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Are you experienced?
Prior experience and the survival of new organizations

By

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Abstract:

This paper investigates the relationship between the level of experience of managers and founders, and the likelihood of survival of their new firms. We take advantage of a comprehensive dataset covering the entire Danish labor market from 1980-2000. This is used to trace the activities of top ranked members of start-ups prior to their founding, and follow the fate of these firms. More specifically, we compare the survival of spin-offs from surviving parents, spin-offs from exiting parents, and other start-ups. Moreover, we investigate whether firms managed and founded by more experienced teams with higher levels of industry-specific experience are more likely to survive. Distinguishing between survivors and firms that have been acquired, we find that spin-offs from a surviving parent company combined with and industry-specific experience, positively affects the likelihood of survival. We also find that spin-offs from parent companies that exit are less likely to survive than either spin-offs from surviving parents or other start-ups. These findings support the theoretical arguments that organizational heritage is important for the survival of new organizations. We found no similar significant results when comparing exits with firms that have been acquired.

Key words: Organizational routine, Industry-specific experience, Survival of new firms, Spin-offs
JEL Codes: L25, M13, L60

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Are you experienced?

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1 Introduction

How does the experience of the founding team shape the performance of start-ups? Does a more experienced management and founding team increase the chances of survival of a new organization? The establishment of new firms and their entrance into an industry are generally seen as key determinants of economic development and the evolution of the industry (Schumpeter, 1934). Consequently, the performance of new organizations is also very important for economic development and growth. The importance of industry-specific experience to the performance of new organizations is the central theme of the present paper.

Organizational sociologists have for a long time been interested in the transfer of routines and experience from a founder's previous employer to the new firm (Phillips, 2002). The argument that the blueprints of a parent firm are passed on to new organizations through their founders is the cornerstone of a line of research by scholars such as Brittain and Freeman (1986), Carroll (1984), Hannan and Freeman (1986), and Romanelli (1985; 1989). The work of these scholars represented a brief, but very active line of research on the background of founders, in the 1980s (Phillips, 2002). These ideas have recently been revamped by contributions from Klepper (2001; 2002), Carroll et al. (1996), and Helfat and Lieberman (2002). The central argument of these contributions is that the survival and success of new organizations are fundamentally shaped by the pre-entry experiences of their founders. This relationship has been studied in the management literature, but from the perspective of the relationship between the experiences of top managers and performance (Hambrick and Mason, 1984; Bantel, 1989; Murray, 1989; Michel and Hambrick, 1992; Hambrick et al., 1996).

In this paper we study the phenomenon in greater detail. More specifically, we want to empirically test these arguments on a wider sample of new firms. So far, the empirical investigations have been based on single case studies of the evolution of selected industries, notably in the US. To lend weight to these investigations, we look at the entire Danish manufacturing sector over a period of 15 years, from 1980 to 1995. The central research

question in this study is: How are the experiences of managers and founders related to the survival of start-ups?

Using a comprehensive longitudinal panel dataset, which covers all employees and thus all start-ups in Denmark, we compare the survival of spin-offs from surviving parents, spin-offs from exiting parents, and other start-ups. Moreover, we investigate whether firms managed and founded by teams with a relatively high level of industry-specific experience also are more likely to survive. Regarding survival, we distinguish between exits, survivors that have been acquired by another firm (takeovers), and firms that survive as independent units in terms of control and ownership.

We find that spin-offs from surviving parents are more likely themselves to survive compared to all other types of start-ups. Furthermore, spin-offs from parents that exit are less likely to survive compared to all other start-ups. In general, there is clear evidence that industry-specific experience positively affects the likelihood of survival. These findings support the theoretical arguments that experience-based organization heritage is important for the survival of new organizations. It is the type of experience that determines the likelihood of survival of firms.

The paper is organized as follows. Section two presents the theoretical/empirical framework and central propositions tested in the paper. Section three describes the database and its contents, the methods used, and the descriptive statistics of the variables. The results of the empirical model are presented in Section four. This is followed by a discussion of the results and the concluding remarks in Section five.

2 Theoretical framework and central propositions

All entrepreneurs bring to their firms knowledge and skills from their past work activities and education experience. This is of value in searching for new business areas and opportunities as well as in the day-to-day running of a firm (Shane, 2000). Thus, all entrants into an industry carry skills and routines embodied in their founders, who are very likely to influence the new firm's future development and success. Start-ups that enter the same industry in which their founders were previously employed are labeled spin-offs. This type of entry is one of the most common (Garvin, 1983). Founders of spin-offs are likely to bring specific knowledge about a wide range of issues to their new firm, e.g. customer demand, products, technologies, suppliers and competitors (Helfat and Lieberman, 2002). This may also include knowledge about how to

exploit new knowledge and technological developments based on unmet supplier or customer demands (as found by Shane, 2000) or prior scientific and technical training (as found by Roberts, 1991). Consequently, more experienced founders, e.g. spin-offs, with valuable industry-specific knowledge should have a higher probability of success compared with less experienced entrants. If this holds true, then the success of a new entrant must depend on the experience of the founder.

