Venture Capital Winners: A Configurational Approach to High Venture Capital-Backed Firm Growth

Accepted for publication, British Journal of Management

Thomas Standaert\textsuperscript{a,b}, Mirjam Knockaert\textsuperscript{b,c}, Sophie Manigart\textsuperscript{a,d}

\textsuperscript{a} Ghent University
Department of Accounting, Corporate Finance and Taxation
Sint-Pietersplein 7
9000 Ghent, Belgium

\textsuperscript{b} Ghent University
Department of Marketing, Innovation and Organization
Tweekerkenstraat 2
9000 Ghent, Belgium

\textsuperscript{c} Technical University of Munich
TUM Entrepreneurship Research Institute
Arcisstraße 21
80333 München, Germany

\textsuperscript{d} Vlerick Business School
Reep 1
9000 Ghent, Belgium
ABSTRACT

The positive effect of venture capital (VC) on firm growth has been widely documented. However, there exists a large variation in growth of VC-backed firms, with only a small number reaching a substantial size. Prior studies have linked the variation in growth of VC-backed firms to differences in resource endowments of the entrepreneurial top management team, the firm or the venture capitalist, without considering their potentially complex interactions. In addition, the literature has taken strong growth aspirations in VC-backed firms as a given, without examining potential variation hereof, and its potential implications. Therefore, this study aims at examining which configurations of resource portfolios and growth aspirations lead to high VC-backed firm growth. In order to do so, it takes an inductive, theory-building approach, and builds upon fuzzy-set qualitative comparative analysis (fsQCA). Our results show that strong growth aspirations in the entrepreneurial top management team are a necessary condition for high VC-backed firm growth. Furthermore, we identify four configurations which, in combination with strong growth aspirations, may lead to high VC-backed firm growth.
INTRODUCTION

Venture capital (VC), referring to equity or equity-linked investments targeted at the launch, early growth or expansion of innovative, growth-oriented ventures (Vanacker and Manigart, 2013), has received considerable attention from policy makers. This interest is explained by a rich academic literature demonstrating the positive effect of VC on firm growth (see Manigart and Wright (2013) for an overview). Nevertheless, not all VC-backed firms grow to the same extent: the variance in growth is significant (Ruhnka et al., 1992), in line with the wide variation in returns realized by venture capitalists (VCs) (Cochrane, 2005).

Differences in venture performance and growth can be examined through the lens of resource-based theories (Alvarez and Busenitz, 2001). Viewing firms as bundles of resources, Penrose (1959) suggested that it is not only the availability of resources, but especially the complementary and reinforcing interaction between resources that creates a competitive advantage, which leads to superior firm growth (Kor and Mahoney, 2000). However, research in the VC literature has typically been dominated by “net-effects thinking”, decomposing resource portfolios of VC-backed firms and focusing on the net effects of specific resources (Baum and Silverman, 2004; Colombo and Grilli, 2010; Cumming et al., 2017; Devigne et al., 2013). This focus on the unique contribution of a particular resource gets in the way of understanding how multiple resources combine in complex ways (Clarysse et al., 2011) and how such combinations lead to high VC-backed firm growth.

While resource portfolios are particularly relevant in understanding firm growth, they may not be sufficient. Growing a firm is difficult and risky and requires a substantial investment of time and effort from entrepreneurs (Autio and Acs, 2010). Entrepreneurs are only willing to make these investments if they have strong growth aspirations (Davidsson, 1989). Entrepreneurs of firms seeking external finance, including VC, have in general stronger growth aspirations than those who prefer internal finance (Cosh et al., 2009). Nevertheless, considerable variation in growth aspirations of entrepreneurs is also likely to exist among firms attracting VC (Wasserman, 2017). Therefore, in this study, we will explore how growth aspirations and resource bundles play together to fuel growth in VC-backed firms.
In order to do so, we employ a configurational approach which emphasizes that causality is complex in that it is often characterized by three features (Meyer et al., 1993): 1) conjunctural causation, which means that outcomes rarely have a single cause but rather result from the interdependence of multiple conditions; 2) equifinality, which entails more than one pathway to a given outcome; and 3) asymmetry, which implies that attributes “found to be causally related in one configuration may be unrelated or even inversely related in another” (Meyer et al., 1993, p. 1178). A configurational approach allows to both empirically and theoretically probe into the questions of (i) which resource portfolios lead to high VC-backed firm growth and (ii) how these resource portfolios lead to high VC-backed firm growth (Fraser et al., 2015).

Specifically, we utilize an inductive theory-building approach relying on qualitative comparative analysis (QCA), aiming at developing a mid-range theory of high VC-backed firm growth. QCA is a methodology that uses set theory to conceptualize causal attributes, or conditions, and outcomes of interest through a set-theoretic analysis of subset relations (Fiss, 2007). As such, we overcome the drawbacks of other techniques such as linear regression models for which interpreting interactions of more than two conditions is challenging (Vis, 2012).

In the next section, we present the theoretical framework used to build the configurational model. Thereafter, we elaborate on our methodology and summarize our results. Finally, we build theory from our findings, discuss the contributions and limitations of our study, and offer suggestions for future research.

**THEORETICAL FRAMEWORK**

Our guiding theoretical framework is grounded in the resource management framework for managers’ resource-focused actions (Sirmon et al., 2007). A resource management model includes structuring the resource portfolio, bundling resources to build capabilities and leveraging capabilities to gain a competitive advantage and create value. As such, this model helps to explain how heterogeneity in firm outcomes results from choices made in the structuring, bundling, and leveraging of resources (Sirmon et al., 2007).
For some entrepreneurs, but not for all, firm growth will be an important outcome. The concept of growth aspirations captures how important this outcome is for a given entrepreneur (Davidsson, 1989). For understanding firm growth, it is hence not only important to consider the portfolio of resources available to the firm, but also how entrepreneurs aspire to grow their venture.

**Resource portfolio**

Resource portfolios are defined as the unique types and amounts of resources that a firm possesses at a given point in time (Black and Boal, 1994). While every resource has the potential to contribute to firm development, it is the mix of resources that determines whether or not such potential is realized. Configurations of resources are important, rather than “resources as singular distinct items” (Black and Boal, 1994), as resources are suggested to be “nested in and configured with one another” (Black and Boal, 1994) and to be most effective when they form “bundles of complementary resources and capabilities” (Barney and Zajac, 1994). Based on extant resource-oriented firm growth literature (e.g. Nason and Wiklund, 2018), we expand hereafter on the resources that are relevant to a configurational model of high VC-backed firm growth, including financial capital, physical capital, technological capital, human capital, and organizational capital resources (Grant, 1991).

