Surviving start-ups: the importance of entrepreneurial capital

Evans Korang Adjei

To cite this article: Evans Korang Adjei (2021) Surviving start-ups: the importance of entrepreneurial capital, Regional Studies, Regional Science, 8:1, 239-258, DOI: 10.1080/21681376.2021.1927813

To link to this article: https://doi.org/10.1080/21681376.2021.1927813

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Published online: 09 Jun 2021.

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ABSTRACT
This paper constructs a theoretical framework that explains how exposure to entrepreneurial activities impacts start-ups’ survival. First, this study examines the effects of entrepreneurial capital (EC) – inherited entrepreneurial practices from parents as a result of the exposure to entrepreneurial activities, on the survival of start-ups. Second, it examines the effects of EC across firm types (family and non-family firm) and regions (smaller and larger region). Using a sample of start-ups in 2002 in Sweden, we found first that EC influences the survival of start-ups, especially start-ups in smaller regions. Further, we found that EC conditions the survival of family start-ups. This paper adds to the literature by opening the discussions on the survival of start-ups and EC. We provide policy implications thereafter.

ARTICLE HISTORY
Received 19 August 2020; Accepted 29 April 2021

KEYWORDS
start-up; entrepreneurship; entrepreneurial capital; survival; region

JEL CLASSIFICATIONS
L26; M13

INTRODUCTION
Entrepreneurship is one of the major strategies by governments all over the world to promote economic growth in lagging and smaller regions, but in most circumstances with limited success. Governments have persistently failed to achieve this goal because of the lack of a clear understanding of what drives the survival of start-ups. Economic growth theories do not suggest a clear approach when it comes to identifying growth factors in smaller and lagging regions (Stephens et al., 2013). This gap in the regional science literature has created a persistent regional difference in the survival and growth of start-ups. Some studies attribute the disparities in the survival rates of start-ups to the processes of firm selection and agglomeration economies (Combes et al., 2012) and regional entrepreneurial attitude (Andersson & Koster, 2011). However, most growth theories assume that human capital is the real engine of growth (Stephens et al., 2013). Meaning, human capital in the form of entrepreneurial skills, education or creativity promote growth (Becker, 1964; Florida, 2002). Yet, it is unclear how these growth theories apply to smaller regions with a low-skilled workforce (Acs & Kallas, 2008).

In this study, we further explore the link between entrepreneurship and regional development by examining how the knowledge transferred within families through entrepreneurial

CONTACT
(Corresponding author) evanskadjei@yahoo.com
Department of Geography, Umeå University, Umeå, Sweden.
activities (hereafter referred to as entrepreneurial capital – EC) may be a critical factor for start-ups’ survival. With this, we take into account the firm type and the regional context. We argue in this paper that EC may affect the staying power of firms, especially in rural regions, where the family relations tend to be more deeply rooted and characterized by a higher frequency of face-to-face interactions (Adjei et al., 2016). Firm survival mainly addresses the regional firm population dynamics (also, a measure of success), and to some extent the local diversity of resilient firms. We test this on a sample of Swedish start-ups from 2002. The paper shows that EC influences the survival of start-ups, especially start-ups in smaller regions. Further, we found that EC conditions the survival of family start-ups. We offer explanations for the nature of these effects by drawing on entrepreneurship and regional development literature.

We make the following contributions. First, we contribute to the regional science literature by examining the role of EC in the regional development framework. We do this by analysing the effects of EC on the survival of start-ups across regions. Second, we contribute to the entrepreneurship and family firm literature by providing large-scale systematic analyses of family firm heterogeneity. The remainder of the article is organized as follows. The next section presents the theoretical framework and hypotheses. The third section presents the data and variables used in the analyses. The fourth section presents the empirical model and results. The fifth section concludes.

THEORETICAL FRAMEWORK AND HYPOTHESES

Entrepreneurship and start-up
Entrepreneurship is important in the regional development framework. Entrepreneurs directly contribute to the creation of new jobs, the emergence of new innovations and new knowledge spillovers, but also stimulates competition and coopetition (Audretsch, 2007; Mueller, 2007). Entrepreneurship can be a driver of innovation and enhance competition in an industry (Van Stel et al., 2005); this can then drive productivity improvement and employment growth (Acs, 2006). Entrepreneurs drive growth through start-ups or small businesses (Decker et al., 2014; Sedláček & Sterk, 2017). Start-ups are important development players because it is economically prudent to have surviving smaller firms that will contribute to growth than a single large employer (contrary to Harrison, 1995). Moreover, there is a reported huge number of exits among start-ups. In most cases, the number of firms that exit the market at a point in time is about the same as the number of entries (Fritsch, 1997). Among the reasons for start-ups’ failure is the lack of market knowledge or industry experience. Not only will the lack of market knowledge affect the survival of start-ups, but it is also more likely to affect the formation of new firms, to start with. Studies show that certain regional factors, albeit measured in somewhat different ways, explain a large share of variations in start-ups’ survival. Factors such as population growth and density, economic diversity, share of small firms, industry density, and entrepreneurial culture influence the formation of new firms (Armington & Acs, 2002; Westlund et al., 2014). Nyström (2007) has shown that regional determinants of start-ups differ among industries and across regions. Westlund et al. (2014) found great variation in the explanatory power of entrepreneurial social capital across sectors and regions. In the Swedish literature, accessibility to human capital and entrepreneurial climate has been shown to have a positive impact on the formation and survival of start-ups in municipalities (Andersson & Koster, 2011).

