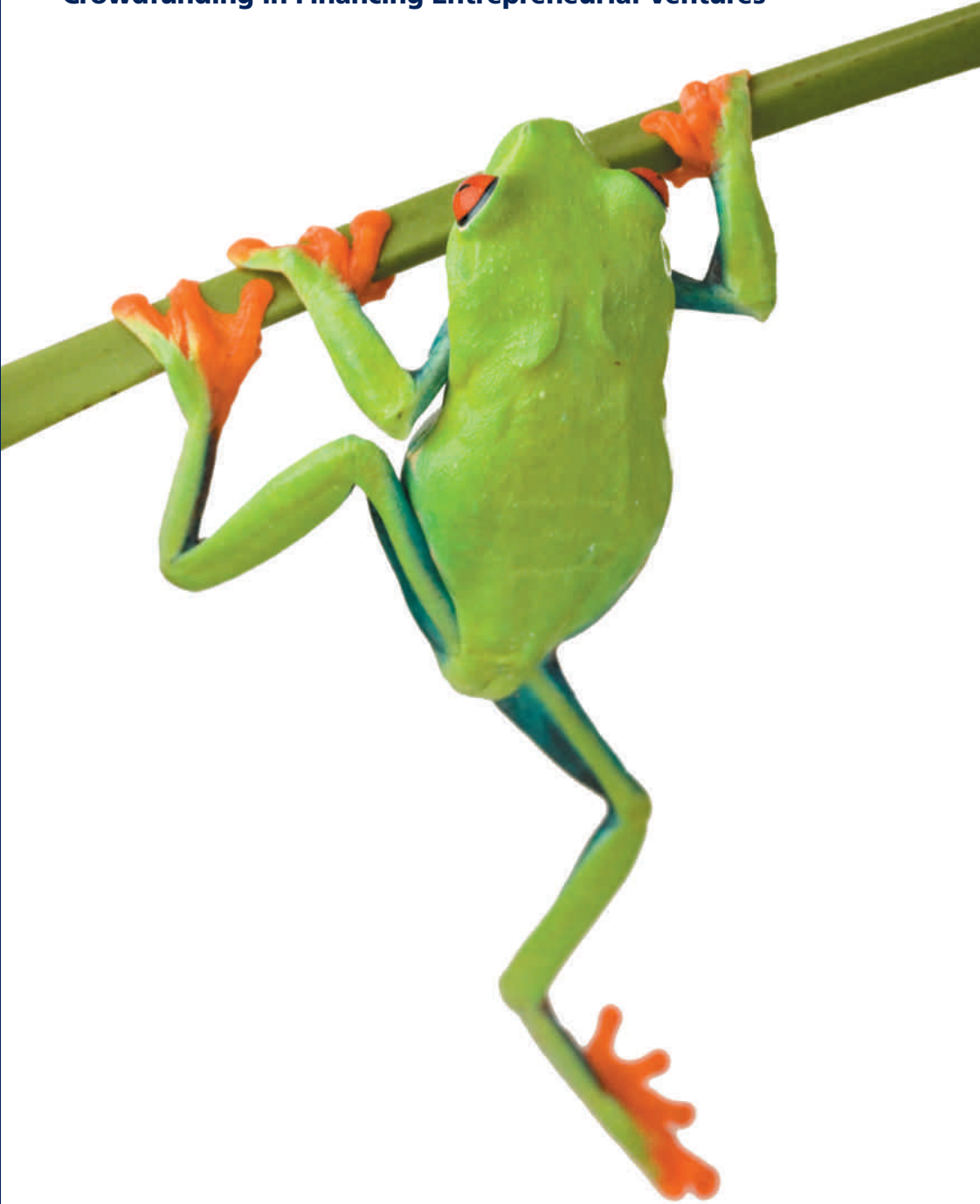


ROXANA TURTUREA

Overcoming Resource Constraints:

The Role of Creative Resourcing and Equity Crowdfunding in Financing Entrepreneurial Ventures



**Overcoming Resource Constraints: The Role of Creative
Resourcing and Equity Crowdfunding in Financing
Entrepreneurial Ventures**

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Resourcing and Equity Crowdfunding in Financing
Entrepreneurial Ventures**

Omggaan met financiële restricties: De rol van creative resourcing
en equity crowdfunding in het financieren van
ondernemingsprojecten

Thesis

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by

Roxana Turturea
born in born in Drobeta-Turnu Severin, Romania

Doctoral Committee

Doctoral dissertation supervisor(s):

Prof.dr. P.P.M.A.R. Heugens

Prof.dr. J.J.P. Jansen

Other members: Prof.dr. D. Dimov

Prof.dr. W. Stam

Dr. D. Stam

Co-supervisor(s): Dr. I. Verheul

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PREFACE

I still vividly recall laughing uncontrollably when my Math teacher in high school suggested I pursue a career in education. I replied with a smug smile: “There is no way I would ever do anything related to education”. Many years later I found out about a new PhD position at RSM, and it took me exactly one day to decide I want it. My PhD journey was lengthy, and occasionally dark and stormy. However, as in any old-fashioned fairy tale, there was help along the way.

First and foremost, I would like to express my gratitude to my promoters, Pursey Heugens, Justin Jansen and Ingrid Verheul. Pursey is an inspiring scholar, and I am very grateful for his support throughout, and after my PhD. Pursey always provided me with candid, but constructive feedback on my work. In so doing, he did not only shape my academic aspirations, but also the way I interact and collaborate with other researchers. I have gained a new appreciation of Pursey when I was on a job market. Being on the job market is not a relaxing experience, but it is substantially more bearable when you have someone like Pursey to encourage you to do your best and have confidence in you when your best is not good enough to get the job. Justin encouraged me to be bold and not hesitate to enter a new research area if I am truly passionate about it. When I started the PhD, crowdfunding was a new phenomenon, with almost no research on it. Many scholars were doubting that crowdfunding would ever take off and become a viable financing source for entrepreneurs. When I shared my half-baked ideas about doing research on crowdfunding, Justin was open and supportive, even though the topic was outside his core research interests. Ingrid is the person that had the strongest influence over my decision to apply for a PhD. She was my master thesis supervisor and the positive experience with her drove me to apply for a PhD position. Ingrid is a passionate and emphatic scholar, working with her made me a better scholar and a better person.

Many thanks also to all my co-authors, I was incredibly lucky to work closely with great scholars that enriched my academic experience. Steve, you have a wonderful work ethic, and never-ending energy! I don't seem to meet you face-to-face often, but that never seemed to impede our collaboration. Marc, I started working with you when I knew nothing

Preface

about research, and I was asking you a million questions. Thank you for all your patience, I used up lots of it! Magdalena, from doing research to watching the stars, our time together has been lovely! Mark, working with you doesn't even feel like work! I hope we will collaborate on many fun projects together, partly because that will give me the opportunity to play with your cats! I am also very grateful for having the opportunity to work with Dean Shepherd, whom I visited at Indiana University in 2015. Dean is a spontaneous, creative and sharp scholar, and he had a tremendous impact on my research interests, and on my identity as an academic.

My PhD journey would not have been the same without my colleagues and friends at RSM. Jorien, Saskia, Agapi, Jochem, Julija, Anika, Gabriele, Laura S., Micha, Derck, Xiao, Nikos K., Katrin B., Katrin S., Ilaria, Radina, Tatjana, Pengfei, Gizem, Joost, Mirko, Laura G., Emre, Krishnan, Hendra, Saeedeh, Riccardo, Taghi, Maria Rita, Giuseppe, Korcan, Luca, Patrick R., Frank W., Lotte, I was lucky to have you around! I am looking forward to meeting you all around the globe and catch up! Warm thanks to my frequent De Smitse companions, Irene (with whom I may have spent more time together inside De Smitse than outside), Balazs (the force is strong with this one), Thijs (wizard that makes drinks appear out of nowhere), Konstantina (the only one who understands my Jamon addiction), Gijs (bad influence) and Philip E (also a bad influence). Ruxi, and Jacomijn, it was a pleasure to share a joyful and colorful office with you! I will always cherish our memories, and I hope we will be making new memories together in the next years! Carolien and Patricia deserve special thanks for all their support in fixing all sorts of administrative issues. Many thanks also to all ERIM representatives that were always there for me when I needed help, Patrick G., Miho, Kim, Tineke and Natalija.

I am immensely grateful for all my non-RSM friends, that made my time in the Netherlands unforgettable. Delia, you were my partner in crime, shopping, foodie experiences, partying and travelling, I really miss you! Philipp K., you were there for me at my best and my worst, and you always managed to cheer me up with an elderflower sour! Aysu, you are one of those bad influences in my life, I shall not share any further incriminating details. Christina, Panos, Eleni, Vassia, Aliko, Giota, Paolo, it was lovely hanging out with you!

It is not always easy to form and maintain lasting friendships when you move around so often. I am fortunate however to have some friends that are close to my heart no matter how far they are, or how often we actually meet or talk. At this point, I know too many of their secrets, and they know too many of mine, so we are bound to be friends forever. Marek, Benedikt, Patrick F., Maxime, Wolfgang, you crazy chickens, we had lots of fun during our master studies together, and even more fun in our numerous informal reunions after. Marek, visiting you in Berlin has become a by-annual ritual, thank you for being there for me in any way possible (Julia says thanks too)! Oana, Adina, Andra, a trip to Bucharest is not the same without catching up with you over coffee! The ancient “friends”, Lorena and Irina, you know me even better than Mark Zuckerberg! We don’t see each other as often as I’d like, but always know I am only a flight away when you need me!

Lastly, I would like to thank my family for everything I am. My mom never told me inspiring stories about how women can achieve anything in life. She just raised me in a way in which it never crossed my mind that anything (including my gender) could prevent me from accomplishing what I want. My mom taught me to be unstoppable when I set my mind on something. My dad was less preoccupied by my educational or professional achievements. He taught me that there is more to life than exams, promotions, or money, and that it is important to be kind, happy and have balance in life. Although Irinel (my brother) is 9 years older than me, he spent ample time in my childhood playing with me and reading me fairy-tales. I taught him patience (apparently, I can be deadly with a porcelain-made panda figurine as a weapon), he taught me that a playful mind is a happy mind! Last Easter we spent 5 hours assembling together a giant Lego car. I am grateful for my “new” family as well. Lorena, my sister-in-law, and my nephews, Robert and Paul, enrich my family and my life. My final thoughts go towards my little water giant, you make me happy!

Roxana Turturea

Helsinki,
September, 2018

Preface

Table of Contents

Chapter 1. Introduction	1
1.1 Overcoming Resource Constraints	1
1.2 Research Questions	4
1.3 Dissertation Overview	5
1.4 Declaration of Contribution	7
Chapter 2. Top Management Team Attributes, Bricolage and Ambidexterity in Small and Medium-Sized Enterprises	9
2.1 Introduction	10
2.2 Theory and Hypotheses	12
2.2.1 Organizational Ambidexterity in SMEs	12
2.2.2 Managing Organizational Resources in SMEs	13
2.2.3 Entrepreneurial Bricolage and Organizational Ambidexterity	16
2.2.4 Managing Entrepreneurial Bricolage: TMT Networking Ability and Cognitive Diversity	18
2.2.5 Entrepreneurial Bricolage as Mediator	20
2.3 Methods	22
2.3.1 Sample and Data Collection	22
2.3.2 Measures and Validation of Scales	23
2.4 Analyses and Results	26
2.5 Discussion and Conclusion	32
2.5.1 Theoretical Implications	33
2.5.2 Managerial Implications	35
2.5.3 Limitations and Future Research	36
Chapter 3. TMT Improvisation, Resource Management and Performance in SMEs: A Mediated Model	39
3.1 Introduction	40
3.2 Theory and Hypotheses	42

Table of Contents

3.2.1 Improvisation in TMTs.....	42
3.2.2 Resource Management Behaviors	43
3.2.3 TMT Improvisation and Resource Management Behaviors	45
3.2.4 Resource Management and Performance	47
3.2.5 The Mediating Role of Bootstrapping and Bricolage.....	49
3.3 Methods	50
3.3.1 Sample and Data Collection	50
3.3.2 Measures and Scale Validation	51
3.4 Analyses and Results	54
3.5 Discussion and Conclusion.....	60
3.5.1 Theoretical Implications	61
3.5.2 Managerial Implications	62
3.5.3 Limitations and Future Research.....	63
Chapter 4. Heuristics in the Decision-Making Process of Crowd Investors	67
4.1 Introduction	68
4.2 Heuristics in Decision-Making.....	71
4.2.1 Heuristics in Equity Crowdfunding	72
4.2.2 Confirmation, Disconfirmation and Selectivity in Equity Crowdfunding	74
4.2.3 Confirmatory Search and Investment Performance.....	75
4.2.4 Disconfirmatory Search and Investment Performance	77
4.2.5 Selective Search and Investment Performance.....	78
4.3 Methods	80
4.3.1 Sample and Data Collection	80
4.3.2 Measures and Validation of Scales.....	81
4.4 Analyses	90
4.4.1 Supplementary Analyses	92
4.5 Conclusion.....	94
4.5.1 Theoretical Implications	95
4.5.2 Practical Implications	97
4.5.3 Limitations and Further Research	97

Table of Contents

References	99
Summary	113
Samenvatting.....	115
About the Author	117
Portfolio	119
The ERIM PhD Series.....	121

Table of Contents

List of Tables

Table 2.1 Measures and Items	25
Table 2.2 Descriptive Statistics	27
Table 2.3 Antecedents of Ambidexterity	29
Table 2.4 Antecedents of Bricolage	30
Table 3.1 Measures and Items	53
Table 3.2 Descriptive Statistics	55
Table 3.3 Antecedents of Bootstrapping and Bricolage	57
Table 3.4 Antecedents of SME Performance	58
Table 4.1 EFA for Confirmatory and Disconfirmatory Search	83
Table 4.2 Measures and Items	87
Table 4.3 Descriptive Statistics	89
Table 4.4 Logistic Regressions	91
Table 4.5 Descriptive Statistics for Selective Search	93

List of Tables

List of Figures

Figure 2.1 Mediation Analyses..... 32
Figure 3.1 Mediation Analyses..... 60

List of Figures

Chapter 1. Introduction

1.1 Overcoming Resource Constraints

Lack of financial capital has been widely regarded as one of most important barriers to firm growth (Carpenter and Petersen, 2002). When internal capital is limited, firms often attempt to secure external capital from “traditional” equity financiers, such as venture capitalists, corporate venture capitalists or business angel investors (Drover et al., 2017). Beyond their financial investments, these investors also help firms by providing them access to wide networks, offering strategic advice, and by sustaining professionalization and monitoring efforts (Croce, Martí, and Murtinu, 2013; Sapienza, Manigart and Vermeir, 1996). Despite the financial and non-financial benefits brought to the table by equity investors, the stark majority of firms do not attract any source of external finance. Research building on information asymmetries and signaling theories suggest that, particularly young or small firms, experience difficulty when trying to access external capital, leading to what finance scholars refer to as “the finance gap” (Bergel and Udell, 1998; Winborg and Landström, 2001). This gap entails that the demand (by entrepreneurs) exceeds the supply (by investors) of financial capital. More recent research shows, nonetheless, that this gap may not be as large as previously thought (Cosh, Cumming, and Hughes, 2009; Vos, Yeh, Carter, and Tagg, 2007). Specifically, many firms do not attract external capital from “traditional” equity financiers, because they do not seek it to begin with (Vos, Yeh, Carter, and Tagg, 2007). While external capital entails substantial benefits for firms, it also involves important drawbacks. Powerful external financiers can limit the voting and equity rights of entrepreneurs, resulting in a loss of control over strategic decision-making. External financiers may also push for a short-term orientation that ensures a successful exit for them as soon as possible, but may hamper firm long-term performance. Several billion-dollar firms, such as Craigslist, GoPro, or Qualtrics, were started with modest personal savings, and deliberately did not secure external capital from investors for the first ten years since their incorporation. When they did indeed attract investors on board, they did so when their valuations were in the range of billions of dollars.

Introduction

Regardless of whether entrepreneurs refrain to access external capital out of necessity (i.e. inability to attract external capital due to information asymmetries or an underlying low quality of their firms), or out of choice (i.e. explicit desire to avoid external finance, despite no perceived hurdles in accessing it), the question that arises is how do these entrepreneurs overcome their resource limitations, without relying extensively on capital from “traditional” equity investors. Two streams of research are particularly relevant to shed light on the alternative ways entrepreneurs overcome inherent resource constraints and pursue new opportunities, particularly in start-ups and small and medium-sized enterprises (SMEs).

A first stream of research is on creative resourcing (Baker and Nelson, 2005; Grichnik, Brinckmann, Singh, and Manigart, 2014; Sonenshein, 2014), and documents resource management behaviors such as bootstrapping or bricolage. Entrepreneurial bricolage refers to “making do by applying combinations of the resources at hand to new problems and opportunities” (Baker and Nelson, 2005: 333). Bootstrapping entails accessing resources at no or low cost, achieved by opting for cheaper resources, sharing resources with other firms or using temporary resources. These behaviors enable firms to lower their reliance on “traditional” sources of finance, and thus reduce resource dependencies on external stakeholders (Desa and Basu, 2013). Papers in this category, usually qualitative in nature, position bricolage and bootstrapping as viable options to circumvent or overcome objective resource limitations.

