

Configurations of Business Founder Resources, Strategy and Environment Determining New Venture Performance

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We advance a configurational perspective that assumes a new venture's performance, operationalized as profitability in this study, is determined by interdependencies among its founder(s)'s resources (i.e., human, social, and financial capital), its strategy, and environmental munificence. Using Rule Ensembles, a semi-parametric set-theoretic method, we conduct an abductive investigation using a sample of 853 new ventures. The Rule Ensembles technique identifies five multivariate interdependencies (rules) that enhance new venture profitability and two that reduce it. Indicators of business founder resources are involved in all of the seven model rules. Four configurational rules, including a strategy and/or environmental component, equally emerge.

Introduction

New ventures have a substantial impact on economic growth in industrialized nations (European Commission, 2016). Founders deciding to forge ahead with their new venture in the face of typical start-up obstacles are concerned with their venture's performance. Still, the high incidence of failure among start-ups cannot be ignored (Messersmith, Patel, and Crawford 2018), suggesting that much is left to be discovered through research and turned into managerial practice and supportive policy subsequently. The present study sets out to identify the drivers of new venture performance, operationalized as profitability, allowing insights to feed into new venture performance research, managerial practice and beyond.

Prior new venture performance research evidence suggests that the resources available to the founder(s) (for example, Crook, Ketchen, Combs, and Todd 2008; Hvide and Moen 2010), the strategy

employed (for example, Teece 2010), and the environment (for example, Debrulle, Maes, and Sels 2014) are all critical in determining business success. Notwithstanding the contributions of this line of research, there is an often perceived shortcoming that it lacks clarity on potential interdependencies between these different elements in determining new venture performance (Gruber, Heinemann, Brettel, and Hungeling 2010; Hughes, Hodgkinson, Elliott, and Hughes 2018). Two related phenomena can account for this observation, as we argue. First, on a theoretical level, within the research stream on new venture performance, the focus on potential interdependencies (if not their complex nature) between resources, strategy, and environment in determining performance is not strongly developed. Second, those studies focusing on interdependencies rely on analysis techniques limiting the possibility to test complex interactions between many variables and to detect asymmetric bundles of performance-determining elements (Haddoud, Jones, and Newbery 2018; Ho, Plewa, and Lu 2016). We elaborate upon both issues in what follows.

So far, mainly two approaches have been used to study the resources–new venture performance relationship. Within the *universalistic approach*, researchers focus on the identification of factors that matter to all new ventures. Prior studies suggest that, for example, new ventures generally benefit from greater access to resources such as finance (for example, Chandler and Hanks 1998), founder human capital (for example, Davidsson and Honig 2003; Wiklund and Shepherd 2003), and founder social capital accessible through networking (for example, Davidsson and Honig 2003). Similarly, new ventures that adopt an innovative strategy tend to perform better (Rosenbusch, Brinckmann, and Bausch 2011). Within the *contingency approach*, researchers assume that the value of resources depends on the context in which they are deployed. Its impact may vary depending on organizational factors such as strategy (for example, Chandler and Hanks 1994) and environmental factors (for example, Debrulle, Maes, and Sels 2014; Wiklund and Shepherd 2005).

Universalistic and contingency approaches provide useful insights into factors that influence new venture performance yet tend to overlook the more complex interactions that exist between these factors. Still, strategic management research has long suggested that strategic choices made in relation to multiple

facets of fit between the external and internal environment affect organizational performance (for example, Andrews 1971; Grant 1991), including that of new ventures (for example, Chandler and Hanks 1994). The RBV perspective also puts forward that the value of firms' resources should be evaluated within the context of strategy and environmental conditions (for example, Barney and Clark 2007). Thus, to gain a deeper understanding of new venture performance, researchers should simultaneously and jointly consider elements of resources, organizational strategy, and the environment (Nordqvist, Sharma, and Chirico 2014; Wiklund and Shepherd 2005). This paper aims to contribute to this strand of research in two ways.

First, a *configurational approach* might provide a promising avenue for dealing with such multivariate interdependencies (for example, Dess, Newport, and Rasheed 1993; Meyer, Tsui, and Hinings 1993; Nordqvist et al. 2014; Salusse and Adreassi 2019; Wilden, Devinney, and Dowling 2016). Recent studies on strategy formation in entrepreneurial settings (for instance, Ott and Eisenhardt 2020) started to zoom in on the generation of complex sets of interdependent activities to exploit opportunities and create value. This line of reasoning supports the call for adopting a configurational perspective in the larger new venture performance research. Configurations are “multidimensional constellations of conceptually distinct characteristics that commonly occur together” (Meyer et al. 1993, p. 1175). According to this approach, firms with internally aligned configurations of resources, organizational, and environmental factors will outperform firms with less aligned configurations (Miller 1986, 1996). Hence, new ventures that succeed in creating and maintaining a better fit among their resources (including those accumulated by the founders), strategy, and environment will achieve superior performance levels. Identifying configurations leading to such superior new venture performance will increase our insights in the more complex and multivariate interdependencies that might be at play (Garcia-Cabrera, Garcia-Soto, and Olivares-Mesa 2019; Gruber et al. 2010; Kiss and Barr 2017; Miller 1996; Wiklund and Shepherd 2005). Specifically, in this study we integrate multiple theoretical perspectives from the RBV and entrepreneurial strategy and introduce a framework that embraces multivariate relationships between different dimensions of founder human, social, and financial capital, venture strategy, and the environment.

Second, since theoretical problems, methodologies, and results of the research process are highly interdependent and mutually reinforcing (Dess et al. 1993), a move towards the configurational approach requires the use of a method that can capture complex interdependencies among many variables (Garcia-Cabrera et al. 2019; Haddoud et al. 2018). In investigating interdependencies with moderated multiple regression, the interaction terms usually comprise two or three variables at best. To some scholars, the traditional use of multiple regression analysis is at least partially responsible for the lack of knowledge on the relevant combinations of factors that propel new venture performance (for example, Haddoud et al. 2018; Ho, Plewa, and Lu 2016). More recently, a number of configuration studies using qualitative fuzzy-set comparative analysis (fsQCA) have demonstrated the value-added of techniques that can deal with the challenges of detecting larger constellations of multiple interacting elements (Fainshmidt, Wenger, Pezeshkan, and Mallon 2019; Haddoud et al. 2018; Mallon, Lanivich, and Klinger 2017). With the arrival of such ‘nontraditional techniques’ (Ott, Eisenhardt and Bingham 2017), research can expedite the process of closing the still existing gap in terms of evidence-based configurations of resources and other elements such as strategy and environment. We adopt the Rule Ensembles technique in this study. It is a novel semi-parametric method that corresponds with the basic assumptions of configurational theory. Rule Ensembles combines advantages of set-theoretic methods and parametric regressions. Like other configurational methods, it attempts to identify parsimonious patterns from the inherently complex reality. Yet, compared with rivaling techniques, it does not try to come up with “ideal organizational types” (Fiss 2007: p. 1183) but rather identifies configurations at a lower unit of analysis (that is, combinations of predictor conditions or ‘rules’). Given the possible complexity of interdependencies within this study, this intermediate level of analysis could be advantageous. It allows us to adopt a pragmatic theorizing approach (Shepherd and Suddaby 2017), which promotes abductive reasoning as a practical compromise of induction and deduction. Constructs of founder characteristics, strategy, and environment are reasonably well developed, yet our understanding of their interdependencies remains relatively limited. Through pragmatic empirical theorizing we can discover and explore interesting resource interdependencies without completing all steps in the hypothetico-deductive process. Interesting resource combinations discovered, previously largely

undetected, are important because they trigger further inquiry and enrich the research field as such. Our study could therefore contribute greatly to making way with the lack of knowledge on the relevant combinations of factors driving new venture performance (Haddoud et al. 2018; Ho et al. 2016; Hughes et al. 2018).

This article proceeds as follows. We first introduce the literature on founder resources, strategy, and the business environment. We subsequently propose a configuration framework to accurately capture the complex relationships among these variables and new venture performance. Next, we elaborate on the research method and results and conclude with a discussion and implications for scholars and practitioners.