EC and survivability
Similarly, entrepreneurship indirectly influences regional development through knowledge transfer, especially within the family. Among other things, the human capital characteristics of an entrepreneur promote good entrepreneurial behaviour. We use EC in this context as an
expansion of the traditional notion of the human capital theory (Becker, 1964) to include social and relational factors such as experiences and skills that are relevant for business ownership (Aldrich et al., 1998). According to this notion, entrepreneurial parents are better placed to facilitate the spillovers of entrepreneurial related behaviours (e.g., willingness to work long hours, managing a workforce and knowledge of what is technically viable) that promote value development (Aldrich et al., 1998). Entrepreneurial parents can facilitate the development of relevant entrepreneurial capabilities through daily familial socialization and early child involvement in the family business. The socialization process enables some form of entrepreneurial spillovers to take place (Lindquist et al., 2015). Exposure to entrepreneurial activities helps children to learn not only the attitudes and skills necessary for becoming an entrepreneur but also those that may facilitate the firm’s staying power. Through the socialization process, parents act as role models, passing along valuable entrepreneurial capabilities to their children. Entrepreneurial parents can influence their children’s entrepreneurial chances in non-financial ways, through personal networks, as personal networking among small and medium-sized enterprises (SME) owners is an important resource for mobilizing business resources. Parents can also act as brokers, linking their children to trustful people who can provide valuable resources for running a business (Johannisson et al., 2007). The EC model we present here encapsulates this argument in the way that people require or must possess in the process of entrepreneurship. We argue that the practices one inherits (EC) from entrepreneurial parents can partly define ones accumulated skills; hence, EC can partially explain the successes or survivability of firms. However, where and which firm? This leads us to hypothesize that:

Hypothesis 1: Having a parent (or both) involved in entrepreneurial activity (EC) has a positive impact on the survival of start-ups.

Relationship between EC, smaller region and family business

The above motivation on the possible relationship between EC and start-ups’ survival is assumed in a non-spatial phenomenon. However, an important question that is begging for an answer is that if there are differences in start-up frequencies or occurrences between urban and rural areas and how the spillovers of entrepreneurial activities can help explain the differentiated regional survival rates of start-ups? The literature establishes that larger regions are characterized by various amenities that attract human capital and entrepreneurship, hence productive firms and people agglomerate in larger regions (Combes et al., 2012) and, by extension, innovative entrepreneurs. The logic implies a high rate of spillovers in larger regions, which in turn influence higher entrepreneurial activities. Whereas smaller regions often lack the important resources needed for entrepreneurial activities to take place. In effect, this suggests that there are differences in the frequencies of start-ups between urban and rural regions hence, the spillovers of entrepreneurial knowledge. Hammarstedt (2009) found that self-employment propensity in Sweden was higher in metropolitan regions as compared with the less dense counties of Northern Sweden. However, using a geocoded data of Sweden’s urban and rural areas Eliasson and Westlund (2013) found that the ratio of self-employment entry was about 60% more frequent in rural and small areas compared with urban and larger areas. When self-employment in the primary sector is excluded, the rate of self-employment entry is almost the same in rural and urban areas. Similar results from other countries have been presented by, for example, Fritsch and Falck (2007). Using the resource-based view approach, Deakins (2006) argues that rural entrepreneurship differs from urban entrepreneurship concerning the access and acquisition of human, financial and social capital. He further argues that rural firms can overcome these disadvantages by, for example, appropriate social and business networks.
However, based on the complexity and diversity of rural social and business networks, several different but complementary and possibly competing networks including family, local clubs and community (Deakins, 2006), it is prudent to argue that any transferred entrepreneurial skills in the rural area are more likely to influence firm survival. The entrepreneurship–region nexus points to the fact that larger and smaller regions may present different entrepreneurial qualities, practices and behaviours due to the different resources that support entrepreneurship. Moreover, what is absent in the literature is the empirical evidence on how the entrepreneurial capabilities acquired from self-employed or entrepreneurs in urban and rural regions may affect the survival rates of start-ups. There are still significant theoretical and empirical gaps in terms of adequate regional theories about how entrepreneurial spillovers are likely to influence the survival of start-ups in different spatial set-ups. Moreover, we argue that since larger regions are characterized by fewer (and weak) face-to-face interactions, we expect entrepreneurial interactions between parents and children to be less rich (in terms of frequency) in larger regions than in smaller regions. Based on this, we formulate the following hypothesis:

_Hypothesis 2: Having a parent (or both) involved in entrepreneurial activity (EC) has a positive impact on the survival of start-ups in smaller or rural areas._

