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Labor Force Diversity and the Survival and Growth of New Firms

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Abstract

Our paper investigates how diversity of the labor force influences the rate of new firm formation and the performance of new firms in urban areas. A diversified labor force within the firm and in the external environment influences the formation, survival and growth of firms. We explore these issues with both aggregate data at the municipal level and individual data at the firm level for the years 1993-2010. We measure diversity using entropy measures that account for a wider range of differences than is typically used. Our empirical analysis finds a positive influence of diversity of the labor force on the rate of new firm formation at the municipal level. At the level of an individual firm, we find that the diversity of the firm's own labor force is positively associated with its survival, but not its growth. Our results add to the literature on the workings of agglomeration economies through variations in human capital, information spillovers and innovation.

Key words: diversity; labor force, education, occupation, industry, new firms; formation, survival, growth

JEL-codes: C31, C33, L25, L26, R10

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1. Introduction

As the flow of individuals across country borders increases, women increase their participation in the labor force across many different sectors, and more elderly individuals stay in the labor force, firms and regions are likely to become more diverse in terms of their labor force. This is the starting point of our paper where the intention is to analyze the impact of diversity on new firm formation as well as on the development of new firms in terms of survival and growth. The paper thereby contributes to the current discussions on the economic effects of a diverse labor force.

The role of new firms for economic thriving and development is hard to dispute since new firms contribute to employment growth, productivity growth, and innovations (Baumol 2002; van Praag and Versloot 2007). Benefits stretch beyond the firm itself. There are numerous studies focusing on how a diverse labor force in terms of the individual's background, i.e. cultural diversity, influence new firm formation (Lee et al. 2004; Audretsch et al. 2010; Niebuhr 2010; Cheng and Li 2012). This paper adds to the existing literature by adding the role of labor force diversity in terms of education and occupation to the analysis of new firm formation. In addition, the diversity aspect is incorporated in the analysis of the survival and growth of new firms. Previous studies have focused on all firms (new and existing) but in this paper we are able to separate out new firms and look solely at their performance. The role of labor force diversity has overall been somewhat overlooked in previous studies analyzing firm performance. Those studies that have examined diversity and firm performance have mainly focused on racial diversity or the gender composition of the management team. Thus, our paper contributes to the literature dealing with diversity by adding more dimensions to the role of diversity. To the authors' knowledge, such an expansion is new to the literature.

The empirical design is divided into two parts. The first uses an aggregate approach where the effect of diversity (in terms of overall demographic diversity, educational diversity, occupational diversity, share of immigrants, and industry diversity) on the rate of new firm formation at the municipal level is analysed. This is done to capture the effect of the external environment and how it effects the formation of new firms. In the second part, diversity within the firm itself is analysed, i.e. the internal aspect is captured. The focus is how diversity within the firm influences the probability of surviving and also the growth of these firms. The sample we analyse contains almost all new establishments in year 2001, approximately 63,000. Thus, it is a rich and detailed dataset. The results show that diversity has a positive influence on the rate of new firm formation as well as on the survival of new firms. We argue that a heterogeneous external as well as internal labor force is beneficial for the formation, survival and growth of new firms. Our results give insights into factors which explain agglomeration forces. Larger locations tend to more diverse and can hence benefit from the positive effects from a diverse labor force.

The remainder of this paper covers the theoretical arguments for why diversity may influence new firm formation and firm performance in Section 2. Section 3 covers the method and description of variables followed by the empirical results and analysis in section 4. Section 5 concludes the paper.

2. Diversity and entrepreneurship

Resources in different locations vary in their composition, dispersion, and turnover. Some sites are characterized by an abundance of important input factors such as labor, capital, information, financial resources, and material. It is not only the scale but also the scope of factors that matters. Norton (1992) finds three main reasons why multiplicity and richness of a specific economic

milieu (agglomeration diversity) bring benefits to firms. A central location offers (1) a diversified supply of various producer services, (2) a regional network for information flows about new production techniques, products, customers, and suppliers, and (3) a large and differentiated supply of labor. Our paper focuses on the last reason. A diverse labor force can work as a signal of a milieu of creativity and openness which attracts human capital. The entry barrier may also be lower in these types of regions making it easier to attract able and talented individuals with various backgrounds. In such a diverse environment innovation and new ideas may be promoted and valued, increasing the rate of new firm formation. A diverse labor force may also positively affect the rate of information exchange and flow facilitating innovation and start-ups (Lee, et al. 2004).

Jacobs (1961) argued that locations that are open and diverse have the ability to attract able individuals leading to a higher level of innovation and creativity, highly correlated with the births of new firms. Regional diversity in itself is also argued by Jacobs as fostering new firm formation and innovations. Even though new ideas are important to be able to create new firms, equally important are the recipients of new ideas. A diverse group of individuals in terms of individual characteristics (gender, age, and background) as well as inherited and learned abilities is more likely to value these ideas differently. Hence, the probability that some see the new ideas as profitable ventures and will act on this and start a new firm is increased. Desrochers (2001) strongly argues for the positive influence from diversity on start-ups since individuals of diverse background are capable of creating new and novel combinations of existing knowledge and technology that is manifested in new firms. The studies by Lee (2001) and Lee et al. (2004) support these hypotheses. The authors find a positive relationship between diversity and the level

of regional innovativeness as reflected in measures such as patents (Lee 2001) and new firm formation (Lee, et al. 2004).

To have a diverse labor force in terms of the background of the individual, referred to as cultural diversity, can enhance the rate of new firm formation. Immigrants that are new in a country may be more prone to start a firm or become self-employed due to discrimination, lack of language proficiency and lack of networks and business contacts (Yoon 1997). They also may have a higher tendency to be risk takers. Immigrants might not have the business network but often have strong networks and ties within their ethnic groups, this ties and connections proved helpful in providing further contacts and financial support for immigrants in Silicon Valley (Saxenian 2000). These aforementioned factors lie at the individual level but may also be translated to the regional level where the share of immigrants has been found to be positively associated with the rate of new firms formation (Reynolds et al. 1995; Saxenian 2000; Kirchhoff et al. 2002; Cheng and Li 2012). The authors emphasize the increased demand for more niched services and products as the labor force become more diverse (pull factors) as well as the lack of employment possibilities for immigrants (push factors).

New firm formations may also vary according to industry structure. Jacobs (1969) highlights the importance of knowledge spillovers but emphasizes sources of knowledge from outside the firm and its core industry. In this case, variety and diversity of closely located industries are important for enhancing a firm's performance, so-called Jacobs' externalities. A wider range of diversity in production activities as well as in skills and occupations in a location may foster more opportunities to find markets or customers. Again these forces may work to enhance new firm formation (Reynolds, et al. 1995). The first hypothesis tested in this paper focuses on the regional level where we examine if new firm formation is positively associated

with a higher regional level of diversity. Diversity is measured through several dimensions such as industry diversity, share of immigrants and the diversity in the labor force in terms of age, gender, background, educational attainment and occupational profile.

