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Accessibility to Knowledge and New Firm Formation in Sweden

Tüzin BAYCAN* and Özge ÖNER**

Abstract

This paper investigates how accessibility to knowledge is related to the new firm formation in Sweden. Utilizing municipal level data, the paper examines how and to what extent geographic proximity to establishments that are specialized in formal knowledge creation plays a role for the overall entrepreneurial milieu in a city region. While measuring accessibility to knowledge at intra-municipal, intra-regional and extra-regional levels, the paper maps out the clustering patterns of new firms and ranks the municipalities by their performance in creating an entrepreneurial milieu. The clustering patterns of new firms highlight critical factors in new firm formation and entrepreneurial performance of regions.

JEL Classification : I23, I25, M13, O31, O32
Keywords : New Firms, Startups, University Spinoffs, Universities and Higher Education Institutions, Knowledge Commercialization, Accessibility to Knowledge, Geographic Proximity, Sweden

1. Introduction

Scientific knowledge becomes increasingly important for innovation and new business development as technologies have grown more sophisticated, emerging industries (i.e. biotechnology and nanotechnology) have become more high-tech, and universities play an enhanced role in knowledge production and innovation both as a human capital provider and a seedbed of new firms (Etzkowitz et al., 2000; Litan et al., 2007a; Mitchell, 2010; Rasmussen et al., 2006). In parallel, the traditional mission of universities including teaching and research has gradually changed with new perspectives on the role of the university in the system of knowledge production and has expanded in order to taken on a ‘third mission’ namely commercial activities including patenting, licensing and company formation (Baldini, 2006; Baycan and Stough, 2013; Owen-Smith and Powell, 2003; Rasmussen et al., 2006). Universities are now expected not only to sustain or to support economic growth but to generate economic growth through producing new knowledge, human capital, licensing innovations and creating new companies.

In recent decades, universities have become more involved with their wider surrounding regions by offering new programmes and by building closer links with business (Boucher et al., 2003; Bramwell and Wolfe, 2008; Duch et al., 2011; Goldstein and Renault, 2004; Hudson, 2006; Lazzaretti and Tavoletti, 2005). As an attractor, educator and retainer of students, and shaping them into knowledge-based graduates for firms in the region (Boucher et al., 2003; Bramwell and Wolfe, 2008), universities have affected the local labour market and contributed to the stock of tacit knowledge to provide formal and informal technical support. They have also contributed to regional economic development, on the one hand, by creating new firms, and on the other hand by influencing the region.

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in which they are located by knowledge spillover mechanisms to fuel the development of the regional entrepreneurial culture. Therefore, the presence of a university and its engagement with commercial activities has played a key role in regional economic development (Baycan, 2013).

Commercialization of knowledge through technology transfer and academic entrepreneurship (university spinoffs) encourages economic development, in particular, local and regional economic development, generates jobs, and provides innovative products. University spinoffs are especially important entities for encouraging local economic development (Shane, 2004). While encouraging local and regional economic development by technology transfer and spinoff companies, knowledge commercialization affects the local and regional environment as well. The presence of a university, or its location, affects on the one hand, the creation and the location decisions of new companies, and on the other hand, the location decisions of spinoff companies. Several studies offer evidence that the presence of a university is a key factor taken into account by firms when making their locational decisions (Duch and García–Estévez, 2011; Goldman, 1984; Pressman, 2002; Shane, 2004; Wright et al., 2002).

Geographic proximity and networks also play a crucial role in the commercialization of knowledge (Huggins, 2008; Rosenbloom, 2007; Shane, 2004; Uranga et al., 2007; Warren et al., 2008). The results of many studies show that in industries where new economic knowledge plays an important role, innovation tends to cluster geographically. Therefore, it may expect that innovative activity is more likely to occur within close geographic proximity to the source of that knowledge (Audretsch and Feldman, 1996; Warren et al., 2008).

