
The who, why, and how of spinoffs

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Studies have consistently found that entrepreneurs who enter industries in which they have prior experience as employees perform better. We nevertheless know little about what accounts for this effect. The presumed explanation has been that experienced entrepreneurs benefit from knowledge acquired in their former jobs. But they might also differ from entrepreneurs without industry experience on a variety of other dimensions: preferential access to resources or differing motivations, for example, may account for their decisions to enter known industries instead of new ones. Combining novel data from a representative survey of entrepreneurs with the matched employer–employee database of all residents in Denmark, we examined how entrepreneurs with prior industry experience differed from those without it, and the extent to which those differences could account for the performance premium associated with prior industry experience. We found that entrepreneurs with industry experience came from younger, smaller, and more profitable parent firms, and that they recruited more experienced employees, worked harder, and placed less value on having flexible hours. The recruitment of more experienced employees and the greater effort exerted appeared to account for at least some of the performance advantage associated with prior industry experience.

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Scholars from a wide range of perspectives, from organization theory and strategy to economics and finance, have long been interested in the sources of homogeneity and heterogeneity among young firms. Within these literatures, one of the more consistent findings has been that entrepreneurs with prior experience in an industry appear

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advantaged relative to those without it. Researchers have assigned the organizations established by these experienced entrepreneurs a variety of names—spinoffs, spin-outs, spawn, and progeny—but, regardless of the label assigned, these firms have been found to survive longer (Brüderl and Preisendörfer, 1998; Phillips, 2002; Agarwal *et al.*, 2004; Dahl and Reichstein, 2007), to grow faster (Brüderl and Preisendörfer, 1998), to earn larger profits (Dahl and Sorenson, 2012), to attract more funding at higher valuations (Chatterji, 2009) and to introduce more innovative products (Agarwal *et al.*, 2004).

The assumption has generally been that these advantages emerge from the transfer of knowledge from parent firms—the prior employers of these entrepreneurs—to their progeny. Spinoff entrepreneurs, for example, may have access to valuable innovations developed at their prior employers (Bhide 1994; Anton and Yao 1995; Agarwal *et al.*, 2004). Or, they might benefit from a more general understanding of effective organizational blueprints and routines for the industry (Phillips, 2002). But the evidence in support of this mechanism remains scant. Few studies have had direct information about the transfer of knowledge. Those that have, moreover, have found that spinoffs outperform other start-ups even after controlling for their better access to technological and organizational knowledge (Phillips, 2002; Agarwal *et al.*, 2004; Chatterji, 2009), suggesting that spinoffs do not benefit *only* from this mechanism.

One possible explanation for this residual effect is that spinoffs also have preferential access to other resources: founders with experience in the industry, for example, have social connections that might help them to identify and recruit able employees to their ventures (Sorenson and Audia, 2000). Investors may also perceive prior industry experience as a positive signal, increasing the ability of the founders of spinoffs to raise capital (MacMillan *et al.*, 1985; Burton *et al.*, 2002; Chatterji, 2009). These financial resources, moreover, could have a self-confirming character if they allow firms to hire better employees, to expand more rapidly, and to survive downturns.

Another possible explanation is that spinoff entrepreneurs have different motivations for founding their firms. Many entrepreneurs open their own firms for the intrinsic rewards of doing so—being one's own boss, being able to spend more time with family and friends, feeling a sense of accomplishment (e.g., Benz and Frey 2008; Wasserman, 2012). Those who start businesses in industries in which they do not have experience have made a conscious decision to do something different. Perhaps they did not like their jobs. Perhaps they were not good at them. Regardless of the reasons underlying their choices, this self-selection may mean that spinoff entrepreneurs differ from other founders in terms of their abilities and the effort they exert.

To date, however, researchers have generally not been able to explore these mechanisms. Doing so requires not just detailed information about a set of start-ups and the employment histories of their founders but also insight into the attitudes of these founders. Though numerous industry-level data sets have been assembled, they generally have had limited information on each founder and therefore have been severely

circumscribed in their ability to illuminate the mechanisms involved. Here, we addressed these issues by combining two unusual data sets. The first is a survey of a representative sample of individuals who founded companies in Denmark in 2004 ($N=1361$), which asked a variety of questions about their motivations for starting a business and the extent to which they received assistance from their social connections. Statistics Denmark has linked this cross-sectional survey to a second, longitudinal, employer–employee database, which allowed us to establish the employment histories of these founders, to identify the employees they hired, and to assess the performance of their ventures.

We found that spinoff entrepreneurs differed from those entering industries in which they did not have experience on multiple dimensions: they had *less* managerial experience than non-spinoff entrepreneurs; they came from smaller, younger, and more profitable parent firms; they recruited fewer family members and more former colleagues to their start-ups as employees; and they placed less value on flexible hours and on some of the intrinsic rewards related to self-employment.

As in prior single-industry studies, Danish spinoff entrepreneurs, on average, enjoyed a substantial survival advantage over non-spinoff entrepreneurs. However, of the numerous differences identified, only a few correlated with the performance of their ventures: having a more experienced workforce and being willing to work harder both explained a portion of the performance differences between spinoff and non-spinoff entrepreneurs. Moreover, we found few differences across industries in either the distinguishing characteristics of spinoff entrepreneurs or the relationships between those characteristics and performance.

Our results inform the research on spinoffs in a number of ways: (i) Companies founded by those with experience in the industry enjoy performance advantages across a wide range of industries. (ii) The dominant explanation for this effect—the transfer of technological and business model innovations—can only account for a fraction of this performance differential, at best. (iii) Few spinoffs emerge from disagreements between entrepreneurs and their prior employers (cf. Klepper, 2007). (iv) Spinoff entrepreneurs recruit higher quality employees. (v) Spinoff entrepreneurs also appear to exert more effort.

1. The spinoff advantage

Numerous labels—such as spinoffs, spinouts, spawn, and progeny—have been applied to companies founded by those with prior experience in the industry. For clarity, we use the term “spinoff” consistently.¹ The criteria used to identify spinoff entrepreneurs have also varied. Some studies have included only those who had

¹Note, however, that some have also used the term “spinoff” for entrepreneurs who may not have any prior industry experience. Eriksson and Kuhn (2006) and Muendler and Rauch (2011), for example, use it to refer to teams of founders who had previously been coworkers (in any industry).

worked for an existing firm in the industry *immediately* before founding their venture (e.g., Phillips, 2002; Agarwal *et al.*, 2004). Others have included all those with experience in the industry at any prior point (e.g., Klepper, 2007; Chatterji, 2009). In some cases, any experience within the industry counted (e.g., Phillips, 2002; Chatterji, 2009); in other cases, only prior *managerial* experience in the industry qualified (e.g., Agarwal *et al.*, 2004; Klepper, 2007). Though our results remain robust to any of these definitions, being a spinoff entrepreneur in the analyses reported refers to the broadest of these possible definitions: having previously been employed, at some point between 1980 and 2003, in any capacity in another firm in the same four-digit industry as one's start-up.²

