

Heritage of Employee Startups: Founder Experiences and Survival of New Firms

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Recent studies have highlighted the superior performance of intra-industry spin-offs over both diversifying firms and other *de novo* entrants. It is often argued that superior knowledge endowments of founders are the explanation of these findings. However, the evidence is still very preliminary. We investigate this further using a detailed dataset covering the entire Danish economy by introducing a proxy for knowledge accumulation of founders, i.e. their previous employer tenure, in a study of the performance of 8,000 new firms across various industries. We find that both proxies significantly influences the performance of spin-offs, which supports that argument that knowledge accumulation could be the explanation for the superior performance of spin-offs.

Key words: Founder tenure, Experiences, Intra-industry spin-offs, Survival of new firms

1. Introduction.

The literature on entrepreneurs with prior background in the industry that they enter, often labeled spin-offs, spin-outs or progeny, have grown tremendously in recent years (see Klepper (2001) and Klepper and Thompson (2006) for reviews). These studies have shown how spin-offs have superior performance over other new entrants and sometimes even diversifying firms. This finding is often explained by superior knowledge endowments of the founders (Agarwal et al. 2004). The argument is that founders have accumulated knowledge while being employed at an incumbent firm in the industry, which become useful for them and eventually lead to superior performance.

One of the most advanced studies of this sort is Klepper's (2007) study the U.S. automotive industry. He finds that spin-offs performed relatively better if they were based on the expertise of the parent firms. These findings highlight how knowledge diffusion could be a key explanation for the superior performance of spin-offs as founders accumulate knowledge in incumbent firms and base their activities on the expertise of parent firms. This could enable them to outperform diversifying firms and other *de novo* entrants.

Given that superior knowledge endowments are frequent explanations for the success of spin-offs, we still have limited evidence for the dynamics of knowledge accumulation in this relationship. This paper makes an attempt to fill these gaps by considering the importance of founder tenure at the parent firm on performance for a wide selection of firms in various industries over a shorter time frame. We argue that founder tenure at the previous organization is proxy, which can be used to evaluate the effect of knowledge accumulation, since founders with longer employment spells are likely to generate more knowledge on the parent organization compared to founders with shorter spells. Most of the studies of this phenomenon have been conducted on single industry data sets covering often most of the history of the industries. This leaves the question whether these findings are general for the survival of new firms across various industries. We estimate the effect of these two proxies for knowledge accumulation and inheritance on the performance of new firms using a detailed matched employer-employee dataset covering the entire Danish economy from 1980 until 2003.

We find that both previous employer tenure of founders have significant and positive effect on performance, if they become spin-offs by entering the same industry as their previous employer. This further indicates that knowledge accumulation could be a valid explanation for the superior performance of spin-offs.

2. Knowledge accumulation and tenure of founders.

Organizational sociologists (Brittain and Freeman 1986, Carroll 1984, Hannan and Freeman 1986) argue these spin-offs from existing firms represent a transfer of knowledge and resources. They claim that blueprints from the founders previous employers are passed to the new firms through the mobility of these founders (Phillips 2002). The type of knowledge transferred is not limited to codified knowledge, widely available in scientific articles, strategy reports and technical specifications, but also includes valuable tacit knowledge accumulated by individuals (Agarwal et al. 2004). Employees leave the parent firms carrying with them the tacit knowledge generated through learning by doing (Arrow 1962) or learning by observing (Nonaka 1994) in the course of their previous employment. Founders of new ventures learn about the parent organization from being employed there. They are able to observe how the parent firms organizational capabilities and knowledge interact and govern the evolution of those firms. The strategies and organizational forms of new organizations are similar to those of the organizations in which their founders were formerly employed (Aldrich and Wiedenmayer 1993).

Empirical evidence supports the parent-progeny transfer of organizational knowledge, which leads progeny firms to follow the organizational principles of parent firms closely. Baron and Hannan

(2002) argue that one might expect that founders previously employed in rather bureaucratic organizations would want to escape from such a model and to create a new firm with a radically different style. However, Baron and Hannan found that entrepreneurs with this profile were actually more likely to stick to a bureaucratic organizational template. Thus, founders are likely to base their new ventures on an organization model that they are familiar with, rather than to adopt a totally new and different model.