Literature Review and Configurational Framework

An essential task for constructing a configurational framework is the selection of its domains, and the constructs within each domain (Dess et al. 1993). Domains can include environments, industries, technologies, strategies, structures, cultures, ideologies, groups, members, processes, practices, beliefs, and outcomes (Meyer et al. 1993). A trade-off must be made between increasing the number of constructs to enhance the model's ability to accurately represent the complex reality and parsimony to deliver interpretable and meaningful results (Dess et al. 1993).

To develop our model, we rely on the RBV and related elements of the broader strategy literature in which it is embedded (for example, Barney, 1991; Grant 1991; Kraaijenbrink, Spender, and Groen 2010; Newbert 2007). The RBV suggests that a firm's valuable and rare resources provide the foundations of competitive advantage and that this advantage can be sustained when these resources are also non-substitutable and hard or expensive to imitate (Barney 1991). Importantly, resources are only valuable when they enable firms to conceive of or implement strategies that exploit opportunities or neutralize threats in the environment (Barney and Clark 2007; Grant 1991). Consequently, a venture's performance is dictated by an interplay of its resources, strategy, and environment.

Theoretical developments in the fields of RBV and strategy have been largely informed by the context of large, established firms. We, therefore, also draw on the entrepreneurship literature that situates the RBV and strategy within the context of new ventures (Foss 2011; Kellermanns, Walter, Crook, Kemmerer, and Narayanan 2016). In particular, we perceive founders as the first among equals in new ventures engaged in the process of discovery and exploitation of market opportunities (Shane and Venkataraman 2000). A fundamental task is to assemble and make available different kinds of resources needed to exploit these opportunities (Alvarez and Barney 2004), in line with the strategic orientation of the venture and the perceived environmental conditions. Unfortunately, new ventures' initial resource endowments are generally meager (Cai, Anokhin, Yin, and Hatfield 2016; Kim, Aldrich, and Keister 2006). They also face difficulties attracting external resources, in part because they lack legitimacy (Larraneta, Zahra, and Gonzalez 2012) or due to information asymmetries (Storey 1994). Consequently, newly created businesses generally turn to the founders for their initial resource requirements. Prior work has shown that within new ventures the organization's need for knowledge, information, network contacts, and funding is initially satisfied by borrowing from the founders' already accumulated resources (for example, Arrègle, Hitt, Sirmon, and Very 2007; Thorpe, Holt, Macpherson, and Pittaway 2005). In this study, we will focus on founder resources, and particularly on their human, social, and financial capital, to form configurations with strategic and environmental elements that affect new venture performance, with the latter expressed in financial terms (that is, profitability). In what follows, we position the key constructs within each domain of our framework, and subsequently summarize prior theorizing regarding the interdependencies between these domains.

Business Founder Resources

Resources available to new ventures can be classified as human, social, financial, technological, physical, and organizational resources (Brush, Greene, and Hart 2001). Little scholarly attention has been paid to physical resources since superior performance and competitive advantage are less likely to be

derived from tangible assets (Crook et al. 2008). Likewise, organizational resources — the ensemble of processes, systems, routines, and practices via which a venture can implement its strategy (Chrisman, Bauerschmidt, and Hofer 1998) — are uncommon in entrepreneurship literature as they are initially not well developed, if at all, in new ventures.

Human capital can be defined as the entire body of knowledge, skills, and experience of a firm's constituents as well as the capacity to add to this reservoir of knowledge, skills, and experience through individual learning (Dess and Lumpkin 2001). A distinction can be made between general and specific human capital (Becker 1993). General human capital refers to skills that are useful and transferable across a wide range of situations (for example, occupational alternatives, economic settings), whereas specific human capital is more related to a specific setting and has a much narrower scope of applicability.

In line with upper echelon theory (Hambrick and Mason 1984), the general and specific human capital of business founders is considered to be an important determinant of new venture performance (Mallon et al. 2017). First, formal education and management experience in other organizations (that is, general human capital) determine the unique set of skills or knowledge base that founders bring to the firm (Cassar 2014) and play an important role in successful opportunity recognition (Shane 2000). Highly educated founders are also more receptive to new ideas (Smith, Collins, and Clark 2005). Specific human capital, such as prior start-up and industry experience, can facilitate successful opportunity recognition (Davidsson and Honig 2003) by providing knowledge of customers, suppliers, products, and services, thereby creating value in a specific industry setting (Gimeno, Folta, Cooper, and Woo 1997). They equally deliver procedural knowledge on how to perform particular tasks, on the pitfalls that may lie ahead, and on steps that should (not) be taken (West and Noel 2009).

Social capital refers to the ability of actors to extract benefits from their social structures, networks, and memberships (Davidsson and Honig 2003). The value of social capital is determined through network structure and the quality of the connections constituting this network (Nahapiet and Ghoshal 1998), and is demonstrated by its effect on the availability, timing, relevance, and quality of tangible and/or intangible resources (Adler and Kwon 2002; Thorpe et al. 2005). Previous work has indicated that a new venture's

need for social capital is initially satisfied by borrowing from the individual social capital of its founder(s) (Arrègle et al. 2007). We distinguish between bridging and bonding social capital (Davidsson and Honig 2003). Bridging social capital consists of weak ties; ties that lie outside of the founders' immediate cluster of contacts and consist of persons with whom they have infrequent contact. Bonding social capital is characterized by strong ties; associations with family and close friends with whom founders have frequent contact. While bridging social capital acts as an interface for the exchange of otherwise unavailable information and scarce resources, bonding social capital is rooted in interpersonal trust and can equip business founders with permanent access to specific resources (for example, advice, support) (Davidsson and Honig 2003; Debrulle et al. 2014).

Financial capital consists of the aggregate of all monetary possessions of the business (Dollinger 2002). Both the level and composition of the initial financial capital are important. The level of the initial capital determines the amount of money that is available for investments in other resources, product/service development, production, and marketing (Chandler and Hanks 1998). These investments are needed to establish a competitive position, and to adjust to environmental conditions (Goddard, Tavakoli, and Wilson 2005; Huang 2016). Nunes, Viveiros, and Serrasqueiro (2012) found that liquidity is positively related to profitability in young SMEs. Next to the level of the initial financial capital its composition is important as well. Most new ventures have greater difficulty to access external financial resources because of their lesser reputation and greater possibility for bankruptcy (Nunes et al. 2012). From an operational point of view, a relatively high percentage of founder-induced financial means is, thus, positive and common, especially in the initial stages of the firm's life cycle.

Strategy

Given that discovery and exploitation of opportunities is central to new venture creation (Shane and Venkataraman 2000), it is of little surprise that strategy has played an important role in new venture research (Kiss and Barr 2015). One of the most enduring components of strategy within the management literature

is differentiation (Porter 1980). According to Miller (1988: p.283), “a strategy of differentiation aims to create a product or service that customers see as unique.” A distinction can be made between technology differentiation, based on technological uniqueness and innovation, and marketing differentiation, based on intensive marketing and brand management (Miller 1986). Durand and Coeurderoy (2001) refer to marketing differentiation as the propensity of a venture to develop originality, quality, and innovation in its marketing policy. They found that these activities significantly benefit the performance of early followers. Robinson and Pearce (1988) concluded that organizations adopting a marketing differentiation strategy achieved the highest performance when comparing five clusters of firms based upon their strategic behaviour. With regards to technology differentiation, some scholars perceive innovation as intertwined with new venture creation, newness, or technological novelty (for example, Maes and Sels 2014), and technological uniqueness as key contributor to the value of new ventures’ products or services (for example, Lee, Kelley, Lee, and Lee 2012). Accordingly, terms such as newness, invention, and innovativeness are frequently found in new venture literature (Johannessen, Olsen, and Lumpkin 2001). Yet, others caution that the reality of the average new firm is anything but innovative, instead taking the form of what is often labelled a ‘me too’ business (Hannan and Freeman 1984). Firms in this so-called ‘modest majority’ (Davidsson and Gordon 2012) tend to imitate other firms by following similar approaches to providing alike products and services. The level of marketing and technology differentiation, thus, represent important elements of a new venture’s strategy and, possibly, non-negligible factors of new venture performance.

