



Financial munificence, R&D intensity, and new venture survival: critical roles of CEO attributes

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Abstract Although financial resources are critical to new ventures, is having more of them always a good thing? Intrigued by industry observations and building on behavioral research into the limitations of munificent resources, we argue that financial munificence can have a negative moderating effect on the impact of R&D investment on venture survival. We further propose that three CEO attributes (i.e., work experience, education, and gender) can mitigate this negative moderating effect. Analyses of a six-year longitudinal dataset of 791 new technology ventures provide strong support for our hypotheses. We contribute to the behavioral research on how resource munificence matters for new ventures by examining the indirect downside of financial munificence and demonstrating how certain CEO attributes can mitigate this effect.

Plain English Summary While capital is essential for new ventures to innovate and survive, is having more of it always good? Our research shows “No” because more money may “spoil the child” by

reducing the benefits that new ventures enjoy from R&D investment. We analyzed 791 new technology ventures across six years and found evidence of a side effect of munificent financial resources, such that when ventures have high levels of financial munificence, they garner fewer survival benefits from increasing R&D. This side effect is weakened when ventures have CEOs who are more experienced, highly educated, or female. These findings extend previous research on the limitations of financial munificence by showing its negative moderating effect on the R&D–survival relationship. For entrepreneurs and venture capitalists in the industry, we advise caution regarding the role of abundant financial resources in new ventures.

Keywords Financial munificence · R&D intensity · New venture survival · Behavioral theory of the firm · CEO attributes

JEL classification D21 · L26 · M13 · O3

Adversity reveals genius; fortune conceals it.

Horace, ancient Roman poet (65–8 BC).

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1 Introduction

Financial munificence is defined as the degree to which firms are relatively abundant in or less

constrained by financial resources (Amezcuca et al., 2013; Cunha et al., 2014). While financial resources are critical for new ventures, it is not clear from industry observations whether they always benefit new venture innovation activities and survival. For example, in the United States, six million new ventures are established each year. Although they account for only 8% of total sales, new ventures spend more than 12% of national R&D and employ more than 23% of all employees in R&D.¹ In spite of such large proportions of financial and human capital investment, only 50% of new ventures survive to a fifth year of operations.² Anecdotal observations also show that even with large influxes of capital, new ventures tend to fail rapidly due to inappropriate decision-making on the part of entrepreneurs.³ Such observations have raised concerns about whether new ventures spend well when they have a great deal to spend. Because R&D investment is associated with high risk and outcome uncertainty, especially in new ventures, does more money have a side effect of “spoiling the child”?

There also exists a rich theoretical discussion on the potential side effect of financial munificence in academia. Traditional resource-based view suggests that new ventures’ performance and survival heavily rely on the resources they possess, including financial resources (Geroski et al., 2010; Hechavarría et al., 2016), human resources (Unger et al., 2011), and network resources (Amezcuca et al., 2013). More resources can support new ventures by providing strategic options and also reducing the pressure of volatile performance outcomes and external shocks (De Carolis et al., 2009). However, the behavioral theory of the firm argues that munificent financial resources, otherwise known as slack, have two-sided effects on performance, such that munificence may provide for more exploration and experimentation that benefits performance but may also reduce managers’ motivation to be prudent and induce biased optimism which can harm performance (George, 2005; Tan & Peng, 2012; Pierce & Aguinis, 2013; Vanacker et al., 2017). Research on resource constraints also shows that, in contrast to resource munificence, resource constraint

may actually encourage experimentation, improve efficiency, and drive innovation and search activities by making firms combine available resources for new purposes, especially for those in early stages of development (Baker & Nelson, 2005; Mosakowski, 2017).

Existing studies that have examined the potential impact of slack have utilized different approaches. First, some researchers posit that different types of slack and different combinations of slack affect performance (George, 2005; Paeleman & Vanacker, 2015; Tabesh et al., 2019). Second, by examining curvilinear relationships, other researchers have studied how different amounts of slack exert differing effects on firm performance (George, 2005; Vanacker et al., 2017; Modi & Mishra, 2011). Third, a rich body of work focuses on identifying contingencies such as environmental factors (Bradley et al., 2011; Vanacker et al., 2017) and firm characteristics (George, 2005; Kim et al., 2008; Vanacker et al., 2013) for variations in the effect of slack resources.

Extending previous behavioral works that examine the performance implications of resource munificence (George, 2005; Pierce & Aguinis, 2013; Vanacker et al., 2017), we look closer into its implications at the strategy–performance interface. Specifically, we examine how financial munificence moderates the effect of R&D on new venture survival. We aim to explore the side effect of financial munificence by raising two research questions: (a) apart from the direct effect, can financial munificence influence a firm’s strategy–performance relationship? More specifically, would financial munificence hurt the effectiveness of new venture R&D in enhancing survival? And (b) what are the roles of managerial characteristics in causing or addressing such side effects? We choose to study venture survival as the performance indicator instead of traditional measures, such as growth or profit, because new ventures face a high possibility of failure and their R&D investments are highly risky such that they may not generate short-term returns in the way of sales or profit (Cuervo-Cazurra & Annique, 2010). For new technology ventures, good short-term returns do not always equal technical success and do not necessarily ensure survival (Gimeno et al., 1997). By comparison, survival is a better indicator of whether the R&D investment of a venture has led to a valuable outcome.

To address these two research questions, we first examine how financial munificence moderates the

¹ <https://www.nsf.gov/statistics/2017/nsf17320/>

² <https://www.bls.gov/bdm/entrepreneurship/entrepreneurship.htm>

³ <http://www.businessinsider.com/facebook-and-foursquare-former-execs-explain-startup-mistakes-2018-4>

relationship between new venture R&D and survival. And then as further support that the side effect relates to potential influences from decision-makers in new ventures, we posit that certain CEO attributes, such as work experience, education, and gender, may attenuate the efficiency-reducing effect of financial munificence. The analysis of a six-year longitudinal dataset on technology new ventures provides strong support for our propositions. We found that new technology ventures' financial munificence negatively moderates the relationship between R&D intensity and survival and that such negative influence is weakened when venture CEOs have more same-industry work experience and higher educational attainment and when they are female. Our research contributes to the body of behavioral works on how resource munificence matters for new ventures by examining the indirect influence of financial munificence on the effectiveness of venture R&D. Moreover, in addressing this side effect, we demonstrate how certain CEO attributes can indirectly benefit new ventures when dealing with the downsides of financial munificence.

2 Theoretical background

2.1 Financial munificence and behavioral theory of the firm for new ventures

Entrepreneurship research has long recognized the importance of resources for new venture survival and growth (Alvarez & Busenitz, 2001). New ventures are more likely to be pressured by resource limitations than mature firms because they differ from more established organizations in substantial ways. Compared to mature firms, new ventures face greater threats of failure because (1) commonly born resource constraints limit their scope of strategic actions; (2) the process of defining new roles and forming effective routines is both time- and resource-consuming; (3) knowledge and experience constraints induce risk and uncertainty that may be costly when ventures develop new products and compete with market rivals; (4) new-to-market players lack legitimacy and stable social links that are crucial for gaining external resources and building relationships (Bruderl & Schussler, 1990; Mata & Portugal, 2002; Morse et al., 2007). Having more resources can help new ventures address these challenges and survive

market competition. Empirical evidence also points to the positive effects of resources on new venture survival and performance (Geroski et al., 2010; Kor & Misangyi, 2008; Packalen, 2007).

However, resource munificence has its limitations. Research built on the behavioral theory of the firm (BTOF) provides a new perspective that reveals potential downsides of having abundant resources. Based on the assumption of bounded rationality, BTOF centers on the internal decision-making of organizations (Cyert & March, 1963). Its key tenet is that managers make strategic decisions based on evaluations of the firm's performance and resource conditions. When firms' performance falls below certain aspiration levels, which are determined by internal comparisons with historical performance or external comparisons with peers and competitors, and they have munificent or slack resources, they become risk-takers and make additional investments that may not be goal-oriented and problem-driven (Cyert & March, 1963; Damanpour, 1991).

When firms have munificent or slack resources, two potential issues emerge: increased risk and reduced motivation. Studies have shown that when firms have high levels of financial resources, they are susceptible to potentially biased risk perceptions and reduced motivation for experimentation and resource utilization (Bradley et al., 2011; George, 2005; Kim et al., 2008). For example, George (2005) found that as financial resources increase, managers become more susceptible to decision-making biases and tend to become overly confident in the accuracy of their market predictions, viability of their operations, and success rates of risky projects, which can hurt performance. Bradley et al. (2011) showed that abundant financial resources reduce the entrepreneurial orientation of mature firms and discourage them from engaging in entrepreneurial activities, which in turn impair long-term growth.

