-up rates in knowledge-intensive services. Similarly, Audretsch et al. (2006) confirmed a positive effect of the number of students on new firm formation rates in technology-oriented industries in Germany.

But recent literature claims that the traditional, education-based measures of human capital only partly reflect the intelligence, creativity, experience, and entrepreneurial capabilities of individuals (e.g., Florida 2002, 2004a and 2008). Florida proposes an occupation-based measure of human capital, specifically a set of creative professions including science, engineering, arts, and knowledge-based occupations of finance, law, healthcare, and education which are also referred to as the "creative class".[4] According to Florida, the creative human capital stimulates a region's economy by introducing new ideas, new technology, or new content. Hence, it can be regarded as a crucial determinant of the generation of innovative entrepreneurial opportunities. In addition, the "creative class" probably possesses the skills necessary for recognizing and implementing innovative business opportunities. Finally, assuming that creative people are more prone to (economic) independence, it is plausible to assume that creative people have a higher inclination to launch a venture than non-creative people (Acs et al. 2008). Correspondingly, Lee et al. (2004) found a significantly positive relationship between the share of creative employment in a region and the level of start-ups. Bosma and Fritsch (2007) detected a high correlation between the share of highly skilled, creative people and start-ups in high-tech sectors for Germany, Finland, Sweden, and Norway.[5] Since creative human capital tends to be concentrated in city-regions (Florida 2004, Fritsch and

[4] This indicator is supposed to display how education is applied and transferred into skills and productivity instead of reflecting potential capabilities gained by education. However, many of the occupations that are defined as creative are associated with high levels of education. Thus, there is a strong overlapping between educational and occupational measures that has often been criticized in the literature (e.g., Markusen et al. 2006, Glaeser 2004). Nevertheless, educational attainment does not affect economic development if it is not applied. For example, it is doubtful whether an engineer working as deliverer is really creative and influences the creation and use of knowledge in society.

[5] The creative class indicators even outperformed the education-based indicator of human capital for Finland and Norway, whereas education shows a higher correlation with the overall start-up rate in Sweden and no difference could be found for Germany.

Stuetzer 2008), the share of high-quality start-ups should also be higher in these areas.

The clustering of skilled and creative labor in agglomerations is strongly connected to the location of innovative activities. Empirical findings suggest that public and private innovative efforts – regardless if they are defined as input or output measures – tend to be concentrated in metropolitan areas (e.g., Malecki 1979, Audretsch and Feldman 1996, Fritsch and Slavtchev 2008). This signifies a functional specialization between urban areas, focusing on knowledge intensive activities, and more peripheral regions that concentrate on more standardized and routine-based production (e.g., Duranton and Puga 2001). The clustering of innovative activities in agglomerations exerts a strong positive effect on new business formation rates, especially on high-quality start-ups in two respects.

First, innovative activities of science and research institutions (e.g., universities and other private and public research establishments) as well as in private sector firms are major sources of innovative entrepreneurial opportunities, in particular for high-tech industries (Stam 2008). These opportunities especially emanate from the creation of new technological or scientific knowledge, which are largely the result of deliberate public and private research and development efforts (Cohen and Klepper 1991 and 1992, Nelson 1993, Edquist 1997, Carree and Thurik 2003). However, these organizations are frequently not able or willing to fully pursue and commercialize this knowledge. Based on the finding that new and small firms account for a disproportional large part of innovative output given their negligible investments in knowledge creation (Audretsch 1995), the knowledge spillover theory of entrepreneurship posits that new knowledge and ideas created in private firms, research institutes, and universities, but which are left unexploited, constitute a major source of opportunities for new and small firms (e.g., Audretsch 1995, Acs and Plummer 2005, Audretsch and Keilbach 2005).[6] The newly generated knowledge spills over to a third party that may exploit this knowledge by starting a new venture (Azoulay and Shane 2001). Frequently, former employees of research institutes or

[6] There are several reasons why new ideas may not be exploited. Firms may be reluctant to pursue new ideas due to the uncertainty associated with the innovation process. In addition, firms may not be interested in searching for new profit opportunities, but rather concentrate on the exploitation of given technologies and products (Audretsch 1995, Geroski 1995). Besides, new knowledge created in universities and other research institutions could be underexploited as their mission is considered to be the exploration of new knowledge but not its exploitation (Mueller 2006).

incumbent firms commercialize on the new knowledge by starting a new firm and trying to exploit and appropriate the value of new knowledge.[7] Empirically, this pattern could be observed mainly in innovative or technology-intensive industries where knowledge is predominantly embodied in people, like the laser industry, the disk drive industry, the wireless telecommunication industry, or the biotech industry (Franco and Filson 2008, Klepper and Sleeper 2005, Dahl et al. 2003, Garnsey and Heffernan 2005, Agarwal et al. 2003, Cooke 2001).