Regardless of the specific definition, a large and growing number of studies have found that spinoffs perform better than other start-ups. In one of the first studies on this topic, Phillips (2002), for example, found that Silicon Valley law firms formed by a former partner from an existing Silicon Valley law firm enjoyed 44% lower failure rates than those founded by other lawyers. Subsequent studies have found that spinoffs experience lower failure rates than other start-ups in a wide variety of industries, from automobiles (Boschma and Wenting 2007; Klepper, 2007) and disk drive manufacturing (Agarwal *et al.*, 2004) to fashion design (Wenting, 2008), and that they also appear to outperform non-spinoffs on operational measures of performance (e.g., Agarwal *et al.*, 2004; Chatterji, 2009).³

Though multi-industry studies have been scarce (for exceptions, see Dahl and Reichstein, 2007 and Dencker *et al.*, 2009), this phenomenon appears general. Figure 1, for example, provides a Kaplan–Meier plot for the failure rates, over their first 4 years of operation, for all start-ups in Denmark founded in 2004 ($N=6799$).⁴ The upper line plots the cumulative survival rate for spinoffs (with the shaded region depicting the 90% confidence interval for the estimate)—firms in which the founder had prior experience in the same four-digit industry as his or her start-up—while the lower line plots the same curve for non-spinoffs. On average, over the first 4 years of their lives, spinoffs enjoyed survival rates roughly 10 percentage points higher than non-spinoffs. This gap in survival rates between spinoffs and non-spinoffs in Denmark emerges quickly, within only a few months of founding, and persists without any obvious erosion as firms mature.

²Though our data did not allow us to track individuals before 1980, <20% of the respondents had left-censored employment histories.

³Exceptions exist. Shrader and Siegel (2007), for example, found a negative correlation between industry experience and sales growth and profitability. But their study only included firms that went public within 6 years of being founded and that survived for at least 10 years post-IPO. The research design therefore introduces a large degree of selection bias into their estimates.

⁴Though the analysis in the remainder of the article focuses on the 1361 survey respondents, this plot uses a larger set of start-ups identified using only registry data. Figure 3 (in the Appendix) provides a parallel analysis using only the survey respondents.

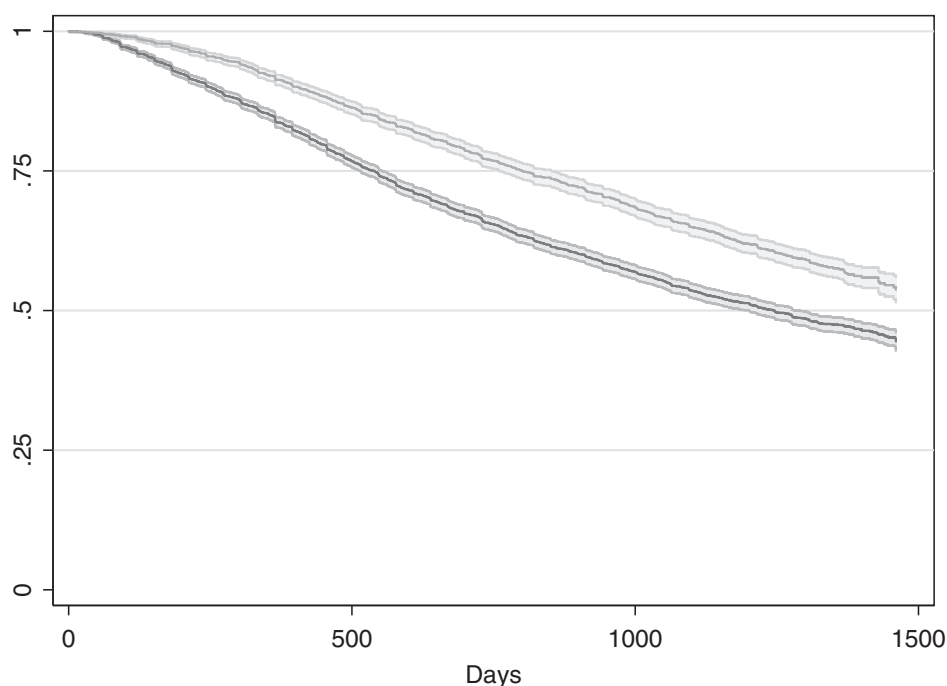


Figure 1 Kaplan–Meier survival plot for spinoffs (light) and non-spinoffs (dark).

Despite the near ubiquity of the finding that spinoff entrepreneurs outperform those entering from outside the industry, what factors underly this effect remains an open question. We see three broad classes of mechanisms that might account for it: (i) Spinoff entrepreneurs bring valuable intellectual capital to their ventures (knowledge); (ii) spinoff entrepreneurs have social capital that assists them in building successful organizations (reputation and relationships); and (iii) self-selection in who remains in an industry may mean that spinoff entrepreneurs have greater aptitude and exert more effort (motivations).

Our approach to exploring which of these factors matter most has been first to examine how spinoff entrepreneurs and their companies differ from non-spinoff entrepreneurs using information from the survey and the employer–employee database (described in detail in the Appendix). If spinoff and non-spinoff entrepreneurs do not differ on some dimension, then that factor cannot account for the superior performance of spinoff entrepreneurs (though it might have its own effects on firm performance). After isolating those dimensions on which the two types of entrepreneurs vary, we then regressed those factors on performance to explore the extent to which they might account for the spinoff advantage.

2. Knowledge

Perhaps the most commonly claimed explanation for the better performance of spinoffs has been superior access to private or tacit information relevant to the

industry. Researchers have nonetheless differed in the kinds of knowledge that they have highlighted. One group of studies, mostly from organizational scholars, has focused on managerial know-how. Phillips (2002), for example, argued that founders with prior experience in the industry have access to organizational blueprints for establishing more effective and reliable routines in their fledgling firms (cf. Feldman *et al.*, 2012). He further reasoned that these blueprints would prove most valuable when they came from larger, older, and more successful firms, as the success and stability of these parents suggest that they had more effective blueprints. Consistent with these arguments, Phillips (2002) found that law firms founded by former partners of incumbent law firms had lower exit rates than those started by attorneys without managerial experience. He also found that spinoffs from more successful and larger parents performed better.

Interestingly, others, using a similar logic, have contended that spinoff founders coming from smaller, younger firms should have an advantage. The key difference in the assumptions behind these diverging expectations has to do with the nature of the managerial problem: whereas Phillips (2002) assumes that the same blueprints should ensure success for the young and the old, the large and the small, others believe that running a start-up raises its own unique set of managerial challenges. As a result, entrepreneurs should benefit more from employment experience in small firms than in large ones (cf. Lazear, 2005). Consistent with this assumption and its implication, Sørensen and Phillips (2011), studying a cross-section of Danish start-ups, found that organizations started by entrepreneurs who had previously been employed at smaller firms both survived longer and earned more money.

