Follow the Money: The Funding Acquisition Process of Nascent Ventures

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Content

1. Executive summary

In view of the agency problems linked to the acquisition of funding by new ventures, the literature often assumes a 'pecking order' of finance acquisition: New ventures are expected to first access their founders' resources, to then acquire funding from family and friends , and in a last step to acquire equity and debt from external (institutional) sources. Despite various studies on the capital structure of ventures, we still know little about how the funding acquisition process evolves at the firm level. This is particularly acute because the existing studies of capital structures often take a rather static view and use meta-level data to analyse a dynamic firm-level process. Based on novel optimal matching techniques, we identify the most typical funding acquisition processes of nascent ventures regarding the sequence of funding types (equity, debt, grant) and sources (founder, insider, external). Furthermore, we use binary logistic regressions to identify the determinants of funding acquisition processes. As a result we offer a more realistic picture of how funding acquisition processes evolve in nascent ventures.

2. Introduction

The public discussion about stimulating entrepreneurship and innovation, especially in Europe, is often dominated by perceived difficulties of nascent ventures to access funding (Bertoni et al., 2016; Nightingale et al., 2009). This problem has been aggravated through the increasing restrictiveness of banks after the financial crisis and corresponding regulatory measures (Block and Sandner, 2009; Cowling et al., 2016; Migendt et al., 2017). Especially sources of funding that allow for experimentation and innovation such as venture capital are less developed in Europe than for example in the US (Bertoni et al., 2015; Migendt et al., 2017; Polzin et al., 2018).

Most common theoretical explanations of this under-funding of innovative ventures and corresponding research are based on principal-agent theory (Block et al., 2018; Brancati, 2015; Cowling et al., 2016; Drover et al., 2017). The latter predicts that the separation between financiers and entrepreneurs/ventures will lead to information asymmetries and hence incomplete contracts. Failure by the financiers to judge the true quality of the venture may lead to (ex-ante) adverse selection or (ex-post) moral hazard situations.

Building on these mechanisms of the principle-agent theory, the entrepreneurial finance literature conceptually describes the funding acquisition process of ventures in the pecking order theory (POT) (Myers and Majluf, 1984). POT describes the effects of the principle-agent theory on each funding source and, as a result, depicts a preference order of funding sources and capital structure over the course of venture development and growth (Cumming, 2005a; Robb and Robinson, 2014; Sapienza et al., 2003; Sogorb-Mira, 2005). The stylized order starts with founder equity, followed by insider equity, for which information asymmetries and moral hazard concerns are typically low, so that costs are limited. Once these sources are exhausted, entrepreneurs are expected to turn to institutional debt-providers, such as banks. If debt acquisition fails, external equity is said to be acquired last, because the latter typically requires giving up control rights over the venture.

The literature struggles to empirically confirm the predominance of the depicted linear funding acquisition process (Cumming, 2005a; Frank and Goyal, 2003; Robb and Robinson, 2014). This struggle has been ascribed to two causes: first, a host of factors that have been identified which

mitigate the principle agent problems for some types of ventures and, second, a methodological one. Methodologically, the capital structure literature relies on metadata of venture funding to analyse a process that happens on the firm level (Cumming, 2005a; Frank and Goyal, 2003). These studies typically use balance sheet data and/or (panel) survey data, such as the PSED study, to link the type and amount of funding to outcomes of the venture creation process, such as venture success or size (Dimov, 2010; Hechavarría et al., 2016; Renko, 2013; Reynolds, 2011). While the sums invested per source and type inform us about the weight of each of these funding options in overall venture funding, they say little about the individual funding acquisition process of ventures (Hechavarría et al., 2016). This is particularly true as 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; Gartner et al., 2012). Process-oriented evidence of the funding acquisition process of nascent ventures is limited (Audretsch et al., 2012; Cassar, 2004; Hechavarría et al., 2016). As a result, little is known about the sequence(s) in which ventures acquire specific amounts and types of funding (Gartner, 1985; Gartner et al., 2012; Gompers and Lerner, 1998; Polzin et al., 2018).

In this paper we disentangle how these processes look like in terms of sequence of funding option such as founders own funds, external equity and debt and which determinants influence them (Berger and Udell, 2006; Kim et al., 2006) and answer long standing calls in entrepreneurship research to explore processes with the help of large longitudinal datasets (Cassar, 2004; McMullen and Dimov, 2013; Ruef, 2005; Ucbasaran et al., 2001).

To this end, as (Cassar, 2004, p. 279) notes: *"The ideal sample (…)consists of entrepreneurs in the process of starting a venture and tracking these entrepreneurs through the initial stages of business formation"*. It takes an event, rather than an outcome driven research approach to thoroughly understand organizational developments that unfold over time, such as the funding acquisition process (Aldrich, 2001). Such an approach takes a process view and explores *"How [..] the entrepreneurship process unfold[s] over time?"* rather than what it antecedents or consequences are (Van de Ven and Engleman, 2004). Accordingly, we here ask:

Do nascent ventures pursue different approaches to funding acquisition and, if so, how do these processes look like and what are their determinants?

We contribute to the literature on the funding of nascent ventures by exploring the funding acquisition processes of early-stage ventures based on a unique and novel dataset of 755 nascent ventures in Europe (UK, Germany, Italy, Netherlands) and the US. This set-up permits us to identify transitions between different funding sources from venture inception until profitability, as well as to differentiate between different overall funding approaches. Importantly, our sample introduces the temporal component missing in previous studies. In addition, our data is explicitly not limited to highly innovative ventures but offers a representative sample of all ventures registered. Based on optimal matching techniques, we illustrate how funding acquisition processes differ over time in terms of equity, debt and grants. Furthermore, we use binary logistic regressions to identify the extent to which innovativeness, type of good or venture size account for these differences.