Against this background, we explore how EC is likely to affect the survival of family and non-family start-ups knowing that they have different growth and surviving trajectories. It is generally argued that family businesses have a higher survival rate than non-family business (Habbershon & Pistrui, 2002; Miller & Le Breton-Miller, 2005), one reason is that they hold on to tried and tested business strategies passed on from parents. We believe that the social and family context in which people grow shapes their creative thinking, develops social capital, generates value, thus creating cultures that can enhance the management of new firms. Some studies have shown a positive relationship between childhood experiences on the development of entrepreneurial intention. Having a family business background and parent business experience influence the desire to start a business (Drennan et al., 2005). However, the literature and empirical evidence on how this further lead to the growth and survival of the family business is scarce. We see EC as a spillover of family traditions and the practices of entrepreneurial parents. Therefore, such experiences are best suited for the survival strategies of firms that are driven by family social capital and values. Thus, we hypothesize the following:

_Hypothesis 3: Having a parent (or both) involved in entrepreneurial activity (EC) is more likely to have a positive impact on the survival of family start-ups than non-family start-ups._

**DATA AND VARIABLES**

**Data**
The data for this study come from a Swedish matched employer–employee database called ASTRID. The database contains different population registers from Statistics Sweden (SCB) and offers several advantages. First, it is comprehensive, containing all start-ups registered in Sweden with firm-specific characteristics. Second, it is longitudinal, with annual observations of people and firms. Thus, it contains panel data for individuals and companies. Third, it contains a wide range of attributes, and most importantly its design allows easy links between registers. From this rich database, the primary study population in the analysis comprise all privately owned start-ups with a maximum of 50 employees in the start year. Thus, start-ups include new business formations in 2002. We followed these firms until 2012. We selected this period because of data availability. The distribution of the sampled firms across the Swedish
functional regions (FA-regions) regions is shown in Figure 1. Family start-ups constitute about 26% of the firms and non-family start-ups constitute about 74%. The majority of these start-ups have fewer than 11 employees (87%). In the analyses, to avoid firms that entered and exited, we only used those that survived the first three years of operation, the so-called ‘valley of death’ (Gibb, 1987). Firms that survive any observed period are treated as right-censored observations (Klepper, 2007). With the data, we can link an entrepreneur to his parent(s) and trace whether the parent(s) were entrepreneur(s). By the nature of our data, the best approach to defining an entrepreneur is through the employment code, as self-employed or as a private firm owner (Alänge & Scheinberg, 1988). We considered an entrepreneur to be the owner of a firm.

Variables

Dependent variable

We estimated firm survival by measuring the firm’s failure rates. We constructed this by using the FAD codes from SCB. The FAD codes reflect vital firm events, such as survival, acquisition and exit, during the firm’s life-cycle. We introduce a note of caution here regarding failure in this case, as there are different forms of exit (by closure, by split, and by merger). We captured firm failure as exit by closure. We adopted this type of exit based on the non-economic objectives of some firms (e.g., family firms). Exit by merger and acquisition (M&A) could generally be seen as a success story; however, we have no further information about the nature of the M&A in the data set (e.g., whether there is still some level of control by the previous owner or family). Due to this lack of information, M&A could reflect anything from success to failure. Our argument is in line with the inheritance strategy literature, whereby entrepreneurs believe in

Figure 1. Number of start-ups by region (A), share of family start-ups (B) and share of non-family start-ups (C), 2002. Total of 3805 start-ups with family start-ups constituting about 26% and non-family start-ups 74%.
building their business not only for themselves but for future generations as well (Gómez-Mejía et al., 2007). Again, the exclusion of firms that exited by M&A falls in line with the sustainable family business model, whereby the sustainability of a family firm is a function of both family functionality and control of the business (Stafford et al., 1999). For this reason, we excluded M&A from the analysis (3%). A firm is labelled as exited (or 1) if it cannot be identified in the subsequent year(s) \((t+1)\) as survived (or 0).

**Independent variables**

Following our theoretical arguments, we employed a set of independent variables to test our hypotheses regarding the importance of EC:

- **Family firm.** The definition of a family firm is greatly debated in the family firm literature (Chrisman et al., 2005; Chua et al., 1999). Given this, we adopted a definition that we could easily implement with our data. Hence, we defined a family firm as a firm with two or more employees belonging to the same family as the firm owner, one of the family members in a management position, and in which the family members earn their main source of income from the firm. This definition makes it comparable with other studies (Adjei et al., 2016; Sciascia et al., 2012). Therefore, a family firm is labelled one and zero for non-family firms.

- **Entrepreneurial capital (EC).** To define EC, we identified the parents of the entrepreneurs in our sample and traced them from the 1970s, which was as far back as the data would allow. Using the occupational code in every firm, we were able to identify these parents as entrepreneurs or not. With these individuals, we used a stricter definition of EC: first, the parent(s) must have owned a business for a minimum of three years; and second, they must have at least one employee. An entrepreneur whose

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**Figure 2.** Share of start-ups with entrepreneurial capital (EC) (A), family start-ups with EC (B) and non-family start-ups with EC (C) across regions, 2002.
parent(s) meets these criteria is identified to have an EC (or 1). Figure 2 shows the distribution of family and non-family start-ups with EC across different regions in Sweden (2002–12).

- **Smaller region.** It is often assumed that metropolitan and urban regions provide more supportive environment for firm survival than smaller regions since resources are more easily accessible for start-ups (Bird & Wennberg, 2014). We classified a region as a smaller or rural region (or 1) based on a variable from SCB where municipalities are grouped based on their degree of urbanisation. For instance, 1 denotes densely populated area or city (metro), 2 is towns and suburbs (larger) and 3 is sparsely populated areas or smaller areas (smaller). This classification of municipalities provides an analytical and descriptive lens on larger and smaller regions regarding the survival of regional start-ups.