Founders of spin-offs are likely to bring to their new firms specific tacit knowledge about a wide range of organizational issues (Helfat and Lieberman 2002). Accordingly, more experienced founders will have more valuable knowledge, which will increase the probability of success compared with less experienced entrants. If this holds true, the success of new entrants will depend on the past experience of their founders. Employees in incumbent firms are well placed to found start-ups based on the knowledge acquired at and developed by the incumbent. Furthermore, this argumentation also means that when prospective founders of new firms leave a parent firm, the initial knowledge endowment will be highly influenced by the parents knowledge at the time of separation (Agarwal et al. 2004). This is likely to have long-term effects on the new firms performance, since the founding condition greatly influences the structure, culture, strategy and routines of the start-up (Stinchcombe 1965).

Founders have different stocks of knowledge and accumulated experience, which implies that they differ in terms of their ability to recognize and follow up new opportunities. Prior knowledge and experience endow them with a greater ability to facilitate the acquisition of information on market development, technological change and production processes (Shane 2003). This, in turn, will increase the ability to found a successful start-up. Hence, the knowledge acquired at a parent firm, which will include knowledge about how to exploit new knowledge and technological developments in the particular industry (Cooper 1985, Roberts 1991), may prove crucial for a start-up. However, the benefit derives not only from knowledge about the technological development of the product in question, but also from knowledge about markets and, perhaps more importantly, knowledge of how to serve these markets (Shane 2000). This can be related to supplier relationships, sales techniques or other market information. Similarly, knowledge about how to serve markets will increase the ability to identify opportunities, because it will improve understanding of the production and marketing gains associated with a new product. A founder with experience in the industry with respect to this process is more likely to be able to exploit such opportunities, and the new start-up is more likely to be founded on the basis of experiences and organizational routines that have

proven successful in the past. Starting with a good model will positively affect the long-term performance of a firm (Cyert and March 1963), since it is difficult to change the initial blueprints. The combination of a good model and superior knowledge endowment from employment in a good parent firm, will produce a higher performing spin-off.

In summary, it is generally accepted that founders' initial knowledge endowments are crucial for the fate of their new ventures. In addition, founders are widely argued to accumulate knowledge at the previous employers, which add to their knowledge endowment. Accumulated knowledge from the parent organization can be particularly useful, when entering the same industry as an entrepreneur. We extend this theory by arguing that the length of tenure of founders with the parent firms is key to superior performance in the spin-offs that have been studied.

Founders acquire tacit knowledge from their parent firms, which they bring to their new firms. However, the duration of employment in parent firms will differ and this almost inevitably will influence the degree of knowledge absorption of the founders. If founders have been employed for a relatively longer time in the parent organizations, the amount of knowledge they will embody is likely to be much higher than in founders with shorter tenure. Founders with longer tenure will have a better view of the organization and broader knowledge about it. Their perceptions of the organizational competence governing the parent firm will be sharper and more complete which will help them to replicate the successes and learn from the failures of the parent firms in their new ventures. Their knowledge endowment will simply be superior to that of other founders with less or no experience or with shorter employment spells. This is likely to increase the probability that these new ventures will survive. Accordingly, we conjecture that relatively longer tenure in the parent firms increases the survival chances of the spin-offs.

We argue that the duration of employment is important, but also the level of employment will have a major influence. If founders have been previously employed part of a top management team, they will likely have been able to get a more extensive view of the organization compared to less senior employees. Klepper and Thompson (2006) argue that the degree to which the founders are able to succeed with their new ventures depends on the founders influence on the decision making process at the parent firm. Knowledge is more accessible at the higher occupational levels. Accordingly, founders who previously held high-level positions are likely to found better performing spin-offs, because of their superior access to knowledge about the firm.

This extension of the theory implies that there are different strengths of inherited knowledge. Along with many other scholars, we have argued that the survival chances of spin-offs are likely to be higher than those of other start-ups. Here we conjecture that among spin-offs, those founded

by entrepreneurs with relatively longer tenure at their parent firms will be better performing as a result of a superior knowledge endowment and more complete knowledge about the organizational routines of the parent firm.