From this it follows that entrepreneurial opportunities increase as the (absolute and relative) investments in new knowledge increase. Empirically, a number of studies could confirm that regions with higher knowledge investment also exhibit greater levels of knowledge spillovers and vice versa (e.g., Jaffe 1989, Audretsch and Feldmann 1996). Therefore, it is plausible to presume that knowledge spillovers and, thus, entrepreneurial opportunities are relatively abundant in agglomerations compared to other spatial categories. Technology-oriented start-ups that are considered to be of high-quality are especially dependent on new technological and scientific knowledge as well as on highly skilled employees that can be found in the environment of public and private research facilities. Therefore, science and research institutions as well as companies that conduct R&D act as incubators for technology-oriented new firms (Agarwall et al. 2004, Franco and Filson 2000, Klepper and Sleeper 2005).

Empirical results confirm that new firms in knowledge-intensive industries tend to locate in areas with large public and/or private R&D investments, supposedly in order to access knowledge spillover. Audretsch et al. (2006) showed that university spillover positively affect the number of knowledge-oriented start-ups in Germany. Likewise, in his study on the effects of Massachusetts Institute of Technology (MIT) on regional start-up activity, Shane (2001a and 2001b) found that university spillovers are largely exploited by new firms. Baptista and Mendoca (2006) showed that knowledge spillovers from company R&D and universities are an important determinant of the location of knowledge-intensive start-ups in manufacturing and services. Moreover, the findings of Bade and Nerlinger (2000) suggest that R&D

[7] Studies on spin-offs found that former employees launch their own venture and commercialize on the knowledge generated in the incumbent firm if they are frustrated due to the rejection of their innovative ideas by their former employer or if they expect larger financial awards from exploiting the new knowledge on their own (Garvin 1983, Klepper and Sleeper 2005).

activities of public research institutes are crucial for the number of top-tech start-ups in manufacturing and new high-tech ventures in services, whereas the amount of high-tech start-ups depends on firm R&D inputs. Finally, a study by Karlsson and Nystrom (2006) explored knowledge spillover from universities and company R&D to positively affect new firm formation in knowledge-intensive services, while for knowledge-intensive manufacturing start-ups only access to firm R&D seems to matter.

Second, universities, research facilities, and private sector firms significantly contribute to the regional human capital endowment. On the one hand, this refers to the attraction and education of human capital in general. Universities and other higher education establishments attract students and provide them with human capital necessary to generate, identify, and use new knowledge. Likewise, attractive jobs in a firm's headquarters entice highly qualified workers whose skills and knowledge are increased as a result of on the job training. On the other hand, in particular the knowledge-generating R&D activities in universities, research institutes, and firms strongly increase the regional stock of human capital. According to Cohen and Levinthal (1989), R&D activities not only generate new knowledge, but also increase an organization's ability to identify, assimilate, and exploit externally created knowledge by augmenting the human capital of their employees (see also Cohen and Levinthal 1990, Zucker et al. 1998). This implies that the higher the level of research and development activities is, the greater the level of absorptive capacity as well as the pool of knowledge that can be exploited is. Applied to the regional level, this suggests that the amount of R&D activities not only causes the quantity and quality of innovative opportunities, but also the possibilities to recognize and exploit them.

