

# Follow the money: funding acquisition processes of nascent ventures

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## ABSTRACT

Answering the call for more process-oriented research into the inception and development of companies, this paper analyses the funding acquisition process of nascent ventures. Based on optimal matching techniques combined with multinomial logistic regression, we identify how the most typical funding acquisition processes of nascent ventures evolve and identify in which circumstances ventures pursue the respective processes. First, and in line with pecking-order theory (POT), we find a standard pattern of founder self-funding. Second, we theorize under which initial conditions, and how, ventures deviate from the path that is set out by POT. The degree of innovativeness and complexity of the venture's offering determine which funding sequence is chosen. With this study we, first, show the importance of initial venture characteristics and strategy for the further resource acquisition and corresponding venture development process and, second, introduce the optimal matching technique to the realm of the entrepreneurship literature.

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## 1. Introduction

Research on resource acquisition in new ventures has shown that financial capital represents the most important venture input, which comes in many different forms and combinations (Lichtenstein and Brush 2001). Founders' equity represents a predominant, default choice of funding strategy (Berger and Udell 1998; Cumming 2005; Gartner, Frid, and Alexander 2012). Next to their own funds, founders can also resort to other financial sources such as equity investments by their families and friends as well as by formal or institutional investors (venture capitalists and business angels). Alternatively, entrepreneurs might approach lenders or attract funding that lays no fixed or residual income claims on the business (e.g. subsidies and grants) (Samuelsson, Söderblom, and McKelvie 2020; Vaznyte and Andries 2019). Because these sources are distinct in terms of the requirements they place on the founders and the nascent ventures (Linder, Lechner, and Pelzel 2019), scholars theorized on the funding choices, developing what has become known as pecking-order theory (POT) (e.g. Cosh, Cumming, and Hughes 2009; Frank and Goyal 2003; Minola, Cassia, and Criaco 2013). Under its formal conditions, POT scholars have argued for one predominant sequence to the process of funding-acquisition: namely founder equity, other internal equity, debt finance and, finally, external equity.

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We will use the core premises of POT and related mechanisms of dealing with asymmetric information to look for systematic variation in the condition and choices of nascent ventures to pursue one financing path versus another, thereby complementing prior work that mainly focuses on the outcomes of finance acquisition (i.e. capital structure) at different points in time (Samuelsson, Söderblom, and McKelvie 2020; Serrasqueiro and Nunes 2012; Vanacker and Manigart 2010). Importantly, though, the POT literature struggles to empirically confirm the predominance of the depicted linear funding acquisition process (Cumming 2005; Frank and Goyal 2003; Robb and Robinson 2014). This struggle is chiefly ascribed to a methodological problem, namely that static data is used to assess propositions about a dynamic process. It hence remains unclear to what extent and under which conditions the theoretical propositions of POT are applicable (Gartner, Frid, and Alexander 2012; Vanacker and Manigart 2010; Vaznyte and Andries 2019).

Our research also addresses the challenge of using static data to make inferences about dynamic processes. Most studies rely on year-by-year data and, thus, a rather static measure for a process that can drastically change within weeks or months (Cassar 2004; Davidsson and Gruenhagen 2020; Gartner, Frid, and Alexander 2012; Samuelsson, Söderblom, and McKelvie 2020). Hence, genuinely process-oriented evidence of the funding acquisition of nascent ventures is limited (Cassar 2004; Hechavarria, Matthews, and Reynolds 2016; Vanacker and Manigart 2010). Therefore, we will add to the understanding about sequence(s) in which entrepreneurs acquire specific types of funding during venture creation (Cumming and Groh 2018; Cumming and Johan 2017; Gartner 1985; Gartner, Frid, and Alexander 2012). Accordingly, we ask: *How does funding acquisition reflect the information asymmetries that arise in the entrepreneurial process?*

To answer this question, we look for patterns in the order of sources of funding and determine whether they can be linked to distinct pecking-order considerations. We explore the funding acquisition processes of early-stage ventures based on a unique and novel dataset of 762 nascent ventures in Europe (UK, Germany, Italy, Netherlands) and the US across the ICT and Renewable Energy (RE) industries: the so-called 'Perfect-Timing' dataset (see Herrmann, Fischer, and Held 2018). We investigate funding acquisition processes with the help of sequence analyses (SA). Originally developed to decode the human genome, sequence analyses proceed in two steps, of which the first leads to the identification of the most common (funding-acquisition) processes underlying the entire process sample. Each individual funding-acquisition process is thus linked to one of the most common processes. The second step consists in testing which venture characteristics predict each of the most common funding-acquisition processes through multinomial logistic regressions.

Our findings contribute to the literatures on entrepreneurial process and entrepreneurial finance in three different ways. First, we show that information asymmetries are endogenous to the entrepreneurial process and, as such, help us understand normal and reversed POT as systematic manifestations of the information interplay between financier and entrepreneur that reflects the nature and needs of the venture. Beyond founder equity as the preferred funding acquisition process (Minola, Cassia, and Criaco 2013; Paul, Whittam, and Wyper 2007) founders pursue debt, equity or grant-based alternative acquisition processes (Hanssens, Deloof, and Vanacker 2016; Samuelsson, Söderblom, and McKelvie 2020). These choices constitute distinct pathways and thus suggest that funders embark on funding acquisition processes based on a systematic logic, rather than ad hoc pursuit of individual sources of finance (Cumming and Groh 2018; Hirsch and Walz 2019; Samuelsson, Söderblom, and McKelvie 2020). We show that this logic depends on a venture's needs regarding product novelty (innovativeness), tangibility and complexity.

Second, and as a corollary of this theoretical contribution, we also make an empirical contribution by identifying overall 7 distinct approaches that entrepreneurs undertake throughout the venture creation process to acquire finance. Broadly speaking, we demonstrate that funding acquisition processes follow a distinct order and are not driven by random funding opportunities. More specifically, we show that one baseline funding process exists, pursued by 75% of nascent ventures, which exclusively relies on the founders' own resources (e.g. Berger and Udell 1998; Cumming 2005; Paul, Whittam, and Wyper 2007; Vaznyte and Andries 2019).

Third, we make a methodological contribution as our study is the first to illustrate how sequence analyses can be applied to the study of funding acquisition processes of nascent ventures. Given that sequence analyses compare entire processes over time, rather than dissecting processes into probabilities of events at specific moments in time (Levie and Lichtenstein 2010; Mödritscher and Sternad 2022), our results offer truly dynamic insights into how funding-acquisition processes unfold. This quantitative approach of identifying the most frequently pursued processes also complements qualitative analyses of the funding acquisition process (Atherton 2012; Fourati and Affes 2013; Warhuus, Frid, and Gartner 2021). Our study thus contributes to pave the way for a new methodological approach to the process study of venture creation and corporate finance research – answering long-standing calls in entrepreneurship research for dynamic analyses of venture creation processes (Dimov 2018; Hjorth, Holt, and Steyaert 2015; McMullen and Dimov 2013; Van de Ven and Engleman 2004).

The remainder of this paper is structured as follows: [Section 2](#) develops the theoretical framework based on a combination of entrepreneurial process and entrepreneurial finance theories which allows us to formulate hypotheses about how nascent ventures approach the funding acquisition process. To assess these claims, [section 3](#) illustrates our empirical approach and explains how we operationalize the respective indicators. [Section 4](#) comprehensively describes our descriptive and statistical results which we link back to the process-based understanding of venture development and discuss in [section 5](#).

## 2. Theory

### 2.1. *Understanding entrepreneurship as a process*

When we refer to entrepreneurship as a process, we readily recognize that (1) it takes place over time and (2) involves a number of different events and developments that gradually coalesce into what we can see retrospectively as its clear end point (Dimov 2011). Multiple theories such as developmental, evolutionary and complexity have been used to characterize this process ('entrepreneurship') (Steyaert 2007). A number of actors most notably entrepreneurs are involved and pursue an opportunity to create value (Dimov 2018; Moroz and Hindle 2012). Although we can describe entrepreneurship, simply, as a process of getting from A to B, there are two distinct meanings with which we can use the term 'process' (Van de Ven and Engleman 2004). The first refers to process as a category of concepts (e.g. decision-making, venture creation, resource acquisition), whereby the set of activities between A and B is treated as an entity to which we could assign attributes such as long or challenging. This puts emphasis on the (aggregate) fact *that* things have moved from A to B. The second meaning relates to *how* things have moved from A to B, that is to the particular sequence of events of how things have transpired or changed over time (Van de Ven and Engleman 2004).

These two meanings represent different stances that research can adopt towards the time elapsed between A and B. In the first case, the time is collapsed or homogenized, treated as a simple countable duration. In the second case, time is recognized as an experiential flow, within which entrepreneurship transpires as an open-ended journey (McMullen and Dimov 2013). Thinking about entrepreneurship in the latter process terms requires that we structure our observation space differently. Rather than treating entrepreneurial efforts as a set of fixed entities that vary across different empirical manifestations (i.e. a set of variables) – thereby drawing partitions across cases and leaving time outside of them – we here treat entrepreneurial efforts as holistic sets that contain time (i.e. each representing a set of events). This enables us to describe the entrepreneurial process in terms of its overall trajectory and the various milestones that comprise it.

Early qualitative contributions highlight the developmental nature and the non-linear progression of events which are being coded qualitatively, arguing that stages are barely identifiable (Liao, Welsch, and Tan 2005). Subsequent research acknowledges the

heterogeneity of entrepreneurial processes and identifies commonalities such as the focus on temporality, entrepreneurial action (organizational creation) and context (Hjorth, Holt, and Steyaert 2015; Moroz and Hindle 2012). Recently, Mödritscher and Sternad (2022) qualitatively developed the concept of entrepreneurial leaps that comprises significant events in firm history (technological breakthrough, change in customer structure, etc.) and what triggers them.

In this paper, we go beyond the leaps and stages structure previously employed and identify critical 'conjunctions' (Van de Ven and Engleman 2004) that trigger particular entrepreneurial sub-processes. We are thus among the first to study processes (sequences) as dependent variable (Davidsson and Gruenhagen 2020). Considering that funding acquisition is an essential aspect of the process, we accordingly think about entrepreneurship as a funding process, entwined with venture development as has barely been studied (Gartner, Frid, and Alexander 2012; Hechavarria, Matthews, and Reynolds 2016; Warhuus, Frid, and Gartner 2021).

## **2.2. Pecking order considerations in funding acquisition**

As entrepreneurs develop their nascent ventures, the question of funding their efforts looms large throughout (Cassar 2004). In addition to whether and how much funding a nascent venture needs, entrepreneurs have to consider the sources for such funding. Prominent within finance, pecking order theory (POT) emerged from modelling of the decision to finance new investment projects when managers are assumed to know more about those projects than potential investors (Myers and Majluf 1984). Asymmetric distribution of information gives rise to a number of agency problems (Eisenhardt 1989; Jensen and Meckling 1976). The main insight from this model is that external equity investors would undervalue the project, which is against the interests of current shareholders. Because managers cannot easily convey their information to the market, external investors deem projects offered to them to be of inferior quality because they assume that managers had decided not to fund such projects internally (Akerlof 1970; Lee, Sameen, and Cowling 2015; Mina, Lahr, and Hughes 2013; Stiglitz and Weiss 1981). As a result, managers would rather forego the investments than raise external equity. They would prefer to use internal funds and, in the absence of these, could resort to using debt (Rocca, Rocca, and Cariola 2011). These insights have been synthesized to suggest that firms prioritize their internal sources of funding, with external equity used as a last resort. Indeed, there is evidence that nascent ventures acquire external equity relatively late in the process (Cosh, Cumming, and Hughes 2009; Frank and Goyal 2003; Warhuus, Frid, and Gartner 2021).