A second group of studies, mostly from economists and students of strategy and focused more on high-technology industries, has emphasized technological knowledge. Agarwal *et al.* (2004), for example, argued that spinoff entrepreneurs benefit from preferential access to the product designs and production processes of their former employers. Analyzing data from the hard disk drive industry, they found that spinoffs produced drives closer to the technological frontier—with higher areal densities and more frequently using the most recent form factors—than non-spinoffs. Even among spinoffs, those whose founders had experience in parent firms closer to the cutting edge entered with more advanced products themselves. Subsequent studies have found strong associations between the technological positions of parents and their progeny in lasers (Klepper and Sleeper, 2005), medical devices (Chatterji, 2009), and electronics (Yang *et al.*, 2010).

To assess the extent to which spinoff entrepreneurs might benefit from better access to knowledge, we began by comparing their answers to those of non-spinoff entrepreneurs on three relevant questions from the survey.⁵ Entrepreneurs indicated the extent to which they considered industry experience, managerial experience, and

⁵Please note that the original survey had been implemented in Danish. The questions and answers reported in the article represent our own translations into English.

“being an expert” as important to the success of their businesses, choosing either “very important,” “important,” or “not important” as a response. The upper panel of Table 1 compares the mean responses provided by spinoff entrepreneurs versus non-spinoff entrepreneurs and the Mann–Whitney P -value for the probability that the difference between these means reflects a true difference in the underlying population means.⁶

The fourth column reports the coefficient for an ordered logit regression with the question responses as a dependent variable and the number of years of prior experience in the same four-digit industry (0 for non-spinoffs) as the only regressor. Note that the mean differences and the ordered logit coefficients do not convey the same information. Whereas the mean differences depend more on the distinction between spinoff and non-spinoff entrepreneurs, the ordered logit coefficients also reflect the extent to which those with more experience in the same industry differ from those with less. The final column reports the number of valid cases for each question or measure.

Both spinoff and non-spinoff entrepreneurs considered industry experience important. In both groups, “very important” represents the modal response. Spinoff entrepreneurs nevertheless felt more strongly about the value of industry experience and expertise. By contrast, though both groups also viewed managerial experience as important, they did not differ noticeably in their opinions. These perceptions, however, may represent an *ex post* rationalization of the choices that entrepreneurs had already made.

The lower panel of the table then compares spinoff and non-spinoff entrepreneurs on several objective measures of experience.⁷ Spinoff entrepreneurs did not differ from other entrepreneurs in terms of their overall experience ($P = 0.481$). They did, however, differ in terms of the industries in which they had experience. Of course, by definition, spinoff entrepreneurs had more industry experience: on average, spinoff entrepreneurs had roughly 6.5 years of experience in the industry before starting their ventures. Not only did they have more industry experience, but also they had more experience in related industries: an average of 2.5 years (versus 2 years for non-spinoff entrepreneurs).

Interestingly, spinoff entrepreneurs had *less* managerial experience than non-spinoff entrepreneurs. Whereas spinoff entrepreneurs had 0.46 years in the managerial ranks, on average, non-spinoff entrepreneurs had nearly 50% more (0.73 years). That is somewhat surprising given the fact that numerous accounts have highlighted

⁶The Mann–Whitney test does not require an assumption of normality. It therefore offers a more appropriate test of the difference in means between two ordinal measures than a t -test.

⁷Because the measures in the lower half of the table represent continuous counts, we used t -tests to compare the means and we regressed the (logged) number of years of industry experience (plus one) on these measures using Poisson regression. For return on assets (ROA), a continuous measure with both positive and negative values, we estimated a least squares regression coefficient.

Table 1 Bivariate associations for measures of knowledge

Variable	Mean (spinoff)	Mean (other)	Mann-Whitney P-value	Ordered logit	N (of 1361)
How important do you find industry experience to the success of your business?	2.57	2.39	0.000**	0.065 (0.014)**	1209
How important do you find managerial experience to the success of your business?	1.99	1.99	0.984	-0.010 (0.012)	1176
How important do you find being an expert or specialist a key to the success of your business?	1.96	1.81	0.001**	0.050 (0.012)	1178
Variable	Mean (spinoff)	Mean (other)	t-test (P-value)	Poisson/OLS	N (of 1361)
Work experience: years employed in any job before founding firm	14.7	15.1	0.481	0.047 (0.007)**	1361
Industry experience: years employed in the same four-digit industry before founding firm	6.47	0.00			1361
Related industry experience: years employed in the same two-digit (but different four-digit) industry	2.48	1.98	0.036*	0.064 (0.019)**	1361
Managerial experience: years employed in the senior-most ranks of their prior employers	0.46	0.73	0.037*	-0.076 (0.038)*	1361
Parent firm age: prior employer age in years	15.1	20.3	0.000**	-0.122 (0.008)**	1158
Parent firm size: average number of employees of prior employer for 5 years before founding	718	1934	0.000**	-0.719 (0.001)**	1162
Parent firm ROA: average return on assets of prior employer for 5 years before founding	0.99	0.25	0.000**	0.005 (0.002)*	1162

Source: Standard errors reported in parentheses. Significance levels: *: 5%; **: 1%.

prior managerial experience as one of the factors favoring spinoff entrepreneurs (e.g., Phillips, 2002; Dencker *et al.*, 2009).

The final three variables describe their previous employers. Spinoff entrepreneurs came from younger firms (an average of 15 years old versus 20 years for non-spin-offs), smaller firms (718 employees, on average, versus 1934 employees) and more profitable firms (in terms of return on assets).⁸ Those facts seem more consistent with the idea that start-ups pose their own managerial challenges than with the idea that proven organizational blueprints work best for all firms at all stages of maturity.

3. Reputation and relationships

Though spinoff entrepreneurs undoubtedly do accrue industry-specific human capital from their prior experience in the industry, they also acquire industry-specific social capital, in the form of a reputation and relationships. Several factors suggest that this social capital might also prove valuable, in particular, in assembling the resources for a new venture.

Investors, employees, buyers, and suppliers all face substantial uncertainty when trying to determine whether to invest in or to do business with a fledgling firm. Is the idea good? Can the entrepreneur run a firm? Will customers buy? Social capital often allows entrepreneurs to overcome this uncertainty. Would-be investors or early employees, for example, may view prior employment as a form of endorsement. Some firms have a reputation for attracting and developing high-quality employees. Having been an employee at one of them therefore suggests a certain level of acumen and promise. Burton *et al.* (2002), for example, found that entrepreneurs from firms with a reputation for producing spinoffs had a higher probability of receiving financing from venture capitalists (see also Higgins and Gulati, 2003; Chatterji, 2009). Not only might these reputations prove valuable to securing funding, but also they may convince skeptical potential employees to join fledgling firms.

In addition to their reputations, spinoff entrepreneurs may also benefit from their personal connections to others in the industry. Workplaces provide settings in which individuals meet and interact with one another. Coworkers commonly become friends. Feld (1981), for example, reported that workplaces accounted for a larger proportion of friendships in America than any other source except family.