Klepper (2001) uses the metaphor of spin-offs as children, and past employers as parents. He proposes an evolutionary model that combines the ideas of reproduction and inheritance with the notion of organizational routines. Nelson and Winter (1982) use this notion and assume that firms are to a large extent governed by organizational routines. A firm has separate routines for the different functions (R&D, marketing, management, etc.) and products involved in its operation. The founders and/or the initial management team install these routines. Decision making at all levels will subsequently depend on these routines, and they will govern the evolution of the firm. When a new firm is born, organizations are reproduced, because founders will rely on routines with which they are already familiar from their previous employment experience, and which have already been shown to be successful.

The quality of the routines will determine the future success and performance of the new firm. Entrepreneurial spin-offs may inherit better routines than any other kind of start-up, as a result of the experience and background of their founders. This may enable spin-offs on average to outperform other start-ups. Eventually their longer survival and better performance will one day turn entrepreneurial spin-offs into parents, since employees with access to better routines will be more likely to found new organizations (Klepper, 2001). Thus, better performing firms will spawn more spin-offs, and more experienced entrepreneurs will establish more successful firms.

When a firm grows, it includes new technologies and products in its business. Accordingly, the organizational routines change and consequently will influence the performance of the firm. The firm will diverge more and more from its starting point and thus its parents. Firms will become less similar as will their performance. Changing routines will change the choices made about product development and innovation. In other words, entrepreneurial spin-offs will be a source of diversity as they develop more distinctive innovations over time – they will thus stimulate the rate of technological change in an industry. A common denominator of the existing research is that leading firms in industries may risk losing their dominant position to new entrants (especially spin-offs) when faced with radical innovations. Given their past success, leading

firms may not recognize what might be critical deficiencies in their resource profile and routines necessary for coping with changing market conditions (Helfat and Lieberman, 2002). At the same time, new spin-offs will have more flexible routines, which will enable them to perform relatively better under volatile conditions.

The average competences of diversifying firms are assumed to be greater than the average competences of the new firms because they have more comprehensive organizational experiences and complementary assets. But if the organizational challenges facing an industry are novel and sufficiently complex, new firms may be able to reach or exceed the average competence level of diversifiers and incumbents. This is because the routines in new firms tend to be more flexible in relation to demand challenges and changing conditions. Inexperienced firms will not be able to compete with any diversifier or spin-off, because they lack the necessary experience and routines. If organizational challenges are not novel, diversifiers will be more likely to dominate the industry (Klepper, 2003).

In summary, the existing theoretical literature and empirical investigations argue that spin-offs from competitive parents will perform relatively better than other start-ups because of the experience embedded in the organizations. Such spin-offs are likely to rely on the organizational routines from previous firms that have already adapted to the environment and also have been proven to be competitive. The hypothesis is that firms founded by more experienced personnel are more likely survive than other firms.

3 Data and method

In order to investigate the importance of pre-entry experiences for the survival of new organizations, we rely on a comprehensive dataset with information for the entire Danish economy. This dataset combines very detailed information on all individuals and all establishments, gathered from the official registers of the Danish government, which records unusually detailed information about the economic activities in the country due to its extensive welfare policies. As a result, it covers all Danish firms and plants as well as the entire Danish labor market. The dataset is maintained by Statistics Denmark under the name 'Integreret Database for Arbejdsmarkedsforskning (IDA)' (which translates to: 'Integrated Database for Labor Market Research'). The dataset is internationally recognized as being extremely useful for economic and other social science research. Recent publications that have exploited this source include Sørensen (2004) and Bingley and Westergård-Nielsen (2003).

IDA contains several elements and characteristics that make it particularly interesting for economic and social science research. First, it holds extensive information on the characteristics of individuals, e.g. sex, age, length and level of education, work experience, occupation, family status and relations, household characteristics, wages and other income, wealth, and unemployment. Second, individuals are matched directly with establishments and employers. It is possible to distinguish between plants and firms, which are characterized by their location, industrial affiliation and other basic information. Third, the database is longitudinal. It has been updated annually since 1980, and thus it is possible to follow individuals, plants and firms from one year to another.

Additionally, the identity of plants and firms is preserved over time. If a plant is bought by another firm, the plant retains its original identity, unless the majority of the employees leave the firm. This means that unless the structure and the group of employees changes during the takeover, a plant will not be labeled as an exit if it is taken over.

Our study takes a different starting point from the existing studies in this area. These existing studies are generally more narrow, single industry studies, where the entrants into the industry can be diversifiers from other industries. So the entrants in these studies are not necessarily new firms, but can have a background in other industries. In the present study, all entrants are new firms. In fact, we are able to capture all start-ups in the Danish economy using this dataset. We are not able to follow very specifically defined industries, such as automobiles or semiconductors, but have to rely on aggregations of statistical industry classifications. The data sources used in this study carry anonymous entities, and, unlike most other studies, it is not possible to identify industries.