One could easily imagine several competing theories for this claims. The parent tenure issue could be especially interesting in this respect. We argue that it is better to stay in one firm for a long time compared to multiple short stays in different firms even in the same industry. It is a question whether it is better have one reference employer that founders have a deep understanding of or have more reference employers that you know less about. We will try to control for as many of these as possible within our data.

3. Empirical strategy.

Our theoretical arguments use broad concepts like knowledge accumulation and performance while our hypothesis is more specific. We want elaborate further on this in order to bridge theory with empirical analysis. We argue that the performance of spin-offs will be higher, if the founders have been employed at the previous employer for relatively longer time. In the present paper, we focus on survival as the main indicator of performance. It is specifically relevant, since a large number of new firms do not survive for a long period of time. Evidence show that 40 per cent of new firms fail within the first year (Taylor 1999), and more than 60 per cent surviving less than five years (Kirchhoff 1994). This indicates that survival is a particularly interesting performance measure for studies of new firms. Consequently, we focus our analysis on explaining the fate of new firms explained by variables on tenure as proxies for the accumulation of knowledge by founders.

3.1. Data and measures.

We analyze data from government registers controlled by Statistics Denmark in the Integrated Database for Labor Market Research, known as the IDA database. This dataset contains combined information on every person, plant and firm in the Danish economy from 1980 to 2003 gathered from the official registers of the Danish government, which, because of its extensive welfare policies, records extremely detailed information about Denmark's economic activity.

In addition, we rely on the Entrepreneurship Database from Statistics Denmark to access information on the founders of new firms in Denmark. In our sample, this database covers all new companies founded from 1995-2001. Statistics Denmark compiles this list of founders based on information on the boards, registrants, management, occupation areas, and wages of all people involved in the founding of each new registered company. Their procedure however only allows for the identification of one main founder per firm. We link these founders to the IDA database

to obtain historical information on the founders. This enables us to trace the background of the founders back to 1980 and follow the fate of their new firms until 2003.

Our sample consists of 7,968 new firms founded from 1995 to 2001. These are founded in the private sector, excluding the primary and public sectors. We focus on the industries classified from 15 to 75 (food processing to business sciences, both included) in the European NACE system's two digit level, but have excluded new firms in the 40 to 45 (recycling) interval, which is a mix of public and private firms. The effects of tenure are likely be very different for serial entrepreneurs, so we focus our analysis on the sample of first time entrepreneurs. We match this sample of new firms with the IDA data and trace the background of founders back to 1980. We restrict our sample to new firms with at least one employee in the first year.

Founder experiences. The majority of literature on spin-offs focus on intra-industry spin-offs as the definition of spin-offs.¹ Here we define spin-offs as firms founded in the same industry as a the founder was previously employed. This is used as a dummy and an interacting effect on relevant explanatory variables in our analysis. We create a continuous variable measuring the previous employer tenure. Based on our matching of the census data from 1980 to 2003 with the list of founders from 1995 to 2001, we calculate the previous employer tenure as the founder's length of employment at the previous employer. Accordingly, this is based on the number of years in which we have information about the respective founder. If the founder were employed at the previous employer only in the year before becoming an entrepreneur, tenure is zero. It starts counting, if the founder were employed for two years or more.

Our theory is that new firms are influenced by the previous employer besides what we can label as industry features. We want to control for industry in order to isolate the previous employer tenure effect. Consequently, we calculate a measure for industry tenure based on the same procedure. We also want to control for competing theories related to long tenure from a single organization or shorter tenure from several organizations. Thus, we add a measure for the log number of firms in the industry in which the founder previously have been employed.

Controls. We include the size of the past employer measured by the number of employees in the year of the spin-off event. Second, we include the parent firm age in the estimations. We use the logged versions of these variables. Since parent firm age is left censored, we add a dummy for the parent firms that 15 years or older. Controlling for parent firm size is in line with the findings of Sørensen and Phillips (2004) that self-employed individuals coming from small previous

¹ An exception is Eriksson and Kuhn (2006) performed on the Danish census data alone, without the list of founders.

employers were more likely to survive and perform well financially than individuals coming from larger organizations. We expect to replicate this result.