**Financial capital resources.** Inadequate financial resources are often cited as the primary reason for why firms are not able to pursue growth opportunities and ultimately fail (Chandler and Hanks, 1998), as financial resources are the most flexible type of resources and can be used to obtain other resources. Moreover, specific finance providers like VCs bring additional resources such as access to networks or legitimacy (Manigart and Wright, 2013). As such, the mobilization of financial resources is one of the key challenges entrepreneurs face as they start and grow their ventures (Brush et al., 2001). Empirical evidence suggests that firms that experienced high growth have typically been able to raise large amounts of financial capital (Puri and Zarutskie, 2012). While all firms in our study successfully raised VC, the amount of financial capital raised may differ significantly.

**Physical capital resources.** Physical capital refers to tangible assets such as property, plant, and equipment (Penrose, 1959). They are utilitarian in producing a product or service (Brush et al., 2001). While physical capital took a particularly prominent place in early resource-based theories, its
importance is currently more limited following recent phenomena such as outsourcing and cloud services which have become substitutes for the firm’s own physical capital (Poppo and Zenger, 1998). However, physical resources may still be particularly relevant to firms not calling upon substitutes (Foss, 1997).

**Technological capital resources.** Technological capital resources refer to patents, copyrights, trademarks, and trade secrets (Barney, 1991). Such resources allow innovative firms to protect their intellectual property from imitation. Patents are especially important to create value and are one of the key technological resources of innovative firms (Lee et al., 2001; Knockaert et al., 2013). Considering patents as technological capital resources is in line with our theoretical perspective, as patents are surrogates for underlying firm-specific capabilities and processes relating to knowledge management and inventive capacity, and are simultaneously valuable, rare, inimitable and non-substitutable (Markman et al., 2004). Patents provide the right to exclude others from producing based upon the invention, and also serve as a valuable signal towards other potential resource providers (Hsu and Ziedonis, 2013).

**Human capital resources.** Human capital refers to the skills and knowledge that individuals acquire through education and experience (Becker, 1964). Human capital contributes most to success if it consists of task-related knowledge and skills, i.e. human capital that relates to the current tasks of the top management team (TMT) members (Unger et al., 2011). By consequence, both the TMT’s start-up experience and functional diversity are of particular importance, as we explain in what follows.

One important dimension of task-related human capital in a new venture context is the TMT’s *start-up experience* (Unger et al., 2011). Such experience points to the cumulative number of start-ups founded by the members of the TMT prior to joining the current TMT (Delmar and Shane, 2006). Hence, start-up experience provides knowledge of organizing routines and skills in which new ventures are initially disadvantaged (Westhead et al., 2005). It also provides knowledge of what roles are necessary in firms, and who should fill those roles (Brüderl et al., 1992). Moreover, start-up experience generates a network of employees, investors, customers, and suppliers (Hsu, 2007). It finally offers TMT members the opportunity to learn from prior mistakes (Ucbasaran et al., 2010).
A second dimension of task-related human capital is related to the degree to which TMT members are complementary in terms of their functional backgrounds (Ensley and Hmieleski, 2005). Functionally diverse TMTs possess a broad range of task-related experiences, information, and perspectives relevant to the TMTs’ work (Foo et al., 2005). Functional diversity therefore allows TMTs to draw upon greater cognitive resources, thereby stimulating effective decision-making (Bunderson and Sutcliffe, 2002). Considering functional diversity in the context of our study is particularly relevant as VC-backed firms typically deal with non-routine, complex tasks. Functional diversity has been considered particularly pertinent in dealing with situations which consist of ill-defined, novel problem solving, as opposed to routine problem solving (Filley et al., 1976).

Organizational capital resources. Organizational capital refers to a firm’s formal reporting structure, its formal and informal planning, controlling and coordinating systems, as well as informal relations among groups within a firm and between a firm and those in its environment (Barney, 1991). In the context of VC-backed firms, we distinguish between four sources of organizational capital: outside boards, advisory boards, VCs, and affiliations with corporations of universities.

The outside board refers to the collective of outside directors of a firm (Pearce and Zahra, 1991). Outside directors are neither members nor relatives to the firm’s current or immediate past TMT, nor employees of the firm (Pearce and Zahra, 1991). The provision of resources by the outside board is a function of the outside board capital (Pfeffer and Salancik, 1978), which consists of both the human capital of its members, or their assembly of skills and knowledge, and their relational capital, or ties to other organizations and individuals (Hillman and Dalziel, 2003). Outside directors can hence provide the TMT with complementary skills and knowledge (Knockaert and Ucbasaran, 2013) and facilitate the firm’s access to additional resources (Hillman and Dalziel, 2003).

Another source of organizational capital is embedded in the advisory board, or quasi-board (Zahra et al., 2011). Advisory boards operate in parallel with outside boards (Morkel and Posner, 2002). They are similar in that they provide resources through their board capital (Zahra et al., 2011). However, the outside board is appointed by the firm’s shareholders, whereas the advisory board is appointed by the TMT (Akers and Giacomino, 2004). Further, advisory boards have no fiduciary duties like outside
boards, and as such advisory board members have no legal responsibilities. As advisory boards are voluntarily established by the TMT, they are less common than boards of directors.

While VCs typically take a board seat and thus become outside directors (Vanaelst et al., 2006), they can also provide resources through direct interaction with the TMT (Sapienza et al., 1996): they regularly meet or telephone with members of the TMT outside of board meetings (Knocckaert et al., 2006). Generally, VCs open up their networks of customers, suppliers and strategic partners (Hochberg et al., 2007), assist in the recruitment of TMT members (Hellmann and Puri, 2002) and enhance firm legitimacy towards other financial resource providers (Vanacker et al., 2014). However, VCs are not homogeneous. Specifically, independent VCs operate alongside VCs affiliated with corporations or with the government (Wright and Robbie, 1998). The difference in ownership and governance structure between these investor types leads to the development of distinct institutional logics, which may in turn affect the impact of VCs for firm resource provision (Pahnke et al., 2015).

Finally, in comparison to independent firms, spin-offs can benefit from resources provided through their corporate or academic affiliation (Fryges and Wright, 2014). At the time of start-up and during the process of business development, spin-offs may therefore be endowed with a superior resource base compared to independent start-ups as they have access to resources from the corporation or university (Rasmussen and Wright, 2015). These resources include access to laboratories and research facilities; R&D collaborations; or advice from former colleagues.

**Growth aspirations**

While the resource portfolio establishes the upper bounds of a firm’s potential value creation (Makadok, 2003), the realized value creation will depend on how the available resources will be bundled to build capabilities, how these capabilities will be leveraged to exploit market opportunities, and eventually contribute to high VC-backed firm growth (Sirmon et al., 2007). The degree to which entrepreneurs will leverage their resources to grow their firm will depend on their growth aspirations, defined as their desire for growth (Davidsson, 1989). High growth requires a substantial investment of time and effort, which entrepreneurs with weak growth aspirations are not willing to make (Autio and
Acs, 2010). Hence, in the entrepreneurship literature, differences in growth aspirations have been used to explain firm growth outcomes (Davidsson, 1989).