Using this database, we identify all new entrants in manufacturing industries from 1984 to 1991 for the analysis. We selected this particular interval, because the definition of the industry variable and its construction changed significantly in 1992, which means that some plants change industries as a result of the new method. We have chosen not to consider new firms from more recent years, because of the inconsistency between past and present industry classifications. Including the new firms from more recent years would represent a possible problem when we construct the industry-experience variable. When identifying new firms, we compare one year to the next and identify start-ups accordingly. We look for new plants in new

firms. Start-ups are thus defined as plants with no prior identity number and which are associated to a firm that has no prior identity number.

After identifying the entrants, we use a method similar to that applied by Åstebro and Bernhardt (2003) by defining them as survivors if they still exist five years on. Furthermore, if another firm has acquired the start-up plant in this period, it is assigned as a takeover. The remaining start-ups are categorized as exits. In total from 1984 to 1991, there are 2497 observations in our sample, which carry the necessary information. The multinomial survival variable is the dependent variable in the regressions below. The outcomes are exit (1), takeover (2) or survival (3).

All entrants are linked to the data on individuals in the database. Using the occupation variable, the top-ranked members of each entrant are identified. These individuals are the founders and/or the initial management team of the entrant. Based on information on this management team, we construct a dummy variable indicating whether the entrant is a spin-off. A spin-off in this study is defined as an entrant if at least two members of the management team were employed in the same firm active in the same six-digit industry the year before the founding.

It is important to note that we are not able to clearly identify founders given the construction of the dataset. We can however accurately identify initial managers. We argue that the vast majority of new Danish firms are very likely to be managed by their founders, and therefore we rely on the assumption that this is the case. In addition, the theoretical framework can be applied to managers as well, since the same analytical aspects relate to the experiences of managers as founders.

In order to integrate the theoretical argument that good firms will spawn better spin-offs, the quality of the parent firm is taken into account. Accordingly, we distinguish between spin-offs with a parent that survives after the founding year of its progeny, and spin-offs with a parent that exits after the founding year of the progeny.¹ The paper therefore operates with a three-level start-up variable indicating spin-off from surviving parent (3) spin-off from exiting parent (2) and other start-ups (1).

¹ As an alternative approximation of the quality of parents, the industrial market share (in terms of share of employment) was also calculated. This ratio was tested in the estimations as the share itself or as a dummy for the quartile of market share ratio (top 25%, mid-high 25%, mid-low 25%, and low 25%). However, neither of these variables was significant in any of the models estimated. Thus it proved to be a poor predictor and was left out of the analysis.

Additionally, we test whether industry-specific experience of the initial managing team is important to understand why firms survive or not. The experience of this team is estimated by looking at their previous four years of employment activity. Based on these activities, the experience is calculated as the total number of years that the members have been employed (or active) in the same six-digit industry of the entrant. The years are weighted exponentially so experience in the most recent year is valued as relatively more important. If the start-up is founded in 1991, the past experience of the management team is tracked from 1990 and back to 1987. For each member of the team, a value of 1 is assigned for each year that the person is active in the same industry as the start-up. These numbers are then weighted by 1.000, 0.500, 0.250 and 0.125 for the years 1990, 1989, 1988 and 1987, respectively. This variable is the proxy for previous industry experience and represents the sum of total experience of the management team.

The final experience variable refers to having been previously employed in a start-up. It is computed in a similar fashion to the industry experience variable. We go back four years from the event of founding and trace the history of the top members. Given that they have been employed in a start-up before, we devise a weighted additive variable. These values are summed for the entire management team as in the calculating the industry experience variable. This variable is a proxy for the experiences that individuals carry in respect of being a part of the start-up process, and which may influence the survival chances of the present start-up.

Three control variables have been added. First, a variable controlling for the level of education of the employees in the firm is included. We apply the same method as Åstebro and Bernhardt (2003) by constructing variables that denote the relative share of employees in various educational levels. We consider three levels of education. High level is a long education equal to a five-year university education or higher. This includes all university masters and Ph.D. programs. Medium level is an education equal to all university bachelor level programs or similar length of education from another type of education institutions. Low level is a short education equal to a high school degree, tradesman/craftsman education, and similar education of up to three years duration after primary school education.

The second control variable adjusts for the general economic business cycles in the founding year. The growth rate of the Danish economy in this year is included in the analysis in order to account for cyclical effects on the survival rate of start-ups. Finally, we control for industry specific effects in the dynamics of entries by including a seven-level industry dummy.

Descriptive Statistics

Table 1 presents the distribution of the observations across the categorical variables. The dataset contains 2497 start-ups of which about 57% survive. Just above 20% of the survivors were acquired by another firm in the course of the five years considered.