Environment

RBV theory suggests that the value of resources is dependent on the market environment into which they are deployed (for example, Collis and Montgomery 1995). In this study, we focus on environmental munificence. An environment’s munificence level refers to its resource abundance and the richness of investment opportunities, and therefore, its capacity to support firm growth and profitability (Gedajlovic, Lubatkin, and Schulze 2004). New ventures typically face difficulties in obtaining resources from the

external environment. Major explanatory factors for this are their limited connections to potential external resource providers and/or their lack of legitimacy and reputation needed to support the external resource acquisition (Cai et al. 2016; Larraneta et al. 2012). Although this forces them to largely build on the business founder resources earlier discussed, the environmental munificence remains an important element to be examined in the context of this study. It is an essential element in any quest trying to understand better firms' competitive advantage and survival because it adds to the idea of adaptation to change associated with the development and leveraging of resources (Bradley, Aldrich, Shepherd, and Wiklund 2011; Helfat 2007). Specifically, since strong munificence increases the ventures' opportunity to acquire resources for development (Aragon-Correa and Sharma 2003), the attractive presence of resources can trigger ventures to develop structures, strategies, processes, and governance modes considered acceptable by the resource providers in order to secure future access to resources available in the environment (Bamford, Dean, and McDougall 2000; Gedajlovic et al. 2004).

Founders' perceptions of the environmental munificence can thus significantly influence ventures' resource combinations by framing definitions of issues facing their company and the entrepreneurial options to deal with them (Simsek, Veiga, and Lubatkin 2007). Environmental munificence creates a fertile context in which entrepreneurial opportunities arise, yet puts heavy information processing burdens on ventures' decision-makers in orchestrating the resources towards capturing the opportunities (Chandler, Honig, and Wiklund 2005; Hmieleski and Baron 2009). Munificence has also been associated with proactive and innovative strategies (Aragon-Correa and Sharma 2003; Rosenbusch, Rauch, and Bausch 2013), suggesting firms try out different combinations of their resources in order to discover promising avenues of development and to generate an approach for managing the interface between the venture and its environment. New venture performance is, thus, dependent on achieving 'environmental fit', whereby resource-rich environments offer more growth opportunities yet generate more challenges regarding resource allocation and require more intensive environmental scanning, a task which in new ventures is typically covered by the founder(s) (Smeltzer, Fann, and Nikolaisen 1988).

The nature of the effect of munificence in the general business environment on the link between founders' resources and venture performance, however, remains less clear and at times contradictory (Aragon-Correa and Sharma 2003; Cai et al. 2016). We believe that including environmental munificence in our study looking into the combinations of resources triggering performance differences among new ventures can be insightful in line with the pragmatic empirical theorizing approach adopted.

Business Founder, Strategy, and Environment Interdependencies

A fundamental difference between the configurational approach and other approaches such as the universalistic or contingency approach is the nature of the interdependencies between the elements of the system. Configurational approaches suggest more complex, multivariate interdependencies as opposed to the direct and two-way interactions highlighted in universal and contingency models. Focusing on the characteristics of founder resource relationships for new ventures, we find that empirical studies are indeed often restricted in terms of the number of founder resources and/or the types of resource relationships they examine. Chandler and Hanks (1998), for instance, examined the substitutability of founder human capital for founder financial capital. Debrulle and Maes (2015) explored interdependencies between founder human and social capital in the context of new venture export intensity, while Brush and Chaganti (1999) investigated the interaction effects of founder human capital and organizational resources. In a recent study, Mallon et al. (2017) explored configurations of human, financial, and social capital that drive new family venture growth. They found multiple distinct configurations that mostly comprise a form of human capital (whether specific or general). Additional human, social, and financial capital interdependencies, while rarely explored in prior research on new ventures and, therefore, generally not limited to the resource contribution of the business founders, are implied by theory or large firm research. Adler and Kwon (2002) argue that social capital can act as a substitute for other resources. According to them, individuals with superior connections can compensate for a lack of human or financial capital. Furthermore, research into a

firm's absorptive capacity suggests a synergistic interdependency between human capital and social capital that facilitates access to external information (Debrulle et al. 2014).

The relationship between strategy and environment has also been prominent in prior entrepreneurship literature. Dess, Lumpkin, and Covin (1997) showed that entrepreneurial firms focusing on marketing differentiation achieved high profitability when active in an uncertain or heterogeneous environment. Miller (1988) found that innovative strategies allow for higher performance in uncertain environments. Regarding technology differentiation, Zahra and Bogner (2000) established that the impact of technology resources on new venture performance is a function of environmental hostility, dynamism, and heterogeneity. In a study on new venture performance, Kiss and Barr (2017) adopted a configurational view on the relationship between the pace of new product development strategy implementation and performance. Their empirical evidence suggests that fast or improvisational approaches to implementation translate into higher firm performance only in certain combinations with elements related to the environment and the ventures' top management team. Although not focusing solely on new ventures, another recent study demonstrated the importance of environmental munificence for configurations of dynamic capabilities and strategic orientation affecting firm competitive advantage (Fainshmidt et al. 2019).

Finally, prior research suggests that elements of the external environment and/or firm's strategy act to moderate the impact of founder resources on firm performance. Wiklund and Shepherd (2005), for instance, conclude that there is an interaction between environmental dynamism and access to financial capital in determining small business performance. Wang and Ang (2004) argue that managerial action taken to deal with perceived environmental munificence differs across ventures, in line with their specific strategic posture and the variation in the human capital of their executives. Symeonidou and Nicolaou (2018) demonstrate that new ventures with high human capital investment relative to rivals are less disadvantaged when they pursue leveraging strategies focused on innovative differentiation compared to new ventures adopting less innovation-focused strategies. Yet, once again, extant research has been dominated by contingent relationships between two variables, with infrequent contributions suggesting three-way interactions (for example, Symeonidou and Nicolaou 2018), and more complex interdependencies

(including resources, strategy, and environmental elements) typically being ignored. A noticeable and recent exception in this research stream is the study of Garcia-Cabrera et al. (2019). This study examines the performance of new technology-based firms using a configurational approach, combining entrepreneurs' resource endowments and technology strategy. Doing so, the study proposes a set of theoretically derived ideal types of configurations and uses a Euclidean distances-based measure to model the configurational fit between the firms' resources and each ideal type. Our configurational study, however, differs from the presented study in that it departs from an abductive approach, as noted earlier. In our opinion, the current state of theory does not allow us to identify clear configurations upfront, something also Garcia-Cabrera et al. (2019) described as a challenging task. In line with our study's abductive view on configurations, we also apply an abductive modelling technique that we will detail in the subsequent methods section.

Methods

Sample

This study is based on three waves (2005, 2007, 2009) of a biennial population survey of new ventures located in Flanders (Belgium), called START (Policy Research Center for Entrepreneurship, Companies, and Innovation, 2001-2011). Each wave targeted all Flemish small new ventures between one and three years old with a minimum of one and a maximum of forty-nine employees that did not participate to an earlier START wave. The survey data is linked to official financial data reported to the Belgian government to measure new venture performance. This financial data is from the BEL-First database (Bureau van Dijk, 2019) which holds the annual financial statements of all firms incorporated under Belgian law.

Each START wave consists of a company questionnaire answered by one of the owners and individual semi-structured interviews with all of the current business owners. We consider the owners to be the persons with the most comprehensive knowledge about the new venture. The questionnaire and interviews included

items on the owners' accumulated human, social, and financial capital, the company's strategy, and its environment.

The total population as defined above amounted to 3,172 new ventures in 2005, 3,251 in 2007, and 3,183 in 2009. Due to obsolete company data, eight to nine percent of these firms could not be reached. Out of the remaining firms, 412 (in 2005), 491 (in 2007), and 465 (in 2009) completed the company questionnaire and participated in the interviews. The total survey response rate, thus, varied between 12.9 percent and 15.1 percent, which is comparable to that of other surveys among small business founders (Baron and Tang 2011).