The second stream of research is on equity crowdfunding, an emerging form of equity finance that enables entrepreneurs to raise relatively small contributions from a large pool of crowd investors (Ahler et al., 2015). Papers in this category primarily build on signaling and social capital theories and focus on understanding the factors that affect the success of crowdfunding campaigns. Unlike bootstrapping and bricolage, equity crowdfunding involves offering an equity stake in the firm. However, this equity stake is relatively small (i.e. typically around 8-12% of total equity) and offered to a large number of investors. Consequently, entrepreneurs can raise capital via equity crowdfunding with minimal consequences for firm strategic decision-making. The dispersion of ownership shifts power to the entrepreneur by replacing a handful of large investors with numerous small investors (Drover et al., 2017).

Creative resourcing and equity crowdfunding, while conceptually different phenomena, explained by distinct theoretical lenses, have several essential commonalities. First, both support firms in overcoming resource constraints, which is of particular importance, when the information asymmetries between firms and traditional investors are high. Bricolage gives firms the opportunity to develop resources internally and to combine and repurpose existing resources in unconventional ways. Bootstrapping helps firms access resources at a lower cost than would be achievable by regular market-based transactions. Lastly, crowdfunding enables firms to access financial capital, while limiting the percentage of equity given to crowd investors. Second, both grant entrepreneurs high control over strategic decision-making because they enable them to reduce and/or delay their reliance on “traditional” investors, such as venture capitalists, corporate venture capitalists, or business angels. Thus, entrepreneurs are free to pursue their own vision, and to adapt their strategy in response to market changes or customer feedback, without fear of antagonizing powerful investors. Third, both creative resourcing and equity crowdfunding are deeply rooted in social interaction, and require the direct or indirect involvement of stakeholders to be successful. Bricolage, entails scavenging resources, that is, access resources that other market players do not value, or value less (Baker and Nelson, 2005). Scavenging is only feasible if these market players have good relationships with the bricoleurs. Bootstrapping, entails accessing resources at low cost, which is also realized by sharing resources with other firms, and negotiating favorable deals with suppliers (Bhide, 1992; Winborg and Landström, 2001). This is of course only possible if bootstrappers cultivate good relationships with external stakeholders. Equity crowdfunding entails receiving financial capital from a large pool of individual investors. Crowdfunders can only achieve this, if they engage and communicate to crowd investors effectively. Thus, bricolage, bootstrapping and equity crowdfunding all require entrepreneurs to connect to the extended stakeholder group, and leverage complementarities.

While previously considered confined to start-ups, and firms in specific industries, recent research suggests creative resourcing and crowdfunding are prevalent among a wide range of firms, including not only start-ups but also small and medium-sized enterprises, and across multiple industries. A drug commonly used as anesthesia, was recently discovered to effectively treat depression (Brachman et al., 2016). While the respective drug was known

Introduction

and available for many years, only recently a bricoleur thought to repurpose it to treat a completely different medical condition and potentially revolutionize the pharmaceutical industry. Similarly, equity crowdfunding is becoming a more prevalent source of financing for start-ups in the biotechnology industry, industry previously thought as incompatible with crowdfunding due to the large amounts of capital it requires (Moran, 2017).

1.2 Research Questions

Prior research on creative resourcing and equity crowdfunding has revealed three theoretical puzzles this dissertation aims to contribute to. First, despite the prevalence of resource management behaviors such as bootstrapping or bricolage, we have a limited understanding of how the reliance on these behaviors affects firm performance. A notable exception is the study of Senyard and colleagues (2014) that shows empirical evidence for a positive effect of bricolage on firm innovativeness. As such, the first research question I address in this dissertation is:

RQ 1: How do bricolage and bootstrapping affect firm-level outcomes?

Second, prior research on bootstrapping and bricolage hints at the idea that certain individuals or teams may be better able to engage in these behaviors (Baker and Nelson, 2005; Gras and Nason, 2015; Halme et al., 2012). For instance, qualitative studies on bricolage, propose that creativity and socio-cognitive attributes may help entrepreneurs to engage in bricolage. Grichnik and colleagues (2014) find empirical evidence for the positive effects of human and social capital on the reliance on bootstrapping. Nonetheless, we still have a nascent understanding of what attributes may enable management teams to engage in these two resource management behaviors. Therefore, your second research question is:

RQ 2: What TMT attributes influence the reliance of firms on bricolage and bootstrapping?

Third, crowd investors emerged as a new class of investors, and changed fundamentally the financing landscape for start-ups. While many studies provided us with important insights into the crowdfunding phenomenon, they tended to focus on other forms of crowdfunding (that do not entail an equity transaction) and were entrepreneur-centric. We

know comparatively less about the investor side of the equation, about their decision-making practices, and how these practices may affect their ability to identify high-quality projects (Drover et al., 2017). Understanding the decision-making process of crowd investors, has important implications for all stakeholder involved, including the investors themselves, the crowdfunding platforms, and the entrepreneurs. As such, the third research question I address in this dissertation is:

RQ 3: How do crowd investors identify high-quality opportunities to invest in?

1.3 Dissertation Overview

This dissertation consists of three papers that aim to address the research questions outlined in the previous section. What ties these studies together, is the important implications they put forward for entrepreneurs in start-ups and SMEs looking for alternative ways to deal with resource constraints. Bootstrapping, bricolage are prevalent resource management behaviors in firms. Equity crowdfunding (and crowdfunding more broadly), while being an emerging form of finance, is increasing in popularity as well. In what regards bootstrapping and bricolage, it is paramount to understand how the engagement in these two resource management behaviors affects firm outcomes. Present research on both bootstrapping and bricolage, predominantly qualitative in nature, highlights potential benefits and drawbacks of these two behaviors, but there is dearth of empirical studies examining how the engagement in these behaviors ultimately affects firm performance. In what concerns equity crowdfunding, it is important to understand the decision practices of crowd investors. This form of financing does not seem to present substantial drawbacks for entrepreneurs, besides the time and effort invested by them in launching and managing the crowdfunding campaign. Entrepreneurs raising capital via equity crowdfunding do so at favorable valuations, and offer a limited amount of equity to a dispersed pool of crowd investors. While most crowdfunding platforms encourage entrepreneurs to maintain a good communication channel with crowd investors (e.g., informing crowd investors of main strategic decisions, and providing them with updates on their progress), entrepreneurs do have control over strategic decision-making. Therefore, the main challenge in equity crowdfunding is not to persuade entrepreneurs that equity crowdfunding could be beneficial for them, but to

Introduction

persuade crowd investors to contribute to crowdfunded firms. Advancing our understanding of the decision-making process of crowd investors, could help entrepreneurs to tailor their campaigns to target the “right” crowd investors in the “right” way. We continue this section by providing a brief summary of each of the three studies included in the dissertation.

Study 1. Top Management Team Attributes, Bricolage and Ambidexterity in Small and Medium-Sized Enterprises.

In this study we provide insights into the top management team (TMT) level antecedents, and firm level consequences of bricolage for SMEs; thus, this paper seeks to address Research Questions 1 and 2 in the section above. We introduce entrepreneurial bricolage as a means through which SMEs can overcome their resource limitations in a proactive way and pursue both exploratory and exploitative activities. We also examine two important TMT attributes that influence the extent to which SMEs engage in bricolage, namely TMT networking ability and TMT cognitive diversity.

To test our hypotheses, we employ survey data collected by the author in 2013. The dataset includes data about the CEO, TMT, strategies and the performance of 237 SMEs in the Netherlands. To address issues with single-informant bias, we collect data on our focal variables from both the CEO and another member of the TMT for all the firms in our final sample. We find that bricolage contributes to the emergence of ambidexterity. Additionally, we show that the networking ability and cognitive diversity enable TMTs to engage in bricolage. Overall, we provide novel insights into how SMEs may reduce resource constraints associated with the pursuit of ambidexterity.

Study 2. TMT Improvisation, Resource Management and Performance in SMEs: A Mediated Model.

In this study we explore how bootstrapping and bricolage affect financial performance in SMEs. In addition, we examine the role of TMT improvisation in increasing the reliance on bootstrapping and bricolage. We therefore propose bootstrapping and bricolage as intervening mechanisms in the relationship between TMT improvisation and firm performance. Overall, this paper advances current knowledge regarding Research Questions 1 and 2 above.

To test our hypotheses, we employ survey data collected by the author in 2014. The dataset includes data about the CEO, TMT, strategies and the performance of 147 SMEs in the Netherlands. To address issues with single-informant bias, we collect data on our focal variables from both the CEO and another member of the TMT for all the firms in our final sample. We find that TMT improvisation plays a fundamental role in how firms manage their resources; teams that score higher on improvisation, make use of bricolage and bootstrapping to a greater extent. In turn, we find that bricolage has a positive effect on SME performance, whereas bootstrapping has a negative effect. TMT improvisation improves SME performance, through its indirect effect via entrepreneurial bricolage and decreases SME performance via bootstrapping.

Study 3. Heuristics in the Decision-Making Process of Crowd Investors

In this study, we build on research on heuristic decision-making to theorize how crowd-investors employ heuristics to evaluate investment opportunities and how the use of these heuristics affects their investment performance. More specifically, we examine the role of three heuristics particularly relevant in a crowdfunding context, namely the confirmation, disconfirmation and selectivity heuristics.

To test our hypotheses, we conduct an online survey with 476 crowd investors on a European equity crowdfunding platform. In addition, we also collected archival data on their investment behavior and the characteristics of the projects in which they invested. We find that crowd investors prioritize information depending on their initial beliefs and on the category of content the information pertains to, thus employing the confirmation, disconfirmation and selectivity heuristics. Furthermore, we show that heuristics can be effective strategies to select high-quality crowdfunding opportunities and provide additional insights into which heuristics specifically benefit crowd investors.

1.4 Declaration of Contribution

I (hereafter “the author”) declare my contribution to each of the chapters in this dissertation and the contributions of other scholars that were involved as co-authors.

Introduction

Chapter 1: The author has completed this chapter on her own, with feedback from her supervisory team.

Chapter 2. The majority of work in this chapter was completed by the author in collaboration with her co-authors (i.e. Prof. Dr. Justin Jansen and Dr. Ingrid Verheul). The paper this chapter is based on was presented at several research conferences, including Academy of Management (AOM) Annual Meeting (selected for Best Paper Proceedings, Entrepreneurship Division), Strategic Management Society (SMS) Annual International Conference, Babson College Entrepreneurship Research Conference (selected for Best Paper Proceedings, Frontiers of Entrepreneurship Research). The author is the first author of the paper, Prof. Dr. Justin Jansen second and Dr. Ingrid Verheul third.

Chapter 3. The majority of work in this chapter was completed by the author in collaboration with her co-authors (i.e. Prof. Dr. Justin Jansen and Dr. Ingrid Verheul). The paper this chapter is based on was presented at several research conferences, including Academy of Management (AOM) Annual Meeting, Strategic Management Society (SMS) Annual International Conference, Babson College Entrepreneurship Research Conference (selected for Best Paper Proceedings, Frontiers of Entrepreneurship Research). The author is the first author of the paper, Prof. Dr. Justin Jansen second and Dr. Ingrid Verheul third.

Chapter 4. The majority of work in this chapter was completed by the author in collaboration with her co-authors (i.e. Dr. Magdalena Cholakova, Prof. Dr. Justin Jansen and Dr. Ingrid Verheul). The author is the first author of the paper, Dr. Magdalena Cholakova second, Prof. Dr. Justin Jansen third and Dr. Ingrid Verheul fourth. The paper is currently under review at a top management journal.

Chapter 2. Top Management Team Attributes, Bricolage and Ambidexterity in Small and Medium-Sized Enterprises¹

Abstract

Research on organizational ambidexterity has introduced various approaches for organizations to combine exploratory and exploitative activities. Yet, these approaches are often not feasible for small and medium-sized enterprises (SMEs). This study attempts to develop our understanding of how SMEs can achieve ambidexterity by advancing a resource management perspective. We introduce entrepreneurial bricolage as a means through which SMEs can overcome their resource limitations in a pro-active way and simultaneously pursue exploratory and exploitative activities. We use a cross-industry sample of SMEs and find that bricolage contributes to the attainment of ambidexterity. Additionally, we show that networking ability and cognitive diversity enable TMTs to engage in bricolage. Overall, we provide novel insights into how SMEs may reduce the resource allocation challenges associated with the pursuit of ambidexterity.

¹ This study is conducted in collaboration with Justin Jansen and Ingrid Verheul.

2.1 Introduction

Organizational ambidexterity, or the ability to pursue and synchronize exploration and exploitation (Tushman and O'Reilly, 1996), is considered essential for the long term performance and survival of organizations (Hill and Birkinshaw, 2014; Jansen, Simsek, and Cao, 2012; Junni, Sarala, Taras, and Tarba, 2013). Yet, the fundamental differences between exploration and exploitation, and the complexity inherent in the simultaneous pursuit of these contrasting activities, pose significant challenges for companies that aim for ambidexterity (Andriopoulos and Lewis, 2009; Raisch and Birkinshaw, 2008; Smith and Lewis, 2011; Smith and Tushman, 2005). The mindsets and organizational attributes needed for exploration are profoundly different from those needed for exploitation (Jansen, Van den Bosch, and Volberda, 2006). In addition, explorative and exploitative activities compete for scarce resources, status, and power (Benner and Tushman, 2003; Gupta, Smith, and Shalley, 2006; March, 1991). To resolve conflicting demands, scholars have typically suggested that organizations may buffer the development of new capabilities in exploratory units from ongoing operations in exploitative units (Fang, Lee, and Schilling, 2010; Jansen, Tempelaar, Van den Bosch FA, and Volberda, 2009).

While the structural separation of explorative and exploitative activities may be a viable approach for larger organizations, such a dual organizational structure requires substantial resource investments and, therefore, may not be feasible for SMEs (Duncan, 1976; Lubatkin, Simsek, Ling, and Veiga, 2006; March, 1991; Raisch, Birkinshaw, Probst, and Tushman, 2009; Voss and Voss, 2013). As a result, smaller organizations tend to pursue contextual approaches to achieve ambidexterity, and seek to simultaneously engage in alignment and adaptability within the same business unit. Nonetheless, SMEs have less available resources to draw upon and may lack critical management expertise and capabilities to balance explorative and exploitative activities (Kammerlander, Burger, and Fueglistaller, 2015; Voss and Voss, 2013). Accordingly, SMEs face greater challenges in concurrently pursuing exploration and exploitation and may need to resort to more flexible, yet less resource demanding, approaches to achieve ambidexterity. As the extant literature has focused mainly on large multiunit organizations, the complexities of achieving ambidexterity in SMEs have prompted various calls for future research (Raisch et al., 2009; Simsek, Heavey, Veiga, and Souder, 2009).

We argue that SMEs require new logics to effectively manage their resources and introduce entrepreneurial bricolage, “making do by applying combinations of the resources at hand to new problems and opportunities” (Baker and Nelson, 2005, p. 333), as a viable means to proactively tackle resource constraints and resolve the paradoxes associated with pursuing exploratory and exploitative activities at the same time. We acknowledge that top management teams (TMTs) play a vital role in fostering organizational ambidexterity (Lubatkin et al., 2006; Raisch and Birkinshaw, 2008) and in managing resources (Barney, Ketchen, and Wright, 2011; Sirmon, Hitt, Ireland, and Gilbert, 2011), and we direct attention to two important TMT-level determinants of organizational ambidexterity: networking ability and cognitive diversity of the management team. The former represents the team’s ability to build relationships with key external stakeholders and extract value from these relationships (Semrau and Sigmund, 2012), while the latter captures the differences in skills, knowledge and values among TMT members (Kilduff, Angelmar and Mehra, 2000). Our study has at least three important contributions.

First, our study goes beyond the well-known structural and contextual perspectives on organizational ambidexterity and proposes a resource management perspective. While it is generally acknowledged that ambidexterity enhances the performance of SMEs (De Clercq, Thongpapanl, and Dimov, 2014; Lubatkin et al., 2006; Patel, Messersmith and Lepak, 2013; Voss and Voss, 2013), there is limited knowledge about how SMEs are able to attain ambidexterity given their resource limitations (Lubatkin et al., 2006). Although scholars have acknowledged the importance of a balanced resource allocation to sustain concomitant exploratory and exploitative initiatives over time (Smith and Tushman, 2005), there is a lack of insight into how organizations, and particularly SMEs, can accomplish this. Our study builds on the research on entrepreneurial bricolage to develop novel insights about how organizational ambidexterity can be achieved within SMEs.