The rationale for this side effect of financial resources is that high levels of resource munificence can cause biases in managers' evaluations and perceptions of their status quo, which influence their motivations and risk preferences, and such effects are passed on to their organization outcomes via the decisions they make. We argue that such problems may be more pronounced in new ventures for two reasons. First, entrepreneurs are more prone to the potential side effects of resources because their decisions are more

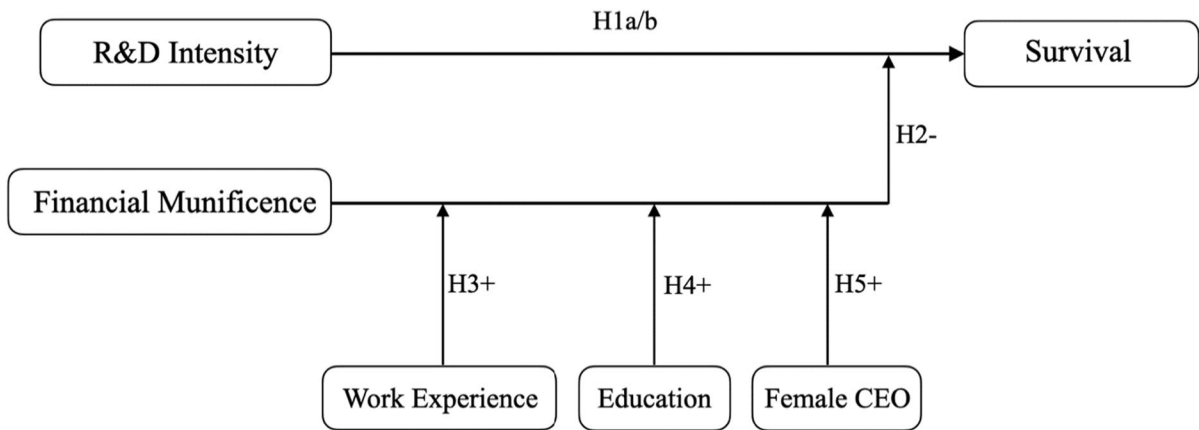


Fig. 1 Conceptual model

susceptible to heuristics and cognitive biases. Studies on entrepreneurial decision-making have shown that because entrepreneurs often face high uncertainty, time pressures, and emotional charges, their decisions are more likely to be influenced by cognitive biases (Shepherd et al., 2015).

Second, compared to top managers in mature firms, CEOs in new ventures have stronger control and influence over firm strategies. In other words, new ventures are more strongly influenced by CEOs' decision-making (Garg & Eisenhardt, 2017). Research on the upper echelons shows that the degree of influence top managers have on firm strategies depends on three factors: managerial discretion, job demand, and structural interdependence. Managerial discretion gives managers latitude for action: the greater the discretion a manager has, the more control over firm resources and strategy s/he wields (Hambrick & Finkelstein, 1987). Job demand refers to the degree of difficulty and challenge associated with the position. Differences in the resource environment, internal facilities, and executive aspirations affect job demand among top managers (Ganster, 2005; Hambrick et al., 2005; Nadkarni & Chen, 2014). Structural interdependence is the degree to which individuals within an organization affect each other vis-a-vis structured relationships. The greater the interdependence, the stronger the influence of upper echelons (Hambrick et al., 2015).

In new ventures, these three factors are more pronounced and managerial discretion is stronger because new venture CEOs typically have more

control over firm resources and strategy compared to CEOs of mature firms, which have larger management teams and boards and more complex organizational hierarchies (Garg & Eisenhardt, 2017). Also, job demand on new venture CEOs is greater because they are engaged in multiple operational facets and deal with serious survival challenges (Hambrick et al., 2005; Stewart et al., 1999). Moreover, as new ventures are typically small in size and have relatively simple team structures, new venture CEOs are more structurally interdependent because they communicate, interact, and cooperate with other top managers more frequently compared to those in mature firms with multi-level and multi-departmental structures (Klotz et al., 2014). Therefore, it is important to consider the role of CEOs when we examine the impact of new venture strategies.

In summary, while empirical studies have begun to show that financial munificence has certain side effects on firm performance, little has been explored on the indirect influence of financial munificence on firm strategy effectiveness. Because entrepreneurs in new ventures are more prone to biases and their decisions have stronger effect on venture outcomes, we argue for the existence of such indirect effects in new ventures and posit that higher financial munificence may impugn the impact of their R&D activities on survival. Accordingly, we examine how financial munificence affects the R&D–survival relationship for new technology ventures and further explore the role of CEO attributes in this relationship. Figure 1 depicts our conceptual model.

2.2 Financial munificence, R&D intensity, and new venture survival

To compete with market incumbents, new technology ventures rely on innovative products, services, or strategies to keep up with consumer preferences and gain market share (Chen et al., 2010; Katila et al., 2012). As the major form of innovation investment, R&D is pivotal to building technological knowledge and capacity and for developing new products and services. While innovative outcomes such as patents, new-to-market products, or services can be valuable for new ventures to achieve competitive advantage, investment in R&D may not always be rewarding because the development, application, and marketization of new technologies involves high levels of risk and uncertainty (Cuervo-Cazurra & Anniq, 2010). Moreover, for new ventures, R&D is especially risky as these enterprises normally lack the resources to spread risk by diversifying R&D projects as large firms do and very often focus on one or very few projects. This exposes them to more volatile outcomes (Ortega-Argilés et al., 2009). Existing literature also shows mixed findings on the relationships between R&D and new venture growth, performance, and chance of survival (Capasso et al., 2015; Esteve-Pérez & Mañez-Castillejo, 2008; Falk 2012; Ortega-Argilés et al., 2009; Stam & Wennberg, 2009). Therefore, the relationship between new technology ventures' R&D and survival is not theoretically determined but rather contingent on important factors that require further exploration. As such, we offer the following two competing predictions:

Hypothesis 1a: R&D intensity has a positive effect on new venture survival.

Hypothesis 1b: R&D intensity has a negative effect on new venture survival.

2.3 The moderating effect of financial munificence

We predict that financial munificence negatively moderates the impact of R&D on new venture survival such that it weakens the positive impact and strengthens the negative effect of R&D. First, financial munificence provides new ventures with high investment capacity, which may cause them to explore opportunities in distant, uncertain, and possibly unnecessarily risky domains, reducing the benefit of R&D to survival. Compared to CEOs in mature businesses, new venture

CEOs have greater control over strategic actions and resource allocation (Hambrick, 2007). However, these CEOs are sometimes over-optimistic about their options and tend to over-estimate the expected outcomes of their investment and rates of success for new projects (Cassar, 2010). As a result, when new ventures' financial munificence is high, entrepreneurs may overestimate potential R&D investment returns. As a result, their investments may be more aggressive, uncertain, and potentially profitless, and have the effect of reducing the benefit of R&D on survival (Ahuja & Novelli, 2017). By comparison, when new ventures have low financial munificence, CEOs are compelled to allocate their R&D investments toward more related and market-driven domains which contribute more to venture survival (Andries et al., 2013).

Second, high financial munificence reduces motivation for cost-saving and resource efficiency and leads to two consequences that may limit the effectiveness of R&D: (1) reduced motivation to save results in unnecessary wastes of time and money during R&D processes, which reduces investment efficiency; (2) while cost-saving efforts can lead to learning benefits re the creative use, reuse, and recombination of resources at hand (Baker & Nelson, 2005), such benefits fade if the new venture has low motivation for cost-saving. To fully utilize R&D investments, new ventures should proactively learn new knowledge through the process of searching, combining, and utilizing various resources (Alvarez & Busenitz, 2001; Senyard et al., 2014). However, when financial resources are munificent, stretching every coin becomes less urgent and new ventures become less efficiency-oriented, thereby undermining resourcing efforts (Bradley et al., 2011; Manzanque et al., 2020). As a result, with high financial munificence, new ventures' R&D costs may increase while resultant learning benefits may diminish, thus inhibiting the impact of R&D on survival. Therefore, we predict:

Hypothesis 2: Financial munificence negatively moderates the effect of R&D intensity on new venture survival.

2.4 The important role of CEO attributes

To verify that our hypothesized side effect of financial munificence relates to top decision-makers in

new ventures, we further examined whether such side effects change based on variations in decision-makers' attributes. Upper echelons theory proposes that firms' strategic choices are reflections of top managers' values, psychological traits, and personalities, and how they perceive the environment, characteristics that are oftentimes non-observable, so scholars have extensively used executive demographics to serve as valid proxies for their cognition and perceptions (Hambrick, 2007; Hambrick & Mason, 1984). Based on origin of influences, executive demographics can be categorized as work-specific, general, and physiological attributes (Smith et al., 2005; Taylor & Greve, 2006; Ucbasaran et al., 2008). Accordingly, we chose one representative attribute from each category, i.e., CEOs' work experience, education, and gender, and examined how these attributes interact with the side effects of financial munificence.

We predict that the side effect of financial munificence is reduced for ventures whose CEOs have more work experience because they are less susceptible to such types of negative influence. First, prior work experience provides CEOs with knowledge of industry best practices, market preferences, and technology development, and plays a key role in the process of high-quality opportunity recognition (Grégoire et al., 2010). Experience also contributes to the forming of better entrepreneurial judgements, which is important in guiding strategic decisions and venture operations (Uygur & Kim, 2016). Therefore, as new venture CEOs are exposed to higher risk and uncertainty when they make R&D decisions with munificent resources, more work experience can improve the quality of their judgements and optimize their opportunity identification acumen, mitigating the risk of making distant and profitless investments (Cornelissen & Clarke, 2010).

Second, work experience also attenuates the reduced cost efficiency of R&D that occurs with financial munificence. Experienced CEOs are better equipped with industry knowledge and technology development know-how and so are more capable of producing novel combinations and creating new variations. This leads to a higher likelihood of discovering and implementing cost-efficient processes (Park et al., 2009). Moreover, as a critical mechanism in enhancing efficiency and productivity, learning capability is largely dependent on accumulated experiences in a given domain (Balasubramanian, 2011).

Therefore, with experienced CEOs, new ventures suffer less from the side effects of financial munificence.

Hypothesis 3: More CEO working experience attenuates the negative moderating effects of financial munificence proposed in Hypothesis 2.