We included a number of variables that have been used in analyses of firm survival in industrial organization (e.g. Audretsch and Mahmood (1995) and Audretsch and Mahmood (1995)) and organization ecology (e.g. Brüderl and Schüssler (1990) and Brüderl et al. (1992)). This should insure that we are not picking up noise from omitted variables, which traditionally are important in survival studies. Most importantly, we want to insure that any finding on the above variables is not associated with the start-up size of the new firms. According, we include the logarithm of the initial size of the new start-up. This is the number of employees in the first year of business. Second, we include two variables to control for the founder's level of education. High level is lengthy education, equivalent to a five-year university education or higher. This includes all university masters and doctoral programs. Medium level is education equivalent to university bachelors programs (three years), or similar lengths and levels of education from other types of education institutions. Lower levels are omitted as a benchmark. Third, we control for the age of the founder to isolate general life experience effects. Brüderl and Schüssler (1990) and Eriksson and Kuhn (2006) controlled for this in a similar or precisely the same way. Fourth, we add a dummy for the immigrants and descendants of immigrants to add a control for the founders coming from abroad, which typically have lower windows of tenure from Danish labor market. Finally, we include seven non-reported industry dummies (one digit NACE level) to control for possible industry differences and 33 non-reported region dummies for the labor market regions of Denmark. Table 1 presents the descriptive statistics.

4. Results.

Our data are discrete yearly observations gathered in the third week of November each year. We cannot identify the specific time of year when a start-up is founded or exits, but only whether or not it exists in the third week of November in the respective year. This means that survival occurs in continuous time, but spell lengths are observed only in intervals. Cox hazard models (Cox 1972, Cox and Oakes 1984) are typically used in these types of studies although they assume continuous time data. There are several other methods available for estimation of hazard rates with discrete time data. We present logit estimations on firm-year data, where the dependent variable is zero in all, but the observation where the firm goes out of business.² These estimations are presented in Table 2.

² Earlier studies (Agarwal et al. 2002, Baum and Oliver 1991, Henderson 1999) have experimented with complementary log-log, logit and probit estimations as a proper alternative to Cox hazard models. To ensure that our results are robust, we also estimated complementary log-log and probit models on firm-year observations (unreported). These findings are robust and identical to the estimations in Table 2.

Table 1 Descriptives

Variable	Mean	Std.dev.	Min	Max
Age (1 year)	.210	.407	0	1
Age (2 years)	.171	.376	0	1
Age (3-4 years)	.242	.428	0	1
Age (5-9 years)	.168	.374	0	1
Ln (initial size)	.898	.825	0	4.419
Limited liability	.512	.500	0	1
Male	.778	.416	-0.014	1
Labor market experiences (years)	13.756	8.058	0	37
Labor market experiences (years) ²	254.174	261.651	0	1369
Education (medium short)	.582	.493	0	1
Education (medium long)	.149	.356	0	1
Education (long)	.065	.246	0	1
Founder income _{t-1}	12.025	1.552	0	15.340
1 st generation immigrants	.061	.239	0	1
2 nd generation immigrants	.005	.072	0	1
Industry tenure (broad)	1.182	1.067	0	3.091
Tenure at previous employer	4.098	4.386	0	21
Ln (previous employer size)	3.039	1.564	.693	8.922
Ln (previous employer age)	2.211	.664	.693	2.773
Previous employer age > 15 years	.420	.494	0	1
Spin-off (narrow)	.376	.484	0	1
Ln (number of firms in industry)	.322	.346	0	.693
Ln (managerial tenure)	.494	.906	0	3.091

Model 1 presents our baseline model with just the controls as predictors. Most of the predictors have significant impacts on the hazard of exit with age, initial size, limited liability and education as the strongest predictors. We add industry tenure and a dummy for intra-industry spin-offs to Model 2. Both are strong predictors. The hazard of exit are significantly lower for firms founded by previous employees of incumbent firms (employed in the industry directly prior to founding the firm) in the same 4-digit industry and/or by founders with experience in the 2-digit industry.

We introduce a number of variables to Model 3. Most importantly, we add tenure at the previous employer. We also add some parent specific controls, age and size. We confirm our theory as tenure from the previous employer have a significant and negative impact on the hazard of exit, even after controlling for age and size of the previous employer. This indicates a clear advantage for longer employment spells prior to entry. Model 4 includes an interaction effect between intra-industry spin-offs and tenure at previous employer. This will show a separate of tenure for spin-offs and non-spin-offs. We find that spin-offs with tenure have even lower hazards of exit, but the main effect remains significant, which shows that even non-spin-offs enjoy longer tenure at previous employer.

