

Two heads are safer than one: Changes in CEO duality and venture failure

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ARTICLE INFO

Keywords:

Board structure
CEO Duality
Failure
Survival
Ventures

ABSTRACT

We study the dynamics of a major design choice in the governance of ventures: whether to distribute power at the top of the venture between a separate CEO and board chair. We propose that ventures are more likely to combine (separate) their CEO and chair positions when operational performance is poor (strong), demonstrating behavior in line with the threat rigidity thesis. Paradoxically, however, ventures would most benefit from a separate CEO and board chair when operational performance is poor. Empirical analysis of data from the Australian mining industry offers general support for our theory, with some interesting nuances. We discuss the implications of our findings for emerging conversations in the literatures on venture boards, boards of directors, and entrepreneurship.

1. Introduction

As entrepreneurial ventures grow and mature, they must make design choices and form organizational structures (Burton et al., 2019). One of the most important of such structures is their board of directors (Garg and Furr, 2017). Boards of directors are generally charged with stewarding the interests of shareholders, even at closely held ventures (Garg, 2013). In addition, they provide advice and guidance to the entrepreneurs as they pursue growth opportunities (Garg and Eisenhardt, 2017). Though board research has historically focused on the context of established organizations, recent high-profile governance failures at ventures like Theranos, Uber, and WeWork indicate that venture boards have the potential to contribute or destroy significant value through their oversight and resource provision activities for ventures as well.

Given the importance of both resource provision and oversight to board functioning—as articulated in resource dependence theory and agency theory, respectively (Hillman and Dalziel, 2003)—one of the more salient design choices ventures make is allocating both the chief executive officer (CEO) role and the board chair role to one individual, a phenomenon known in the literature as “CEO duality” (Gao and Jain, 2012; Knockaert et al., 2015). As CEOs cannot contribute any additional resources to themselves via the chair position, and certainly cannot impose oversight on themselves, corporate governance scholars have studied extensively whether CEO duality benefits or harms established (and usually large) organizations; however, meta-analyses and literature reviews have consistently failed to reveal any overall relationship between CEO duality and firm financial performance (Dalton et al., 1998; Krause et al., 2014).

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More recently, scholars have demonstrated that the choice of board leadership structure and its impact on the organization depend on the circumstances at the time the choice is made (e.g., Gove and Junkunc, 2013; Krause and Semadeni, 2013). Established organizations tend to change board leadership structure around CEO succession events (Quigley and Hambrick, 2012). They also change structure in response to firm performance, rewarding high-performing CEOs with the additional title of board chair and disciplining low-performing CEO/chairs by demoting them from the board leadership position (Krause and Semadeni, 2013, 2014; Vancil, 1987). What theory exists on venture board design choices has focused on the initial establishment of boards (Lynall et al., 2003), as such an investigation is uniquely possible in the venture context. The strongest evidence around CEO duality in established organizations, however, seems to stem from dynamic rather than static considerations (Duru et al., 2016). As little as is known about venture board leadership structure (see Knockaert et al., 2015; Krause and Bruton, 2014), no studies of which we are aware have examined *changes* ventures make to their board leadership structure post-founding.

In this research, we propose that ventures change their board leadership structure in response to operational performance, but in the opposite direction from what research has revealed in established organizations. That is, rather than reward high-performing CEOs with duality, venture boards will be quicker to consolidate—or slower to separate—the CEO and board chair positions in the context of *poor* performance. We conceptualize this relationship as a threat-rigidity response, wherein venture boards favor concentration of authority and decision-making in response to a perceived crisis (Daily and Dalton, 1994a; Finkelstein & D'Aveni, 1994). Consistent with extant theory on threat-rigidity, which is generally conceptualized as a maladaptive bias, we further hypothesize that ventures combining the CEO and board chair roles will increase their hazard of failure, and that ventures separating the roles will more effectively stave off failure, failure being a common and salient outcome for new ventures (Dencker et al., 2009; Shepherd, 1999; Shepherd et al., 2000; Thornhill and Amit, 2003). Using a sample of ventures in the Australian mineral mining industry, we find asymmetric theoretical support; CEO-board chair consolidation behaves as expected, but separation does not.

With this research, we contribute to the theory and practice of venture governance. While folk wisdom has it that there should only be one captain on a ship, our findings imply that entrepreneurs should refrain from trying to centralize authority with a combined CEO/chair, particularly when tempted to do so as a response to poor operational performance. While one could see the intuitive appeal of consolidating decision-making power with one person in the face of change or adversity, our findings imply that such an approach accelerates the risk of venture failure. Our focus on the dynamics (i.e., the change) of venture board leadership structure enables us to illuminate an asymmetry that would be impossible to discern from static comparisons across firms: while ventures respond to poor performance by consolidating the CEO and board chair roles, and in doing so accelerate venture failure, role separation does not exhibit the opposite pattern. Poor performance neither slows ventures from separating the roles nor reduces the risk of venture failure. This finding supports the recent trend in governance studies of theorizing and examining the two types of leadership structure, and their associated dynamics, separately (e.g., Krause, 2017; Krause and Semadeni, 2013; Krause et al., 2017).

Within the entrepreneurship literature, the survival of new ventures has fascinated scholars for decades (e.g., Brüderl et al., 1992; Dencker et al., 2009; Singh et al., 1986; Thornhill and Amit, 2003). Yet, research linking corporate governance to organizational survival—that is, to the avoidance of failure—remains sparse. In fact, two recent literature reviews show that evidence on the consequences of organizational design choices in ventures is limited and mixed (Burton et al., 2019; DeSantola and Gulati, 2017). Our research not only demonstrates the impact of venture board design choices, but also the impact of the dynamic nature of that impact, highlighting the importance of following venture choices over time as circumstances force their hand.

2. Theory and hypotheses

2.1. Venture threat-rigidity and CEO duality

CEO duality is among the most studied topics in the corporate governance domain (Krause et al., 2014). The traditional argument for separating the CEO and board chair positions derives from agency theory (Fama and Jensen, 1983; Jensen and Meckling, 1976). It holds that CEOs are inherently opportunistic, requiring the independent oversight of a separate board chair to avoid CEO entrenchment against the interests of shareholders (Mallette and Fowler, 1992; Rechner and Dalton, 1991). Classical organization theorists counter that the complexity and uncertainty of organizations requires unity of command (see Fayol, 1949), which CEO duality preserves (Finkelstein & D'Aveni, 1994).