The literature examining VC-backed firm growth is based on the implicit assumption that entrepreneurs in firms backed by VCs have strong growth aspirations. On average, entrepreneurs of VC-backed firms have stronger growth aspirations compared to entrepreneurs without external funding (Cosh et al., 2009). Nevertheless, there are reasons to believe that there exists considerable variation in their growth aspirations, even among entrepreneurs of firms that raised VC (Wasserman, 2017). First, the true growth aspirations of entrepreneurs are not easily observable or quantifiable by VCs at the time of application. Entrepreneurs frequently use impression management tactics to present themselves favourably towards prospective investors or even to deceive them (Collewaert et al., 2021). Entrepreneurs with weak growth aspirations who successfully used these impression management tactics may therefore end up securing VC (Cosh et al., 2009). Second, entrepreneurs can negatively adjust their growth aspirations due to changes in the perception of the external environment (Dutta and Thornhill, 2008) or disagreements with VCs on organizational goals and policies (Higashide and Birley, 2002). Therefore, entrepreneurs that initially started with strong growth aspirations may evolve towards more modest aspirations as their firms develop or as the environment changes.

SAMPLE AND METHODOLOGY

Sample

In order to discover configurations of resources and growth aspirations associated with high VC-backed firm growth, our study relies on a unique, hand-collected dataset of VC-backed firms located in the Dutch province of North Brabant and the Belgian region of Flanders, combining information from surveys and secondary data sources. Our motivation to consider these two regions is based upon a strive for obtaining a considerable number of responses, while simultaneously securing a high degree of homogeneity in terms of geographical and institutional factors. First, these geographically adjacent regions are homogeneous in terms of their level of economic development (European Commission, 2015) and culture (Kaasa et al., 2016). Second, both regions are among the highest scoring regions in
Europe in terms of their innovation performance (European Commission, 2018). Third, the ratios of VC investments to GDP are very similar for the countries in which the regions are situated (OECD, 2014).

We used Thomson Reuters’ Thomson One, Bureau van Dijk’s Zephyr and Crunchbase to identify all firms headquartered in North Brabant or Flanders that received a first VC round between 2004 and 2014, i.e. in the ten year period before the date at which we administered the survey (April 2, 2014). This identification process resulted in 158 (254) firms located in North Brabant (Flanders). Next, Bureau van Dijk’s Orbis Europe was used to check the legal status of the firms. Between the time of receiving their first VC round and the date of the survey, 35 (32) firms from North Brabant (Flanders) had ceased to exist or had been acquired by another firm, resulting in an initial sample of 123 (222) firms from North Brabant (Flanders).

Simply asking entrepreneurs to fill out our survey would result in very low response rates (Hsu, 2004). We therefore sought the endorsement of the largest regional government VC of North Brabant and a Flemish fund-of-funds. Our choice to collaborate with these two parties was motivated by their prominence in their region’s VC industries. The regional VC was the most important VC in North Brabant during the period 2004-2014 with investments in 43 firms. The Flemish fund-of-funds had invested in 20 of the 30 Flemish VC funds raised between 2004-2014 and indirectly invested in 99 Flemish firms.

In April 2014, we addressed a survey to these VC-backed firms. First, the portfolio companies of the regional government VC and the portfolio companies of the funds the fund-of-funds invested in were notified by about our survey. Second, all CEOs received an email containing a link to an online survey. We targeted the CEOs as they are expected to possess the most knowledge about the firm’s activities, and to play a central role in strategic direction and day-to-day management of the firm (Wales et al., 2013). After reminder emails and phone calls, we finally obtained 65 usable responses (18.8% response rate), which is in line with other VC studies (e.g. Colombo et al., 2019; George et al., 2016; Lahti, 2014; Luukkanen et al., 2013).

In a longitudinal study design, survey information obtained in 2014 is combined with financial statement information from 2013 to 2017 to assess firm growth. Due to missing financial statement
information, the final sample size drops to 50 (13 from North Brabant and 37 from Flanders). Two-tailed t-tests (p < 0.05) did not reveal significant differences regarding firm age, firm size, and firm growth between respondents and non-respondents. However, the share of firms active in life sciences is significantly higher for our sample (26%) compared to the group of non-respondents (12%). While our sample of 50 VC-backed firms is small for traditional regression techniques, our analytical approach, qualitative comparative analysis (QCA) is especially developed to tackle the challenges of small samples (Ragin, 2008).

**Analytical approach**

Whereas conventional-based approaches, such as linear regression models, treat causal relationships as the covariation between independent and dependent variables, QCA identifies commonalities across cases in the form of consistent subset relations between theoretically relevant attributes, or conditions, and outcomes of interest (Ragin, 2008). Accordingly, QCA is rooted in Boolean algebra and aims to identify necessary and sufficient subset relationships that associate with the outcome of interest. QCA exceeds the capability of traditional methods to deal with the complexity of organizational phenomena, as witnessed by the proliferation of its use in recent management literature (e.g. Campbell et al., 2016; Greckhamer, 2016; Misangyi and Acharya, 2014) and the calls for its use in the entrepreneurship literature (Douglas et al., 2020).

The first step in QCA analysis is to calibrate the data into “sets”, based upon best practices. The second step is to analyse the data with the aim of identifying necessary and sufficient (combinations of) conditions that are associated with the outcome of interest (Greckhamer et al., 2018).

**Measures and calibration**

The specific set-theoretic tool we utilize is fuzzy set QCA (fsQCA). Therefore, all variables must be calibrated into crisp sets and fuzzy sets. Crisp sets define membership status as either “fully in” or “fully out” of a given set. In contrast, fuzzy sets allow to account for the varying degrees of membership of cases in a set by using the anchor 1 to designate “fully in” a particular set, 0 for non-membership, and 0.50 as the point of maximum ambiguity or crossover point, neither in nor out of a particular set. Both
substantive and theoretical knowledge should be used when calibrating and translating measures into set membership scores (Ragin, 2008). Table 1 shows descriptive statistics of the raw (uncalibrated) measures, and Table 2 provides an overview of our calibration strategy, which we elaborate on hereafter.

[Insert Table 1 about here]

[Insert Table 2 about here]

**Outcome**

*High firm growth.* Firm growth is measured in two ways: as the average annual absolute change in the number of employees and in total assets (Vanacker et al., 2017), both measured from 2013 to 2017. Information was retrieved from Orbis Europe. In case the firm was acquired before 2017, we consider the period between the end of 2013 and the end of the fiscal year prior to the year during which the acquisition occurred (Davila et al., 2003). Zephyr and web searchers were used for the identification of acquisitions (Huyghebaert and Luypaert, 2013). An acquisition occurred for 30% of the firms in our final sample. As the outcome (average firm growth) is on average measured 3.4 years after the conditions, which are assessed at the time of the survey, our design allows for testing causality.