The results allow us to qualify pecking order theory: Accordingly, we show that, by far, the most common funding acquisition process is a static one that almost exclusively relies on equity provided by the venture's founders. Interestingly, this approach is frequently pursued by service providing ventures in the ICT industry. In addition, we observe a significant number of ventures that follow a transitory process from founder-equity based funding to debt-based funding. Ventures developing tangible products are especially likely to follow this approach. Furthermore, we find innovative ventures to combine grant acquisitions at an early stage with founder equity, or to start with external equity altogether. Contrary to the focus of an important part of the entrepreneurial finance literature, we show that external (venture capital) investors only provide funding to a very small number of ventures. In addition to these theoretical contributions, our research also seeks to pave the way for the use of sequence analysis as this method is, to date, largely unknown in entrepreneurship research.

To illustrate our arguments, the remainder of this paper is structured as follows: Section 2 develops theory and hypotheses which will be operationalized through our research design, data collection and analysis (methodology, section 3). Section 4 comprehensively describes our descriptive and statistical results which will be mirrored to existing theory in our discussion (section 5).

3. Theory

3.1 Funding of new ventures: Agency problems, pecking-order theory and capital structure

A large variety of ways exists to categorize different venture funding options. They range from broad categorization of private and external funding (Gartner et al., 2012), over intermediate ones that in addition distinguish between external equity and debt (Frid, 2009), to the more detailed one introduced by Robb and Robinson (2014). The latter systematically characterize funding options along two dimensions: namely their source and type. The source indicates which type of actor provides funding to the venture, including founders, insiders (spouses and parents) and outsiders (banks, other businesses, government agencies, and venture capitalists). The type, in turn, indicates whether funding is provided in exchange for shares (equity) or has to be repaid with (or without) interest (debt).

In this article, we largely follow this categorization by Robb and Robinson (2014), whereby we distinguish between different finance sources only with regard to equity in order to increase comparability to existing studies of the broader finance literature (Bhide, 1992; Cumming, 2005a; Kotha and George, 2012). For the same reason, we also account for a third type of funding, namely grants, which are provided without requiring any transfer of shares or a payback (Auerswald and Branscomb, 2003; Feldman and Kelley, 2006). Accordingly, we here account for founder equity, insider equity (Ang, 1992) and external equity (Carpenter and Petersen, 2002), as well as debt finance and grants (Berger and Udell, 2006) as the major funding options of new ventures (see Table 1).

Table 1: Categorization of Funding

Type	Source
Equity	Founder Insider External
Debt	-
Grant	-

The defining characteristic of nascent ventures in relation to acquiring these different types of funding is their liability of newness and often smallness (Parker, 2009; Sine et al., 2006; Stinchcombe, 1965). These traits generally manifest themselves in information opacity, as well as a lack of a track-record and tangible assets (Aldrich and Fiol, 1994; Cressy, 2002). This results in a situation where conveying credible information to potential funders is often either prohibitively expensive or not possible (Berger and Udell, 1998), thus a situation of asymmetric information between the founder of the venture and a potential funder (Lee et al., 2015; Mina et al., 2013; Stiglitz and Weiss, 1981).

Information opacity and asymmetric distribution of information give rise to agency problems that can influence the ability of ventures to acquire funding as funding body and venture are usually two different entities. Agency problems can take the form of adverse selection (Jensen and Meckling, 1976) and moral hazard (Cumming, 2005b; Eisenhardt, 1989). The former describes a situation in which the agent's (the entrepreneur) signals about the quality of the venture cannot be observed or verified by a prospective principal (the funder) (Cumming, 2005b; Eisenhardt, 1989). Depending on the signals used by the agent, the principal's decision making process is thus flawed, so that the wrong investment option (venture) is selected. The latter exemplifies an incomplete contract after closing the deal between principal and agent, under which the agent potentially uses funding not in the best interest of the principal (Busenitz et al., 2005). In addition, depending on the set-up of the contract, the principal has limited influence or sanctioning mechanisms vis-à-vis the agent (Kaplan and Strömberg, 2004).

Founders of ventures are faced with the challenge of overcoming adverse selection and moral hazard 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. In light of these tensions, the so-called Pecking Order Theory (POT) of funding has emerged (Hechavarría et al., 2016; Myers and Majluf, 1984). POT proposes that agency problems entail a distinct order of attractiveness and, thus, accessibility of different funding types and sources. This, in turn, leads to a linear process in which ventures try to acquire these different funding options. The assumed order of preference expects ventures to first exhaust (1)

founder and (2) insider equity. Once these funding options are no longer viable, ventures approach (3) debt providers and only in a last step (4) external equity providers such venture capitalists (Berger and Udell, 1998; de Bettignies and Brander, 2007; Michaelas et al., 1999; Myers and Majluf, 1984).

Graph 1: Adverse Selection and Moral Hazard in POT

The mechanisms underlying this pecking order are the following: 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 et al., 2009; Hechavarría et al., 2016; Norton, 1991). While this does not hold for funding through insider equity (Ang, 1992; Kotha and George, 2012), 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). Accordingly, debt and external equity providers suffer most from adverse selection problems as they have no social network ties to overcome asymmetric information. These agency problems induce debt and external equity providers to ask for a premium to fund new ventures (Akerlof, 1970). This, in turn, makes external funding more expensive and thus less attractive for ventures vis-a-vis founder and insider funding (Cumming, 2005a; Vanacker and Manigart, 2010).