Though some assumptions about CEO entrenchment may not apply as well to ventures (Gao and Jain, 2012; Wasserman, 2003, 2006), the basic problem of managerial oversight still holds. In fact, it may even be *more* applicable in a venture context. Hendry (2002) argued that most of agency theory's predictions regarding executive behavior can be explained by honest incompetence just as easily as by self-interest, with similar governance recommendations to remedy the problem. In other words, the heightened risk of fatal strategic missteps ventures face means that CEOs still require oversight even if they have the best intentions (Garg, 2013). Thus, the oversight a non-CEO board chair might provide to a venture pertains as much—if not more—to guiding and objectively advising the CEO's decisions as to controlling the CEO's personal inclinations.

Recent research has begun to explore this alternative view of CEO-board chair separation. Building on insights from Lorsch and Zelleke (2005) and Sundaramurthy and Lewis (2003), Krause (2017) argued that board chairs can implement their role with a control (i.e., monitoring) and/or collaboration orientation (see also Oliver et al., 2018). The control orientation relates to the traditional agency theory prescription for a separate board chair, whereas the collaboration orientation focuses on providing the CEO with support, advice, and guidance, as well as on improving organizational decision-making through specialization of the CEO and board chair positions (Zhang et al., 2011). When the positions are separate, both the CEO and board chair face fewer job demands (see Hambrick et al., 2005), with the CEO free to manage the venture and the board chair empowered to manage the board, potentially even

keeping the board from interfering too much in the CEO's work (Krause and Bruton, 2014). If a board chair employs a collaboration approach, decision-making at the top of the venture should be more comprehensive, more thoroughly vetted, and less erratic than if a single individual wields total control (Knockaert et al., 2015). This perspective is more consistent with the resource dependence view of boards (Hillman et al., 2009).

Despite the lack of agency theory or resource dependence theory support for CEO duality, many ventures nevertheless choose duality as their leadership structure. This may be driven by the entrepreneur's preferences, industry trends, national traditions, or any number of other factors. The factors affecting the between-firm differences in CEO duality selection are likely to be as varied as the attributes of the CEOs and board chairs involved. Both agency theory and resource dependence theory suggest, however, that over time the oversight demands, or the resource needs of the venture are likely to push ventures toward CEO-board chair separation. These theories are rational systems perspectives, however. To advance the evolving dynamic approach to board leadership (e.g., Duru et al., 2016; Gove and Junkunc, 2013; Krause and Semadeni, 2013), we argue that threat-rigidity in the face of poor performance is likely to stall or reverse the tendency of ventures to move toward CEO-board chair separation over time.

Poor operational performance, something which is common in early-stage ventures, can influence governance and strategic decision-making in maladaptive directions (Sheppard and Chowdhury, 2005). Research in the behavioral theory of the firm has demonstrated how poor financial performance can make firms act out of loss aversion and other biases. In the context of CEO duality and organizational failure, a relevant bias discussed previously in the literature is threat-rigidity (Daily and Dalton, 1994a; Finkelstein & D'Aveni, 1994). The concept of threat-rigidity refers to organizations' tendency to restrict information processing and centralize control in response to a perceived threat (Cameron et al., 1987; Staw et al., 1981). Scholars generally consider threat-rigidity responses to be maladaptive for organizations because they typically fail to address the threat head-on, reflecting more of a "hunkering down" mentality (D'Aveni, 1989; Shimizu, 2007). The threat-rigidity effect is particularly pronounced when the threat—usually operationalized as poor firm performance—represents a threat to organizational survival (D'Aveni, 1989; Greve, 2011). Arguing that small firms tend to lack the resource buffers of established incumbents, Audia and Greve (2006) found that rigid responses to threats were more likely at small firms than at large firms (see also Greve, 2011). Similarly, we argue that threat-rigidity is particularly relevant for the study of venture board leadership structure choices.

Several corporate governance scholars have noted a conceptual link between CEO duality and threat-rigidity (e.g., Daily and Dalton, 1994a; Finkelstein & D'Aveni, 1994; Worrell et al., 1997). One of the hallmarks of a threat-rigidity response to poor financial performance is centralization of power and decision-making within—and particularly atop—the organization (Staw et al., 1981). According to Finkelstein and D'Aveni (1994, pp. 1086-7), poor financial performance "may require a board to signal stakeholders that there is a 'captain in charge of the ship' in whom the board has confidence. This signaling may be one explanation for why CEO duality is a common threat-rigidity response of organizations to poor performance." As such, venture boards likely may respond to flagging operational performance by consolidating authority to signal confidence both internally and externally, as well as to speed decision-making (Boyd, 1995; Finkelstein & D'Aveni, 1994).

We argue that venture boards faced with poor operational performance will exhibit threat-rigidity and gravitate toward CEO duality to centralize authority and constrain information processing. For ventures that have separate CEO and board chair positions, this implies that they will be quicker to combine their CEO and board chair positions when venture operational performance is poor. For ventures that already have CEO duality, this implies that they will be slower to separate their CEO and board chair positions when venture operational performance is poor. On this basis, we formulate Hypotheses 1 and 2 as follows:

Hypothesis 1. At ventures with a separate CEO and board chair, poor operational performance increases the likelihood of CEO-board chair combination.

Hypothesis 2. At ventures with CEO duality, poor operational performance decreases the likelihood of CEO-board chair separation.

2.2. Threat-rigidity and venture survival

Though generally intended to save the organization, threat-rigidity responses typically hasten, rather than staunch, organizational decline (Daily and Dalton, 1994a). It follows, then, that ventures with a separate CEO and board chair that subsequently combine the positions are likely to increase their specific risk of failure above and beyond the risk created by poor operational performance (Barbero et al., 2017). The extant literature offers some suggestive—but hardly conclusive—evidence supporting this argument. More than two decades ago, Daily and Dalton (1994a, 1994b) conducted two studies on matched-pair samples of bankrupt and non-bankrupt firms. In one sample, they found that CEO duality was positively associated with bankruptcy (Daily and Dalton, 1994a), and in the other they found that firms at risk of bankruptcy who exhibited a threat-rigidity response—partly through CEO-board chair consolidation—were more likely to declare bankruptcy (Daily and Dalton, 1994b).

Daily and Dalton's (1994b) findings comport with a broader conceptualization of firm failure as a downward spiral, with threat-rigidity manifesting both as a result of, and contributor to, declining performance (Hambrick & D'Aveni, 1988; Sundaramurthy and Lewis, 2003). At the very time when greater oversight, specialization of tasks, and reduction of job demands via role separation would be advantageous (Krause, 2017; Krause and Semadeni, 2013; Sundaramurthy and Lewis, 2003), organizations respond to operational performance pressures by centralizing decision-making and constraining information processing with a powerful CEO/-chair. This "combination of threat/rigidity responses and entrenchment on the part of officers of the firm escorts the declining firm into a position from which there is little chance for return" (Daily and Dalton, 1994b, p. 649). Indeed, Krause and Semadeni (2013) found that CEO-board chair separation significantly improves performance if past performance is weak.