We also posit that a high level of CEO education reduces the negative influence of financial munificence on the R&D–survival relationship. High educational attainment is associated with stronger cognitive ability, better judgment, and analytical capability, all of which are beneficial for decision-making involving opportunity identification and risk mitigation (Dencker et al., 2009; Unger et al., 2011). When firms that have higher levels of financial munificence are faced with more investment choices, CEOs with higher educational attainment are more capable of identifying viable, valuable opportunities, forming better judgements, and avoiding poor R&D investments that would not enhance survival.

Moreover, high educational attainment improves the capacity to absorb information from multiple sources and to combine and exchange knowledge with partners. Higher education provides both a larger knowledge base and a more fully realized learning capacity, both of which are fundamental to external knowledge acquisition (Smith et al., 2005). When financial munificence is high for new ventures, CEOs of higher educational attainment are able to absorb valuable information from multiple sources and make better investment decisions, thereby mitigating the negative influences of financial munificence. Thus, we predict:

Hypothesis 4: Higher CEO education attenuates the negative moderating effect of financial munificence proposed in Hypothesis 2.

Building on the growing body of research on female entrepreneurship, we posit that female CEOs are more able to reduce the side effects of financial munificence. First, female CEOs are generally less prone to risk-taking and less ambitious than their male counterparts, and thus they are less likely to invest in distant, risky, or uncertain schemes (Faccio et al., 2016; Jeong & Harrison, 2017). Male entrepreneurs are generally more optimistic than females, so they tend to ignore non-confirming information,

comprehend situations in ways that favor success, and attribute overly high value to uncertain opportunities (Hmieleski et al., 2013). By comparison, female CEOs tend to make less risky R&D decisions even with munificent resources. Moreover, compared to male managers, female managers are more likely to engage in a cooperative decision-making style that relies on knowledge-sharing, exchange, and integration from various sources (Dezsö & Ross, 2012; Lyngsie & Foss, 2017; Post & Byron, 2015). Therefore, with higher levels of financial munificence, female CEOs are less likely to make overly optimistic R&D investments that may inhibit survival.

Second, the comparatively cautious nature of female CEOs may help attenuate the side effects of financial munificence on the cost-efficiency of R&D investments. Prior research indicates that because female entrepreneurs have more difficulty obtaining external resources, they often perceive similar resource environments as less advantageous, and as a result they are more likely to be frugal and fully utilize all resources at hand (Langowitz & Minniti, 2007). In this sense, with similar levels of financial munificence, female CEOs are more likely to adopt a thrifty style of operation and hence are less susceptible to the side effect of resource munificence. Therefore, while resource munificence may dampen cost-saving and resource-utilizing behaviors and reduce the benefits of R&D on survival, new ventures with female CEOs are less likely to experience such side effects.

Hypothesis 5: Female CEOs attenuate the negative moderating effect of financial munificence proposed in Hypothesis 2.

3 Methodology

3.1 Data

We tested our hypotheses based on a 2006–2011 dataset from the Kauffman Firm Survey (KFS). The KFS⁴ is a large longitudinal study of new ventures in the United States commissioned by the Ewing Marion Kauffman Foundation, and it is highly regarded in the

field of entrepreneurship and management (Cassar, 2014; Crawford et al., 2015; Farhat et al., 2018). The KFS target population included all new businesses that were established in 2004 in the United States, excluding branches, subsidiaries, inherited businesses, and not-for-profit organizations. The survey was conducted yearly from 2004 through 2011, and there are a total of 3,140 firms in the complete eight-year dataset. Among these ventures, the ultimate controller refers to the “first owner-operator” in the survey and indicates that an owner directly oversees daily operations of his or her firm. Accordingly, the term “CEO” represents a “first owner-operator” in our study.

Given our focus on technology ventures, we excluded non-tech firms based on categorizations designated by the Standard Industry Classification (SIC) code from the U.S. Bureau of Labor Statistics (see Table 3 in the Appendix for detailed classifications). Information on R&D expenditures was collected from the CEOs since 2007, the fourth round of the survey. And because past performance can influence R&D investment, we also controlled for past performance in year $(t-1)$. Thus, we based our analysis on the dataset covering the six years from 2006 to 2011. We excluded ventures that were sold or merged, as this could indicate either success or failure (Wennberg et al., 2010). After excluding observations with missing values, our final sample was comprised of 791 technology new ventures with 2,913 firm-year observations. In Fig. 4 in the Appendix, we show the yearly distribution of our sample ventures along with their average R&D intensity, firm size, and proportion of profitable ventures in order to better understand the representation of the sample. Apart from the KFS data, information on financial munificence was obtained from the Dun and Bradstreet (D&B) database, and information on tech-zone was hand-collected based on county-level postcodes.

3.2 Measurement

3.2.1 Dependent variables

Our dependent variable is *survival*, which was measured as a dummy variable that equals 1 if a venture remained in operation in the subsequent year and 0 if it permanently ceased operations. The use of survival as an indicator is more common in the entrepreneurship literature than in mature firm settings

⁴ <http://www1.kauffman.org/kfs>

because survival is the priority for new ventures in their initial years, and while performance is unstable for new ventures, new ventures commonly experience much higher failure rates than mature firms (Su et al., 2011). We advanced this variable by one year to help assess the causal effect.

3.2.2 Independent variables

R&D intensity was measured as a firm's R&D spending divided by total expenses. We chose total expenses over sales as the denominator to better fit our research context. Prior studies on mature firms often use R&D spending over sales to indicate R&D intensity (Rosenbusch et al., 2011; Zhou et al., 2017). However, studies have shown that whereas new ventures regularly spend money on R&D, wages, rent, materials, etcetera, their sales are highly unstable in the early years (Coad et al., 2016; Robinson, 1999). Our data shows similar cases, where the standard deviation of R&D intensity calculated using sales revenue as the denominator is 72.4% larger than when calculated using total expense as the denominator. Furthermore, using the former measure would eliminate 394 observations from our data set due to incomplete information on reported sales revenues. Thus, it is more appropriate to use R&D spending/total expenses to operationalize R&D intensity for new ventures. Also, our use of R&D as an input measure of innovation can partially address the problem of selection bias commonly seen in entrepreneurship research, where researchers seek to examine the ventures' innovation efforts prior to commercialized output (Katila & Shane, 2005).

We used the composite financial stress score in the D&B database to measure *financial munificence*. The D&B financial stress score⁵ (FSS) is designed to predict the likelihood that a company will experience financial stress. The FSS is suitable for our study because it reflects the overall financial condition of the focal ventures, showing whether they are financially munificent or stressed. The score utilizes the rich information from the D&B database⁶ including

comparative financial ratios, payment trends, public filings, demographic data, and more.⁷ We used the reverse term, financial munificence, to better illustrate the side effects of being financially well-resourced. Ranging from 1 to 100, the score reflects the extent to which focal firms experience financial stress: a lower score indicates more financial stress, and a higher score indicates that the firm is more financially munificent.

Work experience was measured by the number of years the CEO had worked in the same industry when the venture started. Knowledge and experience are accumulated over time and longer tenure provides greater exposure to and absorption of information (Diestre et al., 2015; Tian et al., 2011). *Education* was categorized into eight levels ranging from high school graduate to doctoral degree for the CEO at the time of venture establishment. *Female CEO* was coded as 1 if the CEO is a woman and 0 if it is a man.

3.2.3 Control variables

We controlled for several firm-level factors, starting with *firm type*, a dummy variable with a value of 1 if a firm's is a sole proprietorship and 0 otherwise. Sole proprietorships employ unique decision-making processes, have lower credibility and network fewer resources, and have more difficulty obtaining external finances (Coad et al., 2016). *Firm size* was measured as the logarithm of the number of employees, as larger firms may find it easier to survive (Pe'er et al., 2016). Moreover, because past performance may influence both R&D decisions and subsequent survival, we created a dummy variable (*past performance*) that equals 1 if a firm's net profit in the previous year was positive and 0 otherwise (Xu et al., 2019). The capital structure of equity ownership is an important factor for new ventures (Hellmann & Wasserman, 2017), so we controlled for *CEO equity*, measured as the percentage of equity held by an owner-CEO. Strategic alliances and R&D cooperation foster innovation efficiency and performance (Haeussler et al., 2012;

⁵ <https://docs.dnb.com/mydnb/en-US/glossary/financial-stress-score>

⁶ For more detailed information on the calculation and effectiveness of the score, please see https://test-docs.labs.dnbdi rectapps.com/static/doc-uploads/supplier/en-US/fss_7.1_understanding_10.2009.pdf

⁷ To check the validity of this measure, we obtained information on the cash holdings of the ventures and tested the correlation between the two variables. In a subsample of 2386 observations, the correlation between financial munificence and cash holdings is 0.13 ($p < 0.01$), which provide support for our measure.

Ortega-Argilés et al., 2005), so we included *cooperation*, a dummy variable that equals 1 if the focal venture had cooperated with universities, government agencies, or other firms and 0 otherwise. Moreover, to account for any potential non-linear effects of firm size and financial munificence, we also included their squared terms as controls.

At the industry level, we controlled for *competition* using one minus the HHI index calculated as the sum of squared shares of employees in firms in one industry (Pe'er & Keil 2013). Geographical technology zones and clusters are critical factors that shape knowledge spillover, exchange, innovation, and performance in technology firms (Acs et al., 2009; Ortega-Argilés & Moreno, 2009; Pe'er & Keil, 2013; Zhang & Li, 2010), so we included a dummy variable, *tech-zone*. By matching the postcodes of new venture registration addresses with a list of the top 20 technology zones in the United States, we structured this dummy variable such that 1 means a new venture is located in a technology zone and 0 otherwise.⁸ We also controlled for industry and year variances with *industry dummies* and *year dummies*.