Second, our study proposes a socio-cognitive perspective on entrepreneurial bricolage. We start from the premise that managerial action plays an important role in how organizations make creative use of their resources (Powell, and Baker, 2014; Sonenshein, 2014) and proceed by examining the capabilities TMTs must possess to engage in bricolage successfully. We build on the notion that management teams socially construct their resource environments (Baker, Miner, and Eesley, 2003; Baker and Nelson, 2005) with the support

of key stakeholders, who are either external (i.e. individuals in the social network of teams) or internal (i.e., team members themselves) to the company. To capture this distinction, in our model we take account of two team attributes: i.e., their networking ability and cognitive diversity. These attributes influence the access to information as well as the way these teams structure and interpret information, and incorporate it in their decision-making (Talke, Salomo and Rost, 2010). This is particularly relevant for entrepreneurial bricolage, which involves challenging the objective resource limitations and their definitions (Baker and Nelson, 2005).

Third, our study creates a better understanding of the role senior executives can play in fostering organizational ambidexterity (Gibson and Birkinshaw, 2004; Tushman and Reilly, 1997). Though it is argued that the ability of SMEs to effectively leverage scarce resources and to behave ambidextrously depends on management capabilities, (Lubatkin et al., 2006; Voss and Voss, 2013), thus far we know little about how top management teams (TMTs) may contribute to the emergence of ambidexterity in SMEs, either directly or indirectly. Prior research, however, supports the idea that TMTs can facilitate ambidexterity by building a strong relational context with key stakeholders (Hill and Birkinshaw, 2014; Im and Rai, 2008; Taylor and Helfat, 2009). With our study we develop a more fine-grained understanding of the relational mechanisms through which top managers may affect the ability of organizations to simultaneously pursue exploration and exploitation.

2.2 Theory and Hypotheses

2.2.1 Organizational Ambidexterity in SMEs

Ambidextrous organizations simultaneously pursue the exploitation of existing competences and the exploration of new opportunities (Beckman, 2006). Exploitation encompasses activities such as “refinement, efficiency, selection, and implementation”, while exploration includes “search, variation, experimentation, and discovery” (March, 1991). Despite the performance benefits (He and Wong, 2004; Raisch and Birkinshaw, 2008), scholars have consistently argued that organizational ambidexterity is difficult to achieve because of inherent conflicts, the combination of paradoxical behaviors, and competing resource demands (Andriopoulos and Lewis, 2009; Gedajlovic, Cao, and Zhang, 2012;

March, 1991; Simsek et al., 2009; Smith, 2014). As a response, scholars have developed various approaches for organizations to facilitate the coexistence of exploratory and exploitative activities. For instance, organizations may reconcile these contradictions through structural ambidexterity, i.e., by creating separate business units that focus exclusively on exploration or exploitation (Benner and Tushman, 2003; Jansen et al., 2009; O'Reilly and Tushman, 2004; Tushman and O'Reilly, 1996). However, for smaller organizations structural ambidexterity may not be a feasible approach (Patel et al., 2013; Voss and Voss, 2013). Contextual ambidexterity, defined as the ability to accommodate alignment and adaptability within the same structural unit (Gibson and Birkinshaw, 2004), avoids the high coordination costs but poses other demands on smaller organizations. SMEs have fewer resources at their disposal compared to larger organizations and are likely to experience high internal competition when allocating resources across competing activities (De Clercq et al., 2014; Voss and Voss, 2013). In addition, the relatively limited availability of slack resources in SMEs may hamper the timely allocation of additional resources to explorative or exploitative activities (Jansen et al., 2012). Finally, because SMEs have fewer hierarchical levels, top managers often fulfill both operational and strategic roles, and may experience dissonance when allocating resources to activities with different objectives (Lubatkin et al., 2006).

Thus, attaining ambidexterity in SMEs is not only contingent on the ability of organizations to access sufficient resources, but also on the ability to manage these resources in a way that allows for the pursuit of divergent strategic goals (Raisch and Birkinshaw, 2008). This is particularly true for SMEs where the capabilities of managers are crucial in explaining ambidexterity (Kammerlander, Burger, and Fueglistaller, 2015; Lubatkin et al., 2006).

2.2.2 Managing Organizational Resources in SMEs

The resource management perspective offers a comprehensive framework to explain how managers make use of their resources to achieve strategic outcomes (Sirmon, Hitt, Ireland, and Gilbert, 2011). While the availability of resources is an important determinant of firm outcomes, so is the way in which they are managed (Kraaijenbrink, Spender and Groen, 2010; Sirmon, Gove, and Hitt, 2008). Resource management includes three main processes:

structuring the resource portfolio; bundling resources to build capabilities; and leveraging capabilities to create and maintain value for customers and owners (Sirmon, Hitt, and Ireland, 2007). ‘Structuring’ resources involves acquiring (i.e. purchasing resources externally), accumulating (i.e. developing resources internally) and divesting (i.e. giving up excess or low-potential resources) activities. ‘Bundling’ resources refers to combining resources to form capabilities and can be achieved by stabilizing (i.e. making incremental improvements to existing capabilities), enriching (i.e. extending current capabilities) and pioneering (i.e. creating new capabilities). ‘Leveraging’ resources includes mobilizing (i.e. identifying the necessary capabilities), coordinating (i.e. integrating identified capabilities) and deploying (i.e. using capability configurations). While these processes are important in their own right, their synchronization is even more important for value creation (Sirmon et al., 2007). Empirical research confirms that the way in which resources are managed affects firm outcomes (Kor and Leblebici, 2005; Morrow, Sirmon, Hitt, and Holcomb, 2007; Ndofor, Sirmon and He, 2011), yet managers may differ in their resource management abilities (Holcomb, Holmes and Connelly, 2009).

We use the resource management perspective as a basis for understanding how distinct but integrated resource processes may foster ambidexterity within SMEs. It can be expected that different type of resource activities are employed in SMEs and larger organizations. For instance, mergers and acquisitions as a way to gain access to new resources may hardly be feasible for SMEs. Similarly, divesting resources via spin-offs or subsidiaries will be less used by smaller organizations. SMEs have to overcome greater resource constraints and therefore need to allocate their scarce resources in a more flexible and effective manner across competing activities. For these reasons, we argue that entrepreneurial bricolage, as a resource management behavior, may support SMEs in their effort to attain ambidexterity.

Entrepreneurial bricolage refers to “making do by applying combinations of the resources at hand to new problems and opportunities” (Baker and Nelson, 2005). “Making do” represents a bias for action, suggesting that bricoleurs pursue new challenges and opportunities, even when their resource portfolio seems insufficient. This does not mean bricoleurs exploit an opportunity with fewer or lower quality resources, but rather that they start to exploit an opportunity before they have all the required resources at their immediate

disposal. “Resources at hand” involves resources the organization already acquired or that are available to the organization at no or low cost. This also includes resources that are readily available in the network of bricoleurs (Baker et al., 2003). The combination of existing resources typically involves using resources for purposes they were not originally designed for. Thus, bricolage may enable firms (and especially SMEs) to pursue new opportunities without having to acquire resources externally via conventional market-based transactions.

Bricolage is an alternative to traditional resource seeking, which involves the use of standard resources that have proven capabilities for the specific application they are intended for (Baker, 2007; Desa and Basu, 2013). A key element of bricolage is the notion of transformation (Kannan-Narasimhan, 2014). That is, bricoleurs socially construct their resource environment, thereby challenging existing definitions and understandings of resources (Baker and Nelson, 2005). Because they ‘repurpose’ resources, bricoleurs can make use of resources that others may find substandard (e.g., Garud and Karnøe, 2003). They do not assess resources based on their stand-alone value, but rather on the basis of their transformational potential. Hence, they may employ resources that have limited individual potential, but that create substantial value when combined with other resources “at hand”. Furthermore, an important aspect of bricolage is the emphasis on the creative use of resources, involving re-imagining the use of resources (Sonenshein, 2014), which distinguishes bricolage from other resource management behaviors such as financial bootstrapping (Kannan-Narasimhan, 2014).

While bricolage is an overarching resource behavior, its impact on resource management can be better understood by examining its sub-processes. First, bricolage affects the structuring of resources because bricoleurs are able to acquire resources “at hand” via their personal networks (Baker et al., 2003) instead of obtaining them at a market price. Denrell, Fang and Winter (2003) argue that markets do not always provide an accurate valuation of new or old resources that can be used in novel ways. Hence, bricolage offers opportunities to acquire resources inexpensively. Bricoleurs can also accumulate resources, and develop them internally. Because existing resources are used, bricolage may involve an in-depth understanding of the resources that are available and how these can be used efficiently.

Bricoleurs can also divest resources of lower quality or re-allocate them to other activities. This is particularly important for SMEs as they cannot afford to waste or misuse scarce organizational resources. Aforementioned structuring activities expand the resource portfolio of the firm (i.e., all resources controlled), which helps organizations to overcome their resource constraints. Bricolage also impacts the way resources are bundled to make incremental improvements to existing capabilities, to extend existing capabilities, or to create new capabilities. Bundling resources in novel and unconventional ways may enable SMEs to build valuable, inimitable bundles of resources, which can be employed to build competitive advantage and pursue new opportunities without the need to acquire external resources (Barney, 1991; Barney, Ketchen, and Wright, 2011; Kraaijenbrink, Spender and Groen, 2010). Lastly, bricolage affects the way in which organizations leverage their capabilities. As bricoleurs take action to pursue new challenges and opportunities, despite objective resource limitations, the sub-processes of leveraging (i.e., mobilizing, coordinating and deploying) of capabilities are more intertwined. They can occur sequentially, simultaneously or even in reversed order, through feedback loops (Sirmon et al., 2007). We note however that, while these sub-processes are interwoven, bricoleurs may still engage in them in a planned or structured manner (Perkman and Spicer, 2014). In the subsequent section we discuss how the use of bricolage may help SMEs to sustain concomitant explorative and exploitative initiatives and thus attain organizational ambidexterity.

2.2.3 Entrepreneurial Bricolage and Organizational Ambidexterity

Entrepreneurial bricolage can support the pursuit of ambidextrous strategies in SMEs in two main ways. First, bricolage may alleviate the resource allocation challenges associated with ambidexterity by allowing SMEs to leverage their resource portfolio in a more efficient and effective way. Entrepreneurial bricolage involves the use of organizational resources or resources that can be accessed (inexpensively) via networks to pursue new opportunities (Senyard, Baker, Steffens, and Davidsson, 2014). It entails rich in-depth knowledge of the resources at “hand” and their context (Duymedjian and Rüling, 2010; Halme, Lindeman, and Linna, 2012) which SMEs can employ to create larger “socially constructed” resource portfolios compared to companies not involved in bricolage. This enables SMEs to pursue a wider array of strategic initiatives or pursue projects with higher expected returns and greater

resource requirements. In addition, by fostering an efficient use of resources, resources become available for the pursuit of both explorative and exploitative initiatives. A better understanding of the firm's resources and their potential uses may promote a culture of "resource alertness", which stimulates the efficient use of resources and the reallocation or divestment of misused resources. By constantly challenging the limitations and purposes of their resources, organizations may be able to allocate resources more efficiently between exploratory and exploitative activities. Ultimately, SMEs in pursuit of ambidextrous strategies benefit from bricolage as the efficient and dynamic use of resources (through bricolage) facilitates the reconciliation of competing demands for limited resources.

Second, entrepreneurial bricolage involves the creative (re)combination of resources, which can help SMEs leverage complementarities between exploratory or exploitative activities. Bricoleurs combine resources "at hand" and use them creatively for purposes they were not originally intended for. These combinations sometimes lead to what Levi-Straus referred to as "brilliant unforeseen results" (1967, p.17). For example, in their study on the Danish wind-turbine industry, Garud and Karnøe (2003) describe how actors managed to develop an innovative product, capable of competing with products involving considerably higher R&D costs, by creatively combining scavenged resources. Baker and Nelson (2005) also provide a rich description of how bricoleurs combine their scarce resources in a creative manner to create "something from nothing". Overall, bricolage may help SMEs to (re)combine their scarce resources in novel ways, as to generate new configurations of exploratory and exploitative activities.

To summarize, because the achievement of ambidexterity is determined by an organization's ability to orchestrate the allocation of resources across exploitation and exploration activities (O'Reilly and Tushman, 2013; Smith and Tushman, 2005), and bricolage helps to free up resources for competing activities and generate new combinations of exploratory and exploitative activities, we hypothesize that:

Hypothesis 1: There will be a positive relationship between entrepreneurial bricolage and organizational ambidexterity within SMEs.

2.2.4 Managing Entrepreneurial Bricolage: TMT Networking Ability and Cognitive Diversity

Although the ability of organizations to engage in entrepreneurial bricolage depends on the capabilities of their managers or founders (Baker and Nelson, 2005; Gras and Nason, 2015; Halme et al., 2012), little is known about which managerial capabilities affect the use of bricolage. Qualitative studies however hinted at the importance of socio-cognitive attributes. Bechky and Okhuysen (2011) observe that the successful implementation of bricolage is rooted in social interaction, aimed at developing shared knowledge. Management teams socially construct their resource environments with the support of key stakeholders (Baker et al., 2003; Di Domenico et al., 2010), either external (e.g., suppliers, customers) or internal to the firm (e.g., members of the TMT). To capture the origin of the stakeholders we focus on two socio-cognitive team attributes that may explain why some companies are more successful at bricolage than others. The first one is networking ability, which refers to a team's ability to build relationships with key stakeholders and extract value from these relationships (Semrau and Sigmund, 2012). In general, research has shown that social skills affect the way in which resources are acquired and managed within organizations (Baron and Tang, 2009; Treadway, Adams, Hanes, Perrewé, Magnusen, and Ferris, 2014). The second attribute is cognitive diversity, which captures the diversity of skills, knowledge and values among team members (Kilduff et al., 2000). Cognitive diversity is an important aspect of TMT composition, which affects strategic decision-making in organizations (Olson, Paravitam and Bao, 2007), and should influence the way resources are managed.

Research on entrepreneurial bricolage suggests that resource environments are socially constructed and that different stakeholders are involved in the resource mobilization process (Baker et al., 2003; Baker and Nelson, 2005; Di Domenico, Haugh, and Tracey, 2010). However, to ensure stakeholder involvement, bricoleurs require networking abilities (Baker and Nelson, 2005) that will enable them to access resources readily available in their networks (Baker, 2007; Di Domenico et al., 2010). For instance, Baker and colleagues (2003) show that bricoleurs hire most of their early employees directly through their network. At the same time, management teams can use their networking ability to expand their existing network, and thus increase the pool of potential resources at their disposal, as well as the likelihood of discovering scavenged resources (i.e. discarded resources not used

by stakeholders and which could prove valuable for the organization). In addition, management teams that invest considerable time and effort on networking will not only be alert to available resources residing inside the organization, but also to resources that can be obtained at low cost from their networks. Hence, when assessing market opportunities, they will not only consider their “objective resource portfolio”, but also the resources available via their networks. Summarizing, management teams that consist of skilled networkers have better access to resources and are more likely to take action and pursue new opportunities despite objective resource limitations. As a result, the networking ability of the TMT is expected to increase the involvement in entrepreneurial bricolage in SMEs. We hypothesize that:

Hypothesis 2: There will be a positive relationship between TMT networking ability and entrepreneurial bricolage within SMEs.

While social networking skills enable organizations to expand their portfolio of “resources at hand” and gain support and expertise from various stakeholders, management teams can also use their own skills and expertise to successfully engage in bricolage. Management teams with diverse skills and competences benefit from having a wider range of perspectives and experiences and generally show more creativity in their work (Taylor and Greve, 2006; Van der Vegt and Janssen, 2003; Woodman, Sawyer, and Griffin, 1993). Consequently, diverse management teams may be better able to identify uncommon uses for existing resources and creative ways of combining them, as well as to identify misused or wasted resources and reallocate them to value-creating activities. At the same time, they have access to a wider range of information and set of decision-making alternatives, preventing groupthink (Hambrick and Mason, 1984), and positively affecting the outcomes of the strategic decision-making process (Talke et al., 2010). In addition, diverse teams have a more profound understanding of the organizational resources, allowing them to make use of the limited resources at their disposal instead of acquiring external resources. To conclude, we expect TMT cognitive diversity to relate positively to bricolage, because it is associated with more creative and efficient resource management, and a higher likelihood of pursuing market opportunities with existing resources. Thus, we hypothesize the following:

Hypothesis 3: There will be a positive relationship between TMT cognitive diversity and entrepreneurial bricolage within SMEs.

2.2.5 Entrepreneurial Bricolage as Mediator

Apart from the inherent resource constraints encountered by SMEs targeting organizational ambidexterity, TMT members also need to accommodate the different processes and behaviors associated with exploration and exploitation (Birkinshaw and Gupta, 2013). A key tenet of prior research is that managers should consider rich and diverse information to avoid managerial myopia and sustain ambidexterity (Lubatkin et al., 2006; Smith and Tushman, 2005). Managers of ambidextrous organizations can make use of their networks to access information about the firm's internal and external environment (Raisch et al., 2009; Simsek, 2009). Cao and colleagues (2010) show that CEOs with extensive external networks are better able to identify additional valuable resources that reside outside of the firm and, as a result, successfully mobilize resources to support ambidextrous initiatives. Therefore, it is expected that management team members jointly put in effort building and cultivating relationships with key stakeholders. Skilled teams that invest time and effort in networking will be better able to access relevant information and identify valuable resources that can source ambidexterity. Thus, TMT networking ability should stimulate ambidexterity.