Moving to the firm level, studies have found that firms with a diverse work force tend to perform better than firms facing more uniform work forces (Watson et al. 1993; Tallman and Li 1996; Richard 2000; Page 2007). A diverse work force with a variety of opinions has been found to form better-quality decisions. Thus, a heterogonous workforce may provide better decision-making and problem-solving through the use of a wider range of perspectives and a more critical analysis of issues (Jackson 1992).

The knowledge creation model by Berliant and Fujita (2008; 2009) focuses on agent heterogeneity. The authors state that knowledge creation is optimized when there is a balance between common and differentiated knowledge. Common knowledge is created when individuals meet over a long period and as the common knowledge is increased they become less productive. Similar, two individuals that are very heterogeneous can be less productive as they do not share a common knowledge base. The degree of suitability among individuals depends therefore on the level of common and exclusive knowledge. In terms of diversity these studies emphasize the heterogeneity in knowledge, embodied in individuals, in creating new and successful ideas. An employee's ethnicity may serve as a proxy for her networks, affiliations, beliefs and perspectives. This as well as the experience of the individual gives insights into the differentiated knowledge embodied in the individual.

The perspective of intra-firm decision-making, problem solving and knowledge creation leads us to our second hypothesis where we examine if the survival and growth of new firms is positively associated with a higher degree of intra-firm labor force diversity. Diversity is

measured through the diversity in the labor force in terms of age, gender, background, educational attainment and occupational profile.

3. Data, variables and empirical results

To empirically test the relationship between diversity and new firm formation, survival and growth, the empirical approach is divided into two parts. The first part investigates how regional diversity influences the rate of new firm formation at the municipal level using a fixed-effects model for the period 1993 to 2010. The independent variables of interest are entropy measures composed of the characteristics of the individuals in the region and share of immigrants. The second part of the empirical analysis uses firms as the unit of observation. Using a Heckman selection model, the composition of the new firms' labor forces are analyzed to see the impact on the firms' survival and growth.

3.1 Municipal level

The dataset used in the municipal empirical estimation originates from Statistics Sweden and covers variables at the municipal level for the period 1993 to 2010.[3] The new firm formation variable is constructed by Statistics Sweden and uses firm-level data aggregated to the municipal level. Only firms with economic activity are analyzed for each year, i.e. firms that report value-added taxes (VAT) and/or payroll taxes. A firm is registered as a new firm if a new organization number is identified *and* the majority of the employees are new, i.e. if they did not work in the firm before the organization number was changed.[4] New firms that arise due to division of firms or mergers of already existing firms where the majority of employees are the same as previous years are not registered as new firms. Thus, spin-offs and/or mergers are registered as new firms

[3] The data set has restricted public access.
[4] The two following conditions are met: (number of common employees year t and t+1)/(number of employees in t+1) <0.5 and (number of common employees year t and t+1)/(number of employees in t) <0.5

given that they substantially change their composition of employees. By using these criteria only actual new active establishments given the employee composition are included in the sample. Meaning that, we are able to capture the level of entrepreneurship in the municipality.

The number of new firms is standardized by the number of individuals in the labor force following the labor market approach suggested by Audretch and Fritsch (1994).[5] The labor market approach is justified by the fact that mostly individuals and not firms create new firms. And the new firms are often established close to the individuals' residences (Mueller and Morgan 1962; Evans and Jovanovic 1989; Sorenson and Audia 2000).

The explanatory variables describe the characteristics of the labor force in the municipality. We choose to measure diversity of the labor force using various entropy measures. Entropy measures have many features which make them suitable for measuring firm diversity. One feature is the decomposable nature of the indexes and perhaps more important is the weighting structure. The weights in an entropy measure decrease in absolute terms as the share in a category increases. The entropy measure differs from the often used Herfindahl-index. A small increase in the number of individuals in the category that constitutes the majority makes a small difference for the entropy value while a small increase in an under-represented category increases the entropy value. A Herfindahl index would be more sensitive, and change in value, if there were a small change in the number of individuals in the largest category and not sensitive to the under-represented categories (Jacquemin and Berry 1979; Kwoka 1985). The entropy measure is also more responsive to changes within a given group than are other measures; the entropy measure grows higher as diversity increases given a fixed number of individuals (White 1982).

[5] The ecological approach where the number of new firms is standardized by the total number of firms in a municipality has also been tested with similar results.

The same kind of weighting cannot be applied to more simple diversity measures where each category is entered as a separate variable in a regression. Nevertheless, another measure of regional diversity is the share of inhabitants born outside Sweden (*Share immigrants, municipality*). This is included to capture the direct and isolated effect of immigrants in the economic environment; such variables have been used in several studies. The entropy measures and immigrant variables are constructed using population registrar data aggregated to the municipal level.

The first variable describing municipal demographic diversity takes into account the dimensions of gender, age, and ethnicity of the inhabitants. Individuals are separated into three age, two gender and two ethnicity categories.[6] An entropy measure (Theil index) is used to define the diversity and is presented in Eq. (1):

$$Demographic\ diversity_m = -\sum_{c=1}^{12} \frac{i_c}{i_m} ln\left(\frac{i_c}{m}\right) \quad (1)$$

where i represent the number of inhabitants, m represents the municipality and c represents the category that an individual can belong to depending on gender, age, and ethnicity. A more diversified municipality has a higher entropy value. The distribution of this entropy value ranges from zero to $ln(c)$. We include all individuals irrespective of age when composing the entropy measure. We do not wish to exclude older individuals since these individuals may have much knowledge generated by many years of work experiences. Older individuals often have a broad professional and social network that can be useful in promoting new firms. Also, studies have

[6] Age groups: (i) under 30, (ii) 30-55, (iii) above 55. Ethnicity: (i) born in Sweden, (ii) born in another country. The average share of individuals that are born outside of Sweden in Swedish municipalities over the period 1993 to 2010 is 0.14, the share of female over the same period is 0.47 and the average share of individuals in each category is (i) under 30:0.20 (ii) 30-55:0.43 (iii) above 55: 0.38.

found that many older individuals are in themselves entrepreneurial and start new firms or become self-employed (Quinn and Kozy 1996; Cahill et al. 2007).