3.2 A process perspective on funding acquisition: Sequences and transition

Taking the pecking-order-theory as a reference point (Cumming, 2005a; Frank and Goyal, 2003; Myers and Majluf, 1984; Robb and Robinson, 2014), we assume that the funding acquisition process typically starts with the founders own resources, is followed by the acquisition of insider funding and, finally, by acquiring external (institutional) funding. While little is known about the (determinants of) transition between the funding phases (Cassar, 2004; Gartner et al., 2012), a variety of factors have been identified that help nascent ventures overcome agency problems and gain access to external funding sources (Burns et al., 2016).

First, hiring (experienced) employees signals a venture's legitimacy to external funders and can thus help to mitigate the liability of newness problem (Busenitz et al., 2005). Contrary to that, ventures that do not hire employees tend to have rather limited growth ambitions (Gartner et al., 2012; Storey, 1994). These ventures typically do not require as much funding and, as a result, are more likely to satisfy their funding needs through finance provided by the founders themselves (Avery et al., 1998; Kotha and George, 2012; Renko, 2013). We therefore expect nascent ventures that do not hire any employees to be restricted to founder funding, both by the lack of supply and demand for external funding. In contrast, we expect ventures hiring at least one employee to make use of external funding sources once the founder resources are exhausted.

H1: *Ventures that do not hire employees are less likely to acquire funding after acquiring founder equity.*

Second, and in line with the pecking-order-theory, ventures developing novel products can be expected to be financed by a combination of grants, internal and external equity (Islam et al., 2018). As research and development (R&D) of novel products is generally a highly uncertain process, grants are likely to be among the first funding sources accessed by innovative nascent ventures (Auerswald and Branscomb, 2003; Burns et al., 2016; Polzin et al., 2018). Furthermore, the investment amounts required for R&D processes are large. They often exceed the resources of the venture founders, forcing the latter to acquire funding from external funders, who often contribute not only funding but also knowledge and access to their networks (Barney et al., 1996; Hsu, 2006; Sorensen, 2007). In addition, a recent study by Islam et al. (2018) found that being awarded a prestigious research grant also increases the likelihood of subsequently acquiring venture capital. Therefore, and due to the resulting growth expectations of innovative ventures, we expect innovative ventures to not tap into insider capital sources (Kotha and George, 2012) but to directly approach institutional investors or grant providers (Bertoni et al., 2016; Gompers and Lerner, 1998):

H2: *Innovative ventures are more likely to acquire external equity or grants after acquiring founder equity.*

Third, 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. This, in turn, is attractive for banks as they might be able to (partly) recover their investments in case of venture failure. As a result ventures producing tangible products can more easily overcome the liability of newness which often prevents nascent ventures from acquiring debt (Berger and Udell, 1998; Cosh et al., 2009). Product developing ventures are also are more likely to pursue economies of scale and thus require larger investments compared to ventures that are 'asset-light' service providers (Bertoni et al., 2016; Polzin et al., 2018; Winton and Yerramilli, 2008). Consequently, the funding needs of product developers are likely to exceed their founders' resources, which leads them to seek external financing options (Lee et al., 2015; Mina et al., 2013; Winton and Yerramilli, 2008). Taken together, ventures producing tangible products are thus more likely to seek and gain access to debt finance after the investment of founder equity (Berger and Udell, 2006, 1998):

H3: *Ventures that produce tangible products are more likely to acquire debt after the investment of founder equity.*

4. Methodology

4.1 The Data: Sample and operationalization

To test the aforementioned hypotheses, we use the "Perfect Timing" (PT) database. Based on computer-assisted telephone interviews with founders, we collected this dataset in two waves 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). In order to capture possible variations in venture creation processes, the population interviewed includes ventures of all legal forms (excluding sole proprietorship) that were registered between 2004 and 2014 in the information technology (IT) and renewable energy (RE) industries in Germany, Italy, the US, the Netherlands and the UK. From this population, founders were randomly selected and invited to participate in an interview about the venture creation process of their company until a representative sample of 755 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 at the moment when the venture generated sustainable profits (defined as 3 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.

Dependent variable: The funding acquisition process

For the purpose of this analysis we only consider that part of the venture creation process which is relevant for a ventures funding. Accordingly, we consider the first time 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 overall venture creation process as described above. Throughout this process, we report the funding acquisition activities undertaken on a monthly basis. 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 actually received funding. This definition of funding acquisition ensures the comparability across cases. Accordingly, we only record funding acquisition activities that were successful, thus led to the actual 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 with regard to differences in the length of funding activities, it allows us to gear the analysis towards exploring the sequence of funding acquisition activities. Given that the latter is at the basis of pecking-order theory, this approach is most appropriate for the theoretical aim of our paper to shed light on the POT arguments.

In order 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, we distinguish between equity, debt and grant as types of funding. We furthermore follow the literature 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, Insider Equity, External Equity as well as Debt and Grants.

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 et al., 2012; Robb and Robinson, 2014) we consider eight, individual and aggregate states (listed in Table 2) at which we arrive in the following two-step approach.

Table 2: Coding the Funding Source/Type states

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

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, according to POT theory, is most difficult to acquire. The POT order considers external equity as most difficult and founder equity as the least 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 is based on the assumption that acquiring grants is such a unique and time-intense activity that it is basically irrelevant if and what other type of funding is acquired simultaneously.

We illustrate these two aggregation steps by the hypothetical funding acquisition process exemplified in Table 3: For the first two 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).

Table 3: Example of a Funding acquisition process

Source	Type	Month									
		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**

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.

Independent Variables: Contextual factors

We measure the different contextual factors that may influence which funding acquisition process is pursued by a new venture as follows (Aldrich and Fiol, 1994; Li and Zahra, 2012; North, 1990). We use World Bank data on bank loans given to the private sector (Demirgüç-Kunt and Maksimovic, 2002) and the volume of the stock market (Li and Zahra, 2012) to characterize the financial framework a venture operates in (Hirsch-Kreinsen, n.d.; Lerner and Tag, 2013; Migendt et al., 2017).