In Model 5, we add an additional interaction effect between intra-industry spin-off and size of previous employer. This will tell whether we separate effects of previous employer size on spin-offs and non-spin-offs. We find that intra-industry spin-offs have significantly lower hazards of exit with declining previous employer size than the average effect. This shows that spin-offs of small firms

Table 2 Logit regressions (firm-year observations)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Age (1 year)	17.680** (0.185)	17.671** (0.188)	17.669** (0.199)	17.667** (0.200)	17.667** (0.201)	17.667** (0.201)	17.667** (0.201)
Age (2 years)	17.621** (0.187)	17.629** (0.189)	17.631** (0.200)	17.629** (0.201)	17.629** (0.202)	17.629** (0.203)	17.629** (0.202)
Age (3-4 years)	17.394** (0.187)	17.418** (0.189)	17.424** (0.200)	17.421** (0.201)	17.423** (0.203)	17.422** (0.203)	17.422** (0.202)
Age (5-9 years)	17.158** (0.189)	17.205** (0.192)	17.215** (0.203)	17.214** (0.204)	17.215** (0.205)	17.215** (0.205)	17.215** (0.205)
Ln (initial size)	-0.241** (0.023)	-0.221** (0.023)	-0.224** (0.023)	-0.223** (0.023)	-0.228** (0.023)	-0.228** (0.023)	-0.228** (0.023)
Limited liability	-0.355** (0.038)	-0.384** (0.038)	-0.389** (0.039)	-0.388** (0.039)	-0.394** (0.039)	-0.395** (0.039)	-0.404** (0.039)
Male	-0.119** (0.041)	-0.030 (0.042)	-0.014 (0.042)	-0.017 (0.042)	-0.020 (0.042)	-0.019 (0.042)	-0.027 (0.043)
Labor market experiences (years)	-0.051** (0.007)	-0.037** (0.008)	-0.031** (0.008)	-0.031** (0.008)	-0.031** (0.008)	-0.031** (0.008)	-0.031** (0.008)
Labor market experiences (years) ²	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)
Education (medium short)	-0.264** (0.042)	-0.224** (0.043)	-0.222** (0.043)	-0.222** (0.043)	-0.223** (0.043)	-0.223** (0.043)	-0.223** (0.043)
Education (medium long)	-0.279** (0.059)	-0.309** (0.059)	-0.316** (0.060)	-0.315** (0.060)	-0.315** (0.060)	-0.315** (0.060)	-0.337** (0.061)
Education (long)	-0.321** (0.082)	-0.313** (0.082)	-0.331** (0.083)	-0.329** (0.083)	-0.327** (0.083)	-0.327** (0.083)	-0.384** (0.089)
Founder income _{t-1}	-0.030** (0.011)	-0.026* (0.010)	-0.026* (0.010)	-0.026* (0.010)	-0.027* (0.010)	-0.027* (0.010)	-0.027** (0.010)
1 st generation immigrants	0.084 (0.071)	0.067 (0.072)	0.063 (0.072)	0.062 (0.072)	0.067 (0.072)	0.068 (0.072)	0.070 (0.072)
2 nd generation immigrants	0.242 (0.191)	0.190 (0.197)	0.201 (0.188)	0.203 (0.188)	0.205 (0.188)	0.205 (0.188)	0.195 (0.188)
Industry tenure (broad)		-0.194** (0.021)	-0.179** (0.021)	-0.168** (0.022)	-0.173** (0.022)	-0.169** (0.025)	-0.170** (0.025)
Tenure at previous employer			-0.025** (0.005)	-0.020** (0.006)	-0.019** (0.006)	-0.019** (0.006)	-0.019** (0.006)
Ln (previous employer size)			0.059** (0.012)	0.058** (0.012)	0.044** (0.013)	0.044** (0.013)	0.044** (0.013)
Ln (previous employer age)			-0.072† (0.038)	-0.068† (0.038)	-0.075† (0.039)	-0.076† (0.039)	-0.075† (0.039)
Previous employer age > 15 years			-0.014 (0.050)	-0.014 (0.050)	-0.004 (0.050)	-0.004 (0.050)	-0.003 (0.050)
Spin-off (narrow)		-0.298** (0.044)	-0.245** (0.046)	-0.189** (0.054)	-0.431** (0.093)	-0.423** (0.097)	-0.418** (0.097)
x tenure at previous employer				-0.020* (0.010)	-0.021* (0.010)	-0.020* (0.010)	-0.020* (0.010)
x ln (previous employer size)					0.100** (0.032)	0.100** (0.032)	0.098** (0.032)
Ln (number of firms in industry)						-0.023 (0.088)	-0.022 (0.088)
Ln (managerial tenure)							0.044† (0.025)
Constant	-17.695	-17.543	-17.609	-17.642	-17.579	-17.578	-17.558
Industry effects (7)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Labor market region effects (33)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.12	0.13	0.13	0.13	0.13	0.13	0.13
Log likelihood	-12,156	-12,012	-11,980	-11,977	-11,972	-11,972	-11,971
Firm-year cases	38,059	38,059	38,059	38,059	38,059	38,059	38,059
Number of firms	7,968	7,968	7,968	7,968	7,968	7,968	7,968