We focus on changes in employment and total assets rather than in sales, as a sizeable proportion of the firms in our sample are either too young to generate sales or are active in an industry in which they may spend years in research and development before bringing a product or service to the market, such as the life sciences industry. Therefore, the change in the number of employees and total assets is a more relevant indicator of growth than sales for these types of firms (Gilbert et al., 2006).

We use the average annual absolute change measures as the time span for which firm growth is evaluated depends on whether and when the firm was acquired. We did not use relative growth measures as initial firm size highly influences a relative growth measure (Shepherd and Wiklund, 2009).³

Table 1 shows that the mean (median) firm in our sample grows on average with 3.83 (0.88) employees and 584,109 (110,395) euros in total assets per year. We now have to calibrate firms into
the set of high growth VC-backed firms. The literature on VC-backed firm growth does not provide us with a clear definition of high growth in a VC-backed firm, however. In order to avoid using an arbitrary threshold for high VC-backed firm growth, we turn to the literature on VC successes (Kaplan and Lerner, 2010). As only 20% of VC investments can be considered successes (European Investment Fund, 2017), we take the 80th percentile of employment (total assets) growth in our sample, or an average annual growth with 8 employees (696,595 euros), as the minimum threshold for being considered fully in the set of high growth VC-backed firms.

*Conditions*

The data used to construct the measures for the conditions are collected through the survey, unless specified otherwise.

**Financial capital resources** For each firm, we compute the total VC funding and long-term debt raised (in millions of EUR) at the time of the survey. Total VC funding raised is computed by aggregating the invested amounts over all VC rounds prior to the survey date, as identified in the Thomson One, Zephyr, and Crunchbase databases. Total long-term debt funding raised is collected using the firm’s financial statement information provided by Orbis Europe. The mean (median) firm in our sample raised EUR 5.2M (EUR 3M) of financial capital resources.

In order to calibrate financial capital resources, we use European VC investment data in 2014 to define the thresholds and crossover point (Dealroom, 2019). We set the “fully in” threshold to EUR 6.6M, which corresponds to the median investment amount of a Series B round. Firms whose total funding raised is lower than EUR 3.6M, or the median investment amount of a Series A round, are considered to be fully out of the set. The crossover point is set at EUR 5.1M (halfway point; Fiss, 2011).

**Physical capital resources.** We scale tangible fixed assets by total assets, and use this ratio as a proxy for the firm’s physical capital, as we are interested in understanding the impact of a strong reliance on tangible fixed assets, rather than the impact of firm size, proxied by the level of total assets. The data required for computing the ratio is collected using the firm’s financial statement information. The average (median) firm in our sample has 9% (4%) of tangible fixed assets. We code firms as 1, or
fully in this set, if the ratio exceeds the value of 0.44, which corresponds to the value of the median firm in Cassar and Holmes (2003) for a sample of 1,555 Australian SMEs. We code firms as fully out (0) of this set if the ratio equals 0. The crossover point is set at the halfway point (0.22) (Fiss, 2011).

**Technological capital resources.** For each firm, we collect the total number of patents and applications from the PATSTAT database at the time of the survey. The mean (median) firm in our survey already had or had successfully applied for 2.28 (1) patents. The relevant distinction is between firms that have at least one or no patent (Helmers and Rogers, 2011). Accordingly, we code firms as fully in the set (1) if they had at least one patent or a patent application that was subsequently granted at the time of the survey. All other firms are coded as fully out of the set (0).

**Human capital resources.** Following previous studies (e.g. Delmar and Shane, 2006), we measure start-up experience as the cumulative number of start-ups founded by the members of the TMT prior to joining the TMT. The mean (median) TMT in our sample has experience in 1.1 (0) prior start-ups. We consider firms managed by TMTs without prior start-up experience to be fully out of the set. Based on the sample distribution, we further assign membership scores of 1 (“fully in”) if the TMT founded five or more start-ups, and 0.80 (“mostly in”) for 2 to 4 start-ups founded.

We compute the TMT’s functional diversity using Blau’s index (1977), which is the most commonly employed measure for diversity (Harrison and Klein, 2007). The index score is calculated as \(1 - \sum P_i^2\), where \(P_i\) is the proportion of unit members in category \(i\). In our case, \(P_i\) represents the proportion of the TMT members’ working experiences in the following six functional areas: management; marketing, sales and promotion; accounting, controlling and financing; R&D and engineering; production; and human resources (Cantner et al., 2010). Values of Blau’s index can range from zero to \((i-1)/i\). In our sample, the functional diversity index ranges from 0 to 0.82, and has an average (median) score of 0.58 (0.66). This is close to the average value of 0.68 found by Cantner et al. (2010) for a sample of 337 German start-ups. We decide to use this value as the crossover point in the set. We code firms as fully in the set (1) if the Blau’s index exceeds the value of 0.80, which corresponds approximately to the 90\(^{th}\) percentile of all firms. Firms with a value of 0 are coded as fully out of the set (0).
**Organizational capital resources.** The size of the outside board, measured as the number of outside directors, is a proxy for *outside board capital* (Knockaert and Ucbasaran, 2013). The mean (median) firm in our sample has 3.2 (3) outside board members. Based on the median value of 3 for the outside boards in 16,140 VC-backed firms found by Amornsiripanitch et al. (2019), we set the qualitative threshold for being more in than out of the set to three outside directors. Based on the sample distribution, we further code firms as 1, or fully in this set if the number of outside directors is five or higher; 0.80 (“mostly in”) for 4 outside directors; 0.60 (“more in than out”) for 3 outside directors; 0.40 (“more out than in”) for 1 to 2 outside directors; and 0 (“fully out”) for no outside directors.

36% of all firms in our sample have an advisory board. We generate a crisp set to indicate the presence of an *advisory board*. Firms with an advisory board are coded as fully in the set (1), whereas those firms without an advisory board are coded as fully out of the set (0).

We capture the influence of investor types by building two crisp sets that indicate whether the (lead) investor is either an *independent VC* (44% of the firms in the sample) or a *government VC* (44% of the firms in the sample) (Bertoni et al., 2015). Our focus on the lead investor is particularly relevant as non-lead investors typically take a more passive role, and rely on the lead investor for managing the relationship with the portfolio firm (Manigart et al., 2006). Furthermore, the lead investor is also considered as the party bringing the most resources to the firm (Wright and Lockett, 2003). We identify the lead investor as the VC that has made the largest investment in the firm at the time of the survey (Hochberg et al., 2007). Information on VCs and their investments is collected from Thomson One, Zephyr, and Crunchbase. To correct for potential misclassifications of investor types (Bertoni et al., 2015), we checked for potential affiliations to corporations or institutions using information available on the investor websites.