Labor force diversity is also captured by the composition of the inhabitants' educational profiles (*Education diversity*) and occupation profiles (*Occupation diversity*). Both are measured by summarizing what is termed "unrelated variety" and "related variety." Unrelated variety is measured at a higher aggregation level and gives an indication of the variety of education or occupational orientation. It shows how a municipality is diversified in terms of different types of activities. Related variety is a weighted sum of entropy at a finer level of aggregation within each higher level aggregation, i.e. variety within education or occupational groups (Hackbart and Anderson 1975; Jacquemin and Berry 1979; Frenken et al. 2004; Frenken et al. 2007). The measurements of the unrelated (UV) and related variety (RV) are presented in Eqs. (2) and (3).

$$UV_m = -\sum_{g=1}^{G} P_g ln\left(P_g\right) \tag{2}$$

$$RV_m = \sum_{g=1}^{G} P_g H_g \text{ where } H_g = -\sum_{i \in S_g} \frac{P_i}{P_g} ln\left(\frac{P_i}{P_g}\right) \tag{3}$$

where G is the number categories at the higher aggregation level (two-digit), P_g is the share of total employment at the higher level in the municipality *m*, S_g is the number of categories at the finer aggregation level (three-digit) and P_i is the employment share at the three-digit level *i* within each two-digit level. Due to the decomposable nature of the entropy measure the unrelated and related variety can be summed to form the total education or occupation diversity. That is we define

$$Educational\ diversity_m = UV_m + RV_m \tag{4}$$

$$Occupational\ diversity_m = UV_m + RV_m \tag{5}$$

where educational categories are used in Eq. (4) and occupational categories are used in Eq. (5). The *Educational Diversity* is then the weighted average diversification within each education category plus the diversification across education categories and *Occupational Diversity* is interpreted similarly except using occupation categories. (Theil 1972; Jacquemin and Berry 1979). A higher value indicates more diversification.

Diversity can also be measured through the industrial structure of employment. The diversity of the municipal industrial structure is represented by the sum of the two entropy measures: unrelated and related variety (*Industry diversity*) described in Eqs. (2) and (3). Unrelated variety is measured at the two-digit SIC code level and related variety is a weighted sum of entropy at the five-digit level within each two-digit industry. That is

$$Industry\ diversity_m = UV_m + RV_m \quad (6)$$

New firms may arise in environments that are booming and/or already have a large demand and this is captured by including variables that measure the change in demand (Δ*demand*) and the economic size (*Market potential*) of the municipality (Armington and Acs 2002; Sutaria and Hicks 2004b; van Stel and Suddle 2008). The intensity of human capital—the share of highly educated individuals—may foster knowledge spillovers and can be used as valuable inputs by new firms (Johansson and Wigren 1996; Malmberg et al. 1996; Malmberg and Maskell 1997; Parker 2004; Karlsson and Backman 2011). The human capital variable is however highly correlated with the market potential and is therefore not included in the regression analysis. Another labor market factor is the unemployment rate (*Unemployment rate*) that can have an ambiguous effect on new firm rate formation. It can work as a pull factor since the individual does not have another occupation. It can however also work as a push factor since a high rate of unemployment indicate that the economy is suffering and might have a lower demand and

market potential (Binks and Jennings 1986; Audretsch et al. 2001; Parker 2004; Sutaria and Hicks 2004a). The industrial structure in a municipality affects the new firm formation rate where locations with on average larger firms, in terms of number of employees, (*MES*) have a hampering effect. A larger number of small establishments can also be an indicator of diversification, following Reynolds et al. (1995). Local competition (*Firms per capita*) might work as a growth stimulus since local it fosters innovation and information spillovers. Further, an increase in the number of firms given the population should facilitate knowledge spillovers (Porter 1990; Ciccone and Hall 1996).

Table 1 gives a short description of the chosen variables and summary statistics at the municipal level, where we have a total of 4760 observations (17 years for each of 280 municipalities). There are currently 290 municipalities in Sweden but due to changes over time only 280 municipalities can be traced over the chosen time period.

Our estimation model predicting new firm formation at the municipal level is described in Eq. (7).

$$\boldsymbol{lnNFF_{mt} = \alpha + Diversity'_{mt}\theta + X'_{mt}\delta + \varepsilon_{mt}} \quad (7)$$

Where $Diversity'_{mt}$ is a vector of variables that measures the diversity of inhabitants in the municipality *m (*i.e. demographic diversity, education diversity, occupation diversity) at time *t* ,X'_{mt} represents a vector of control variables related to municipal characteristics *m*. θ, and δ are vectors of parameters and ε_{mt} is the error term.

We estimated both fixed-effect and random-effects versions of the model, Eq. (7). A robust Hausman test favors the fixed effects over the random effects model. The variables show however low variance over time (less than 5%) compared to the between-variance over municipalities. Hence, these variables are semi-fixed. In such circumstances, fixed effects

Table 1 Description of variables and summary statistics, municipal level (N = 4760, n = 280 municipalities)

Indicator	Description	Exp. Sign	Mean	St. Dev
	Dependent variable			
Number of new firms standardized by the number of individuals in the labour force, in municipality *s* at time *t*			0.012	0.004
	Independent variable			
Demographic diversity	Entropy measure, based on age, gender and origin (Eq. 1)	+	2.073	0.121
Education diversity	Entropy measure, sum of unrelated and related varieties of education at municipal level (Eq.4)	+	3.845	0.325
Occupation diversity	Entropy measure, sum of unrelated and related varieties of occupation at municipal level (Eq. 5)	+	3.699	0.148
Industry diversity	Entropy measure, sum of unrelated and related variety of industries (Eq.6)	+	3.906	0.674
Share immigrants, municipality	Share of inhabitants born outside Sweden	+	0.137	0.074
Δ*demand*	Annual change in the sum of the inhabitants' wages, in million SEK[a]	+	139.79	869.79
Market potential	Access to wages, in thousand SEK[b]	+	1.35e7	2.13e7
Unemployment rate	Unemployment rate, proportion of labour force registered as unemployed	+/-	0.046	0.022
MES	Mean establishment size (# employees)	-	7.171	2.232
Firm per capita	Number of firms divided by the population	+	0.062	0.020

[a] Calculated as the wages that the inhabitants that live in the municipality earn.
[b] Calculated as the accessibility to wages (what the inhabitants that live in each municipality earn). The accessibility measure is compiled by the intra-municipal, inter-regional and extra-regional accessibility to wages accounting for distance decay effects, following Johansson et al. (2002; 2003). Thus, accessibility to wages is intended to capture the market potential in each location.

models can work poorly: resulting in inefficient parameter estimates for the semi-fixed variables with large standard errors (Cameron and Trivedi 2009). Hence, the fixed effects capture most of the effect since there is limited variation over time. Given this, a random effects model is also estimated.[7] Since the fixed effect model captures variation over time for each municipality it can be considered as capturing the short or medium run (considering the time-period). The random effects estimation, on the other hand, captures the long run effects as it captures variation across municipalities (Durlauf and Quah 1999; Rodríguez-Pose and Tselios 2012). In this setting the models are not substitutes but rather complements.