Robust standard errors are reported in parentheses.

Significance levels : † : 10% * : 5% ** : 1%

are more likely to survive over time.

Our findings in Table 2 confirmed our hypothesis concerning the negative effect of tenure on the hazard of exit for spin-offs. We argue that the longer employment spell at the previous employers leads to more and better accumulation of knowledge, which ultimately is advantageous, when founders leave to start their own business in the same industry. This advantage leads to better probabilities of survival according to our theory.

However, we could also see other effects behind this finding. Our theory is a human capital story, where longer tenure is an accumulation of human capital based on knowledge about the organization of the previous employer and the industry in which it resides. What we are finding could also be interpreted as a social capital story, where the founder builds social relationships in and outside the previous employer during long spells of employment. Earlier studies of social networks have found that mobility typically expands social networks. Thus if it is a social capital story rather than a human capital story, more mobile founders should have greater networks, which should lower the hazard of exit.

Another theoretical argument would be that founders might just as well accumulate human capital from employment in several firms in the same industry and not just one. This would be captured by our measure for industry tenure, but we add another variable, the log of the number of firms in the industry in which the founder have been employed, to test this and the social capital story in Model 6. This measure is insignificant. There is no effect on the hazard of exit, if the founder have been employed in multiple firms in the industry. We still cannot completely rule out that the effects of tenure at previous employer is social capital, but it seems peculiar that these would be specific to the employment in one single organization.

Tenure is by definition long-term employment at one organization. In some cases, long-term employment could lead to promotions within this firm. Therefore, founders with longer tenure could be higher ranked in the previous organization, which could an alternative explanation behind our findings. To control for this, we add the log number of years of managerial experience that the founder has. This cannot be the explanation for our findings, since this measure has a modestly significant positive effect on the hazard of exit (and is uncorrelated with tenure at the previous employer).

Another more serious threat to our findings could be that founders with longer employment spells at past employers become more and more accommodated with the past employer as time goes by. The fact that they have been there for a long time indicated that they have a good fit with that organization. The likelihood of them leaving the firm might be influenced by this development.

If this is true, our results could be explained by the argument that founders are more reluctant to leave the longer they have stayed there. They simply have higher opportunity cost of leaving. As a consequence, it will require a relatively better idea or opportunity for them to leave. This would lead to endogeneity in our results, because there is selection in who becomes entrepreneurs.

5. Discussion.

Prior theoretical and empirical research suggests that spin-offs are in some way mirror images of their parent firms in terms of their organizational routines. Organizational routines are transferred from the parent firm to the start-up through the founders of the new firm. Founders adapt and improve on the organizational routines of their parent firms. These routines involve both codified and tacit knowledge, which are accumulated during employment in the parent firm. It has been argued in the literature that this significantly improves the survival probabilities of the spin-offs compared to other start-ups. We argue that the degree of absorption of the organizational routines will be shaped by the duration of founders employment in the parent firm. These start-ups will simply have a superior initial knowledge endowment, because their founders have had the opportunity to accumulate more knowledge at the parent firm during a longer period of employment. This will enable them to perform better, because they are better able to adapt and improve the routines, since their knowledge about them is presumably greater. Shorter tenured founders might have to rely more completely on the parent firms routines, because they do not have the amount of knowledge needed to sufficiently adapt the routines.