Friends and colleagues in turn have more favorable beliefs about one another than those without such relationships. Selection means that these connections most commonly form among those who hold each other in higher regard. But psychological biases also reinforce this tendency. Mere contact generates positive affect and

⁸Gompers *et al.* (2005) reported similar results analyzing spinoffs from a sample of public firms in the United States.

therefore favorable opinions of others (Sorenson and Waguespack, 2006). Confirmation biases, meanwhile, ensure that friends often disregard information that might lead them to believe otherwise (Wason, 1968). These favorable perceptions, therefore, help to assuage potential employees' concerns about the prospects of joining friends' companies. Not surprisingly then, family, friends, and former colleagues account for a large proportion of the early employees of entrepreneurial ventures. Ruef (2010), for example, reports that they represented 95% of the members of founding teams in a representative sample of start-ups in the United States.

Of course, the hiring of family, friends, and former colleagues in general has somewhat ambiguous implications for firm performance. On the negative side, entrepreneurs' biased beliefs about these individuals may lead them to hire or promote family, friends, and former colleagues ahead of others more qualified. But, on the positive side, it allows entrepreneurs to avoid adverse selection in the labor market (Montgomery, 1991). They need not rely simply on those looking for a job. Hiring those they know may also engender trust within the organization and facilitate the establishment of organizational routines (Phillips, 2002; Timmermans, 2010, 2012). Timmermans (2012), for example, found that start-ups staffed by employees with more prior experience with one another had significantly higher survival rates than those comprised of strangers.

Spinoff entrepreneurs also have an added advantage in hiring their former coworkers. These colleagues have experience in the industry and therefore bring industry-specific human capital to the venture. Prior experience in the industry therefore gives these individuals preferential access to the pool of employees with the highest expected productivity (Sorenson and Audia, 2000).

Table 2 explores whether spinoff and non-spinoff entrepreneurs differed in their access to financial resources and in whom they hired. The upper panel, once again, reports data from the survey.⁹ Spinoff entrepreneurs did not differ markedly in their access to financial capital, either from family and friends ($P = 0.535$) or from venture capitalists ($P = 0.796$). They did, however, report substantial differences in their recruiting patterns: spinoff entrepreneurs relied less on family to staff their ventures but more on former colleagues.

The lower panel, reporting registry data, tells a similar story. Spinoff entrepreneurs did not have access to greater personal financial resources, either in terms of their own wealth ($P = 0.581$) or that of their parents ($P = 0.905$). Nor did they differ in terms of their average tenure in the region, a measure of regional embeddedness previously found to benefit firm performance (Dahl and Sorenson, 2012). But they did recruit different employees. The employees recruited by spinoff entrepreneurs had more overall work experience, more experience in the same four-digit

⁹Note that responding to the first two questions depended on having received funding and the next four questions on having hired at least one employee in the first year, hence the substantial number of "missing" cases.

Table 2 Bivariate associations for measures of resources

Variable	Mean (spinoff)	Mean (other)	Mann-Whitney P-value	Ordered logit	N (of 1361)
Did you receive a loan or investment from family, friends, or other acquaintances?	1.14	1.16	0.535	-0.876 (0.032)**	1056
Did you receive financing from venture capitalists?	1.02	1.02	0.796	-0.076 (0.085)	1017
How many of the initial employees were					
Close family?	1.20	1.29	0.030*	-0.069 (0.025)**	595
Other family?	1.03	1.06	0.096 [†]	-0.143 (0.081) [†]	578
Former colleagues?	1.41	1.23	0.000**	0.025 (0.020)	586
Other friends or acquaintances?	1.18	1.17	0.975	-0.071 (0.033)*	584
Variable	Mean (spinoff)	Mean (other)	t-test P-value	Poisson/OLS	N (of 1361)
Household wealth: net worth in Danish kroner	206,238	234,851	0.581	7338.2 (5642.7)	1361
Parent wealth: sum of parents' household net worth in Danish kroner	620,084	640,078	0.905	-436.8 (18,150)	1361
Region tenure: years living in same township as start-up before founding	4.86	4.52	0.337	0.091 (0.013)**	1361
Employee work experience: average years of experience in any industry	3.70	2.55	0.001**	0.206 (0.015)**	1361
Employee industry experience: average years of experience in same four-digit industry	1.42	0.22	0.000**	0.873 (0.031)**	1361
Employee region tenure: average years of experience in same township	1.98	1.27	0.001**	0.219 (0.021)**	1361
Common experience: average years as coworker of founder before start-up	0.47	0.30	0.052 [†]	0.294 (0.042)**	1361

Source: Standard errors reported in parentheses. Significance levels: [†]: 10%; *: 5%; **: 1%.

industry (nearly seven times as much!), more common experience as a coworker with the entrepreneur, and longer tenure living in the region. The employees that spinoff entrepreneurs hired therefore appear of higher quality.

4. Motivation

Spinoff entrepreneurs may also differ in their reasons for becoming entrepreneurs. This possibility has been a central theme in much of the descriptive and theoretical research on spinoffs. In particular, several have sought to answer the question: Why do employees spin out on their own rather than remaining with their former employers? Two motives have mainly been suggested: (i) disagreements, and (ii) expropriation.

The idea of disagreements has a long history. Garvin (1983), in his early article describing spinoffs, suggested anecdotally that many spinoff entrepreneurs appeared to have had disagreements with their former employers about the future direction of their industries or of product development. They therefore left to pursue the products and strategies that their former employers rejected. Several articles have developed this idea more rigorously in the context of formal models where these disagreements emerge either because incumbent firms face different incentives for pursuing projects (e.g., Cassiman and Ueda, 2006) or because their managers have less accurate perceptions of the value of novel ideas than would-be entrepreneurs (Klepper and Sleeper, 2005; Klepper and Thompson, 2010). These models suggest that spinoff entrepreneurs should pursue more innovative and more profitable ideas than non-spinoff entrepreneurs.

Others suggest that entrepreneurs leave their former employers to profit from the human and intellectual capital that they gained during their tenure in these firms. Anton and Yao (1995), for example, developed a model in which employees who discover potentially profitable ideas quit to pursue them on their own. Because their employers do not have enforceable property rights over the inventions, these employees stand to gain more financially from founding their own firms. From these models, one might expect money to motivate spinoff entrepreneurs more than non-spinoff entrepreneurs.

The choice problem in these literatures, however, has been “Why do employees leave their employers?” It has essentially been assumed that if they do leave their employers that they will remain in the same industry. But clearly many entrepreneurs also start businesses in other industries. Given that these entrepreneurs, too, have presumably gained valuable industry-specific expertise, this decision to shift to another industry seems a bit of a puzzle. We see at least two factors that might account for these decisions. First, non-spinoff entrepreneurs may perceive the expected returns to staying in their industries as being low. Through experience, these individuals may have discovered that they do not have the abilities or attributes required to

succeed in an industry, or that the industry itself has poor prospects. The systematic removal of poor performers from the population may therefore account for the superior performance of spinoff entrepreneurs. Studies of firm-level diversification, for example, similarly suggest that adverse selection may account for the diversification discount—firms enter new industries when the growth of their home markets slows (Villalonga, 2005).