Table 2 presents our basic results about the determinants of new firm formation at the municipal level with particular focus of the role of various measures of diversity—*Demographic diversity, Education diversity* and *Industry diversity*—and shows all control variables. Table 3 illustrates some of our robustness checks using other measures of diversity. In Table 3 we show only the coefficients on the alternative diversity variables while the control variables are suppressed; however, the signs and significance of the control variables are robust across the different estimations. Equations with *Occupation diversity* and *Share immigrants, municipality* are estimated separately. The separation is motivated by the high correlation between the demographic diversity measure and the share of immigrants in a municipality. Another reason the equation with occupation diversity is estimated separately is due to data restrictions; this variable is only measured from 2002 to 2010. The estimations include the same regressors as in Table 2 plus year

[7] While comparing the pooled OLS and random-effects models, the null hypothesis of no variance across municipality in the Breusch-Pagan Lagrange multiplier test was rejected. Hence, the test works in favor of the random-effects model.

Table 2 Diversity and new firm formation, municipal level, fixed- and random- effects, 1993-2010

Dependent variable: New firm formation, standardized-(ln)		
	Fixed-effect	**Random-effect**
Demographic diversity	**0.533****	**0.469****
	(0.171)	**(0.082)**
Education diversity	**0.038****	**0.075****
	(0.010)	**(0.029)**
Industry diversity	**-0.003**	**0.031**
	(0.024)	**(0.016)**
Δdemand	2.99e-6**	**4.92e-6****
	(9.34e-7)	**(9.78-7)**
Market potential (ln)	-0.279**	**-0.017**
	(0.053)	**(0.011)**
Unemployment rate	0.017	**-0.103**
	(0.381)	**(0.375)**
MES	-0.045**	**-0.037****
	(0.007)	**(0.005)**
Firms per capita	9.531**	**11.112****
	(0.797)	**(0.689)**
Constant	-1.751*	**-6.133****
	(0.812)	**(0.246)**
N	4760	**4760**
n (municipalities)	280	**280**
F-value	162.63	
Wald chi^2		**4771.02**
R^2 overall	**0.31**	**0.72**
R^2 within	**0.63**	**0.62**

Notes: ** significant at one per cent, * significant at five per cent. Standard errors in parentheses, clustered at the municipality-level. The estimations include year dummies.

Table 3 Robustness check, alternate diversity measures and new firm formation, municipal level, fixed- and random- effects

Dependent variable: New firm formation, standardized-(ln)		
	Fixed-effect	**Random-effect**
Occupation diversity	**0.076**	**-0.050**
	(0.105)	**(0.042)**
Share immigrants, municipality	**0.393**	**0.421****
	(0.219)	**(0.102)**

Notes: ** significant at one per cent, * significant at five per cent. Standard errors in parentheses, clustered at the municipality-level. Each of the variables capturing the diversity of the municipality; *Occupation diversity* and *Share immigrants, municipality* are estimated separately. The estimations include the same regressors as in Table 2 plus year dummies in the case of *Share immigrants, municipality*. For *Occupation diversity* the *Industry diversity* is dropped due to high bivariate correlation. In addition, in the case of *Occupation diversity* only the years 2002 to 2010 can be used due to data restrictions.

dummies in the case of the equation using *Share immigrants, municipality* as the alternate measure of diversity.

The results confirm a positive relationship between diversity and the new firm formation rate at the municipal level, confirming the first hypothesis. We find that the overall diversity of the inhabitants in the municipality in terms of age, gender and background, and the educational diversity have a positive effect on new firm formation. These results are robust across different estimation methods, i.e. fixed- and random-effects model.

The share of immigrants positively influences the rate of new firms, but only in the random effects model. It is insignificant in the fixed effects model. The lack of significance in the fixed effects model is most likely caused by the low variance over time in this variable. Compared to the other diversity measures the immigrants share has half the variance over time. The positive influence on new firm formation confirms other studies examining cultural diversity (Audretsch, et al. 2010; Niebuhr 2010; Cheng and Li 2012). The industry diversity, used to capture Jacobs externalities (where knowledge spillovers emerge from outside a firm's core industry and enhance a firm's performance or enhance the conditions for new firm formation) is insignificant. Hence, the industrial diversity tends to be less important when creating favourable conditions for new firms. In addition, since there is no information regarding each new firm and which core sector it belongs to and in which municipalities some sectors are over-represented, the variable might not fully capture the extent of knowledge spillovers. The variable capturing diversity in terms of occupational categories is also insignificant. The occupation diversity is only measured for 2002 to 2010 (due to data restrictions) but it is not the time period as such that is driving the results. The other diversity variables, *Demographic diversity*, *Education diversity*, and *Share immigrants, municipality* are positive and significant when estimated for the same

period. Thus, the occupational diversity as such does not seem to create beneficial conditions for new firm formation. Looking at the magnitude of the diversity measures by measuring the elasticities we observe that the overall diversity (*Demographic diversity*) has the largest influence followed by the *Education diversity*, and lastly *Share immigrants, municipality*.[8] The elasticity of new firm formation with respect to the *Demographic diversity* is approximately 0.25 whereas the elasticities with respect to *Education diversity*, and *Share immigrants, municipality* ranges around 0.01 to 0.03. Hence, the Demographic diversity has the strongest influence on new firm formation among the diversity measures.

All in all, the results highlight the benefits of having a diverse set of inhabitants in terms of background, age (experience), gender and education in terms of new firm formation. These relationships work through many channels. First, a more heterogeneous set of inhabitants may create an economic environment where ideas are created and transmitted. Second, a diverse population may create a tolerant atmosphere attractive to innovative and human capital-rich individuals. Third, the probability that any individual will see an economic opportunity as a profitable venture may increase if a region is comprised of many different set of individuals. Fourth, by having a more diverse population more economic opportunities for niched services and products may be produced.

The signs of the control variables' coefficients follow the normal expectations where an increase in demand and the number of firms per capita is associated with increases new firm formation. The mean establishment size is associated with decreases the rate of new firm formation. The only unexpected result is the negative coefficient on the size variable (*Market potential*). The result has been found in previous studies on Swedish new firm formation

[8] The elasticity is calculated as
$(\beta_i * mean\ indep.variable)/mean\ predicted\ value\ of\ the\ dependent\ variable.$

(Andersson and Koster 2011). The result may be driven by the fact that the rate of new firm formation is high in many small municipalities in the north of Sweden. The correlation between the mmarket potential and overall diversity is approximately 0.60 (the highest bivariate correlation among the variables in the estimations) meaning that larger locations also tend to have a higher degree of diversity.