In relation to the GDP in year and country of the venture's registration these two values allow us to control for the financial conditions a ventures was set up under.

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.[1] 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, again, 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 / improvement (0), or radical innovation (1).

Table 4: Dataset descriptives

Variable	Value	N	in %
Country	US	198	26,2%
	UK	118	15,6%
	Germany	282	37,4%
	Italy	124	16,4%
	Netherlands	33	4,4%
Innovativeness	Not Radical	658	87,2%
	Radical	97	12,8%
Type of Good	Service	235	31,1%
	Mix	394	52,2%
	Product	126	16,7%
Zero Employees	No	314	41,6%
	Yes	441	58,4%

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[1] Concrete question asked in the questionnaire: 'How would you describe the degree of novelty of your venture`s core business idea?'

Industry	ICT	508	67,3%
	RE	247	32,7%
PT Solo founder	No	699	92,6%
	Yes	56	7,4%
Legal Type	Unlimited	90	11,9%
	Limited	665	88,1%

The second variable included in our analyses is the type of good a venture produces. We assert whether a venture produces a tangible product (0), offers only services (2), or provides a mixture of both (1). This variable was recorded in the same three-step process as the ventures innovativeness.

Furthermore, we distinguish between ventures that never hired an employee throughout the venture creation process (1) and those who hired at least one employee (0).

Industries are structurally different and induce ventures to pursue different business models, requiring distinct organisational structures (Sine et al., 2006) and thus different funding strategies (Gartner et al., 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 on the basis of NAICS industry codes and their business descriptions. In a second step, the person cleaning the samples drawn 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. Ventures that have an affiliation with both industries are classified as RE ventures.

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, which makes them likely to exclusively rely on founder funding. We group ventures into those set-up by a solo part-time founder (1) and those with all other founder (team) constellations (0).

Finally, we control for the legal form under which a venture was incorporated. The literature is divided about the effect of legal forms limiting owner liability. Some argue that limited liabilities might induce ventures to seek more debts because founders are not personally liable for them with their private

assets (Gartner et al., 2012). Others argue that this is the exact reason why banks do not offer debt to ventures incorporated under limited liability forms (Berger and Udell, 1998; Carter and Van Auken, 1990). While remaining agnostic about the effect of limited liability on debt funding, we code limited liability ventures as (1) and ventures registered under personally liable forms as (0).

4.2 Analyses

In line with our theoretical illustrations, we run two different types of analyses: **(1)** In a first step, we assess whether ventures follow the funding acquisition process as prescribed by the pecking order theory or deviate from this linear path. 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 fairly 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:

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 under section 3 we ensure comparability with previous studies by distinguishing between 8 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

In order to measure the distance between two funding acquisition sequences (as created in step 1), a cost needs to be assigned for replacing one state by any other state with the aim of transforming one sequence into the other. These so-called substitution costs range from 0 to an arbitrary maximum (here: 2) and are estimated on the basis of the relative frequency of transitions between two states within the entire dataset. Based on this transition frequency between any two funding states, a so-called substitution cost matrix is determined.

The substitution cost matrix obtained for our dataset intuitively makes sense as the substation costs are lowest to transform each equity state into the same equity state combined with debt. 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 transitions costs reflect the pecking-order 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.

Table 5: Substitution Cost Matrix

	Founder Equity	Insider Equity	External Equity	Debt	Debt & FE	Debt & IE	Debt & EE	Grant
Founder Equity	0							
Insider Equity	1.980546	0						
External Equity	1.980546	1.992141	0					
Debt	1.976390	1.979856	1.987631	0				
Debt & FE	1.861760	2.000000	1.997812	1.893771	0			
Debt & IE	2.000000	1.945409	2.000000	1.932181	1.987395	0		
Debt & EE	1.983565	1.983871	1.871734	1.932824	1.981683	1.989583	0	
Grant	1.956760	1.993256	1.971531	1.984678	1.993435	1.989583	1.966571	0

Step 3: Calculating Sequence Similarity

Based on these substitution costs, it is then calculated (for each of the 755 sequences in our dataset) how costly it is to transform one sequence into any of the other 754 sequences. The cost of transforming one sequence into the other expresses their respective distance. To determine the distance of sequences that differ in length, we calculate their distance based on the length of the shorter of the two sequences. This reflects that the shorter of the two funding acquisition processes is unknown beyond the period observed and should thus not influence the distance measure. This novel solution was introduced in Held et al. (Held et al., 2018) and addresses an often voiced concern of using OM for analysing sequences in social science that vary greatly in length (Aisenbrey and Fasang, 2010)..

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

Step 4: Perform a Cluster Analysis

In the concluding step, the funding acquisition processes are clustered on the basis of their respective distances to one another. Consequently, each cluster obtained encompasses those processes that are particularly similar to each other, and distant to the processes of other clusters. Accordingly, each cluster represents one of the most frequent and, thus, typical approaches to funding acquisition. We run the cluster analysis based on the Ward's minimum variance method, which has been shown to

consistently produce the most accurate sequence clustering within the framework of OM analyses (Dlouhy and Biemann, 2015).

We use a combination of various partition quality measurements, namely the Weighted Average Silhouette Width (ASWw), R², Point Biserial Correlation (PBC), and Hubert's C (HC) to determine the optimal clustering solution amongst all solutions between one and twenty clusters. These measures indicate how similar sequences are within one cluster and how different they are between clusters. Consequently, we calculated these indicators for one, two, three, etc., up to twenty clusters in order to determine their goodness of fit. In this way, we could determine for which cluster number the goodness of fit is maximized. In doing so, we could exclude those cluster solutions which either did not yield distinct approaches, because they clustered together too different sequences, or which spread out sequences over too many similar clusters.