3.3 Analysis

Since our dependent variable is dichotomous venture survival, which is recorded on a discrete-time yearly basis rather than a continuous timeline, and our research questions pertain to effects on survival rates, we used discrete-time survival analysis to test our hypotheses (Allison, 2014; Box-Steffensmeier et al., 2004). In Table 1, we report the summary statistics and correlations between the dependent, independent, and control variables. We performed diagnostic tests by examining variance inflation factors (VIFs) for the independent and control variables. The results showed that the VIF scores for the full sets of independent and control variables range from 1.02 to 1.52, all of which are below the cutoff of 10. Therefore, multicollinearity does not seem to be a problem in our study (Ryan, 1997).

⁸ The list of tech-zones by metro area is obtained from the Milken Institute, and detailed methodology and rankings are available at <https://milkeninstitute.org/>

Table 1 Descriptive statistics and correlations

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Survival	.95	0.21												
2. R&D intensity	0.04	0.14	0.02											
3. Financial munificence	43.15	22.26	-.09**	0.02										
4. Work experience	15.87	10.82	0.05**	-0.04	0.05**									
5. Education	5.10	1.94	0.01	0.14**	0.01	0.05*								
6. Female CEO	0.22	0.41	-0.04*	-0.00	0.00	-0.20**	0.03							
7. Firm type	0.26	0.44	-0.04*	-0.02	-0.16**	-0.05*	-0.12**	0.07**						
8. Firm size	0.93	1.01	0.10**	0.08**	0.10**	0.01	0.02	-0.08**	-0.33**					
9. Past performance	0.67	0.47	0.05**	-0.13**	0.09**	0.02	0.01	-0.01	-0.05	0.06**				
10. CEO equity	81.67	26.52	-0.02	-0.10**	-0.11*	0.05**	-0.03	0.01	0.38**	-0.48**	0.04*			
11. Cooperation	0.21	0.41	0.03	0.14**	0.01	-0.00	0.12**	0.03	-0.05**	0.10**	-0.03	-0.08**		
12. Tech-zone	0.08	0.27	0.01	0.02	0.03	-0.07**	0.13**	0.05*	-0.04*	0.11**	0.01	-0.06**	0.03	
13. Competition	0.12	0.18	0.01	0.01	-0.04*	-0.12**	-0.08**	-0.02	0.00	0.10**	-0.01	-0.07**	-0.01	-0.07**

N= 2913; *p < 0.05, **p < 0.01 (two-tailed)

Table 2 Results of discrete-time survival analysis

Dependent variable	Survival					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	odds ratio	odds ratio	odds ratio	odds ratio	odds ratio	odds ratio
Controls						
Firm type	0.84 (0.18)	0.96 (0.20)	0.96 (0.20)	0.96 (0.20)	0.95 (0.20)	0.96 (0.20)
Firm size	1.83* (0.57)	1.78 [†] (0.56)	1.78 [†] (0.57)	1.76 [†] (0.56)	1.77 [†] (0.56)	1.77 [†] (0.57)
Firm size squared	1.08 (0.15)	1.08 (0.15)	1.08 (0.15)	1.07 (0.15)	1.08 (0.15)	1.08 (0.16)
Past performance	1.49* (0.27)	1.42 [†] (0.26)	1.41 [†] (0.26)	1.44 [†] (0.27)	1.40 [†] (0.26)	1.42 [†] (0.26)
Owner equity	1.01 (0.00)	1.01 [†] (0.00)	1.01 [†] (0.00)	1.01 [†] (0.00)	1.01* (0.00)	1.01 [†] (0.00)
Cooperation	1.30 (0.31)	1.26 (0.30)	(1.26) (0.30)	1.21 (0.28)	1.23 (0.29)	1.24 (0.29)
Tech-zone	0.96 (0.33)	1.00 (0.34)	1.00 (0.34)	1.01 (0.34)	1.04 (0.36)	0.99 (0.34)
Competition	1.25 (0.74)	1.45 (0.85)	1.42 (0.83)	1.63 (0.95)	1.45 (0.82)	1.44 (0.83)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Independent variables						
Work experience (WE)		1.02* (0.01)	1.02* (0.01)	1.03** (0.01)	1.02* (0.01)	1.02* (0.01)
Education (ED)		1.01 (0.05)	1.02 (0.05)	1.01 (0.05)	1.00 (0.05)	1.02 (0.05)
Female CEO (FC)		0.66* (0.13)	0.67* (0.13)	0.65* (0.13)	0.65* (0.13)	0.66 [†] (0.14)
Financial munificence (FM)		1.02** (0.00)	1.02** (0.01)	1.02** (0.00)	1.01* (0.00)	1.01** (0.00)
FM squared		1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
H1a/b: R&D intensity (RD)		2.02 (1.74)	2.33 (1.97)	27.40* (38.33)	3.60 (4.45)	2.49 (2.80)
Interactions						
H2: FM × RD			0.95* (0.03)	0.98 (0.04)	0.86** (0.05)	0.91* (0.04)
RD × WE				1.30* (0.13)		
FM × WE				1.00 (0.00)		
H3: FM × RD × WE				1.01* (0.00)		
RD × ED					1.38 (0.63)	

Table 2 (continued)

Dependent variable	Survival					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	odds ratio	odds ratio	odds ratio	odds ratio	odds ratio	odds ratio
FM×ED					1.00 (0.00)	
H4: FM×RD×ED					1.08** (0.03)	
RD×FC						1.05 (1.64)
FM×FC						1.01 (0.01)
H5: FM×RD×FC						1.10 [†] (0.07)
Log-likelihood	- 520.52	- 506.94	- 506.19	- 502.62	- 503.57	- 505.61

$N=2913$; standard errors in parentheses. [†] $p < 0.10$, * $p < 0.05$, ** $p < 0.01$ (two-tailed)

We performed our analyses in the following steps. Table 2 model 1 includes the control variables for baseline analysis. In model 2, we entered control and independent variable to test Hypothesis 1a/b. In model 3, we entered the two-way interaction to test Hypothesis 2. In models 4 through 6, we entered the three-way interactions of the independent and moderating variables, respectively, along with three sets of two-way interactions to test the three-way moderation effects posited in Hypotheses 4 through 6. We included clustered robust standard errors at the firm level in all estimations to account for heteroskedasticity across ventures.

4 Results

In Table 2, we report the results (odds ratios) from the discrete-time survival analysis along with standard errors in parentheses. Hypothesis 1a/b predicts opposing effects of R&D intensity on survival. In model 2, the odds ratio of R&D intensity is 2.02 (larger than 1) but not statistically significant. This result indicates that for new technology ventures, investing more in R&D does not always contribute to survival, a finding which emphasizes the need for further exploration into the conditions that influence how R&D may benefit or harm new ventures.

Hypothesis 2 predicts a negative moderating effect of financial munificence on the relationship between

R&D intensity and survival. In model 3, the odds ratio of interaction between financial munificence and R&D intensity is significantly below 1 ($p < 0.05$), which indicates a negative moderating effect, thus supporting Hypothesis 2. To better illustrate the economic importance of this result, we calculated the odds ratios of R&D intensity at high and low levels of financial munificence (one standard deviation above and below the mean). Results show that when financial munificence changes from low to high, the odds ratio of R&D intensity changes from 2.04 ($p < 0.05$) to 0.35 ($p > 0.10$). This means when financial munificence is low, a 1% increase in R&D intensity increases the odds of survival by 2.04%. However, when financial munificence is high, the benefit of R&D for survival disappears. To further show these moderating effects, we plotted the effects of R&D intensity on survival at low and high levels of financial munificence (one standard deviation below and above the mean). In Fig. 2, we show that, as explained previously, the survival rate grows more rapidly with R&D intensity when financial munificence is at a low level compared to a high level, which supports our argument that high financial munificence reduces the effectiveness of R&D investment.

Hypothesis 3 posits that working experience attenuates the negative moderating impact of financial munificence. In the results obtained from model 4, the odds ratio of the three-way interaction of financial munificence with R&D intensity and working

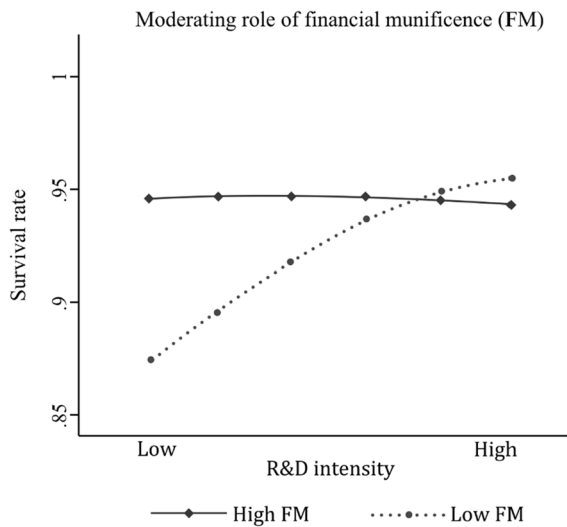


Fig. 2 Two-way interaction effect (H2)

experience is significantly above 1 ($b < 0.05$). Thus, Hypothesis 3 is supported. In Fig. 3a, we show that when CEO work experience is low, the effects of R&D intensity on survival are weaker for ventures with high levels of financial munificence. However, the lines of high and low financial munificence converge when CEO work experience is high, which indicates that the negative moderating effect of financial munificence is attenuated when a venture's CEO is highly experienced.