Because of our focus on the pivotal role of founders, the sample was limited to organizations in which the current owners were the initial firm founders. We, therefore, made sure that the current owners were the ones who had identified the business opportunity, provided the necessary financial capital, requested counsel and assistance from friends and colleagues, and converted the initial business idea into an actual business. As a result of this, the total sample of 1,368 firms was reduced to 1,297 new ventures. Due to the use of list-wise exclusion of item non-response during the statistical procedures, the final sample consists of 853 new ventures (213 from the 2005 wave, 363 from 2007, and 277 from 2009). The sectors most frequently represented in the final sample are construction (31.1 percent), professional services and consultancy (20.6 percent) and manufacturing industry (17.9 percent). The average number of employees is 5.74, but the distribution is highly skewed. 70.9 percent of these ventures has five employees or less, 22 percent are single-employee businesses. About 63.5 percent of the ventures has been created by a single founder, nearly 30.7 percent by two founders and 5.8 percent by three founders.

Given a potential time gap of one to three years between the founding of the business and the administration of the survey, our study is susceptible to survivor bias. However, since our time frame between founding and questioning is much shorter than that of similar studies (for example, Bamford, Dean, and Douglas 2004) and the accompanying company failure rate only swings around 10 percent, survivor bias is not considered to be substantial. Moreover, data from BEL-First used for our dependent variable (see *Measures* section) allowed us to compare respondent with non-respondent firms. No significant

difference (that is, chi-square and t-tests) regarding firm age, size (that is, number of employees, total assets, and equity), and financial indicators (that is, gross value added, total assets, solvency, and liquidity) emerged.

Measures

New Venture Performance. Due to the requirements of the Rule Ensembles technique, a dummy variable was used to measure new venture performance. In essence, this dummy reflects whether (code 1) or not (code 0) the ventures show above-industry-average performance. Following Zahra, Ireland, and Hitt (2000), performance was measured as profitability, more specifically the Return On Assets (ROA). As an indicator of a firm's profitability relative to its total assets, the ROA sheds light on a company's efficiency at using its resources to generate earnings. The focus on ROA instead of typical alternatives such as Return On Equity (ROE) is supported by Robb and Watson (2012), explaining that the level of debt the venture's owner(s) is (are) comfortable with (which is a personal choice having an impact on the amount of assets acquired) is important in assessing new venture performance. For each of the first three years of operation, we compared the new venture's profitability with that of its population peers, that is all new ventures targeted by START that belong to the same industry. As the European standard, we made use of (the first level of) the NACE hierarchical industry structure to classify sectors of economic activities, which corresponds with the world standard for classifying enterprises, ISIC, from which NACE is derived. We use a three-year time period because this is required to accurately reflect the financial position of the new firm taking into account a certain time evolution and related venture development (Aspelund, Berg-Utby, and Skjevdal 2005). Yet, it avoids the introduction of noise (for example, changing structures, organizational process development) through not using longer time periods (Ramanujam and Varadarajan 1989). Only new ventures that were consistently able to outperform their population-industry peers for each of their first three years of operation were classified as achieving superior new venture performance. The use of an audited and independent database for our dependent variable measure (that is, BEL-First)

enhances the reliability of our measure and mitigates common method bias with our other variables collected via survey. The BEL-First database (consulted years 2003-2011) included information on the ROA for 9,347 out of the 9,606 new ventures targeted by START (97.3 percent). A total of 1,975 firms (21.1 percent) achieved such superior performance, out of which 194 companies (22.7 percent) belong to our final sample.

Founder Resources. Founder resources were operationalized using nine variables spread over three constructs: human capital, social capital, and financial capital (Table 1). All measures are based on those used in prior studies of new venture performance.

Human Capital. For founders' general human capital we adopt two measures: the highest obtained education level (Bosma, van Praag, Thurik, and De Wit 2004), and the number of years of management experience (Bates 1990). For founders' specific human capital, we make use of the number of years of industry experience and a dummy variable to measure start-up experience (Bosma et al. 2004; Davidsson and Honig 2003). In case of multiple business founders, average indicator values were calculated for the founders' level of education, management experience, and industry experience, while start-up experience was coded '1' if at least one of the team members had experience with entrepreneurship.

Social Capital. Following Davidsson and Honig (2003), we distinguish between bridging social capital and bonding social capital. We adopt a scale from Debrulle et al. (2014) representing the possible organizational benefits extracted from the founder's network of professional contacts and business network (bridging social capital) and a scale on similar benefits provided by the founder's network of friends, family, and acquaintances (bonding social capital).

Financial Capital. We follow Chandler and Hanks (1994) and measure two important financial decisions taken at start-up: the amount of financial capital that is made readily-available at start-up (founding capital), and the overall capital structure (that is, the percentage of initial capital provided by the founders; self-financing).

Strategy. Following Durand and Coeurderoy (2001) differentiation is captured by two factors: marketing differentiation — the extent to which originality, quality, and innovation is implanted in the

firm's marketing policy — and technology differentiation — the extent to which new technology is developed, used, and embedded in new products. As heterogeneity of technology across the firms in our sample is high (for example, hardware, software, and machines), it is difficult to measure the construct directly. Therefore, and in accordance with Zahra, Matherne, and Carleton (2003), we decided to measure technology indirectly. More information on the scales can be found in the Appendix.

Environment. Environmental munificence is captured by means of a factor representing the availability of business opportunities in the surrounding environment (Zahra 1993). Items and factor loadings are displayed in Appendix.

Control variable. As our sample capitalizes on three different START waves, we included dummy variables for the year of the survey (2005, 2007, and 2009) to capture possible time or cohort effects.

Table 1 about here

Analysis Technique

This study applies an abductive modeling approach. Configurational researchers often turn to abductive or inductive techniques when no ideal types can be theoretically derived or no assumptions can be made on the existence and nature of interdependencies between variables, or when the number of variables is too large to accommodate every potential interdependency (Fiss 2007). Specifically, *set-theoretic* methods like Qualitative Comparative Analysis (QCA), crisp-set QCA (csQCA), and fuzzy-set QCA (fsQCA) have been employed (for example, Marx, Rihoux, and Ragin 2014). Set-theoretic methods are useful in that they do not assume a predefined functional form of the relationship between the dependent and independent variables and accommodate complex interdependencies among a wide set of independent variables. However, despite their popularity, several drawbacks can be identified. First, because of the case-based logic of these methods, input sample sizes should be small to moderate (Ragin and Rihoux 2004). Set-theoretic techniques depend on the ability of the researcher to iterate back and forth between data and theory, and make changes to selected cases and conditions measured, a cumbersome and complex process when sample sizes grow larger (Vis 2012). Second, QCA methods require variables to be coded as degrees

of membership on a condition. In csQCA membership is binary while in fsQCA fuzzy sets support intermediate values to express a degree of membership. Consequently, categorical and continuous variables — most independent variables in this study or in any study on resources — are not readily supported.

This study adopts a novel semi-parametric method, Rule Ensembles, which combines advantages of set-theoretic methods and parametric regression models. Rather than attempting to identify archetypical configurations characterizing the resources, strategy, and environment patterns of specific firms, this technique identifies specific ‘rules’, that is combinations of conditions on venture characteristics that either contribute to, or detract from, business performance. A Rule Ensembles model structurally resembles a linear regression equation in that it takes the form of a linear combination of terms whereby every term is assigned a coefficient that reveals the strength and direction of the effect it exerts on the dependent variable. However, terms are not individual variables but rules. Specifically, these rules are defined on one or more independent binary, categorical, and/or continuous variables and each new venture may satisfy none, one, many, or all the identified rules.