Nonetheless, the mechanisms through which networking ability affects organizational ambidexterity are largely unexplored. In this study we argue that management teams that are good at networking engage in bricolage to a greater extent which in turn will help them reconcile the tensions associated with ambidexterity. We expect that bricolage will have a positive effect on ambidexterity, because it can help SMEs alleviate resource constraints and combine resources in novel and creative ways (see Hypothesis 1). We also expect that teams that score higher on networking ability will rely to a greater extent on bricolage (see Hypothesis 2). Consequently, SMEs with management teams that emphasize networking are expected to be more ambidextrous because of higher levels of entrepreneurial bricolage. Thus, we propose that, besides a direct effect, TMT networking ability also has an indirect effect on organizational ambidexterity via bricolage. We formulate the following hypothesis:

Hypothesis 4: Entrepreneurial bricolage mediates the relationship between TMT networking ability and organizational ambidexterity within SMEs

We build on team cognition literature to deepen our understanding of how management teams resolve the paradoxes of innovation. Team cognition is thought to positively affect team performance (DeChurch and Mesmer-Magnus, 2010; Marks, Sabella, Burke, and Zaccaro, 2002; Mathieu, Heffner, Goodwin, Salas, and Cannon-Bowers, 2000; Mathieu, Maynard, Rapp, and Gilson, 2008). Indeed, team cognitive diversity increases the team's cognitive resources and its ability to engage in more complex and creative problem-solving (Bantel and Jackson, 1989; Jackson and Ruderman, 1995; Watson, Kumar, and Michaelsen, 1993). Furthermore, diverse teams benefit from a wider network of external advisors, encompassing various areas of expertise (Hambrick, 1994), and have a greater absorptive capacity (Cohen and Levinthal, 1990). Because diverse teams have access to more non-redundant information (Dahlin, Weingart, and Hinds, 2005) and dispose of a greater variety of perspectives and skills (Cao, Gedajlovic and Zhang, 2009), they are more likely to overcome the tensions between exploration and exploitation, and counterbalance tendencies to focus on one at the expense of the other. Prior research supports the idea that diverse management teams are more likely to achieve ambidexterity. Taylor and Greve (2006) find that diverse teams perform better at both exploration and exploitation, despite the fact that they are contradictory processes. Similarly, Beckman (2006) argues that teams with different experiences are more likely to simultaneously pursue exploration and exploitation. Thus, cognitive diversity appears to cultivate ambidextrous performance.

What is lacking, however, is a clear understanding of how management teams make use of their cognitive diversity to attain ambidexterity. While a team's cognitive diversity may affect SME performance in different ways, we focus on its consequences for how resources are managed. We expect that bricolage will positively affect organizational ambidexterity in SMEs (see Hypothesis 1), and that diverse teams will rely more on bricolage to manage the company's resources (see Hypothesis 3). Consequently, SMEs with more diverse management teams are expected to be more ambidextrous because of higher levels of entrepreneurial bricolage. We propose that, next to a direct effect, TMT cognitive diversity has an indirect effect on organizational ambidexterity via bricolage. We formulate the following hypothesis:

Hypothesis 5: Entrepreneurial bricolage mediates the relationship between TMT cognitive diversity and organizational ambidexterity within SMEs.

2.3 Methods

2.3.1 Sample and Data Collection

We randomly selected 6,000 SMEs in the Netherlands using a commercial database. These SMEs covered a broad range of industries and included private organizations with a minimum of 5 and a maximum of 250 employees. The latter is the upper limit for the classification of companies as SMEs in the European Union, whereas small enterprises have up to 50 employees.

Each organization received two surveys; the first of which was addressed to the CEO and the second to another member of the management team. The surveys were accompanied by a letter instructing the CEO to hand the second survey for completion to another member of the TMT. The data collection took place in 2013 and resulted in a total response from 654 distinct companies, and 903 completed questionnaires (either filled out by the CEO or the other TMT member), which corresponds to a response rate of 10.9%.

The final sample for this study consisted of 237 organizations out of 654 organizations, for which both surveys were returned and all our variables of interest were available. Organizations in the final sample were about 19 years old and have on average 3.52 TMT members (including the CEO) and 35.97 full-time employees. These SMEs were operating in a wide range of industries, covering manufacturing (8.9%), information and communication (10.5 %), financial services (11.4%), professional services (46%), administrative services (11.4%) and other services (11.8%). To assess non-response bias, we compared early and late respondents (who responded before and after 6 weeks after the invitation to participate in the survey), based on the assumption that late respondents are more similar to non-respondents (Kanuk and Berenson, 1975). We did not find significant mean differences between them on any of the variables included in our model ($p > 0.05$), indicating that non-response bias was not a problem in this study.

To address potential problems associated with single-informant bias and common method bias, we collected data for the dependent and independent variables from different key informants of the companies. We took the dependent variable (i.e. explorative and exploitative innovation) from the management team member survey and the independent variables, mediator and control variables (i.e., bricolage, TMT networking ability, TMT cognitive diversity) from the CEO survey. As a robustness check we ran our analyses with the dependent variable from the CEO survey and the other variables from the management team member survey. All the hypothesized relationships remain significant with the same sign. For brevity, we only report the results for the former model in this paper.

The CEO of the company was on average 49.26 years old and had been employed by the firm for 14.25 years. The second informant of the company (i.e. the other TMT member) was on average 44.73 years old and had been employed by the firm for 19.13 years. Moreover, in 133/237 (56%) of the SMEs, at least one respondent (either the CEO or the other TMT member)

2.3.2 Measures and Validation of Scales

Organizational ambidexterity. To measure organizational ambidexterity, we take a two-step approach. We make use of the six-item scales for exploration ($\alpha = 0.89$) and exploitation ($\alpha = 0.76$) from Jansen et al. (2006). Following Gibson and Birkinshaw (2004) and Jansen and colleagues (2012), we multiply exploration and exploitation to compute ambidexterity. Exploration captures the extent to which organizations pursue radical innovations for emerging markets or customers and includes sample items such as “We experiment with new products and services in our local market” and “Our organization accepts demands that go beyond existing products and services”. Exploitation conveys the extent to which organizations pursue incremental innovation for current customers and includes sample items such as “We regularly implement small adaptations to existing products and services” and “We improve our provision’s efficiency of products and services”. In our study we asked the other TMT member of each company to answer the items pertaining to ambidexterity. As a validity check we also asked the CEO of each firm to rate ambidexterity in his or her company, which yielded a Cronbach alpha of 0.89 for

explorative innovation and 0.75 for exploitative innovation. To mitigate concerns of common method bias, we measure ambidexterity using the answers of the TMT member.

Entrepreneurial bricolage. The scale for entrepreneurial bricolage ($\alpha = 0.79$) is adapted from Senyard et al. (2014) and includes seven items. Sample items are “When we face new challenges we put together workable solutions from our existing resources” and “We usually combine our resources to act on new business opportunities”. To assess the convergent and discriminant validity of our bricolage measure we performed exploratory analysis. Exploratory factor analysis on all items relating to bricolage, exploration and exploitation, produced a 3-factor structure, with all items loading clearly on their intended factor. The bricolage items loaded highest on one factor, and cross loadings on the two other factors (i.e. exploration and exploitation) were below 0.25.

TMT attributes. We use a 5-item scale for networking ability ($\alpha = 0.80$), adapted from Semrau and Sigmund (2012). Sample items include: “We are good at establishing relations with influential people” and “We use our networks to get things done”. We measure TMT cognitive diversity with a 5-item scale ($\alpha = 0.72$) from Van der Vegt and Janssen (2003). Sample items include: “MT members have different fields of expertise” and “MT members have complementary knowledge and skills”

Control variables. We control for a range of variables that are expected to have an impact on organizational ambidexterity, including firm size (i.e. number of FTEs), TMT size (i.e., number of TMT members) and company age. As firm size and firm age are not normally distributed, we use the logarithm transformations for these two measures. Furthermore, we control for environmental dynamism, measured as a 5-item scale ($\alpha = 0.79$) from Jansen and colleagues (2009). Sample items include: “Environmental changes in our local market are highly unpredictable” and “Demand for products and services changes frequently and rapidly in our local market”. We also control for slack resources with a 3-item measure ($\alpha = 0.71$) adapted from (Danneels, 2008). Sample items include: “Our organization has a reasonable amount of resources in reserve”.

A detailed description of all scale variables is included in Table 2.1.

Table 2.1 Measures and Items

Bricolage (adapted from Senyard et al., 2014)

We respond to new opportunities, even when others might consider our resource base as insufficient

We take on a broader range of challenges than other companies would do with the same resources

We always make use of our existing resources to take on new challenges

We usually combine our resources to act on new business opportunities

We always try to face new challenges with existing resources

Resources are often (combined and) used for purposes they weren't originally intended to accomplish

When we face new challenges we put together workable solutions from our existing resources

Exploratory innovation (Jansen et al., 2006)

Our organization accepts demands that go beyond existing products and services

We invent new products and services

We experiment with new products and services in our local market

We commercialize products and services that are completely new to our organization

We frequently utilize new opportunities in new markets

Our organization regularly uses new distribution channels

Exploitative innovation (Jansen et al., 2006)

Lowering costs of internal processes is an important objective

We improve our provision's efficiency of products and services

Our organization expands services for existing clients

We regularly implement small adaptations to existing products and services

We introduce improved, but existing products and services for our local market

We increase economies of scales in existing markets

TMT networking ability (adapted from Semrau and Sigmund, 2012)

MT members put a lot of time in creating external networks

We are good at establishing relations with influential people

We use our networks to get things done

MT members spend time on maintaining contacts with supplies and customers

We have good access to governmental agencies

TMT cognitive diversity (adapted from Van der Vegt and Janssen, 2003)

MT members have different fields of expertise

MT members differ in the way they view the world

Members of the MT have different experience

MT members have complementary knowledge and skills

MT members differ in their beliefs of what is right and wrong

Note. All items are measured on a seven-point scale, anchored by 1 = strongly disagree and 7 = strongly agree

We performed confirmatory factor analysis (STATA 14.1) of all the scales in our main analyses (restricted to load on the proposed constructs, on exploration, exploitation, bricolage, networking ability, cognitive diversity, environmental dynamism and slack resources) indicate a good fit with the data ($\chi^2(608) = 1226.41$, $p < 0.001$; comparative fit index (CFI) = 0.83; Tucker-Lewis index (TLI) = 0.82, root mean square error of approximation (RMSEA) = 0.07; coefficient of determination (CD) = 1.00). Also, all item loadings on the proposed indicators were significant ($p < 0.001$). The results of the CFA support the constructs' discriminant and convergent validity.

We computed the intra-class correlations (ICCs) for the variables in our model (McGraw and Wong, 1996; LeBreton and Senter, 2008) to assess the degree of agreement and consistency among our informants (i.e. CEOs and TMT members). The mean ICC(K) per variable (one-way random model) amounts to 0.70 for ambidexterity, 0.63 for bricolage, 0.66 for networking ability, 0.49 for cognitive diversity, 0.69 for environmental dynamism and 0.77 for slack resources. In addition, we calculated the inter-rater agreement scores (rwg) for the same variables (James, Demaree, and Wolf, 1984). The average rwg is 0.82 for ambidexterity, 0.91 for bricolage, 0.86 for networking ability, 0.89 for cognitive diversity, 0.84 for environmental dynamism and 0.85 for slack resources. These results show that the answers of the CEO and the other TMT member are consistent.

2.4 Analyses and Results

Table 2.2 presents the means, standard deviations and correlations for this study's measures

Table 2.2 Descriptive Statistics

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Ambidexterity	22.16	8.24	1												
2. Bricolage	4.83	0.83	.33**	1											
3. TMT networking ability	4.73	1.04	.28**	.41**	1										
4. TMT cognitive diversity	5.37	0.82	.12	.27**	.24**	1									
5. Firm age	2.61	0.85	-.10	-.09	-.09	-.14*	1								
6. Firm size	2.99	1.03	-.04	-.08	-.04	.04	.13*	1							
7. TMT size	3.52	1.71	.03	-.06	-.10	.05	.17**	.48**	1						
8. Environmental dynamism	4.46	1.16	.30**	.22**	.17**	.02	.05	-.08	-.07	1					
9. Slack resources	4.41	1.31	.06	.13	.21	-.01	.02	-.06	.01	.05	1				
10. ICT	0.11	0.31	.12	-.06	-.02	-.07	.06	.03	-.03	.09	.03	1			
11. Financial	0.11	0.32	-.05	-.04	-.09	-.03	-.01	.19**	.09	-.01	.04	-.12	1		
12. Professional	0.46	0.50	.02	.04	.12	.15*	-.05	-.13*	.05	.02	.05	-.31**	-.33**	1	
13. Administrative	0.11	0.32	-.11	.01	-.03	-.04	-.11	-.02	.02	-.09	-.08	-.12	-.13*	-.33**	1
14. Other industry	0.12	0.33	-.04	-.02	.01	-.04	-.02	-.06	-.14	-.07	-.03	-.13*	-.14*	-.34**	-.13*

* p < .05, ** p < .01, p < .001***

TMT Attributes, Bricolage and Ambidexterity in SMEs

To assess multicollinearity, we computed variance inflation factors (VIFs). The maximum VIF in the model was 2.2, which is well below the threshold level of 10 (Neter, Wasserman, and Kutner, 1990). Table 2.3 and 2.4 present the results of the regression analyses for ambidexterity and bricolage, respectively.

We performed OLS regression analyses to test the first three hypotheses. Hypothesis 1, predicting a positive relationship between bricolage and organizational ambidexterity was supported ($\beta = 2.04$, $p < .01$) (see model 3 in Table 2.3). To take account of common method bias we used the bricolage measure and controls from the CEO and the ambidexterity measure from the other TMT member. As a validity check, we ran the same regression with ambidexterity computed as the sum (instead of the product) of exploration and exploitation. The relation between bricolage and ambidexterity remained significant ($\beta = 0.48$, $p < .001$). We also found support for Hypothesis 2, predicting a positive relationship between TMT networking ability and the use of bricolage ($\beta = 0.26$, $p < .001$). Hypothesis 3, proposing a positive relation between TMT cognitive diversity and entrepreneurial bricolage, was also confirmed by our results ($\beta = 0.20$, $p < .01$) (see model 2 in Table 2.4).

Table 2.3 Antecedents of Ambidexterity

	Model 1	Model 2	Model 3
<i>Control variables</i>			
Firm age	-1.49* (0.62)	-1.24* (0.61)	-1.13 (0.60)
Firm size	-0.39 (0.60)	-0.60 (0.58)	-0.47 (0.57)
TMT size	0.51 (0.36)	0.64 (0.35)	0.62 (0.34)
ICT	0.47 (2.33)	0.24 (2.26)	1.09 (2.24)
Financial	-3.07 (2.32)	-3.01 (2.25)	-2.42 (2.22)
Professional	-1.97 (1.92)	-2.84 (1.88)	-2.14 (1.86)
Administrative	-4.29 (2.34)	-4.77 (2.28)	-4.34 (2.24)
Other industry	-2.24 (2.28)	-2.84 (2.22)	-2.18 (2.19)
Environmental dynamism	2.09*** (0.45)	1.80*** (0.44)	1.57*** (0.44)
Slack resources	0.23 (0.39)	-0.07 (0.39)	-0.14 (0.39)
<i>Independent variables</i>			
TMT networking ability		1.83*** (0.52)	1.30*** (0.54)
TMT cognitive diversity		0.54 (0.64)	0.14 (0.64)
Bricolage			2.04** (0.67)
R ²	0.14	0.19	0.23
Adj R ²	0.10	0.15	0.18
Δ R ²		0.05	0.04

Note. N=237. Unstandardized B coefficients are reported and the standard errors are included in parentheses below each B coefficient. * p < .05, ** p < .01, *** p < .001.