Second, non-spinoff entrepreneurs may have decided for some (nonpecuniary) reason that they did not like their jobs. Job satisfaction depends on a bundle of extrinsic and intrinsic rewards. Individuals differ in the extent to which they value these rewards (Kalleberg, 1977). Some care about money; others may prefer a job with flexible hours, so that they can spend time with family and friends or pursuing their hobbies; still others may want a job that they find intellectually stimulating or emotionally fulfilling. Non-spinoff entrepreneurs may have discovered that something about the nature of their former job did not fit well with their preferences and therefore have decided to pursue a career in a different industry, more in line with their interests. Those choices, moreover, may lead them to start businesses with less promising financial prospects (because those businesses offer compensating rewards on other dimensions).

In assessing motivations, the survey proves critical. Though the Danish registry data can provide insight into the prior employment experience and the resource mobilization of all entrepreneurs, assessing their motivations requires information on their attitudes and motivations. Table 3 reports the responses to a variety of questions meant to assess entrepreneurs' reasons for starting their ventures.

The first nine questions asked entrepreneurs to choose either "very important," "important," or "not important" as a response (the first two questions also included a fourth category, "not relevant"). Beginning with the first question, spinoff entrepreneurs and non-spinoff entrepreneurs displayed almost no difference in the extent to which they reported disagreements with management as a reason for starting their businesses ($P = 0.909$); most, moreover, considered it unimportant to their decision to found a firm. Spinoff and non-spinoff entrepreneurs also did not appear to differ in the extent to which they cited the potential for material rewards as a motivation ($P = 0.484$), though here both groups considered it important, on average. Those responses therefore raise questions regarding the extent to which existing formal models capture the actual dynamics of entrepreneurial decisions.

Spinoff and non-spinoff entrepreneurs do nevertheless differ on other motivational dimensions. The responses to two different questions suggest that non-spinoff entrepreneurs actively choose to change industries: non-spinoff entrepreneurs reported that a spell of unemployment more commonly influenced their decision to become entrepreneurs and also indicated that they placed greater importance on having a job that fit with their skills and abilities (despite changing industries).

With respect to the importance of the nonpecuniary characteristics of their jobs, the two groups did not differ in terms of the importance of self-fulfillment. Both

Table 3 Bivariate associations for measures of motivation

Variable	Mean (spinoff)	Mean (other)	Mann-Whitney <i>P</i> -value	Ordered logit	<i>N</i> (of 1361)
How important were disagreements with colleagues or management for your decision to start a business?	1.99	1.99	0.909	-0.011 (0.013)	1166
How important was unemployment or a resignation to your decision to start a business?	1.84	2.07	0.000**	-0.037 (0.013)	1171
How important is it that your job provides a high income?	2.04	2.01	0.484	0.002 (0.013)	1323
How important is it that your job fits your skills and abilities?	2.28	2.36	0.040*	-0.027 (0.013)*	1317
How important is it that your job strengthens your skills and abilities?	2.44	2.41	0.418	-0.000 (0.012)	1338
How important is it that you find your work interesting?	2.70	2.72	0.496	-0.032 (0.013)	1345
How important is it that your work involves a variety of tasks?	2.53	2.49	0.339	0.014 (0.013)	1338
How important is it that your job allows for vacation and leisure time?	1.71	1.78	0.047*	-0.024 (0.012) [†]	1331
How important is it that your job has flexible hours?	1.89	2.00	0.006**	-0.025 (0.012)*	1314
Within the past 5 years, have you been unable to participate in family activities owing to your job?	2.62	2.43	0.001**	0.017 (0.012)	1321
Within the past 5 years, have you been unable to contribute to household chores owing to your job?	3.07	2.93	0.006**	0.015 (0.012)	1322
Within the past 5 years, has your job required you to work during vacation or holidays?	3.20	3.02	0.001**	0.012 (0.012)	1323

Source: Standard errors reported in parentheses. Significance levels: [†]: 10%; *: 5%; **: 1%.

considered it critical that they find their work interesting and that they have varied tasks.

But the two groups did differ in the extent to which they cared about work intruding on other domains of their lives. Non-spinoff entrepreneurs placed greater importance on having more flexible hours and on having jobs that would accommodate leisure and vacation time. Their self-reports of the extent to which their entrepreneurial ventures infringed on their personal lives revealed consistent patterns. On the final three questions, respondents had to indicate “regularly,” “occasionally,” “rarely,” or “never” as an answer. Spinoff entrepreneurs reported that their jobs more frequently led them to miss out on family activities and to neglect household duties and to work during holidays and vacation. Spinoff entrepreneurs therefore appear to work in less flexible jobs and/or to work harder to ensure the success of their ventures.

5. Distinguishing characteristics

Though the preceding section discussed factors that might distinguish spinoff and non-spinoff entrepreneurs, it did so one variable at a time. But many of these factors likely correlate with one another or depend on common antecedents. To isolate those factors most important to differentiating spinoff entrepreneurs from other founders, we moved to a multivariate analysis.

Table 4 introduces the various variables above into a logit model of whether or not the entrepreneur entered an industry in which he had prior experience (i.e., whether the venture qualified as a spinoff).¹⁰ We introduced these variables in three groups based on the three classes of mechanisms discussed above. Because variables that did not differ significantly in their distributions across founder types should not predict the likelihood of being a spinoff, we only included those factors that had either a significant difference in their means across the groups or a significant estimated relationship with industry experience.¹¹ In the final column, Model 4, we included only factors that had a significant coefficient in one of the first three models.

In the multivariate analysis, a number of factors with significant bivariate associations dropped out as being useful predictors of entrepreneur type. Several nevertheless remain: among the measures of knowledge, spinoff entrepreneurs had more related industry experience but less managerial experience. They also came from

¹⁰To avoid the loss of cases owing to missing responses, we set the values for “don’t know” to the means of the relevant variables for the multivariate analyses.

¹¹To ensure that the absence of a bivariate association did not depend on some suppressor relationship with a third variable, we also ran a version of Table 4 with all of the variables. None with insignificant bivariate associations had a significant coefficient at the 0.05 level.

Table 4 Logit estimates of likelihood of being a spinoff

Variable	(1)	(2)	(3)	(4)
Work experience (years)	0.003 (0.007)			
Related industry experience, two-digit (years)	0.034* (0.014)			0.037* (0.015)
Managerial experience (years)	-0.071* (0.033)			-0.054† (0.032)
Parent firm age	-0.011** (0.004)			-0.012** (0.004)
Parent firm size	-0.000** (0.000)			-0.000* (0.000)
Parent firm ROA	1.586** (0.348)			1.306** (0.357)
Did you receive a loan or investment from family, friends, or other acquaintances?		-0.061 (0.153)		
How many of the initial employees were close family?		-0.486* (0.214)		-0.340 (0.214)
How many of the initial employees were former colleagues?		0.604** (0.162)		0.612** (0.166)
How many of the initial employees were other friends or acquaintances?		0.147 (0.213)		
Region tenure (years)		0.001 (0.010)		
Employee work experience (years)		-0.045** (0.016)		-0.043** (0.014)
Employee industry experience (years)		0.453** (0.059)		0.444** (0.061)
Employee region tenure (years)		0.010 (0.025)		
Common experience (years)		0.019 (0.052)		
How important was unemployment or a resignation to your decision to start a business?			-0.269** (0.070)	-0.221** (0.073)
How important is it that your job fits your skills and abilities?			-0.218* (0.098)	-0.244* (0.104)
How important is it that your job allows for vacation and leisure time?			-0.009 (0.094)	
How important is it that your job has flexible hours?			-0.161† (0.094)	
Within the past 5 years, have you been unable to participate in family activities owing to your job?			0.111 (0.073)	
Within the past 5 years, have you been unable to contribute to household chores owing to your job?			0.059 (0.083)	
Within the past 5 years, has your job required you to work during vacation or holidays?			0.133† (0.075)	0.157* (0.070)
Constant	-0.593** (0.119)	-1.093** (0.412)	-0.168 (0.427)	-0.531 (0.481)
Pseudo R ²	0.04	0.08	0.02	0.12
Log-likelihood	-842	-807	-853	-773
Observations	1361	1361	1361	1361