48% of all firms in the sample have a *corporate or academic affiliation*. We generate a crisp set to indicate whether a firm has a such affiliation. Firms that emerged from a corporation or university are coded fully in the set (1), whereas independent firms are coded as fully out of the set (0).

**Growth aspirations.** Respondents were asked to indicate on a 7-point Likert scale (1-strongly disagree to 7-strongly agree) how strongly they agreed with the following statements (Cassar, 2006, 2007): “I would like that, within 5 years, my firm has become as large as possible” and “I would like
that, within 5 years, my firm has reached a size I can manage on my own, or with the support of a relatively small number of people” (reverse coded) (Cronbach’s alpha = 0.68). We combine the scores for the two items into a single measure by calculating their average (Knockaert et al., 2015). In contrast to a common assumption in the VC-literature, the average (median) entrepreneur in our sample scores only 3.64 (4) on this 7-point Likert scale, which is average, rather than consistent with a high-growth mindset.

We code firms as 1 (“fully in”) if the average score is higher than or equal to 6; 0.60 (“more in than out”) for an average score between 4 and 6; 0.40 (“more out than in”) for an average score of 4; 0.20 (“mostly out”) for an average score between 2 and 4; and 0 (“fully out”) for an average score less than or equal to 2.4

RESULTS

QCA analysis identifies which conditions are necessary or sufficient to realise the outcome, i.e. high firm growth, through set-theoretic measures of consistency and coverage (Ragin, 2008), which serve analogous purposes of significance and effect sizes in regression analysis. Consistency gauges the degree to which configurations, or cases sharing a given combination of conditions, agree in displaying the outcome. Coverage, by contrast, assesses the degree to which a configuration accounts for instances of the outcome. Tables 3 (focusing on change in employment) and 4 (focusing on change in total assets) summarize the configurations identified through our analyses, following the notation of Ragin and Fiss (2008) and Greckhamer (2016). Full squares or circles indicate the presence of a condition and crossed out squares or circles indicate the absence of a condition.

[Insert Tables 3 and 4 about here]

To identify which individual conditions are necessary for the outcome to occur, we conduct necessity analysis. For a condition to be deemed necessary for the outcome, it should exhibit minimum consistency. Therefore, we use a recommended consistency score threshold of 0.90 (Ragin, 2008;
Schneider and Wagemann, 2012). As indicated by the large squares in Tables 3 and 4, strong growth aspirations, with a consistency score of 0.95, are the only condition to exceed this threshold. This suggests that strong growth aspirations of the TMT are a necessary condition for high VC-backed firm growth.

Strong growth aspirations are insufficient on their own for producing high VC-backed firm growth, but they operate in conjunction with the firm’s resource portfolio. In the next step, sufficiency analysis allows us to reveal which configurations are sufficient for the outcome, based upon the well-established consistency score threshold of 0.80 (Ragin, 2008). Consistent with prior small-N QCA studies (e.g. Haxhi and Aguilera, 2017), we set the case frequency threshold for a configuration to be included in the sufficiency analysis to 1.

As output of the sufficiency analysis, the fsQCA software generates a complex, an intermediate, and a parsimonious solution. Used together, the intermediate and parsimonious solutions allow researchers to identify “core” and “contributing” conditions. Core conditions are part of both intermediate and parsimonious solutions. Contributing conditions only occur in intermediate solutions. In other words, core conditions are those for which “the evidence indicates a strong causal relationship with the outcome of interest” (Fiss, 2011, p. 394), whereas contributing conditions are those for which “the evidence for a causal relationship with the outcome is weaker” (Fiss, 2011, p. 394). In Tables 3 and 4, large circles indicate core conditions, while small circles refer to contributing conditions. Blank cells indicate that that particular causal condition is not relevant within that solution configuration.

Our sufficiency analysis reveals the existence of four distinct resource portfolios leading to high VC-backed firm growth, in combination with strong growth aspirations. Interestingly, the four configurations leading to growth in employment (Table 3) are exactly the same as those leading to growth in total assets (Table 4), underlying the robustness of our findings. Further, while TMT’s start-up experience contributes to achieve high growth in all configurations, it is never a core condition. Technological capital resources, measured as whether or not a firm has a patent granted, is not associated with any configuration; its contribution to growth is hence not essential.

The four configurations that lead to high VC-backed firm growth are the following. Configuration 1, labelled as “Physical assets”, includes firms with high levels of physical capital. These
firms need a functionally diverse top management team to achieve high growth, but should not have an affiliation with a corporate or university. Outside board capital and government VCs may further contribute to growth. Configuration 2, labelled as “Intangible investments”, includes firms with high levels of financial capital resources but low physical capital resources, implying that they use their financial capital mainly to invest in intangible assets (like R&D or marketing and sales). They need an advisory board to grow, while an independent VC may further contribute to growth. Configuration 3, labelled as “Homogeneous TMT”, highlights that VC-backed firms with a TMT with low functional diversity needs high outside board capital and an independent VC to achieve high growth. A corporate or university affiliation may further contribute to growth. Finally, “Spin-offs”, the fourth configuration, need a functionally diverse TMT to grow, with outside board capital and a government VC as contributing conditions.

DISCUSSION

A mid-range theory of high VC-backed firm growth

Concentrating on the set-theoretical logic reflected in the configurations summarized above, we further develop a mid-range theory of high VC-backed firm growth. In line with the principle of equifinality, we identified four configurations of growth aspirations of the TMT and resource portfolios leading to high VC-backed firm growth.

To further aid our interpretation of the results, we scheduled online semi-structured interviews with two VC investment managers early in July 2020. Investment manager X has 20 years of experience as an investor in early-stage ICT firms. Investment manager Y has 6 years of investment experience in the life sciences industry. During both interviews, we asked both interviewees to think about one of their portfolio companies that had demonstrated high growth. For each of the conditions included in our configurational model, we then asked them whether and how these had contributed to the high growth outcome. Where relevant to the interpretation of our results, we have added quotes of these interviews to this section.
Our results indicate that strong growth aspirations in the TMT are key to produce high VC-backed firm growth, as strong growth aspirations are present in all four configurations. Figure 1 visualizes the 50 cases on a scatterplot with our measure for growth aspirations on the x-axis and the average annual absolute change in the number of employees on the y-axis. First, we visualize that growth aspirations vary widely across VC-backed firms. Second, all VC-backed firms that subsequently are able to grow, are consistently characterized by strong growth aspirations of the TMT. This suggests that strong growth aspirations are a necessary condition for high VC-backed firm growth. In other words, in the absence of strong growth aspirations, high VC-backed firm growth will simply not happen. This finding extends prior research on the relationship between entrepreneurs’ growth aspirations and venture growth to the context of VC-backed firms, and emphasizes its importance, irrespective of resource provision. Therefore:

*Proposition 1. Strong growth aspirations of the TMT are a necessary condition for high VC-backed firm growth.*

When the necessary condition of strong growth aspirations is fulfilled, high VC-backed firm growth outcomes can be realized through four distinct configurations. In the first configuration, firms need to invest in physical assets. Managing these assets requires a functionally diverse TMTs to grow, but no corporate or university affiliation. Outside board capital may help to support this growth. The strong reliance on physical capital resources may deter independent VCs from investing in these firms, as evidenced by investment manager X’s opinion on investments in physical capital as “*being totally wrong*”. However, their high potential for employment growth makes them interesting targets for government VCs, as employment generation is one of their objectives (Colombo et al., 2016). Given the highly tangible nature of firm assets, investment decisions are more akin to lending decisions than to “typical” VC investments in risky ventures. For this set of firms, the role of government VCs thus corresponds with that of a “scout”, screening for firms with high growth potential and a capable TMT (Minola et al., 2017).
Proposition 2. Firms with high levels of physical capital resources require a functionally diverse TMT to grow, whereby outside directors and a government VC can further contribute to growth.

Configuration 2, “Intangible assets” points to VC-backed firms that are poor in terms of physical capital, but at the same time, are rich in financial capital. This suggests that these firms invest heavily in intangible assets including R&D or sales and marketing. In order to do so, high levels of organizational capital are needed to grow, especially when provided through an advisory board. Investment manager X referred to a Belgian Software as a Service (SaaS) company that has raised more than EUR 18M. While the firm did not have an advisory board early in its lifetime, it was later installed to get answers to strategic questions such as “where should we sell our product?” and “how is the market evolving?”.

In this set of firms, an independent VC may further actively contribute to firm growth. This finding thus draws the attention to advisory boards as a contingent source of organizational capital in VC-backed firms. Therefore, we suggest:

Proposition 2. High growth of VC-backed firms with high levels of financial capital resources and low levels of physical capital resources involves the presence of an advisory board.

Configuration 3, “Homogeneous TMT” may be interpreted as firms managed by TMTs with low functional diversity. In order to grow, they need to source organizational capital from both resource-rich outside boards and independent VCs. This finding is congruent with the notion of complementarity between these two sources of organizational capital to VC-backed firms facing the challenge of a homogenous TMT. As such, it bridges the gap between research on the role of outside boards (Vandenbroucke et al., 2016) and investor types (Cumming et al., 2017) in explaining differences in VC-backed firm growth outcomes. First, large outside boards have been found to alleviate the concerns of homogeneous TMTs through their high board capital (Vandenbroucke et al., 2016). However, larger outside boards also increase the risk of conflict, threatening the outside board’s efficiency (Eisenberg et al., 1998). Our results suggest that independent VCs play an important role in safeguarding the efficiency of the resource provision by the outside board. According to investment manager X, it is
common practice for independent VCs to appoint an independent board member who can “moderate...when outside directors are not on the same page”. Additionally, the superior growth performance of firms backed by independent VCs has been linked to the larger resource endowments of independent VCs vis-à-vis other types of VCs (Pahnke et al., 2015). Our results show that the resource endowments of outside boards with high board capital, as proxied by the larger size of the outside board, are complementary to those of independent VCs and lack of resources in TMT, suggesting the presence of both conditions in order for high VC-backed firm growth to occur. Thus, we formulate the following proposition:

Proposition 3. High VC-backed firm growth involves high outside board capital and independent VCs working as complements to TMTs with little functional diversity.

Configuration 4 consists of spin-off from corporate or academic institutions. The parent company or academic institution are instrumental in providing organizational capital resources (Rasmussen and Wright, 2015). Investment manager Y used the metaphor of “an umbilical cord that must not be cut”. In addition, in order to grow, these firms should be managed by functionally diverse TMTs. TMTs that are diverse in terms of members’ task-related backgrounds are better able to handle complex and non-routine tasks, which benefits firms in turbulent environments, such as that of the commercialization of corporate or academic technology (Bjornali et al., 2016). Our results indicate that government VCs, as a source of organizational capital, and outside board members, play a contributing rather than core role in the high growth of these firms.

Proposition 5. Corporate or academic spin-offs need functionally diverse TMTs to grow, while outside boards and government VCs can further contribute to grow.

Theoretical contributions and practical implications

Our study generally contributes to management and entrepreneurship literatures, calling for the embracement of causal complexity in the study of entrepreneurial phenomena (Douglas et al., 2020).
We followed a configurational approach, which encompasses the key theoretical contribution of our study, as it provides a better understanding of the set of conditions under which VC-backed firms demonstrate high growth. Our analyses identified four distinct configurations leading to high growth in both employment and assets. This shows that VC-backed firms can grow with very different resource endowments. But for all configurations, entrepreneurs with strong growth aspirations are key, even in the context of VC-backed firms: we did not find any configuration that allowed firms to grow despite entrepreneurs having below-average growth aspirations. Interestingly, while the TMTs’ start-up experience may contribute to growth in all configurations, it is never essential. Finally, we failed to find a role for technological resource endowments in fuelling growth in VC-backed firms: they are neither a resource that contributes to growth, nor are they a deterrent.

As such, our study provides additional insights over and above the “net-effects thinking” that has traditionally dominated research on VC-backed firm growth. Through its configurational approach, our study also contributes to a number of other literatures. Specifically, it helps in reconciling contradictory findings in the corporate governance and VC literatures by offering a contingency approach into when (1) high outside board capital is beneficial and (2) government VCs are instrumental in reaching high firm growth, and by pointing to specific resource portfolios as contingency factors. It further adds to the corporate governance literature by pointing to the important role of advisory boards, a corporate governance mechanism which has been highly overlooked (Zahra et al., 2011), for specific firms.

Our study also has important implications for practitioners, including ambitious entrepreneurs, VCs, and policy makers. To entrepreneurs, our study provides guidance in the resource acquisition process, enabling entrepreneurs to focus their efforts on building resource portfolios that are conducive to high firm growth. Having start-up experience is helpful, but not a major factor, to build a high-growth firm. To independent VCs, we highlight the complementarity of large outside boards and the valuable role of advisory boards in their portfolio companies. Furthermore, we contribute by showing that, next to considering the resource portfolio of investment proposals, assessing the growth aspirations of the TMT is highly important and should be a key priority. To policy makers, our study shows that government VCs can be effective in supporting high firm growth, but only if their investments are
focused on firms with high levels of physical capital resources or spin-offs managed by functionally diverse TMTs. Furthermore, as our study points to the importance of growth aspirations, policy makers could focus on introducing formal institutions which are conducive to strong growth aspirations (Estrin et al., 2013) and establishing a growth-oriented culture through education and promotion of role models (Capelleras et al., 2019).