(2) In order to provide meaning and context to the results of an exploratory process analysis, the next step is to understand *"what factors cause the different sequences observed"* (Van de Ven and Engleman, 2004). We therefore use binary logistic regression models to identify the conditions that influence the pursuit of one funding acquisition approach (cluster) as compared to all other approaches (dependent variable). Testing *Hypotheses 1-3*, we determine the explanatory power of a venture's innovativeness, its type of good, as well as whether it hired employees (independent variables). In addition, we control for the venture's legal form, whether it is led by a solo part-time founder, and the financial conditions under which the venture was created (control variables).

We fit the following model for each cluster to obtain the estimates:

$$ln\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 Innovativeness_i + \beta_2 Product_i + \beta_3 Employees + \boldsymbol{\beta'x}_i \ (1)$$

where p_i denotes the probability that venture i belongs to the cluster rather than to any of the other clusters, β_0 the cluster's intercept, β_1, β_2, and β_3 the estimated coefficients for our independent variables, $\boldsymbol{\beta}$ a vector of coefficients for the control variables, and $\boldsymbol{x}_i$ a vector of control variables.

5. Results

5.1 Funding types and sources

Before running the aforementioned analyses, we look at some data descriptives: When looking at the order in which funding was acquired (Table 6), we observe, that three quarters of the ventures in our sample receive the first funding from their founders. While this supports a fundamental assertion of the POT theory, it also means that one quarter of the ventures do not follow the POT expectations already from the beginning of their funding acquisition process. In addition, almost 10% of the ventures receive their first funding from equity insiders, which according to POT also belong to the earliest funding forms that ventures typically acquire. Nevertheless, a significant group of ventures remain that acquire their initial funding from debt providers, which runs counter to POT expectations.

Table 6: First funding acquired

1st funding acquired	N	in %
Founder Equity	568	75.3%
Insider Equity	64	8.5%
Debt	50	6.6%
Grant	22	2.9%
Debt & FE	17	2.3%
External Equity & FE	15	2.0%
External Equity	12	1.6%
External Equity & IE	3	0.4%
Debt & IE	2	0.3%

Debt & EE	1	0.1%
Total	755	100%

When we do not only look at the first type of funding acquired, but also include the second type of funding that was acquired (see Table 7), the picture gets even more differentiated, and we find further evidence, that most funding acquisition processes are largely in line with the expectations of the POT. However, these results are also indicative of a great variety of different funding acquisition processes amongst nascent ventures.

Table 7 depicts the five most common sequences of the first two funding types that ventures acquired. These five sequences make up 80.8% of our sample. Interestingly, more than half of the ventures never acquire any other funding type than the investment they received from their founders (55.6%). Only 10.6% of ventures follow up on the initial founder investment received with the acquisition of debt. However, almost half as many ventures (namely 4%) first acquire debt and then receive funding from their founders.

Table 7: First two types of funding acquired

1st / 2nd funding acquired	N	in %
FE / -	419	55.6%
FE / Debt	80	10.6%
FE / Grant	41	5.4%
IE / -	39	5.2%
Debt / FE	30	4.0%
Total	609	80.8%

This picture gets even more diverse when we consider that the remaining 19.2% of the sample are distributed over 37 different sequences with regard to their first two funding acquisitions. In order to

explore this variety in greater depth, we now carry out the aforementioned OM sequence analysis. This does not only allow us to include more than two funding acquisitions, it also introduces the length of time it took ventures to acquire these funding types. In other words, it allows us to depict the actual funding acquisition process instead of singular funding acquisition events.

5.2 Patterns in Funding acquisition processes

As outlined in the theory section, the funding acquisition processes of ventures have been researched at the meta level, so that our research question *"Do nascent ventures pursue different approaches to funding acquisition and, if so, how do these processes look like?"* has never been answered. The partition quality measurements identify the solution of 7 clusters (out of the overall 1-20 solutions considered) as optimal (ASWw = 0.75; R^2 = 0.82; PBC = 0.83; HC = 0.04). Each of these 7 clusters (reported in Figure 1) represents one of the most typical funding acquisition processes with regard to its funding types and sources, as well as the timing and sequence in which funding is acquired. As a result, we can answer the first part of our research question with "yes": nascent ventures pursue one of overall seven distinct approaches to funding acquisition.

Moving on to the second part of the research question, 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 process. The most representative process (Rep.) 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 (FP1): The 481 ventures pursuing the approach depicted in cluster FP1 largely fund themselves through their founders' equity. The process is rather static in that only a few ventures add other funding sources at all; and those who do so, acquire additional funding rather late in the process. The dominance of one static funding process based on founder equity contradicts the expectations formulated in the POT in so far as POT expects ventures to routinely transition to other funding options.