We argue, then, that above and beyond the baseline effect of poor operational performance on the likelihood of venture failure, the

act of combining the CEO and board chair positions should further hasten the venture's failure.

Hypothesis 3. At ventures with a separate CEO and board chair, CEO-board chair combination increases the likelihood of venture failure beyond any effect of poor operational performance.

In contrast to the hastened decline of the venture exhibiting threat-rigidity, ventures with CEO duality that choose to separate the CEO and board chair positions may likely reduce their risk of failure, regardless of the venture's operational performance. Particularly if the venture is performing poorly, the imposition of independent oversight and the reduction in CEO job demands may help redirect the venture out of a downward spiral (Krause, 2017; Krause and Semadeni, 2013). Even if the venture is performing well, however, CEO-board chair separation may reduce the risk of failure. The risk that ventures face with CEO duality is not so much that the CEO/chair will shirk or otherwise act opportunistically at the venture's expense (Gao and Jain, 2012), but rather that the CEO/chair might make otherwise preventable mistakes (Hendry, 2002) or lack the bandwidth for two jobs increasing in complexity over time (Hambrick et al., 2005; Sanders and Carpenter, 1998). Essentially, CEO duality is a riskier board leadership structure than non-duality because it invests total decision-making in one individual, subjecting the organization to the potentially fatal extremes of that individual's choices (Goranova et al., 2017). Over time, it becomes increasingly likely that a powerful CEO/chair will escalate commitment to a chosen path in contravention to the dictates of the venture's circumstances.

This perspective on the board chair's role combines agency theory and resource dependence theory, in that the chair's oversight is primarily delivered through advice-giving and collaboration rather than oppositional control. By being an objective outside voice, the board chair can reduce the likelihood of extreme performance outcomes (Goranova et al., 2017); the low extreme manifests as venture failure. Thus, we predict that over time, separation of the CEO and board chair positions is likely to decrease the risk of venture failure above and beyond the effect of operational performance.

Hypothesis 4. At ventures with CEO duality, CEO-board chair separation decreases the likelihood of venture failure beyond any effect of poor operational performance.

3. Methodology

3.1. Research setting

Our research context is the Australian mineral mining industry. Mineral mining is mainly concerned with three activities: mineral exploration, the extraction and trade of mineral resources, and the provision of a range of services to firms engaged in these activities (Bakker, 2016). The mining industry is an important source of employment and economic growth globally, partly due to worldwide economic development driving demand for natural resources (Bakker, 2016; Taylor, 2011).

A specific feature of Australian mineral mining is that firms are publicly listed at a very early stage. As one mining executive that we interviewed told us:

"Australia's ASX includes small companies as opposed to most of the rest of the world, where it's bigger more substantial companies, so there is a chance to float here which you just don't have elsewhere in the world. [...] Canada is okay but the US, Germany you have to have six years of profit before you can list. So, it is very different. By having an ASX company, you might be very small."

and

"[Being on the ASX] gives you a reputation when you go to talk to people that oh you are seen like a New York company, as a listed company. So that is very much to your advantage when you are talking. Coming in with an ASX company, you are automatically seen as an open, well-run company because you are subject to these stringent audits and things that we do. Being on the ASX is a huge advantage."

As a result, there is a large group of early-stage entrepreneurial ventures in this industry that are listed and that hence do have a reporting requirement to the ASX. This implies there is a unique opportunity to study entrepreneurial ventures with a level of detail in the data that in the rest of the world would just be reserved for large corporations. Importantly, the boards of mineral mining firms tend to do what they do in other industries, as one mining executive that we interviewed told us:

"I don't think boards play a different role, or fulfil a different role, in mining companies than everywhere else in the market-place. To my thinking, you've got to have checks and balances to make sure that the shareholders' interests are defended and taken care of for the long term. So, a board in my thinking is like another branch of government to make sure that the first branch of government is doing what it's supposed to. Are executives behaving like they're supposed to? Boards meet regularly to look at the broad strokes of what the executives are doing and to see if that makes sense and if that is aligned with the interests of the shareholders."

Two features of mineral mining make this industry a very appropriate setting for this study. First, the boards of start-up mining ventures (known in the industry as "junior miners") regularly face critical decisions with implications for venture viability and survival, stemming from the high cost (Beamish, 1987; Harrigan, 1986) and high failure rate (Bakker and Shepherd, 2017) of mineral mining projects. That is, junior miners continuously need to make life-and-death decisions regarding what prospects to follow-up on and invest in, and these decisions are typically made at the top of the organization. It is not unusual for a junior miner to have to go all in on a single project within their portfolio, even though that project faces a significant risk of failure. In addition, the dynamics of

separating authority are very salient in mining. Typically, any decisions regarding major investment in, and relinquishment of, critical assets need to be ratified by the board. That is, the board has the final say on any critical portfolio decisions, which directly influence the junior miner's prospects. As a board member we interviewed stated:

"I guess the board had final say on getting rid of assets. It rarely came to a vote, but it is essentially a board decision. You can imply that there is a vote being taken. I put together a board initially with two lawyers, an accountant and myself. That changed after a few years to just the Chairman being a lawyer. One of the lawyers we put off in the GFC, when we actually cut some costs and so we came down to a smaller board, so we had a Lawyer and an Accountant, and he was essentially the CFO and myself who was essentially the only geological technical person. In essence that board I guess got their geological interpretations/advice from me. A little later on we took on a new chairman who had geological training and he augmented my decision making. In essence for quite a long period, it was my decision alone, when to pull out of a project."

3.2. Sample

Our main data source is the *Register of Australian Mining* (RAM), a comprehensive archive of reference books with annual data on all mining companies, directors, and mineral deposits in the Australian mining industry. This database includes detailed data on (1) all exploration and mining companies active in Australian mining, including their directors, senior managers, major shareholders, profit and loss, asset and liability history, their Australian mineral interests, plus editorial comment on the mine companies' corporate and operational achievements; (2) a list of mining company directors, their areas of expertise and names of the companies with which they are associated; and (3) all mines, development projects, and exploration prospects recorded in Australia, including their location, ownership, management, mining reserves/resources, method of operation, mining plant and equipment, and editorial summary of recent activity and planned work programs. We had access to the online archive for the period 2002–2011.

Within this archive, we operationalized ventures as *de novo* firms established during the observation window of our data (similar to Baum et al., 2000). The database contained 1082 ventures based on this operationalization, and we were able to compile full data on 932 ventures. In models predicting changes in board leadership structure (i.e., combination or separation) or using board leadership structure changes to predict venture failure, the samples consist of fewer ventures because CEO-board chair combination can only occur at firms with a separate board chair in the year prior, and separation can only occur at firms with CEO duality in the prior year. It is inappropriate to examine these phenomena in instances where they are impossible (Goertz, 2006). The number of ventures shown in the models predicting venture failure with CEO-board chair combination and separation add up to slightly more than 932 because once a venture goes through a board leadership structure change, it becomes at risk for the opposite change, so the same venture could appear in both samples at different times.