Several motivations lie at the basis for our choice to deploy Rule Ensembles. First, it shares some of the attractive qualities of set-theoretic methods, such as: (1) the identification and automatic selection of variable conditions which allow for the discovery of multifaceted interdependencies; and (2) the discovery of complex relationships between dependent and independent variables without hypothesizing an exact functional form. Second, Rule Ensembles provides distinct advantages over the aforementioned techniques: (1) it contains a parametric component next to the non-parametric rules: linear relationships between a single independent variable and the dependent variable can enter the model; (2) Rule Ensembles is flexible in terms of input data as it supports any mix of continuous, categorical, and dichotomous independent variables; and (3) it is highly suitable for the analysis of large data samples whereby the desired outcome value is rare within the sample (for example, superior performance) and might be reached through diverse and possibly distinct combinations of rule conditions that may apply to only a handful of cases. Third, Rule Ensembles offers several instruments that facilitate model interpretation. *Rule coefficients* represent the strength of the relationship between a rule and the dependent variable and can be interpreted in a similar

way as a (standardized) linear regression coefficient. *Rule support* represents the proportion of cases to which the rule applies. *Rule importance* combines the rule's coefficient and its support, scaled to 100 percent for the most important rule. *Variable importance* is obtained by aggregating all rule importance scores in which a variable appears, weighted for the number of unique variables within each rule. *Rule lift* is a measure of rule quality describing how much more likely an outcome is occurring for cases satisfying the rule, in comparison to the full data sample. Translated to the context of this study, any lift value larger than one implies that superior new venture profitability (that is, the consequent) occurs more often for ventures fulfilling the rule (that is, the antecedent), while a lift value of one indicates the absence of a relation between superior performance and rule fulfillment. In other words, the larger the rule lift, the higher the probability of the consequent given the antecedent. For further technical details of Rule Ensembles and their estimation process, we kindly refer the reader to Friedman and Popescu (2008). In this study, we operationalize Rule Ensembles using the Rulefit procedure (Friedman and Popescu 2012) in R (R Core Team 2019).

Table 2 about here

Results

Overview of Results

Table 2 reports the results of the Rule Ensembles analysis for determining new venture profitability (shortened to “profitability” throughout this section). Seven rules constitute our configurational model (Table 2 columns), which adopts 10 of the 11 variables included in our data set (Table 2 rows, with absent variables shaded). The first three columns of Table 2 list the three domains within our framework, their underlying constructs, and indicator/variable names. The fourth column reports the variable importance. The first four rows of Table 2 contain the rule's number (ordered by importance), coefficient, support, and lift. Rules #3 and #5, with negative coefficients, appear to significantly hinder profitability ($\beta = -17.18$; -

10.90), whereas the other five rules, with positive coefficients, enhance it ($\beta = 113.60; 77.43; 17.05; 15.33; 5.68$).

We learn from Table 2 that all performance-contributing rules are characterized by a lift exceeding the value of one and, thus, significantly increase the likelihood of superior profitability for new ventures that live up to the rule conditions. Rules with a negative coefficient, in contrast, appear to have a lift close to or equal to zero (0; 0.11), which suggests they significantly reduce the probability of superior profitability relative to the ‘independent situation’ (that is, rule conditions [the antecedent] and new venture performance [the consequent] are unrelated [that is, lift = one]). This finding is confirmed by the rule support, which has been captured by two numbers (that is, Table 2, [X/Y] in row 3). The first number (X) represents the amount of new ventures in our sample that did attain superior profitability over their first three years of operation and to which the rule conditions apply. In other words, they have successfully adopted the rule. The second number (Y) refers to the amount of new ventures that also lived up to the rule conditions yet did not yield any superior profitability. We learn from Table 2 that Rules #1, #2 and #6, with positive coefficients, are exclusively adopted by new ventures with superior profitability (with one company exception for Rule #6), whereas Rules #3 and #5, with negative coefficients, are essentially adhered to by non-superior-performing new ventures (with four company exceptions for Rule #5).

The cells in Table 2, displaying resource positions for a specific rule, provide multifaceted information on each of the 28 rule conditions. We first indicate whether the rule is valid for high, medium, and/or low values of the relevant variable (first line). For example, for Rule #2 to occur founder management experience needs to be low (L). Second, we list the exact rule condition and cut-off value(s) determined by our configurational model (second line). With respect to Rule #2, on top of the other rule conditions, it appears that management experience needs to be between one and six years for the rule to take effect ($> 1y$ and $\leq 6y$). Finally, we account for the percentage of new ventures in our sample that meets this rule element (third line). Close to one in three new ventures in our data set (30 percent) seems to be run by individuals with a low level of management experience. A cell-based examination of Table 2 reveals that rules are built of two to five rule conditions. This initial observation already differentiates our study from configurations

detected in previous work. For example, the study of Haddoud et al. (2018) used fsQCA to track configurations of managerial characteristics supporting small and medium-sized firms' export intention. Similarly, Mallon et al. (2017) used fsQCA to investigate which combinations of human, social, and financial capital consistently lead to new family venture growth in terms of employees. The configurations detected in these studies, however, comprise two to three elements maximum each. As in these studies, in our results too no rule capitalizes on a single condition, hence no universalistic effects emerge. Where a rule consists of more than one rule condition, the rule should be interpreted as satisfying all rule conditions.

The Contribution of Each Domain

Table 2 shows that all three domains contribute to the seven rules. Apart from marketing differentiation, all variables in the model contribute to at least one of the rules. Overall, the rules are dominated by founder resource variables – albeit these represent 8 of the 11 variables. The variable importance (column 3) indicates the contribution of each variable relative to the most important variable – self-financing (normalized to 100 percent). Other founder resource variables vary in importance from 24 percent (start-up experience) to 69 percent (industry experience). Four rules in our model (Rules #1, #2, #3, and #7) all encompass technology differentiation (a strategy component domain) together with multiple indicators of founder resources. Technology differentiation emerges as the second most important variable in our model (72 percent), closely followed by industry experience (69 percent), and environmental munificence (65 percent). Munificence, our only environment domain variable, contributes to one rule (rule #3).

Rule #3 illustrates an interaction between all three theoretical domains derived from the RBV, strategy, and entrepreneurship literature. As such, it acts to confirm the empirical value of our configurational approach. It stipulates that founders should refrain from implementing a low to medium technology differentiation strategy ($< 50/100$) if their start-up is to compete within a munificent environment ($> 50/100$) if their team has third medium-high level education ($\geq 3/5$) and medium-high moderate to high management

experience ($> 5.5y$). On the other hand, three rules are comprised only of founder resources (that is, Rules #4, #5, and #6). Rule #4 associates a high amount of founding capital ($> 140k\text{€}$) and a medium level of self-financing (> 33 percent and ≤ 75 percent) with superior profitability. This combination of founder financial capital conditions has been successfully followed by 26 of the 194 new ventures with superior profitability, next to six new ventures without superior profitability (row 3: rule support).

Discussion

Overall, the results of the study extend current understanding of the impact of interactions between founder resources, strategy, and the environment on new venture performance. We seek to advance theoretical development by engaging in what Shepherd and Suddaby (2017) describe as pragmatic empirical theorizing. That is, we use insights from our empirical investigation that cannot be easily explained by current theories as a trigger for further theorizing. The process becomes one of abduction, which is central to the logic of discovery.

Configurations – Aiming for Parsimony from Complexity

In general, scientific enquiry is concerned with developing simplified abstractions of the real world (Godfrey-Smith 2009). Like configurational models developed in other domains of organizational studies (for example, Ketchen, Combs, Russell, Shook, Dean, Runge, Lohrke, Naumann, Haptonstahl, Baker, Beckstein, Handler, Honig, and Lamoureux 1997; Lacoursière, Fabi, and Raymond 2008), our model was created to identify parsimonious representations of the often multifaceted and inherently complex reality in new ventures. While moderators to the founder–new venture performance relationship have been investigated before, founder resources, business strategy, and environmental conditions have not been previously combined in a configurational model of superior new venture performance, with the exception of the new technology-based firms focused study of Garcia-Cabrera et al. (2019) discussed before. We argue that our theory-informed yet abductive analysis approach sits between the inductive qualitative

research and deductive quantitative research that dominate the entrepreneurship field (Shepherd and Suddaby 2017). Hence, our study can be best viewed as theory elaboration, in that it elaborates theoretical links not previously addressed in the literature (Lee, Mitchell, and Sablinski 1999). We do not suggest that a configurational approach is superior to other approaches, but that it has the potential to make an important contribution towards our collective progression of knowledge and theory (Ott et al. 2017). Indeed, insights from studies on configurations may lead to avenues for further qualitative and quantitative research on (new) venture performance.