Figure 1: Distinct Funding acquisition processes
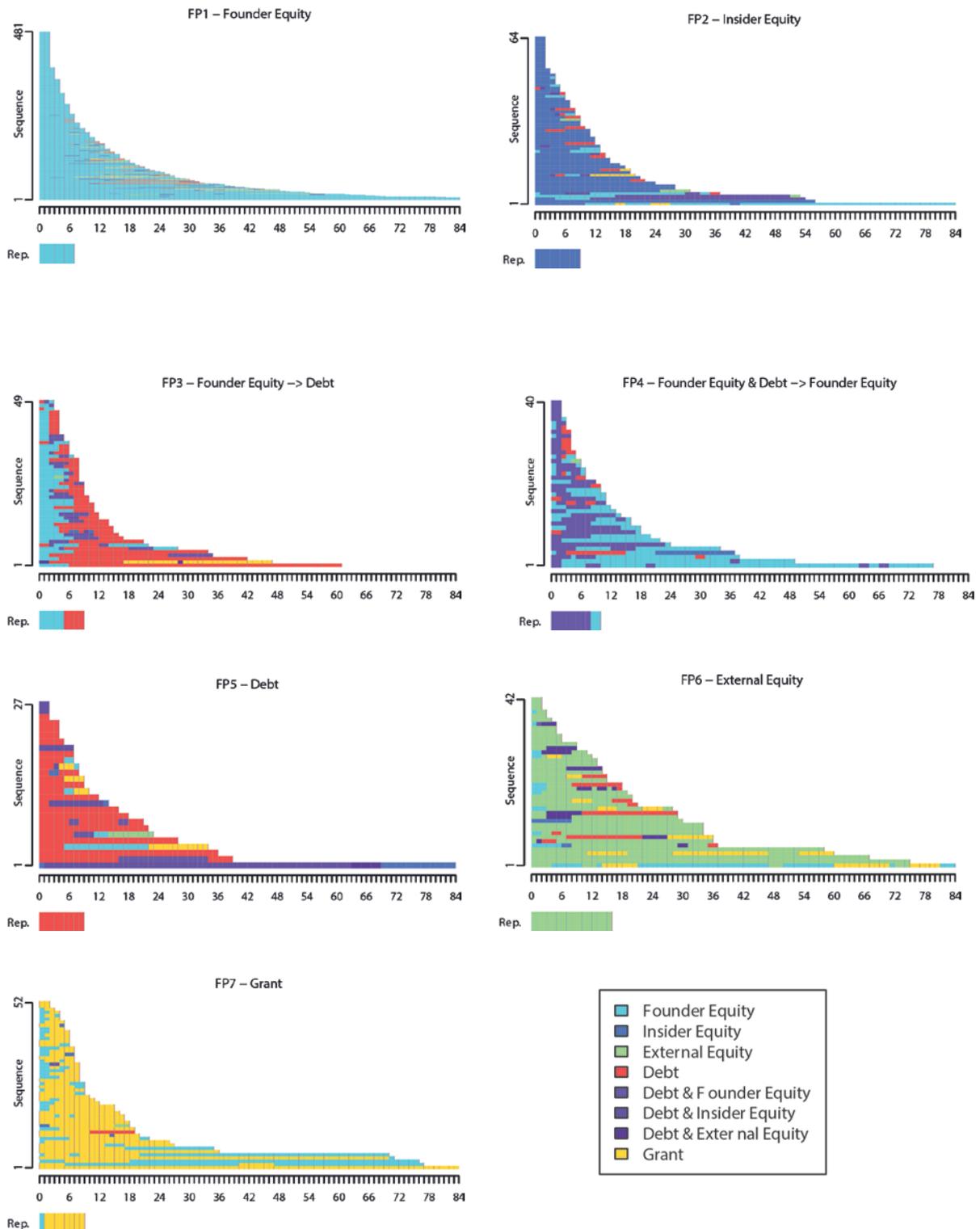
The second largest cluster (FP2) features ventures that largely depend on insider equity. As defined

above, this state also encompasses months in which both founder and insider equity are

simultaneously acquired. Cluster FP2 thus depicts a funding acquisition process sponsored by both the venture founders and their immediate network.

Clusters FP3 and FP4, in turn, report two opposing approaches characterised by the combination of founder equity and debts. Most ventures combine these two funding sources in a dynamic transition process from founder equity to debt after about six months (FP3). However, ventures pursuing the approach depicted in cluster FP4 proceed the other way around: They begin with acquiring debt and, after about six months, turn to acquiring founder equity. While the number of ventures pursuing this approach is comparatively limited (n = 40), the existence of these two opposing approaches to debt and founder equity runs counter to the POT assumptions.

Cluster FP5 is rather small (n = 27) and clearly dominated by ventures that finance themselves almost exclusively through debt. This finding is particularly interesting, considering that debt is often assumed to be out of reach for nascent ventures.

Ventures pursuing the approach of cluster FP6 strongly focus on acquiring external equity. In view of the attention paid to institutional equity both in public discussions and in the literature on venture funding, it is surprising how small the number of ventures is that belong to cluster FP6.

Finally, cluster FP7 features those ventures that acquire a grant as part of their funding acquisition process. This mostly happens in combination with initial equity provision by founders, which often continues throughout the grant application phase.

5.3 Determinants of approaches to the Funding Acquisition Process

After establishing the existence of seven distinct funding acquisition processes and describing their basic differences, we want to understand what factors influence the ventures' choice to follow a particular acquisition process. In other word, what drives the differences in the funding acquisition processes of ventures (Table 8)?

Our first hypothesis is that ventures which do not hire employees are less likely to seek other forms of funding after acquiring founder equity (H1). We find clear evidence in support of this hypothesis: Ventures pursuing the acquisition process depicted in cluster FP1 (founder equity only) are two times

as likely as other ventures in our sample to never hire any employees (FP1; Exp β = 2.049; p < .01). Ventures pursuing all other funding approaches (except the one depicted in cluster FP5) are less likely not to hire employees. Even though this finding is statistically significant only for clusters FP3 (Founder Equity -> Debt) and FP6 (External Equity), the regression results overall can confirm H1.