Other robustness checks were performed pertaining to the error structure and another measure of diversity. We tested for spatial autocorrelation, and found none. Using Pesaran and Friedman's test of cross-sectional dependence, we did not reject the null hypotheses of cross-sectional independence (De Hoyos and Sarafidis 2006). As another robustness test on the workings of diversity, we used an instrumental variable approach where the share of immigrants in 1990 was used as an instrument for the share of immigrants and *Demographic diversity* over the time period. The results are similar and not significantly different from the results presented in Table 2 and 3. The validity of the instrument is driven by policy changes. In 1991 the government changed the rules allowing immigrants to settle wherever they wanted; before this change immigrants were allocated by the government to different municipalities. Thus, the share of immigrants in 1990 should be exogenous. The relevance condition is verified by significant results in the first-stage equation and by high F-values (all are above 10) meaning that the null hypothesis of weak instruments can be rejected.

3.2 Firm level

The dataset used at the firm level also originates from Statistics Sweden and also has restricted access. The dataset is built on employee-employer matched data where there is detailed information about the firm as well as the employees of the firm. New firms are defined as those

with a new organization number and a new set of employees following the same definition as Statistics Sweden explained in the previous section. The firms are identified in 2001 and followed over three years (to 2004), five years (to 2006) and nine years (to 2010), time periods that we term the "short run," "medium run" and "long run," respectively.

We again encounter the challenge of how to measure diversity, this time at the firm-level. Diversity is often measured only using variables that separately capture the ethnicity of employees (Yoon 1997; Lee 2001) or age, gender, education or occupation structures. But our framework uses the more complete measures found in entropy indexes and so allows a richer analysis to be performed leading to new knowledge about the influence of diversity on firm performance.

The demographic (within) firm diversity is measured by an entropy measure (Theil index), presented in Eq. (8), following the same structure as the demographic diversity in the municipality presented see Eq. (1). The gender, age, and ethnicity of the employees are taken into account where individuals are separated into three age, two gender and two ethnicity categories:[9]

$$Demographic\ diversity_i = -\sum_{c=1}^{12} \frac{e_c}{e_i} ln\left(\frac{e_c}{e_i}\right) \quad (8)$$

where *e* represents the number of employees, *i* represent the firm and *c* represents the category that an individual can belong to depending on gender, age, and ethnicity. A more diversified work place has a higher entropy value. The work force diversity within a firm can also be thought of along the dimensions of education (*Education diversity*) and occupation (*Occupation diversity*). Educational and occupation diversity is also measured through entropy measures, unrelated variety and related variety (Eqs. (2) and (3)) that are summed (Eqs. (4) and (5)), but

[9] Age groups: (i) under 30, (ii) 30-55, (iii) above 55. Ethnicity: (i) born in Sweden, (ii) born in another country.

here diversity is measured at the firm instead of at the municipal level. Another measure of firm diversity captures the background of the individual employee (*Immigrants*) and is measured as the share of employees with a foreign background.

The initial size of the firm is likely to influence the survival and growth of a firm (*Size*). In order to allow for nonlinear effects, a quadratic term is included ($Size^2$). The initial size has been used in many studies (Simon and Bonini 1958; Hymer and Pashigian 1962; Singh and Whittington 1975; Hall 1987; Petrunia 2008; Teruel-Carrizosa 2010). The knowledge and skills of the employees in the firm are measured through the share of employees within the firm with a bachelor degree or more (*education*), and by their accumulated experience (*experience*) (Davis et al. 1996; Andersson and Noseleit 2011). We further control for industry by adding an industry dummies (*Industry*). The economic environment is captured at the municipal level and includes the same variables used in regional empirical context (see Table 1) plus one capturing the specialization level at the two-digit SIC level. To capture the local turnover ratio (*Turnover ratio*), the number of new firms divided by the number of exiting firms measured at the SAMS level (Small Areas for Market Statistics) are used. There are approximately 9200 SAMS in Sweden, compared to 290 municipalities, and they each have roughly 1000 inhabitants. Thus, the geographical size differs. All explanatory variables are from 2001, the starting period in our analysis. Table 4 gives an overview of the firm-level variables and summary statistics.

We encounter some challenges in our modeling and estimation procedures using firm-level data. First, because so many of the firms are only one-employee firms we have a dilemma as to how to handle with-in firm diversity in this case. By definition, one-employee firms are not diverse, so we must develop an approach for handling this. In our sample, about 79% of the firms have only one-employee and about 21% have more than one employee. Out of the firms with

Table 4. **Description of variables and summary statistics, firm level (N=62,057)**

Name	Definition	Exp. sign	Mean	St.dev
Dependent variables				
Survival	= 1 if firm exists in 2004/2006/2010; = 0 if firm exited the market		0.394 0.298 0.201	0.489 0.457 0.401
Growth	Difference in number of people employed in the firm from 2001 to 2004/2006/2010		0.167 0.237 0.339	0.537 0.622 0.743
Independent variables (all from 2001)				
Firm level				
Demographic diversity	Entropy measure based on the gender, age & ethnicity of the employees (Eq. 8) at establishment level	+	0.146	0.347
Education diversity	Entropy measure, sum of unrelated and related varieties of education (Eq. 4) at establishment level	+	0.201	0.474
Occupation diversity	Entropy measure, sum of unrelated and related varieties of occupation (Eq. 5) at establishment level	+	0.159	0.367
Immigrants	Share of employees born outside Sweden	+/-	0.201	0.384
Size	Number of employees	+	1.923	6.789
$Size^2$	$(\text{Number of employees})^2$	-	-	-
Education	Share of employees with at least three years of higher education. The distinction of three years of higher education is used since it normally takes at least three years to achieve a bachelor's degree in Sweden.	+	0.158	0.351
Experience	Average experience of the employees in the firm. Experience is defined as the employee' age minus six, minus the number of years of education.	+	23.674	12.757
Industry	Dummies based on the two-digit SIC-code, 60 dummies in total		-	-
Neighborhood level				
Turnover ratio	Number of establishments that entered the market divided by the establishments that exit the market	+/-	2.504	1.545
Municipal level[a]				
Specialisation	Location quotients at the two-digit SIC-code level	+/-	-	-

[a] The estimations at the firm level also include the variables from Table 1 but we omit the summary statistics since they are the same as in Table 1.

more than one employee most have less than ten employees (93%). Our approach is to split the sample into two subsamples, (1) firms with only one employee and (2) firms with more than one employee. For the one-employee firms we look at the characteristics of the single employee (gender, higher education, experience, and foreign background) and ask how individual characteristics effect the survival and growth of firms. For the firms larger than one, we measure diversity using Eqs. (2) - (5) at the firm level.