POT thus depicts a preference order of funding sources and capital structure over the course of venture development and growth (Cumming 2005; Robb and Robinson 2014; Sogorb-Mira 2005). The stylized order starts with founder equity, followed by insider equity, for which information asymmetries (Akerlof 1970) and moral hazard concerns are typically low, so that costs are limited. Once these sources are exhausted, founders are expected to turn to institutional debt-providers, such as banks (Cole and Sokolyk 2018; Freel 1999). Banks then monitor the repayment of the debt (Serrasqueiro and Nunes 2012). Higher-quality start-ups (measured in revenue) are more likely to obtain debt (Cole and Sokolyk 2018). If debt acquisition fails, external equity is said to be acquired last, because the latter typically requires giving up control rights over the venture (Minola, Cassia, and Criaco 2013; Paul, Whittam, and Wyper 2007; Vanacker and Manigart 2010). Founders of ventures are thus faced with the challenge of overcoming information problems in order to secure the required funding, while they also need to optimize the cost of capital and to retain control over their venture (Hechavarria, Matthews, and Reynolds 2016; Myers and Majluf 1984).

### 2.3. Vectors for funding acquisition processes in nascent ventures

Applied to the *early stages of new venture creation*, POT suggests that entrepreneurs would maintain internal funding of the ventures until their financial resources are exhausted (Berger and Udell 1998; Gregory et al. 2005; Rocca, Rocca, and Cariola 2011). This is based on the premise that entrepreneurs know more about their nascent ventures than external investors and keeping the venture internally funded avoids facing agency issues when dealing with external investors. A venture funded by its founders has by definition no agency problems (adverse selection or moral hazard), because ownership and control are in the hands of the same person(s), making it cheap and easy to access this funding source (Cosh, Cumming, and Hughes 2009; Hechavarría, Matthews, and Reynolds 2016; Norton 1991). While this does not hold for funding through insider equity (Ang 1992), information asymmetries between insider equity providers and the venture are less pronounced because of the equity providers' personal relationships to the founders and, thus, their social control and informal access to venture information (Cable and Shane 1997; Cornelissen and Clarke 2010; Shane and Cable 2002).

This suggests that there are two considerations for whether and how nascent ventures might deviate from what is widely seen as a default or baseline approach of funding their activities via founder equity (Eckhardt, Shane, and Delmar 2006). First, since the amount of founder equity is not unlimited, it can become exhausted and thus the founder needs to resort to other sources of funding to further the development and growth of the ventures (Audretsch and Lehmann 2004). In other words, founders seek additional funding if they need it. This is intuitive and mirrors a similar logic to the one that ventures only grow if entrepreneurs aspire for growth (Vanacker et al. 2011; Wiklund and Shepherd 2005). Thus, *whether* ventures deviate from the baseline pathway is a question of whether they have funding needs that go beyond what the founder can afford.

Second, and attuned with our core research question, to the extent that a venture requires additional funding and thus needs to look beyond the means of the founder, its funding options would reflect the *information interplay* between the founder and potential investors. The question that arises is whether the founder or external investors are better placed to evaluate the potential of the venture. In the classic formulation of POT, founders have an informational advantage, which leads them to use debt first and external equity only as a last resort (Cosh, Cumming, and Hughes 2009; Frank and Goyal 2003). However, there are situations in which the *information asymmetry* can be reversed in that external investors have greater expertise in project evaluation, leading to a reversal of the normal pecking order, whereby external equity is preferred to debt (Garmaise 2001). Such situations can arise in cases where new ventures develop innovative projects (Carpenter and Petersen 2002; Minola, Cassia, and Criaco 2013; Wiklund and Shepherd 2005) or more complex offerings for which they need external knowledge and expertise (Audretsch, Bönnte, and Mahagaonkar 2012). In these regards, external equity can be used to finance activities that have higher associated risk, while debt is used to finance tangible assets and non-innovative activities (Brewer et al. 1996; Cole and Sokolyk 2018).

Below, we develop these insights into formal hypotheses about the nature of additional sources of funding used. While empirical findings show that nascent ventures rely mainly on their founders' own equity (Gartner, Frid, and Alexander 2012; Rocca, Rocca, and Cariola 2011), as ventures need additional funding – and are thus forced to look beyond founder equity – *their choices would reflect the relative information advantage between founders and external investors*. Differences in information advantage can arise with regard to the innovativeness and complexity of the venture's offering (Carpenter and Petersen 2002; Cosh, Cumming, and Hughes 2009; Paul, Whittam, and Wyper 2007).

#### 2.3.1. Innovativeness

If new ventures simply imitate the offerings of other market players, there is no uncertainty regarding the nature of the offering or its market distribution. In this setting, founders can enjoy informational advantage based on their industry or market knowledge that may enable them to exploit existing

operational inefficiencies or serve particular market niches better (Ang 1992; Cosh, Cumming, and Hughes 2009; Levie and Lichtenstein 2010). Because external investors can readily evaluate the potential of such ventures once the founder's knowledge is revealed, there would be little uncertainty about the value of the venture and this would put the founders at a disadvantage in negotiating external equity stakes (Carpenter and Petersen 2002). In addition, in this situation founders would not need networks or professional expertise of a financier (Wiklund and Shepherd 2005). According to POT, founders thus consider debt funding as more desirable in order to keep capital costs low and avoid giving up control of the venture (Covin, Slevin, and Covin 1990; Vaznyte and Andries 2019). We therefore expect that:

**H1a:** *When funding needs go beyond founder equity, imitative ventures are more likely to use debt funding.*

Beyond imitation, innovativeness is a key characteristic of entrepreneurial ventures that seek to create novel products or services in dynamic and uncertain markets (Audretsch, Bönte, and Mahagaonkar 2012; Carpenter and Petersen 2002; Minola, Cassia, and Criaco 2013). However, innovativeness also creates more complex information dynamics between the founders of the venture and the potential external financiers, such as venture capitalists, angel investors or banks. Radically innovative products and services are more difficult to understand and evaluate from a financier's perspective and therefore come with high information asymmetries (Gompers and Lerner 2001; Nanda and Rhodes-Kropf 2013). Incrementally innovative products and services tend to require both less capital to implement their innovative activities and less support from external investors to access the relevant markets and customers. Therefore, information considerations between founder and external investors would be weaker for incrementally than for radically innovative products and services (Carpenter and Petersen 2002; Herrmann 2019).

Although the founders may have superior knowledge about the technical merits of their innovation, external investors may be in a better position to evaluate its market potential or appreciate its uncertainties, particularly when market launch requires the establishment of new stakeholder relationships (Audretsch and Lehmann 2004; Drover et al. 2017; Gompers and Lerner 2001). Therefore, external investors may demand a higher return or a larger share of ownership to invest in the venture. This may discourage the founders from seeking external financing, unless they are confident that the venture's development can indeed command a higher valuation (Block et al. 2018; Paul, Whittam, and Wyper 2007).

Where the venture is not yet developed sufficiently as to warrant valuation that would prevent the founder's ownership from being diluted excessively, founders would rely on grants, which represent an extension of internal equity as there is no default risk (Eckhardt and Shane 2003). Grants are provided by government agencies to stimulate entrepreneurship and innovation in a particular region (Cumming, Johan, and Zhang 2018; Howell 2017). Importantly, the grant application process offers evaluation by external experts of the merits of the venture's offering and thus provides an important signal to the entrepreneur.

This leads us to expect that:

**H1b:** *When funding needs go beyond founder equity, radically innovative ventures are more likely to use external equity and grant funding.*

### 2.3.2. Complexity and tangibility of the offering

For complex offerings, such as those involving product rather than service developments, external expertise can help ventures overcome knowledge gaps, access complementary capabilities, and gain legitimacy in new domains (Block et al. 2018; Cosh, Cumming, and Hughes 2009; Paul, Whittam, and



Wyper 2007). That is, external funding can help companies finance costly and risky investments, leverage economies of scale and scope, and share the burden of uncertainty (Minola, Cassia, and Criaco 2013). In this regard, the funding needs of product developers are typically higher, which implies that they often need to seek external financing options (Fourati and Affes 2013; Mina, Lahr, and Hughes 2013). Obtaining external expertise and funding for it may also entail challenges, such as finding suitable and trustworthy partners, aligning incentives and expectations, and managing conflicts and trade-offs (Huang and Knight 2015). According to POT, debt financing has moderate information asymmetry and adverse selection costs and is therefore the preferred source of funding for complex offerings (Baum and Silverman 2004; Cosh, Cumming, and Hughes 2009; Frank and Goyal 2003; Paul, Whittam, and Wyper 2007).

In addition, ventures that seek to invest funds into tangible assets or products have a larger chance to use these assets as collateral in the funding acquisition process to address moral hazard and problems related to information asymmetry (Gregory et al. 2005; Hanssens, Deloof, and Vanacker 2016; Robb and Robinson 2014). This, in turn, is attractive for banks as they might be able to (partly) recover their investments in case of venture failure (Lee, Sameen, and Cowling 2015). A venture producing tangible products can more easily signal future cash-flows based on the sales of these products, which constitutes a major decision criterion for obtaining external bank finance (Berger and Udell 1998; Cole and Sokolyk 2018; Cosh, Cumming, and Hughes 2009). Taken together, we therefore expect ventures developing complex and tangible products to be more likely to follow a different funding path. We accordingly hypothesize that:

**H2:** *When funding needs go beyond founder equity, ventures offering complex and tangible products rather than services are more likely to use debt funding.*

### 3. Methodology

#### 3.1. The data: sample and operationalization

Scholars have repeatedly called for studies of entire funding processes including the acquisition of different sources of finance (Cassar 2004; Cumming and Groh 2018; Cumming and Johan 2017): ‘*The ideal sample (...) consists of entrepreneurs in the process of starting a venture and tracking these entrepreneurs through the initial stages of business formation*’ (Cassar 2004, 279). Our sample addresses this call as we use a unique firm-level dataset entitled ‘Perfect Timing Database’ to test our hypotheses.

Based on computer-assisted telephone interviews with founders, this dataset was collected between 2011 and 2018 by an international research team located in Utrecht (The Netherlands), New York (US), Germany (Düsseldorf and Cologne), London (UK), and Palermo (Italy). To capture possible variations in venture creation processes, the population interviewed includes independently registered ventures of all legal forms (excluding sole proprietorship and liberal professions) that were registered between 2004 and 2014<sup>1</sup> in the information technology (IT) and renewable energy (RE) industries in Germany, Italy, the US, the Netherlands, and the UK. The five countries were selected in line with the varieties-of-capitalism literature in order to control for different institutional backgrounds: Germany, Italy and the Netherlands have strong banking systems, whereas the Anglo-Saxon countries have equity-based financial systems (Cumming, Schmidt, and Walz 2010; Cumming and Zhang 2019). From this population, founders were randomly selected and invited to participate in an interview about the venture creation process of their company until a sample of 762 cases had been obtained.

We collected the data with an explicit focus on the timing and sequencing of venture creation activities, which also allows us to discern patterns in funding acquisition processes (dependent variable) on a monthly basis. Importantly, the dataset is restricted to the duration of the initial

phase of the venture creation process. This process begins with the first time a founder talked with someone else about setting up the venture in question; it ends with the moment in which the venture generated sustainable profits (defined as three consecutive profitable months). If a new venture never made sustainable profits, three alternative process ends can occur, namely the acquisition, merger or liquidation of the respective venture. If none of these events occurred until the date of the interview, the process of venture creation was categorized as ongoing and recorded up to a maximum duration of 84 months. Six hundred and sixty-nine ventures (87.79%) reached sustainable profits successfully. Thirty-one (4.08%) were acquired, merged or closed down. For 62 companies, the venture creation process was still ongoing at the time of the interview.