Table 8: Regression estimates for funding acquisition process clusters

Variable	Funding acquisition process cluster (Exp β)						
	FP1	FP2	FP3	FP4	FP5	FP6	FP7
Type of Good - Mix	1.15	.632	1.121	.694	.85	1.199	1.074
- Product	.421***	.982	2.7**	2.635**	2.924*	.631	1.653
Degree Novelty	.626*	1.54	.419	.196	.858	4.012***	2.032*
Legal Type	1.014	1.55	1.118	.936	.487	4.291	.536
Solo PT Founder	.714	2.386**	.603	1.114	.272	1.668	1.375
Zero Employees	2.049***	.851	.554**	.696	1.223	.208***	.661
Industry	.579***	.595	2.965***	1.966*	2.157*	1.404	.967
Loans to Private Sector (in % of GDP)	1.005	.989	1.021**	.999	1.01	.99	.983**
Stock Market Volume (in % of GDP)	.992	1.013	.981*	.995	1.003	1.007	1.021**
Intercept	1.499	.135***	.012***	.079***	.008***	.038***	.203**
Observations in Cluster	481	64	49	40	27	42	52
R²	.117	.038	.116	.122	.086	.165	.051

p-values *** < .01, ** < .05, * < .1

With regard to the ventures' innovativeness, we hypothesized that ventures developing radically new products are more likely to receive external equity and grants after the initial founder investment (H2). This hypothesis is confirmed by the finding that the approaches relying chiefly on external equity (FP6) and grants (FP7) are significantly more likely to be pursued by ventures developing radically new goods (FP6; Exp β = 4.012; p < .01 / FP7; Exp β = 2.032; p < .1).

We also find proof of our third hypothesis (H3), which proposed a relationship between the type of good a venture produces and the likelihood of acquiring debt funding in addition to the founders' investment. We observe that ventures producing tangible products rather than services are highly unlikely (FP1; Exp β = .421; p < .01) to acquire any other funding than their founders' investment (FP1). Instead, product developing ventures are highly likely to acquire debt funding after, or even instead of, founder equity (FP3; Exp β = 2.7; p < .05 / FP4; Exp β = 2.635; p < .05 / FP5; Exp β =

2.924; p < .05). We therefore conclude that there is a positive relationship between product developing ventures and their acquisition of debt funding.

Furthermore, we observe that the financial environment has hardly an effect on the funding approach pursued by nascent ventures. Although there is significant relation between both the volume of loans provided to the private sector and the volume of stock market capitalization and clusters FP3 and FP7, the effect size is rather small. Yet, as one might expect, ventures in countries where higher amounts of loans are provided to the private sector are more likely to seek debt finance after founder equity (FP3), while ventures in environments with high stock market capitalization are less likely to do so. Interestingly, the two environments have the opposite effects on the likelihood of acquiring grants (FP7), which seems to indicate a substation effect between grants and debt.

Out of the remaining control variables, two prove to be significantly correlated with distinct funding approaches. Accordingly, we observe that ventures active in the renewable energy sector are less likely to solely finance themselves through founder equity (FP1) but instead choose debt-based funding approaches (FP3, FP4 and FP5). Considering that ventures in the renewable energy sector are more likely to require larger scale production machinery than their counterparts in the ICT sector, these collaterals may well explain why renewable energy ventures – like product developing ventures – find it easier to obtain debt finance. Finally, we find interesting correlations between solo part-time founders and their funding acquisition approaches, who are likely to not only finance their venture themselves but together with insider equity providers (FP2; Exp β = 2.386; p < .05).

5.4 Cluster descriptives – Funding sums, success rate and process length

In order to further explore distinctive characteristics of each of the funding acquisition processes identified, we analyse the average amount of funding a venture received pursuing each approach. Given that the founders interviewed were often reluctant to provide information about the funding amounts received, the case number is overall too limited for running statistical analyses. Nevertheless, the descriptive data provides interesting insights into further differences between the funding acquisition processes (Table 9).

The funding approach with the lowest average investment is FP1 (Founder Equity), because only very few ventures pursuing this approach receive funding other than founder equity. In view of the low amounts invested by founders, the average total funding acquired by ventures pursuing this approach is decisively lower than that of other approaches.

In contrast, the two funding processes characterize by a transition from founder equity to debt (FP3 and FP4) acquire by far the highest average funding amounts (3,863 k €, respectively 3,229 k€). These amounts are driven by large debts rather than the founder equity invested.

The funding processes of clusters FP6 (external equity) and FP7 (grant) seem diametrically opposed with regard to the funding types they tap into. While ventures focusing on the acquisition of external equity (FP6) also receive the highest amounts thereof but hardly any founder equity, the opposite holds true for ventures focusing on grant acquisition (FP7), which chiefly finance themselves through founder equity.

While incomplete, the data on the funding amounts obtained allows us to conclude that debt is by far the most important funding source, followed by external equity and grants. Together with insider equity, founder equity – which constitutes the first founding source for almost all ventures – is least important in terms of the amounts received. These findings are in line with the capital structure literature (Robb and Robinson, 2014; Sogorb-Mira, 2005) and thus corroborate the reliability of our dataset. Combined with the above cluster analysis, we can show that funding acquisition processes of nascent ventures do not only differ in the sequence of funding types, but also in terms of the weight the funding types carry and overall investment sums.

Table 9: Average amounts of funding received per cluster (in € thousand)

Funding Source	FP1	FP2	FP3	FP4	FP5	FP6	FP7	Overall
Founder Equity	91	141	93	310	26	75	1301	**104**
(n)	256	20	25	15	5	15	19	**355**
Insider Equity	63	34	15	NA	8	66	17	**36**
(n)	2	24	1	0	3	4	2	**36**
External Equity	110	205	NA	396	NA[2]	697	50	**590**

[2] A single outlier case is not considered here

Variable	FP1	FP2	FP3	FP4	FP5	FP6	FP7	Overall
(n)	1	1	0	1	0	20	2	25
Total Equity	92	161	94	336	30	767	130	**154**
(n)	256	24	25	15	5	20	20	365
Debt	783	1,089	3,769	3,100	467	663	1,397	**1,940**
(n)	22	6	25	14	15	6	3	91
Grant	166	66	NA	NA	NA	416	158	**173**
(n)	7	1	0	0	0	2	22	32
Total Funding	164	436	3,863	3,229	477	1,007	466	**632**
(n)	256	24	25	15	15	20	22	377

In a last step, we use three output measures to complement our analyses with data on the outcome of the seven funding acquisition processes, namely the *success rate*, *profitability* and *length of venture creation*. We find that the seven processes differ with regard to these three output indicators. Table 10 provides an overview for each funding acquisition process. As illustrated above (see section 3), venture creation *success* is defined as sustainable profitability, i.e. as making profits for three consecutive months. Venture *profitability* is indicated as the profits made by ventures during these three months. The *length of venture creation* is calculated as the duration between idea conception and the end of venture creation.