<INSERT TABLE 1 ABOUT HERE>

About 13% of the start-ups are spin-offs according to the definition applied. Our data seem to suggest that, contrary to what Garvin (1983) suggests, spin-offs are not the most frequent start-up firm. The reason for our different finding may be due to our more strict definition of spin-offs. About 10% of the start-ups are spin-offs from surviving firms, while the remaining almost 3% are spin-offs from parents that have closed. There is a significantly higher percentage of spin-offs from better performing firms than from poor performing firms, which supports Klepper (2001). The distribution of the observation across the seven-level industry classification shows that machinery and electronics, and wood, paper and graphics account for the majority of the start-ups at almost 40% and just over 20%, respectively. The non-metallic minerals industry accounts for the lowest number of start-ups, i.e. only about 4.5% of the observations.

Table 2 summarizes the most basic descriptive statistics of the variables and the correlation matrix. Some of the statistics confirm the details presented in Table 1. We use four different kinds of start-up variables. Variable 1.a refers to a variable in which all three categories of the start-up variable (spin-off from surviving parent (3), spin-off from exiting parent (2) and other-start-up (1)) are included. It confirms that other start-ups are the most frequent with a 1.23 mean and a median at 1. The remaining spin-off variables are constructs based on variable 1.a. One by one we excluded the categories and looked only at a sub-sample of the dataset. This enabled us to benchmark each of the spin-off levels against each of the other levels without taking the third into account. The descriptive statistics of these variables confirm that we have more other start-ups than spin-offs from surviving parents, more spin-offs from surviving parents than from exiting parents and hence more other start-ups than spin-offs from exiting parents.

<INSERT TABLE 2 ABOUT HERE>

It is difficult to say anything about the two other experience related variables in the dataset based on the descriptive statistics. It is noteworthy though that the industry experience variable

is 1.31 on the mean, indicating that some firms do have a considerable number of members in the managing team that have experience with the specific six-digit industry in which the firm is operating. The median is zero indicating the distribution to be right skewed confirming that the variable is truncated at zero.

The medians of the education variables indicate that a considerable number of the firms are founded with managers with neither a high nor a medium level education. On the mean, these start-ups may be categorized as having 6% of the workers in the managing team with a high level of education. Finally, the cyclical effect variable shows that the economy on average is growing at approximately 6% per year in the period analysis, assuming that the number of start-ups is consistent over the years.

As shown in the correlation matrix, the main variables of interest are significantly correlated. The experience based variables all show significant correlation estimates. In particular, the industry experience variable is highly correlated with the spin-off variables. This is due to the fact that spin-offs have initial managers that also come from the same industry. The significant correlation estimates also suggest that a gradual introduction of the experience variables may show diversified results.

The cyclical effect variable also seems to be highly correlated with the other variables. Only the industry dummy and the fourth start-up experience variable are not significantly correlated with this variable. The survival variable does exhibit some correlation with the explanatory variables.

4 Results

The model to be estimated predicts the probability of survival of a start-up. The dependent variable is a multinomial response variable with three response levels (exits, acquired survivors, independent survivors). We therefore apply a polytomous logistic regression in which there is no underlying assumption that the dependent variable is ordered. The distinction between survivors and takeovers makes it especially problematic to assume that the variable is ordered. The method applied involves a maximum likelihood estimation of parameters. Since the dependent variable has three levels, two functions will be estimated. As we have chosen exit as our base category, the first function refers to the logistic function between exits (0) and independent survivors (1). The second function refers to exits (0) compared to takeovers (1).

Tables 3a and 3b summarize the results of the regressions.² Four different datasets are used. Model 1 includes the total number of start-ups. The three others include sub-samples of the total sample. Model 2 includes the categories other start-ups and spin-offs from surviving firms. This amounts to 2429 observations. Model 3 includes the 2242 observations categorized either as other start-ups or spin-offs from exiting parents. Finally, Model 4 analyses the observations that are either spin-offs from surviving parents or from exiting parents, which is 323 observations. Each of the four sub-samples has three estimated models (a-c) with a gradual introduction of the experience variables. In total, 12 regressions are estimated. The Pearson Chi² statistics suggest that all 12 models fit the data well.

<INSERT TABLE 3a ABOUT HERE>

<INSERT TABLE 3b ABOUT HERE>

The results confirm that spin-offs from surviving parents have a higher probability of survival regardless of benchmarking against other start-ups (Model 1 and 2) or spin-offs from exiting parents (Model 4). All parameter estimates of the function for survivors with respect to spin-offs from surviving parents are significantly positive. Five of the nine estimates are significant at the 1% level. The remaining four are significant at a 5% level. The levels depend somewhat on the model considered. In benchmarking against other start-ups, spin-offs from surviving parents have a between 1.5 and 2.2 times greater chance of surviving compared to exiting (see Model 1a-c and 2a-c). The corresponding ratios of odds when benchmarking against spin-offs from exiting parents are even higher. The estimated parameter estimates (1.20 and 1.34 in model 4a and 4c) suggest odds ratios between 3.67 and 3.82.

The variable of spin-off from surviving parents is less impressive if we look at the function between exits and takeovers. Even though they are all positive, only a few of the parameters are significant (Models 1a and 2a). The variable is less suited to explaining the difference between these outcomes.