Against this background, the aim of this paper is to investigate how accessibility to knowledge is related to the new firm formation in Sweden. The paper examines how and to what extent geographic proximity to establishments that are specialized in formal knowledge creation plays a role for the overall entrepreneurial milieu in a region. While measuring accessibility to knowledge at intra-municipal, intra-regional and extra-regional levels, the paper maps out the clustering patterns of new firms and ranks the municipalities by their performance in creating an entrepreneurial milieu. The next section examines how the presence of a university, or its location, affects the creation and the location decisions of new companies as well as the role of geographic proximity and networks that plays a crucial role in commercialization of knowledge. Using Swedish data at municipal aggregation level, Section 3 analyzes how accessibility to knowledge affects the new firm formation at intra-municipal, intra-regional and extra-regional levels and maps out the clustering patterns of new firms. Section 4 highlights critical factors in new firm formation and entrepreneurial performance of regions.

2. Geographic Proximity to Knowledge and New Firm Formation

Geographic or spatial proximity to knowledge plays an important role in the creation and the location decisions of new firms (Duch and García–Estévez, 2011; Goldman, 1984; Pressman, 2002; Shane, 2004; Wright et al., 2002). According to a study by Goldman (1984), 72 percent of the high technology companies in Boston area in the early 1980s were based on technologies originally developed at MIT laboratories. A recent study by Duch and García–Estévez (2011) provides evidence from Spain that the natural sciences and engineering, and the social sciences and humanities faculties have had a marked impact on the creation of firms. Another study by Duch et al. (2011) that examines the main contributions of universities to the economic growth of Spanish regions shows that the growth of regional GVA is positively correlated with both the human capital created by universities and

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The location of a knowledge institution also affects the location decisions of spinoff companies. According to Pressman (2002), in the U.S., 80 percent of all spinoffs operate in the same state as the institution that they came from. A similar pattern is also observed in other countries. In Canada, 98 percent of spinoff companies operate in the same province as the university from which they emerged (Pressman, 2002). In the UK, 74 percent of all spinoffs created since 1996 are located in the same region as their spawning university (Wright et al., 2002). Given this tendency to cluster, the impact of university spinoffs on regional economic development is often magnified (Shane, 2004).

Geographic proximity and networks also play a crucial role in the commercialization of knowledge (Huggins, 2008; Rosenbloom, 2007; Shane, 2004; Uranga et al., 2007; Warren et al., 2008). The dynamics prior to commercialization of knowledge take place at local geographic levels including local clusters, megacentres, and regions (Uranga et al., 2007). Both venture capitalists and universities are important actors within networks of local or regional clusters of knowledge-based activities or systems of regional innovation (Cooke et al., 2004; Huggins, 2008). Most venture capitalists seek to invest in ventures and activities that are relatively proximate to their own location, being in the same locality or region (Huggins, 2008). The start-up companies are predominantly local and the 'industry helix' is embedded in local network relationships (Uranga et al., 2007). Collaborations between universities and non-academic agents, and organizations are localized geographically and according to Frenken and Oort (2004), the capacity to collaborate and cooperate is often more important than the ability to produce knowledge. Therefore, as mentioned also by Huggins (2008), the ability to access transparent and visible networks and communication channels linking the academic, financial and intermediary sectors is a key factor to successful regional knowledge commercialization processes.

Geographic proximity is a key factor in developing strong ties within the local and regional networks to promote the transfer of complex knowledge. The argument related to geographic proximity suggests that strong ties promote the transfer of complex knowledge, while weak ties promote the transfer of simple knowledge (Batheild et al., 2004; Huggins, 2008). Weak ties or poor network conditions may also lead to information asymmetries between the potential investors and investees (Shane, 2004). The lack of existing and effective networks may have a negative effect on the commercialization of knowledge not just in terms of financing, but also in terms of exchanging expertise and experience (Huggins, 2008). To develop strong ties requires face-to-face interaction and the geographic proximity of network actors facilitates this interaction. Therefore, the existence of established spatially proximate networks plays an important role in regional knowledge commercialization. In more advanced clusters, territories, and network drivers are more biased to creating conditions to commercialize knowledge, and to a lesser extent, to government intervention to foster development (Uranga et al., 2007).