Hypothesis 4 argues that education attenuates the negative moderating impact of financial munificence. In the results obtained with model 5, the odds ratio of the three-way interaction of financial munificence with R&D intensity and education is significantly above 1 ($b < 0.01$). Therefore, Hypothesis 4 is supported. In Fig. 3b, we show that when CEO education is low, the effects of R&D intensity on survival are negative for ventures with high financial munificence and positive for ventures with low financial munificence, indicating a strong negative moderating effect of financial munificence. However, when CEO education is high, both lines become convergently positive, which means that when CEOs are highly educated, the negative moderating effect of financial munificence is attenuated.

Hypothesis 5 posits that female CEOs may attenuate the negative moderating impact of financial munificence. In model 6, the odds ratio of the

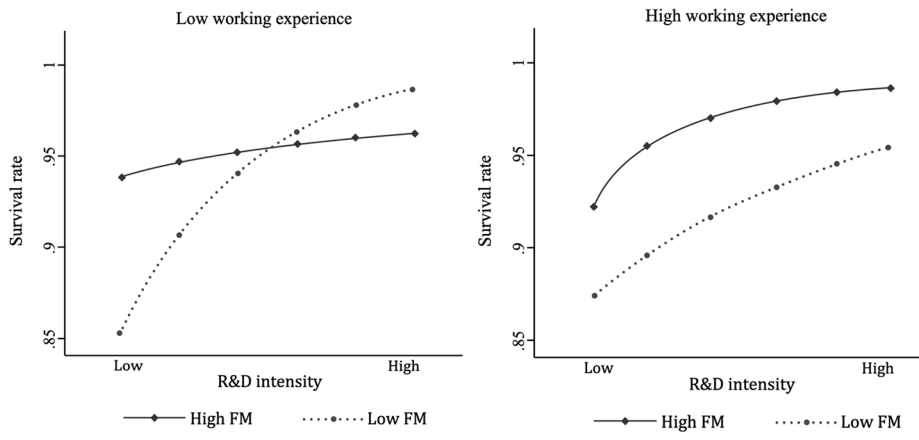
three-way interaction between financial munificence, R&D intensity, and having a female CEO is marginally significant and above 1 ($b < 0.10$). Thus, Hypothesis 5 is marginally supported. In Fig. 3c, we show that for ventures with male CEOs, the marginal effects of R&D intensity are negative at high levels of financial munificence and positive at low levels of financial munificence. However, for ventures with female CEOs, the marginal effects of R&D intensity remain positive across varying levels of financial munificence, indicating that the negative moderating effect of financial munificence is attenuated for ventures with female CEOs.

5 Discussion

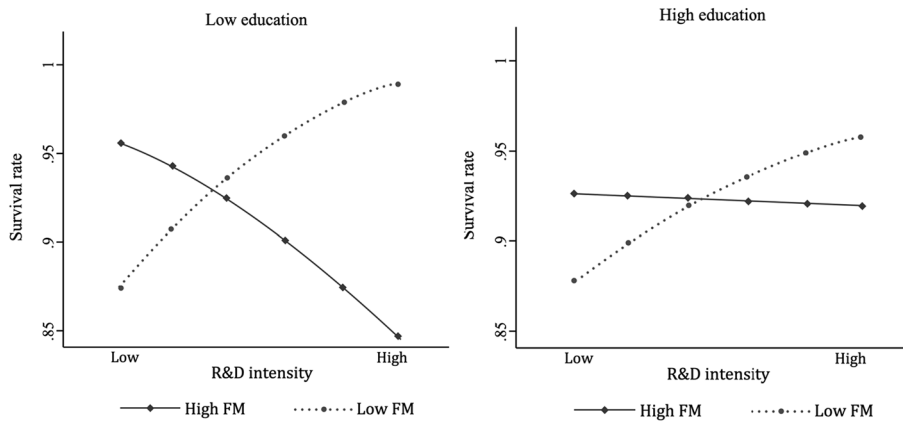
5.1 Theoretical implications

Existing research has demonstrated that financial munificence can have a negative influence on firm performance, but less is known about its indirect influence on the effectiveness of firm strategies. Based on a longitudinal dataset on new technology ventures from 2006 to 2011, we found that financial munificence reduces the positive impact of R&D intensity on venture survival. That is, new ventures with high financial munificence do not enhance their survival odds through increased R&D intensity. We further identify three CEO attributes that address these side effects: new ventures whose CEOs have more work experience, have attained higher levels of education, and are female are better at dealing with the negative moderating effects of financial munificence on the R&D–survival relationship. Our findings make important contributions to the behavioral research on resource munificence for new ventures.

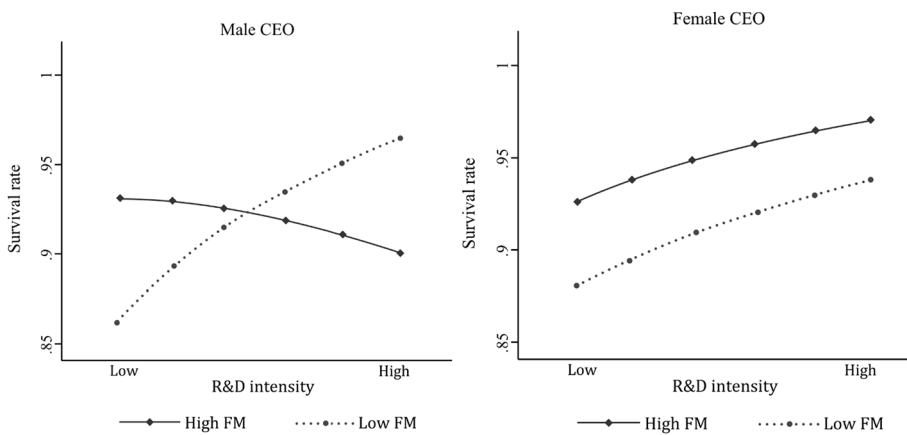
First, we contribute to the body of behavioral research in entrepreneurship by identifying the indirect effect of financial munificence for new venture R&D. Previous literature has adopted various approaches to study the two-sided effects of resource munificence on firm performance (Bradley et al., 2011; George, 2005; Paeleman & Vanacker, 2015; Vanacker et al., 2017). Extending this line of research, we further examine the indirect influence of resource munificence on the strategy–performance relationship. We show that financial munificence has a side



a. Three-way interaction effect (H3)



b. Three-way interaction effect (H4)



c. Three-way interaction effect (H5)

Fig. 3 a Three-way interaction effect (H3). b Three-way interaction effect (H4). c Three-way interaction effect (H5)

effect of reducing the impact of new venture R&D on survival. Previous entrepreneurship literature mostly focuses on the benefits of financial resources and suggests that such resources are critical to new venture growth and survival by enabling entrepreneurs to execute strategic objectives, launch ambitious plans or strategic initiatives, and enhance strategic flexibility and resilience in the face of volatility (Gilbert et al., 2006; Hsu & Ziedonis, 2013). We echo previous qualitative works on the merits of resource constraints which suggest that resource limitations compel firms to seek novel solutions, new combinations of available resources, and more efficient ways of deploying resources (Baker & Nelson, 2005; Mosakowski, 2017; Senyard et al., 2014; Stenholm & Renko, 2016; Welter et al., 2016). Unlike ventures with munificent resources, financially constrained ventures find ways of “making do” with limited resources. They are driven to solve problems in new ways, connect previously unrelated resources, and identify new opportunities that create more value for themselves.

Second, we contribute to a broader understanding of managers’ roles by revealing how CEO attributes can mitigate the limitations of financial munificence. Prior studies have explored how CEO attributes can indirectly influence strategic choices firms make in the face of resource munificence (Tabesh et al., 2019). We further demonstrate that certain CEO attributes can also enhance a venture’s ability to deal with the negative influences of resource munificence. Our results show that more experienced CEOs, highly educated CEOs, and female CEOs are better at dealing with the negative influences of financial munificence. Previous entrepreneurship literature has typically categorized the human capital ventures possess as specific (e.g., same-industry work experience) and general (e.g., education) human capital (Ucbasaran et al., 2008), and posited that human capital fosters venture success by improving opportunity identification and exploitation, ensuring quality strategic planning, obtaining external resources, and enhancing organizational learning (Dencker & Gruber, 2015; Unger et al., 2011). Our findings on work experience and education show that these two forms of human capital can also help new ventures avoid potential resource squandering induced by munificent resource conditions.

We also contribute to the growing body of research on female entrepreneurship. Prior literature has

largely focused on performance differences between male-led and female-led ventures (Santos et al., 2018), and suggested that one reason female entrepreneurs sometimes underperform is due to their inability to attract external resources relative to their male counterparts (Fairlie & Robb, 2009; Zhao & Wry, 2016). As such, female entrepreneurs tend to perceive the resource environment as less munificent than their male peers (Langowitz & Minniti, 2007). We offer a new perspective on this issue by showing that although female entrepreneurs may not be powerful resource acquirers, they are better able to deploy their resources, particularly in resource-munificent situations, than their male counterparts. In general, our findings indicate that entrepreneurs with a diversity of attributes may react differently to resource-munificent conditions, which contributes to a more nuanced understanding of how entrepreneurial attributes matter for new ventures.

5.2 Limitations and future research

Our study is subject to several limitations. First, while we identify three CEO attributes as factors that may attenuate the negative influence of financial munificence, we do not directly examine the cognitive mechanisms CEOs deploy. Future research could explore the cognitive and behavioral mechanisms underlying resource munificence decision-making. For example, does resource munificence increase overconfidence or hubris in top managers? Does effectuation or causation logic help firms overcome the negative influence of resource munificence?