### ***3.1.1. Dependent variable: the funding acquisition process***

In line with our research focus on funding sequences, we here consider that part of the venture creation process which is relevant for a venture's financing. Accordingly, we consider the first time at which the venture starts acquiring any type of finance as the starting point of the funding acquisition process; its end date corresponds to the end date of the overall venture creation process as described above. Throughout this process, we report the monthly funding acquisition activities. Thereby, each funding activity is recorded, starting with the month in which the venture approached a funder and ending with the moment in which the venture received funding. This definition of funding acquisition ensures the comparability across cases. Accordingly, we only record funding acquisition activities that were successful, i.e. that actually led to the acquisition of funding. Failed attempts to acquire funding are not recorded. Furthermore, months during which a venture was not actively acquiring any type of funding are ignored for the purpose of the analysis. While this approach reduces the explanatory power of our analysis regarding differences in the length of funding activities, it allows us to gear the analysis towards exploring the sequence of funding acquisition activities.

To create a typology of funding acquisition processes, we determine the state of funding acquisition for each month of venture creation. The respective state of funding acquisition represents the funding types and sources acquired for each month. In line with the literature (Berger and Udell 1998; Gartner, Frid, and Alexander 2012; Gregory et al. 2005), we distinguish between equity, debt and grant as types of funding. We furthermore follow Robb and Robinson (2014) by determining from which source equity was acquired. As a result, we distinguish between five different states, representing five combinations of different funding types and sources, namely Founder Equity (own capital), Insider Equity (e.g. spouses, parents or friends), External Equity (VC, BA) as well as Debt (Banks) and Grants (government agencies given as a subsidy, converted to equity). In contrast to equity, we cannot distinguish the sources for debt, which is a limitation to our study (Cole and Sokolyk 2018). Newer forms of finance such as equity and lending crowdfunding are still very rare among nascent ventures (Samuelsson, Söderblom, and McKelvie 2020).

Of course, a venture can simultaneously acquire funding from more than one source and of more than one type. Consequently, these five type/source combinations can co-occur during the funding acquisition process. In order to keep the number of possible states manageable and comparable to previous work (Gartner, Frid, and Alexander 2012; Robb and Robinson 2014) we consider eight, individual and aggregate states (listed in Table 1) at which we arrive in the following two-step approach.

In the first step (1), we reduce the number of states whenever a venture is simultaneously acquiring multiple types of equity. In these cases, we give preference to that type of equity which is most difficult to acquire. In a second step (2), we code all states in which grant acquisition co-occurred with any other type of funding acquisition as a 'grant-only' state. This coding approach assumes that acquiring grants is such a unique and time-intensive activity that it is basically irrelevant if and what other type of funding is acquired simultaneously.



**Table 1.** Coding the funding source/type states.

		Funding Type			
		Equity	Debt	Debt & Equity	Grant
Equity Source	Founder	FE	D	D&FE	G
	Insider (& Founder)	IE		D&IE	
	External (& Founder) Insider)	EE		D&EE	

**Table 2.** Example of a funding acquisition process.

		Month									
Source	Type	1	2	3	4	5	6	7	8	9	10
Equity	Founder	FE	FE	FE	FE	FE	FE	FE			
	Insider			IE	IE	IE					
	External					EE	EE				
Debt							D	D	D	D	0
Grant										G	G
Funding State		FE	FE	IE	IE	EE	D&EE	D&FE	D	G	G

We illustrate these two aggregation steps by the hypothetical funding acquisition process exemplified in Table 2: For the first 2 months, the hypothetical venture is exclusively financed through the equity of its founder. In month 3, the venture starts acquiring equity from an insider (i.e. family member or friend). Consequently, and as described in step (1) above, we aggregate the simultaneous acquisition of founder and insider equity to the state ‘acquiring insider equity’ (IE). The same happens in month 5, when the venture acquires all three equity types simultaneously. Again, in accordance with aggregation step (1), we code this state as ‘acquiring external equity’ (EE) as the latter is the most difficult equity source to acquire. In month 6, the venture starts acquiring debt finance in parallel to founder equity and external equity which is coded as ‘debt and external equity acquisition’ (D&EE). Finally, and in accordance with step (2), we aggregate the simultaneous acquisition of debt and grant in month 9 to the state ‘grant acquisition’ (G). The row ‘Funding State’ aggregates the funding acquisition activities for every month as outlined above, thereby reporting the entire funding acquisition process of our hypothetical venture.

### 3.1.2. Independent variables: antecedents of funding acquisition pathways

In developing our hypotheses, we highlighted the need to consider whether a venture has funding needs that go beyond what founder equity can support; and how the innovativeness, tangibility and complexity of the venture’s offering may lead to different prioritizing of external funding sources. Accordingly, we measure several characteristics that may influence which funding acquisition process is pursued by a new venture and thus enable us to test our hypotheses. First, we consider characteristics that may capture the unobservable condition of whether a venture needs funding beyond its founder equity. Such characteristics can help us differentiate smaller-scale self-employment venturing efforts from more ambitious start-ups (Dvouletý 2018). Therefore, we distinguish between ventures that *hired at least one employee* within the first three months of the funding acquisition process (1) and those who hired no employees in that time span (0). We also capture a venture’s *legal form* by distinguishing between limited liability ventures as (1) and ventures registered under personally liable forms as (0). Controlling for ventures that are led by *solo part-time founders* allows us to single out founders who neither have major growth ambitions nor want to share decision-making power with others. We group ventures into those which were set-up by a solo part-time founder (1) and those with all other founder (team) constellations (0).

The *innovativeness* of a venture's business idea was determined in a three-step process. In the first step, the founder was asked whether her business develops a radically new, incrementally new, or imitative product or service. In a second step, the interviewer (upon completion of the interview) cross-checked the founder's answer by comparing the venture's innovativeness with the innovativeness of the other ventures with which s/he had conducted interviews. In a third step, the person cleaning the data, cross-checked the degree of innovativeness indicated against the classification scheme he had developed while cleaning the entire dataset. In both step two and step three, the interviewer and the data cleaner relied on the information provided by the founder as well as on online information about the venture's business idea. This three-step process made it possible to minimize the over-estimation bias that typically occurs when founders self-report the level of their business' innovativeness. The degree of innovativeness is measured as imitation (0), incremental innovation (1) or radical innovation (2) (Aldrich and Ruef 2006).

To capture the tangibility and complexity of a venture's offering, we determine whether the *good* that a venture develops is a tangible product (2), provides services (0), or a mixture of both (1). This variable was recorded in the same three-step process as the venture's innovativeness.

Finally, there are several variables that capture important sources of diversity among the ventures and thus serve as controls in our analysis. Founder-related variables include *previous entrepreneurial experience* of the funding team (yes (1) or no (0)), as well as a *prior finance-related occupation* of the funding team (yes (1) or no (0)). Both can be a predictor of fundraising success for different finance sources (Gilbert, McDougall, and Audretsch 2006; Packalen 2007).

*Industries* are structurally different and induce ventures to pursue different business models, requiring distinct organizational structures (Sine, Mitsuhashi, and Kirsch 2006) and thus different funding strategies (Gartner, Frid, and Alexander 2012). Therefore, a venture's industry was included as a control variable. It was determined in a three-step process, where ventures were first sampled based on NAICS industry codes and their business descriptions. In a second step, the person cleaning the samples confirmed a venture's industry affiliation through online information, such as the venture's website. Finally, the founder was asked to confirm the venture's industry affiliation as part of the interview. We group ventures into ICT (0) and Renewable Energy (1). Ventures that have an affiliation with both industries are classified as RE ventures. *Country* controls are inserted as dummy variables.

Table 3 shows the descriptives of the full dataset. Here we see that the majority of ventures develops a combination of product and service (i.e. a product with a service component or vice-versa), is not innovative, incorporated as a limited liability company, and did not hire employees during the first three months of venture development.

### 3.2. Analyses

In line with our theoretical considerations, we run two different types of analyses: (1) In a first step, we assess whether and, if so, how many ventures follow the baseline funding acquisition process. To this end, we illustrate what the most typical funding acquisition processes look like. To identify these processes, we use optimal matching (OM) techniques combined with cluster analyses, whereby the funding acquisition process constitutes the unit of analysis. The OM algorithm measures the distance between processes. If subsequently paired with cluster analyses, such sequence analyses allow us to explore and interpret patterns in longitudinal data (Halpin 2010). We apply OM techniques because, when compared to other methods, OM has been found to deliver superior results in identifying patterns in sequence data in the context of management science (Biemann and Datta 2014).

Given that more wide-ranging developments and applications of OM algorithms only occurred after the year 2000, OM can still be considered a young method. Nevertheless, a standard way of running sequence analyses, based on OM techniques, has crystallized, which we here follow (Biemann and Datta 2014). It includes four steps. For a better understanding, it should be noted that, in line with the standard terminology used to describe sequence analysis, we here use the terms of (funding-acquisition) *process*, *sequence*, and *trajectory* interchangeably:

**Table 3.** Dataset descriptives.

Variable	Description	Levels	N	Percentage
1+ employee(s) in first quarter	The number of employees hired by the venture during the first three months of the venture creation process.	1 (one or more)	283	37.1%
		0 (zero)	479	62.9%
Legal Form	The legal form under which the venture was initially registered.	1 (limited liability)	667	87.5%
Degree Novelty	The degree of novelty of the good that the venture develops.	0 (personal liability)	95	12.5%
		2 (radical innovation)	91	11.9%
Type of Good	The type of good a venture develops.	1 (partial/incremental improvement)	303	39.8%
		0 (imitation/replication)	368	48.3%
		2 (product)	126	16.5%
		1 (mix/both)	401	52.6%
Solo PT Founder	The venture is created by a single founder who commits less than 35 hours per week to the venture: Yes (1) or no (0)	0 (service)	235	30.8%
		1 (yes)	59	7.7%
Founding experience	Prior start-up experience of the founder(s): Yes (1) or no (0).	0 (no)	703	92.3%
		1 (at least 1 founder has founding experience)	325	42.7%
Prior founder occupation	Prior occupation of the founder(s) before engaging in venture creation.	0 (no experience)	437	57.3%
		1 (finance-related: white collar professional/managerial or self-employed)	364	47.8%
		0 (not finance-related: Public Servant, White Collar – Sales/ Clerical, Blue Collar Craft/ Foreman, Blue Collar – Semiskilled/Unskilled, Student, Out of Work, Other))	398	52.2%
Industry	The industry in which the venture is (chiefly) active	1 (renewable energy/RE)	250	32.8%
Country	Country where venture is registered.	0 (ICT)	512	67.2%
		Germany	282	37.0%
		Italy	125	16.4%
		Netherlands	38	5.0%
		UK	126	16.5%
		USA	191	25.1%

**Step 1: coding the data**

The first step consists in reporting the funding acquisition process of each venture on a monthly basis. More concretely, this means that a sequence of funding states, describing each venture's funding acquisition process, needs to be created for each venture. The reported funding acquisition process can vary in length for each venture as the length is a result of time that passed between the first funding activity and the end of the venture creation process.

As outlined in [section 2.1](#), we ensure comparability with previous studies by distinguishing between eight different possible values for funding state of a venture, namely:

- Founder Equity (FE)
- Insider Equity (IE)
- External Equity (EE)
- Debt (D)
- Debt & Founder Equity (D & FE)
- Debt & Insider Equity (D & IE)
- Debt & External Equity (D & EE)
- Grant (G)

### Step 2: define the substitution costs

To identify the distance between two funding acquisition sequences (as created in step 1), a cost needs to be assigned for replacing one funding state with any other funding state – with the final goal of transforming one funding acquisition sequence into the other. These so-called substitution costs range from 0 to an arbitrary maximum (here: 2). They are determined according to the relative frequency of transitions between two funding states within the entire dataset. The underlying assumption is, that the more often a transition occurs between two pairs of states, the more similar the states are (Biemann and Datta 2014). Based on this transition frequency between any two funding states, a so-called substitution cost matrix is determined (Table 4).