Geographic proximity and the existence of a strong regional innovation system also determine the effectiveness of technology transfer activities, or in other words, commercialization of knowledge. Warren et al. (2008), on the basis of their study where the effectiveness of technology transfer activity in the USA was analyzed, have found that many universities that are geographically isolated from supportive innovation systems, exhibit less efficiency in transferring technology. They have stated that remoteness is an important factor as it is indicative of a lack of the required support infrastructures and according to the results of their study, technology transfer is currently an ineffective process for geographically remote universities in the USA. The results of this study show that the efficiency of a uni-
University technology transfer offices (TTO) depends strongly on whether the institution is located within a strong and highly networked innovation system. Universities in regions with a highly developed social structure of innovation are thus more efficient.

A recent study by Rosenbloom (2007) on the geography of innovation commercialization in the USA also supports the existence of a highly developed regional innovation system. The results of Rosenbloom’s analysis show that the three measures of innovation commercialization (small business innovation research (SBIR) and small business technology transfer (STTR) grants, venture capital investments, and initial public offerings (IPOs)) are substantially more geographically concentrated and more unequally distributed than is population. The 5 largest cities (San Francisco, Boston, Denver, San Diego and Austin,) in the nation, which make up one third of the population of the top 50 cities, have received the highest number of grants and account for more than half of all grants. These results show that city size matters. Larger cities have more resources and thus ought to have more economic and innovative activity than smaller cities. In other words, bigger cities within a strong regional innovation system are more efficient. However, Rosenbloom’s study highlights some other interesting points, for instance, high rates of idea generation do not necessarily imply high rates of innovation commercialization. Nevertheless, investments in innovative capacity and idea generation do have an important localized effect on the rate of innovation commercialization.

3. Accessibility to Knowledge and New Firm Formation in Sweden

In this paper we aim to investigate how accessibility to knowledge is related to the new firm formation in Sweden. Using accessibility to knowledge we examine how and to what extent geographic proximity to establishments that are specialized in formal knowledge creation plays a role for the overall entrepreneurial milieu in a region/municipality. While measuring accessibility to knowledge at intra-municipal, intra-regional and extra-regional levels, we aim to map out the clustering patterns of new firms and to rank the municipalities by their performance in creating an entrepreneurial milieu. In the following sub-sections we will first describe our data and methodology and next, we interpret our empirical analysis and its results.

3.1 Data and Methodology

For the empirical analysis, we employ a unique data set for the year 2008 from Statistics Sweden. This Swedish micro data provides information at individual level, establishment level, as well as firm level for several years. We use this cross sectional data in order to examine the performance of different municipalities in terms of entrepreneurial milieu with respect to access to knowledge. Therefore, for our empirical analysis we aggregate the data on a municipal level in order to utilize the respective accessibility measures and we calculate access to formal knowledge creation in terms of access to: i) universities and higher education institutions; ii) R&D in natural sciences and engineering; and iii) R&D in social sciences and humanities. All these three categories are used as they are listed separately based on their function in the industrial classification (SNI 2002) provided by Statistics Sweden. So an establishment appears in our data set as an R&D spot only if the dominant economic activity in that establishment is classified as research and development. For the universities and higher education institutions, we have taken all establishments that provide education for those that obtain an highschool degree. We proxy for the entrepreneurial milieu in a region by taking the number of new firms in 2008 in each municipality. We acknowledge that the impact from proxim-
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Accessibility to knowledge should be substantially different for different kinds of entrepreneurial activities. Nevertheless in this paper, we found it plausible to start off by taking a look at a possible impact from proximity to knowledge on the overall entrepreneurial milieu in Swedish municipalities. In Sweden there are 290 municipalities, 81 of which together with smaller municipalities surrounding them constitute functional regions (FER). These functional regions have a certain degree of accessibility within its borders, hence are considered to be local labor markets.

For our empirical analysis, we describe five variables: new firms, accessibility to knowledge, human capital, immigrant share and economic diversity and we perform regression analysis. Our variables and their descriptions are given in Table 1.

**New firms**

We use total number of new firms in a municipality for the year 2008 as the dependent variable in the regression analysis. We also looked at the performance of individual Swedish municipalities when it comes to new formation to see whether they behave differently when market size (in terms of wage sums) is taken into consideration rather than the geographical proximity (in terms of access to knowledge) is taken into account. The number of new firms should be naturally higher in bigger municipalities, so the impact would mostly be driven by the size. We cannot control for the size by using a market potential measure as an explanatory variable due to high correlation between any possible market potential measure and the access to knowledge measures. Instead this variable is adjusted for market size (in terms of wage sums).