Second, our study considered only the role of CEOs in addressing the side effects of munificence; however, employees also have key roles in identifying opportunities and determining resource utilization practices. Both the actions of employees and the interactions between CEOs/managers and employees affect the resourcing patterns and behaviors of an organization (Feldman & Worline, 2012; Sonenshein, 2014). Therefore, future research may further explore how the negative influence of resource munificence is reflected at employee and manager-employee interaction levels, and how management practices or organizational structure may help to reduce it.

Third, our study utilizes the context of new technology ventures and focuses only on financial munificence and R&D investment. Future research could

expand this focus by considering whether other types of resources, such as human capital, network, and knowledge resources, impact the benefits of innovation strategy. Further research might also consider how alternative types of innovation are affected by resource munificence, such as market innovation, structural innovation, and exploration/exploitation.

5.3 Managerial implications

Our study also carries important managerial implications for entrepreneurs and venture capitalists. For entrepreneurs, it is important to understand that having abundant financial resources can actually hinder efficiency and weaken the impact of R&D on new venture survival. Industry observations show that many new ventures, when experiencing financial munificence, become more aggressive in making investments and less prudent about using resources.⁹ For example, Clinkle, a fin-tech venture that started in 2011, claimed to have invented a “mobile wallet” that could change how people make purchases. Despite an investment of \$25 million, the largest seed round in Silicon Valley at that time, the company ended up failing in 2015 for reasons such as overinvestment and poor market fit.¹⁰ Therefore, CEOs must be cautious when investing in and utilizing R&D. Moreover, new venture CEOs should understand the strengths and weaknesses that come with their backgrounds. To better utilize R&D investments, CEOs are advised to team up with experienced mentors, attend entrepreneurial education programs, and increase team diversity by including females among their top managers.

Venture capitalists (VCs) should understand the importance of choosing appropriate magnitudes of investment and endeavor to avoid the “money race” when competing for promising target ventures, as high investment may hurt R&D activities in funded ventures. Also, VCs should take into account CEO experience and the educational background of managers when investing in new ventures, especially technology firms. Finally, VCs should recognize that

females are in some ways better at managing the negative influences of resource munificence, and therefore adequate support should be provided for female entrepreneurs.

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Appendix

Table 3, Fig. 4

Table 3 Standard industry classification codes for technology ventures

Two digits SIC	Industry
28	Chemicals and allied products
35	Industrial machinery and equipment
36	Electrical and electronic equipment
38	Instruments and related products
Three digits SIC	Industry
131	Crude Petroleum and natural gas operations
211	Cigarettes
229	Miscellaneous textile goods
261	Pulp mills
267	Miscellaneous converted paper products
291	Petroleum refining
299	Miscellaneous petroleum and coal products
335	Nonferrous rolling and drawing
348	Ordnance and accessories, not elsewhere classified
371	Motor vehicles and equipment
372	Aircraft and parts
376	Guided missiles, space vehicles, parts
379	Miscellaneous transportation equipment
737	Computer and data processing services
871	Engineering and architectural services
873	Research and testing services
874	Management and public relations
899	Services, not elsewhere classified

⁹ <https://www.forbes.com/sites/robasghar/2013/07/25/too-much-capital-is-toxic-a-cautionary-tale-for-startups/#15a948cc7737>

<https://www.businessinsider.com/why-raising-too-much-money-can-harm-your-startup-2016-7>

¹⁰ Crunchbase.com; businessinsider.com.

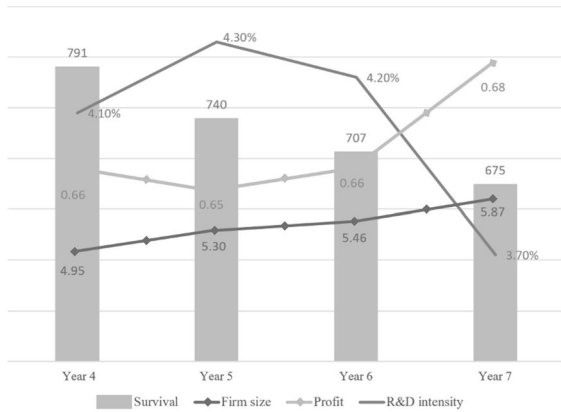


Fig. 4 Yearly distributions of sampled new ventures

References

- Acs, Z. J., Braunerhjelm, P., Audretsch, D. B., & Carlsson, B. (2009). The knowledge spillover theory of entrepreneurship. *Small Business Economics*, 32(1), 15–30. <https://doi.org/10.1007/s11187-008-9157-3>.
- Ahuja, G., & Novelli, E. (2017). Activity overinvestment: The case of R&D. *Journal of Management*, 43(8), 2456–2468. <https://doi.org/10.1177/0149206317695770>.
- Allison P. D. (2014). *Event history and survival analysis: Regression for longitudinal event data*. SAGE publications.
- Alvarez, S. A., & Busenitz, L. W. (2001). The entrepreneurship of resource-based theory. *Journal of Management*, 27(6), 755–775. <https://doi.org/10.1177/014920630102700609>.
- Amezcu, A. S., Grimes, M. G., Bradley, S. W., & Wiklund, J. (2013). Organizational sponsorship and founding environments: A contingency view on the survival of business-incubated firms, 1994–2007. *Academy of Management Journal*, 56(6), 1628–1654. <https://doi.org/10.5465/amj.2011.0652>.
- Andries, P., Debackere, K., & van Looy, B. (2013). Simultaneous experimentation as a learning strategy: Business model development under uncertainty. *Strategic Entrepreneurship Journal*, 7(4), 288–310. <https://doi.org/10.1002/sej.1170>.
- Baker, T., & Nelson, R. E. (2005). Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative Science Quarterly*, 50(3), 329–366. <https://doi.org/10.2189/asqu.2005.50.3.329>.
- Balasubramanian, N. (2011). New plant venture performance differences among incumbent, diversifying, and entrepreneurial firms: The impact of industry learning intensity. *Management Science*, 57(3), 549–565. <https://doi.org/10.1287/mnsc.1100.1294>.
- Box–Steffensmeier J. M., Box–Steffensmeier J. M., & Jones B. S. (2004). *Event history modeling: A guide for social scientists*. Cambridge University Press.
- Bradley, S. W., Wiklund, J., & Shepherd, D. A. (2011). Swinging a double-edged sword: The effect of slack on entrepreneurial management and growth. *Journal of Business Venturing*, 26(5), 537–554. <https://doi.org/10.1016/j.jbusvent.2010.03.002>.
- Bruderl, J., & Schussler, R. (1990). Organizational mortality: The liabilities of newness and adolescence. *Administrative Science Quarterly*, 35(3), 530. <https://doi.org/10.2307/2393316>.
- Capasso, M., Treibich, T., & Verspagen, B. (2015). The medium-term effect of R&D on firm growth. *Small Business Economics*, 45(1), 39–62. <https://doi.org/10.1007/s11187-015-9640-6>.
- Cassar, G. (2010). Are individuals entering self-employment overly optimistic? An empirical test of plans and projections on nascent entrepreneur expectations. *Strategic Management Journal*, 31(8), 822–840.
- Cassar, G. (2014). Industry and startup experience on entrepreneur forecast performance in new firms. *Journal of Business Venturing*, 29(1), 137–151. <https://doi.org/10.1002/smj.83>.
- Chen, E. L., Katila, R., McDonald, R., & Eisenhardt, K. M. (2010). Life in the fast lane: Origins of competitive interaction in new vs. established markets. *Strategic Management Journal*, 31(13), 1527–1547. <https://doi.org/10.1002/smj.89>.
- Coad, A., Frankish, J. S., Roberts, R. G., & Storey, D. J. (2016). Predicting new venture survival and growth: Does the fog lift? *Small Business Economics*, 47(1), 217–241. <https://doi.org/10.1007/s11187-016-9713-1>.
- Cornelissen, J. P., & Clarke, J. S. (2010). Imagining and rationalizing opportunities: Inductive reasoning and the creation and justification of new ventures. *Academy of Management Review*, 35(3), 539–557. <https://doi.org/10.5465/AMR.2010.53502700>.
- Crawford, G. C., Aguinis, H., Lichtenstein, B., Davidsson, P., & McKelvey, B. (2015). Power law distributions in entrepreneurship: Implications for theory and research. *Journal of Business Venturing*, 30(5), 696–713. <https://doi.org/10.1016/j.jbusvent.2015.01.001>.
- Cuervo-Cazurra, A., & Anniq, U. C. (2010). Why some firms never invest in formal R&D. *Strategic Management Journal*, 31(7), 759–779. <https://doi.org/10.1002/smj.836>.
- Cunha, M. P. E., Rego, A., Oliveira, P., Rosado, P., & Habib, N. (2014). Product innovation in resource-poor environments: Three research streams. *Journal of Product Innovation Management*, 31(2), 202–210. <https://doi.org/10.1111/jpim.12090>.
- Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm*. Prentice Hall.
- Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal*, 34, 555–590. <https://doi.org/10.2307/256406>.
- De Carolis, D. M., Yang, Y., Deeds, D. L., & Nelling, E. (2009). Weathering the storm: The benefit of resources to high-technology ventures navigating adverse events. *Strategic Entrepreneurship Journal*, 3(2), 147–160. <https://doi.org/10.1002/sej.68>.
- Dencker, J. C., & Gruber, M. (2015). The effects of opportunities and founder experience on new firm