3.3. Measures

3.3.1 Dependent variables. Our analyses include three dependent variables: *Venture Failure*, *CEO-Board Chair Combination*, and *CEO-Board Chair separation*. *Venture Failure* is determined based on ventures ceasing their reporting of operations in the RAM. We observed 288 such exits. Because ventures can exit for multiple reasons, we manually checked all the editorial comments in the RAM database for information regarding the reason of the exit. In doing so we encountered two reasons for ventures exiting, namely acquisition by another company (91 cases) and a true venture failure (197 cases). In our measurement of venture failure, we excluded acquisitions as they are not true failures. Ventures sometimes are acquired to stave off liquidation; in many other cases, however, venture acquisition constitutes a successful and profitable exit for the entrepreneur. As a robustness check, we included these cases as failures and our results strengthened. This suggests that perhaps several of the acquisitions in our sample are episodes of salvation rather than success. Given that we do not have access to this information, however, we remain conservative in our conceptualization and include in our measurement of venture failure only those cases where the venture clearly failed. Our *Venture Failure* variable takes the value '1' if the venture truly failed, and '0' in all other cases.

The *CEO-Board Chair Combination* variable takes the value '1' when a venture transitions from a separate board chair to CEO duality, and '0' otherwise; the *CEO-Board Chair Separation* variable takes the value '1' when a venture transitions out of CEO duality by appointing a separate board chair, and '0' otherwise. All dependent variables are measured in year $t + 1$ relative to the independent variables.

3.3.2 Independent variables. Our first independent variable (used to test Hypothesis 1 and 2) is *Poor Operational Performance*, which we measure as the annual accounting profits reported by the venture in AUD billions, reverse-coded to reflect poor performance. Actual profits are preferred to ratio measures, as ratio measures can create inaccurate parameter estimates and decrease statistical power (Certo et al., 2020). Because we predict that poor operational performance will affect CEO-board chair combination and separation, we also include it as a control in our models of venture failure to avoid endogeneity due to omitted variable bias. Finally, *CEO-Board Chair Combination* and *CEO-Board Chair Separation* act as independent variables in our tests of Hypotheses 3 and 4, respectively.

3.3.3 Control variables. Our analyses include several control variables to account for alternative explanations. *Ownership Concentration* is measured based on the distribution of shares of the venture (Wruck, 1989). Specifically, the RAM includes information about the percentage of total shares owned by the 20 largest shareholders. In our research context, this is a relevant indicator that shows substantial amounts of variation between ventures (the minimum is 2.44 percent, and the maximum is 100 percent). We therefore use this indicator as our measure of ownership concentration. To ease interpretation of our findings, we standardized this

Table 1
Descriptive statistics and correlations*.

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 Venture Failure	0.07	0.26																		
2 Separate Board Chair	0.87	0.34	-0.03																	
3 Poor Operational Performance	-0.06	0.34	0.02	-0.04																
4 Venture Age	2.91	2.06	0.01	0.01	-0.09															
5 Ownership Concentration	58.01	16.95	-0.01	0.02	-0.06	-0.06														
6 Positive Asset Position	0.14	0.34	0.01	0.06	-0.24	0.05	0.10													
7 Board Size	4.49	1.47	-0.02	0.05	-0.29	0.15	0.21	0.17												
8 Board Social Capital	1.45	1.90	-0.03	-0.06	0.01	0.04	-0.05	-0.02	0.13											
9 Board Background Diversity	3.13	1.06	-0.02	0.05	-0.16	0.14	0.12	0.09	0.61	0.06										
10 Board Gender Diversity	0.04	0.09	0.01	0.02	-0.08	0.03	-0.00	0.03	0.08	-0.01	0.04									
11 Female CEO	0.03	0.17	0.01	0.01	0.02	-0.01	0.06	-0.02	0.04	0.01	0.03	0.37								
12 Munificence	0.84	2.27	-0.01	-0.00	-0.00	-0.06	-0.00	0.01	-0.04	-0.07	-0.01	-0.03	0.01							
13 Dynamism	-0.02	0.65	-0.00	-0.00	-0.00	-0.03	0.01	-0.00	-0.00	-0.00	-0.01	0.02	0.02	0.15						
14 Total Mines	3.51	4.25	-0.04	-0.00	0.01	-0.04	-0.04	-0.03	-0.01	0.33	-0.03	0.01	-0.03	-0.03	0.02					
15 Solo-Owned Mine	0.61	0.49	-0.05	-0.00	0.01	-0.07	0.04	-0.05	0.01	0.44	-0.02	0.02	-0.01	-0.02	-0.00	0.58				
16 Co-Owned Mine	0.42	0.49	-0.04	-0.01	0.05	-0.06	-0.07	-0.02	-0.09	0.30	-0.09	-0.00	-0.02	0.01	-0.00	0.57	0.37			
17 Operational Mine	0.32	0.46	0.01	0.01	-0.10	0.13	0.05	0.14	0.08	0.11	0.06	-0.01	-0.02	0.03	-0.01	0.31	0.21	0.27		
18 Separate Board Chair Prevalence	0.07	0.34	0.08	0.05	-0.04	0.04	0.05	0.07	0.12	-0.11	0.05	0.07	0.04	0.06	0.10	-0.41	-0.31	-0.31	-0.05	
19 Insider Board Percentage	0.36	0.22	-0.01	-0.35	0.12	-0.00	-0.11	-0.07	-0.23	0.13	-0.17	-0.07	-0.03	-0.05	-0.02	0.06	0.06	0.06	-0.07	-0.08

* Nventures = 932; Nventure-years = 3616.

variable prior to analysis.

It is also important to control for the venture's financial position. Unfortunately, the amount of financial information that the ventures we study (need to) disclose is limited. Based on the available information we constructed a dummy variable that proxies the leverage of the venture. This dummy variable, *Positive Asset Position*, takes the value '1' if the value of the venture's assets exceeds that of its liabilities (14% of our observations) and '0' otherwise.

We also control for several characteristics of the board and the CEO that could potentially influence our results. Specifically, we control for *Board Size*, calculated as the total number of directors on a venture's board each year. Besides sheer size, boards can also differ in their degree of diversity. We control for *Board Background Diversity*, because start-ups must consider governance, financial and legal issues in addition to geological mining-related issues to be successful. One would expect start-ups with more background diversity to be better able to advise the CEO and prevent erratic decision making. Following [Forbes and Milliken \(1999\)](#) we measured a start-up's board's background diversity by computing for each year the number of unique skills contributed by the firm's board members (e.g., business administration, geology, human resources, etc.). Furthermore, we control for *Board Gender Diversity* based on the notion that gender-diverse boards allocate more effort to monitoring ([Adams and Ferreira, 2009](#)) and often found to impact venture performance ([Hoogendoorn et al., 2013](#)). Given that our database did not include direct information on the gender of individuals we used the *genderize.io* tool to predict the genders of all names listed in the RAM archive ([Wais, 2016](#)). Subsequently we calculated the percentage of women on the board. Based on the same data and logic we also control for whether the venture had a *Female CEO*.