Table 2.4 Antecedents of Bricolage

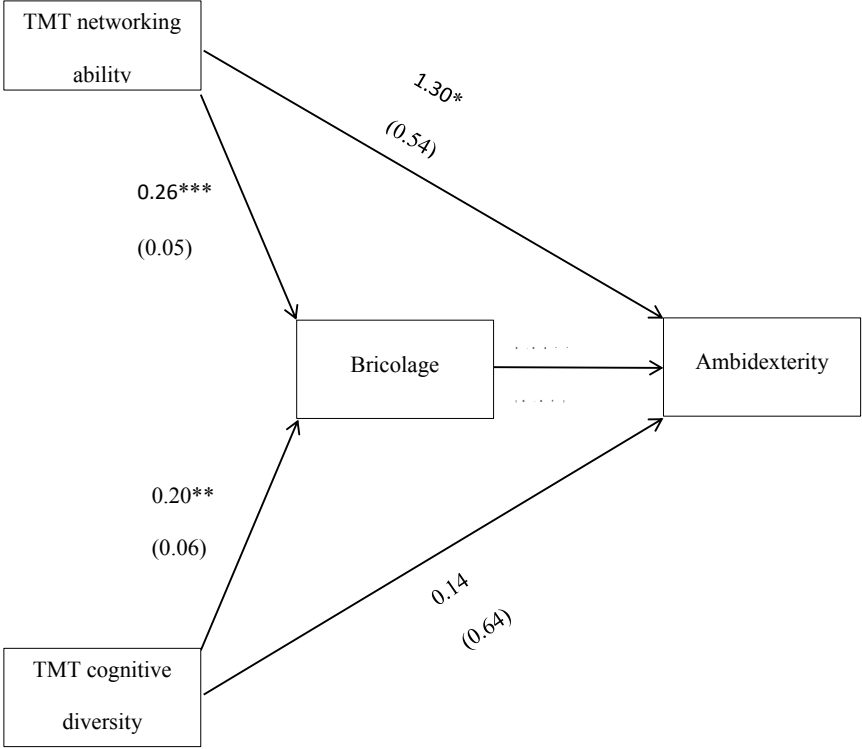
	Model 1	Model 2
<i>Control variables</i>		
Firm age	-0.11 (0.06)	-0.05 (0.06)
Firm size	-0.03 (0.06)	-0.06 (0.06)
TMT size	-0.01 (0.04)	0.01 (0.03)
ICT	-0.38 (0.24)	-0.42 (0.22)
Financial	-0.29 (0.24)	-0.29 (0.22)
Professional	-0.19 (0.20)	-0.35 (0.18)
Administrative	-0.14 (0.24)	-0.21 (0.22)
Other industry	-0.22 (0.24)	-0.32 (0.22)
Environmental dynamism	0.16*** (0.05)	0.12** (0.04)
Slack resources	0.08 (0.04)	0.04 (0.04)
<i>Independent variables</i>		
TMT networking ability		0.26*** (0.05)
TMT cognitive diversity		0.20** (0.06)
R ²	0.09	0.25
Adj R ²	0.05	0.21
Δ R ²		0.16

Note. N=237. Unstandardized B coefficients are reported and the standard errors are included in parentheses below each B coefficient. * p < .05, ** p < .01, *** p < .001.

To test Hypothesis 4 we used the approach in Hayes (2013), with ambidexterity as the dependent variable, bricolage as the mediator, networking ability as the independent variable and including controls for firm age (ln age), firm size (ln FTEs), TMT size, environmental dynamism, slack resources and TMT cognitive diversity. Our analysis (5,000 bootstrap samples, 95% CI) shows that networking ability is positively related to bricolage at $p < .001$ and that bricolage and networking ability are both positively related to ambidexterity at $p < .05$, respectively. TMT networking ability has a direct effect on ambidexterity ($c = 1.30$, $SE = 0.54$, $LLCI = 0.23$, $ULCI = 2.36$) and an indirect effect, mediated by bricolage ($ab = .53$, $SE = 0.20$, $LLCI = 0.20$, $ULCI = 1.04$). Our mediation falls into the complementary mediation category because both direct and indirect effects are significant, and have the same sign (Zhao, Lynch, and Chen, 2010). Hypothesis 4 was thus confirmed.

We followed the same approach to test Hypothesis 5, with ambidexterity as the dependent variable, bricolage as the mediator, cognitive diversity as the independent variable and including controls for firm age (ln age), firm size (ln FTEs), TMT size, environmental dynamism, slack resources and TMT networking ability (5,000 bootstrap samples, 95% CI). TMT cognitive diversity is positively related to bricolage at $p < .01$ and bricolage is positively related to ambidexterity at $p < .01$. We did not find a significant direct effect of TMT cognitive diversity on ambidexterity ($c = .14$, $SE = 0.64$, $LLCI = -1.12$, $ULCI = 1.40$). However, TMT cognitive diversity has an indirect effect on ambidexterity, mediated by bricolage ($ab = .39$, $SE = 0.22$, $LLCI = 0.06$, $ULCI = 0.95$). This mediation falls into the ‘indirect-only mediation’ category because only the indirect effect is significant (Zhao et al., 2010). As the existence of the indirect effect is the only necessary condition for mediation (Hayes, 2013; Zhao et al., 2010), Hypothesis 5 was confirmed. Thus, while TMT cognitive diversity does not have a direct effect on organizational ambidexterity; it has a significant indirect effect mediated by bricolage. The results of the mediation analyses are summarized in Figure 2.1.

Figure 2.1 Mediation Analyses



Note. N=237. Unstandardized B coefficients are reported, 5000 bootstrap samples,* p < .05, ** p < .01, *** p < .001. The standard errors are included in parentheses below each B coefficient.

Indirect effect of TMT networking ability = 0.53; SE = 0.21

Indirect effect of TMT cognitive diversity = 0.39, SE = 0.22

2.5 Discussion and Conclusion

Despite the notion that ambidexterity may enable organizations to improve their performance over time, there is still limited understanding of how SMEs can manage their resources effectively to sustain concomitant exploration and exploitation (O’Reilly and

Tushman, 2013). We examine whether a specific resource management practice, entrepreneurial bricolage, enables SMEs to reconcile the inherent challenges associated with ambidexterity. Supporting our argument, we find that the use of bricolage contributes to the ability of SMEs to engage in exploratory and exploitative activities at the same time. In addition, we show how two important attributes of top management teams, TMT networking ability and TMT cognitive diversity, may help SMEs to engage in entrepreneurial bricolage successfully, and potentially manage their resources more efficiently. We test a mediation model, in which the characteristics of the management team affect their resource management behavior (i.e. in our context, the use of bricolage), which in turn impacts firm ambidexterity. We find supporting evidence for the direct and indirect effect (mediated by bricolage) of networking ability on ambidexterity. Contrary to our expectations, even though we find an indirect effect of cognitive diversity on ambidexterity, we find no evidence of a direct effect. It appears that when the diversity in knowledge, values and skills of the TMT does not reflect in the way resources are managed, SMEs are unable to mobilize the necessary resources to sustain the complex processes involved in the pursuit of an ambidextrous strategy. Our study has several important implications for both theory and practice.

2.5.1 Theoretical Implications

This study contributes to the literature on organizational ambidexterity by putting forward a resource management perspective. We propose that ambidextrous SMEs proactively deal with resource constraints and overcome their objective resource limitations by making use of entrepreneurial bricolage. In line with prior studies emphasizing the role of bricolage in alleviating resource constraints (Desa, 2012; Desa and Basu, 2013; Mair and Marti, 2009), we find that bricolage contributes to the achievement of ambidexterity in SMEs. However, having the necessary resources is not a sufficient condition to achieve ambidexterity since SMEs also should be able to adequately (re)allocate these resources to explorative and exploitative activities (Jansen et al., 2009). In a study about how print newspaper firms adjusted to digital media, Gilbert (2005) observes that the problem was not the allocation of sufficient resources (i.e. resource investment) but the inability of firms to change the resource management processes necessary to use their resources effectively. Our results

suggest that bricoleurs allocate their resources more efficiently and creatively across competing activities, and are more flexible with respect to their reallocation. This is particularly important for SMEs that have to reconcile resource allocation limitations when pursuing ambidextrous strategies.

Providing additional insights into how bricolage may affect organizational outcomes, our study has implications for research on entrepreneurial bricolage. Prior literature is generally silent about the performance implications of this resource management behavior. A notable exception is the study of Senyard and colleagues (2014) which reports a positive relationship between the use of bricolage and innovativeness in young firms. Even though the potential benefits of bricolage for SMEs were not examined empirically, Baker and Nelson (2005) note that bricolage could be a viable resource management strategy even for organizations that do not face severe resource constraints. In addition, Desa and Basu (2013) observe that also prominent organizations in highly munificent environments make use of bricolage to better integrate knowledge, skills and resources from multiple stakeholders. Our study suggests that bricolage may be particularly useful for organizations engaging in complex behaviors, such as those associated with ambidexterity.

This study also advances research on bricolage by examining the capabilities managers must possess to engage in bricolage successfully. In line with Baker and Nelson (2005) we start from the premise that some individuals may be better equipped to be bricoleurs than others. If bricolage is a beneficial resource management behavior, it is important to understand how bricoleurs (entrepreneurs or managers) can implement it successfully. Our finding that networking ability is positively related to bricolage is consistent with prior qualitative research that shows that bricoleurs make use of their networks to access resources “at hand” (Baker et al., 2003) and induce stakeholder participation by using their social skills (Baker and Nelson, 2005; Di Domenico et al., 2010). We also find that TMT cognitive diversity relates positively to bricolage, possibly because managers with more diverse skills and knowledge are more likely to identify “out of the box” uses for resources, and creative combinations of resources. Broadly, we provide additional insights into the socio-cognitive attributes of TMTs, which affect the way resources are managed within SMEs.

Finally, our study provides evidence that the link between managerial action and organizational ambidexterity is highly complex. By including bricolage as a mediator, we gain a better understanding of how the socio-cognitive attributes of top management teams affect their resource management behavior and, with that, organizational ambidexterity. Our findings show that the TMT networking ability is both directly and indirectly (via bricolage) related to ambidexterity. Hence, we extend the limited literature on the role of social skills of top executives (including networking ability) in achieving firm outcomes (Baron and Markman, 2000; Baron and Tang, 2008). Even though we do not find evidence of a direct relationship between TMT cognitive diversity and ambidexterity, we do find an interesting indirect effect, because TMT cognitive diversity increases the use of bricolage. It seems that TMT cognitive diversity alone is not sufficient to achieve ambidexterity, in particular if this diversity does not reflect in how firms manage their resources. While diverse TMTs should benefit from a wider range of experiences and perspectives, the absence of a coherent resource management strategy may prevent them from mobilizing the necessary resources to sustain explorative and exploitative innovations. Overall, our study confirms earlier findings that TMTs may attain ambidexterity, by building a strong relational context with key external and internal stakeholders (Hill and Birkinshaw, 2014). We take this research a step further and show that one important way through which stakeholders support ambidextrous SMEs, is by assisting them in their resource management process (i.e. bricolage).

2.5.2 Managerial Implications

The main practical implication of this study is that it proposes entrepreneurial bricolage as resource management behavior that can help SMEs to pursue ambidextrous strategies. Thus, bricolage provides a means to deal with resource constraints proactively, and to allocate resources more efficiently across competing activities. Still, bricolage is not an easy task for managers of SMEs, as it requires them to gain an in-depth understanding of the firm's internal resources; mobilize external resources available inexpensively in their networks; and at the same time engage multiple stakeholders. Our findings emphasize the importance of putting time and effort into building networks with key external stakeholders and show the relevance of management team composition. Bricolage is a multi-stakeholder

process and teams that are cognitively diverse and invest in networking are more likely to mobilize key resources and stakeholders. Another practical implication is that management teams targeting ambidexterity have to build and maintain their social networks based on seemingly contradictory criteria. On the one hand, TMTs have to target stakeholders that can provide them timely and relevant market information (i.e. new technologies, shifts in consumer demands, competition). On the other hand, TMTs need to nurture relationships with stakeholders that grant them access to resources “at hand” (i.e. discarded resources). The absence of a relationship between team cognitive diversity and ambidexterity highlights the importance of considering intervening factors in our understanding of organizational ambidexterity. Bricoleurs pursuing ambidextrous strategies may still extract value from their team cognitive diversity, when this cognitive diversity directly impacts the way resources are managed.

2.5.3 Limitations and Future Research

Even though our study provides important insights into how SMEs can attain ambidexterity, it is subjected to several limitations. For instance, our cross-sectional research design may raise concerns about causality. Further longitudinal research is needed to more rigorously establish a causal relationship, or to examine in more detail the potentially dynamic relationship between bricolage and ambidexterity. In addition, while we do find a positive relationship between bricolage and ambidexterity, we do not consider other resource management behaviors, that could help SMEs pursue ambidextrous strategies. It may well be that other such behaviors may provide fruitful alternatives for ambidextrous SMEs. For instance, slack resources, could enable SMEs to more fluidly re-allocate resources across competing activities. In their study, Voss and colleagues (2008) examine how various types of slack relate to product exploration and product exploitation, respectively in SMEs. Further research could examine how slack resources, and specifically what types of slack resources may enable SMEs to reconcile the tensions associated with concomitant exploration and exploitation.

Another direction for further research, regards the antecedents of entrepreneurial bricolage. While we provide evidence for two management team attributes that relate positively to bricolage, there are other characteristics of bricoleurs (entrepreneurs or

managers) that may help them implement this resourcing behavior successfully. For instance, improvisation at either individual or team level, may enhance SME's ability to make use of bricolage. Similarly, we focus on only one aspect of TMT cognition, namely cognitive diversity. Other components of team cognition, such as shared cognition or cognitive conflict may help TMTs make better use of entrepreneurial bricolage.

Finally, another opportunity for further research is to study how bricolage relates to SME's financial performance, possibly with a contingency framework. While research suggests certain actions taken by bricoleurs may be detrimental to financial performance (Baker and Nelson, 2005), a clear understanding of the effects of bricolage on performance is lacking. In conclusion, this study contributes to extant literature, by advancing our understanding of how SMEs can achieve ambidexterity by dealing with their resource limitations in a pro-active way, through the means of entrepreneurial bricolage. We enrich our model by examining also the top management team attributes that are conducive of bricolage and ambidexterity, respectively.

Chapter 3. TMT Improvisation, Resource Management and Performance in SMEs: A Mediated Model²

Abstract

Although it has been argued that organizations can benefit from improvisation, research findings are mixed. Our paper moves beyond direct effects and explores the intervening mechanisms through which top management team (TMT) improvisation affects the performance of small and medium-sized enterprises (SMEs). Specifically, we direct attention to two resource management behaviors: bootstrapping and bricolage. We use a cross-industry sample of SMEs and find that TMT improvisation plays a fundamental role in how firms manage their resources. Teams that improvise more, make use of bricolage and bootstrapping to a greater extent. In turn, we find that bricolage has a positive effect on SME performance, whereas bootstrapping has a negative effect. As such, TMT improvisation enhances SME performance through bricolage, but at the same time decreases SME performance through bootstrapping.

² This study is conducted in collaboration with Justin Jansen and Ingrid Verheul.

3.1 Introduction

Team improvisation, defined as the collective “creative and spontaneous process of trying to achieve an objective in a new way” (Vera and Crossan, 2005: 205), has been linked with improved organizational learning, firm adaptation and innovation (Barret, 1998; Kamoche and Cunha, 2003). Nonetheless, the impact of improvisation on organizational performance in business settings is not straightforward (Kyriakopoulos, 2011). Scholars argue, for instance, that improvisation can help organizations solve a problem, but it can also escalate it (Vera and Crossan, 2004). Consequently, while some studies reported a positive effect of improvisation on performance outcomes (Magni, Maruping, Hoegl, and Proserpio, 2013), others found no effect (Hmieleski, Corbett, and Baron, 2013; Kyriakopoulos, 2011; Vera and Crossan, 2005). These mixed results may be attributed to the distinct roles improvisation plays across different teams, including municipality work teams (Vera and Crossan, 2005), new product development teams (Kyriakopoulos, 2011; Magni et al., 2013), R&D teams (Vera, Nemanich, Vélez-Castrillón, and Werner, 2014), or film production crews (Bechky and Okhuysen, 2011). Also, the effectiveness of improvisation may depend on the task teams are involved in (Bingham, 2009). Whereas improvisation may be critical when dealing with surprises or crisis situations (Bechky and Okhuysen, 2011; King and Ranft, 2001), it may be less relevant when operating in contexts shaped by formal routines and structures (Magni et al., 2013). Thus, it appears that understanding how improvisation is employed within an organization is essential to untangle its effects on organizational outcomes.

We draw on Resource Dependence Theory (Drees and Heugens, 2013; Hillman, Withers and Collins, 2009), the Resource Based View (Barney, 1991; Barney, Wright and Ketchen, 2001; Barney, Ketchen, and Wright, 2011; Kraaijenbrink, Spender and Groen, 2010) and Resource Management theories (Sirmon, Hitt, and Ireland, 2007; Sirmon, Hitt, Ireland, and Gilbert, 2011) to develop novel insights into the role of improvisation in organizations. Qualitative studies have suggested that improvisational skills affect the way resources are managed within organizations (Bechky and Okhuysen, 2011; Majchrzak, Jarvenpaa and Hollingshead, 2007). Nevertheless, it remains unclear how improvisation influences the choice for and the reliance on specific resource management behaviors. We direct attention to two resource management behaviors, financial bootstrapping and entrepreneurial bricolage. Bootstrapping entails accessing resources at no or low cost,

achieved by opting for cheaper resources, sharing resources with other firms or using temporary resources. Entrepreneurial bricolage refers to “making do by applying combinations of the resources at hand to new problems and opportunities” (Baker and Nelson, 2005: 333). In the context of resource management (Sirmon et al., 2011), bootstrapping provides a low-cost alternative to traditional external resource acquisition, while bricolage gives companies the opportunity to develop resources internally and combine existing resources in unconventional ways. Bootstrapping and bricolage can support organizations in their efforts to reduce resource dependencies on external stakeholders, which is particularly relevant when there are few suppliers of high-quality resources in the market (Desa and Basu, 2013). Bricolage, in particular, may help companies assemble resources in novel ways and create new capabilities (Duymedjian and Ruling, 2010)

This study has two main contributions to management research. First, we direct attention to top management teams (TMTs) in small and medium-sized enterprises (SMEs) and theorize how their improvisational skills may shape their decisions regarding resource management. As improvisation involves spontaneity, improvisational TMTs are more likely to avoid market-based resource transactions and instead prefer resource management behaviors that could ensure a timely access to resources (Baker, 2007). Additionally, due to the creativity component, improvisational TMTs are more likely to access and assemble organizational resources in novel ways (Magni et al., 2013). In this study we specifically examine how TMT improvisation affects the reliance on two distinct resource management behaviors, namely bricolage and bootstrapping.