The substitution cost matrix obtained for our dataset intuitively makes sense as the substitution costs are lowest to transform each equity state into the same equity state combined with debt (see Table 4). For transformations of debt, costs are lowest for debt being transformed into any (of the three possible) combination/s with equity. Furthermore, it is overall less costly to transform grant funding into combinations with equity rather than with debt funding. Given that these transition costs reflect the theoretical arguments about the relative ease with which ventures can access (different types of) equity as compared to debts and grants, the transition costs – while relatively similar – reflect the relatedness of funding acquisition states.

### Step 3: calculating sequence similarity

Based on these substitution costs, it is then calculated (for any of the 762 sequences in our dataset) how costly it is to transform one funding acquisition sequence into any of the 761 other sequences. More specifically, this is done by comparing each state of one funding-acquisition sequence to the corresponding state of another sequence – in order to derive (from the substitution matrix) the cost related to transforming this state into the respective other state. The costs of transforming each state of one sequence into the corresponding states of the other sequence are then added up, providing the overall cost of transforming one sequence into the other. This cost then expresses the distance between the two sequences. This distance is calculated for all sequence pairs in the sample. To determine the costs of sequences that differ in length, we calculate their distance for the length of the shorter of the two sequences. This reflects that the shorter acquisition processes is unknown beyond the period observed. Accordingly, it should not influence the distance measure. This novel solution was first developed by Held et al. (2018), addressing an often voiced concern of applying OM for analysing sequences that vary in length (Aisenbrey and Fasang 2010).

Furthermore, we normalize the values of the respective sequence differences by dividing them by the length of the shorter sequence in order to maintain a comparable difference measure across all sequence pairs. This results in a matrix which reports the distances between each sequence pair.

### Step 4: perform a cluster analysis

In a final step, the funding acquisition processes are clustered on the basis of their respective distances to each other. Consequently, each cluster obtained includes those processes that are particularly similar to each other and, respectively, distant to the processes of the other clusters. Each

**Table 4.** Substitution cost matrix.

	Founder Equity	Insider Equity	External Equity	Debt	Debt & FE	Debt & IE	Debt & EE	Grant
Founder Equity								
Insider Equity	1.974457							
External Equity	1.987821	1.994065						
Debt	1.976719	1.979975	1.988756					
Debt & FE	1.884100	2	2	1.906987				
Debt & IE	1.989639	1.937110	2	1.933587	1.987518			
Debt & EE	1.989822	1.990291	1.899141	1.939154	1.983458	1.989796		
Grant	1.963940	1.994576	1.974241	1.984778	1.990888	2	1.979354	

cluster therefore represents one of the most frequent and, hence, most typical approaches to funding acquisition. We run the cluster analysis using Ward's minimum variance method as the latter has been found to consistently produce the most accurate sequence clusters within the framework of OM analyses (Dlouhy and Biemann 2015).

We use a combination of different partition quality measurements, namely the Weighted Average Silhouette Width (ASWw),  $R^2$ , Point Biserial Correlation (PBC), and Hubert's C (HC) in order to assess the optimal clustering solution amongst all solutions between 1 and 20 clusters. These measures indicate how similar sequences are within one cluster and, respectively, how different they are between clusters. Consequently, we calculated these indicators for 1, 2, 3, etc., up to 20 clusters in order to determine their goodness of fit. In this way, we could identify for which cluster number the goodness of fit is maximized. Thereby, we could also exclude those cluster solutions, which either did not yield distinct approaches because too different sequences were clustered together, or which spread out sequences over too many similar clusters.

To provide meaning and context to the results of this exploratory process analysis, the next step is to understand *which circumstances lead nascent ventures to deviate from the baseline funding trajectory*, as captured by our hypotheses. We therefore use multinomial logistic regression analyses (Long and Freese 2006) to identify the conditions that influence the pursuit of one funding acquisition approach (cluster) as compared to founder equity (dependent variable). Importantly, and in line with ordinary regression, multinomial regression following an OM procedure cannot determine causalities between an independent variable and the moment in which an activity occurred, because the entire process (or cluster) is taken as dependent variable. A correlation matrix between the main independent variables and the investment cluster can be found in Table A2 (Appendix A2).

To test *Hypotheses 1a, b, and 2*, we determine the explanatory power of a venture's innovativeness and complexity of offering while controlling for a number of other characteristics, as listed in Table 3.

We fit the following model to obtain the estimates:

$$\log \frac{p_{ij}}{p_{iJ}} = \beta_0 + \beta'_j x_i \quad (1)$$

where  $p_{ij}$  denotes the probability that venture  $i$  belongs to the cluster  $j$  rather than cluster  $J$  (founder equity trajectory),  $\beta_0$  reports the cluster's intercept,  $\beta$  is a vector of coefficients for the independent variables  $x_i$ . The  $J - 1$  multinomial logit equations contrast each of categories 1; 2; ...  $J - 1$  with category  $J$ .

## 4. Results

### 4.1. Patterns in funding acquisition processes

In answer to the first part of our research question '*How do the funding acquisition processes of nascent ventures unfold over time?*', the partition quality measurements identify the solution of seven clusters (out of the overall 1–20 solutions considered) as optimal (ASWw = 0.77;  $R^2$  = 0.74; PBC = 0.87; HC = 0.04). Each of these seven clusters (reported in Figure 1) represents one of the most typical funding acquisition processes reporting both the funding sources and time of funding acquisition and, the sequence in which funding is acquired (horizontal axis). The vertical axis represents the number of firms.

The results obtained from OM analyses also make it possible to illustrate what these funding acquisition processes look like. For each of the seven clusters, Figure 1 provides an overview of all funding acquisition approaches within the cluster, as well as the most 'Representative Sequence'. The latter depicts the modal funding state for each month of the median process in each cluster. The distribution over these seven processes is highly skewed towards cluster 1 (FE). Accordingly, we indeed find that most of the ventures in our sample, namely 482 ventures (or 63%), pursue the approach depicted in cluster 1 (FE): they largely fund themselves through their founders' equity. This

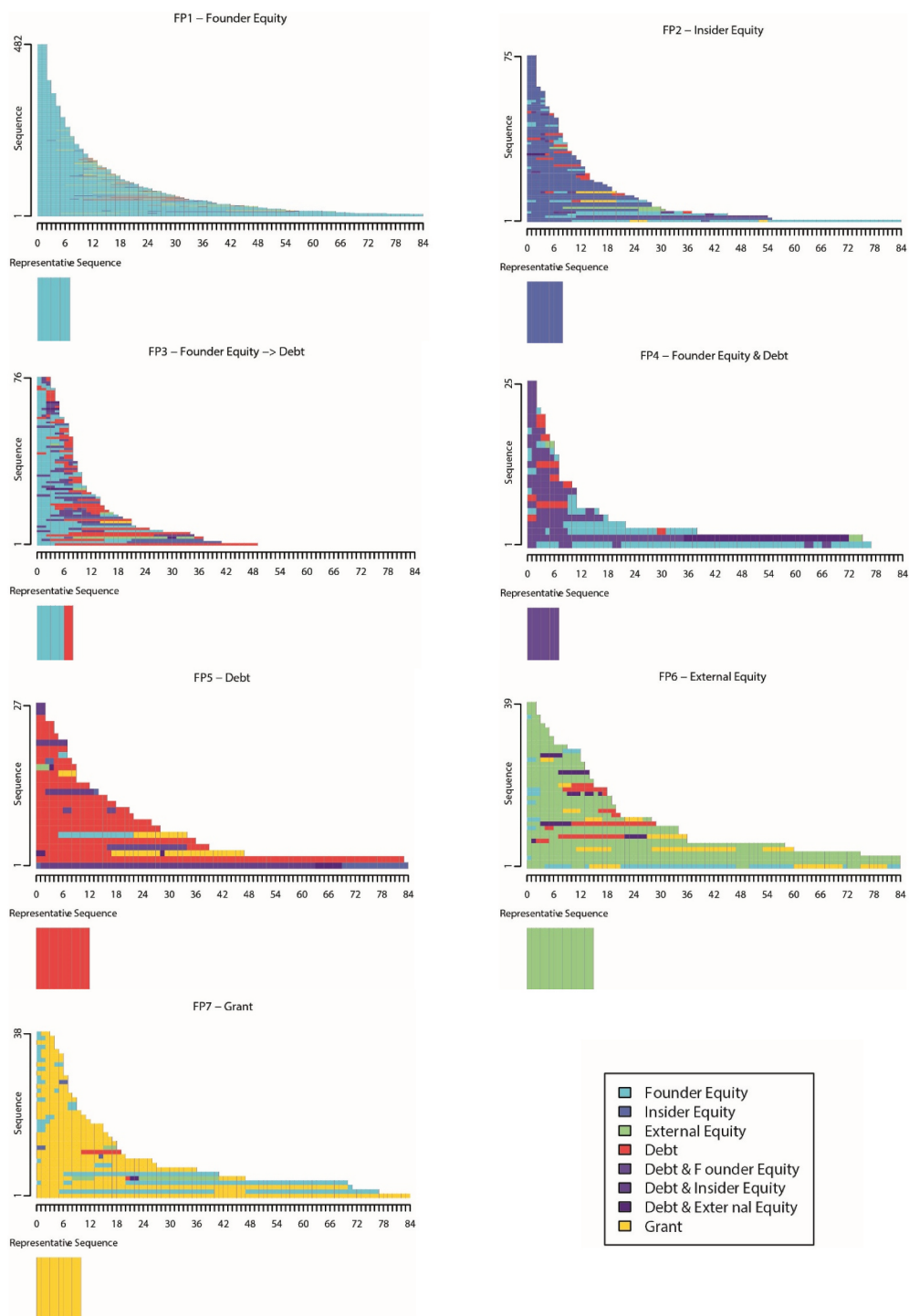


Figure 1. Distinct funding acquisition processes.



finding is in line with prior work using POT (Berger and Udell 1998; Gregory et al. 2005; Rocca, Rocca, and Cariola 2011) that finds that the majority of nascent ventures exclusively rely on the founder's own resources to finance their business. Notably, 63% of these ventures did not hire an employee in the first three months. Indeed – in a binary logistic regression analysis not reported here – whether a venture hired an employee in the first three months turned out to be the strongest predictor of whether a venture is funded only by founder equity and thus can serve as a proxy for whether a venture's funding needs eventually go beyond founder equity.

Also, the second largest cluster (Cluster 2, IE) features ventures that largely depend on insider equity ( $N = 75$ ). Yet, as defined above, this state also encompasses months in which both founder and insider equity are simultaneously acquired. Cluster 2 thus depicts a process where funding is acquired from both the venture founders and their immediate network. Taken together, 557 (73.1%) of the ventures in our sample (included in clusters 1 and 2) rely either on founder or insider equity to fund their development which is in line with predictions by POT (Ang 1992).

Furthermore, the OM sequence analyses reveal five distinct funding acquisition processes, which all heavily rely on funding beyond the equity of founders and their relatives or friends: including the funding acquisition processes of clusters 3 and 4 as well as 5, 6 and 7 – and thus a minority of slightly more than 25% of all ventures. These indeed deviate from the POT baseline (Gartner, Frid, and Alexander 2012; Rocca, Rocca, and Cariola 2011). The additional funding sources are not necessarily used after or together with founder equity (see clusters 3 and 4) but instead of founder equity (clusters 5, 6, and 7).

Clusters 3 (FE/Debt) and 4 (FE & Debt) report two distinct approaches characterized by the combination of founder equity and debt ( $N = 76$  and 25, respectively). The ventures included in cluster 3 combine these two funding sources in a dynamic transition process by first relying on founder equity and then acquiring debt after, on average, eight months. Ventures pursuing the approach depicted in cluster 4 proceed slightly differently: They acquire debt and founder equity simultaneously and right from the beginning of venture creation. Contrary to that, the funding approach depicted in cluster 5, is clearly dominated by ventures that finance themselves almost exclusively through debt from the outset. This finding is particularly interesting, considering that debt is often assumed to be out of reach for nascent ventures. At the same time, cluster 5 is rather small ( $N = 27$ ).