- performance. *Strategic Management Journal*, 36(7), 1035–1052. <https://doi.org/10.1002/smj.2269>.
- Dencker, J. C., Gruber, M., & Shah, S. K. (2009). Pre-entry knowledge, learning, and the survival of new firms. *Organization Science*, 20(3), 516–537. <https://doi.org/10.1287/orsc.1080.0387>.
- Dezső, C. L., & Ross, D. G. (2012). Does female representation in top management improve firm performance? A panel data investigation. *Strategic Management Journal*, 33(9), 1072–1089. <https://doi.org/10.1002/smj.1955>.
- Diestre, L., Rajagopalan, N., & Dutta, S. (2015). Constraints in acquiring and utilizing directors' experience: An empirical study of new-market entry in the pharmaceutical industry. *Strategic Management Journal*, 36(3), 339–359. <https://doi.org/10.1002/smj.1978>.
- Esteve-Pérez, S., & Mañez-Castillejo, J. A. (2008). The resource-based theory of the firm and firm survival. *Small Business Economics*, 30(3), 231–249. <https://doi.org/10.1007/s11187-006-9011-4>.
- Faccio, M., Marchica, M.-T., & Mura, R. (2016). CEO gender, corporate risk-taking, and the efficiency of capital allocation. *Journal of Corporate Finance*, 39, 193–209. <https://doi.org/10.1016/J.JCORPFIN.2016.02>.
- Falk, M. (2012). Quantile estimates of the impact of R&D intensity on firm performance. *Small Business Economics*, 39(1), 19–37. <https://doi.org/10.1007/s11187-010-9290-7>.
- Fairlie, R. W., & Robb, A. M. (2009). Gender differences in business performance: Evidence from the characteristics of business owners survey. *Small Business Economics*, 33(4), 375–395. <https://doi.org/10.1007/s11187-009-9207-5>.
- Farhat, J., Matusik, S., Robb, A., & Robinson, D. T. (2018). New directions in entrepreneurship research with the Kauffman Firm Survey. *Small Business Economics*, 50(3), 521–532. <https://doi.org/10.1007/s11187-017-9905-3>.
- Feldman, M. S., & Worline, M. C. (2012). Resources, resourcing, and ampliative cycles in organizations. In G. M. Spreiter & K. S. Cameron (Eds.), *The Oxford handbook of positive organizational scholarship* (pp. 1–14). Oxford University Press.
- Ganster, D. C. (2005). Executive job demands: Suggestions from a stress and decision-making perspective. *Academy of Management Review*, 30(3), 492–502. <https://doi.org/10.5465/AMR.2005.17293366>.
- Garg, S., & Eisenhardt, K. M. (2017). Unpacking the CEO–Board relationship: How strategy making happens in entrepreneurial firms. *Academy of Management Journal*, 60(5), 1828–1858. <https://doi.org/10.5465/amj.2014.0599>.
- George, G. (2005). Slack resources and the performance of privately held firms. *Academy of Management Journal*, 48(4), 661–676. <https://doi.org/10.5465/AMJ.2005.17843944>.
- Geroski, P. A., Mata, J., & Portugal, P. (2010). Founding conditions and the survival of new firms. *Strategic Management Journal*, 31(5), 510–529. <https://doi.org/10.1002/smj.823>.
- Gilbert, B. A., McDougall, P. P., & Audretsch, D. B. (2006). New venture growth: A review and extension. *Journal of Management*, 32(6), 926–950. <https://doi.org/10.1177/0149206306293860>.
- Gimeno, J., Folta, T. B., Cooper, A. C., & Woo, C. Y. (1997). Survival of the fittest? Entrepreneurial human capital and the persistence of underperforming firms. *Administrative Science Quarterly*, 42(4), 750. <https://doi.org/10.2307/2393656>.
- Grégoire, D. A., Barr, P. S., & Shepherd, D. A. (2010). Cognitive processes of opportunity recognition: The role of structural alignment. *Organization Science*, 21(2), 413–431. <https://doi.org/10.1287/orsc.1090.0462>.
- Haeussler, C., Patzelt, H., & Zahra, S. A. (2012). Strategic alliances and product development in high technology new firms: The moderating effect of technological capabilities. *Journal of Business Venturing*, 27(2), 217–233. <https://doi.org/10.1016/J.JBUSVENT.2010.10>.
- Hambrick, D. C. (2007). Upper echelons theory: An update. *Academy of Management Review*, 334–343. <https://doi.org/10.1057/9781137294678.0713>.
- Hambrick, D. C., & Finkelstein, S. (1987). Managerial discretion: A bridge between polar views of organizational outcomes. *Research in Organizational Behavior*, 9, 369–406. [https://doi.org/10.1016/S0076-6879\(82\)89033-2](https://doi.org/10.1016/S0076-6879(82)89033-2).
- Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, 9(2), 193–206. <https://doi.org/10.5465/AMR.1984.4277628>.
- Hambrick, D. C., Finkelstein, S., & Mooney, A. C. (2005). Executive job demands: New insights for explaining strategic decisions and leader behaviors. *Academy of Management Review*, 30(3), 472–491. <https://doi.org/10.5465/amr.2005.17293355>.
- Hambrick, D. C., Humphrey, S. E., & Gupta, A. (2015). Structural interdependence within top management teams: A key moderator of upper echelons predictions. *Strategic Management Journal*, 36(3), 449–461. <https://doi.org/10.1002/smj.2230>.
- Hechavarría, D. M., Matthews, C. H., & Reynolds, P. D. (2016). Does start-up financing influence start-up speed? Evidence from the panel study of entrepreneurial dynamics. *Small Business Economics*, 46(1), 137–167. <https://doi.org/10.1007/s11187-015-9680-y>.
- Hellmann, T., & Wasserman, N. (2017). The first deal: The division of founder equity in new ventures. *Management Science*, 63(8), 2647–2666. <https://doi.org/10.1287/mnsc.2016.2474>.
- Hmieleski, K. M., Corbett, A. C., & Baron, R. A. (2013). Entrepreneurs' improvisational behavior and firm performance: A study of dispositional and environmental moderators. *Strategic Entrepreneurship Journal*, 7(2), 138–150. <https://doi.org/10.1002/sej.1143>.
- Hsu, D. H., & Ziedonis, R. H. (2013). Resources as dual sources of advantage: Implications for valuing entrepreneurial-firm patents. *Strategic Management Journal*, 34(7), 761–781. <https://doi.org/10.1002/smj.2037>.
- Jeong, S.-H., & Harrison, D. A. (2017). Glass breaking, strategy making, and value creating: Meta-analytic outcomes of women as CEOs and TMT members. *Academy of*