Source: Standard errors reported in parentheses. Significance levels: †: 10%; *: 5%; **: 1%.

smaller, younger, and more profitable firms. With respect to access to resources, all of the measures of financial resources became insignificant, controlling for other factors. Spinoff entrepreneurs, however, still recruited more heavily from their former colleagues, therefore also hiring employees with more experience in the industry (though with less experience in other industries). Interestingly, these recruiting differences had the strongest predictive power in distinguishing spinoff from non-spinoff entrepreneurs.

Three motivational factors also continued to distinguish spinoff entrepreneurs from others: a spell of unemployment less frequently influenced spinoff entrepreneurs' decisions to become entrepreneurs; spinoff entrepreneurs placed *less* importance on having a job that fit their abilities and attributes; and spinoff entrepreneurs more frequently reported working on holidays and vacations.

Though our discussion and analysis has treated all entrepreneurs as though they behave uniformly, the reasons that entrepreneurs remain within an industry instead of moving to a new one might vary across industries. For example, those interested in a "lifestyle" business might gravitate toward retail. Although the size of the survey sample does not allow us to slice it too thinly, we explored whether the characteristics distinguishing spinoff and non-spinoff entrepreneurs differed by industry entered in two ways. First, we categorized industries into three broad groups: traditional manufacturing (271 firms), modern manufacturing (111 firms; essentially high tech), and services (979 firms) and interacted these categories with each of the variables in the final model (using services as the baseline category). None of these interactions met the $P < 0.05$ level.

Second, we calculated the growth rate of each four-digit industry (across all firms in Denmark) and used that growth rate to split the sample into terciles: declining, stable, and growing industries. We again interacted these categories with each of the variables in the final model (using stable industries as the baseline). Only one interaction proved significant: among those entering growing industries, the extent to which a spell of unemployment influenced their decision to become an entrepreneur did not differ between spinoff and non-spinoff entrepreneurs.

6. Performance

Even if spinoff and non-spinoff entrepreneurs differ, those differences do not help to explain the performance advantage enjoyed by spinoffs unless those factors also contribute in some way to firm performance. We therefore explicitly investigated the extent to which these various factors might account for the spinoff advantage.

We began exploring the performance implications by analyzing the functional form of the relationship between survival and years of industry experience using a flexible nonparametric specification. We regressed the exit rate for start-ups on a vector of indicator variables for each possible number of years of prior experience in

the four-digit industry (0 for non-spinoffs). Figure 2 displays the estimated coefficient for each indicator, as well as its 95% confidence interval.

This analysis has two purposes. First, it gives us some insight into whether selection or maturation processes contribute more strongly to the spinoff advantage. If selection processes dominate, then one would expect a step function—a relatively constant difference regardless of time in the industry. If, on the other hand, maturation processes—such as the accrual of human or social capital—prove paramount then one would expect the differential to grow with experience. From the figure, it appears that the advantage of spinoffs rises with the industry experience of their founders, consistent with maturation processes (if anything, selection actually seems somewhat negative, with spinoffs with only one year of industry experience doing worse than non-spinoffs).

The second purpose is to establish the appropriate functional form for including industry experience with other measures in the analysis of firm performance. The individual coefficient estimates increase in magnitude but at a decreasing rate. In fact, the piecewise coefficients do not differ significantly from the predictions produced by the logged number of years (plus one to avoid logging zero). We therefore simplified the specification to logged years of industry experience.

Table 5 examines firm performance in a multivariate context. The first column includes only the founder's logged years of prior industry experience. Prior experience has a significant and large effect on exit rates; a doubling in industry experience decreases the failure rates of firms by 17.6%. Because the average spinoff entrepreneur has more than 6 years of experience in the industry, he enjoys $\sim 38\%$ ($= 1 - e^{-0.235 \times \ln(6.47+1)}$) lower failure rates than the average non-spinoff entrepreneur.

Models 6 through 9 then enter those factors that distinguished spinoff entrepreneurs from non-spinoff founders. Several appear unrelated to start-up performance. Somewhat surprisingly, prior managerial experience does not have a significant relationship with survival rates. Parent firm size and profitability also have weak relationships, at best, to the performance of their progeny. Most of the differences in recruiting patterns also appear to have little effect on start-up performance.

In total, only 5 of the 11 variables distinguishing spinoff and non-spinoff entrepreneurs had significant partial correlations with start-up survival. Founder experience in related industries reduced the failure rates of their ventures. Because spinoff entrepreneurs more commonly had experience in related industries as well, this effect accounted for a portion of the spinoff advantage. Entrepreneurs who had previously worked in *older* firms also had lower failure rates. That is somewhat surprising because previous research had found entrepreneurs coming from smaller (and presumably younger) firms to have lower failure rates (Sørensen and Phillips, 2011). It also means that estimates of the performance advantages associated with spinoffs may underestimate those benefits because spinoff entrepreneurs, on average, come from younger organizations (a disadvantage).

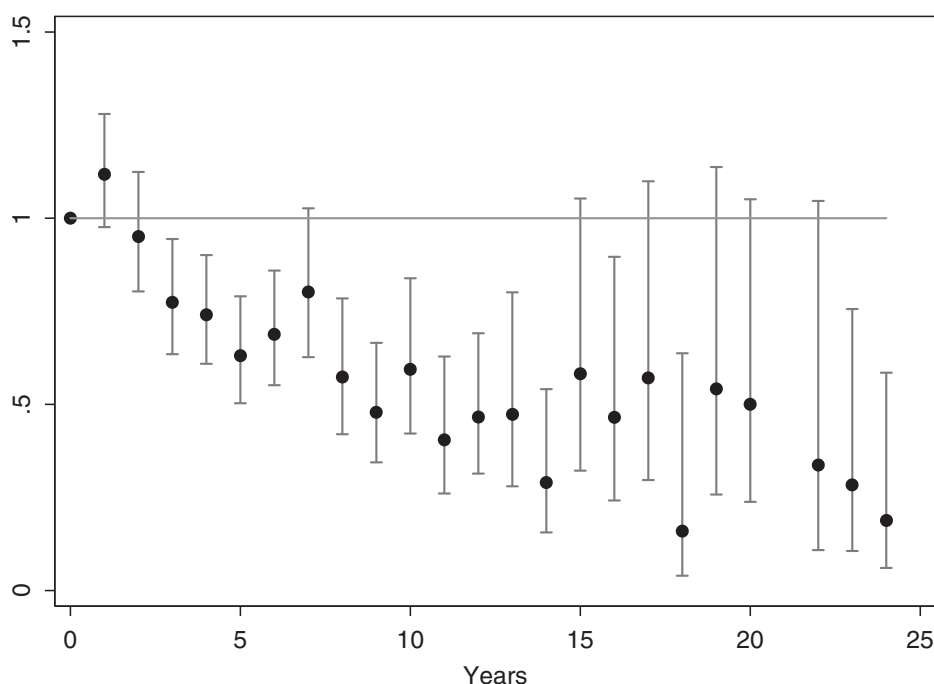


Figure 2 Multiplier rate of exit by years of industry experience.