**Control variables**

We controlled for entrepreneurs’ characteristics to check attrition, firm- and regional-specific factors that affect firm survival. Firm survival has been linked to the entrepreneur’s human capital (higher education) and industry experience and, to some extent, being married, being male, and the age of the entrepreneur (Gimeno et al., 1997; Stafford et al., 2010). We expect that higher education and industry experience of the entrepreneur will increase the survival rate of the start-up, and also that an entrepreneur being married will positively affect the survival rate of the firm since married households are more likely to have higher income, therefore, capital than non-married households (Haynes & Ou, 2002). We expect that female-led start-ups will have lower survival rates as shown in other studies (e.g., Fairlie & Robb, 2009). Older business owners, who are likely to expend less effort on the business, have been associated with lower firm survival rates, even though they may have accumulated skills over time (Bates, 1990).

Firm-specific factors such as employment size, capital intensity and productivity have been linked to firm survival (Delmar et al., 2013; Gimeno et al., 1997). An increase in employment size, productivity and capital intensity may improve efficiency and survival.

We controlled for two regional or agglomeration factors: specialization and diversification. Specialization economies refer to the situation where firms benefit from the local presence of other firms belonging to the same industry. When firms belonging to the same industry collocate, they benefit from a specialized labour market matching employers and employees, and from the sharing of intermediate inputs and local knowledge spillovers (Duranton & Puga, 2004). Moreover, a higher presence of firms within the same industry in the same region may also lead to tougher competition and firm selection, hence, a higher probability of firm exit. However, a positive or negative effect of specialization economies on firm survival remains an empirical issue (Basile et al., 2017). Using German data, Fritsch et al. (2006) report that firms are less likely to exit if there are other new firms in the same region and industry. In other words, locating a firm in a region with complementary industries reduces failure rates. We controlled for this effect by including a measure for specialization: location quotient (LQ), which measures the relative concentration of employment in a sector in a region with regards to the average concentration of the same sector in the country (equation 1). Diversification economies refer the situation where firms benefit from the colocation of firms in a large variety of industries (Jacobs, 1969), this increases the chances of interaction, generation, replication, modification and recombination of ideas (Basile et al., 2017). Basile et al. (2017) argue that diversification may protect firms from idiosyncratic demand shocks, hence reduce the likelihood of exit. We used the entropy measure to capture the effect
of industrial diversification (equation 2).

\[ \text{LQ}_{ir} = \frac{e_{ir}}{e_r} / \frac{e_i}{e} \]  

(1)

where \( e_{ir} \) is the number of employees in two-digit industry \( i \) and region \( r \); \( e_r \) is the total number of employees in the region \( r \); \( e_i \) is the number of employees in two-digit industry \( i \); and \( e \) is the total number of employees in Sweden. If \( \text{LQ} > 1 \), the industry has a larger share of the employees in a region than the country as a whole, implying that the region is more specialized than average in that industry.

\[ D_r = - \sum_{i=1}^{n} \left( \frac{e_{ir}}{e_r} \right) \ln \left( \frac{e_{ir}}{e_r} \right) \]  

(2)

where \( D_r \) measures diversity in region \( r \); and \( e_{ir} \) and \( e_r \) are as above. The entropy measure ranges from zero (no diversity) to \( \ln n \) (maximum diversity), where \( n \) is the total number of two-digit industries in region \( r \). Table 1 reports the definition, description and sources

| Variable | Description | Source |
|----------|-------------|--------|
| Dependent variable | Failure | If the firm exits | FAD codes, SCB |
| Independent variables | Family firm | If two or more family members of the entrepreneur are in the firm and at least one is in management | Author’s definition, from occupation code, SCB |
| | Entrepreneurial capital | If the entrepreneur’s parent(s) were the ones who owned a business for at least three years with at least one employee | Author’s definition, from occupation code, SCB |
| | Smaller/rural region | If a municipality is defined as being thinly populated | SCB Regionala indelningar (regional divisions) 2019, SCB |
| Control variables | Higher education | If the entrepreneur has four or more years of a university education | Individual register, SCB |
| | Industry experience | If the entrepreneur has industry experience in the same three-digit industry class | Individual register, SCB |
| | Marriage | If the entrepreneur is married | Individual register, SCB |
| | Age | Age of the entrepreneur | Individual register, SCB |
| | Female | If the entrepreneur is female | From the firm register, SCB |
| | Employment size (ln) | Total number of employees | From the firm register, SCB |
| | Capital intensity (ln) | Capital stock in the firm (depreciation) | Author’s calculation, from firm register, SCB |
| | Labour productivity (ln) | Per capita value added | From the firm register, SCB |
| | Specialization (ln) | Ratio of employees in a two-digit industry in a region to those at the national level | Author’s calculation, from firm register, SCB |
| | Diversification (ln) | Entropy of total employment within two-digit codes of the functional region | Author’s calculation, from firm register, SCB |
Table 2. Correlation and description of variables in the survival model.