Given that cluster FP1 (founder equity) is so large, it is hardly surprising that it displays values close to the average on all three indicators. Interestingly, those ventures that focus on acquiring external equity (FP6) and grants (FP7) are characterised by the lowest success rate and the longest average processes. These findings further corroborate hypothesis H1, if we consider that debt providers are unlikely to invest in highly innovative and, thus, risky ventures Interestingly, ventures funded by external equity differ from ventures funded by grants most notably in the profits generated by successful ventures: Successful ventures backed by external equity are substantially more profitable during their first three profit months than ventures funded by grants. Ventures funded by grants do thus not only take longer to achieve profitability but also create lower profits than ventures funded by external equity.

Table 10: Succes measures of venture creation

Variable	FP1	FP2	FP3	FP4	FP5	FP6	FP7	**Overall**

Success rate	90%	83%	94%	85%	96%	67%	77%	**87%**
Profit (€)	24,507	16,362	28,639	33,070	24,665	27,798	17,465	**24,366**
(n)	187	16	16	10	17	13	15	**274**
VCP length (month)	31	34	35	31	37	48	42	**33**

The high success rate of ventures relying on debt finance (approaches FP3 and FP5) is noteworthy but hardly surprising in view of the risk aversion of banks. Lastly, we find that insider backed ventures (FP2) display a success rate and profitability that are both below average. Whether this means that ventures with less attractive business proposition use insiders as funders of last resort, or miss input from professional funders, requires further investigation.

6. Discussion and Conclusions

The funding that (nascent) ventures acquire has been shown to influence their survival, speed and performance (Berger and Udell, 1998; Hechavarría et al., 2016; Shane and Venkataraman, 2000). Although a growing literature provides an initial understanding of the interplay between context and venture funding, research on the funding acquisition processes of nascent ventures is still limited (Block et al., 2018; Cassar, 2004; Drover et al., 2017).

With this study, we are able to bring the funding acquisition process of the individual venture to the forefront (Cassar, 2004). Instead of being obscured by contradicting trends in meta-data on investment volumes, we are able to discern distinct funding acquisition processes at the venture level, thereby aiming to contribute a more fine grained view on nascent venture funding. Extending previous work on start-up financing in general (Bhide, 1992; Cassar, 2004; Gartner et al., 2012; Vanacker and Manigart, 2010; Winton and Yerramilli, 2008), and pecking-order theory in particular (Frank and Goyal, 2003; Myers and Majluf, 1984; Robb and Robinson, 2014), our analyses reveal that seven distinct funding acquisition processes exist. Interestingly, by far the most common process is a static one that almost exclusively relies on equity provided by the venture's founders. While we observe a significant number of ventures to follow a process of transition, this transition usually sees ventures

move from founder equity based funding to debt based funding. In line with assumptions in recent discussions (Bertoni et al., 2015; Block et al., 2018; Drover et al., 2017; Islam et al., 2018), external investors provide funding only to a small number of nascent ventures (Ang, 1992; Kotha and George, 2012; Renko, 2013).

Our results allow for additional contributions on principal-agent problems as drivers of pecking-order financing as we are able to identify several factors that influence a venture's choices throughout its funding acquisition process. Our results show that factors reducing principal-agent (i.e. moral hazard and adverse selection) problems between funders and ventures have the expected effects (Block et al., 2018; Connelly et al., 2011; Drover et al., 2017): Ventures producing tangible goods are less likely to fund themselves chiefly through their founder's equity (Berger and Udell, 2006, 1998; Cosh et al., 2009; de Bettignies and Brander, 2007; Polzin et al., 2018; Winton and Yerramilli, 2008) and more likely to turn to debt funding early on.

Innovative ventures target external funding early on, whereby they are more likely to acquire external equity or grants than debt funding. These findings are not only in line with previous research based on panel data and balance sheet information (Gartner et al., 2012; Hechavarría et al., 2016; Robb and Robinson, 2014), they also corroborate the idea that external equity providers generally take on a more active advisory role than debt providers (Barney et al., 1996; Hsu, 2006; Sorensen, 2007).

The decision not to hire any employees seems to be an expression of limited growth ambitions, which induces ventures to mostly rely on their founders equity and renders them unsuccessful in acquiring external equity throughout the start-up process (Avery et al., 1998; Kotha and George, 2012; Renko, 2013). Why solo part-time founders do not only rely on their own funds but also strongly draw on insider equity requires further investigation.

Furthermore, our paper also offers an important methodological contribution. 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; Ruef,

2005; Ucbasaran et al., 2001; Van de Ven and Engleman, 2004) and funding acquisition process in particular (Dimov, 2010; Gartner et al., 2012; Hechavarría et al., 2016).

Our research is subject to a set of limitations. On the one hand, our dataset would have benefitted from both a larger N and a larger variety in terms of industry and country coverage. On the other hand, we almost exclusively included static drivers (such as a venture's industry, innovativeness, or goods developed) to explain variations in dynamic processes. Future research would benefit from including dynamic aspects (such as moments in which core activities take place) to assess their influence on the sequence and length of funding acquisition processes.

Acknowledgments

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