Diversity

Diversity is another distinctive characteristic of agglomerations. Following Jacobs (1969), diversified cities provide the best environment for spurring creativity and innovation, which are the underlying forces of entrepreneurship. The main benefit of social and economic variety is that of so-called new combinations (Schumpeter 1934), i.e. the recombination of existing pieces of knowledge from different backgrounds that result in new ideas and business opportunities. Particularly, the combination of ideas from totally unrelated fields may increase the probability of

discovering radically new solutions (Boschma and Lambooy 2002). Jacobs (1969) also argued that diversified cities provide the best milieu to “add new work to old.” Entrepreneurial opportunities may arise by combining ideas from different fields or by finding a new application for an already existing idea or concept (Desrochers 2000, 2001). Prominent examples for the former are Thomas Edison, whose idea for the screw base of his light bulb was based on the unscrewed the cover of a kerosene can (Smil 2005) and the inventor of the shipping container, Charles McLean, whose invention was inspired by watching bales of cotton being hauled by laborers, with the trailer eventually becoming the container (Jung 2005). Well-known examples for the new use of existing know-how are templates that were first developed by railroad companies and later adapted by American telegraph companies to handle the flow of multiple message to and from multiple locations (Bunker and Ciccantell 2005) or the integration of sheet steel punch and presswork technology by Ford which were originally used in the bicycle industry. Therefore, the local diversity of economic actors and resources can be regarded as a further important source of innovative opportunities because it provides the scope for the cross-fertilization of competences and knowledge from unrelated fields.

Nevertheless, a recent stream of literature claims that it is not variety per se, but the complementarity of diverse competences that is decisive for the generation of knowledge and innovation (e.g., Frenken et al. 2007, Bosma and Immarino 2007). It is assumed that knowledge and ideas will only spill over if the cognitive distance between actors is not too large (Nooteboom 2000, Bosma 2005), i.e. they have to be related by complementary knowledge bases and competences that are necessary to secure effective communication, understanding, and learning (Bosma and Immarino 2007, Cohen and Levinthal 1990). For example, what can a farmer learn from a laser-producing company despite the fact that they are neighbors? Therefore, related instead of unrelated variety is said to be crucial for learning and creating new ideas. As related variety is often largest in cities (Frenken et al. 2007), it is plausible to assume that this is also true for the amount of innovative entrepreneurial opportunities emanating from the cross-fertilization of knowledge of related fields. But as the examples of the light bulb or the shipping container illustrate, variety as source of new ideas is not restricted to complementarity; although it seems plausible that the

relatedness of knowledge bases facilitates the recombination of existing pieces of knowledge.

Following the "economic geography of talent" hypothesis introduced by Florida (2002, 2004a and b), the diversity of urban centers also attracts highly qualified, creative people (the so-called "creative class"). He argues that people in creative occupations base their location decision not only on job opportunities, but equally important on factors such as an urban climate of tolerance and openness towards new ideas or different styles of living. These places show low barriers to entry for human capital, therefore attracting a broad range of talent across racial, ethnic, and other lines (Florida et al. 2008). Creative people prefer these environments as they allow for unorthodox ideas and their diversity serves as a source of inspiration for innovative activities (Andersen and Lorenzen 2005). Besides, they are also attracted by the variety of urban amenities, like cinemas, bars, museums, art galleries, restaurants, or trendy shops. (Florida 2002, Glaeser et al. 2001). Therefore, creativity and talent tend to concentrated in city-regions (Florida 2004a).

According to Florida, regions that provide a welcoming and open environment to creative people will benefit economically as they are more innovative and entrepreneurial and attract creative businesses like high tech-firms. Hence, he challenges the orthodox view that regional growth is driven by "hard" locational factors like low taxes or a rich supply of physical infrastructure. Instead, he postulates that the main economic asset of places stems from a tolerant, diverse, and open-minded urban culture that attracts and retains creative, highly qualified people who in turn create new knowledge, innovation, and growth (Florida 2004a and b).[8] It is, particularly, the combination of creativity and diversity that stimulates the creation of new ideas and novel combinations of existing knowledge. The concentration of diverse and creative actors in agglomerations also constitutes an important source of innovative entrepreneurial opportunities. In addition, the share of highly qualified and talented people also contribute to the emergence of high-quality start-ups as they are likely to possess the skills for recognizing and implementing innovative business opportunities (Lee et al. 2004). Therefore, although causalities are not easy to

[8] Consequently, Florida challenges the common wisdom that human capital is attracted to economically prospering places. On the contrary, he claims that regional growth is expected to be a result of the presence of creative and talented people. Or in the terminology of Florida, jobs will follow people, instead of people following jobs (Florida 2004a).

identify, there seems to be a mutually reinforcing interdependence among certain characteristics of cities (e.g., cultural or ethnic diversity), the concentration of talented and creative people, and the quantity and quality of entrepreneurship.