A final important feature of boards of directors for which we need to control is that they are often used to craft strategic connections—known as board interlocks—between firms ([Mizruchi, 1996](#)). These connections create value for a venture by conferring social capital onto the board through the interlocking director. The extent of social capital available to the board can have a profound effect on venture strategy and performance ([Beckman et al., 2004](#); [Haynes and Hillman, 2010](#)). We therefore control for the number of interlocks on a venture board with the variable *Board Social Capital*.

We also used several venture-level characteristics as control variables in our analyses. First, to control for venture size, we calculated the *Total Mines* owned by the venture. Then, to capture the venture's structure as a mining operation, we included two dummy variables, *Solo-Owned Mine* and *Co-Owned Mine*, which reflect whether the venture owns at least one mine outright and at least one mine in combination with another firm, respectively. We also include a dummy variable, *Operational Mine*, which takes a value of 1 if the venture owns or co-owns at least one mine that is operational rather than purely speculative, and 0 if none of the venture's mines is operational.

Relevant industry-level controls were captured through market *Munificence* and market *Dynamism*. The mining sector encompasses the mining of different minerals. Differences in the price developments of these minerals can be substantial and could result in differences in behavior and performance between firms active in different mineral markets. We therefore controlled for the munificence and the dynamism of the respective mineral markets of each venture (see [Bakker and Shepherd, 2017](#)). *Munificence* captures the mineral price trend over the previous 12 months. This measure is based on [Dess and Beard's \(1984\)](#) and [Boyd's \(1990\)](#) measurement of industry munificence and is the coefficient (beta) of a regression of time against mineral price divided by the mean of the mineral price over the period. The resulting score for each venture is based on a moving window of the mineral price in the previous 12-months. In the case a venture is active on multiple mineral markets we took the mean of the respective scores.

Dynamism captures the price variability of a mineral (i.e., its amplitude around the trend) over the preceding 12 months. Consistent with the approach used by [Dess and Beard \(1984\)](#) and [Boyd's \(1990\)](#), we took a moving window of the standard error of the coefficient (beta) from a regression of time against the monthly price of a mineral. We used the mean of the dynamism score of each mineral if a venture was involved in multiple mineral markets.

Finally, it is important to account for the role of time when examining changes in board leadership structure as well as venture failure ([Gove and Junkunc, 2013](#)). In the probit models where time is not a part of the estimation, we control for calendar year fixed effects ([Certo and Semadeni, 2006](#)), as well as *Venture Age*, calculated as the number of years elapsed since the venture's founding. In our hazard models, time is operationalized as venture age.

4. Analyses and results

4.1. Descriptive statistics

Descriptive statistics and pairwise correlations for our variables are shown in [Table 1](#). The failure rate contrasts sharply with that of Fortune 500 or S&P 1500 firms, the typical board leadership research sample, in which total organizational failure is a rare and newsworthy event. Other descriptive statistics further demonstrate the difference between ventures as a subject of study and traditional corporate governance samples. The average board size is under 5 members, considerably smaller than the average board of a mature organization and consistent with prior research showing that ventures have smaller boards ([Garg and Furr, 2017](#); [Rosenstein et al., 1993](#)). In addition, the average venture age is just under 3 years, which is logical as our dataset is a panel of ventures founded during the study window. None of the correlations shown give us concerns about multicollinearity. Examination of variance inflation factors from our models confirmed that multicollinearity is not a problem.

4.2. Hypothesis tests

Our primary variable of interest is the presence of a separate board chair, which is not a random choice. It is important, then, to address the possibility for selection bias in the distribution of this variable. As such, we initially specify a first-stage probit selection

model with venture random effects, with which we predict the presence of a separate board chair each year. In this model, we include two exclusion restrictions: *Separate Board Chair Prevalence*, which is the rate of separate board chair incidence within the venture's mineral market (i.e., industry average of the independent variable [exclusive of the focal firm]); and *Insider Board Percentage*, which is the percentage of directors on the board who are employees of the firm (Dalton et al., 1998; Finkelstein & D'Aveni, 1994). The incidence rate of the independent variable among the venture's peer set is becoming a frequently used instrument as it should be entirely exogenous and only impact the dependent variable insofar as the independent variable does (e.g., Germann et al., 2015; Krause et al., 2019). The results of this probit model are shown in Table 2. As the model shows, both exclusion restrictions are strong predictors of a separate board chair. We then derived an Inverse Mills Ratio from the predicted values of this model and included it as a control in all subsequent hypothesis-testing models.

As our Hypotheses estimate the effect of within-firm changes on discrete events that ventures may or may not experience over time, with time being a salient factor in the likelihood of the events, we use Cox proportional hazard models with robust standard errors. Survival models like the Cox model predict the hazard of an outcome occurring, which combines both the likelihood of it occurring as well as the time elapsed prior to the occurrence. In all our analyses, time is operationalized as venture age. Observations are in annual increments. The mean age at which ventures first appear in our dataset is 0.75 years, with 90 percent of ventures first appearing at either age 0 or age 1.

Hypothesis 1 states that ventures with a separate CEO and board chair are more likely to combine the CEO and board chair positions when operational performance is poor. Since CEO-board chair combination is only possible at ventures with a separate CEO and board chair, it is necessary to exclude ventures with CEO duality from the testing sample; such ventures violate Goertz's (2006) possibility principle. As such, in our models predicting CEO-board chair combination, ventures become at risk for CEO-board chair combination at the earliest point they exhibit a separate CEO and board chair, whether from founding or subsequently. Our Cox models of CEO-board chair combination are shown as Models 1 and 2 of Table 3. Both models pass the test of the proportional hazards assumption using Schoenfeld residuals ($p > 0.43$). As Model 2 shows, poor operational performance has a positive coefficient with a low p value ($\beta =$

Table 2
First-stage random effects probit model of separate board chair^a.