Models 1 and 3 analyze whether there is a statistical difference in the survival probability between other start-ups and spin-offs from exiting parents. The results are rather mixed with significant estimates only for the function for survivors. A certain significance pattern emerges, nevertheless. It seems that we need to include the industry experience variable in the regression

² The marginal effects of the regressions are included in Tables 4a and 4b.

to find any significance. The parameter estimates of spin-offs from exiting parents are not significant in Models 1a and 3a, but they are significant in Models 1b-c and 3b-c. The significant estimates suggest that other start-ups have a between 2.12 (Model 3b-c) and 2.39 (Model 3b-c) greater chance of surviving than exiting.

At first sight, the industry experience variable seems to give rather vague results. However this first impression is misleading. All functions that compare exits to survivors and include spin-offs with surviving parents, show significant and positive estimates. This suggests that especially spin-offs from surviving parents diversify themselves compared to the other types of start-ups. These spin-offs have a much higher probability of survival than any other start-ups.

All parameter estimates of the start-up experience variable are non-significant. The start-up experience variable has a very limited effect on the results expressed by comparing the b models to the c models. None of the parameters changes significantly when the start-up experience variable is introduced.

Finally, the cyclical effect variable is significantly positive in the majority of the regressions, when considering exit firms compared to survivors. This suggests that start-ups have a higher chance of surviving if they are founded in a year in which the economy in general is growing.

5 Discussion and concluding remarks

This study is based on an unusually comprehensive dataset, which contains very accurate information, and this has important advantages for an investigation of firms' survival. In the construction of the data many issues are taken into account, some of which would be problematic for other studies with similar register-based census data. One of the disadvantages of other data sources is that the identity of firm is not well handled over time, and surviving firms, which are acquired by other firms, appear to be exits. In the present dataset, these types of changes in identity are overruled by the statistics office unless the group of employees is radically different after the acquisition. This is a clear advantage in this type of study, which enables us to separate the acquired firms from the exits and the other survivors. These firms are labeled as takeovers.

The results give support to the theoretical proposition that the likelihood of survival is positively influenced by a high degree of industry-specific experiences. Start-ups with founders and initial

managers with experience are more likely to survive than relatively less experienced start-ups. This finding supports the general argument that the life chances of new organizations will be positively influenced by industry-specific experience of their founders and managers. Knowledge and experience from within the same industry will make start-ups more successful from the outset, because their routines will be better shaped to continue in business.

The effects of inherited routines on survival are shown to be even stronger, when considering the different types of start-ups. Spin-offs with surviving parents from the same industry perform remarkably better than other spin-offs, and other start-ups. Comparing the survival chances of spin-offs with surviving parents, with those of spin-offs with exiting parents, shows that inherited routines have a remarkable effect. Our results suggest that spin-offs with surviving parents have an up to four times higher chance of survival. The effects are not so remarkable when we compare spin-offs with surviving parents to other start-ups. Here, the likelihood of survival for spin-offs of surviving parents is twice as high as that of other start-ups. These are very powerful results and illustrate the importance of the right type of experience rather than just experience. It is clearly a benefit to have experience from a parent organization that survives. Even though this is a rather crude measure of the parent's success, it nevertheless indicates that prior experience in such an organization facilitates access to knowledge and routines, which ultimately will be of significant benefit to the employee(s) involved in a start-up.

The type of experience that entrepreneurs and initial managers carry from other firms in the industry thus seems to be very important for the likelihood of survival of their own new organization. Entrepreneurs and initial managers with a history in the industry, but from firms that are not able to continue their operations, will carry routines of low fitness, which, according to the theory, will be a disadvantage. Spin-offs from exiting parents may have been pushed out of existing employment because the parents were facing closure. In our analysis, spin-offs with exiting parents perform significantly worse than any other type of start-up and especially when compared to spin-offs with surviving parents. However, spin-offs with exiting parents also perform worse than other start-ups. In fact, they have only around a 50 per cent chance of survival compared to other start-ups. This result that it is better not to spin-off than to become a spin-off with an exiting parent. It is important to take the history into account when studying spin-offs and to understand that these organizations are rather heterogeneous in this respect. Moreover, it is important to recognize that the quality of parent firm will have vital influence on the performance prospect of any spin-off.

The results of the present study imply that the best start-ups come from the best existing firms. As a result of their higher chances of survival, these start-ups bring higher benefits to the economy. They have the prior experiences and industry-specific knowledge that enable them to perform better than other start-ups. Even though industry-specific experience generally increases the chances of survival of new firms, our study shows that experience gained in an exiting firm is a direct disadvantage for a new organization. This clearly demonstrates that it is the type of experience and the type of start-up, which is at the centre of survival and subsequent long-term economic growth. Many market economies from the West (Denmark certainly included) focus heavily on entrepreneurship and increased firm founding to promote economic growth. This occurs often with no account being taken of our finding that the background of the start-ups has clear and significant effects on life chances. It would perhaps be more rational for policy makers to focus on specific types of start-up rather than simply encouraging increased numbers of start-ups.