Configurations at the 'Rule' Level of Analysis. Our approach based on Rule Ensembles differs from other configurational approaches within strategy and organization studies. Prior contributions encompass either ideal types derived from a priori theoretical assumptions (for example, Mintzberg 1979; Garcia-Cabrera et al. 2019) or empirically-derived configurations that are abductively developed through theory-informed studies (for example, Ganter and Hecker 2014). Regardless of which approach is taken, configurations, so far, describe holistic organizational arrangements and, therefore, exist at the unit of analysis of the organization. In contrast, our approach adopts 'rules' as the unit of analysis for configurations, which are specified multivariate interdependencies between elements that make up the configurational model. An organization may adopt any number of rules, which represent a level of analysis somewhere between 'the organization' and its constituting elements (for example, founder indicators, strategic components, and environmental conditions). This provides researchers with an opportunity to gain a more accurate representation as well as a deeper understanding of organizational phenomena (Friedman and Popescu 2008), thereby opening new lines of research that can sit beside more traditional methods. In fact, insights generated through Rule Ensembles conveniently lend themselves to be tested by traditional regression techniques, or to be elaborated further through richer, case-based exploration (Ganter and Hecker 2014; Marx et al. 2014).

From Single Resources to Bundles. In line with the RBV, our findings show that the value of resources is derived from bundles of interdependent resources rather than a single resource in isolation (Barney and Clark 2007). Black and Boal (1994) distinguish between four different types of resource interdependencies.

They suggest that resources can complement (one plus one equals two), substitute (one plus one equals one), enhance (one plus one equals three), or suppress (one plus one equals zero) one another. Rules #1, #2, and #7 seem to suggest that founder start-up experience and founder management experience may substitute each other vis-à-vis profitability. The same applies for founding capital and self-financing across Rules #1, #2, #4, #6, and #7. When one of these variables is incorporated in a rule, the other one is not (for example, Rule #1, #6, and #7: founder financial capital; Rule #1 and #2: founder human capital). Or, when a rule condition requires a high amount of one of these resources, another condition within the same rule puts a restriction on its substitute (for example, Rule #7: medium to high management experience and no start-up experience; Rule #4: high founding capital and restricted self-financing).

As previously mentioned, Rules #1 and #2 seem to suggest that a medium to high amount of founder bonding social capital benefits profitability, but only when complemented by a low amount of founder bridging social capital. Short of its complement, founder social capital must be limited to a somewhat lower range in order to add value (for example, Rules #6: bridging social capital, and #7: bonding social capital). Additionally, high environmental munificence appears to require high technology differentiation (Rule #3). Kelley and Rice (2002) already found that the development of a portfolio of technology is critical for new ventures, especially those operating in highly dynamic industries. Insufficient technology differentiation within munificent environments appears to obstruct new venture performance, at least for those firms run by post-secondary educated entrepreneurs with medium to high management experience (that is, Rule #3).

To find out if any suppressing or enhancing resource relationships occur within our model, we plotted the significant interaction effects in surface plots, thereby accounting for the averaged effect of all other model variables (Friedman and Popescu 2008). Figure 1 shows the interaction effect of founder bonding social capital and founding capital on profitability, while Figure 2 illustrates the joint impact for founder industry experience against founder management experience on profitability.

Figures 1 and 2 about here

Figure 1 illustrates how the positive influence of founding capital on profitability is enhanced by cumulative bonding social capital, and vice versa. A peak in profitability is reached when high founder bonding social capital is associated with high founder founding capital. Figure 2, in contrast, indicates that a mixture of founder industry experience and founder management experience is most favorable for profitability when there is a fairly high (yet not extreme) level of industry experience and low level of management experience. At both low and high levels of founder industry experience its contribution to profitability appears to be increasingly counterbalanced or ‘suppressed’ by cumulative levels of founder management experience. A trough in profitability is reached for firms managed by founders low in industry experience yet high in management experience.

Unsure about the mechanism that governs the relationship between founder bonding social capital and founding capital, we speculate that a substantial amount of the money made available by the founders at start-up could originate from their network of friends and family. We already pointed out that these intimate emotional ‘strong ties’ may grant the founder access to specific resources, advice, and ad hoc assistance (Davidsson and Honig 2003). We now posit that this might be particularly true when these ties are financially involved in the firm. Such synergy of bonding social capital and founding capital should make the founder better equipped for the financial and non-financial challenges ahead and, thus, may enhance new venture performance.

A plausible explanation for the interaction effect of founder industry experience and management experience can be found in the RBV (Barney 1991) and human capital literature (Bates 1990). As a source of generic abilities with a broad scope of applicability (Gimeno et al. 1997), management experience has been shown to stimulate cognitive reasoning and individual problem-solving (Chandler and Lyon 2009). Industry experience, in contrast, is commonly considered a source of more venture-related abilities, such as the ability to ‘read’ the market and anticipate changes in customer preferences (Shane and Stuart 2002). Industry experience is, therefore, believed to be better suited than management experience as a source of competitive advantage. However, for it to remain valuable to the firm, industry experience must be up-to-date (Cohen and Levinthal 1990), which involves incessantly scanning the environment for venture-related

knowledge (West and Noel 2009). Since individual effort and time are limited, founders' firm-internally oriented company management responsibilities, though beneficial at first, might interfere with their firm-externally oriented industry investments. This may trigger a situation in which the founder's industry-related contribution to new venture performance is reduced. In order to validate this line of thought additional research is imperative.

Complicated Founder Resources Configurations

Our results confirm that founder characteristics are essential determinants of new venture performance. Indeed, they take part in every rule of our configurational model. Yet, we need to be careful in interpreting their effect. More is apparently not always better. Inspection of Table 2 reveals that out of the 23 rule conditions involving founder resources, only nine unambiguously state that more resources improves profitability (that is, a positive rule coefficient without upper cut-off value in the rule condition), with five of them being related to founder financial capital. This finding is at odds with a widespread perspective in entrepreneurship literature and the RBV, which presumes that greater amounts of a resource (not only those provided by the founder) benefit the firm (for example, Barney 1991; Chandler and Hanks 1994).

Accordingly, our results seem to be more in line with research advancing a nuanced view on the relationship between firms' resources and performance. This research not only adopts the idea that more resources do not necessarily lead to higher performance, but also acknowledges that the (non-linear) resource-performance relationship differs between types of resources (Davidsson and Honig 2003; Mishina, Pollock, and Porac 2004). X-inefficiency theory (Leibenstein 1969), for example, states that performance will decrease from a certain resource level onwards because of inefficient behavior. Other studies draw on behavioral theory in order to understand the differential performance impact of resource slack levels (for example, Hmieleski, Carr, and Baron 2015; Kiss, Fernhaber, and McDougall-Covin 2018), through mechanism such as managerial discretion, risk-taking, organizational change, and innovation. Our findings indeed show curvilinear effects to some extent, with a growing effect in the lower ranges of a resource, a

maximum for medium levels of the resource, and a declining effect for ‘too much’ of the resource. We see this, for example, with founder bridging social capital across Rules #1, #2, #5, and #6. One possible explanation is that the ventures can better develop their organizational processes based on the (growing) information set of more bridging ties. Beyond a certain point, however, increasing levels of bridging social capital become unproductive because the owners face limits in dealing with the diversity of information and lose focus or fail to deviate from the status quo. Building on Hmieleski et al. (2015), it does not come as a surprise that in two cases (Rules #1 and #2) we observe this pattern to appear in the creative context of medium to high technology differentiation, pushing the ventures to scan the market for information in order to try to be (come) different from the competitors.

Still, our analysis also reveals that new venture profitability benefits from both low and high values of founder resources (for example, bonding social capital across Rules #1, #2, and #7; start-up experience across Rules #1 and #7), as would be the case with a U-shaped curvilinear relationship. An explanation here could be that having very few bonding (strong) ties allows the owners the flexibility to develop the venture as they see fit. With a fairly high number of strong ties, the owners can afford to deviate from the vision/opinion of some strong ties because these can be played against one another. In the case of a moderate number of strong ties, it becomes more likely that the strong ties have much more influence on the venture’s management and that it grows far more difficult to develop one’s own vision as a founder. Further, in the detected rules we also observe a profitability penalty for both high and low values of a founder resource (for example, the level of education across Rules #3 and #5) as well as a penalty and benefit for identical values of founder resources (for example, industry experience across Rules #5 and #6; management experience across Rules #3 and #7).