Having employees with more work experience overall also had a positive relationship with firm performance. But again, surprisingly, it did not matter in what industry employees had gained their experience: experience in the same industry had no more value than experience in other industries.

Finally, entrepreneurs' motives for starting their own businesses also predicted firm performance. Those who became entrepreneurs because they had experienced a spell of unemployment had ventures with higher failure rates. Lesser abilities may account for both their earlier loss of a job and the later failure of their firms. Because non-spinoff entrepreneurs more frequently experienced these spells of unemployment before starting their firms, selection on abilities therefore may account for some of the spinoff advantage.

Entrepreneurs willing to work on holidays and vacations also had lower failure rates. That is not surprising. One would generally expect a positive relationship between effort and performance. But again, because spinoff entrepreneurs reported forgoing these leisure days more frequently, this too may account for part of the positive performance associated with prior experience in the industry.

Together, these factors appeared to account for roughly one-third of the spinoff advantage, as the coefficient for industry experience declines substantially after controlling for these factors. But founder industry experience continued to have a direct positive relationship on the performance of their firms. Why? One possibility is that the factors explored do completely mediate the relationship between industry experience and performance but that measurement error prevents us from adequately

Table 5 Piecewise exponential estimates of start-up exit rates

Variable	(5)	(6)	(7)	(8)	(9)
Industry experience, four-digit (years, logged)	-0.235** (0.051)	-0.204** (0.053)	-0.187** (0.053)	-0.195** (0.051)	-0.145** (0.052)
Related industry experience, two-digit (years, logged)		-0.127* (0.051)			-0.108* (0.052)
Managerial experience (years, logged)		-0.077 (0.078)			
Parent firm age (logged)		-0.144** (0.040)			-0.115** (0.040)
Parent firm size (logged)		0.032 [†] (0.019)			0.021 (0.019)
Parent firm ROA		0.049 [†] (0.029)			0.039 (0.029)
How many of the initial employees were close family?			0.189 (0.144)		
How many of the initial employees were former colleagues?			0.033 (0.128)		
Employees work experience (years, logged)			-0.258** (0.058)		-0.236** (0.048)
Employees industry experience (years, logged)			-0.077 (0.127)		
How important was unemployment or a resignation to your decision to start a business?				0.182** (0.047)	0.144** (0.046)
How important is it that your work fits your skills and abilities?				-0.020 (0.072)	
Within the past 5 years, has your job required you to work during vacation or holidays?				-0.288** (0.044)	-0.275** (0.044)
Age dummies	Yes	Yes	Yes	Yes	Yes
Log-likelihood	-1396	-1382	-1376	-1368	-1344
Firms	1361	1361	1361	1361	1361

Source: Standard errors reported in parentheses. Significance levels: [†]: 10%; *: 5%; **: 1%.

controlling for them (Judd and Kenny, 1981). Another is that we have omitted some important mechanism captured by the residual differential. A third (likely) possibility is that industry-specific organizational and technological knowledge accounts for much of this effect.

We also explored heterogeneity in these effects across industries. Even if similar factors distinguish spinoff entrepreneurs across industries, they may nonetheless differ in their implications for performance. We again split the start-ups into three sectors—traditional manufacturing, modern manufacturing, and services—but again observed no significant differences across these sectors. We also tried grouping the start-ups again by the growth rates of their industries. Here, some interactions emerged (see Table 6), at least one of which seemed interesting. The residual effect of experience discussed above stems almost entirely from its effect in growing industries. Another possible explanation then is that industry-specific knowledge benefits spinoffs most at the earlier stages of industry evolution, before important innovations become diffused throughout the population.

7. Discussion

Drawing on data from Denmark, we found that spinoff entrepreneurs differed from those without industry experience in numerous ways. They had less managerial experience but more experience both in the industry they entered and in related ones. Spinoff entrepreneurs had previously been employed in smaller, younger, and more profitable firms. When starting their businesses, they recruited as employees fewer from their family and more who had previously been coworkers. Spinoff entrepreneurs also appeared to work harder and to care less about having a job with flexible hours. They also less likely entered entrepreneurship from a spell of unemployment.

Only a few of these differences, however, appeared to contribute to the better performance of spinoffs. Notably, the recruitment of more experienced employees, having not had a prior spell of unemployment, and exerting greater effort each accounted for a portion of the performance benefits associated with prior experience in the industry. But, even after accounting for these differences, spinoffs still outperformed non-spinoffs.

Though our results could not isolate one particular mechanism that accounted for the outperformance of spinoffs, they do usefully inform the debates surrounding spinoffs. For example, one prominent claim has been that spinoffs originate from employees who have had disputes with management over the strategic directions of their companies. When they cannot convince management to adopt their visions, they pursue them on their own (e.g., Klepper, 2007; Klepper and Thompson, 2010). Though anecdotal accounts suggest that this scenario does occur occasionally, entrepreneurs rarely reported disagreements as being an important factor in their

Table 6 Piecewise exponential estimates of start-up exit rates

Industry	(10) Declining	(11) Stable	(12) Growing
Industry experience, four-digit (years, logged)	-0.116 (0.078)	-0.054 (0.092)	-0.407** (0.127)
Related industry experience, two-digit (years, logged)	-0.047 (0.079)	-0.034 (0.099)	-0.119 (0.130)
Parent firm age (logged)	-0.085 (0.059)	-0.098 (0.085)	-0.096 (0.087)
Parent firm size (logged)	0.001 (0.029)	0.005 (0.039)	0.045 (0.038)
Parent firm ROA	0.027 (0.041)	0.056 (0.059)	0.004 (0.064)
Employees work experience (years, logged)	-0.212* (0.086)	-0.340** (0.098)	-0.170* (0.082)
How important was unemployment or a resignation to your decision to start a business?	0.205** (0.064)	0.074 (0.103)	-0.057 (0.114)
Within the past 5 years, has your job required you to work during vacation or holidays?	-0.288** (0.064)	-0.242* (0.097)	-0.209* (0.095)
Age dummies	Yes	Yes	Yes
Log-likelihood	-621	-322	-280
Observations	583	365	300

Source: Standard errors reported in parentheses. Significance levels: *: 5%; **: 1%.

decisions to start their firms, and spinoff entrepreneurs appeared no more likely to have reported disagreements as a motive.