Our findings and those in numerous other empirical studies find that organizations founded by individuals from within the industry have relatively higher chances of survival. This result clearly directs the attention towards the possible negative effect of non-compete covenants in the contracts of employees. If spin-offs are more likely to survive, they will also be socially beneficial and provide the economy with valuable input by promoting growth. In this respect, it would probably be of benefit to the economy if firms could be dissuaded from imposing conditions that prevent former employees from starting up businesses within the same industry. In fact, legislators may want to reduce any stigma often associated with employees that leave a company to start their own firms.

The findings in this paper imply that organizational routines carried to spin-offs from their parents have a significant impact on the performance of new organizations. Spin-offs from better performing parents are based on better routines, which positively increases their chances of survival. On the other hand, unhealthy routines negatively influence the likelihood of survival of spin-offs.

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Tables

Table 1: Distribution of observations across the categorical variables

Variable	Number of observations	Percentage of observations	Cumulative No. of obs.	Cumulative Percentage
Survival				
Survivor	1186	47.50	2497	100.00
Takeover	239	9.57	1311	52.50
Exit	1072	42.93	1072	42.93
Start-up				
Other start-ups (1)	2174	87.06	2497	100.00
Spin-offs from exiting parents (2)	68	2.72	323	12.94
Spin-offs from surviving parents (3)	255	10.21	255	10.21
Industry				
Food, beverages and tobacco (1)	258	10.33	258	10.33
Textile and footwear (2)	261	10.45	519	20.78
Wood, paper and graphics (3)	522	20.91	1041	41.69
Chemical (4)	128	5.13	1169	46.82
Non-metallic mineral (5)	111	4.45	1280	51.26
Machinery and electronics (6)	992	39.73	2272	90.99
Furniture (7)	225	9.01	2497	100.00

Source: Ever Private Sector Dataset maintained by CCP at Aarhus School of Business.

Table 2: Basic descriptive statistics and the correlation matrix

Variables	Mean	Median	Std. Dev.	1a	1b	1c	1d	2	3	4a	4b	4c	5	6	7
1. Start-up															
1a. Three level variable	1.23	1.00	0.62												
1b. Spin-off from surviving parent (2) vs. Other start-up (1)	1.10	1.00	0.31	1.00											
1c. Spin-off from exiting parent (2) vs Other start-up (1)	1.03	1.00	0.17	1.00	.										
1d. Spin-off from surviving parent (2) vs from exiting parent (1)	1.79	2.00	0.41	1.00	.	.									
2. Industry experience	1.31	0.00	2.37	0.75	0.77	0.68	-0.12								
3. Start-up experience	0.09	0.00	0.48	0.06	0.08	-0.05	0.13	0.04							
4. Education															
4a. High education	0.06	0.00	0.26	0.00	-0.02	0.09	-0.26	0.02	-0.02						
4b. Medium education	0.21	0.00	0.36	0.02	0.01	0.06	-0.13	0.03	-0.02	0.12					
4c. Low education	0.41	0.40	0.26	0.01	0.01	0.00	0.02	0.00	0.03	-0.17	-0.28				
5. Cyclical effect	0.06	0.03	0.05	-0.05	-0.04	-0.05	0.08	-0.07	0.07	-0.05	-0.09	-0.03			
6. Industry	4.38	5.00	1.96	-0.02	-0.02	0.02	-0.08	-0.05	-0.02	0.06	0.17	0.16	0.01		
7. Survival	1.95	2.00	0.95	0.09	0.11	-0.03	0.23	0.08	0.01	-0.02	-0.01	0.04	0.04	0.07	

Source: Ever Private Sector Dataset maintained by CCP at Aarhus School of Business.

Note: Figures in bold have associated P-values lower than 0.05.

Table 3a: Results of the multinomial regression analysis with exit being the benchmark for the two remaining functions