	Separate Board Chair
Constant	3.63 (0.00)
Venture Age	-0.04 (0.26)
Ownership Concentration	-0.08 (0.25)
Positive Assets Position	0.33 (0.06)
Board Size	-0.17 (0.00)
Board Social Capital	-0.04 (0.14)
Board Background Diversity	0.05 (0.49)
Board Gender Diversity	-0.31 (0.68)
Female CEO	-0.29 (0.41)
Munificence	-0.00 (0.75)
Dynamism	-0.06 (0.27)
Total Mines	0.01 (0.50)
Solo-Owned Mine	0.06 (0.71)
Co-Owned Mine	0.07 (0.64)
Operational Mine	-0.02 (0.91)
Poor Operational Performance	-0.33 (0.38)
Separate Board Chair Prevalence	0.50 (0.01)
Insider Board Percentage	-4.90 (0.00)
N _{Observations}	3616
N _{Ventures}	932
χ^2	231.51

^a P values in parentheses; Standard errors clustered by venture; Year fixed effects included.

0.69, $p = 0.04$), supporting [Hypothesis 1](#). In real terms, holding all other factors constant, a decrease in operational performance of one standard deviation increases the rate of CEO-board chair combination by 12 percent. [Fig. 1](#) depicts this effect graphically by showing the survival estimates for CEO and board chair combination for firms with above and below median operational performance.

[Hypothesis 2](#) states that at ventures with CEO duality, CEO-board chair separation is less likely when operational performance is poor. Our Cox models of CEO-board chair separation are shown as Models 3 and 4 of [Table 3](#). As with Models 1 and 2, these models are limited in their sample, with ventures becoming at risk of CEO-board chair separation when they first exhibit CEO duality, whether at founding or subsequently. Both models pass the test of the proportional hazards assumption using Schoenfeld residuals ($p > 0.99$). As Model 4 shows, the coefficient is negative, consistent with [Hypothesis 2](#), but the p value is fairly high ($\beta = -1.26$, $p = 0.37$). [Fig. 2](#), which depicts the survival estimates for CEO and board chair separation for firms with above and below median operational performance confirms that the effect points in the hypothesized direction but does not reach statistical significance.

The magnitude of the coefficient suggests that perhaps the smaller sample size for this model is inhibiting statistical power and masking a true effect. As such, we performed a power analysis. For a sample of 196 ventures as we have in these models, a Cox model would find statistical significance (i.e., $p = 0.05$) at a power of 0.8 for a hazard ratio as high as 0.67 ($\beta = -0.40$). As a hazard ratio of 0.67 indicates that a unit decrease in the independent variable reduces the hazard of the dependent variable by a third, we conclude that our analyses have enough power to reveal a meaningful relationship if one existed. As such, we do not find empirical support for [Hypothesis 2](#).

Hypotheses 3 and 4 predict venture failure, but this time as a hazard resulting from within-venture changes in board leadership structure. [Hypothesis 3](#) states that at ventures with a separate CEO and board chair, CEO-board chair combination increases the likelihood of venture failure. Once again, our sample for testing this hypothesis includes ventures that have a separate CEO and board chair (i.e., ventures that can combine the CEO and board chair positions). Our Cox models for this sample are shown in Models 5 and 6 of [Table 4](#). By including venture operating performance as a control in these models, we reduce the likelihood that endogeneity arises from omitted variable bias because the variable likely to affect both CEO-board chair combination and venture failure is, in fact, not omitted. In these models, ventures exited the risk set if they, having combined the CEO and board chair positions, re-separate them, as any effects on failure past that point would be confounded and could not reliably be tied to the combination event. Both models pass the test of the proportional hazards assumption using Schoenfeld residuals ($p > 0.34$). As Model 6 shows, the coefficient for CEO-board

Table 3
Cox proportional hazard models of CEO-Board chair combination and separation^a.

	Combination		Separation	
	Model 1	Model 2	Model 3	Model 4
Inverse Mills Ratio	0.74 (0.01)	0.73 (0.01)	0.30 (0.01)	0.30 (0.01)
Ownership Concentration	0.03 (0.72)	0.04 (0.64)	-0.04 (0.51)	-0.06 (0.41)
Positive Asset Position	-0.37 (0.20)	-0.27 (0.33)	0.20 (0.26)	0.15 (0.45)
Board Size	0.04 (0.55)	0.06 (0.36)	0.11 (0.03)	0.11 (0.05)
Board Social Capital	0.06 (0.13)	0.06 (0.12)	-0.03 (0.36)	-0.03 (0.36)
Board Background Diversity	-0.17 (0.08)	-0.16 (0.08)	-0.04 (0.63)	-0.04 (0.59)
Board Gender Diversity	0.38 (0.68)	0.47 (0.61)	-0.09 (0.89)	-0.18 (0.80)
Female CEO	0.47 (0.20)	0.44 (0.23)	-0.39 (0.39)	-0.37 (0.42)
Munificence	-0.01 (0.87)	-0.00 (0.90)	0.00 (0.94)	-0.00 (1.00)
Dynamism	0.01 (0.80)	0.01 (0.83)	-0.12 (0.04)	-0.12 (0.03)
Total Mines	0.02 (0.42)	0.02 (0.40)	0.01 (0.51)	0.02 (0.43)
Solo-Owned Mines	-0.09 (0.68)	-0.09 (0.67)	0.08 (0.64)	0.06 (0.71)
Co-Owned Mines	-0.17 (0.39)	-0.18 (0.34)	-0.04 (0.82)	-0.03 (0.85)
Operational Mine	0.03 (0.85)	0.04 (0.81)	-0.03 (0.84)	-0.05 (0.73)
Poor Operational Performance		0.69 (0.04)		-1.26 (0.37)
Time at Risk	2100	2100	327	327
N _{Ventures}	727	727	196	196
N _{Changes}	153	153	151	151
χ^2	22.16	26.61	24.08	25.51

^a Regression coefficients used instead of hazard ratios. P values in parentheses; Standard errors clustered by venture.

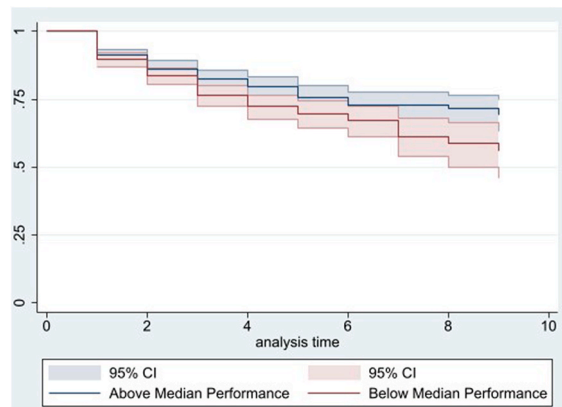


Fig. 1. Survival estimates for CEO-Board Chair combination.