Another challenge we face in the firm-level estimation is that we do not have the street address of each firm. Therefore--unlike in our regional analysis--when we use municipalities as the unit of observation it is not possible to test for spatial covariance because we cannot construct a spatial weight matrix. The spatial dependence between municipalities is however likely reduced by using a market potential measure (*Market potential*) where the influence from surrounding locations is incorporated by using an accessibility measure (Andersson and Gråsjö 2009).

A third challenge is how to control for the possible selection bias of surviving firms in our model of the growth of firms over time. To estimate the relationship between diversity within and outside the firm for firm survival and growth, we use a two-step Heckman selection model. We examine three time periods of changes, from 2001 to the years 2004, 2006 and 2010. By looking at the number of observations, censored and uncensored observations we observe that the total sample is slightly less than 62,000 firms. Hence, there were about 62,000 firms in 2001 that were classified as being new. Out of these 39% of new firms survive in the short term, 2001 to 2004. The share of new firms that survive in the medium term, 2001 to 2006, is 30% and 20% of the new firms survive over the long term, 2001 to 2010. The models for our firm-level

analysis are presented below; Eq. (9) presents the survival model (selection equation) and Eq. (10) the growth model (outcome equation):

$$Survival_{it} = Firm\ diversity'_{i\bar{t}}\beta_1 + Firm\ controls'_{i\bar{t}}\beta_2 + Municipal\ diversity'_{i\bar{t}}\beta_3 + Municipal\ controls'_{\bar{i}t}\beta_4 + \beta_5 z_{\bar{i}t} + u_{it} \quad (9)$$

$$Growth_{it} = Firm\ diversity'_{i\bar{t}}\beta_6 + Firm\ controls'_{i\bar{t}}\beta_7 + Municipal\ diversity'_{i\bar{t}}\beta_8 + Municipal\ controls'_{i\bar{t}}\beta_9 + \beta_{10}\hat{\lambda}_{it} + \beta_{10}\left(\hat{\lambda} - \hat{\lambda}_{it}\right) + \varepsilon_{it} \quad (10)$$

where *Survival* is a dummy variable (0, 1): 1 if firm *i* survived in period t for t = 2004, 2006 *or* 2010; $\bar{t}$ is the base year, 2001; and *u* is the error term. *Growth* measures the change in the number of employees if the firm survived in period *t*, for *t* = 2004, 2006 *or* 2010; or *Growth* = 0 for non-surviving firms; $\hat{\lambda}_{it}$ is the so-called "Heckman's lambda," estimated from selection Eq. (9) and $[\beta_{10}(\hat{\lambda} - \hat{\lambda}_{it}) + \varepsilon_{it}]$ is the error term. $Firm\ Diversity'_{i\bar{t}}$ measures diversity at the firm level in the base year, $\bar{t}$ = 2001, and $Municipal\ \ Diversity'_{i\bar{t}}$ measures diversity at the municipal level in 2001. $\beta_1 - \beta_4 and \beta_6 - \beta_9$ are vectors of parameters while β_5 and β_{10} are individual parameters.

In the second step of the procedure when the outcome equation is estimated, the inverse of the Mill's ratio (Heckman's lambda), $\hat{\lambda}$ is added to Eq. (10). $\hat{\lambda}$ is obtained from the probit equation in the first stage estimation of the selection equation and is evaluated at predicted values for Eq. (9) using $\hat{\lambda}(\cdot) = \phi(\cdot) / \Phi(\cdot)$, *where* $\phi(\cdot)$ is the standard normal pdf and $\Phi(\cdot)$, is the standard normal cdf. The inclusion of the inverse Mill's ratio accounts for possible selection bias and for the possible correlation of the errors between the selection and outcome equations.

We achieve identification by the use of an exclusion restriction, a variable *z* is included in Eq. (9) but not in Eq. (10). We hypothesize that the variable *Turnover ratio* captures the extent of failures (entry divided by exit) of the local competition and so affects the probability that a given firm will survive in a given neighborhood. We assume that the variable does not influence the growth of surviving firms.

Our firm-level results are shown in Tables 5 - 7. Table 5 focuses on new firms having more than one employee and shows the relationship between our preferred measure of firm-level diversity, *Demographic diversity*, as well as diversity outside the firm for firm survival and growth. Table 6 shows results from our robustness tests based on alternate measures of with-in firm diversity for the firms with more than one employee, *Education diversity* and *Occupational diversity*. Table 7 focuses on the second sample of new firms, those only having one employee. Table 7 shows the relationship between individual employee characteristics within the firm and diversity outside the firm for firm survival and growth.

The motivation for using a Heckman model is supported by the significant Heckman's λ's in the short and medium term estimations in Table 5 and in Table 7. The estimated λ is significant at the ten percent level in the long term estimation, 2001 to 2010, in Table 5. The significant λ's indicate that there is likely a selection bias since the error terms are correlated across the different estimations (the output and selection model). OLS estimates would be inconsistent.

We discuss our results by first analyzing how diversity influences firm growth (in terms of the number of employees), presented in Table 5 and 6. Recall that these tables pertain to those firms having more than one employee in 2001. To provide some context for interpreting these

Table 5. Influence of diversity on the survival and growth of new firms, 2001, Heckman selection, firms with more than one employee

Variable	2001 to 2004	2001 to 2006	2001 to 2010
Dependent variable: Δemployment between 2001 and 2004/2006/2010			
Firm level in 2001			
Demographic diversity	-0.020	-0.098*	-0.071
	(0.058)	(0.047)	(0.056)
Immigrants	-0.138	0.012	0.006
	(0.089)	(0.074)	(0.100)
Size	0.001	-0.007	-0.006
	(0.004)	(0.004)	(0.005)
Size^2	-5.34e-6	2.13e-5	2.34e-5
	(2e-5)	(1e-5)	(2e-5)
Education	0.001	-0.023	0.103
	(0.057)	(0.049)	(0.069)
Experience (ln)	-0.066	-0.152**	-0.204**
	(0.040)	(0.028)	(0.032)
Municipal level in 2001			
Demographic diversity	-0.165	-0.018	-0.257
	(0.189)	(0.189)	(0.300)
Share immigrants, municipality	-4.41e-7	1.38e-6	-2.48e-7
	(1e-6)	(1e-6)	(2e-6)
Industry diversity	0.061	0.144**	0.126*
	(0.042)	(0.040)	(0.059)
Δ*demand*	-2.12e-6	-9.98e-7	-7.57e-6
	(5e-6)	(5e-6)	(7e-6)
Market potential (ln)	-0.013	-0.024	0.011
	(0.021)	(0.020)	(0.029)
MES	0.019	0.033*	0.027
	(0.015)	(0.015)	(0.021)
Firms per capita	1.245	1.891	0.755
	(1.199)	(1.197)	(1.670)
Specialisation	0.008	0.003	0.006
	(0.005)	(0.004)	(0.005)
Dependent variable: dummy var, 1 = if the firm existed in 2004/2006/2010, 0 = exited the market			
Firm level in 2001			
Demographic diversity	0.157**	0.139**	0.120**
	(0.034)	(0.034)	(0.035)
Immigrants	-0.250**	-0.234**	-0.261**
	(0.046)	(0.046)	(0.049)
Size	0.017**	0.018**	0.019**
	(0.002)	(0.002)	(0.002)
Size^2	-5.75e-5**	-5.80e-5**	-6.02e-5**
	(1e-5)	(1e-5)	(1e-5)
Education	0.096	0.005	0.003
	(0.054)	(0.054)	(0.056)
Experience (ln)	0.119**	0.078**	0.022
	(0.023)	(0.023)	(0.024)