On the one hand, our study, thus, provides support that a configurational approach is a useful perspective to study new ventures which, consistent with case study research (for example, Heirman and Clarysse 2004), shows that reality is more complex than previously thought and studied in quantitative research adopting a ‘more is better’ logic. On the other hand, it confirms additional research on the specifics of the discovered configurations is required to better understand and explain the complex interdependencies

between these variables. Recent research on (for instance) strategy formation can be very informative in this respect (Ott and Eisenhardt 2020; Ott et al. 2017).

Negative Influence of Bridging Social Capital. Prior work suggests that bridging social capital has a positive influence on new ventures by extending access to knowledge flows and resources. As a consequence, this facilitates opportunity discovery (De Carolis and Saporito 2006), stimulates innovation (Tortoriello and Krackhardt 2010), and supports opportunity exploitation (Davidsson and Honig 2003; Arrègle et al. 2007). However, our findings consistently indicated that higher levels of bridging social capital (BSC) were detrimental to profitability. Rules #1, #2 and #6 reveal a positive influence on profitability for low BSC, whereas Rule #5 shows a negative influence of medium-high BSC. The earlier studies mentioned above investigate the linear, main effect of BSC, and control for only a limited number of founder resources or environmental and strategy elements. In contrast, our findings suggest that, when considered in combination with these other factors, BSC has a negative impact.

Seeking a theoretical explanation for this finding, we draw on the attention view of management (Ocasio 1997). Indeed, managerial cognition scholars have consistently identified that attention of senior management shapes organizational response (Barr, Stimpert, and Huff 1992; Kaplan 2008). Although speculative, we propose that founders with strong BSC tend to engage with broad networks that shift their focus and attention away from the core issues needed to progress their new venture. Consequently, this leads to poorer new venture performance. Moreover, scholars have found that managerial cognition is particularly important when dealing with uncertain environments (Barr 1998; Garud and Rappa 1994; Tripsas and Gavetti 2000). This is consistent with our finding that low BSC can be beneficial when the venture was engaging in high technology differentiation (Rules #1 and #2), where we can expect the market and technology environment to be more munificent.

Complicated Influence of Financial Capital. Our findings confirm that financial capital is critical for new venture performance. Self-financing appears prominent as a factor improving profitability, as it is the most influential variable in our model (100 percent variable importance). It allows for more autonomy and flexibility in decision-making (Huyghebaert and Van de Gucht 2007). Founding capital also has a positive

influence, which again is well known from prior literature (Chandler and Hanks 1998; Goddard et al. 2005; Nunes et al. 2012).

However, our findings also extend conventional notions of the role of financial capital in new venture performance. A first extension relates to non-linear interaction. Rule #4 is the only universal rule combining variables from a single category of resources – a high level of founding capital, combined with a medium level of self-financing. In other words, we identify a positive interaction effect between founding capital and a curvilinear (inverted U) for self-financing. Prior research has identified a curvilinear relationship between the wealth of founders and startup performance, finding that high levels of wealth lead to a decline in performance (Hvide and Moen 2010). They suggest that excessive wealth may induce a less alert or a less dedicated management. We find a similar, but slightly different effect – the level of founding capital itself is not curvilinear, but rather the percentage of self-financing is curvilinear. We propose that a mix of self-financing and external investors acts to counteract the possible negative inattention identified by Hvide and Moen (2010) if the venture were fully self-financed. On the other hand, in line with Huyghebaert and Van de Gucht (2007), we concur that a threshold level of self-financing (we find 33 percent) is needed to ensure autonomy and flexibility in decision-making, and to guard against asymmetric information between investors and founders (La Rocca, La Rocca, and Cariola 2011).

A second extension concerns the substitution of resources: high self-financing for founding capital. Our findings suggest that self-financing (Rule #1) may substitute for founding capital (Rule #2) under some circumstances. Specifically, both rules (#1 and #2) operate under condition of high technology differentiation, low bridging social capital, and high bonding social capital. Under these conditions, the combination of high self-financing plus start-up experience (Rule #1) substitutes for the combination medium-high founding capital plus managerial experience.

Implications for Practice

Collectively the “simple rules” discussed above (Table 2) provide a set of “rules of thumb” for entrepreneurs to follow (the positive rules) or avoid (the negative rules), when starting new ventures. Depending on the environmental context and technology differentiation of their products/services, the rules provide a set of guidelines for seeking financing and the new venture’s team composition. Importantly, entrepreneurs may choose more than one option. We have summarized these rules and possible pathways, both to follow and avoid, visually in Figure 3.

Figure 3 about here

Limitations and directions for future research

This study is not without its limitations, which suggest promising opportunities for future research. First, although we opted for a suitable and powerful novel method to explore new venture configurations, and our choice of constructs was carefully guided by a theoretically informed model, the technique remains sensitive to the measures that are used. While the richness and comprehensiveness of the available survey data that was developed to study new venture performance is no doubt a strength of the study, we were nonetheless restricted to the choice of measures available in START. More specifically, in addition to environmental munificence, prior research suggests environmental dynamism is an important moderator of the venture strategy-performance link (Cai et al. 2016; Fainshmidt et al. 2019). Future configurational research on new venture performance could look to include both. Next, because of our focus on new ventures, we did not include organizational resources. Yet, in high growth ventures organizational resources might become highly relevant as growing firms might need more formalized processes, systems, routines, and practices to implement their strategy. As such, future research on developing ventures might add these organizational resources to the configurations.

Second, our study used measures of managers' perceptions of the external environment. Although some research suggests managerial cognition may be more important than objective external environment (Csaszar and Ostler 2020), they are not the same thing. Above we discussed that some of our unexpected findings related to bridging social capital may be driven by unobserved managerial cognition in our study. This suggests that a fruitful line of enquiry might investigate the role of managerial cognition in organizational configurations – both as a category of variables that interacts with environmental variables to affect firm performance (Kiss and Barr 2017) as well as a mediator that links the environment to strategic choices in the formation of different organizational configurations (Nadkarni and Barr 2008).

Third, while the availability of external, longitudinal, and objective financial performance data to measure our dependent variable is an advantage, it is not without its own limitations. We use new venture profitability, specifically industry-adjusted ROA over the first three years of operation, as our measure of new venture performance. While this is consistent with earlier research (for example, Robb and Watson 2012; Zahra et al. 2000), limiting the time horizon to three years may be too short for some ventures to achieve profitability. Moreover, measuring new venture performance is widely acknowledged as problematic (Murphy, Trailer, and Hill 1996). Next to profitability, new venture growth, a prominent outcome of interest in entrepreneurship scholarship, might be looked at in future research (Arrègle, Batjargal, Hitt, Webb, Miller, and Tsui 2015; Hmieleski and Baron 2009). Interestingly, Rule Ensembles may yield quite different results because drivers of firm growth are likely to be different to drivers of profitability (Davidsson, Steffens, and Fitzsimmons 2009; Nason and Wiklund 2018; Steffens, Davidsson, and Fitzsimmons 2009). Future research could distinguish between configurations leading to high growth and high profitability, configurations leading to low growth and low profitability, and configurations stimulating one (growth or profit) at the detriment of the other. We invite future work to advance on these points.

Fourth, though our results provide empirical evidence for the existence of rule-based configurations, our approach remains abductive. Compared to inductive research methods such as case studies, these abductive insights remain coarse and somewhat opaque (albeit generalizable to a wider empirical context than case

studies). Consequently, follow-up research is needed that carefully describes, theoretically grounds, and empirically validates the interdependencies between the different elements of the configurations we found.

Finally, our sample is restricted to specific Flemish new ventures, of an age between one to three years, and with one to forty-nine employees. Moreover, the study examined the first three years of new ventures started between 2003 and 2009, a period that introduced a European economic slowdown. Future research is warranted to validate whether the configurations we found can be generalized to a larger set of new ventures, other geographic regions, and different economic cycles.

Conclusion

We introduce a novel technique, Rule Ensembles, to advance a configurational approach to new venture performance. We conduct an abductive investigation using a sample of 853 new ventures to investigate the impact on new venture profitability of the interdependencies among the founder(s)'s resources (human, social, and financial capital), the firm's strategy, and environmental munificence. These rules are at a level between an organization's overall configuration and the individual variable and may be combined to represent an overall configuration. Our analysis identified five multivariate interdependencies (rules) that enhance new venture profitability and two that reduce it. All seven rules represent "complicated" relationships between variables that advance our understanding of new venture performance. Our study demonstrates that the Rules Ensemble technique offers considerable promise as a fresh approach to configuration studies in entrepreneurship and management more generally.