**Accessibility to knowledge**

Being the variables of interest, we utilize accessibility to knowledge to examine how and to what extent geographical proximity to establishments that are specialized in formal knowledge creation plays a role for the overall entrepreneurial milieu in a municipality.

We employ each Swedish municipality’s accessibility to total number of establishments that are specialized in formal knowledge creation (e.g. higher education institutions, universities, research and development centers) as a measure for ‘geographic proximity to knowledge’. Our calculations are based on the earlier work of Johansson, Klaesson, and Olsson (2002). In their study, accessibility measures

<table>
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<th>Variables</th>
<th>Descriptions</th>
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<tr>
<td>New firms</td>
<td>Total number of new firms in a municipality in 2008</td>
</tr>
</tbody>
</table>
| Accessibility to knowledge (geographic proximity to formal knowledge creation) | Intra-municipal access to knowledge : access to knowledge within the municipal border  
 Intra-regional access to knowledge : access to knowledge within the functional region  
 Extra-regional access to knowledge : access to knowledge outside of a given functional region |
| Human capital | Share of population with at least 3 years of higher education |
| Immigrant share | Share of population that is first generation immigrant to control for push vs pull factors |
| Economic diversity | Number of different 5-digit level industries in a municipality to control economic diversity |
are combined with the wage sums of municipalities to construct an accessible market size measure. Following the same ground, we obtain an accessibility measure for the potential knowledge for the Swedish municipalities. Total accessibility of each municipality is divided into three parts as shown below:

\[ A_{m,t}^{\text{tot}} = A_{m,t}^{\text{im}} + A_{m,t}^{\text{ir}} + A_{m,t}^{\text{er}}, \quad \forall m, t \]  

(1)

In equation 1, \( A_{m,t}^{\text{im}} \) refers to intra-municipal, \( A_{m,t}^{\text{ir}} \) to intra-regional and \( A_{m,t}^{\text{er}} \) to extra regional accessibility for a municipality \( i \) in a point of time, \( t \). What meant by intra-regional in this context is the accessibility from one to the other municipalities within the same functional economic region (FER). The summation in the equation is not considered to be the relevant measure for an individual municipal market. It rather provides a total ‘knowledge accessibility’ for the entire country. The reason is that different municipalities are assumed to be in competition for the same geographical pattern of entrepreneurs and consumers. Hence one can utilize the three components of the equation as separate indicators of the same geographical hierarchy, municipal accessibility being the most important one and decaying as it radiates outswards.

In the research of Johansson et al. (2002), it is argued that the influence of the three components in the given equation differs for different municipalities. The relative size of these components is used to provide different types of municipalities. Assuming \( W = \{1, \ldots, n\} \) to be the set containing all municipalities, \( n \) in an economy and \( R \) denoting a functional economic region (FER) employing several municipalities \( (W) \) within, we can say that \( R \subset W \). Then \( R_m = R \setminus \{m\} \) denoting the municipalities in region \( R \), while excluding the given municipality \( m \). Finally \( W_R = W \setminus R \) denotes all municipalities in that economy excluding the ones in \( R \).

Intra-municipal: \( A_{m,t}^{\text{im}} = K_{m,t} e^{-\lambda_{\text{im}}(t)_{m,m}} \)

Intra-regional: \( A_{m,t}^{\text{ir}} = \sum_{R_m} K_{m,t} e^{-\lambda_{\text{ir}}(t)_{m,k}} \)

Extra-regional: \( A_{m,t}^{\text{er}} = \sum_{W_R} K_{m,t} e^{-\lambda_{\text{er}}(t)_{m,k}}, \quad \forall m, m \neq k, t \)

\( K \) in the formula, for this particular analysis stands for the total number of establishments in a municipality that are specialized in formal knowledge creation. Travelling time by car between two given municipalities are represented by \( t \), and as a time distance sensitivity parameter, \( \lambda \) is used. For each component of the equation, there exists a different \( \lambda \) value\(^1\). The values are found by Johansson et al. (2003b) by using Swedish commuting data for 1998. A similar approach has previously been used by Karlsson and Nyström (2006), where they investigated the impact of a set of selected knowledge firms on industries of different kinds.