| Variable                  | Mean | SD   | Minimum | Maximum | VIF  |
|---------------------------|------|------|---------|---------|------|
| Failure                   | 0.14 | 0.35 | 0       | 1       | 1.00 |
| Family firm               | 0.24 | 0.43 | 0       | 1       | 1.00 |
| Entrepreneurial capital   | 0.21 | 0.41 | 0       | 1       | 1.00 |
| Small/rural region        | 0.14 | 0.35 | 0       | 1       | 1.00 |
| High education            | 0.68 | 0.47 | 0       | 1       | 1.00 |
| Industry experience       | 0.55 | 0.50 | 0       | 1       | 1.00 |
| Married                   | 0.24 | 0.43 | 0       | 1       | 1.00 |
| Age                       | 44.71| 11.03| 16      | 84      | 1.23 |
| Female                    | 0.68 | 0.47 | 0       | 1       | 1.00 |
| Employment size           | 5.61 | 1.27 | 0       | 10.33   | 3.28 |
| Capital intensity         | 5.66 | 0.84 | -0.69   | 9.41    | -0.49|
| Labour productivity       | 5.66 | 0.84 | -0.69   | 9.41    | 0.06 |
| Specialization            | 5.88 | 1.94 | 0       | 8.03    | 0.04 |
| Diversification           | 5.22 | 1.94 | 0       | 8.03    | 0.04 |
|                           | High education | Industry experience | Married | Age | Female | Employment size | Capital intensity | Labour productivity | Regional specialization | Regional diversification |
|---------------------------|----------------|---------------------|---------|-----|--------|-----------------|-------------------|----------------------|------------------------|------------------------|
| Failure                   |                |                     |         |     |        |                 |                   |                      |                        |                        |
| Family firm               |                |                     |         |     |        |                 |                   |                      |                        |                        |
| Entrepreneurial capital   |                |                     |         |     |        |                 |                   |                      |                        |                        |
| Small/rural region        |                |                     |         |     |        |                 |                   |                      |                        |                        |
| High education            | 1.00           |                     |         |     |        |                 |                   |                      |                        |                        |
| Industry experience       | 0.04           | 1.00                |         |     |        |                 |                   |                      |                        |                        |
| Married                   | 0.08           | 0.00                | 1.00    |     |        |                 |                   |                      |                        |                        |
| Age                       | 0.13           | −0.03               | 0.27    | 1.00|        |                 |                   |                      |                        |                        |
| Female                    | 0.07           | −0.01               | 0.02    | −0.01| 1.00   |                 |                   |                      |                        |                        |
| Employment size           | −0.09          | 0.16                | 0.02    | −0.08| 0.02   | 1.00            |                   |                      |                        |                        |
| Capital intensity         | 0.04           | 0.19                | 0.04    | −0.01| −0.09  | 0.60            | 1.00              |                      |                        |                        |
| Labour productivity       | 0.17           | 0.05                | 0.04    | 0.10 | −0.12  | −0.27           | 0.38              | 1.00                 |                        |                        |
| Specialization            | −0.07          | 0.02                | 0.00    | 0.06 | −0.04  | 0.16            | 0.15              | 0.03                 | 1.00                   |                        |
| Diversification           | 0.17           | 0.06                | 0.01    | −0.03| 0.02   | 0.02            | 0.02              | 0.04                 | −0.44                  | 1.00                   |
of the variables. Table 2 shows the descriptive statistics of the variables, correlation matrix and variance inflation factor (VIF); there is no problem of multicollinearity.

EMPIRICAL MODEL AND RESULTS

Empirical model
We specified two models in this study. First, we used a Kaplan–Meier (KM) survival curve to explore the survival rates of family and non-family start-ups. KM is the ratio of firms without the event over firms at risk multiplied by time, shown in equation (3), where \( S(t) \) is the time until exit, \( n_j \) is the number of firms at risk, \( d_j \) is the number of firms with the event. The event is recoded in discrete time, as we know only the year when the event occurred but not the exact month or day. One best indication for the discrete-time method is the presence of large numbers of ties, whereby a tie is the occurrence of two or more observations experiencing the event at the same time. Firms that survive at the end of an observed period are treated as right-censored observations (Klepper, 2007). As a KM curve only offers the visualization of univariate or multi-variate curves that lack a statistical measure of the strength and direction of the relationships, a regression analysis is necessary:

\[
S(t) = \prod \left( \frac{n_j - d_j}{n_j} \right)
\]

(3)

\[
b(t|X_i) = b_o(t) \exp(\beta_1 X_{i1} + \ldots + \beta_i X_{ik})
\]

(4)

We used a Cox proportional hazard model to test the relationship between EC and start-ups’ survival. It is appropriate for firm survival, whereby general trends tend towards a naturally decreasing cumulative hazard over time, regardless of individual characteristics. The hazard function, denoted as \( b(t|X_i) \) is summarized in equation (4), where \( b_o(t) \) is the baseline hazard function corresponding to the probability of a firm surviving when the explanatory variables are zero. \( \exp(\beta_1 X_{i1}) \) is the covariate-related component (including the interaction terms). Equation (4) includes fixed effects to control for unobserved heterogeneity at the regional level (72 FA regions) and industry level (153 three-digit industry class).