Experience within the industry has a greater effect on survival than tenure, but we emphasize that knowledge from a specific parent firm has a significant impact. This indicates quite strongly that the knowledge that founders pick up from specific parent firms has a positive impact on their start-ups the longer they were employed in that organization. These findings support the general argument that the survival chances of new organizations are positively influenced by the knowledge endowment of their founders. Knowledge and experience from within the same industry will make spin-offs more successful from the outset, because their organizational routines and accumulated knowledge will be better shaped for success.

It is important to take founders histories into account when studying spin-offs and to understand that these organizations are rather heterogeneous. We found evidence that tenure significantly increases the probability that a spin-off survives. The theory is that the longer a person is employed at the parent firm before the spin-off occurs, the more likely the spin-off will be influenced by the organizational routines of the parent firm. Inherited effects are stronger, the longer the founders

were employed there. A stronger inherited effect on the organizational routines should consequently lead to a greater likelihood of survival, because the founders are better endowed to adapt, improve and reflect on the knowledge gained in the parent firm. The tenure effect shows that parent firms have an important impact on the survival of spin-offs. The fact that tenure is significant and positive in this respect supports the assumption that parent-specific knowledge is the explanation for the increased probability of survival.

If the founders were employed a relatively longer time at the parent firm, this positively influences the chances of survival of spin-offs, because they have a much stronger heritage. The founders are able to both replicate and modify the organizational routines of the parent firms to a much higher extent, because of their relatively longer employment which is likely to increase the degree of absorption and accumulation of knowledge. This clearly demonstrates that it is the source of experience and the type of start-up that is at the centre of survival, and subsequent long-term economic growth.

6. Conclusions.

Many countries and governments focus strongly on entrepreneurship and increased firm founding to promote economic growth but often will little 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 to encourage increased numbers.

The findings from our study have some important implications for policy. We find that the strongest entrepreneurs are those that have pre-entry experience and have been employed in an incumbent organization in the industry. This implies that it would be of value to encourage this type of entry. In this respect, it is critical to address the possible negative impact of non-compete covenants on this specific type of entry. Non-compete covenants are a component of employment contracts, which prevent the employees from starting up new firms in the same industry in the future. Incumbent firms include such clauses in their employment contract in an effort to protect firm specific knowledge from being diffused to other firms. While this may or may not achieve their aims, it may critically hinder potential entrepreneurs from starting own ventures in the industry. This means that the pool of entrepreneurs that have been successful, has been reduced from a societal point of view. Prohibiting firms from including these covenants in their employment contracts could increase entry of new successful firms, thereby benefiting the overall economy.

Organizations founded by individuals from within the industry have relatively higher chances of survival. This result clearly directs attention towards the possible negative effect of non-compete

covenants in employees contracts. If spin-offs are more likely to survive, they will also be socially beneficial and provide the economy with valuable input as promoters of 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 the stigma often associated with employees who leave companies to start their own firms.

The findings from this study imply that organizational knowledge carried to spin-offs from parent firms has a significant impact on the performance of new organizations. Spin-offs seem to be based on a stronger knowledge endowment, which positively increases their chances of survival.

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References

- Agarwal, Rajshree, Raj Echambadi, April Mitchell Franco, M. B. Sarkar. 2004. Knowledge transfer through inheritance: Spin-out generation, development, and survival. *Academy of Management Journal* **47**(4) 501–522.
- Agarwal, Rajshree, M. B. Sarkar, Raj Echambadi. 2002. The conditioning effect of time on firm survival: An industry life cycle approach. *Academy of Management Journal* **45**(5) 971–994.
- Aldrich, Howard E., Gabrielle Wiedenmayer. 1993. From traits to rates: An ecological perspective on organizational founding. *Advances in Entrepreneurship, Firm Emergence and Growth* **1** 145–195.
- Arrow, K. J. 1962. The economic implications of learning by doing. *Review of Economic Studies* **29**(80) 155–173.
- Audretsch, David B., Talat Mahmood. 1995. New firm survival: New results using a hazard function. *Review of Economics and Statistics* **77**(1) 97–103.
- Baron, James N., Michael T. Hannan. 2002. Organizational blueprints for success in high-tech start-ups: Lessons from the stanford project on emerging companies. *California Management Review* **11**(3) 8–36.