We expect a positive and significant impact from intra-municipal accessibility to knowledge on the total number of new firms in a municipality in a given year. Whereas the intra-regional knowledge access is expected to have a negative impact for the number of firms in a given municipality as a results of competition between city municipalities. If a municipality is surrounded by others with higher access to knowledge, start-ups are expected to outflow towards these municipalities. Finally extra-regional accessibility to knowledge, is expected to have no or very little impact on the new firm formation in a municipality.

\(^1\) \( \lambda_{\text{im}} \) for intra-municipality 0.02, \( \lambda_{\text{ir}} \) (intra-regional) 0.1, and for the \( \lambda_{\text{er}} \) (extra-regional) 0.05
Human capital

We constructed this variable by taking the share of the population in a municipality with minimum
three years of higher education. Municipalities with higher human capital share are expected to have
a greater potential for entrepreneurial spirit.

Immigrant share

Previous studies in relation to pull and push factors for entrepreneurial spirit in a given location
suggest that places with higher immigrant population has the tendency to reflect greater potential for
entrepreneurship, hence for new firm formation. After all those that are less likely to be employed in
the existing industries may have greater incentive to start up a firm. Hence municipalities that are
densely populated by immigrants are expected to reflect a tendency for a push factor for the entrepre-
neurial milieu in the region. By looking at the share of the population that is first generation immi-
grant in a municipality, we aim to control for the potential push factor in the close surrounding.

Economic diversity

Since the data is aggregated on a municipal level, it is not possible to control for the type of start-
ups. We rather control for the overall economic diversity in a given municipality to capture—at least to
some extent—whether the entrepreneurial milieu is dependent on a diverse or a specialized market
setting. For this variable, we look at the total number of different industries as they are classified in
the finest aggregation level (5-digit SIC).

3.2 Empirical Analysis

For the empirical analysis, first we map several indicators of entrepreneurship in a region to see if
there is a clear spatial pattern among the Swedish municipalities. Next, we conduct a regression
analysis via which we try to capture the way these indicators have an impact on the overall entrepre-
neurial milieu in a city region.

Figure 1 shows the first map that is created to capture the outlook of market size in Swedish
municipalities. Market size as explained previously is calculated in terms of wage sums. It is a well-
known phenomenon in Sweden that the economic activities, as well as population are clustered in the
southern part of the country, whereas physically large but sparsely populated municipalities occupy
northern part of the country. As can be seen in Figure 1 the three metropolitan regions, Stockholm,
Malmö and Göteborg appear to be a notably higher market density in the southern part of Sweden.

Next, we produced a second map in which the distribution of new firms across Swedish municipal-
ities that are represented by the green dots (Figure 2). Each dot in the map corresponds to 100 new
firms. Meanwhile the map is shaded with respect to human capital share of the municipalities. With
this map, we aimed to see whether the municipalities with higher human capital are the same ones
when it comes to the clustering of the start-ups. Looking at the concentration of the green dots on
the map, as expected from the previous map we see that the southern part of the country is highly con-
centrated in terms of the number of start-ups in 2008. Although southern part of Sweden appears to
be slightly more concentrated for the human capital share, it is hard to detect a clear pattern between
the human capital and new firm formation. This is due to the fact that the number of new firms cap-
tures economic activities of all sorts, whereas human capital may not be the relevant indicator for the
overall entrepreneurial picture. We can assume that this map would appear to be completely different
if we were looking at the new firm formation in a particular sector, which is high human capital abundant. Nevertheless our study aims to capture the overall entrepreneurial profile in these municipalities and so far this map is not indicating a clear pattern for the relation between human capital and the total number of new firms.

The map in Figure 3 lays down the university spin-offs over the concentration of establishments that are specialized in formal knowledge creation. After all we can observe only 42 university spin-offs for the year 2008, most of which is clustered in the three metropolitan areas in Sweden. These establishments are selected following the methodology used in Nabavi and Lööf (2012). They are establishments parents of which are listed under education related categories in the industrial classification provided by Statistics Sweden. (A list for university spin-offs per municipality in 2008 can be found in the appendix.)