Second, we advance research on the performance implications of TMT improvisation, by understanding the mechanisms through which TMT improvisation influences performance in SMEs. TMTs have a leading say in a firm’s strategic decision-making and therefore play a vital role in determining firm performance (Hambrick and Mason, 1984). They generally engage in a wide range of activities, which may or may not benefit from improvisation (Bingham, 2009; Gras and Nason, 2015; Kamoche and Cuhna, 2003; Weick, 1993). At the same time, improvisation poses demands on their limited managerial attention (Davis, Eisenhardt, and Bingham, 2009) as it involves real-time sense-making (Weick, 1993). Therefore, while TMTs have the potential to employ their

improvisational skills to pursue organizational goals, they may encounter difficulty when trying to effectively do so. We posit that resource management constitutes a key mediating mechanism between TMT improvisation and SME performance. Hence, we examine how TMT improvisation in SMEs relates to the use of bootstrapping and bricolage, and the extent to which these resource management behaviors are differentially related to SME performance. In doing so, we provide a more balanced perspective on the role of improvisation in organizations, and explain that depending on how it is used by TMTs, improvisation may have positive or negative, unintended consequences for SME performance.

3.2 Theory and Hypotheses

3.2.1 Improvisation in TMTs

Improvisation is considered essential to strategic renewal (Brown and Eisenhardt; Feldman, 2000; Weick, 1998), crisis management (Crossan, 1998; Lamberg and Pajunen, 2010) and organizational learning (Barret, 1998; Miner, Bassof, and Moorman, 2001). Generally, improvisation encompasses two facets, i.e., spontaneity and creativity (Vera and Crossan, 2004). First, spontaneity implies the merger of composition and execution of improvisational actions, teams that improvise “think on their feet” and deal with situations on the spur of the moment (Miner et al., 2001). However, improvisation may still rely on rules and routines that are pre-established and rehearsed (Vera and Crossan, 2005). By practicing, individuals can “rehearse spontaneity” (Mirvis, 1998) and thus “prepare to be spontaneous” (Barret, 1998). Second, creativity involves the search for novelty and usefulness in improvisational actions, teams that improvise find new, original ways to achieve their objectives (Vera and Crossan, 2005).

Improvisation may play a particularly important role in top management teams. As improvisation helps organizations deal with unanticipated events and situations of urgency (Bechky and Okhuysen, 2011; Vera and Crossan, 2005), TMTs may use their improvisational skills to make strategic decisions under time pressure or when confronted with fluctuating environmental conditions (Hmieleski, Corbett and Baron, 2013). Moreover,

as improvisation supports organizations in coping with uncertain or complex, non-routine, infrequent situations (Bergh and Lim, 2008; Smets, Morris and Greenwood, 2012), TMTs may also use their improvisational skills to identify, assess and pursue entrepreneurial opportunities (Akgun, Lynn and Reily, 2002; Bingham, 2009). Overall, TMT improvisation can enhance the quality of strategic decision-making within organizations by stimulating real-time organizational learning (Barret, 1998).

To understand how TMT improvisation affects SME performance, it is important to consider how TMTs employ improvisation in the strategic decision-making process and their actions. We build on prior qualitative studies suggesting that teams use their improvisational skills to access, bundle and deploy resources ((Bechky and Okhuysen, 2011; Brown and Eisenhardt, 1997; Crossan, Cunha, Vera, and Cunha, 2005; Moorman and Miner, 1998), and we posit that TMT improvisation affects the preference for, and reliance on different resource management behaviors.

3.2.2 Resource Management Behaviors

We pay attention to two resource management behaviors relevant in the context of SMEs: financial bootstrapping and entrepreneurial bricolage. Bootstrapping enables firms to minimize their reliance on external debt and equity (Bhide, 1992; Winborg and Landström, 2001) and reduce resource dependencies (Kannan-Narasimhan, 2014). It involves acquiring access to resources at no or low cost, which can be achieved by opting for cheaper resources, sharing resources with other firms (f.i. sharing equipment or office space with other firms) or using temporary resources (f.i. hiring employees on a short-term basis). Thus, bootstrapping is a resource management behavior aimed at avoiding market-based resource transactions (Grichnik, Brinckmann, Singh, and Manigart, 2014). From the perspective of the Resource Dependence Theory (RDT), bootstrapping provides organizations with inter-organizational arrangements, such as joint or temporary contracts with resource providers, which ensure greater organizational autonomy (Drees and Heugens, 2013; Pfeffer and Salancik, 2003). While early research suggested bootstrapping to be prevalent among underperforming firms or firms unable to access external finance (Ebben and Johnson, 2006), recent evidence shows firms may also engage in bootstrapping even after securing external finance or when they do not foresee difficulties in accessing (additional) finance

(Brush, Carter, Gatewood, Greene, and Hart, 2006; Winborg, 2009). Additional evidence confirms that managers with higher levels of human and social capital make more use of bootstrapping (Grichnik et al., 2014). As such, firms may deliberately employ bootstrapping as an integral part of their resource management to reach their strategic goals (Grichnik et al., 2014).

Entrepreneurial bricolage refers to “making do by applying combinations of the resources at hand to new problems and opportunities” (Baker and Nelson, 2005: 333). “Making do” implies that bricoleurs pursue new challenges and opportunities, even when their resource base may be considered insufficient. This does not mean however, that bricoleurs pursue opportunities with fewer resources, but rather that they start pursuing them before having all resources at their immediate disposal. “Resources at hand” include existing resources the organization already acquired or resources that are inexpensively available to the organization. This also includes resources freely available in the bricoleur’s network (Baker, Miner, and Eesley, 2003). The combination of existing resources typically involves using resources for purposes they were not originally designed for. Thus, bricolage may enable SMEs to build bundles of valuable, inimitable resources that can be deployed to create a competitive advantage and pursue new opportunities without having to acquire resources externally (Barney, 1991; Barney, Ketchen, and Wright, 2011; Kraaijenbrink, Spender and Groen, 2010). Bricolage can therefore be seen as an alternative to traditional ways of acquiring resources, involving the use of standard resources that have proven capabilities for the specific application for which the resources are intended (Baker, 2007; Desa and Basu, 2013). From a RDT perspective, bricolage provides SMEs with the opportunity to in-source the production of necessary resources, and gain more autonomy from external resource providers (Drees and Heugens, 2013; Lacity and Willcocks, 1998).

Bootstrapping and bricolage are distinct resource management behaviors. First, bricolage has a transformational component (Kannan-Narasimhan, 2014) that is not present in bootstrapping. Because bricoleurs repurpose resources, they can take advantage of resources that others may find substandard (see for instance Garud and Karnøe, 2003) or resources that have limited potential alone, but create value when combined with other resources “at hand”. Second, bootstrapping is associated with accessing resources at a low cost, which is not necessarily the case for bricolage. Bootstrappers put time and effort into

acquiring resources at a lower cost, for example by selecting and negotiating favorable terms with suppliers, employing cheaper resources (f.i. leasing instead of acquisition), or sharing resources with other firms (Winborg and Landström, 2001). While bricoleurs scavenge resources (i.e., use resources that have little value to their current owners), they do not actively target resources valued by current owners. Third, bricolage involves a bias for action that is not representative of bootstrapping. Although bootstrapping may be used to ensure greater “freedom of action” in relation with external resource providers (Winborg, 2009), bootstrappers do not necessarily take action to pursue new opportunities before they have all the required resources at their immediate disposal.

3.2.3 TMT Improvisation and Resource Management Behaviors

Despite qualitative evidence implying that some firms are better at bootstrapping than others (Jonsson and Lindbergh, 2011), insights about the underlying reasons are relatively scarce (Neeley and Auken, 2009). While early studies highlight resource constraints as a precursor to bootstrapping (Ebben and Johnson, 2006), recent research emphasizes the role of human agency (Alvarez, and Busenitz, 2001; Grichnik et al., 2014). As such, the capabilities of the TMTs influence their preference for and ability to engage in bootstrapping (compared to other resource management behaviors). Reflective of this logic, Grichnik and colleagues (2014) find that entrepreneurs with higher levels of human and social capital rely more on bootstrapping than others.

TMT improvisation affects the extent to which SMEs make use of bootstrapping for at least two reasons. First, as improvisation is conducive to organizational change (Feldman, 2000; Smets, Morris and Greenwood, 2012), improvisational TMTs should be more likely to identify new and original ways to minimize their capital needs by bootstrapping, and thus access resources unavailable via conventional market-based transactions. Due to their enhanced creativity, TMTs with well-developed improvisational skills may be better able to draft out agreements with suppliers that enable them to acquire resources at a lower cost. At the same time, these TMTs may be better equipped to leverage resource complementarities with other firms, thus facilitating resource sharing. Similarly, TMTs that are good at improvising may be able to manage their resources in a way that reduces the reliance on non-temporary resources.

Second, as improvisation can help organizations to deal with surprises or unexpected situations (Bechky and Okhuysen, 2011; King and Ranft, 2001), improvisational TMTs will be able to promptly address potential challenges associated with bootstrapping. Sharing resources with other firms and acquiring temporary use of resources requires coordinating resource access in a way that ensures that all needed resources are readily available for bundling. Failing to do so may result in costly delays. For instance, bootstrappers may underestimate the time they need to access a specific resource, and encounter delays when losing access to a resource they still require. TMTs that “think on their feet” are better able to find solutions to resource coordination challenges and thus more likely to engage in bootstrapping. Therefore, we hypothesize:

Hypothesis 1: TMT improvisation is positively related to financial bootstrapping in SMEs.

Although the ability of organizations to engage in entrepreneurial bricolage depends on the capabilities of their managers or founders (Baker and Nelson, 2005; Gras and Nason, 2015; Halme, Lindeman, and Linna, 2012), we know little about which managerial capabilities affect the use of bricolage. We expect that TMT improvisation affects the use of entrepreneurial bricolage for several reasons. First, improvisational TMTs are likely to rely on their “repertoire”, that is, favor resources readily available over resources originating from conventional, more time-consuming market-based transactions (Baker, 2007; Miner, Bassof, and Moorman, 2001). As a result, these teams will be more likely to use and recombine their existing resources. Second, improvisation is likely to increase TMTs’ ability to “make do” and pursue opportunities despite resource limitations (Bechky and Okhuysen, 2011). Due to the emphasis on spontaneity, improvisational management teams may assemble the necessary resources quickly, even after the decision to pursue a business opportunity has been made. As a result, these TMTs may be more willing to take action to pursue business opportunities without waiting for the “right” bundle of resources. Third, improvisational skills enhance the ability of the TMT to effectively (re)combine the resources at hand. As improvisation entails originality and creativity (Miner, Bassof, and Moorman, 2001; Vera and Crossan, 2005), it may facilitate the discovery of unconventional ways to use existing resources, or the creative (re)combinations of resources. Because teams

with high improvisational skills are more open towards others' members' ideas (Crossan, 1998), they are also more likely to show support towards unusual or untested ideas proposed by their members and more willingness to integrate them into the way they manage organizational resources. Thus, we put forward the following hypothesis:

Hypothesis 2: TMT improvisation is positively related to entrepreneurial bricolage in SMEs

3.2.4 Resource Management and Performance

While studies examining the relationship between bootstrapping and firm performance produced mixed findings, there are several reasons to expect that reliance on bootstrapping will be detrimental for the performance of SMEs. First, bootstrapping may entail access to resources that are inadequate (Vanacker et al., 2011; Ebben and Johnson, 2006), and could constrain firm growth (Penrose, 1959). An emphasis on low-cost resources may lead companies to make use of lower quality resources that are not congruent with the firm's strategic goals. Similarly, while sharing resources with other firms ensures access to a larger pool of resources, it may also lead to unforeseen delays in resource bundling. Also, using temporary contracts, particularly when hiring employees, may allow companies to save money in the short term, but may eventually lead to higher employee turnover and difficulties in retaining skilled personnel. Second, bootstrapping may impose challenges to managerial attention. TMTs have to deal with conflicting demands on their time and attention (Seshadri and Shapira, 2001; Shepherd, McMullen and Ocasio, 2016). When TMTs allocate substantial time and attention to securing small savings for their organization, this will come at the expense of time available to identify and exploit promising market opportunities (Vanacker et al., 2011). Bhide (1992) observes that as firms grow, managers need to shift their attention away from small expenditures towards the big picture. Thus, bootstrapping may hamper the ability of SMEs to adapt to increasing organizational complexity and commit to a long-term strategy. Third, bootstrapping may affect the legitimacy of SMEs, by damaging their relationships and collaboration with key stakeholders (e.g., investors, suppliers). Potential stakeholders may perceive SMEs that engage in bootstrapping as less legitimate or of a lower quality (Ebben and Johnson, 2006;

Patel et al., 2011) and thus refrain from collaborating with them. This in turn would negatively impact their access to information and non-bootstrapped resources. While studies have reported a positive or non-negative relationship between bootstrapping and firm performance, these studies focused on young firms (Jones and Jayawarna, 2010; Patel et al., 2011; Vanacker et al., 2011) or nascent firms (Perry, Chandler, Yao, and Wolff, 2011). However, the aforementioned discussion demonstrated that bootstrapping may incur higher costs for SMEs as compared to new or nascent firms (Patel, Fiet, and Sohl, 2011). Consequently, we expect that for SMEs the overall disadvantages of using bootstrapping may outweigh the benefits. Thus, we posit:

Hypothesis 3: Bootstrapping is negatively related to SME performance.

We argue that there are three main reasons to expect that bricolage contributes to the performance of SMEs. First, bricolage could help SMEs alleviate resource constraints by ensuring a more efficient resource management and a broader resource portfolio. Due to the reliance on existing resources, bricolage may foster a richer understanding of the resources at “hand” and their context (Duymedjian and Rüling, 2010; Halme et al., 2012), which can facilitate an efficient allocation of the company’s resources, for example by identifying misused resources and divesting them or repurposing them to value creating activities. Furthermore, because bricoleurs challenge resource limitations (Baker and Nelson, 2005), their “socially constructed” resource portfolio includes resources physically residing in the organization and resources available “at hand” in their networks. Second, bricolage may help SMEs to deal with uncertainty about new markets and products. Bricoleurs take action to address new challenges and opportunities, even when they don’t have all resources at their disposal (Garud, Kumaraswamy, and Karnøe, 2010; Senyard, Baker, Steffens, and Davidsson, 2014). This enables them to respond more effectively and timely to external threats. In this respect, Lanzara (2001) shows that organizations make use of bricolage to respond to new problems associated with technology adoption and Spicer and Sewell (2010) observe that firms use bricolage to deal with challenges associated with changing organizational logics. When pursuing new opportunities, this bias for action may grant bricoleurs a lead start, which could translate into a first-mover advantage (Suarez and Lanzolla, 2007). When addressing new problems, bricoleurs may be better equipped to

minimize the damage produced to their firm by tackling problems as they emerge. Third, bricolage may enable SMEs to develop new capabilities that can be used to pursue promising market opportunities. According to Levi-Straus (1967: 17) the creative combination and recombination of resources by bricoleurs can lead to “brilliant unforeseen results”. Several qualitative studies have documented how bricoleurs manage to “create something from nothing”, that is, to combine seemingly unrelated and valueless resources in original ways, and thus build new capabilities (Baker and Nelson, 2005; Di Domenico, Haugh, and Tracey 2010; Garud and Karnøe, 2003). SMEs may subsequently leverage these capabilities to create value for customers and owners. Because bricolage can support SMEs in managing their resources more efficiently, dealing with uncertainty and building new capabilities, we expect that bricolage will enhance the performance of SMEs:

Hypothesis 4: Bricolage is positively related to SME performance.