Ventures pursuing the approach of cluster 6 (external equity) strongly focus on acquiring external equity, typically next to using founder equity. In view of the attention paid to institutional equity both in the public discussion, as well as in the literature on venture funding, it is surprising how small the number of ventures is that belongs to cluster 6 (EE,  $N = 39$ ). Cluster 7 (grant funding) features those ventures that acquire a grant as part of their funding acquisition process ( $N = 38$ ). This mostly happens in combination with initial equity provision by founders, which often continues throughout the grant application phase. Clusters 6 and 7 thus support the idea that ventures use external equity and grants in combination with founder equity.<sup>2</sup>

#### **4.2. Antecedents influencing the choice of distinct funding acquisition processes**

After establishing the existence of seven distinct funding acquisition processes and describing their differences, we want to understand – in line with our hypotheses – what circumstances lead nascent ventures to leave the default funding path (corresponding to the second part of our research question). Table 5 provides an overview of the multinomial regression results obtained, taking the funding acquisition process of sole founder-equity funding as the baseline category. The likelihood ratio test compares the model with an independent variable included to a model without that variable included. Statistically significant chi-square values indicate that the independent variable is significantly related to a funding trajectory.

Our hypotheses were formulated on the premise that ventures would look for funding sources beyond founder equity if their funding needs went beyond the available founder equity. Since this

condition is unobservable amongst the ventures in our dataset, we discussed earlier that this can be reasonably proxied by whether ventures *hired at least one employee* from the start, meaning that such ventures would be more likely to follow a funding process that deviates from the baseline trajectory. This is evident in our results. As the likelihood ratio test demonstrates, the model which does not include '1+ Employees' has a lower predictive power than the model including this variable ( $\text{Chi}^2 = 37.002$ ,  $p < 0.01$ ). Our regression results indicate that ventures with at least one employee follow funding acquisition trajectories that substantially rely on external finance. Accordingly, they acquire debt either after founder finance has been used ( $\text{Exp } \beta = 2.281$ ;  $p < 0.01$ ) or in parallel with using their founders' finance ( $\text{Exp } \beta = 3.973$ ;  $p < 0.01$ ). Alternatively, ventures with more than one employee are significantly more likely than ventures without employees to acquire external equity ( $\text{Exp } \beta = 6.068$ ;  $p < 0.01$ ) or grant finance ( $\text{Exp } \beta = 1.965$ ;  $p < 0.1$ ) over their start-up process.

Hypothesis 1a stated that *imitative ventures* are more likely to rely on debt funding. In our model, imitative offerings were coded as the omitted category of the variable measuring innovativeness. The results thus show that, compared to incrementally innovative ventures, imitative ventures rely only on debt funding ( $\text{Exp } \beta = 0.294$ ;  $p < 0.05$ ). Similarly, imitative ventures use more debt funding after founder equity (FE/Debt) than both incrementally ( $\text{Exp } \beta = 0.552$ ;  $p < 0.1$ ) and radically innovative ( $\text{Exp } \beta = 0.196$ ;  $p < 0.05$ ) ventures. There are no significant differences in the simultaneous use of founder equity and debt funding (FE & Debt) between imitative and incrementally or radically innovative ventures. Taken together, these results support hypothesis 1a.

**Table 5.** Multinomial logistic regression results: contrasts of funding patterns with founder equity.

Variable	Funding acquisition process cluster (Exp $\beta$ )						Likelihood Ratio Tests		
	IE	FE/Debt	FE & Debt	Debt	EE	Grant	-2 Log Likelihood of Reduced Model	Chi-Square (reduced model)	df
1+ Employees (in first quarter)	1.207	2.281***	3.973***	1.879	6.068***	1.965*	1258.817	37.002***	6
Legal Type (limited)	0.745	1.340	0.480	0.590	+	0.648	1232.827	11.012*	6
Degree Novelty (baseline replication)							1274.561	52.747***	12
• Incremental	2.256	0.552*	0.653	0.294**	2.807**	1.092			
• Radical	3.176	0.196**	0.369	1.034	11.601***	2.724*			
Type of Good (baseline service)							1244.821	23.006**	12
• Mix	0.654	1.149	0.914	0.942	1.190	1.566			
• Product	1.060	2.881***	1.755	4.324**	1.620	5.904***			
Solo PT Founder (yes)	2.239**	0.574	1.139	0.318	1.224	1.391	1229.477	7.662	6
Founder entrepreneurial experience (yes)	0.412	0.641	0.957	0.453*	1.208	0.870	1233.337	11.522*	6
Founder prior occupation (finance-related)	1.086	1.863*	1.797	1.361	0.586	0.831	1227.756	5.941	6
Industry (RE)	1.152	2.464***	3.751***	3.551***	1.972*	1.957*	1244.936	23.121***	6
Country (baseline US)							1300.873	79.058***	24
• Germany	1.112	1.106	3.114*	0.425	1.967	1.140			
• Italy	0.603	0.661	0.691	0.712	4.134**	4.538**			
• Netherlands	0.253**	1.376	4.779	0.713	2.506	20.759***			
• UK	1.214	0.755	7.378E-8	4.089**	2.027	6.972***			
Intercept	0.926***	0.059***	0.013***	0.051***	2.403***	0.011***	1221.815	0.000	0

N = 762. The reference category is founder equity. Unstandardized coefficients, standard errors in parentheses. p-values \*\*\* < .01, \*\* < .05, \* < .1, + all ventures in these cluster were registered as limited entities; hence no variation was observed, resulting in extremely large effect sizes.

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

Hypothesis 1b, in turn, stated that *radically innovative ventures* are more likely to rely on external equity and grant funding. Our results indeed show that radically innovative ventures are more likely to use external equity (Exp  $\beta = 11.601$ ;  $p < 0.05$ ) and grants (Exp  $\beta = 2.724$ ;  $p < 0.1$ ). Similarly, incremental innovators are also more likely to use external equity (Exp  $\beta = 2.807$ ;  $p < 0.05$ ), although this effect size is weaker than for radical innovators. Together, these results provide empirical support for hypothesis 1b.

Regarding the tangibility and complexity of a venture's offering, hypothesis 2 stated that *ventures developing products* (rather than services) are more likely to use debt funding. In this regard, it is first insightful to note that the reduced model excluding 'Type of good' has a significantly lower predictive power than the full model ( $\text{Chi}^2 = 23.006$ ,  $p < 0.05$ ). Furthermore, ventures developing products rather than services or product-service combinations are statistically more likely to follow funding trajectories based on debt after founder equity (FE/debt: Exp  $\beta = 2.881$ ,  $p < 0.01$ ) and debt alone (Debt: 4.324,  $p < 0.05$ ). This provides support for hypothesis 2. In addition, ventures developing products are also more likely to use grant finance (Grant: 5.904,  $p < 0.01$ ).

Other variables we included in our analysis (as controls) also influence the deviation from the default funding trajectory. These are country controls ( $\text{Chi}^2 = 79.058$ ,  $p < 0.01$ ) and the industry in which the venture operates ( $\text{Chi}^2 = 23.121$ ,  $p < 0.01$ ), as well as founders' entrepreneurial experience ( $\text{Chi}^2 = 11.522$ ,  $p < 0.1$ ). The fact that the venture is run by a single parttime founder ( $\text{Chi}^2 = 7.687$ , ns) and the founders' prior occupation ( $\text{Chi}^2 = 5.941$ , ns) does not have a statistically significant impact on the funding acquisition trajectories pursued.

To establish the robustness of our results, we re-ran the analysis for the subset of ventures that excludes the founder equity category. In this way, we focus only on the cases in which ventures have demonstrated funding needs that go beyond founder equity. In the respective multinomial logit analysis, we use insider equity (path 2) as the baseline category (see [appendix A3/Table A3](#)). The direction of the coefficients and their significance are in line with our main analysis.

## 5. Discussion and conclusions

Despite repeated calls for discerning the processes that nascent ventures pursue in their start-up phase, over-time insights into entrepreneurial processes are still limited (Davidsson and Gruenhagen 2020). This is highly problematic as we still have no systematic process-understanding of 'what entrepreneurs do' (see Gartner 1988); and if, what they do, materializes in a limited number of distinct pathways, or is rather driven by random opportunities to acquire resources (Linder, Lechner, and Pelzel 2019). This literature gap is particularly pressing with regard to the acquisition of venture funding, because the latter influences venture survival, speed and performance (Berger and Udell 1998; Hechavarría, Matthews, and Reynolds 2016; Shane and Venkataraman 2000) and leads to different patterns of firm growth (Delmar, Davidsson, and Gartner 2003). Although a growing literature provides an initial understanding of the antecedents of venture funding sources, research on the funding acquisition *processes* of nascent ventures is still limited (Cassar 2004; Davidsson and Gruenhagen 2020; Samuelsson, Söderblom, and McKelvie 2020).

To address this literature gap, we here pursued the 'pioneering approach' (Davidsson and Gruenhagen 2020, 4) of investigating funding acquisition processes with the help of sequence analyses. Thanks to the use of this novel, two-step method, our study is the first to provide encompassing insights into (1) how funding acquisition processes of nascent ventures unfold over time, and (2) what circumstances lead ventures to pursue one processes rather than others.

### Theoretical contributions

Our work makes several contributions to the literatures on entrepreneurial process and entrepreneurial finance. First, while Pecking Order Theory (POT) has long offered a stylistic account of the

priority of venture funding sources (Cosh, Cumming, and Hughes 2009; Frank and Goyal 2003; Myers and Majluf 1984; Paul, Whittam, and Wyper 2007), we have been able to bring important nuances to theoretical discussions of funding processes by taking a closer look into the funding acquisition process. Notably, we considered that the core premise of POT – namely *informational advantage* of founders over external investors – can be reversed in early-stage settings. This makes external investors important sources of information, leading to the formulation of ‘reverse’ pecking order (Fourati and Affes 2013; Frank and Goyal 2003; Paul, Whittam, and Wyper 2007). We show that the two funding processes of pecking order vary systematically with the innovativeness as well as the tangibility and complexity of the venture’s offering.

Nascent ventures that pursue a *debt-focused acquisition process* – as they fund their endeavours either *exclusively through debt*, as they *transition from founder equity to debt*, or as they *acquire debt in parallel with founder equity* – tend to be imitative in nature (Ang 1992; Cosh, Cumming, and Hughes 2009; Levie and Lichtenstein 2010) which reflects the low information asymmetry between financier and venture (Covin, Slevin, and Covin 1990; Vaznyte and Andries 2019; Wiklund and Shepherd 2005). However, the associated product development for ventures pursuing this pathway points towards its value as collateral to further address information opaqueness of nascent ventures in early funding acquisition (Cole and Sokolyk 2018; Cosh, Cumming, and Hughes 2009).

Regarding the *external equity pathway*, we find that this process is typically pursued by innovative nascent ventures. Thereby, radically innovative ventures are even more likely than incrementally innovative ventures to pursue this process, complementing prior work on the (external-equity based) capital structure technology-based ventures (Carpenter and Petersen 2002; Minola, Cassia, and Criaco 2013; Nanda and Rhodes-Kropf 2013). However, contrary to previous work that argues ventures would benefit from value added services (e.g. advice and networks) of venture capitalist or business angels (Audretsch and Lehmann 2004; Drover et al. 2017; Vanacker and Manigart 2010), we do not find that product-developing ventures would be more likely to pursue a process of external equity acquisition.