After mapping several indicators of entrepreneurship, we run a simple regression using number of firms as a dependent variable and the log transformed municipal wage sums as an explanatory variable.
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With this regression, we obtain the top 10 performing municipalities in Sweden as listed below in Table 2 from the predicted values. It is not surprising to see the three metropolitan areas appearing at the top of the list. Following cities, having a greater market potential, come naturally at this top ten list.

Next, when we perform the same practice for the new firm formation with respect to total number of establishments where formal knowledge creation takes place, we obtain a new list for the top ten municipalities as listed below. When look at the impact driven from geographic proximity to knowledge rather than the market potential we observe that our top ten list changes significantly. For example Malmö, what is the second best in the former list now comes at the 6th rank. Another exemplary ranking is Umeå, where obviously the impact of proximity to knowledge on the number of new firms is greater than the market potential when it comes to its rank among the Swedish municipalities in terms of performance.

As an additional practice, we also looked at the same rank by now taking the number of employment in these establishments where knowledge creation takes place into account instead of number of
establishments. The ranking is once more changed. Lund, which was the 4th rank in the earlier ranking now occupies the 2\textsuperscript{nd} rank which is suggesting that the scale of these establishments rather than the number when it comes to new firm formation plays a greater role in Lund in comparison to the other municipalities in Sweden. The same story can be applied for Luleå, where Luleå University of Technology with a considerable scale captures most of the employment within one establishment.

We also produce a map in order to show the relation between the number of establishments that are specialized in formal knowledge creation and the employment in these establishments (Figure 4). We found it plausible to exhibit these two indicators on the same map, shading being based on employ-
It is easy to observe a clear pattern between the two where this relationship decays as we move towards north. So, one can say that the variation in terms of establishments is higher in south, whereas we start observing a big scale of knowledge establishments hosting most of the employment at one place as we approach north.

Next, we perform a regression analysis. By our regression analysis, we aim to capture the direction of the impact driven from our predictors (access to knowledge being the primary one, human capital, immigrant population and economic diversity). The dependent variable is obtained by taking the total number of new firms in a municipality into account. In order to normalize this number with respect to market size, wage sums of these municipalities are utilized. Hence the dependent variable can be considered to be –at least to some extent– the number of start-ups with respect to market size (Table 3).

As explained previously, our variables of interest are the access to formal knowledge creation. Intra-municipal accessibility to knowledge, being the combination of driving distances and the number of establishments that are specialized in formal knowledge creation has a highly statistically significant and positive impact on the number of start-ups, and its impact is higher than the other predictors we employ in this analysis (Table 3). Second variable, intra-regional access to knowledge, is calculated likewise by taking driving distances and number of establishments that are specialized in knowledge creation into account but for the relevant functional region (municipal access to knowledge is discounted so it is not double counted as explained before). Like we anticipated previously, the impact driven from this variable is highly significant and negative (Table 3). This is suggesting that if a municipality has greater access to knowledge creation within the regional borders that may lead a competition effect. Meaning start-ups in small municipalities may rather have the tendency to show up in larger places with higher number of knowledge establishments. This type of relation however is not captured for the third variable, extra-regional access to knowledge, suggesting that the overall access to knowledge creation generates a positive impact no matter what (Table 3). In fact this type of result is well expected given that municipalities within the same regional border have greater incentive for competition whereas municipalities outside of a functional region can rather be accounted for the overall impact driven from knowledge creation in the country.
We also wanted to control for several municipal characteristics in the analysis (Table 3). The first one is the share of human capital. The variable is obtained by taking the share of population with three years or more higher education. As expected high level of human capital in a municipality has a highly significant positive impact for the entrepreneurial milieu. Although its impact is not as strong as human capital, immigrant share in a municipality (being the share of the population that is foreign born) has a positive and significant impact as well. This may signal two things: due to a sorting mechanism immigrants may be present in places that have higher level of entrepreneurial spirit, or due to the labor market conditions there may be some sort of push factors for those that face employment obstacles, hence ends up by starting new firms. The questions are open for investigation for

Figure 4. Knowledge establishments and employment in these establishments per municipality in 2008 (Data Source: Statistics Sweden, Map created by authors)
this variable, which is beyond the scope of our paper. We also wanted to control for the economic diversity in a municipality by taking the number of different industries (on 5-digit) into account. One other surprising result is depicted by this variable, the impact being significant and negative. This result may be generated due to the fact that we do not control for different types of start-ups in the analysis. Also this may signal that start-ups favor specialized market places more than diverse market places. This result requires further investigation likewise.