RESULTS

Figure 3A shows a general monotonic decreasing survival rate with about 22% of the start-ups operational during the last observation year. Figure 3B shows that, taking into account every time point, family firms are more likely to survive than non-family firms are, this corroborate other studies (Dyer, 2006; Miller & Le Breton-Miller, 2005). The differences in the survival rates of family and non-family start-ups are comparatively higher in subsequent years. At the end of the last observation year, 46% of family start-ups compared with 18% of non-family start-ups had survived. This descriptive information supports the literature asserting that family firms are more resilient than are non-family firms. Moreover, a regional description shows a spatial gradient (not reported here), where family firms are more likely to survive in smaller regions than non-family firms are. This only goes to explain that without taking into account other entrepreneurial, firm and regional factors, family firms are more likely to survive than non-family firms are especially in smaller regions. A possible explanation could be that because family firms are more embedded in smaller settings (Bird & Wennberg, 2014) it gives them leverage in terms of accessing information, knowledge and resources from family and community networks. Figure 3C shows that EC enhances the survival of both family and non-family start-ups. Figures 3D–F show that EC facilitates the survival of both family and non-family
start-ups across different regions compared with start-ups without EC. However, EC enhances firm survival the most in family start-ups in rural regions (69%). The effect of EC on firm survival represents a spatial gradient, whereby EC is most important for firm survival in smaller regions.

Table 3 presents the results of the Cox proportional hazard regression. We estimated equation (4) on the sample of family and non-family start-ups. Model 1 includes only the control variables; models 2–4 include smaller region, family firms and EC, respectively; model 5 includes smaller region, family firm and EC; and model 6 includes all the interactions. The
Table 3. Cox proportional hazard model: survival rates of start-ups (hazard ratio – RRF). Clustered (on firms) standard errors in parentheses.

| Model 1   | Model 2   | Model 3   | Model 4   | Model 5   | Model 6   |
|-----------|-----------|-----------|-----------|-----------|-----------|
| High education | 0.834 (0.104) | 0.834 (0.104) | 0.830 (0.103) | 0.805* (0.100) | 0.805* (0.100) | 0.805* (0.100) |
| Industry experience | 0.804*** (0.059) | 0.804*** (0.059) | 0.802*** (0.059) | 0.823*** (0.061) | 0.818*** (0.060) | 0.818*** (0.060) |
| Married | 0.875** (0.056) | 0.875** (0.056) | 0.903 (0.059) | 0.859** (0.055) | 0.879** (0.058) | 0.880* (0.058) |
| Age | 0.919*** (0.017) | 0.919*** (0.017) | 0.918*** (0.017) | 0.909*** (0.017) | 0.909*** (0.017) | 0.909*** (0.017) |
| Age square | 1.001*** (0.000) | 1.001*** (0.000) | 1.001*** (0.000) | 1.001*** (0.000) | 1.001*** (0.000) | 1.001*** (0.000) |
| Female | 1.089 (0.081) | 1.089 (0.081) | 1.097 (0.082) | 1.099 (0.082) | 1.104 (0.083) | 1.107 (0.083) |
| Employment size | 2.705*** (0.253) | 2.705*** (0.253) | 2.760*** (0.258) | 2.775*** (0.263) | 2.826*** (0.268) | 2.815*** (0.267) |
| Employment size square | 0.775*** (0.026) | 0.775*** (0.026) | 0.773*** (0.025) | 0.768*** (0.026) | 0.766*** (0.026) | 0.766*** (0.026) |
| Capital intensity | 1.197*** (0.067) | 1.197*** (0.067) | 1.199*** (0.067) | 1.204*** (0.067) | 1.202*** (0.067) | 1.205*** (0.067) |
| Labour productivity | 0.792*** (0.056) | 0.792*** (0.056) | 0.794*** (0.056) | 0.804*** (0.057) | 0.808*** (0.058) | 0.805*** (0.058) |
| Regional specialization | 0.866** (0.051) | 0.866** (0.051) | 0.872** (0.051) | 0.865** (0.051) | 0.871** (0.051) | 0.870** (0.051) |
| Regional diversification | 1.010 (0.034) | 1.010 (0.034) | 1.011 (0.034) | 1.009 (0.034) | 1.010 (0.034) | 1.010 (0.034) |
| Smaller region | 5.666*** (2.845) | 6.376*** (3.264) | 4.555*** (2.314) | 0.886* (0.063) | 0.881* (0.063) | 0.630*** (0.053) |
| Entrepreneurial capital | 0.849** (0.060) | 0.610*** (0.049) | 0.621*** (0.051) | 0.630*** (0.053) | 0.777 (0.132) | 0.777 (0.132) |
| Family firm entrepreneurial capital | | | | | | |
| Family firm × smaller region | 0.859 (0.180) | 0.859 (0.180) | 0.859 (0.180) | 0.859 (0.180) | 0.859 (0.180) | 0.859 (0.180) |
| Entrepreneurial capital × smaller region | 0.585* (0.167) | 0.585* (0.167) | 0.585* (0.167) | 0.585* (0.167) | 0.585* (0.167) | 0.585* (0.167) |

(Continued)
Table 3. Continued.

|                      | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|----------------------|---------|---------|---------|---------|---------|---------|
| Family firm ×        |         |         |         |         |         | 1.251   |
| entrepreneurial      |         |         |         |         |         | (0.673) |
| capital × small      |         |         |         |         |         |         |
| region               |         |         |         |         |         |         |
| Sector FE            | Yes     | Yes     | Yes     | Yes     | Yes     | Yes     |
| Region FE            | Yes     | Yes     | Yes     | Yes     | Yes     | Yes     |
| N                    | 17,955  | 17,955  | 17,955  | 17,955  | 17,955  | 17,955  |
| n                    | 3739    | 3739    | 3739    | 3739    | 3739    | 3739    |
| Pseudo-$R^2$         | 0.059   | 0.059   | 0.059   | 0.061   | 0.061   | 0.061   |

Notes: Non-family start-ups, larger region and start-ups without EC are reference.