The *grant trajectory* has a high likelihood of being chosen by radically innovative product-developing ventures since information asymmetries are highest, and these are difficult to mitigate via ownership and control or debt covenants (Cole and Sokolyk 2018; Vanacker and Manigart 2010). This lends support to the idea that distinct funding processes exist between radically and incrementally innovative nascent ventures. We accordingly complement earlier work that links the use of grants to innovative nascent venture (Cumming, Johan, and Zhang 2018; Howell 2017) showing that such ventures choose different funding trajectories rather than only initially applying for grants to finance their R&D.

In sum, our work contributes to the theoretical development of a processual understanding of venture funding (Hanssens, Deloof, and Vanacker 2016; Samuelsson, Söderblom, and McKelvie 2020) as it shows that *funding trajectories represent distinct and holistic units of observation* that span the venture development journey and arise from early strategic choices (‘conjunctions’ according to Van de Ven and Engleman 2004) by the founders: The conditions under which founders from the outset choose a distinct funding trajectory allows for a more comprehensive understanding of early-stage financing choices of nascent ventures (Davidsson and Gordon 2009, 2012; Davidsson and Gruenhagen 2020). More specifically, our findings amend the lifecycle financing debate in entrepreneurial finance (Cumming and Groh 2018; Hirsch and Walz 2019; Samuelsson, Söderblom, and McKelvie 2020) as we show that entrepreneurs choose among entire funding acquisition processes rather than different financing sources. The insight that venture funding is subject to path-dependence mechanisms also opens up new research avenues for theoretical development (see also Mödritscher and Sternad 2022).

### **Methodological contribution**

The contributions of our paper are therefore not only of an empirical and theoretical nature, but also of methodological interest. By applying optimal matching techniques to analyse funding acquisition processes, we illustrate how this novel methodological approach can be used in business and

management research. Our research thus offers a methodological answer to the long-standing call for systematic insights into how venture creation processes unfold over time in general (McMullen and Dimov 2013; Moroz and Hindle 2012; Ucbasaran, Westhead, and Wright 2001; Van de Ven and Engleman 2004) and funding acquisition process in particular (Dimov 2010; Gartner, Frid, and Alexander 2012; Hechavarría, Matthews, and Reynolds 2016). Accordingly, our paper invites for further research into entrepreneurial processes with the use of sequence analyses.

### ***Empirical contribution***

Empirically, our paper contributes the insight that seven distinct processes exist which nascent ventures pursue to acquire funding. More concretely, our results show that the *majority* (about 75%) of ventures embark on a baseline funding trajectory that exclusively relies on equity provided by the venture's founders. Next to that, we observe that a *minority* (of about 25%) of nascent ventures follow six distinct funding trajectories acquiring debt, external equity, or grant funding – either sequentially or in parallel. These findings establish validity for our work in that they are consistent with prior observations of the predominant use of founder equity as a source of funding (Berger and Udell 1998; Minola, Cassia, and Criaco 2013; Vaznyte and Andries 2019). Given that the collection of the Perfect Timing dataset took place at a time when digital funding sources (such as crowdfunding) were still in their very infancy (Samuelsson, Söderblom, and McKelvie 2020), our work also invites future research to assess whether these seven processes persist once digital funding sources are considered.

### ***Policy implications***

Interestingly, policy discussions on entrepreneurial finance have often focused on innovative ventures with growth ambitions (Shane 2009). Our analyses show that, in the early stages of the venture creation process, only few companies fall into this category. The majority acquires their finance from owner and insider equity which is both (easily) accessible and convenient. Entrepreneurial finance policies might thus be more successful in stimulating nascent entrepreneurship if they target the majority (rather than a small minority) of nascent ventures, for example by offering tax breaks to founders as well as their family and friends investing into nascent ventures.

### ***Limitations***

Our research is subject to a set of limitations. Like most empirical work, our dataset would have benefitted from both a larger sample and a larger variety in terms of industry and country coverage. Resource constraints in the data collection means that we included only static drivers (such as a venture's legal form, innovativeness, or goods developed) to explain variations in dynamic processes. While dynamic determinants that vary over time would have been desirable, they would have led to an additional – and thus undesirable – methodological complexity. We also do not focus on the characteristics of the founder (team) but only include some controls to explain the choice for funding trajectory. Furthermore, we capture the dynamics of supply and demand for finance in the resource acquisition process to a somewhat limited extend, because we could only track successful funding requests. We did not have any information on 'digital' finance sources, such as crowdfunding. While massive data collection efforts would be necessary to address the first and final limitation, future research would benefit from including dynamic independent variables to assess their influence on the sequence of funding acquisition processes.

## Notes

1. Based on this sampling approach, a minimum 1.25 and maximum 28.08 years elapsed between the start of a venture's funding acquisition process and the moment of interview; the mean is 8.53 years.
2. Appendix A1 (Table A1) provides the descriptive statistics of the seven distinct funding acquisition processes.

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## References

- Aisenbrey, S., and A. E. Fasang. 2010. "New Life for Old Ideas: The Second Wave of Sequence Analysis Bringing the Course Back into the Life Course." *Sociological Methods & Research* 38 (3): 420–462. <https://doi.org/10.1177/0049124109357532>.
- Akerlof, G. A. 1970. "The Market for "Lemons": Quality Uncertainty and the Market Mechanism." *The Quarterly Journal of Economics* 84 (3): 488–500. <https://doi.org/10.2307/1879431>.
- Aldrich, H. E., and M. Ruef. 2006. *Organizations Evolving*. London: SAGE.
- Ang, J. S. 1992. "On the Theory of Finance for Privately Held Firms." *Journal of Small Business Finance* 1 (3): 185–203. <https://doi.org/10.57229/2373-1761.1121>.
- Atherton, A. 2012. "Cases of Start-Up Financing: An Analysis of New Venture Capitalisation Structures and Patterns." *International Journal of Entrepreneurial Behavior & Research* 18 (1): 28–47. <https://doi.org/10.1108/13552551211201367>.
- Audretsch, D. B., W. Bönte, and P. Mahagaonkar. 2012. "Financial Signaling by Innovative Nascent Ventures: The Relevance of Patents and Prototypes." *Research Policy* 41 (8): 1407–1421. <https://doi.org/10.1016/j.respol.2012.02.003>.
- Audretsch, D. B., and E. E. Lehmann. 2004. "Financing High-Tech Growth: The Role of Banks and Venture Capitalists." *Schmalenbach Business Review* 56 (4): 340–357. <https://doi.org/10.1007/BF03396700>.
- Baum, J. A. C., and B. S. Silverman. 2004. "Picking Winners or Building Them? Alliance, Intellectual, and Human Capital as Selection Criteria in Venture Financing and Performance of Biotechnology Startups." *Journal of Business Venturing* 19 (3): 411–436. [https://doi.org/10.1016/S0883-9026\(03\)00038-7](https://doi.org/10.1016/S0883-9026(03)00038-7).
- Berger, A. N., and G. F. Udell. 1998. "The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle." *Journal of Banking & Finance* 22 (6–8): 613–673. [https://doi.org/10.1016/S0378-4266\(98\)00038-7](https://doi.org/10.1016/S0378-4266(98)00038-7).
- Biemann, T., and D. K. Datta. 2014. "Analyzing Sequence Data: Optimal Matching in Management Research." *Organizational Research Methods* 17 (1): 51–76. <https://doi.org/10.1177/1094428113499408>.
- Block, J. H., M. G. Colombo, D. J. Cumming, and S. Vismara. 2018. "New Players in Entrepreneurial Finance and Why They are There." *Small Business Economics* 50 (2): 239–250. <https://doi.org/10.1007/s11187-016-9826-6>.
- Brewer, E., H. Genay, W. E. Jackson, and P. R. Worthington. 1996. "How are Small Firms Financed? Evidence from Small Business Investment Companies." *Economic Perspectives-Federal Reserve Bank of Chicago* 20 (Nov): 2–18. <https://www.chicagofed.org/-/media/publications/economic-perspectives/1996/epnd96a-pdf.pdf>.
- Cable, D. M., and S. Shane. 1997. "A prisoner's dilemma approach to entrepreneur-venture capitalist relationships." *The Academy of Management Review* 22:142–176. <https://doi.org/10.5465/AMR.1997.9707180262>. 1
- Carpenter, R. E., and B. C. Petersen. 2002. "Capital Market Imperfections, High-Tech Investment, and New Equity Financing." *The Economic Journal* 112 (477): F54–F72. <https://doi.org/10.1111/1468-0297.00683>.
- Cassar, G. 2004. "The Financing of Business Start-Ups." *Journal of Business Venturing* 19 (2): 261–283. [https://doi.org/10.1016/S0883-9026\(03\)00029-6](https://doi.org/10.1016/S0883-9026(03)00029-6).
- Cole, R. A., and T. Sokolyk. 2018. "Debt Financing, Survival, and Growth of Start-Up Firms." *Journal of Corporate Finance* 50:609–625. <https://doi.org/10.1016/j.jcorpfin.2017.10.013>.
- Cornelissen, J. P., and J. S. Clarke. 2010. "Imagining and Rationalizing Opportunities: Inductive Reasoning and the Creation and Justification of New Ventures." *Academy of Management Review* 35 (4): 539–557. <https://doi.org/10.5465/AMR.2010.53502700>.
- Cosh, A., D. Cumming, and A. Hughes. 2009. "Outside Entrepreneurial Capital." *The Economic Journal* 119 (540): 1494–1533. <https://doi.org/10.1111/j.1468-0297.2009.02270.x>.