Resource base

The exploitation of entrepreneurial opportunities requires various resources such as human capital, intermediate goods, and business services. High-quality start-ups show specific requirements with regard to these inputs that can be best met by the diverse and specialized input markets in agglomerations.

On the one hand, this refers to the supply of skilled workers. Theoretical considerations and empirical evidence suggest that human capital of employees is a crucial resource for the creation and development of new ventures (e.g., Krugman 1991, Salmen 2001, Acs and Armington 2004). Therefore, it can be assumed that the level and the diversity of human capital available in a region is an important determinant of the location of high-quality start-ups (Stuart and Sorensen 2001). Especially high-quality start-ups demand qualified and highly-specialized employees (Stuart and Sorensen 2003) who tend to be concentrated in agglomerations for several reasons. First, the scale and the diversity of economic activities contribute to the emergence of a large and diverse pool of specialized human capital (Glaeser 1998). Moreover, the presence of academic education and the concentration knowledge intensive activities (e.g., management as well as research and development) attracts, retains, and increases highly qualified and specialized human capital. Finally, skilled workers are attracted and retained by a diverse and creative (social) environment that is most likely to be found in urbanized areas (Florida 2002 and 2004). Therefore, high-quality start-ups are more likely to find highly skilled and specialized employees that match their requirements in the large and diverse urban labor markets.

On the other hand, the local presence of a large and diverse supply of intermediate goods and business services is an important input factor particularly for the exploitation of high-quality entrepreneurial opportunities. Agglomerations provide unique pools of specialized intermediate good suppliers with special technical knowledge and assets that support the development and implementation of new

knowledge (Simmie 2002). They are complemented by high-end business services, like consulting, financing, marketing, tax, and legal advice as well as R&D services which tend to concentrate in agglomerations as well (Holmes and Stevens 2004b, Shearmur and Doloreaux 2008). Since high-quality start-ups are associated with product or process innovation, their demand for input is at least highly special but mostly innovative. Thus, they benefit from being located in agglomerations due to the possibilities of picking and matching highly-specialized inputs throughout the whole entrepreneurial process.[9] However, input-output relations can also be performed over spatial distance, and the strong localization of these linkages is rarely because of high physical transportation costs of goods or people. It is rather the necessity of personal interaction that makes the local supply of such inputs important. Personal contact is essential whenever information is incomplete, distributed asymmetrically between the actors, or if inputs are rarely standardized or even tailor-made (Storper and Venables 2004). Such input-output-relations are typical for high-quality start-ups as the following two examples illustrate.

First, due to the risks associated with the development and introduction of innovations, most high-quality start-ups are funded by Venture Capital (VC) companies. This is particularly true for technology-oriented new businesses whose (potential) investors face strong difficulties in evaluating early-stage technologies, uncertainty about the R&D results and their market potential, few tangible assets as well as high failure rates of technology-based start-ups (Stuart and Sorensen 2003, Athreye and Keble 2000, Kortum and Lerner 2000, Florida and Kenney 1988). Empirical results suggest that VC firms are highly clustered in space, especially in the urban centers.[10] The importance of proximity between the investor and the financed firm can mainly be attributed to the activities that VC companies perform in connection with the funding of the new business. They consult and monitor their portfolio firms, and these services require frequent and direct personal interactions

[9] Of cause, high-quality start-ups also profit from lower transport costs and lower costs of intermediate inputs and business services in agglomerations that have been widely discussed in the literature on agglomeration benefits (for an overview, see Rosenthal and Strange 2004, Duranton and Puga 2004). However, these benefits do not exclusively affect high-quality start-ups, but rather all (new) ventures and are, therefore, not considered.

[10] See for example, Sorensen and Stuart 200, Powell et al. 2002, Florida et al. 1991, Leinbach and Amrhein 1987 for the US VC market, Mason and Harrison 1999 and 2002a, Martin 1989, Martin et al. 2005 for the UK VC market, Martin et al. (2002) for the French and German markets.