We acknowledge the fact that by no means this regression analysis clarifies all of the underlying factors behind the entrepreneurial potential of a municipality precisely. Using panel data, possible problems related to endogeneity and omitted variable bias can be eliminated in further research. However our findings are still signaling a positive and significant impact from geographic proximity to the formal knowledge.

4. Concluding Remarks

In this paper, we investigate how accessibility to knowledge affects the new firm formation in Sweden and to what extent geographic proximity to establishments that are specialized in formal knowledge creation plays a role for the overall entrepreneurial milieu in a city region. We found accessibility to formal knowledge to play a significant role for the entrepreneurial milieu in a region. Our analysis at intra-municipal, intra-regional and extra-regional levels highlighted that: i) intra-municipal accessibility to knowledge has a high statistically significant positive impact on the number of start-ups, and its impact is higher than the other predictors; ii) the impact from intra-regional access to knowledge is also highly significant but negative impact on the number of start-ups, suggesting that if a municipality is surrounded by other municipality, implying a competition effect between the municipalities of a functional region; iii) extra-regional access to knowledge has a relatively smaller but positive impact on the number of start-ups, suggesting that municipalities within the same regional border may have greater incentive for competition whereas the overall access to knowledge is beneficial for any municipalities’ entrepreneurial milieu in Sweden. An overall assessment of our analysis demonstrated that access to knowledge within municipality plays a more important role and that municipalities with higher knowledge access within its border have greater entrepreneurial potential.

We also examined the clustering patterns of new firms and the performance of municipalities in
Creating an entrepreneurial milieu. Mapping several indicators of entrepreneurship including market size, human capital, university spin-offs and employment in knowledge institutions highlighted that: i) economic activities are clustered in southern part of Sweden and the three metropolitan regions, Stockholm, Malmö and Göteborg appear to be a notably higher in market density; ii) the number of start-ups and the university spin-offs are also clustered in the southern part of the country, especially in the three metropolitan areas; iii) southern part of the country also appears to be slightly more concentrated for the human capital share, however it is hard to detect a clear pattern between the human capital and the new firm formation. Regarding these clustering patterns of economic and entrepreneurial activities in the southern part of the country, especially in metropolitan areas, it is not surprising that our performance analysis ranked the metropolitan areas and cities having a greater market potential at the top of the list. Nevertheless, our performance analysis also showed that the impact of geographic proximity to knowledge does not necessarily overlap with the impact of market potential on entrepreneurial performance. Our descriptive practices signal that the municipalities, which are over performing in terms of entrepreneurship with respect to market size, are not exactly the same ones that are over performing with respect to potential knowledge hosted within municipal borders.

An overall evaluation of our findings highlights that geographic proximity to formal knowledge may be a critical success factor in new firm formation as well as the entrepreneurial performance of regions in Sweden, which motivates a need for further investigation on the variation and the magnitude of this kind of impact.

References

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Appendix 1. University spin-offs by municipality in 2008 in Sweden

<table>
<thead>
<tr>
<th>Municipalities</th>
<th>Spin-offs</th>
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<tbody>
<tr>
<td>Stockholm</td>
<td>8</td>
</tr>
<tr>
<td>Växjö</td>
<td>3</td>
</tr>
<tr>
<td>Uppsala</td>
<td>2</td>
</tr>
<tr>
<td>Västerås</td>
<td>2</td>
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<tr>
<td>Upplands Väsby</td>
<td>2</td>
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<tr>
<td>Västervik</td>
<td>2</td>
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<tr>
<td>Malmö</td>
<td>1</td>
</tr>
<tr>
<td>Örebro</td>
<td>1</td>
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<td>Östersund</td>
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<td>Landskrona</td>
<td>1</td>
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<tr>
<td>Sundsvall</td>
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<td>Åmål</td>
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<td>Strängnäs</td>
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<td>Täby</td>
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<td>Ångelholm</td>
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<td>Falkenberg</td>
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