Neighborhood level in 2001			
Turnover ratio	0.018* (0.008)	0.026** (0.008)	0.031** (0.008)
Municipal level in 2001			
Demographic diversity	-0.033 (0.212)	-0.206 (0.211)	-0.616** (0.219)
Share immigrants, municipality	-2.64e-7 (1e-6)	-1.10e-6 (2e-6)	-2.19e-6 (2e-6)
Industry diversity	-0.039 (0.045)	0.022 (0.045)	0.079 (0.047)
Δ*demand*	-3.76e-6 (5e-6)	-3.20e-6 (5e-6)	-8.70e-6* (6e-6)
Market potential (ln)	-0.013 (0.023)	-0.007 (0.023)	0.023 (0.024)
MES	0.002 (0.016)	0.014 (0.016)	0.001 (0.017)
Firms per capita	0.055 (1.328)	1.146 (1.322)	0.009 (1.374)
Specialisation	0.010 (0.006)	0.008 (0.005)	0.008 (0.005)
N	10 204	10 204	10 204
Censored obs.	4 495	5 599	6 820
Uncensored obs.	5 709	4 605	3 384
λ	0.94*	0.12*	0.53

Notes: ** denotes statistical significance at the 1-percent level, * at the 5-percent level. Standard errors in parentheses. The regression models also include industry-dummies. The size variables have been centered to avoid the problem of multicollinearity (Smith and Sasaki 1979).

Table 6. Robustness check, alternate measures of firm diversity and their influence on firm survival and growth, new firms in 2001, Heckman selection, firms with > 1 employee

Variable	2001 to 2004	2001 to 2006	2001 to 2010
Dependent variable: Δemployment between 2001 and 2004/2006/2010			
Education diversity	0.066 (0.072)	-0.065 (0.060)	-0.061 (0.070)
Occupational diversity	0.085 (0.074)	0.002 (0.037)	0.003 (0.048)
Dependent variable: dummy var, 1 = if the firm existed in 2004/2006/2010, 0 = exited the market			
Education diversity	0.205** (0.029)	0.204** (0.029)	0.213** (0.029)
Occupational diversity	0.114** (0.030)	0.091** (0.030)	0.101** (0.030)

Notes: ** denotes statistical significance at the 1-percent level, * at the 5-percent level. Standard errors in parentheses. The same regressors excluding *Demographic diversity* as in Table 5 (except for the regressor *Education* when estimating the effect from the *Education diversity* variable) have been used and they are robust across the different estimations.

Table 7. How individual characteristics influence firm survival and growth of new firms--Heckman selection model, new firms with only one employee in 2001

Variable	2001 to 2004	2001 to 2006	2001 to 2010
Dependent variable: Δemployment between 2001 and 2004/2006/2010			
Female	0.044**	0.043**	0.044
	(0.011)	(0.015)	(0.023)
High education	-0.034**	-0.047**	-0.068**
	(0.011)	(0.015)	(0.024)
Experience (ln)	-0.076**	-0.101**	-0.141**
	(0.007)	(0.009)	(0.014)
Immigrants	-0.013	-0.026	-0.019
	(0.011)	(0.017)	(0.027)
Dependent variable: dummy var, 1=if the firm existed in 2004/2006/2010, 0 = exited the market			
Female	-0.104**	-0.091**	-0.091**
	(0.016)	(0.017)	(0.019)
High education	-0.019	0.001	-0.009
	(0.019)	(0.020)	(0.023)
Experience (ln)	0.052**	0.034**	-0.018*
	(0.010)	(0.010)	(0.012)
Immigrants	-0.092**	-0.111**	-0.124**
	(0.018)	(0.019)	(0.021)
N	35 976	35 976	35 976
Censored obs.	22 265	25 884	29 481
Uncensored obs.	13 711	10 092	6 495
λ	-0.12*	-0.07*	-0.16*

Notes: ** denotes statistical significance at the 1-percent level, * at the 5-percent level. Standard errors in parentheses. The same regressors excluding *Demographic diversity*, Size and Size^2 as in Table 5 have been used and they are robust across the different estimations.

tables, it is useful to know that there approximately 56 % firms survive over the first three years, 45 % survive five years and 33 % survive nine years.

We surprisingly find that none of the within-firm diversity measures (*Demographic diversity*, *Education diversity* and *Occupation diversity*) have a positive relation with the growth of firms in any of the time periods. In fact, the coefficient on *Demographic diversity* is negative and significant in the medium run, from 2001 to 2006. Why the inverse relationship between diversity and growth at the firm level in the medium run? We are still considering alternative explanations but expect it has to do with the potential endogeneity of the choice of labor by the firms in 2001, which we are in effect treating as exogenous here.

However, for the case of survival of firms we observe a different pattern. The diversity measures (*Demographic diversity*, *Education diversity* and *Occupation diversity*) are all positively related to the probability of a firm surviving. In the case of survival, the diversity measures increase the probability to survive in the short (3 years), medium (five years) and in the long term (nine years). Hence, our results confirm previous studies that diversity is beneficial for firm performance (Jackson 1992;Watson, et al. 1993; Tallman and Li 1996; Richard 2000; Page 2007). Hence, firms with more diverse employees, whether it is in the composition of age, gender and background or the educational or occupational structure are more likely to survive. A diverse set of individuals (in all the above mentioned aspects) is more likely to bring in different set of knowledge and skills through their differentiated experience and education. Hence, the knowledge base and knowledge creation is likely to be larger, compared to a more homogenous firm, positively influencing the status and performance of the firm.