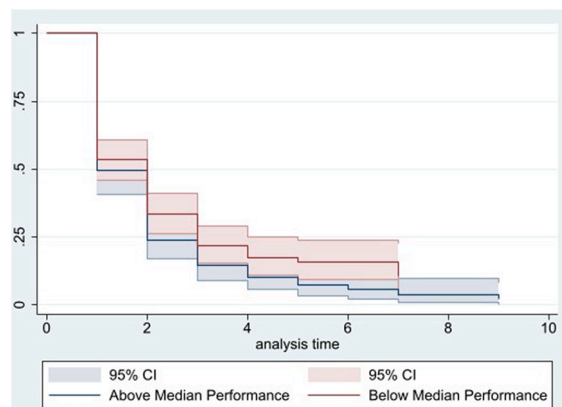


Fig. 2. Survival estimates for CEO-Board Chair separation.

chair combination is positive with a low p value ($\beta = 0.49$, $p = 0.05$), providing support for [Hypothesis 3](#). In real terms, the hazard ratio is 1.65, suggesting that at ventures with a separate CEO and board chair, combining the positions increases the hazard of venture failure by approximately 65 percent. [Fig. 3](#) confirms this finding graphically by depicting the survival estimates for ventures with separated/combined CEO and board chairs.

Finally, [Hypothesis 4](#) states that at ventures with CEO duality, CEO-board chair separation increases the likelihood of venture failure. Accordingly, our sample includes only ventures with CEO duality, and ventures exit the risk set if and when they choose to recombine the positions. Our Cox models for this sample are shown as Models 7 and 8 of [Table 4](#). Both models pass the test of the proportional hazards assumption using Schoenfeld residuals ($p > 0.63$). As Model 8 shows, the coefficient for CEO-board chair separation is negative, consistent with [Hypothesis 4](#), but the p value is above generally accepted levels ($\beta = -0.69$, $p = 0.17$). This finding is corroborated by the survival estimates depicted in [Fig. 4](#). For the period between 2 and 4 years we find the expected difference between ventures with separated/combined CEO and board chairs, but the difference disappears thereafter.

Once again, the magnitude of the coefficient leads us to investigate whether our smaller sample size might be impeding statistical power. The sample size is similar to the previous analysis, so the results are as well. Our analyses should be able to reveal a hazard ratio of 0.67. In fact, at a power level of 0.8, a true hazard ratio of 0.46 would only require a sample of 47. Therefore, though the data suggest a pattern consistent with [Hypothesis 4](#), we cannot claim empirical support for it.

4.3. Robustness tests

We conducted a number of robustness checks to verify our findings. First, we re-specified our Cox models of venture failure using random effects probit models. These models produced the same results as the Cox models, so model specification does not seem to be driving these findings. As mentioned above, we also expanded our operationalization of venture failure to include ventures exiting due to acquisition, and the results became stronger. In addition, though we do not think it appropriate to include observations for which the focal variables are impossible, we specified an alternative model of venture failure that included all ventures in the sample and both CEO-board chair combination and separation as predictors simultaneously. The results remained the same as in our primary hypothesis tests. One interesting aspect of this approach is that we can test for any difference between the effects of CEO-board chair separation

Table 4
Cox proportional hazard models of venture failure^a.

	Model 5	Model 6	Model 7	Model 8
Inverse Mills Ratio	-0.78 (0.09)	-0.79 (0.08)	-1.08 (0.05)	-1.00 (0.07)
Ownership Concentration	0.02 (0.79)	0.02 (0.82)	-0.29 (0.10)	-0.29 (0.10)
Positive Asset Position	0.12 (0.61)	0.12 (0.60)	0.25 (0.63)	0.26 (0.63)
Board Size	-0.07 (0.31)	-0.08 (0.29)	-0.38 (0.04)	-0.36 (0.05)
Board Social Capital	-0.00 (0.98)	-0.00 (0.94)	0.06 (0.47)	0.06 (0.54)
Board Background Diversity	-0.06 (0.52)	-0.06 (0.57)	0.23 (0.34)	0.22 (0.35)
Board Gender Diversity	0.07 (0.93)	0.06 (0.95)	1.99 (0.02)	2.22 (0.01)
Female CEO	-0.09 (0.83)	-0.11 (0.80)	1.12 (0.05)	0.94 (0.12)
Munificence	-0.01 (0.59)	-0.01 (0.57)	-0.11 (0.01)	-0.10 (0.01)
Dynamism	-0.09 (0.24)	-0.10 (0.23)	0.39 (0.25)	0.34 (0.32)
Total Mines	0.02 (0.56)	0.02 (0.59)	0.01 (0.85)	0.01 (0.84)
Solo-Owned Mines	-0.63 (0.00)	-0.62 (0.00)	-0.45 (0.37)	-0.41 (0.43)
Co-Owned Mines	-0.28 (0.17)	-0.27 (0.19)	-0.48 (0.23)	-0.48 (0.23)
Operational Mine	0.01 (0.95)	0.01 (0.96)	0.38 (0.27)	0.37 (0.29)
Poor Operational Performance	1.03 (0.04)	1.03 (0.05)	-0.32 (0.95)	-0.24 (0.96)
CEO-Board Chair Combination		0.49 (0.05)		
CEO-Board Chair Separation				-0.69 (0.17)
Time at Risk	2255	2255	586	586
N _{Ventures}	739	739	205	205
N _{Changes}	157	157	41	41
χ^2	33.11	35.29	65.65	72.10

^a Regression coefficients used instead of hazard ratios. P values in parentheses; Standard errors clustered by venture.

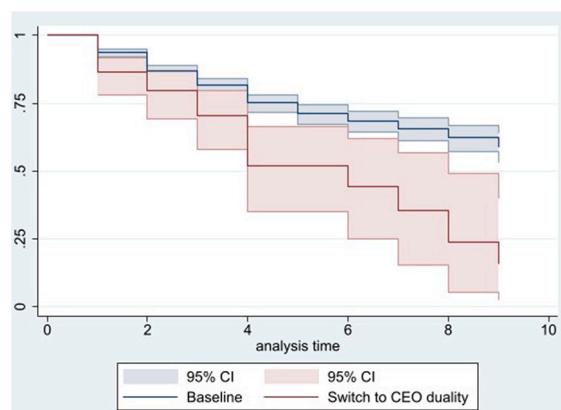


Fig. 3. Survival estimates after CEO-Board Chair combination.

and combination. Though CEO-board chair separation still exhibited no discernible effect on venture failure in this alternative model, the effect of CEO-board chair combination did appear to be more positive than the effect of separation ($\chi^2 = 4.26, p = 0.04$). This lends some additional credence to our overall theoretical logic. Nevertheless, we urge caution in interpreting any results from this model, as CEO-board chair combination and separation are never possible for the same venture at the same time.