**Limitations and avenues for future research**

As most studies, our study is not free of limitations. First, we have used fsQCA for the analysis of VC-backed firms that were active and independent at the time we constructed the sampling frame. Using a panel data set including longitudinal observations of both surviving and failed firms would allow for a more prudent configurational analysis while also addressing potential survivorship bias concerns. Second, while the resources included in our configurational model are theoretically relevant, we acknowledge that more fine-grained attributes could provide additional insights. For example, our failure to find a significant role for technological capital resources might be driven by our focus on patents. Including, for example, R&D expenses as an alternative technological capital resource might provide a more nuanced picture. Further, future research could examine the specific resources embedded within outside board capital, advisory board, VC, and corporation or academic institutions at the micro-level. How are the resources provided by these external stakeholders combined to enhance firm value? For example, VCs differ in their experience, sector and investment stage focus, and syndication network. In addition, more specific human capital measures, such as experience in a VC-backed start-up (as opposed to any start-up), could provide deeper insights into the role of task-specific human capital. Also, future research could consider the organizational capital resources that are supplied by non-lead investors. Third, we are aware that environmental contingencies (such as, for instance, dynamism, hostility, complexity, munificence) can potentially affect VC-backed firm growth. Therefore, future research that examines how such contingency conditions influence high VC-backed firm growth should prove fruitful. Fourth, it is possible that our findings cannot be transferred to other institutional settings. Since institutions are likely to affect how resource portfolios can be leveraged.
(Bradley and Klein, 2016), we suggest future research to examine the impact of institutions in configurational studies on VC-backed firm growth.

**CONCLUSION**

This study aimed at developing a mid-range theory of high VC-backed firm growth. To this end, we relied on a resource management theoretical model to develop a framework of relevant theoretical attributes and subsequently used fsQCA for our analytical approach. We find that strong growth aspirations of the TMT are a necessary condition for high VC-backed firm growth, and identify four resource portfolios leading to high VC-backed firm growth. As such, our study provides a significantly better understanding of the combination of conditions leading to high VC-backed firm growth, contributing to both theory and practice.
REFERENCES


Figure 1 Strong growth aspirations as a necessary condition for high VC-backed firm growth
<table>
<thead>
<tr>
<th>Outcome and conditions</th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>St dev</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>High firm growth (change in employment)</td>
<td>50</td>
<td>3.83</td>
<td>0.88</td>
<td>7.65</td>
<td>-6.25</td>
<td>32.5</td>
</tr>
<tr>
<td>High firm growth (change in total assets)</td>
<td>50</td>
<td>584,109</td>
<td>110,395</td>
<td>2,120,461</td>
<td>-1,892,346</td>
<td>12,511,077</td>
</tr>
<tr>
<td>Financial capital resources</td>
<td>50</td>
<td>5.22</td>
<td>3.04</td>
<td>8.07</td>
<td>0.284</td>
<td>53.22</td>
</tr>
<tr>
<td>Physical capital resources</td>
<td>50</td>
<td>0.09</td>
<td>0.04</td>
<td>0.12</td>
<td>0</td>
<td>0.59</td>
</tr>
<tr>
<td>Technological capital resources</td>
<td>50</td>
<td>2.28</td>
<td>1</td>
<td>4.03</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Start-up experience</td>
<td>50</td>
<td>1.1</td>
<td>0</td>
<td>1.66</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Functional diversity</td>
<td>50</td>
<td>0.58</td>
<td>0.66</td>
<td>0.23</td>
<td>0</td>
<td>0.82</td>
</tr>
<tr>
<td>Outside board capital</td>
<td>50</td>
<td>3.2</td>
<td>3</td>
<td>2.09</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Advisory board</td>
<td>50</td>
<td>0.36</td>
<td>0</td>
<td>0.48</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Independent VC</td>
<td>50</td>
<td>0.44</td>
<td>0</td>
<td>0.5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Government VC</td>
<td>50</td>
<td>0.44</td>
<td>0</td>
<td>0.5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Corporate or academic affiliation</td>
<td>50</td>
<td>0.48</td>
<td>0</td>
<td>0.5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Growth aspirations</td>
<td>50</td>
<td>3.64</td>
<td>4</td>
<td>1.66</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>

Note: Descriptive statistics are based on raw (uncalibrated) measures.
Table 2 Calibration strategy

<table>
<thead>
<tr>
<th>Outcome and conditions</th>
<th>Type of set</th>
<th>Assignment of membership scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>High firm growth</td>
<td>Crisp set</td>
<td>• “Fully in” threshold: average annual absolute change in the number of employees of 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Fully in” threshold: average annual absolute change in total assets of 696,595 euros</td>
</tr>
<tr>
<td>Financial capital resources</td>
<td>Fuzzy set</td>
<td>• “Fully in” threshold: EUR 6.6M of funding raised</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Crossover point: EUR 5.1M of funding raised</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Fully out” threshold: EUR 3.6M of funding raised</td>
</tr>
<tr>
<td>Physical capital resources</td>
<td>Fuzzy set</td>
<td>• “Fully in” threshold: tangible fixed assets ratio of 0.44</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Crossover point: tangible fixed assets ratio of 0.22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Fully out” threshold: tangible fixed assets ratio of 0</td>
</tr>
<tr>
<td>Technological capital resources</td>
<td>Crisp set</td>
<td>• “Fully in” threshold: one patent application that was eventually granted</td>
</tr>
<tr>
<td>Start-up experience</td>
<td>Fuzzy set</td>
<td>• “Fully in” threshold: 5 prior start-ups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Mostly in” threshold: 2 prior start-ups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “More in than out” threshold: 1 prior start-up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Fully out” threshold: no prior start-ups</td>
</tr>
<tr>
<td>Functional diversity</td>
<td>Fuzzy set</td>
<td>• “Fully in” threshold: Blau’s index value of 0.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Crossover point: Blau’s index value of 0.68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Fully out” threshold: Blau’s index value of 0</td>
</tr>
<tr>
<td>Outside board capital</td>
<td>Fuzzy set</td>
<td>• “Fully in” threshold: 5 outside directors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Mostly in” threshold: 4 outside directors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “More in than out” threshold: 3 outside directors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “More out than in” threshold: 1 outside director</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Fully out” threshold: no outside directors</td>
</tr>
<tr>
<td>Advisory board</td>
<td>Crisp set</td>
<td>• “Fully in” threshold: advisory board in place</td>
</tr>
<tr>
<td>Independent VC</td>
<td>Crisp set</td>
<td>• “Fully in” threshold: independent VC as (lead) investor</td>
</tr>
<tr>
<td>Government VC</td>
<td>Crisp set</td>
<td>• “Fully in” threshold: government VC as (lead) investor</td>
</tr>
<tr>
<td>Corporate or academic affiliation</td>
<td>Crisp set</td>
<td>• “Fully in” threshold: affiliation with corporation or academic institution</td>
</tr>
<tr>
<td>Growth aspirations</td>
<td>Fuzzy set</td>
<td>• “Fully in”: average score ≥ 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “More in than out”: average score &gt; 4 and average score &lt; 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “More out than in”: average score = 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Mostly out”: average score &gt; 2 and average score &lt; 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “Fully out”: average score ≤ 2</td>
</tr>
</tbody>
</table>