- Covin, J. G., D. P. Slevin, and T. J. Covin. 1990. "Content and Performance of Growth-Seeking Strategies: A Comparison of Small Firms in High- and Low Technology Industries." *Journal of Business Venturing* 5 (6): 391–412. [https://doi.org/10.1016/0883-9026\(90\)90013-J](https://doi.org/10.1016/0883-9026(90)90013-J).
- Cumming, D. J. 2005. "Capital Structure in Venture Finance." *Journal of Corporate Finance* 11 (3): 550–585. <https://doi.org/10.1016/J.JCORPFIN.2004.02.004>.
- Cumming, D., and A. P. Groh. 2018. "Entrepreneurial Finance: Unifying Themes and Future Directions." *Journal of Corporate Finance* 50:538–555. <https://doi.org/10.1016/j.jcorpfin.2018.01.011>.
- Cumming, D., and S. Johan. 2017. "The Problems with and Promise of Entrepreneurial Finance." *Strategic Entrepreneurship Journal* 11 (3): 357–370. <https://doi.org/10.1002/sej.1265>.
- Cumming, D., S. Johan, and Y. Zhang. 2018. "Public Policy Towards Entrepreneurial Finance: Spillovers and the Scale-Up Gap." *Oxford Review of Economic Policy* 34 (4): 652–675. <https://doi.org/10.1093/oxrep/gry012>.
- Cumming, D., D. Schmidt, and U. Walz. 2010. "Legality and Venture Capital Governance Around the World." *Journal of Business Venturing* 25 (1): 54–72. <https://doi.org/10.1016/j.jbusvent.2008.07.001>.
- Cumming, D., and M. Zhang. 2019. "Angel Investors Around the World." *Journal of International Business Studies* 50 (5): 692–719. <https://doi.org/10.1057/s41267-018-0178-0>.
- Davidsson, P., and S. R. Gordon. 2009. Nascent Entrepreneur(ship) Research: A Review (Working Paper).
- Davidsson, P., and S. R. Gordon. 2012. "Panel Studies of New Venture Creation: A Methods-Focused Review and Suggestions for Future Research." *Small Business Economics* 39 (4): 853–876. <https://doi.org/10.1007/s11187-011-9325-8>.
- Davidsson, P., and J. H. Gruenhagen. 2020. "Fulfilling the Process Promise: A Review and Agenda for New Venture Creation Process Research: Entrepreneurship Theory and Practice." *Entrepreneurship Theory and Practice* 45 (5): 1083–1118. <https://doi.org/10.1177/1042258720930991>.
- Delmar, F., P. Davidsson, and W. B. Gartner. 2003. "Arriving at the High-Growth Firm." *Journal of Business Venturing* 18 (2): 189–216. [https://doi.org/10.1016/S0883-9026\(02\)00080-0](https://doi.org/10.1016/S0883-9026(02)00080-0).
- Dimov, D. 2010. "Nascent Entrepreneurs and Venture Emergence: Opportunity Confidence, Human Capital, and Early Planning." *Journal of Management Studies* 47 (6): 1123–1153. <https://doi.org/10.1111/j.1467-6486.2009.00874.x>.
- Dimov, D. 2011. "Grappling with the Unbearable Elusiveness of Entrepreneurial Opportunities." *Entrepreneurship Theory and Practice* 35 (1): 57–81. <https://doi.org/10.1111/j.1540-6520.2010.00423.x>.
- Dimov, D. 2018. "Entrepreneurial process." In *Research Handbook of Entrepreneurial Behavior, Practice, and Process*, edited by W. B. Gartner and B. Teague, 56–80. Cheltenham: Edward Elgar Publishing. <https://doi.org/10.4337/9781788114523.00011>.
- Dlouhy, K., and T. Biemann. 2015. "Optimal Matching Analysis in Career Research: A Review and Some Best-Practice Recommendations." *Journal of Vocational Behavior* 90:163–173. <https://doi.org/10.1016/j.jvb.2015.04.005>.
- Drover, W., L. Busenitz, S. Matusik, D. Townsend, A. Anglin, and G. Dushnitsky. 2017. "A Review and Road Map of Entrepreneurial Equity Financing Research: Venture Capital, Corporate Venture Capital, Angel Investment, Crowdfunding, and Accelerators." *Journal of Management* 43 (6): 1820–1853. <https://doi.org/10.1177/0149206317690584>.
- Dvouletý, O. 2018. "How to Analyse Determinants of Entrepreneurship and Self-Employment at the Country Level? A Methodological Contribution." *Journal of Business Venturing Insights* 9:92–99. <https://doi.org/10.1016/j.jbvi.2018.03.002>.
- Eckhardt, J. T., and S. A. Shane. 2003. "Opportunities and Entrepreneurship." *Journal of Management* 29 (3): 333–349. <https://doi.org/10.1177/014920630302900304>.
- Eckhardt, J. T., S. Shane, and F. Delmar. 2006. "Multistage Selection and the Financing of New Ventures." *Management Science* 52 (2): 220–232. <https://doi.org/10.1287/mnsc.1050.0478>.
- Eisenhardt, K. M. 1989. "Agency Theory: An Assessment and Review." *Academy of Management Review* 14 (1): 57–74. <https://doi.org/10.5465/AMR.1989.4279003>.
- Fourati, H., and H. Affes. 2013. "The Capital Structure of Business Start-Up: Is There a Pecking Order Theory or a Reversed Pecking Order? —Evidence from the Panel Study of Entrepreneurial Dynamics." *Technology and Investment* 4 (04): 244. <https://doi.org/10.4236/ti.2013.44029>.
- Frank, M. Z., and V. K. Goyal. 2003. "Testing the Pecking Order Theory of Capital Structure." *Journal of Financial Economics* 67 (2): 217–248. [https://doi.org/10.1016/S0304-405X\(02\)00252-0](https://doi.org/10.1016/S0304-405X(02)00252-0).
- Freel, M. S. 1999. "The Financing of Small Firm Product Innovation within the UK." *Technovation* 19 (12): 707–719. [https://doi.org/10.1016/S0166-4972\(99\)00082-6](https://doi.org/10.1016/S0166-4972(99)00082-6).
- Garmaise, M. J. 2001. "Informed Investors and the Financing of Entrepreneurial Projects." *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.263162>.
- Gartner, W. B. 1985. "A Conceptual Framework for Describing the Phenomenon of New Venture Creation." *Academy of Management Review* 10 (4): 696–706. <https://doi.org/10.5465/AMR.1985.4279094>.
- Gartner, W. B. 1988. "Who is an entrepreneur?" is the wrong question." *American Journal of Small Business* 12 (4): 11–32. <https://doi.org/10.1177/104225878801200401>.
- Gartner, W. B., C. J. Frid, and J. C. Alexander. 2012. "Financing the Emerging Firm." *Small Business Economics* 39 (3): 745–761. <https://doi.org/10.1007/s11187-011-9359-y>.

- Gilbert, B. A., P. P. McDougall, and D. B. Audretsch. 2006. "New Venture Growth: A Review and Extension." *Journal of Management* 32 (6): 926–950. <https://doi.org/10.1177/0149206306293860>.
- Gompers, P. A., and J. Lerner. 2001. "The Venture Capital Revolution." *Journal of Economic Perspectives* 15 (2): 145–168. <https://doi.org/10.1257/jep.15.2.145>.
- Gregory, B. T., M. W. Rutherford, S. Oswald, and L. Gardiner. 2005. "An Empirical Investigation of the Growth Cycle Theory of Small Firm Financing." *Journal of Small Business Management* 43 (4): 382–392. <https://doi.org/10.1111/j.1540-627X.2005.00143.x>.
- Halpin, B. 2010. "Optimal Matching Analysis and Life-Course Data: The Importance of Duration." *Sociological Methods & Research* 38 (3): 365–388. <https://doi.org/10.1177/0049124110363590>.
- Hanssens, J., M. Deloof, and T. Vanacker. 2016. "The Evolution of Debt Policies: New Evidence from Business Startups." *Journal of Banking & Finance* 65:120–133. <https://doi.org/10.1016/j.jbankfin.2016.01.008>.
- Hechavarría, D. M., C. H. Matthews, and P. D. Reynolds. 2016. "Does Start-Up Financing Influence Start-Up Speed? Evidence from the Panel Study of Entrepreneurial Dynamics." *Small Business Economics* 46 (1): 137–167. <https://doi.org/10.1007/s11187-015-9680-y>.
- Held, L., A. M. Herrmann, and A. van Mossel. 2018. "Team Formation Processes in New Ventures." *Small Business Economics* 51 (2): 441–464. <https://doi.org/10.1007/s11187-018-0010-z>.
- Herrmann, A. M. 2019. "A Plea for Varieties of Entrepreneurship." *Small Business Economics* 52 (2): 331–343. <https://doi.org/10.1007/s11187-018-0093-6>.
- Herrmann, A. M., B. Fischer, and L. Held. 2018. "Internationally comparative dataset on start-up processes and their institutional foundations in Germany, Italy, the UK and the US." <https://www.projectfires.eu/wp-content/uploads/2018/10/d5.1-combined-complete.pdf>.
- Hirsch, J., and U. Walz. 2019. "The Financing Dynamics of Newly Founded Firms." *Journal of Banking & Finance* 100:261–272. <https://doi.org/10.1016/j.jbankfin.2018.11.009>.
- Hjorth, D., R. Holt, and C. Steyaert. 2015. "Entrepreneurship and Process Studies." *International Small Business Journal* 33 (6): 599–611. <https://doi.org/10.1177/0266242615583566>.
- Howell, S. T. 2017. "Financing Innovation: Evidence from R&D Grants." *American Economic Review* 107 (4): 1136–1164. <https://doi.org/10.1257/aer.20150808>.
- Huang, L., and A. Knight. 2015. "Resources and Relationships in Entrepreneurship: An Exchange Theory of the Development and Effects of the Entrepreneur-Investor Relationship." *Academy of Management Review*. 2014.0397. <https://doi.org/10.5465/amr.2014.0397>.
- Jensen, M. C., and W. H. Meckling. 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics* 3 (4): 305–360. [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X).
- Lee, N., H. Sameen, and M. Cowling. 2015. "Access to Finance for Innovative SMEs Since the Financial Crisis." *Research Policy* 44 (2): 370–380. <https://doi.org/10.1016/J.RESPOL.2014.09.008>.
- Levie, J., and B. B. Lichtenstein. 2010. "A Terminal Assessment of Stages Theory: Introducing a Dynamic States Approach to Entrepreneurship." *Entrepreneurship Theory and Practice* 34 (2): 317–350. <https://doi.org/10.1111/j.1540-6520.2010.00377.x>.
- Liao, J., H. Welsch, and W.-L. Tan. 2005. "Venture gestation paths of nascent entrepreneurs: Exploring the temporal patterns." *Journal of High Technology Management Research* 16 (1): 1–22. <https://doi.org/10.1016/j.hitech.2005.06.001>.
- Lichtenstein, B. M. B., and C. G. Brush. 2001. "How Do "Resource Bundles" Develop and Change in New Ventures? A Dynamic Model and Longitudinal Exploration." *Entrepreneurship Theory and Practice* 25 (3): 37–58. <https://doi.org/10.1177/104225870102500303>.
- Linder, C., C. Lechner, and F. Pelzel. 2019. "Many Roads Lead to Rome: How Human, Social, and Financial Capital are Related to New Venture Survival." *Entrepreneurship Theory and Practice* 1042258719867558 (5): 909–932. <https://doi.org/10.1177/1042258719867558>.
- Long, J. S., and J. Freese. 2006. *Regression Models for Categorical Dependent Variables Using Stata*. College Station, TX: Stata press.
- McMullen, J. S., and D. Dimov. 2013. "Time and the Entrepreneurial Journey: The Problems and Promise of Studying Entrepreneurship as a Process." *Journal of Management Studies* 50 (8): 1481–1512. <https://doi.org/10.1111/joms.12049>.
- Mina, A., H. Lahr, and A. Hughes. 2013. "The Demand and Supply of External Finance for Innovative Firms." *Industrial and Corporate Change* 22 (4): 869–901. <https://doi.org/10.1093/icc/dtt020>.
- Minola, T., L. Cassia, and G. Criaco. 2013. "Financing Patterns in New Technology-Based Firms: An Extension of the Pecking Order Theory." *International Journal of Entrepreneurship & Small Business* 25 (19): 212–233. <https://doi.org/10.1504/IJESB.2013.054964>.
- Mödritscher, D., and G. Sternad. 2022. "Entrepreneurial Leaps: Growth Processes in Transition Phases Between Dynamic States." *Entrepreneurship Theory and Practice* 46 (4): 952–984. <https://doi.org/10.1177/104225872092989>.
- Moroz, P. W., and K. Hindle. 2012. "Entrepreneurship as a Process: Toward Harmonizing Multiple Perspectives." *Entrepreneurship Theory and Practice* 36 (4): 781–818. <https://doi.org/10.1111/j.1540-6520.2011.00452.x>.
- Myers, S. C., and N. S. Majluf. 1984. "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have." *Journal of Financial Economics* 13 (2): 187–221. [https://doi.org/10.1016/0304-405X\(84\)90023-0](https://doi.org/10.1016/0304-405X(84)90023-0).