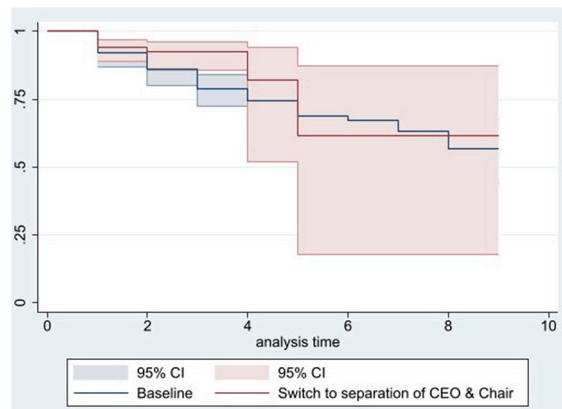


Fig. 4. Survival estimates after CEO-Board Chair separation.

5. Discussion

We examined board leadership structure and organizational failure in a sample of mining ventures, which face a high baseline risk of failure. Our central findings show that poor operational performance significantly increases the hazard of CEO-board chair combination at ventures without CEO duality; and that if a venture combines its CEO and board chair positions, it increases its probability of failure by approximately 65%. In the following, we will discuss the implications of our research for the literatures on venture governance, governance in general, and entrepreneurship.

5.1. Implications for theory

By tying changes in board leadership structure to venture failure, we have illuminated a possible manifestation of the long-theorized but heretofore empirically equivocal relationship between CEO duality and firm performance (see Krause et al., 2014). Our study first and foremost contributes to theory in corporate governance by highlighting how consolidation of the CEO and board chair positions occurs as a threat-rigidity response to poor operational performance. Many have suggested a link between CEO duality and threat-rigidity (Daily and Dalton, 1994b; Finkelstein & D'Aveni, 1994), but this link has rarely been tested. Such a test would require examination of both the antecedents and consequences to show that the practice is a response to a threat, and that it proves maladaptive to the organization's circumstances. We offer such a test, showing that ventures with a separate board chair are more likely to combine the positions following poor operational performance, and that such changes only serve to accelerate the venture's downward spiral toward failure. Interestingly, we do not find that ventures with CEO duality are less likely to separate the positions in response to poor operational performance, suggesting some degree of asymmetry in the way threat-rigidity manifests in terms of board leadership.

In addition, corporate governance and entrepreneurship scholars alike have recognized that extant theory has thus far largely neglected the role of the board of directors in entrepreneurial firms (Daily et al., 2002; Knoblen and Bakker, 2019; Zahra and Filatotchev, 2004). This is surprising to the degree that entrepreneurs are bound to face questions pertaining to governance as their ventures grow and mature beyond the nascent stage. Previous studies of venture boards have looked at founder departures and top management team changes (Boeker and Karichalil, 2002; Boeker and Wiltbank, 2005). We are among the first to study board leadership structure in the context of start-up ventures. Our findings add to this body of research by emphasizing the importance of shared governance to prevent strategic missteps and unintended errors, something which does not sit easily with the view of entrepreneurs as "rugged individualists" who wield total control over their ventures (e.g., McGrath et al., 1992), and are reluctant to cede any control of their "baby".

Furthermore, by showing that CEO-board chair combination exhibits the characteristics of a threat-rigidity response at poorly performing ventures we add new information to a literature that has given scant attention to the dynamic aspects of board leadership and treated board leadership structure as a choice exogenous to firm performance (for exceptions, see Gove and Junkunc, 2013; Krause and Semadani, 2013). Iyengar and Zampelli (2009) specifically tested the assertion that performance drives firms' choice of board leadership structure and found no evidence that CEO duality was endogenous to firm performance. If anything, scholars have suggested that CEO-board chair combination is a reward for strong CEO performance (Krause and Semadani, 2013), rather than a threat-rigidity response to poor performance. Therefore, we encourage future research exploring when CEO-board chair combination is likely to proceed from strong versus weak performance, as the cumulative knowledge remains inconsistent.

5.2. Practical implications

Our research also offers some implications for practitioners, particularly for entrepreneurs. As their ventures mature and grow, entrepreneurs must choose whether to maintain full organizational authority or cede some of this authority to others. On one hand,

retaining full power over firm resources may allow for acting entrepreneurially and making quick decisions (Bakker and Shepherd, 2017). On the other hand, entrepreneurs could get overwhelmed by having to oversee a growing business. Moreover, lacking independent oversight may increase the likelihood of making fatal errors. While folk wisdom has it that too many cooks spoil the broth, our findings imply that ventures should refrain from trying to centralize authority with a combined CEO/chair, particularly when tempted to do so as a response to poor operational performance. While one could see the intuitive appeal of consolidating decision-making power with one person in the face of change or adversity, our findings imply that such an approach increases the risk of venture failure, particularly if the board is not very large. This is an important practical implication that arises from our research.

5.3. Limitations and future research

Clearly, our research is subject to limitations which simultaneously provide a promising starting point for future work. First, an obvious limitation of our study is that our sample is limited to a single sector (mining) in a single country (Australia). While we do not necessarily believe that our context would be unique in terms of our theorizing, it remains an empirical question if, or to what extent, our pattern of findings holds in other research settings.

In addition, our quantitative approach does not yield great detail on the intra-venture dynamics that are at play behind the structural changes we observe. CEO-chair combination and separation decisions may entail significant planning and debate behind the scenes. Having access to more fine-grained (qualitative) data from within the venture boardroom would certainly contribute and enrich the preliminary framework we develop here (e.g., Bezemer et al., 2018; Hoppman et al., 2019; Pitcher and Smith, 2001).

Additionally, in line with most previous board research, our focus was mostly internal to the firm. As Beckman et al. (2014) point out, however, venture boards also play a key role in mitigating the influence of the external environment. Knoblen and Bakker (2019), for example, recently pointed out that venture boards can play an important role in shaping early-stage overtures to other firms—thereby paving the way for a successful future strategic alliance. In that vein, future work could extend ours by studying how board leadership impacts the venture's interactions with its environment. For example, larger boards bring greater social capital and, according to our findings, can substitute for a separate board chair as an oversight mechanism. We encourage scholars to explore how these nuances of the board's boundary-spanning roles interact to affect venture behavior and outcomes.

6. Conclusion

A pertinent question for many entrepreneurs is whether their ventures would do better if they would cede some control to others. Our research points out that there are venture survival-threatening risks to entrepreneurs clinging to power at all costs. Interestingly, we find that ventures are likely to combine their CEO and board chair positions when operational performance is poor, exactly when these ventures would benefit most from having a separate CEO and board chair.

Author statement

Ryan Krause: Conceptualization, Formal analysis, Roles/Writing - original draft, Writing - review & editing. **Rene Bakker:** Conceptualization, Data curation, Funding acquisition, Roles/Writing - original draft, Writing - review & editing. **Joris Knoblen:** Conceptualization, Data curation, Formal analysis, Roles/Writing - original draft, Writing - review & editing.

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