3.2.5 The Mediating Role of Bootstrapping and Bricolage

Prior research confirms that the effect of improvisation on performance is not straightforward business settings (Hmieleski and Corbett, 2008; Kyriakopoulos, 2011; Vera and Crossan, 2004) and depends on contextual factors (Vera and Crossan, 2005) and the stakeholders involved (Magni et al., 2013). This paper examines improvisation at the TMT level, team that has a great impact on decision-making within SMEs, and thus can potentially use their improvisational skills to enhance SME performance. Unlike other types of teams (f.i. product development teams), TMTs can influence a wide variety of organizational processes. For these reasons, we expect that the extent to which TMT improvisation reflects on firm performance depends on the processes in which TMT choose to employ their improvisational skills. As a result, we refrain from making any prediction concerning the direct effect of TMT improvisation on SME performance. Instead we direct attention to the indirect effects, through bootstrapping and bricolage. Because we expect that improvisation has a positive effect on bootstrapping, and that bootstrapping has a negative effect on SME performance (see Hypotheses 1 and 3), we predict that improvisation will have a negative indirect effect on SME performance, mediated by bootstrapping. Similarly, as we argue that improvisation has a positive effect on bricolage and that bricolage has a positive effect on

SME performance (see Hypotheses 2 and 4), we predict that improvisation will have a positive indirect effect on SME performance, mediated by bricolage. Thus, hypothesize the following:

Hypothesis 5: Bootstrapping mediates the relationship between TMT improvisation and SME performance.

Hypothesis 6: Bricolage mediates the relationship between TMT improvisation and SME performance.

3.3 Methods

3.3.1 Sample and Data Collection

We randomly identified 3,000 SMEs in the Netherlands using a commercial database. The initial sample consisted of private organizations with 5 to 250 employees in a broad range of industries. Two surveys were sent to each organization, of which one was addressed to the CEO, and the other to a second member of the management team. The surveys were accompanied by a letter instructing the CEO to hand the second survey for completion to another member of the TMT. The data collection took place in 2014 and resulted in a total response from CEOs of 321 companies, corresponding to a response rate of 10, 1%.

The final sample for our study consists of 147 companies for which we received completed surveys from both CEO and the (second) member of the TMT. On average, organizations in the final sample had 38.18 full-time employees, 4.15 TMT members, and existed for 30.28 years. They were operating in a wide range of industries, covering manufacturing (26.5%), transportation (10.9%) information and communication (13.6 %), financial services (3.4%), professional services (36.7%), administrative services (6.8%) and other services (2%). Furthermore, CEOs were on average 51.37 years old and had been employed by the firm for 16.89 years. The average age of the other TMT member was 44.24 years and (s)he had been employed by the firm for 11.34 years. Moreover, in 68 out of 147 SMEs (46%), at least one respondent (either CEO or the other TMT member) was also one of the founders of the firm.

To address potential problems associated with single-informant bias and common method bias, we collected data for the dependent variables and independent variables included in our study from two key informants (i.e. the CEO and a second member of the TMT). In our main analyses, we took the dependent variables (i.e. bootstrapping, bricolage and performance) from the CEO survey management team member survey and the independent variables and control variables (i.e., TMT improvisation) from the management team member survey.

3.3.2 Measures and Scale Validation

Bootstrapping. To measure bootstrapping we developed a ten-item scale ($\alpha = 0.70$). We use a newly developed scale for two reasons. First, existing measures were mainly developed to examine bootstrapping in nascent and young firms, and are therefore less applicable to SMEs where, for example, withholding the salary of owners and managers is less common. Other techniques studied, such as buying on consignment from suppliers, are relevant only within the context of specific industries. Our scale has the advantage that it applies to multiple contexts. Second, to allow for the comparison of bootstrapping with other resource management behaviors, such as bricolage, our measure emphasizes resource aspects such as accessing resources at lower cost, making use of temporary resources, or sharing resources with other companies. Our operationalization is in line with recent studies that emphasize the role of bootstrapping as a resource management approach that enables firms to reduce their capital requirements (Grichnik et al., 2014). The scale consists of ten items of which three items measure whether organizations acquire resources at lower cost than the market price (corresponding to minimizing investment methods in Winborg and Landström, 2001), three items that capture whether organizations make use of temporary resources (corresponding to temporary resources in Grichnik et al., 2014), and four items measuring whether organizations share resources with other firms (corresponding to joint-utilization methods in Ebben and Johnson, 2006, Grichnik et al., 2014, or Winborg and Landström, 2001). Sample items include the following: “We always look for ways to acquire resources at a lower cost”, “We make use of flexible contracts (f.i. rent, lease, temporary contacts)”, and “We share resources with other firms”.

Entrepreneurial bricolage. We used a seven-item scale to measure entrepreneurial bricolage ($\alpha = 0.71$), adapted from Senyard et al. (2014). Sample items include: “When we face new challenges we put together workable solutions from our existing resources” and “We usually combine our resources to act on new business opportunities”.

TMT improvisation. The seven-item scale for team improvisation ($\alpha = 0.82$) is from Vera and Crossan (2005), and is also used by Magni and colleagues (2009) and Magni and colleagues (2013). The scale captures the creativity and spontaneity facets of team improvisation. Sample items include: “Our MT deals with unanticipated events on the spot” and “Our MT tries new approaches to problems”.

Firm performance. To measure firm performance we used a 5-item scale ($\alpha = 0.79$), adapted from Sieger, Zellweger and Aquino (2013). We asked respondents to rate their company’s current performance compared to their competitors on a series of performance indicators (f.i. growth in sales, growth in market share, growth in profits).

Control variables. We control for several variables that are expected to have an impact on firm performance, including firm size (i.e., number of full time equivalent employees), TMT size (i.e., number of TMT members), company age, and industry (seven industries corresponding to the NACE REV main industry classification). As firm size and firm age are not normally distributed, we use the logarithm transformations for these two measures. Furthermore, we control for environmental dynamism, measured as a 5-item scale ($\alpha = 0.83$) by Jansen, Tempelaar, Van den Bosch, and Volberda (2009). Sample items include: “Environmental changes in our local market are highly unpredictable” and “Demand for products and services changes frequently and rapidly in our local market”. We also control for environmental munificence, with a newly developed 4-item scale ($\alpha = 0.94$) that builds on the one-item measure for access to capital developed by Wiklund and Shepherd (2005) and used by Grichnik and colleagues (2014). Sample items include: “Our access to financial capital is fully satisfactory for the firm’s development” and “We always manage to access the financial resources necessary to support new strategic initiatives”. All scales were measured on a 7-point Likert scale. Table 3.1 provides a detailed description of all scale variables in this study.

Table 3.1 Measures and Items

<i>Bootstrapping</i>
When acquiring resources, we go for cheaper alternatives
We always look for ways to acquire resources at a lower cost
We often try to reduce costs by negotiating lower prices with suppliers
We make use of flexible contracts (f.i. rent, lease, temporary contacts)
We often try to acquire temporary use of resources (f.i. leasing)
We often hire employees on a temporary basis (f.i. short term contracts, freelancers)
We share resources with other firms
We shares premises with other firms (f.i. office space, conference rooms)
We share employees with other firms (f.i. rotation)
We often coordinate purchases with other firms
<i>Bricolage (adapted from Senyard et al., 2014)</i>
We respond to new opportunities, even when others might consider our resource base as insufficient
We take on a broader range of challenges than other companies would do with the same resources
We always make use of our existing resources to take on new challenges
We usually combine our resources to act on new business opportunities
We always try to face new challenges with existing resources
Resources are often (combined and) used for purposes they weren't originally intended to accomplish
When we face new challenges we put together workable solutions from our existing resources
<i>TMT improvisation (Vera and Crossan, 2005)</i>
Our MT deals with unanticipated events on the spot
Team members think on their feet when carrying out actions
Our MT responds in the moment to problems
Our MT tries new approaches to problems
Our MT identifies opportunities for new work processes
Our MT takes risks in terms of introducing new ideas in doing its job
Our MT demonstrates originality in its work
<i>SME Performance (adapted from Sieger, Zellweger and Aquino, 2013)</i>
How does your organization perform vis-à-vis your competitors? (1 = much worse and 7 = much better)
ROA
Growth in revenues
Growth in profits
Growth in market share
Recruiting new customers

Note. All items are measured on a seven-point scale, anchored by 1 = strongly disagree and 7 = strongly agree, unless indicated otherwise.

We computed intra-class correlations (ICCs) for the variables in our model (LeBreton and Senter, 2008; McGraw and Wong, 1996) to assess the level of agreement and consistency between our informants (i.e., CEOs and TMT members). The mean ICC(K) per variable (one-way random model) are 0.61 for improvisation, 0.75 for bootstrapping, 0.57 for bricolage, 0.71 for performance, 0.66 for environmental dynamism and 0.76 for environmental munificence. In addition, we calculated the inter-rater agreement scores (rwg) for the same variables (James, Demaree, and Wolf, 1984). The average rwg are 0.90 for improvisation, 0.93 for bricolage, 0.92 for bootstrapping, 0.91 for performance, 0.85 for environmental dynamism, and 0.77 for environmental munificence. These results suggest accurate agreement between the answers provided by the CEO and the other TMT member on the variables included in our study.

3.4 Analyses and Results

Table 3.2 present the means, standard deviations and correlations for this study's measures.

Table 3.2 Descriptive Statistics

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Performance	4.78	0.76	1													
2. Bootstrapping	3.73	0.88	-0.09	1												
3. Bricolage	4.99	0.72	0.27**	0.26**	1											
4. TMT improvisation	5.14	0.80	0.14	0.23**	0.22**	1										
5. Transportation	0.11	0.31	0.07	0.03	-0.04	0.03	1									
6. ICT	0.14	0.34	0.08	-0.04	0.16	0.04	-0.14	1								
7. Financial	0.03	0.18	0.01	-0.08	-0.17*	-0.02	-0.07	-0.07	1							
8. Administrative	0.07	0.25	-0.13	-0.04	0.04	0.01	-0.09	-0.11	-0.05	1						
9. Professional	0.37	0.48	0.10	0.20*	0.05	0.05	-0.27**	-0.30**	-0.14	-0.21*	1					
10. Other industries	0.02	0.14	-0.02	0.05	-0.08	0.03	-0.05	-0.06	-0.03	-0.04	-0.11	1				
11. Firm age	3.13	0.76	0.03	-0.13	-0.04	-0.11	0.16	-0.13	0.07	-0.24**	-0.25**	-0.00	1			
12. Firm size	3.21	0.91	0.15	-0.07	-0.11	-0.05	0.07	-0.08	0.03	-0.06	-0.23**	-0.11	0.22*	1		
13. TMT size	4.15	1.72	0.11	-0.06	0.03	-0.14	-0.03	0.08	-0.04	-0.15	-0.08	-0.13	0.13	0.41**	1	
14. Dynamism	4.19	1.09	-0.02	0.16*	0.24**	0.25*	0.04	0.17*	-0.08	0.03	0.03	-0.03	-0.03	-0.15	0.08	1
15. Munificence	4.45	1.50	0.31**	-0.10	0.09	0.11	0.02	0.05	-0.03	-0.11	-0.13	0.05	0.06	0.23**	0.15	0.09

* p<0.05, ** p<0.01, *** p<0.001; N = 147

To assess multicollinearity, we computed variance inflation factors (VIFs) for each of the regression equations. The maximum VIF across all models was 2.04, which is well below the threshold level of 10 (Neter, Wasserman, and Kutner, 1990). Table 3.3 present the results of the regression analyses explaining bootstrapping (model 2) and bricolage (model 4), where models 1 and 3 represent the baseline models including only controls. Table 3.4 includes the results of the regression analyses explaining SME performance (model 3). Model 1 represent the baseline model including only controls, while Model 2 shows the results when the two mediators are not included.

We performed OLS regression analyses to test our first four hypotheses. Hypothesis 1, predicting a positive effect of TMT improvisation on the use of bootstrapping was supported ($\beta = 0.22$, $SE = 0.09$, $p < 0.05$). We also found support for Hypothesis 2, predicting a positive effect of TMT improvisation on the use of bricolage ($\beta = 0.17$, $SE = 0.08$, $p < 0.05$). Consult model 2 and model 4 in Table 3.3 for the antecedents of bootstrapping and bricolage, respectively. Hypothesis 3, predicting a negative effect of bootstrapping on firm performance was also supported ($\beta = -0.16$, $SE = 0.08$, $p < 0.05$). We found a positive, significant effect of bricolage on firm performance, confirming hypothesis 4 ($\beta = 0.37$, $SE = 0.10$, $p < 0.001$). Consult model 3 in Table 3.4 for the antecedents of firm performance.

Table 3.3 Antecedents of Bootstrapping and Bricolage

	Model 1 (Bootstrapping)	Model 2 (Bootstrapping)	Model 3 (Bricolage)	Model 4 (Bricolage)
<i>Control variables</i>				
Transportation	0.23 (0.26)	0.20 (0.26)	-0.02 (0.21)	-0.04 (0.21)
ICT	-0.03 (0.26)	-0.04 (0.26)	0.27 (0.21)	0.26 (0.21)
Financial	-0.14 (0.42)	-0.15 (0.41)	-0.52 (0.34)	-0.53 (0.33)
Administrative	-0.10 (0.34)	-0.09 (0.34)	0.22 (0.28)	0.22 (0.28)
Professional	0.34 (0.21)	0.32 (0.21)	0.10 (0.17)	0.09 (0.17)
Other industries	0.52 (0.54)	0.49 (0.53)	-0.38 (0.44)	-0.41 (0.43)
Firm age	-0.12 (0.11)	-0.10 (0.11)	0.04 (0.09)	0.06 (0.09)
Firm size	0.04 (0.09)	0.03 (0.09)	-0.09 (0.08)	-0.10 (0.08)
TMT size	-0.00 (0.05)	0.01 (0.05)	0.03 (0.04)	0.04 (0.04)
Environmental dynamism	0.14* (0.07)	0.10 (0.07)	0.12* (0.06)	0.09 (0.06)
Environmental munificence	-0.06 (0.05)	-0.07 (0.05)	0.05 (0.04)	0.04 (0.04)
<i>Independent variables</i>				
TMT improvisation		0.22* (0.09)		0.17* (0.08)
R ²	0.10	0.13	0.12	0.15
Adj R ²	0.02	0.05	0.05	0.07
Δ R ²		0.03		0.03

Note. N=147. Unstandardized B coefficients are reported. * p < 0.05, ** p < 0.01, *** p < 0.001. The standard errors are included in parentheses below each B coefficient.

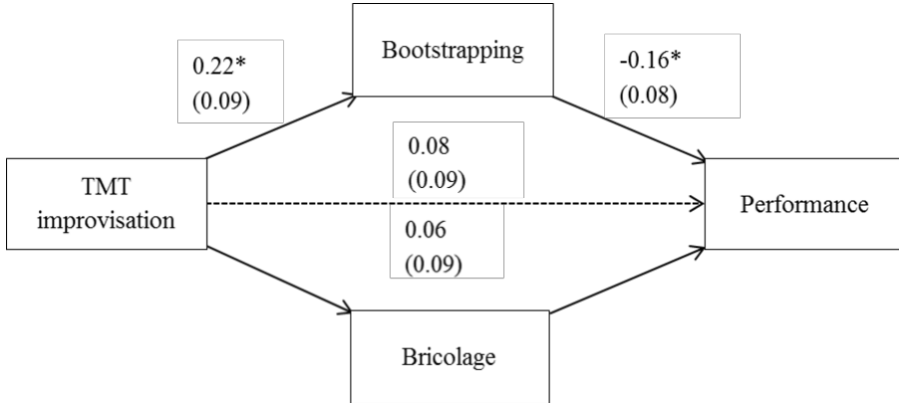
Table 3.4 Antecedents of SME Performance

	Model 1	Model 2	Model 3
<i>Control variables</i>			
Transportation	0.14 (0.24)	0.13 (0.25)	0.18 (0.23)
ICT	0.14 (0.25)	0.14 (0.25)	0.04 (0.24)
Financial	-0.28 (0.39)	0.27 (0.39)	0.44 (0.37)
Administrative	-0.35 (0.32)	-0.35 (0.32)	-0.45 (0.31)
Professional	-0.03 (0.20)	-0.03 (0.20)	-0.02 (0.19)
Other industries	-0.12 (0.50)	-0.13 (0.50)	0.10 (0.48)
Firm age	-0.04 (0.10)	-0.03 (0.10)	-0.07 (0.10)
Firm size	0.06 (0.09)	0.06 (0.09)	0.10 (0.08)
TMT size	0.01 (0.04)	0.01 (0.04)	0.00 (0.04)
Environmental dynamism	-0.05 (0.07)	-0.06 (0.07)	-0.08 (0.06)
Environmental munificence	0.16*** (0.05)	0.16*** (0.05)	0.13*** (0.05)
<i>Independent variables</i>			
TMT improvisation		0.08 (0.09)	0.06 (0.09)
<i>Mediating variables</i>			
Bootstrapping			-0.16* (0.08)
Bricolage			0.37*** (0.10)
R ²	0.13	0.14	0.23
Adj R ²	0.06	0.06	0.14
Δ R ²		0.01	0.09

Note. N=147. Unstandardized B coefficients are reported. * p < 0.05, ** p < 0.01, *** p < 0.001. The standard errors are included in parentheses below each B coefficient.