(Gompers 1995, Lerner 1995; Sapienza and Gupta, 1994, Petersen and Rajan, 2002). In addition,, transaction costs of monitoring and supervising increase with distance (Mason and Harisson 2002b, Stuart and Sorensen 2001). Therefore, venture capitalists prefer investments that are nearby (Sorensen and Stuart 2001, Gompers 1995, Fried and Hisrich 1995, Hellmann and Puri 2002, Kaplan and Strömerg 2004).[11] As a result, the local presence of VC companies is an important benefit of agglomerations in fostering high-quality entrepreneurship.

Second, high-quality start-ups are typically based on some kind of innovation, requiring adapted or even customized intermediate goods and services, tools, or machinery. As far as the provision of these goods or services is associated with frequent interaction, proximity to these suppliers might be crucial. This is particularly true for contract or cooperative research and development activities that involve the transfer of tacit (i.e. not completely codified) knowledge as well as a high degree of uncertainty as their results are rarely predictable. They, therefore, necessitate frequent personal interaction. Hence, the local presence of specialized services and intermediate good suppliers is an important input factor for high-quality businesses. As agglomerations provide a relatively wide and diversified range of these suppliers, high-quality start-ups are more likely to find a supplier that matches their specific requirements in urban areas.

Local Demand

The literature on new business formation identifies local market demand as an important determinant of start-up activity (e.g., for the USA see Armington and Acs, 2002, for Germany see Fritsch and Falck 2007, Audretsch and Fritsch 1994). In particular, the large and diversified local markets in agglomerations (Glaeser 2007; Glaeser et al. 2000) offer a variety of niches that can be exploited by new firms (Acs et al. 2008). In addition, the concentration of innovative activities and headquarter functions implies a high demand for the provision of high-quality services and assets

[11] However, there is also counterevidence. For example, Fritsch and Schilder (2008a and 2008b) show that proximity of VC firms and their portfolio companies is not a necessary precondition for an investment. VC companies tend to syndicate VC investments that are far away in order to overcome the problems attached to investments that are located far away. Nevertheless, the authors acknowledge that the surprising unimportance of spatial distance may also be related to the relatively balanced spatial structure in Germany that allows for a relative good accessibility of most locations, and a shortage of promising VC investment opportunities in Germany.

(Davis and Henderson 2008). Therefore, agglomerations provide favorable demand conditions that are conducive to the emergence of high-quality start-ups. However, the importance of local market conditions should not be overstated for these new businesses as they are frequently aiming at inter-regional or international markets. A crucial part of high-quality new businesses are even "born global," i.e. they enter foreign markets right after or shortly after their foundation (Rennie 1993, Rialp et al. 2005 for an overview of the literature). Empirical evidence is strong for high-tech manufacturing firms, but there is also striking evidence for high-quality services that serve international markets right from the start or shortly thereafter (e.g., Mahnke and Venzin 2003, Schmidt-Buchholz 2001, Metzger et al. 2008).[12] Nevertheless, local markets remain relevant, especially if transactions comprise the provision of specialized goods and services, whose production requires frequent and/or face-to-face interactions. Thus, large and diversified local demand markets in agglomerations remain an important determinant of the emergence of high-quality start-ups.

Proximity

Proximity of economic actors is a key characteristic of agglomerations. The crowding of individuals creates opportunities for intended and unintended personal contacts and, therefore, stimulates the quick flow and exchange of knowledge and ideas (Jacobs 1969). Hence, geographic propinquity provides opportunities to learn by sharing knowledge and imitating successful routines (Malmberg and Maskell 2002). In this manner, proximity also affects the generation, dissemination, and exploitation of entrepreneurial opportunities and, thus, the emergence of high-quality start-ups.

The importance of propinquity basically emanates from the special attributes of knowledge. As long as the knowledge is codified, i.e. it is written down in texts, blueprints, mathematical formulae, or it is embodied in products or processes, it can be easily communicated between actors and across space (Polanyi 1966). In contrast, tacit knowledge is less codified or even uncodifiable and embodied in persons or processes. Since it is often embedded in individual experiences and involves intangible factors, such as personal beliefs, insights, intuitions, and the value system, its precise meaning is interpretative. Hence, tacit knowledge can rarely be

[12] Prominent examples are consulting firms, internet-based service firms, like Amazon or eBay, and software firms like Intershop.

transferred by standardized mediums over larger distance (Maskell and Malmberg 1999). Rather its exchange – if at all possible – requires face-to-face contact (Teece 1981, von Hippel 1994, Asheim and Isaken 2002) that allows for verbal and non-verbal communication. Non-verbal communication forms, like facial and vocal expressions, postures, movements, and gestures, comprise important additional information that are crucial for understanding externally generated knowledge and can only be observed in personal contacts (Mehrabian 1981, Storper and Venables 2004.