Crisp set: membership status is defined as either “fully in” or “fully out” of a given set; Fuzzy set: membership status of a given set is allowed to vary anywhere in between 0 (“fully out”) and 1 (“fully in”).
## Table 3 Configurations for achieving high VC-backed firm growth (change in employment)

<table>
<thead>
<tr>
<th>Solution</th>
<th>Configuration 1</th>
<th>Configuration 2</th>
<th>Configuration 3</th>
<th>Configuration 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&quot;Physical assets&quot;</td>
<td>&quot;Intangible investments&quot;</td>
<td>&quot;Homogeneous TMT&quot;</td>
<td>&quot;Spin-offs&quot;</td>
</tr>
<tr>
<td>Financial capital resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical capital resources</td>
<td>☐</td>
<td>☩</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technological capital resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human capital resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start-up experience</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Functional diversity</td>
<td>☐</td>
<td></td>
<td>☩</td>
<td>☐</td>
</tr>
<tr>
<td>Organizational capital resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board capital</td>
<td>☐</td>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Advisory board</td>
<td></td>
<td></td>
<td>☩</td>
<td>☐</td>
</tr>
<tr>
<td>Independent VC</td>
<td></td>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Government VC</td>
<td>☐</td>
<td></td>
<td></td>
<td>☐</td>
</tr>
<tr>
<td>Corporate or academic affiliation</td>
<td>☩</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Growth aspirations</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Consistency</th>
<th>Raw coverage</th>
<th>Unique coverage</th>
<th>Overall solution consistency</th>
<th>Overall solution coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistency</td>
<td>0.84</td>
<td>0.12</td>
<td>0.08</td>
<td>0.89</td>
<td>0.42</td>
</tr>
<tr>
<td>Raw coverage</td>
<td>0.83</td>
<td>0.14</td>
<td>0.09</td>
<td>0.93</td>
<td>0.07</td>
</tr>
<tr>
<td>Unique coverage</td>
<td>0.85</td>
<td>0.22</td>
<td>0.11</td>
<td>0.07</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Outcome condition: High firm growth based on the average annual absolute change in the number of employees. Firms with average annual absolute change in the number of employees of more (less) than 8 (80th percentile) are considered fully in (out) of the set of high growth VC-backed firms. Full squares or circles indicate the presence of a condition. Crossed out squares or circles indicate the absence of a condition. Large squares indicate necessary conditions. Large circles indicate "core" or central conditions, which are conditions that are part of both parsimonious and intermediate solutions. Small circles refer to contributing conditions, which are conditions that only occur in intermediate solutions. Blank cells indicate that that particular causal condition is not relevant within that solution configuration.
### Table 4 Configurations for achieving high VC-backed firm growth (change in total assets)

<table>
<thead>
<tr>
<th></th>
<th>Configuration 1</th>
<th>Configuration 2</th>
<th>Configuration 3</th>
<th>Configuration 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial capital resources</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Physical capital resources</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Technological capital resources</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Human capital resources</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Start-up experience</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Functional diversity</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Organizational capital resources</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Board capital</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Advisory board</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Independent VC</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Government VC</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Corporate or academic affiliation</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Growth aspirations</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>Consistency</strong></td>
<td>0.89</td>
<td>0.89</td>
<td>0.86</td>
<td>0.96</td>
</tr>
<tr>
<td><strong>Raw coverage</strong></td>
<td>0.13</td>
<td>0.17</td>
<td>0.24</td>
<td>0.08</td>
</tr>
<tr>
<td><strong>Unique coverage</strong></td>
<td>0.09</td>
<td>0.13</td>
<td>0.12</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Overall solution consistency</strong></td>
<td><strong>0.91</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overall solution coverage</strong></td>
<td><strong>0.46</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Outcome condition: High firm growth based on the average annual absolute change in total assets. Firms with average annual absolute change in total assets of more (less) than 696,595 euros (80th percentile) are considered fully in (out) of the set of high growth VC-backed firms. Full squares or circles indicate the presence of a condition. Crossed out squares or circles indicate the absence of a condition. Large squares indicate necessary conditions. Large circles indicate "core" or central conditions, which are conditions that are part of both parsimonious and intermediate solutions. Small circles refer to contributing conditions, which are conditions that only occur in intermediate solutions. Blank cells indicate that that particular causal condition is not relevant within that solution configuration.
Thomson One, Zephyr and Crunchbase are three commercial databases containing information on VC investments. Thomson One is one of the two longstanding databases in VC research (Kaplan and Lerner, 2017). We complement this dataset with information provided by Zephyr, which has a stronger European focus (Devigne et al., 2013) and Crunchbase, a relatively new database sourcing investment information from community contributors.

While QCA may look similar to cluster analysis, they differ in the types of questions that they can answer. Specifically, cluster analysis can be used to answer questions such as “what cases are more similar to each other?”, whereas QCA is suited to answer questions such as “what configurations of attributes are associated with an outcome of interest?” (Greckhamer et al., 2018).

As prior research has pointed to high concurrent validity across absolute and relative measures of employment growth, either measure is considered suitable in order to study firm growth (Shepherd and Wiklund, 2009).

Even though it seems logical to consider the midpoint of the scale (4) as the point of maximum ambiguity or crossover point, our calibration strategy involves assigning membership scores to the set of firms managed by TMTs with strong growth aspirations. Therefore, we consider firms with a score of 4 to be more out than in this set.

A solution consists of one or multiple configurations (i.e. following the logic of an OR operator), which are combinations of conditions (i.e. logical AND operator) (Schneider & Wagemann, 2012). The three solutions differ in the way they deal with counterfactuals, i.e. logically possible combinations of conditions lacking empirical instances (Ragin, 2008). The complex solution does not make any assumptions on counterfactuals. Counterfactuals are evaluated by means of counterfactual analysis to produce intermediate and parsimonious solutions (Ragin, 2008). Counterfactuals can be distinguished as “easy” or “difficult”. Easy counterfactuals are those consistent with prior empirical evidence and theoretical knowledge, while difficult counterfactuals are those that may be consistent with empirical evidence but not with theoretical knowledge. The intermediate solution considers the easy counterfactuals, while the parsimonious solution produces the most concise result by considering both easy and difficult counterfactuals.