- Baum, Joel A. C., Christine Oliver. 1991. Institutional linkages and organizational mortality. *Administrative Science Quarterly* **36** 187–218.
- Brittain, Jack W., John Freeman. 1986. Entrepreneurship in the semiconductor industry.
- Brüderl, Josef, Peter Preisendörfer, Rolf Ziegler. 1992. Survival chances of newly founded business organizations. *American Sociological Review* **57**(2) 227–242.
- Brüderl, Josef, Rudolph Schüssler. 1990. Organizational mortality: The liability of newness and adolescence. *Administrative Science Quarterly* **35**(3) 530–537.
- Carroll, Glenn R. 1984. Organizational ecology. *Annual Review of Sociology* **10** 71–93.
- Cooper, Arnold C. 1985. The role of incubator organizations in the founding of growth-oriented firms. *Journal of Business Venturing* **1** 75–86.
- Cox, David R. 1972. Regression models and life tables. *Journal of the Royal Statistical Society* **B34** 187–220.
- Cox, David R., David Oakes. 1984. *Analysis of Survival Data*. Chapman & Hall, London.
- Cyert, Richard M., James G. March. 1963. *A Behavioural Theory of The Firm*. Prentice-Hall, Englewood Cliffs, N.J.
- Eriksson, Tor, Johan Moritz Kuhn. 2006. Firm spin-offs in denmark 1981-2000 - patterns of entry and exit. *International Journal of Industrial Organization* **24**(5) 1021–1040.
- Franco, April Mitchell, Darren Filson. 2005. Spin-outs: Knowledge diffusion through employee mobility. *RAND Journal of Economics* **Forthcoming**.
- Hannan, Michael T., John Freeman. 1986. Where do organizational forms come from? *Sociological Forum* **1** 50–57.
- Helfat, Constance E., Marvin B. Lieberman. 2002. The birth of capabilities: Market entry and the importance of pre-history. *Industrial and Corporate Change* **11**(4) 725–760.
- Henderson, Andrew D. 1999. Firm strategy and age dependence: A contingent view of the liabilities of newness, adolescence, and obsolescence. *Administrative Science Quarterly* **44** 281–314.
- Kirchhoff, Bruce A. 1994. *Entrepreneurship and Dynamic Capitalism*. Praeger, Westport, CT.
- Klepper, Steven. 2001. Employee startups in high tech industries. *Industrial and Corporate Change* **10** 639–674.
- Klepper, Steven. 2007. Disagreements, spinoffs, and the evolution of detroit as the capital of the u.s. automobile industry. *Management Science (forthcoming)* **53**.
- Klepper, Steven, Sally D. Sleeper. 2005. Entry by spinoffs. *Management Science* **51**(8) 1291–1306.
- Klepper, Steven, Peter Thompson. 2006. Intra-industry spinoffs.
- Nonaka, Ikujiro. 1994. A dynamic theory of organizational knowledge creation. *Organizational Science* **5**(1) 14–37.

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- Phillips, Damon J. 2002. A genealogical approach to organizational life changes: The parent-progeny transfer among silicon valley law firms, 1946-1996. *Administrative Science Quarterly* **47** 474–506.
- Roberts, Edward B. 1991. *Entrepreneurs in High Technology*. Oxford University Press, New York.
- Shane, Scott. 2000. Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science* **11** 448–469.
- Shane, Scott. 2003. *A General Theory of Entrepreneurship: The Individual-Opportunity Nexus*. Edward Elgar, Northhampton, MA.
- Sørensen, Jesper B., Damon J. Phillips. 2004. Do small firms produce better entrepreneurs?
- Stinchcombe, Arthur L. 1965. Social structure and organizations. J. G. March, ed., *Handbook of organizations*. Rand McNally, Chicago, 153–193.
- Taylor, Mark P. 1999. Survival of the fittest? an analysis of self-employment duration in britain. *Economic Journal* **109**(454) C140–C155.