Therefore, if proximity fosters the flow of ideas and knowledge, spillover should be strongest within agglomerations as the density of actors facilitates intended and random personal contacts among people and, thus, provides more opportunities for learning. This seems particularly true for the flow of tacit knowledge, which constitutes a substantial amount of knowledge of organizations and individuals (Teece 1977). In particular, tacitness is a striking feature of innovative activities and the thereby created new knowledge. Therefore, agglomerations provide favorable conditions for the creation and transmission of new knowledge. Consequently, urban areas also stimulate the emergence of high-quality start-ups as new knowledge is an important source of entrepreneurial opportunities and new and existing ideas disseminate much faster and more complete to potential applicants in an environment that allows for frequent intended or haphazard personal contacts.

The importance of propinquity in accessing and exploiting externally created knowledge for start-ups has been widely investigated in the literature. It is argued that locating close to the sources of new knowledge increases the expected profits of new firms by lowering the costs of accessing this knowledge (Audretsch and Lehmann 2005). These savings arise because the absorption of externally created knowledge is much cheaper than its internal generation and because the cost of accessing knowledge spillover decrease with the proximity to its source (Harhoff 2000). Since high-quality start-ups are based on innovations that are likely to cause substantial development investments, these benefits should be particularly high for this kind of business. Correspondingly, numerous empirical studies confirmed the importance of localized knowledge spillover emanating from research organizations and from incumbent firms for the emergence of high-quality start-ups (e.g., Bade and Nerlinger

2000, Audretsch et al. 2006, Audretsch and Lehmann 2005, Baptista and Mendoca 2006, Karlsson and Nystrom 2006).

Nevertheless, the mechanisms underlying the spillover of (tacit) knowledge are less clear (Storper and Venables 2004). Empirical studies suggest that (tacit) knowledge is best disseminated and exchanged within social networks (Piore and Sabel 1984, Saxanian 1994, Sorensen and Stuart 2001). Social networks constitute social relations between actors that are based on trust and reciprocity. Therefore, they are an advantageous alternative for obtaining fine-grained information, tacit knowledge, resources as well as for common problem solving compared to the government structures market and hierarchy (Putnam 2000, Adler and Kwon 2002, Uzzi 1996). However, social networks do not connect individuals randomly. Rather, proximity of individuals is crucial for the development of social ties as it increases the possibility of frequent and personal encounters which are a precondition for trust building. In addition, geographic propinquity often implies cognitive (common knowledge and interpretation schemes) and institutional proximity (e.g., language, social norms, and habits). Since people appear to prefer social relations with people, who share backgrounds and interests (Lazarsfeld and Merton 1954), social and institutional propinquity are a further precondition for the development of social ties (Sorensen 2003, Bosma 2005). As a consequence, agglomerations (should) exhibit relatively large and dense social networks, fostering the exchange of (tacit) knowledge and, hence, learning processes among actors.

A large strand of the entrepreneurship literature underlines the benefits of being embedded in social networks for identifying entrepreneurial opportunities and mobilizing necessary resources.[13]. Social networks convey streams of information and knowledge about promising (technological) opportunities. Consequently, participating in such networks facilitates the access of new knowledge and information about technological developments, market conditions, and potential business partners and, therefore, supports the creation and the recognition of business opportunities (Nahapiet and Ghoshal 1998). Furthermore, social relations are used to govern and limit the risks associated with the venture. Potential entrepreneurs rely on them to gain valid information about risks and verify the

[13] e.g., Zimmer and Aldrich 1986, Shane and Cable 2002, Shane and Stuart 2002, Nicolaou and Birley 2003, Stuart and Sorensen 2003 and 2005, Davidsson and Honig 2003, Elfring and Hulsink 2003, Sorensen 2003, Jack and Anderson 2002

potential of their business ideas by asking for advice and feedback (Birley 1985). Besides, new firms often experience a “liability of newness” and the perceived risks of resource holders in affiliating a new venture increases with the innovativeness of the business concept. Therefore, especially high-quality start-ups will face severe problems in gaining potential investors, employees, suppliers, collaborators, and customers (Stuart and Sorensen 2003, Elfring and Hulsink 2003). The embeddedness in social networks can have a signaling or reputational effect, helping innovative start-ups to overcome these uncertainties and to secure tangible commitments from skeptical resource holders (e.g., Shane and Cable 2002, Shane and Stuart 2002, Nicolaou and Birley 2003).