- Nanda, R., and M. Rhodes-Kropf. 2013. "Investment Cycles and Startup Innovation." *Journal of Financial Economics* 110 (2): 403–418. <https://doi.org/10.1016/j.jfineco.2013.07.001>.
- Norton, E. 1991. "Capital structure and small public firms." *Journal of Business Venturing* 6 (4): 287–303. [https://doi.org/10.1016/0883-9026\(91\)90020-E](https://doi.org/10.1016/0883-9026(91)90020-E).
- Packalen, K. A. 2007. "Complementing Capital: The Role of Status, Demographic Features, and Social Capital in Founding Teams' Abilities to Obtain Resources." *Entrepreneurship Theory and Practice* 31 (6): 873–891. <https://doi.org/10.1111/j.1540-6520.2007.00210.x>.
- Paul, S., G. Whittam, and J. Wyper. 2007. "The Pecking Order Hypothesis: Does It Apply to Start-Up Firms?" *Journal of Small Business and Enterprise Development* 14 (1): 8–21. <https://doi.org/10.1108/14626000710727854>.
- Robb, A. M., and D. T. Robinson. 2014. "The Capital Structure Decisions of New Firms." *Review of Financial Studies* 27 (1): 153–179. <https://doi.org/10.1093/rfs/hhs072>.
- Rocca, M. L., T. L. Rocca, and A. Cariola. 2011. "Capital Structure Decisions During a Firm's Life Cycle." *Small Business Economics* 37:107–130. <https://doi.org/10.1007/s11187-009-9229-z>.
- Samuelsson, M., A. Söderblom, and A. McKelvie. 2020. "Path Dependence in New Ventures' Capital Structures." *Entrepreneurship Theory and Practice* 45 (2): 319–349. <https://doi.org/10.1177/1042258720901717>.
- Serrasqueiro, Z., and P. M. Nunes. 2012. "Is Age a Determinant of SMEs' Financing Decisions? Empirical Evidence Using Panel Data Models." *Entrepreneurship Theory and Practice* 36 (4): 627–654. <https://doi.org/10.1111/j.1540-6520.2010.00433.x>.
- Shane, S. 2009. "Why encouraging more people to become entrepreneurs is bad public policy." *Small Business Economics* 33 (2): 141–149. <https://doi.org/10.1007/s11187-009-9215-5>.
- Shane, S., and D. Cable. 2002. "Network Ties, Reputation, and the Financing of New Ventures." *Management Science* 48 (3): 364–381. <https://doi.org/10.1287/mnsc.48.3.364.7731>.
- Shane, S., and S. Venkataraman. 2000. "The Promise of Entrepreneurship as a Field of Research." *Academy of Management Review* 25 (1): 217–226. <https://doi.org/10.5465/AMR.2000.2791611>.
- Sine, W. D., H. Mitsuhashi, and D. A. Kirsch. 2006. "Revisiting Burns and Stalker: Formal Structure and New Venture Performance in Emerging Economic Sectors." *Academy of Management Journal* 49 (1): 121–132. <https://doi.org/10.5465/AMJ.2006.20785590>.
- Sogorb-Mira, F. 2005. "How SME Uniqueness Affects Capital Structure: Evidence from a 1994–1998 Spanish Data Panel." *Small Business Economics* 25 (5): 447–457. <https://doi.org/10.1007/s11187-004-6486-8>.
- Steyaert, C. 2007. "'Entrepreneurship' as a Conceptual Attractor? A Review of Process Theories in 20 Years of Entrepreneurship Studies." *Entrepreneurship & Regional Development* 19 (6): 453–477. <https://doi.org/10.1080/08985620701671759>.
- Stiglitz, J. E., and A. Weiss. 1981. "Credit Rationing in Markets with Imperfect Information." *The American Economic Review* 71 (3): 393–410. <https://www.jstor.org/stable/1802787>.
- Ucbasaran, D., P. Westhead, and M. Wright. 2001. "The Focus of Entrepreneurial Research: Contextual and Process Issues." *Entrepreneurship Theory and Practice* 25 (4): 57–80. <https://doi.org/10.1177/104225870102500405>.
- Vanacker, T. R., and S. Manigart. 2010. "Pecking Order and Debt Capacity Considerations for High-Growth Companies Seeking Financing." *Small Business Economics* 35 (1): 53–69. <https://doi.org/10.1007/s11187-008-9150-x>.
- Vanacker, T., S. Manigart, M. Meuleman, and L. Sels. 2011. "A Longitudinal Study on the Relationship Between Financial Bootstrapping and New Venture Growth." *Entrepreneurship & Regional Development* 23 (9–10): 681–705. <https://doi.org/10.1080/08985626.2010.502250>.
- Van de Ven, A. H., and R. M. Engleman. 2004. "Event- and outcome-driven explanations of entrepreneurship." *Journal of Business Venturing* 19 (3): 343–358. [https://doi.org/10.1016/S0883-9026\(03\)00035-1](https://doi.org/10.1016/S0883-9026(03)00035-1).
- Vaznyte, E., and P. Andries. 2019. "Entrepreneurial orientation and start-ups' external financing." *Journal of Business Venturing* 34:439–458. <https://doi.org/10.1016/j.jbusvent.2019.01.006>.
- Warhuus, J. P., C. J. Frid, and W. B. Gartner. 2021. "Ready or not? Nascent entrepreneurs' actions and the acquisition of external financing." *International Journal of Entrepreneurial Behavior & Research* 27 (6): 1605–1628. <https://doi.org/10.1108/IJEBR-09-2020-0586>.
- Wiklund, J., and D. Shepherd. 2005. "Entrepreneurial Orientation and Small Business Performance: A Configurational Approach." *Journal of Business Venturing* 20 (1): 71–91. <https://doi.org/10.1016/j.jbusvent.2004.01.001>.

## Appendix

### A.1 Descriptive statistics

**Table A1.** Descriptive statistics.

			FE	IE	FE/ Debt	FE & Debt	Debt	EE	Grant	Overall
Type of Good	Service (0)	Count	162	26	20	7	8	6	6	235
		% within investment cluster	33,6%	34,7%	26,3%	28,0%	29,6%	15,4%	15,8%	30,8%
	Mix (1)	Count	267	37	30	8	11	28	20	401
		% within investment cluster	55,4%	49,3%	39,5%	32,0%	40,7%	71,8%	52,6%	52,6%
	Product (2)	Count	53	12	26	10	8	5	12	126
		% within investment cluster	11,0%	16,0%	34,2%	40,0%	29,6%	12,8%	31,6%	16,5%
Innovativeness	Radical (2)	Count	48	12	2	1	4	15	9	91
		% within investment cluster	10,0%	16,0%	2,6%	4,0%	14,8%	38,5%	23,7%	11,9%
	Incremental (1)	Count	200	38	22	7	4	18	14	303
		% within investment cluster	41,5%	50,7%	28,9%	28,0%	14,8%	46,2%	36,8%	39,8%
	Reproduction (0)	Count	234	25	52	17	19	6	15	368
		% within investment cluster	48,5%	33,3%	68,4%	68,0%	70,4%	15,4%	39,5%	48,3%
Legal Form	Unlimited (0)	Count	60	11	7	5	4	0	8	95
		% within investment cluster	12,4%	14,7%	9,2%	20,0%	14,8%	0,0%	21,1%	12,5%
	Limited (1)	Count	422	64	69	20	23	39	30	667
		% within investment_cluster	87,6%	85,3%	90,8%	80,0%	85,2%	100,0%	78,9%	87,5%
PT Solo Founder	No (0)	Count	449	64	71	22	26	37	34	703
		% within investment cluster	93,2%	85,3%	93,4%	88,0%	96,3%	94,9%	89,5%	92,3%
	Yes (1)	Count	33	11	5	3	1	2	4	59
		% within investment cluster	6,8%	14,7%	6,6%	12,0%	3,7%	5,1%	10,5%	7,7%
1+ Employees	No (0)	Count	331	50	40	11	16	9	22	479
		% within investment cluster	68,7%	66,7%	52,6%	44,0%	59,3%	23,1%	57,9%	62,9%
	Yes (1)	Count	151	25	36	14	11	30	16	283
		% within investment cluster	31,3%	33,3%	47,4%	56,0%	40,7%	76,9%	42,1%	37,1%
Industry	ICT (0)	Count	357	56	33	8	12	25	21	512
		% within investment cluster	74,1%	74,7%	43,4%	32,0%	44,4%	64,1%	55,3%	67,2%
	RE (1)	Count	125	19	43	17	15	14	17	250
		% within investment cluster	25,9%	25,3%	56,6%	68,0%	55,6%	35,9%	44,7%	32,8%
Country	Germany	Count	167	32	39	18	6	14	6	282
		% within investment cluster	34,6%	42,7%	51,3%	72,0%	22,2%	35,9%	15,8%	37,0%
	Italy	Count	86	7	10	2	3	10	7	125
		% within investment cluster	17,8%	9,3%	13,2%	8,0%	11,1%	25,6%	18,4%	16,4%
	Netherlands	Count	16	1	3	2	1	3	12	38
		% within investment cluster	3,3%	1,3%	3,9%	8,0%	3,7%	7,7%	31,6%	5,0%
	UK	Count	79	12	8	0	11	6	10	126
		% within investment cluster	16,4%	16,0%	10,5%	0,0%	40,7%	15,4%	26,3%	16,5%
	US	Count	134	23	16	3	6	6	3	191
		% within investment cluster	27,8%	30,7%	21,1%	12,0%	22,2%	15,4%	7,9%	25,1%

## A.2 Correlation analysis

**Table A2.** Correlation matrix.

	Investment cluster #	1+ Employees (in first quarter)	Legal Type (limited)	Degree Novelty	Type of Good	Solo PT Founder (yes)	F'entrep experience (yes)	F'occup (finance-related)	Industry (RE)
Investment cluster #	1								
1+ Employees (in first quarter)	−0.181***	1							
Legal Type (limited)	0.000	0.109***	1						
Degree Novelty	−0.097***	0.118***	0.101***	1					
Type of Good	−0.170***	0.050	0.050	0.174**	1				
Solo PT Founder (yes)	−0.010	−0.111***	−0.069*	−0.068*	0.062*	1			
Founder entrepreneurial experience (yes)	0.011	0.046	0.125**	0.051	0.085**	−0.002	1		
Founder prior occupation (finance-related)	0.002	0.040	0.033	0.144***	0.081**	−0.048	0.197***	1	
Industry (RE)	−0.178***	0.018	0.010	−0.176***	0.173***	0.090**	0.076**	−0.044	1

Pearsson correlation (significance 2-tailed) p-values \*\*\* < .01, \*\* < .05, \* < .1.

## A.3 Robustness with alternative baseline

**Table A3.** Multinomial logistic regression results: contrasts of funding patterns with insider equity.

Variable	Funding acquisition process cluster (Exp $\beta$ )					Likelihood Ratio Tests		
	FE/Debt	FE & Debt	Debt	EE	Grant	−2 Log Likelihood of Reduced Model	Chi-Square (reduced model)	df
1+ Employees (in first quarter)	2.370**	5.024***	1.925	5.727***	1.705	631.667	17.905***	5
Legal Type (limited)	1.426	0.447	0.813	+	0.646	625.301	11.538**	5
Degree Novelty (baseline replication)						664.551	50.788***	10
• Incremental	0.244	0.308*	0.133***	1.478	0.436			
• Radical	0.062**	0.122*	0.357	6.951**	1.220			
Type of Good (baseline service)						623.226	9.463	10
• Mix	1.543	1.391	1.069	1.109	1.579			
• Product	2.505*	1.573	3.504*	1.271	5.657**			
Solo PT Founder (yes)	0.225**	0.412	0.142*	0.573	1.176	622.551	8.788	5
Founder entrepreneurial experience (yes)	1.559	3.608**	0.768	2.468*	1.706	622.025	8.262	5
Founder prior occupation (finance-related)	1.362	0.385	1.525	0.80	1.082	617.144	3.381	5
Industry (RE)	2.277*	2.760	4.523**	1.766	1.957*	622.576	8.813	5
Country (baseline US)						688.551	74.788***	20
• Germany	0.870	2.545	0.253*	2.780	0.976			
• Italy	0.962	0.959	0.962	7.237**	8.196**			
• Netherlands	3.298	13.249	1.740	10.373*	115.618***			
• UK	0.502	6.792E−8	2.584	1.567	5.565**			
Intercept	0.538	0.134**	0.37	2.688***	0.089**	613.763	0.000	0

$N = 280$ . The reference category is insider equity. Unstandardized coefficients, standard errors in parentheses. p-values \*\*\* < .01, \*\* < .05, \* < .1, + all ventures in these cluster were registered as limited entities; hence no variation was observed, resulting in extremely large effect sizes.

The chi-square statistic is the difference in −2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.