Variables	Model 1a		Model 1b		Model 1c		Model 2a		Model 2b		Model 2c	
	Par.	Std.	Par.	Std.	Par.	Std.	Par.	Std.	Par.	Std.	Par.	Std.
	Est.	Dev.	Est.	Dev.	Est.	Dev.	Est.	Dev.	Est.	Dev.	Est.	Dev.
Survive function												
Spin-off from surviving parent	0.79 ***	0.15	0.42 **	0.21	0.42 **	0.21	0.79 ***	0.15	0.45 **	0.23	0.45 **	0.23
Spin-off from exiting parent	-0.41	0.27	-0.87 ***	0.34	-0.87 ***	0.34						
Other Start-up	benchmark		benchmark		benchmark		benchmark		benchmark		benchmark	
Industry experience			0.07 **	0.03	0.07 **	0.03			0.07 *	0.03	0.07 *	0.03
Start-up experience					-0.04	0.09					-0.01	0.10
Education												
High	-0.15	0.17	-0.15	0.17	-0.15	0.17	-0.18	0.18	-0.18	0.18	-0.18	0.18
Medium	-0.11	0.13	-0.12	0.13	-0.12	0.13	-0.10	0.13	-0.10	0.13	-0.10	0.13
Low	0.10	0.18	0.09	0.18	0.09	0.18	0.10	0.18	0.09	0.18	0.09	0.18
Cyclical effect	1.97 **	0.85	2.04 **	0.85	2.07 **	0.86	1.95 **	0.86	2.00 **	0.86	2.01 **	0.86
Constant	-0.39 **	0.17	-0.43 **	0.18	-0.43 **	0.18	-0.37 **	0.18	-0.41 **	0.18	-0.41 **	0.18
Takeover function												
Spin-off from surviving parent	0.53 **	0.24	0.42	0.35	0.41	0.35	0.54 **	0.24	0.28	0.38	0.27	0.38
Spin-off from exiting parent	-0.17	0.45	-0.31	0.54	-0.28	0.54						
Other Start-up	benchmark		benchmark		benchmark		benchmark		benchmark		benchmark	
Industry experience			0.02	0.05	0.02	0.05			0.05	0.06	0.05	0.06
Start-up experience					0.21	0.15					0.22	0.15
Education												
High	-0.42	0.35	-0.42	0.35	-0.42	0.34	-0.35	0.34	-0.34	0.34	-0.35	0.34
Medium	-0.52 **	0.24	-0.52 **	0.24	-0.52 **	0.24	-0.45 *	0.24	-0.45 *	0.24	-0.45 *	0.24
Low	-0.06	0.30	-0.07	0.30	-0.07	0.30	-0.04	0.30	-0.05	0.30	-0.05	0.30
Cyclical effect	1.19	1.41	1.20	1.41	1.02	1.42	1.39	1.43	1.43	1.43	1.25	1.43
Constant	-1.97 ***	0.32	-1.98 ***	0.32	-1.97 ***	0.32	-1.97 ***	0.32	-2.00 ***	0.32	-1.99 ***	0.32
Industry Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	2497		2497		2497		2429		2429		2429	
Pearson Chi^2	81.84 ***		87.73 ***		90.35 ***		79.44 ***		83.34 ***		85.58 ***	

Source: Ever Private Sector Dataset maintained by CCP at Aarhus School of Business.

Note: *, **, ***: P<0.1, P<0.05, P<0.01.

Table 3b: Results of the multinomial regression analysis with exit being the benchmark for the two remaining functions

Variables	Model 3a		Model 3b		Model 3c		Model 4a		Model 4b		Model 4c	
	Par.	Std.	Par.	Std.	Par.	Std.	Par.	Std.	Par.	Std.	Par.	Std.
	Est.	Dev.	Est.	Dev.	Est.	Dev.	Est.	Dev.	Est.	Dev.	Est.	Dev.
Survive function												
Spin-off from surviving parent							1.20 ***	0.32	1.30 ***	0.33	1.34 ***	0.33
Spin-off from exiting parent	-0.41	0.27	-0.75 **	0.37	-0.75 **	0.38	benchmark		benchmark		benchmark	
Other Start-up	benchmark		benchmark		benchmark							
Industry experience			0.05	0.04	0.05	0.04			0.11 ***	0.04	0.11 ***	0.04
Start-up experience					0.00	0.10					-0.19	0.18
Education												
High	-0.15	0.17	-0.15	0.17	-0.15	0.17	0.09	0.52	-0.03	0.53	-0.12	0.54
Medium	-0.10	0.13	-0.10	0.13	-0.10	0.13	-0.30	0.42	-0.40	0.42	-0.40	0.43
Low	0.11	0.19	0.11	0.19	0.11	0.19	-0.14	0.64	-0.21	0.64	-0.17	0.64
Cyclical effect	2.12 **	0.89	2.14 **	0.89	2.13 **	0.89	1.11	2.79	1.94	2.84	2.49	2.88
Constant	-0.45 **	0.18	-0.47 **	0.19	-0.47 **	0.19	-0.48	0.57	-1.18 *	0.64	-1.25 *	0.65
Takeover function												
Spin-off from surviving parent							0.77	0.52	0.83	0.53	0.79	0.53
Spin-off from exiting parent	-0.15	0.45	0.28	0.59	0.28	0.59	benchmark		benchmark		benchmark	
Other Start-up	benchmark		benchmark		benchmark							
Industry experience			-0.08	0.07	-0.08	0.07			0.06	0.07	0.06	0.07
Start-up experience					0.21	0.19					0.17	0.23
Education												
High	-0.53	0.38	-0.53	0.38	-0.53	0.38	-0.21	0.88	-0.27	0.88	-0.26	0.89
Medium	-0.53 **	0.25	-0.52 **	0.25	-0.52 **	0.25	-1.24	0.77	-1.30 *	0.78	-1.29 *	0.78
Low	0.01	0.31	0.02	0.31	0.02	0.31	-1.18	1.08	-1.19	1.09	-1.24	1.10
Cyclical effect	1.65	1.48	1.62	1.47	1.50	1.48	-6.42	5.05	-5.92	5.07	-6.43	5.12
Constant	-1.99 ***	0.33	-1.95 ***	0.33	-1.95 ***	0.33	-2.10 *	1.24	-2.50 *	1.32	-2.40 *	1.32
Industry Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	2242		2242		2242		323		323		323	
Pearson Chi ²	49.61 ***		53.59 ***		54.87 ***		31.6 *		38.93 **		41.64 **	

Source: Ever Private Sector Dataset maintained by CCP at Aarhus School of Business.