From the previous arguments, it follows that the proximity of actors in agglomerations is of outstanding importance for the generation, dissemination, and exploitation of innovative entrepreneurial opportunities and, hence, the emergence of high-quality start-ups.

In the previous sections, it was argued that due to their specific characteristics, agglomerations offer relatively better conditions for the creation, dissemination, and exploitation of innovative entrepreneurial opportunities compared to non-urban regions However, this is not a deterministic view on the urban environment. Rather, huge differences in the endowment of these benefits can be observed among agglomerations: On the one hand, there are agglomerated areas like Silicon Valley, Munich, Amsterdam, Lyon, or Jena that provide favorable conditions for high-quality start-ups with regard to all phases of the entrepreneurial process. Although these urban areas are quite heterogeneous with regard to their size, industry structure, etc., they all exhibit a strong public and private research performance, large and diversified labor markets (especially with respect to highly qualified and specialized human capital), a broad resource base as well as large and diversified local demand markets. Moreover, these resources are reinforced and activated by rich networks linkages that foster knowledge spillover and mutual learning (see e.g. van Winden et al. 2007, Saxanian 1994, Oßenbrügge and Zeller 2002, Albrecht 2005, Cantner et al. 2003) On the other hand, there are agglomerated areas lacking one or even more of these characteristics; therefore, they have more difficulties generating high-quality entrepreneurship. For example, although empirical evidence suggest that public and

private research efforts are concentrated in metropolitan areas, there are large differences in the quantity and quality of these activities among agglomerations (for Germany, see Fritsch et al. 2007). Therefore, those agglomerations exhibiting quantitatively and qualitatively lower levels of knowledge generating activities will also show a lower likelihood of inducing high-quality entrepreneurship. Moreover, some agglomerations like Manchester or the Ruhr area in Germany still struggle with the legacy of past specialization in traditional manufacturing industries that are in decline or that have strongly declined in recent decades. They, therefore, tend to suffer from less diversified economic activities, a relatively large share of low-skilled labor, and a negative "working-class" image that impedes the attraction of creative and highly skilled labor (van Winden et al. 2007). Finally, some agglomerations are afflicted with an "overembeddedness" of actors in social networks. As Grabher (1993) has impressively shown in his study on the Ruhr area, strong and long lasting social relationships (so-called strong ties) may also be harmful for a region´s development if they suppress the generation and the implementation of new ideas and creativity. Hence, strong social networks can also turn into a disadvantage for agglomerations, which hinders the emergence of high-quality start-ups.

Consequently, not all agglomerations show equally favorable conditions for the foundation of high-quality start-ups as they are dependent on the presence and fortune combination of many (or even all?) resources. Nevertheless, the nexus of opportunity generation, dissemination, and exploitation that drives high-quality entrepreneurship, innovation, and growth is more likely to be found in cities than in urban or rural areas.

3.2. The impact of competition on the employment effect of new business formation

The magnitude of the employment effects of new businesses is obviously closely related to the intensity of competition. A high-level of competition spurs the market selection and leads to a higher performance and competitiveness of the surviving new and established businesses, which, in turn, is likely to induce employment growth and welfare. Therefore, the larger economic impact of entry in agglomerations can also be attributed to a higher degree of competition in urban areas. The higher level of competition is reflected by empirical analyses that find a higher level of start-

ups (Fritsch and Falck, 2007) but a lower probability of survival (Fritsch et al. 2006; Engel and Metzger 2006; Weyh 2006) in these areas. The intense competition can be attributed to a higher business density in agglomerations, i.e. more firms demanding inputs and providing products and services on the same market.