Another claim has appeared in the literature on agglomeration, where spinoffs have been seen as an important source of within-region spillovers, as employees leave the largest and most profitable firms to establish their own companies (Klepper, 2007; Greenstone *et al.*, 2010). Klepper (2007), for example, argues that this process accounted for the rise of Detroit as the center of the automobile industry. However, we found little to support this idea. Human capital clearly matters. Survival rates increased with both industry experience and related industry experience. But the value of this industry experience did not depend on its source. Spinoffs may still contribute to agglomeration, but the reason probably stems more from the simple fact that having previously been employed in the industry means that these entrepreneurs live in close proximity to incumbents and therefore they generally locate their companies near to them (Sorenson and Audia, 2000; Dahl and Sorenson, 2009).

By contrast, our results suggest at least two fruitful avenues for future research. First, who start-ups hire and how those hires influence their performance deserves much more attention. Spinoff entrepreneurs recruited employees of higher apparent quality, which appeared to contribute to their performance advantage. Does this recruiting effect represent a return on industry-specific social capital, awareness of who one would want to hire and the ability to convince them to join the venture? Or do spinoff entrepreneurs simply have better ideas or other attributes that attract more able employees? Though both practitioners and academics would generally agree that the success of start-ups depends in large part on the quality of its early employees, relatively little systematic research has been done on this issue (for important exceptions, see Ruef *et al.*, 2003; Ruef, 2010; Timmermans, 2010).

Second, researchers need to know more about why individuals become entrepreneurs and why they choose the industries they enter. We found substantial evidence of (self-) selection effects. Those entering industries in which they had prior experience appear to work harder and to have interests and abilities that fit better with the demands of those industries. These differences, moreover, appear to matter to start-up performance. With few exceptions (e.g., Nanda and Sørensen, 2010; Dahl and Sorenson, 2012; Kulchina, 2012), however, studies of entrepreneurs have paid little attention to the extent to which who becomes an entrepreneur and the industries and locations they choose depends on differences in the people and the social context of those involved.

In concluding, however, we would note that overall the attitudinal measures revealed fewer differences and contributed far less to understanding the performance of start-ups than the measures derived from the archival data. That bodes well for the future of using registry data to continue to push forward research on entrepreneurship.

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Appendix

Our study draws on a data set created by connecting a representative cross-sectional survey of 1446 first-time entrepreneurs in Denmark to longitudinal Danish census data—in particular, the matched employee–employer database known by its Danish acronym, IDA. The survey provides insight into the motivations and start-up activities of entrepreneurs, while the census data allow us to track entrepreneurs (and their employees) for 23 years before entering into entrepreneurship and for 4 years following the establishment of their firms.

The survey comprised questions relevant to entrepreneurship from a number of well-established instruments, including the European Values Study, the General Enterprising Tendency Test (GET2), the General Social Survey, and the survey on Factors of Business Success (FOBS). It also included additional questions on the extent to which entrepreneurs relied on social relationships for support in their start-ups. Dahl *et al.* (2009) provide a complete description of the sampling, the survey design and questions, and the responses received (Appendix G includes a copy of the complete survey instrument).

Statistics Denmark mailed the survey in the spring of 2008, collected and coded the responses, and linked the survey data to the IDA. It derived the sample on the basis of information from IDA. The sampling frame included all people living in Denmark of working age (15–66 years in 2004). The primary group for the survey, entrepreneurs, comprised only those who had started a business in 2004 ($N = 6799$). Restricting this set to those who had never previously founded a firm reduced the number eligible to 4586. Statistics Denmark sent surveys to this entire population of first-time entrepreneurs and received 1446 completed questionnaires (a 31.5% response rate). Statistics Denmark also sent surveys to a second group, a matched random sample of nonentrepreneurs. Note, however, that our analyses do not use any of the respondents from this comparison set.

Because the original sample had been selected from the IDA data, Statistics Denmark had extensive information on those who did not respond. Nielsen (2011) analyzed and documented the differences between respondents and non-respondents in detail. His comparisons revealed that female, older, married, native Danish, higher earning, more wealthy, and more educated individuals responded at significantly higher rates. However, these groups differed little in terms of absolute differences in response rates. The large sample size simply meant that he had substantial statistical power for precisely identifying even small differences.

Figure 3 depicts the hazard rates for the firms started by the spinoff and non-spinoff survey respondents. Though the pattern here appears consistent with that observed in the population as a whole (see Figure 1), it differs in two ways from the entire 2004 population of entrepreneurs. First, the sample of respondents, both the spinoffs and the non-spinoffs, had higher survival rates, on average. Second, in

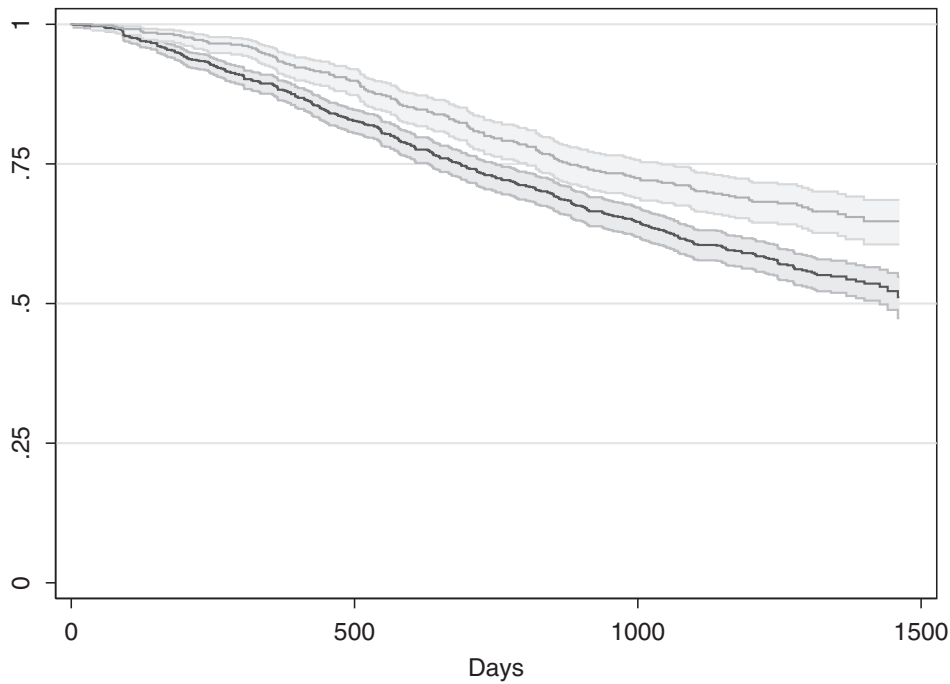


Figure 3 Kaplan–Meier survival plot for spinoffs (light) and non-spinoffs (dark) among survey respondents.

the sample of respondents, spinoff and non-spinoff entrepreneurs differed somewhat less in their performance than in the population as a whole. Given these facts, our findings probably understate the differences between spinoff and non-spinoff entrepreneurs.