Note: *: P<0.1, **: P<0.05, ***: P<0.01.

Table 4a: Marginal effects of Models 1a-c and 2a-c

Models / Variables	Model 1a			Model 1b			Model 1c		
	Exits	Takeovers	Survivors	Exits	Takeovers	Survivors	Exits	Takeovers	Survivors
Spin-off from surviving parent	-0.18 ***	0.01	0.17 ***	-0.10 **	0.02	0.08 *	-0.10 **	0.02	0.08 *
Spin-off from exiting parent	0.09	0.00	-0.09	0.18 **	0.00	-0.18 ***	0.18 **	0.00	-0.18 ***
Industry experience				-0.02 **	0.00	0.02 **	-0.02 **	0.00	0.02 **
Start-up experience							0.00	0.02	-0.02
High education	0.05	-0.03	-0.02	0.05	-0.03	-0.02	0.05	-0.03	-0.02
Medium education	0.05	-0.04 **	-0.01	0.05	-0.04 **	-0.01	0.05	-0.04 **	-0.01
Low education	-0.02	-0.01	0.03	-0.02	-0.01	0.03	-0.02	-0.01	0.03
Cyclical effect	-0.46 **	0.02	0.44 **	-0.47 **	0.02	0.45 **	-0.47 **	0.00	0.46 **
	Model 2a			Model 2b			Model 2c		
	Exits	Takeovers	Survivors	Exits	Takeovers	Survivors	Exits	Takeovers	Survivors
Spin-off from surviving parent	-0.18 ***	0.01	0.17 ***	-0.10 **	0.00	0.10 *	-0.10 **	0.00	0.10 *
Industry experience				-0.02 *	0.00	0.01 *	-0.02 *	0.00	0.01 *
Start-up experience							-0.01	0.02	-0.01
High education	0.05	-0.02	-0.03	0.05	-0.02	-0.03	0.05	-0.02	-0.03
Medium education	0.04	-0.03 **	-0.01	0.04	-0.03 *	-0.01	0.04	-0.04 *	-0.01
Low education	-0.02	-0.01	0.03	-0.02	-0.01	0.02	-0.02	-0.01	0.02
Cyclical effect	-0.46 **	0.04	0.42 **	-0.47 **	0.04	0.43 **	-0.47 **	0.02	0.44 **

Source: Ever Private Sector Dataset maintained by CCP at Aarhus School of Business.

Note: *, P<0.1, **, P<0.05, ***, P<0.01.

Table 4b: Marginal effects of Models 3a-c and 4a-c

Models / Variables	Model 3a			Model 3b			Model 3c		
	Exits	Takeovers	Survivors	Exits	Takeovers	Survivors	Exits	Takeovers	Survivors
Spin-off from exiting parent	0.09	0.00	-0.09	0.12	0.06	-0.17 **	0.12	0.06	-0.17 **
Industry experience				-0.01	-0.01	0.02 *	-0.01	-0.01	0.02 *
Start-up experience							-0.01	0.02	-0.01
High education	0.05	-0.04	-0.01	0.05	-0.04	-0.02	0.05	-0.04	-0.01
Medium education	0.04	-0.04 **	0.00	0.04	-0.04 *	0.00	0.04	-0.04 *	0.00
Low education	-0.02	0.00	0.03	-0.02	0.00	0.03	-0.02	0.00	0.03
Cyclical effect	-0.51 **	0.06	0.45 **	-0.51 **	0.05	0.46 **	-0.50 **	0.04	0.46 **
	Model 4a			Model 4b			Model 4c		
	Exits	Takeovers	Survivors	Exits	Takeovers	Survivors	Exits	Takeovers	Survivors
Spin-off from surviving parent	-0.27 ***	0.01	0.26 ***	-0.29 ***	0.01	0.28 ***	-0.30 ***	0.01	0.29 ***
Industry experience				-0.02 **	0.00	0.02 **	-0.02 ***	0.00	0.02 ***
Start-up experience							0.03	0.02	-0.06
High education	-0.01	-0.02	0.03	0.01	-0.02	0.01	0.03	-0.02	-0.02
Medium education	0.10	-0.09	-0.02	0.13	-0.09	-0.04	0.12	-0.09	-0.04
Low education	0.07	-0.09	0.02	0.08	-0.09	0.01	0.08	-0.09	0.02
Cyclical effect	0.00	-0.58	0.59	-0.18	-0.59	0.77	-0.28	-0.65 *	0.93

Source: Ever Private Sector Dataset maintained by CCP at Aarhus School of Business.

Note: *, P<0.1, **, P<0.05, ***, P<0.01.