Concerning the input side, the density of economic actors in agglomerations causes higher competition for all kinds of localized resources, like business premises, human capital, or most services, which results in higher input prices. Therefore, businesses in agglomerations have to be relatively efficient in order to compete successfully with competitors locating elsewhere and facing lower factor costs. Due to new business formation, the competition on input markets becomes is reinforced as the demand and, hence, the prices for inputs are likely to rise. This affects new as well as incumbent firms and forces them to become more efficient in their use of resources in order to stay in the market. If the market selection process works according to the 'survival of the fittest'-scenario, less efficient businesses are crowded out and only the most efficient start-ups and incumbents will be able to compete successfully. As a consequence, the surviving new and established businesses show considerable improvements in their competitiveness, which is likely to result in employment growth. As the scope of these supply-side effects depends on the level of local competition, it is plausible to assume that the employment effects of start-ups are relatively larger in agglomerated areas than in moderately congested and rural areas where the degree of competition is less intense.

Similarly, the relatively strong employment effects of start-ups in agglomerations can also be explained by a correspondingly high degree of competition on regional output markets. Again, the entry of new businesses intensifies the competition and the selection process which finally stimulates the competitiveness of the local economy and, therefore, probably yields in employment growth. There are several ways in which the competition in output markets can foster employment growth on the supply-side of the market. The main supply-side effects induced by new businesses may be securing efficiency and stimulating an increase in productivity by contesting established market positions; the acceleration of structural change, e.g. incumbents are substituted by newcomers; amplified innovation, particularly, the creation of new markets; and a greater variety of products and problem solutions (Fritsch and Mueller 2004 and 2008). However, as these supply-

side effects are constrained to firms that predominantly serve local markets, the competition effect on output markets can be regarded as less important than these on input markets.

6. Conclusions

Recent empirical results suggest that the magnitude of employment effects of new businesses is closely related to the density of economic activity. However, the underlying reasons for this relationship have not been investigated in detail yet. This paper tried to answer this question by relating the particularly large employment impact of start-ups in agglomerations to the particularities of the urban environment. On the one hand, it was shown how the specific resource endowment of urban areas may facilitate the emergence of high-quality start-ups, which are known to induce larger direct and, more importantly, indirect employment effects than other types of new ventures. Following the view that entrepreneurship is a process of perceiving opportunities and transforming them into innovations that create economic value and growth, the number and the quality of new businesses should differ across regions depending on the pool of innovative opportunities as well as on the quantity and quality of resources available to use these opportunities. This paper, therefore, argued that agglomerations offer relatively better conditions for the generation, dissemination, and exploitation of innovative opportunities than moderately congested and rural regions. The advantages of agglomerations in this respect emanate from the combination of a broad knowledge base, a great diversity of economic activities, a strong and diverse local demand, a rich resource base, and the proximity of actors that fosters knowledge spillover and learning. On the other hand, it was argued that the magnitude of the employment effects is strongly related to the level of competition. An intense competition spurs the market selection and causes a higher competitiveness of the surviving firms that is likely to be reflected in larger employment growth by entry. As the level of competition and, hence, the improvements on the supply-side of the markets are larger in agglomerations than in other regions, the employment effects of new businesses are also more pronounced in urban areas.

Several policy implications can be drawn from the previous considerations. First, policy should be aware of the influence that regional characteristics exert on the

employment impact of start-ups. Launching programs that foster the foundation of new ventures will, therefore, differ in their economic effects among regions. Second, the efficiency of such measures will be particularly large in agglomerated areas as these regions show larger employment effects of entry than moderately congested and rural areas. The present paper illustrated that this effect is the result of a relatively large share of high-quality start-ups as well as of an intense competition in agglomerated areas. Third, policy should focus on the promotion of high-quality start-ups as they are more likely to induce larger supply-side effects and employment growth than other types of new businesses. Since their emergence depends on the presence of a multiplicity of resources necessary to generate and exploit innovative entrepreneurial opportunities, corresponding policy efforts require a holistic approach affecting the quality and the quantity of these inputs. Furthermore, it is evident that the intensity of competition is a key determinant of the magnitude of the employment impact induced by new businesses. However, this effect presupposes that the market selection results in a 'survival-of the-fittest'-scenario. For this reason, the forth policy implication should be to secure and enhance the quality of the market selection process and, particularly, avoid measures disturbing the 'survival-of-the-fittest'-mechanism. Finally, if the quality of start-ups and the intensity of competition are the underlying reasons for the magnitude of the employment effects of start-ups in agglomerations, supporting these key determinants is also a promising strategy for the promotion of new businesses in moderately congested and rural areas.

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