Even though the overall diversity measure, *Demographic diversity*, incorporated the background of the individual, it is also interesting to observe the isolated effect from different

variables. Here we examine the share of immigrants as this aspect is common when talking about the diversity of individuals and used in previous research. The share of immigrants has a negative influence on the survival of firms (for the short, medium and long terms) and no effect on the growth of firms. These results might be driven by language difficulties, less knowledge about the business climate, less access to business networks or pure discrimination in terms of customers-response and access to financial capital. Most previous studies have focused on the management level where immigrants tend to increase firm performance, especially in the US. We have also tested the share of females (negative and significant); these results are available on request.

Comparing the magnitude of the estimates by calculating elasticities of survival with respect to the independent variables, we observe that the elasticities for the different diversity measures are very similar. Typically they range from -0.01 to 0.05 where the overall employee diversity and education diversity show the largest elasticities and the elasticities with respect to the share of immigrants are the lowest. The estimations have been performed on new firms in 2001; and we have performed several robustness checks. The same estimations have also been performed using the whole sample of firms and the already existing firms in 2001. The results differ for the already existing firms in terms of the diversity measures where the firm diversity negatively influences the firm growth and the share of immigrants and the municipal diversity has a positive influence on firm growth. For firm survival the results are robust. These results are available on request.

Turning to one-employee firms (Table 7) we observe that 35,976 new firms only have one employee at their opening year, out of these 38% survive over the first three years, 28% survive five years while only 18% survive over nine years. Comparing the estimated coefficients

to their counterparts in Table 5, we observe that if the establishments are larger at the start they have a higher chance of surviving, confirming previous results (Audretsch 1995; Geroski 1995; Honjo 2000). We cannot test the role of diversity for the one-employee firms, as this is impossible per definition as previously stated. We have therefore chosen to include several characteristics of the individual to see how these influence the growth and survival of new establishments (gender, higher education, experience, and foreign background).

In terms of firm growth those started by women have a higher growth in the short and medium run. Individuals with a higher education that start a one-employee firm do not seem to have a growth objective as the education variable is negative and significant. These individuals are most likely involved in consultancy tasks where one-employee firms are common. The average experience (i.e. age of the individual) has a significant influence and in this case is negative. Older individuals might have different motives and objectives. Older entrepreneurs may have slightly more preference for the objectives of the continuity of the firm and independence, while younger entrepreneurs may show preference for the objectives of making a profit and achieving growth (Ruis and Scholman 2012).

For the survival of firms we observe another pattern. Firms managed by female entrepreneurs or individuals born outside Sweden seem less likely to survive, irrespective of the examined time period. In the case of older individuals their firms seems more likely to survive over the short and medium time periods, up to five years, while in the long run the age of the individual has a negative effect. These findings could correspond to the mentioned objective of older individuals. The firm level corresponds to the fact that elder individuals tend to have different objectives focusing more on continuity rather than growth. This corresponds to the positive effect of the average experience in the survival equation.

The only control variable in the growth equation (Table 5) that is significant at the firm level is the average experience which shows a negative influence. The only control variable that is significant at the municipal level is the *Industry diversity*. This variable is positively influence the growth of firms in the medium and in the long term. The mean establishment size is positive in the medium term. Turning to the selection equation, whether the firms survive or not, more variables are found to influence the probability of surviving. At the firm level, larger firms tend to have a higher probability of surviving, even though the effect is marginally decreasing. Firms with more accumulated experience e.g. having older employees overall, have a higher probability of surviving in the short and medium run. The neighborhood variable (*Turnover ratio*) shows a consistent positive influence on firm survival over the three different time periods. Firms located in regions with a high level of overall diversity (in terms of age, gender and background) have a lower probability of surviving in the long run. This variable may also capture the competition level at the municipal level. Regions with a heterogeneous population may foster new firm formation, increasing the level of competition which may make it harder for the firms to survive. The change in demand may negatively influence the survival of firms in the long term. Municipalities that are growing fast are associated with decreases in the probability that a particular firm survives.

4. Conclusions

As more countries, regions and cities become increasingly integrated, the flow of capital, products and most importantly, individuals, will increase. At the same time, a larger share of women is entering occupations and industries that previously have been male dominated. In addition, older individuals are engaged in the labor market and work longer. All these factors

combined lead to regional economic environments with a more heterogeneous population. This paper analyses the effect from diversity within firms, in terms of employees, and in the external environment, in term of the inhabitants, on the formation, survival and growth of new firms in Sweden. New firms are suitable to analyze since new firms are likely to mirror the capacity of the population to value and assess new ideas as profitable ventures--and these ideas are realized in the birth of new firms. The focus on diversity and new firms also adds knowledge to the existing literature which normally focuses on more limited measures of diversity than we use here. Concomitant with our in-depth measures of diversity is our ability to examine issues at the firm level. Using a restricted data set allows us to analyze each firm's internal labor force. We are able to examine the extent to which employee diversity affects the probability of a firm's survival and its growth.

Our empirical work is divided in two parts. The first part focuses on the municipal level. We investigate how diversity in terms of demographic diversity, educational diversity, occupational diversity, share of immigrants, and industry diversity influence the rate of new firm formation at the municipal level for the period 1993 to 2010. The results confirm a positive relationship between a diverse set of inhabitants in terms of background, age (experience), gender and education in a municipality and the new firm formation rate.

The second part of the empirical analysis uses new firms as the unit of observation. Here we examine how work-force demographic diversity in terms of age, gender, background; as well as education and occupation influences the probability of survival and growth. The firm-level results show that diversity has a positive influence on the rate of new firm formation as well as on the survival of new firms. Thus, we can conclude that having access to a diverse set of individuals, both in the local urban economy and within the firm itself is beneficial to firms'

economic outcomes. Individuals with different backgrounds, age, gender, experience and knowledge may view economic opportunities and new ideas differently. Hence, it is more likely that one individual views a new idea as a base for a profitable firm. Within the firm, different sets of individuals may bring differentiated knowledge that increases the total amount of knowledge within the firm and also speeds up the production of knowledge.

The results in this paper also bring some insight into the workings of some of the positive benefits of agglomeration forces. Overall, we expect to have greater diversity in denser and larger cities. The diversity in these cities may contribute to firm formation, survival and growth that is has an overall positive impact for the whole region. These diverse regions may become incubators for new firms. From a policy perspective it is important to acknowledge the importance of a diverse economic environment in terms of individuals. And yet we recognize that even though we find a positive relation between diversity and the formation and survival of new firms, diversity might not be the answer or key to everything about the economics of firms. It is important to recognize that too much diversity might not be beneficial for firm performance as there may be a lack of common ground (knowledge) to stand on and to use as a starting point. The findings of insignificant coefficients on most of the within–firm diversity measures on firm growth may mirror such issues.

To further explore the role of diversity on firm behavior, researchers could compare existing firms with new firms and examine the differences and similarities. Different sets of sectors and regions could be explored since the conditions for the formation, survival and growth of firms may differ across space and type of industry.

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