- Management Journal*, 60(4), 1219–1252. <https://doi.org/10.5465/amj.2014.0716>.
- Katila, R., & Shane, S. (2005). When does lack of resources make new firms innovative? *Academy of Management Journal*, 48(5), 814–829. <https://doi.org/10.5465/amj.2005.18803924>.
- Katila, R., Chen, E. L., & Piezunka, H. (2012). All the right moves: How entrepreneurial firms compete effectively. *Strategic Entrepreneurship Journal*, 6(2), 116–132. <https://doi.org/10.1002/sej.1130>.
- Kim, H., Kim, H., & Lee, P. M. (2008). Ownership structure and the relationship between financial slack and R&D investments: Evidence from Korean firms. *Organization Science*, 19(3), 404–418. <https://doi.org/10.1287/orsc.1080.0360>.
- Klotz, A. C., Hmieleski, K. M., Bradley, B. H., & Busenitz, L. W. (2014). New venture teams: A review of the literature and roadmap for future research. *Journal of Management*, 40(1), 226–255. <https://doi.org/10.1177/0149206313493325>.
- Kor, Y. Y., & Misangyi, V. F. (2008). Outside directors' industry-specific experience and firms' liability of newness. *Strategic Management Journal*, 29(12), 1345–1355. <https://doi.org/10.1002/smj.709>.
- Langowitz, N., & Minniti, M. (2007). The entrepreneurial propensity of women. *Entrepreneurship Theory and Practice*, 31(3), 341–364. <https://doi.org/10.1111/j.1540-6520.2007.00177.x>.
- Lyngsie, J., & Foss, N. J. (2017). The more, the merrier? Women in top-management teams and entrepreneurship in established firms. *Strategic Management Journal*, 38(3), 487–505. <https://doi.org/10.1002/smj.2510>.
- Manzanaque, M., Rojo-Ramírez, A. A., Diéguez-Soto, J., & Martínez-Romero, M. J. (2020). How negative aspiration performance gaps affect innovation efficiency. *Small Business Economics*, 54(1), 209–233. <https://doi.org/10.1007/s11187-018-0091-8>.
- Mata, J., & Portugal, P. (2002). The survival of new domestic and foreign-owned firms. *Strategic Management Journal*, 23(4), 323–343. <https://doi.org/10.1002/smj.217>.
- Modi, S. B., & Mishra, S. (2011). What drives financial performance-resource efficiency or resource slack?: Evidence from U.S. based manufacturing firms from 1991 to 2006. *Journal of Operations Management*, 29(3), 254–273. <https://doi.org/10.1016/j.jom.2011.01.002>.
- Morse, E. A., Fowler, S. W., & Lawrence, T. B. (2007). The impact of virtual embeddedness on new venture survival: Overcoming the liabilities of newness. *Entrepreneurship Theory and Practice*, 31(2), 139–159. <https://doi.org/10.1111/j.1540-6520.2007.00167.x>.
- Mosakowski, E. (2017). Overcoming resource disadvantages in entrepreneurial firms: When less is more. *Strategic Entrepreneurship: Creating a New Mindset*, 106–126. <https://doi.org/10.1002/9781405164085.ch6>.
- Nadkarni, S., & Chen, J. (2014). Bridging yesterday, today, and tomorrow: CEO temporal focus, environmental dynamism, and rate of new product introduction. *Academy of Management Journal*, 57(6), 1810–1833. <https://doi.org/10.5465/amj.2011.0401>.
- Ortega-Argilés, R., & Moreno, R. (2009). Evidence on the role of ownership structure on firms' innovative performance. *Investigaciones Regionales*, 15, 231–250.
- Ortega-Argilés, R., Moreno, R., & Suriñach, J. (2005). Ownership structure and innovation: Is there a real link? *Annals of Regional Science*, 39(4), 637–662. <https://doi.org/10.1007/s00168-005-0026-6>.
- Ortega-Argilés, R., Vivarelli, M., & Voigt, P. (2009). R&D in SMEs: A paradox?. *Small Business Economics*, 33(1), 3–11. <https://doi.org/10.1007/s11187-009-9187-5>.
- Packalen, K. A. (2007). Complementing capital: The role of status, demographic features, and social capital in founding teams' abilities to obtain resources. *Entrepreneurship Theory and Practice*, 31(6), 873–891. <https://doi.org/10.1111/j.1540-6520.2007.00210.x>.
- Paeleman, I., & Vanacker, T. (2015). Less is more, or not? On the interplay between bundles of slack resources, firm performance and firm survival. *Journal of Management Studies*, 52(6), 819–848. <https://doi.org/10.1111/joms.12135>.
- Park, M. H. J., Lim, J. W., & Birnbaum-More, P. H. (2009). The effect of multiknowledge individuals on performance in cross-functional new product development teams. *Journal of Product Innovation Management*, 26(1), 86–96. <https://doi.org/10.1111/j.1540-5885.2009.00336.x>.
- Pe'er, A., & Keil, T. (2013). Are all startups affected similarly by clusters? Agglomeration, competition, firm heterogeneity, and survival. *Journal of Business Venturing*, 28(3), 354–372. <https://doi.org/10.1016/j.jbusvent.2012.03.004>.
- Pe'er, A., Vertinsky, I., & Keil, T. (2016). Growth and survival: The moderating effects of local agglomeration and local market structure. *Strategic Management Journal*, 37(3), 541–564. <https://doi.org/10.1002/smj.2331>.
- Pierce, J. R., & Aguinis, H. (2013). The too-much-of-a-good-thing effect in management. *Journal of Management*, 39(2), 313–338. <https://doi.org/10.1177/0149206311410060>.
- Post, C., & Byron, K. (2015). Women on boards and firm financial performance: A meta-analysis. *Academy of Management Journal*, 58(5), 1546–1571. <https://doi.org/10.5465/amj.2013.0319>.
- Robinson, K. C. (1999). An examination of the influence of industry structure on eight alternative measures of new venture performance for high potential independent new ventures. *Journal of Business Venturing*, 14(2), 165–187. [https://doi.org/10.1016/S0883-9026\(97\)00083-9](https://doi.org/10.1016/S0883-9026(97)00083-9).
- Rosenbusch, N., Brinckmann, J., & Bausch, A. (2011). Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of Business Venturing*, 26(4), 441–457. <https://doi.org/10.1016/j.jbusvent.2009.12.002>.
- Ryan, T. P. (1997). *Modern regression methods*. John Wiley & Sons.
- Santos, G., Marques, C. S., & Ferreira, J. J. (2018). A look back over the past 40 years of female entrepreneurship: Mapping knowledge networks. *Scientometrics*, 115(2), 953–987. <https://doi.org/10.1007/s11192-018-2705-y>.
- Senyard, J., Baker, T., Steffens, P., & Davidsson, P. (2014). Bricolage as a path to innovativeness for resource-constrained new firms. *Journal of Product Innovation*

- Management*, 31(2), 211–230. <https://doi.org/10.5464/AMBPP.2011.141.a>.
- Shepherd, D. A., Williams, T. A., & Patzelt, H. (2015). Thinking about entrepreneurial decision making: Review and research agenda. *Journal of Management*, 41(1), 11–46. <https://doi.org/10.1177/0149206314541153>.
- Smith, K. G., Collins, C. J., & Clark, K. D. (2005). Existing knowledge, knowledge creation capability, and the rate of new product introduction in high–technology firms. *Academy of Management Journal*, 48(2), 346–357. <https://doi.org/10.5465/AMJ.2005.16928421>.
- Sonenshein, S. (2014). How organizations foster the creative use of resources. *Academy of Management Journal*, 57(3), 814–848. <https://doi.org/10.5465/amj.2012.0048>.
- Stam, E., & Wennberg, K. (2009). The roles of R&D in new firm growth. *Small Business Economics*, 33(1), 77–89. <https://doi.org/10.1007/s11187-009-9183-9>.
- Stenholm, P., & Renko, M. (2016). Passionate bricoleurs and new venture survival. *Journal of Business Venturing*, 31(5), 595–611. <https://doi.org/10.1016/j.jbusvent.2016.05.004>.
- Stewart, W. H., Watson, W. E., Carland, J. C., & Carland, J. W. (1999). A proclivity for entrepreneurship: A comparison of entrepreneurs, small business owners, and corporate managers. *Journal of Business Venturing*, 14(2), 189–214. [https://doi.org/10.1016/S0883-9026\(97\)00070-0](https://doi.org/10.1016/S0883-9026(97)00070-0).
- Su, Z., Xie, E., & Li, Y. (2011). Entrepreneurial orientation and firm performance in new ventures and established firms. *Journal of Small Business Management*, 49(4), 558–577. <https://doi.org/10.1111/j.1540-627X.2011.00336.x>.
- Tabesh, P., Vera, D., & Keller, R. T. (2019). Unabsorbed slack resource deployment and exploratory and exploitative innovation: How much does CEO expertise matter? *Journal of Business Research*, 94, 65–80. <https://doi.org/10.1016/j.jbusres.2018.08.023>.
- Tan, J., & Peng, M. W. (2012). Organizational slack and firm performance during economic transitions: Two studies from an emerging economy. *SSRN Electronic Journal*, 24(13), 1249–1263. <https://doi.org/10.2139/ssrn.1552171>.
- Taylor, A., & Greve, H. R. (2006). Superman or the fantastic four? Knowledge combination and experience in innovative teams. *Academy of Management Journal*, 49(4), 723–740. <https://doi.org/10.5465/AMJ.2006.22083029>.
- Tian, J., Halebian, J., & Rajagopalan, N. (2011). The effects of board human and social capital on investor reactions to new CEO selection. *Strategic Management Journal*, 32(7), 731–747. <https://doi.org/10.1002/smj.909>.
- Ucbasaran, D., Westhead, P., & Wright, M. (2008). Opportunity identification and pursuit: Does an entrepreneur's human capital matter? *Small Business Economics*, 30(2), 153–173. <https://doi.org/10.1007/s11187-006-9020-3>.
- Unger, J. M., Rauch, A., Frese, M., & Rosenbusch, N. (2011). Human capital and entrepreneurial success: A meta-analytical review. *Journal of Business Venturing*, 26(3), 341–358. <https://doi.org/10.1016/j.jbusvent.2009.09.004>.
- Uygun, U., & Kim, S. M. (2016). Evolution of entrepreneurial judgment with venture-specific experience. *Strategic Entrepreneurship Journal*, 10(2), 169–193. <https://doi.org/10.1002/sej.1222>.
- Vanacker, T., Collewaert, V., & Paeleman, I. (2013). The relationship between slack resources and the performance of entrepreneurial firms: The role of venture capital and angel investors. *Journal of Management Studies*, 50(6), 1070–1096. <https://doi.org/10.1111/joms.12026>.
- Vanacker, T., Collewaert, V., & Zahra, S. A. (2017). Slack resources, firm performance, and the institutional context: Evidence from privately held European firms. *Strategic Management Journal*, 38(6), 1305–1326. <https://doi.org/10.1002/smj.2583>.
- Welter, C., Mauer, R., & Wuebker, R. J. (2016). Bridging behavioral models and theoretical concepts: Effectuation and bricolage in the opportunity creation framework. *Strategic Entrepreneurship Journal*, 10(1), 5–20. <https://doi.org/10.1002/sej.1215>.
- Wennberg, K., Wiklund, J., DeTienne, D. R., & Cardon, M. S. (2010). Reconceptualizing entrepreneurial exit: Divergent exit routes and their drivers. *Journal of Business Venturing*, 25(4), 361–375. <https://doi.org/10.1016/j.jbusvent.2009.01.001>.
- Xu, D., Zhou, K. Z., & Du, F. (2019). Deviant versus aspirational risk taking: The effects of performance feedback on bribery expenditure and R&D intensity. *Academy of Management Journal*, 62(4), 1226–1251. <https://doi.org/10.5465/amj.2016.0749>.
- Zhang, Y., & Li, H. (2010). Innovation search of new ventures in a technology cluster: The role of ties with service intermediaries. *Strategic Management Journal*, 31(1), 88–109. <https://doi.org/10.1002/smj.806>.
- Zhao, E. Y., & Wry, T. (2016). Not all inequality is equal: Deconstructing the societal logic of patriarchy to understand microfinance lending to women. *Academy of Management Journal*, 59(6), 1994–2020. <https://doi.org/10.5465/amj.2015.0476>.
- Zhou, K. Z., Gao, G. Y., & Zhao, H. (2017). State ownership and firm innovation in China: An integrated view of institutional and efficiency logics. *Administrative Science Quarterly*, 62(2), 375–404. <https://doi.org/10.1177/0001839216674457>.

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