*p < 0.1, **p < 0.05, ***p < 0.01.
models present the hazard ratios, which represent the relative risk of failure faced by the firms. Consequently, when the hazard ratio is < 1, the greater the chance of survival, and vice versa. The control variables are largely in line with our expectations and previous studies. Our data do not provide evidence that higher education supports the survival of start-ups. Moreover, when we included EC (model 4), higher education showed a positive effect on the survival of start-ups (Stafford et al., 2010). This shows that the entrepreneur's level of education alone is not a guarantee for the staying power of start-ups. Additionally, the entrepreneur’s industry experience positively affects start-ups’ survival (Gimeno et al., 1997). Entrepreneur’s age (inverted U-shape) and marital status also positively affect the success of the firm. Moreover, employment size negatively affects the survival of start-ups (inverted U-shape). The estimates show that increased in capital stock negatively affects the survival of start-ups, but productivity positively affects start-ups’ survival. The results show that regions with complementary industries reduce failure rates of start-ups (Fritsch et al., 2006).

Model 2 indicates that start-ups located in smaller regions are less likely to survive compared with start-ups in larger regions (Combes et al., 2012). Compared with non-family firms; family firms survive by 15% more (model 3). This means that family firms have a higher tendency to survive than do non-family firms. The empirical evidence supports previous studies (Braun & Latham, 2009; Hiebl, 2014) and the data description in Figure 1B. Model 4 shows that EC increases the survival chances of start-ups by 39%. This also confirms the description in Figure 1C. This provides full support for hypothesis 1. In model 5, the significance level (10%) and survival rate (11%) drop for family start-ups when it was regressed together with smaller region and EC. This somehow indicates that smaller region and EC condition the survival rate of family firms. Even though family firms may have higher survival rate than non-family firms, our estimate shows that such an effect may be confounded by smaller region and EC. Model 6 shows that there is a relationship between EC and smaller region in terms of start-up survival. Our data suggest that start-ups with EC advantage in smaller regions are more likely to survive by 80% compared with 37% for start-ups in larger regions. This confirms hypothesis 2. Our data do not provide evidence to support or deny hypothesis 3 even when considering if the parent’s business was a family business.

Robustness checks
To determine the validity, consistency and importance of EC, we have estimated three main models. First, we estimated a logit model on failure. Like the Cox proportional hazard model where our focus was on how the risk factor (EC) significantly contributes to the hazard function (failure) for the duration and timeline of the start-up experiencing the event, the logit model shows how the explanatory variable significantly contribute to the probability of a start-up failing (e.g., Chen, 2005). The results for the independent variables remained in terms of sign and significance: A start-up with the entrepreneur exposed to entrepreneurial activities is associated with a 39% decrease in the odds of failing (Table 4, model 1). Also, the odds of family firms failing is 13% less than non-family firms will. Second, having a parent (or both) involved in entrepreneurial activity is more likely to increase one’s entrepreneurial abilities and mindsets that can benefit the firm by fostering creativity, innovation and firm performance (Lindquist et al., 2015). We tested the effects of EC on firm productivity (value added) and profitability. In effect, this will show how EC affects production efficiency and the financial soundness of the start-up. Therefore, we estimated an ordinary least squares (OLS) regression; the results indicate that being exposed to entrepreneurial activities increases productivity by 6%, but with no evidence of EC affecting profitability (Table 4, models 2 and 3).
CONCLUSIONS

The present study investigated how the exposure to entrepreneurial activities may be a critical factor for start-up survival. We drew on theories of entrepreneurship and growth to postulate a set of hypotheses related to how parental entrepreneurial knowledge transfer will impact the survival of start-ups across space. Using a comprehensive set of data on privately owned Swedish start-ups from 2002 to 2012, which combines data on start-ups and event dates and other relevant firm and regional attributes, we found that being exposed to entrepreneurial activities in general has a higher likelihood of influencing a start-up’s survival (Aldrich et al., 1998), mostly in smaller regions than start-ups without EC. This major and robust finding contributes to the spatial differences in the survivability of start-ups in regional science (e.g., Deakins, 2006). EC may be one way for start-ups in smaller regions to compensate for the lack of agglomeration economies and variety (e.g., Adjei et al., 2016). In effect, because smaller regions do not have the incentives to support firm survival, firms are more likely to rely on informal ways (e.g., entrepreneurial skill spillovers from parents) to obtain industry knowledge (e.g., Deakins, 2006). This implies that entrepreneurship not only contributes to economic growth but also stimulates the development of knowledge. Second, our analysis shows that while start-ups may explain the spatial variations in economic development, EC is crucial in explaining the spatial variation in the survival of start-ups. Generally, the analysis is consistent with our argument that EC is an important factor for a higher survival rate among start-ups in the long term, especially among start-ups in smaller regions (except that we did not have any evidence to support our claim that EC supports the survival of family start-ups in smaller regions). Our results also suggest that the problem of uneven regional development is complex and multifaceted.