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Table 1
Variables Included in the Analyses

Domain	Construct	Variable Name	Type/Description	Mean	SD
FOUNDER RESOURCES	Human Capital	Number of founders	Number of business founders actively involved with management of the new venture	1.53	0.78
		Level of education	Highest obtained education level of the business founder: 1 – primary education or lower secondary education; 2 – higher secondary education; 3 – bachelor’s degree; 4 – master’s degree (not university); 5 – university master’s degree	2.77	1.25
		Management experience	Amount of company management experience accumulated by the business founder (years)	11.02	7.78
		Industry experience	Amount of industry experience accumulated by the business founder (years)	14.34	8.40
		Start-up experience	Dummy indicating whether the business founder has already engaged in entrepreneurship	0.64	0.48
	Social Capital	Bridging social capital	Scale ^a representing the business founder’s bridging social capital (Appendix)	33.34	23.48
		Bonding social capital	Scale ^a representing the business founder’s bonding social capital (Appendix)	23.09	24.45
	Financial Capital	Founding capital	Amount of financial capital made available by the founder at start-up (k€)	59.23	203.93
		Self-financing	Percentage of financial capital provided by the founder relative to the total amount of financial capital (percent)	67.05	37.33
STRATEGY	Differentiation	Marketing differentiation	Scale ^a representing new venture technology differentiation (Appendix)	40.98	24.51
		Technology differentiation	Scale ^a representing new venture marketing differentiation (Appendix)	60.44	16.87
ENVIRONMENT	Munificence	Environmental munificence	Scale ^a representing environmental munificence (Appendix)	51.34	22.27

Note: ^a Factor scores are rescaled and expressed as a score between 0 and 100.

Table 2
Rule Ensembles Results for Determining New Venture Profitability (NVP)

Rule Number (Rule Importance)			1	2	3	4	5	6	7	
Rule Coefficient			113.60	77.43	-17.18	17.05	-10.90	15.33	5.68	
Rule Support			8/0	9/0	0/43	26/6	4/66	18/1	117/35	
Rule Lift			2	2	0	1.63	0.11	1.89	1.54	
Construct	Variable Name	Rule Importance →	100%	72%	35%	30%	28%	21%	21%	
FOUNDER RESOURCES	Human capital	<i>Variable Importance ↓</i>								
		<i>Level of education</i>	46%		M-H [≥ 3/5] (47%)		L-M [< 5] (87%)			
		<i>Management experience</i>	51%		L [> 1y and ≤ 6y] (30%)	M-H [> 5.5y] (70%)			M-H [> 5.5y] (70%)	
		<i>Industry experience</i>	69%					L-M [≤ 23.5y] (86%)	L-M [< 15y] (52%)	
		<i>Start-up experience</i>	24%	YES [= 1] (64%)						No [= 0] (36%)
	Social Capital	<i>Bridging social capital</i>	52%	L [> 5/100 and ≤ 26.7/100] (26%)	L [≤ 25/100] (42%)			M-H [> 12.5/100] (77%)	L [> 2.5/100 and ≤ 7.5/100] (3%)	
		<i>Bonding social capital</i>	45%	M-H [> 33.3/100] (25%)	H [≥ 50/100] (13%)					L-M [≤ 50/100] (88%)
	Financial Capital	<i>Founding capital</i>	40%		M-H [> 22k€] (34%)		H [> 140k€] (6%)			
		<i>Self-financing</i>	100%	H [> 95%] (50%)			M [> 33% and ≤ 75%] (22%)	L [≤ 10%] (13%)	H [> 95%] (50%)	H [> 95%] (50%)
	STRATEGY	Differentiation	<i>Marketing differentiation</i>							
<i>Technology differentiation</i>			72%	H [≥ 62.5/100] (23%)	M-H [> 12.5/100] (84%)	L-M [< 50/100] (59%)			M-H [> 20/100] (79%)	
ENVIRON- MENT	Munificence	<i>Environmental munificence</i>	65%			M-H [> 50/100] (48%)				

Note: H (High), M (Medium), L (Low); rule cut-off values are displayed between '['']; sample percentages that satisfy a rule condition are displayed between '(')'; by balancing the dependent variable distribution in our data set, rule lift is constrained between 0 and 2.

Appendix

Factor Structure for Founder Social Capital, Environmental Munificence, Marketing Differentiation, and Technology Differentiation.

<i>Items (answers varied from 1=entirely disagree to 5=entirely agree)</i>	Bridging SC	Bonding SC	Env. Mun.	Mkt. Diff.	Techn. diff.
<i>Our business network enables us to identify market opportunities</i>	0.75	0.05	-0.01	0.09	0.00
<i>Our business network provides us with solutions for operational problems we struggle with</i>	0.76	0.02	-0.06	-0.04	0.01
<i>Our business network is important for the further development of our firm</i>	0.90	-0.11	-0.05	0.00	0.07
<i>Our business network leads to more customers, new staff and better suppliers</i>	0.81	0.07	-0.01	0.05	0.01
<i>We often receive advice and support from professional friends on issues related to our company</i>	0.54	0.31	0.08	-0.04	-0.05
<i>We get support from family, friends and acquaintances when developing company policy</i>	-0.01	0.78	0.01	0.05	-0.04
<i>Using family, friends and acquaintances, we acquire products and services cheaper and/or faster</i>	0.07	0.76	0.05	-0.05	-0.04
<i>Because of our family, friends and acquaintances, we are able to easily acquire external and/or wide-ranging financing</i>	0.10	0.74	0.04	-0.10	-0.02
<i>Within our industry there are many opportunities for new product introduction</i>	-0.06	0.06	0.79	0.08	0.03
<i>Within our industry consumer demand for new products is growing</i>	-0.04	0.12	0.84	0.13	-0.09
<i>Within our industry market demand for new products is growing</i>	-0.06	0.09	0.85	0.07	-0.05
<i>Our industry offers many opportunities for technological innovation</i>	-0.01	-0.04	0.69	-0.14	0.15
<i>Demand for new technology in our industry is growing</i>	-0.02	0.01	0.84	-0.10	0.06
<i>New technology is needed for growth in this industry</i>	0.03	-0.03	0.74	-0.14	0.09
<i>Within our industry there are many attractive opportunities for future growth</i>	0.08	-0.12	0.60	0.19	-0.09
<i>We intend to offer our customers a better service (after sales) compared to our competitors</i>	0.09	-0.16	0.11	0.74	-0.13
<i>Our main objective is to offer our customers products/services of superior quality</i>	0.11	-0.22	0.11	0.65	-0.13
<i>Our customer facilities (for example, shops, offices, showrooms) are superior to those of our competitors</i>	-0.11	0.25	-0.15	0.41	0.28
<i>This business deals with its sales process more professionally than its competitors</i>	-0.03	0.05	-0.10	0.67	0.19
<i>We offer our customers more choice (bigger scope) compared to our competitors</i>	-0.08	0.22	0.02	0.56	0.10
<i>Our competitors find it difficult to imitate our products/services</i>	-0.05	0.08	-0.13	0.01	0.77
<i>Our products/services are more up-to-date than those of our competitors</i>	0.01	0.04	0.06	0.12	0.73
<i>Our products/services are unique compared to those of our competitors</i>	-0.02	-0.03	-0.06	0.11	0.78
<i>This business intends to develop new and/or advanced technologies and processes</i>	0.08	-0.06	0.08	-0.09	0.79
<i>This business makes use of new and/or advanced technologies and processes</i>	0.04	-0.09	0.13	-0.07	0.72
<i>This business has turned its use of new and/or advanced technologies and processes into a company strong point</i>	0.05	-0.09	0.19	-0.03	0.69
Cronbach's alpha	0.84	0.73	0.87	0.64	0.89

Extraction Method: Principal Components Analysis, Promax rotation. To compute the factors we made use of the following formula to obtain one single score from 0 to 100: $F = ((S - V) / ((V \cdot W) - V)) \times 100$ with S equal to the sum of all initial values, V referring to the number of variables and W representing the number of scale points.