Contribution to research in entrepreneurship, family business and regional development

A key contribution of our study is that we have theorized on and empirically tested the systematic differences between start-ups with and without EC. Aside from influencing the survival of start-ups, it must also be noted that EC increases productivity. Therefore, the findings suggest the need for studies to also consider not just the direct economic relationship between entrepreneurship and regional development but also the indirect relationship, an insight not given the needed empirical attention. Second, with previous studies such as Braun and Latham (2009), confirming that family firms are more resilient than non-family firms in many aspects of firm performance, our results show another dimension. The argument that family firms survive

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Table 4. Logit and ordinary least squares (OLS) models.

|                           | Logit (1) Odds ratio | OLS (2) Profitability | OLS (3) Productivity |
|---------------------------|----------------------|-----------------------|----------------------|
| Smaller region            | 6.290*** (1.778)     | 0.122 (0.167)         | −0.161 (0.133)       |
| Family firm               | 0.868* (0.063)       | 0.0488 (0.040)        | 0.0100 (0.014)       |
| Entrepreneurial capital   | 0.611*** (0.051)     | 0.0436 (0.049)        | 0.0585*** (0.017)    |
| Sector FE                 | Yes                  | Yes                   | Yes                  |
| Region FE                 | Yes                  | Yes                   | Yes                  |
| Pseudo $R^2$ (adjusted $R^2$) | 0.110 (0.162)       |                       | (0.570)              |

Notes: All control variables used in Table 3 were also included here, but are not reported. We only reported the independent variables. Clustered (on firms) standard errors are shown in parentheses. Non-family start-ups, larger region and start-ups without EC are reference.

*p < 0.1, **p < 0.05, ***p < 0.01.
more than non-family firms is stronger when the analysis excludes EC, implying that EC confounds this effect to some extent. This suggests that family businesses do not survive because they are family businesses, but their survival is influenced by both endogenous and exogenous factors, including entrepreneurial experiences and exposure. Finally, the regional differences regarding the influence of EC on start-ups’ survival uncovered in this present study support earlier claims on the level of familial relationships in smaller regions and how that translates into firm performance (Adjei et al., 2016). Our study shows that all other things been equal, the survival of start-ups is observable at the familial level (e.g., Aldrich et al., 1998; Lindquist et al., 2015), indicating the need for more micro-level theories of entrepreneurship to address regional development differences.

**Contribution to policy and organizational governance**

The findings in the present study have implications for regional policymaking and organizational governance. First, the study addresses a call by Basco (2015) to understand the role and importance of family relations and family firms in the regional development framework. Our study indicates that not only will the creation of an enabling environment or an entrepreneurial ecosystem enhance the entry into entrepreneurship, but also the development of a familial resource that can affect the survival of start-ups. This study also addresses the concern of Acs and Kallas (2008) about how growth theories such as human capital and entrepreneurial skills apply to lagging and smaller regions. Policymakers in general can view the process (exposure to entrepreneurial activity in a familial setting) that begets EC as a knowledge-creation process that can influence the formation of businesses and their survival. Moreover, the results point to the need to evaluate the rate of business formation in smaller regions and the spillovers of EC, as firm survival and growth in rural regions comprise a policy concern and has implications for entrepreneurship planning. Finally, businesses should strengthen familial collaborations and interactions on tasks that require the sharing of soft skills that we perceive as ‘untraded’, such efforts will facilitate the sharing of soft resources and entrepreneurial experiences and also enhance efficiency and effectiveness on result delivery.

**Limitations and avenues for future research**

Even though our sample – to a very large extent – has several advantages in terms of its longitudinal and relational nature and wide coverage, there are some caveats, several of which represent important avenues for future studies. First, we are aware of the limitations imposed by our measurement and operationalization of EC as a binary variable. It may be too simplistic and miss some interesting aspects of the argument; however, this is how far our data allowed us to go. Future studies might consider data that can account for a wider definition of EC, which could potentially be more informative. Further, future studies could investigate specific EC (e.g., resource management, networks, strategic decision-making skills, etc.) and how they individually affect firm performance. Finally, future studies should consider the multiplicative effects of EC, as not every relationship may be additive. For instance, the interaction between EC and some management strategies on firm performance.

In this study, we have sought to advance research on entrepreneurship and regional development, specifically on the survivability of start-ups by distinguishing between two distinct types of start-ups, theorizing and investigating how EC influences the survival rate of these start-ups. Our results confirm that EC influences the survivability of start-ups especially those in smaller or rural regions. We hope our study will encourage other scholars to engage in comparative studies of the influence of EC on firm performance.
DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author.

FUNDING

This study was supported by the Riksbankens Jubileumsfond [grant number P13-1044:1]. The findings and conclusions in this work remain the sole views of the author and not those of the funding agency.

NOTE

1 FAD – Företagens och Arbetsställenas Dynamik.

ORCID

Evans Korang Adjei http://orcid.org/0000-0002-7179-347X

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