To test Hypotheses 5 and 6 we used the approach in Hayes (2013), with firm performance as the dependent variable, bootstrapping and bricolage as mediators, TMT improvisation as the independent variable and controls for firm age, firm size, TMT size, environmental dynamism, and industry. Our analysis (5,000 bootstrap samples), show that TMT improvisation has a positive effect on bootstrapping at $p < 0.05$ and that bootstrapping has a negative effect on firm performance. Similarly, TMT improvisation has a positive effect on bricolage at $p < 0.05$. In turn, bricolage has a positive effect on firm performance at $p < 0.001$. We find a positive but insignificant effect of TMT improvisation on firm performance ($\beta = 0.08$, $SE = 0.09$, $p > 0.05$), and this effect decreases further after the two mediators are added in the model ($\beta = 0.06$, $SE = 0.09$; $p > 0.05$). This shows that even though TMT improvisation contributes to SME performance, part of its influence is explained by the way TMT improvisation influences resource management behaviors within the organization. TMT improvisation has a significant negative indirect effect through bootstrapping ($ab = -0.04$, $SE = 0.03$, $LLCI = -0.1124$, $ULCI = -0.0010$), which supports Hypothesis 5. TMT improvisation has also has one significant positive indirect effect through bricolage ($ab = .06$, $SE = 0.04$, $LLCI = 0.0081$, $ULCI = 0.1652$), thus confirming Hypothesis 6. For a summary of the results of the mediation analyses, see Figure 1.

Figure 3.1 Mediation Analyses



Note. N=147. Unstandardized B coefficients are reported, 5000 bootstrap samples, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The coefficient above the path from improvisation to performance represents the total effect, with no mediator included; the coefficient below the path represents the direct effect when the mediators were inserted in the regression model. The standard errors are included in parentheses below each B coefficient.

Indirect effect (bootstrapping) = - 0.04; SE = 0.03; LLCI = -0.1124; ULCI = -0.0010
 Indirect effect (bricolage) = 0.06; SE = 0.04; LLCI = 0.0081; ULCI = 0.1652

3.5 Discussion and Conclusion

We find evidence that TMT improvisation plays a fundamental role in how firms manage their resources; teams that score higher on improvisation make more use of bricolage and bootstrapping. This is in line with research emphasizing the role of managerial capabilities in the creative use of resources (Sonenshein, 2014). We find support for the positive relationship between bricolage and SMEs performance, because bricolage entails a more efficient and creative allocation and re-allocation of resources inside the organization. We find a negative effect of bootstrapping on SME performance, which provides support for our prediction that bootstrapping may shift managerial attention away from strategic towards operational objectives. Overall, we identify bricolage and bootstrapping as two important mechanisms explaining how TMT improvisation affects firm performance. TMT

improvisation enhances SME performance through bricolage, but at the same time decreases SME performance through bootstrapping.

3.5.1 Theoretical Implications

Our paper advances improvisation literature, by revealing how improvisation shapes TMTs' resource management decisions. Specifically, we show that management teams with well-developed improvisational skills manage resources differently: i.e., they demonstrate greater reliance on bootstrapping and bricolage. In turn, bootstrapping and bricolage differentially affect SME performance. This is particularly important for TMTs that can influence a wide range of organizational processes and exert a great control over strategic decision-making (Hmieleski and Corbett, 2008). Our study thus complements present research on improvisation, by adopting a process perspective on the role of improvisation in SMEs. Improvisation may improve the quality of strategic decision-making within SMEs and help them respond effectively to situations that are uncertain, dynamic, or unexpected. However, when employed indiscriminately, improvisation may have unintended consequences for SME performance. Our study has implications for research on bootstrapping, as it examines how bootstrapping affects performance in SMEs. The few studies investigating the performance consequences of bootstrapping examine this relationship in the context of young or nascent firms (Jones and Jayawarna, 2010; Patel et al., 2011; Perry et al., 2011; Vanacker et al., 2011). While research suggested that bootstrapping may prohibit growth when organizations age (Ebben and Johnson, 2006), in the literature it is not clear whether bootstrapping is a viable resource management option for SMEs. Our findings show that bootstrapping is relatively prevalent among SMEs. Nonetheless, we find that bootstrapping has a negative effect on organizational performance. It appears that the costs associated with bootstrapping are not negligible, and may increase for larger organizations. Higher organizational complexity requires managers to incorporate new processes and restructure existing processes; a transition that can put considerable strain on managerial attention (Seshadri and Shapira, 2001). When managers spend a lot of time and effort on achieving small savings, this may complicate effective allocation of managerial attention across different tasks. We would like to emphasize here that we do not advise SMEs to refrain from bootstrapping altogether. Rather, we argue that bootstrapping may bring substantial benefits

that do not directly translate into increased firm performance. Bootstrapping may enable initial equity owners to keep a larger percentage of the firm's equity and to reduce resource dependencies on external financiers or suppliers (Bhide, 1992). We rather suggest that for SMEs bootstrapping may be effective when employed selectively and depending on the context.

This study also has implications for the literature on entrepreneurial bricolage, as it provides additional insights into how bricolage may affect organizational outcomes. While qualitative studies have documented organizational benefits of bricolage (Di Domenico et al., 2010; Garud and Karnøe, 2003; Mair and Marti, 2009), there is still limited knowledge of how bricolage affects organizational outcomes. A notable exception is the study by Senyard and colleagues (2014) finding evidence of a positive relationship between bricolage and firm innovativeness in young firms. Despite the potential drawbacks associated with a reliance on bricolage, suggested by prior qualitative research (Baker and Nelson, 2005; Stinchfield, Nelson, and Wood, 2013), we find a strong positive effect of bricolage on organizational performance. Thus, bricolage may help companies overcome resource constraints, cope with uncertainties regarding markets and products, and facilitate the pursuit of new opportunities with their existing resources. Senyard and colleagues (2014) do not find evidence of negative consequences for a company's innovativeness at high levels of bricolage, implying that while there may be disadvantages of overreliance on bricolage, the benefits counterbalance these negative consequences. We extend current research on bricolage, by investigating performance consequences in SMEs. While prior research predominantly examined bricolage in nascent and young firms (Senyard et al., 2014), or firms operating in penurious environments (Desa, 2012; Di Domenico et al., 2010; Halme et al., 2012; Mair and Marti, 2013), bricolage could be also a viable solution for organizations that do not face severe resource constraints (Baker and Nelson, 2005). Desa and Basu (2013) report that even prominent organizations in highly munificent environments make use of bricolage, possibly to integrate ideas and resources from a wide range of stakeholders. By demonstrating a positive effect of bricolage on SME performance, we provide additional support for the view that bricolage may not be used solely to alleviate extreme resource constraints but may also have a broader range of benefits for firms.

3.5.2 Managerial Implications

An important practical implication of this study is that TMTs may use their improvisational skills to manage their resources creatively. Bootstrapping and bricolage provide options for SMEs to tackle resource constraints by either expanding their resource portfolio or ensuring a more efficient use and allocation of resources. Bricolage specifically can be expected to influence resource bundling as it enables SMEs to repurpose resources “at hand” and combine them to pursue new opportunities (Baker and Nelson, 2005). This is particularly important because improvisational skills can be improved by training (Vera and Crossan, 2005) or with experience (Hmieleski and Corbett, 2008).

Nonetheless, managers have to be wary of how they use their improvisational skills to enhance firm performance. Our findings show that the link between TMT improvisation and SME performance is not direct; management teams with well-developed improvisational skills approach resource management in a distinct manner (for example by a greater reliance on bootstrapping and bricolage). On turn, these resource management behaviors have consequences for firm outcomes, while bricolage enhances firm performance, bootstrapping prohibits it to some extent. Even though managers should pay attention to the activities in which they apply their improvisational skills, we do not go as far as to suggest that SMEs should refrain from engaging in bootstrapping. Rather, we advise them to carefully consider the drawbacks of bootstrapping (f.i., additional strain on managerial attention) and find ways to mitigate them. When SMEs engage in bootstrapping, while remaining congruent with their strategic goals, bootstrapping may still support them in exploiting entrepreneurial opportunities (Alvarez and Busenitz, 2001).

3.5.3 Limitations and Future Research

Our study is subjected to several limitations that also could represent promising avenues for future research. For instance, our cross-sectional research design may raise concerns about causality. Further longitudinal research is needed to more rigorously establish a causal relationship between our variables of interest, or to examine in more detail the potentially dynamic relationship between resource management and SME performance. In addition, future research is needed to clarify the relationship between bootstrapping and SME outcomes. While we show that bootstrapping affects negatively financial performance, we do not account for the individual returns of equity holders. As bootstrapping is often used

to reduce dependence on external financiers (Bhide, 1992), bootstrapping may enable equity holders to extract higher returns, despite a lower overall firm performance.

It may also be worthwhile to explore what factors could moderate the relationship between bootstrapping and SME performance. Bootstrapping clearly provides important benefits for organizations, such as reduced dependence on external financiers (Ebben and Johnson, 2006), freedom of action (Winborg, 2009), and an alternative way to deal with resource constraints (Winborg and Landström, 2001). Consequently, it may be promising to examine what factors may enable firms to leverage the benefits of bootstrapping, while mitigating the costs. Patel and colleagues (2011) show that for new firms that have a diverse alliance portfolio, bootstrapping actually has a positive effect on performance. Key alliance partners may provide firms that bootstrap with access to additional resources, and may increase their legitimacy in the eyes of external stakeholders. Considering the importance of human capital for bootstrapping (Grichnik et al., 2014), it could be that increased human capital at the TMT level may mitigate the negative effects of bootstrapping on performance. Managers with greater entrepreneurial or managerial experience may be able to distribute their attention more efficiently, and bootstrap in a way congruent with their firm's strategic goals.

Another direction for future research concerns the mechanisms through which TMT improvisation influences firm outcomes. While our study showed that the improvisational skills of TMTs affect resource management, we know very little about what other organizational processes may benefit from improvisation. Since TMTs pose a great influence over a broad range of organizational processes, and improvisational skills can be improved by training and experience (Hmieleski and Corbett, 2008; Vera and Crossan, 2005), it would be useful to gain a richer understanding of the mechanisms through which TMT improvisation affect SME performance.

Finally, research on improvisation would benefit greatly from a more integrative view of improvisation in organizations. Our study examines the consequences of improvisation at the TMT level, team that has a great influence over the strategic decision-making and the performance of their firms. However, other teams within the organization (f.i. new product development teams, marketing teams) may improvise as well. While prior research examined improvisation in a variety of teams, an understanding on how

improvisation emerges across different types of teams within an organization, and how managers synchronize and foster improvisation across these teams is lacking. Overall, our study sheds light on how management teams can use their improvisations skills to improve firm performance, by influencing the way resources are managed within the firm.

Chapter 4. Heuristics in the Decision-Making Process of Crowd Investors³

Abstract

Crowd investors have emerged as a new class of equity investors, yet we still know little about their decision-making process. We build on heuristic decision-making research, to theorize how crowd investors employ heuristics to evaluate investments opportunities, and how the use of these heuristics affects their investment performance. We find that crowd investors prioritize information depending on their initial beliefs and on the category of content the information pertains to, thus employing the confirmation, disconfirmation and selectivity heuristics. Furthermore, we show that heuristics can be effective strategies to select high-quality crowdfunding opportunities and provide additional insights into which heuristics specifically benefit crowd investors.

³ This study is conducted in collaboration with Magdalena Cholakova, Justin Jansen and Ingrid Verheul.

4.1 Introduction

Equity crowdfunding is a form of financing where funders (hereafter referred to as crowd investors) invest small amounts of money in exchange for equity in one or several fundraising campaigns, initiated by founders (hereafter referred to as entrepreneurs). The global equity crowdfunding market has recently experienced a steep growth (Ahlers et al., 2015; Massolution Report, 2015), and more and more countries are passing regulation aimed both at encouraging equity crowdfunding and protecting crowd investors. The range of firms resorting to equity crowdfunding for financing is also widening. For instance, firms in the biotechnology industry – an industry that is traditionally not accessible to small investors – are increasingly making use of equity crowdfunding (Moran, 2017).

Crowdfunding liberalized equity investing and made it possible for smaller investors to participate. Nonetheless, crowd investors are left with the challenge of deciding how to choose among a large number of firms of uncertain quality. Compared to other types of crowdfunding, equity-based crowdfunding attracts a larger number of smaller investors (Ahlers et al., 2015), who are mainly driven by financial motivations (Cholakova and Clarysse, 2015). However, these investors do not have the experience, or the financial resources, needed to engage in the extensive due diligence conducted by professional investors (Ahlers et al., 2015). In addition, crowd investors, when compared to professional investors, invest in firms that are earlier stage, and consequently, characterized by a higher level of uncertainty. Lastly, due to the high ownership dispersion inherent in equity crowdfunding, crowd investors generally have limited influence over the strategic decision-making of the firms in which they invest (Drover et al., 2017). Despite the key role crowd investors play in the crowdfunding ecosystem, we know surprisingly little about the strategies they employ when evaluating opportunities, and how these strategies impact their investment performance.

In our study, we turn to research on heuristic information processing (Chaiken, 1980; Kahneman and Tversky, 1984; Mishra, 2014; Simon and Newell, 1958) to understand how the decision-making practices of crowd investors affect their investment performance. We focus on the broader class of information search heuristics, that is, heuristics that guide the collection of information about an opportunity (Gigerenzer et al., 1999). An essential

criterion used by individuals when searching for information is the relationship between informational cues and their beliefs and attitudes about these cues (Freedman and Sears, 1965; Hart et al., 2009; Klayman and Ha, 1987). We thus focus on how crowd investors select and prioritize informational cues, which either confirm or contradict their initial beliefs about a crowdfunding campaign. A tendency to seek confirmatory information entails use of the confirmation heuristics, whereas a tendency to seek contradictory information entails the use of the disconfirmation heuristic (Klayman and Ha, 1987). Even though the confirmation and disconfirmation heuristics have received substantial scholarly attention, present research is ambiguous about their consequences for decision-making quality. The confirmation heuristic has often been positioned as a bias leading to poor decisions, yet this is based on limited and conflicting empirical evidence (Karelaia, 2006; Shepherd et al., 2012). The disconfirmation heuristic has been commonly operationalized as the opposite of the confirmation heuristic, even though from a theoretical standpoint, these two heuristics are not mutually-exclusive and can co-exist (Hart et al., 2009). Therefore, the disconfirmation heuristic has been considered as beneficial, despite the lack of direct empirical evidence. Another fundamental criterion that guides information search is the relationship between informational cues and the category of information they pertain to (Fox, Ratner and Lieb, 2005; Shah and Oppenheimer, 2011). Prior research has investigated how various categories of content shape investment decisions (Becker-Blease and Sohl, 2015; Carpentier and Suret., 2015; Huang and Pearce, 2015; Maxwell, Jeffrey, and Lévesque, 2011). We refer to prior research on professional investors (Carpentier and Suret, 2015; Grandori & Cholakova, 2013; Maxwell et al., 2011) and include categories such as the team, the product and the strategy of the firm. We develop a new heuristic to capture how investors prioritize information depending on the category of content it pertains to, which we label a selectivity heuristic. The selectivity heuristic entails the tendency to allocate time unevenly across categories of content, by attending to specific categories more than to others.

In order to shed light on the decision-making process of equity crowdfund investors and its effectiveness, we conduct an online survey with 476 crowd investors on a European equity crowdfunding platform. In addition, we also collected archival data on their investment behavior and the characteristics of the projects in which they invested. Our

results corroborate that the confirmation, disconfirmation and selectivity heuristic are prevalent among crowd investors, and that they impact investment performance differently. Consistent with our theorizing, the disconfirmation and selectivity heuristics enhance investment performance, proving to be useful strategies to identify high-quality projects. Contrary to our prediction and some of the existing approaches, the confirmation heuristic appears to neither enhance, nor hamper the investment performance.

Our paper puts forward three important contributions. First, we contribute to the entrepreneurial finance literature, by providing insights into the decision-making process of a new type of investors, namely crowd investors. We thus respond to the call for future research by Drover and colleagues (2017) who plea for more work examining the decision practices of crowd investors. We build on research on heuristic decision-making, specifically on the fast-and-frugal perspective (Gigerenzer and Brighton, 2009; Gigerenzer and Goldstein, 1996; Gigerenzer, Hertwig and Pachur, 2011) and on the heuristics-and-biases perspective (Kahneman, 2011; Kahneman and Tversky, 1984) to examine how three heuristics that guide information search, namely the confirmation, disconfirmation and selectivity heuristics, affect the performance of investors. In so doing, we provide a more nuanced view on the role of heuristics in investment decisions that acknowledges investors can rely on several different heuristics when evaluating a firm, each with varying consequences for investment performance.

Second, we contribute to research on heuristic decision making by examining the role of confirmation and disconfirmation heuristics in the novel context of equity crowdfunding, a context characterized by extreme uncertainty and high accuracy motivation of decision-makers (i.e. motivation to select the highest quality alternative). These heuristics convey an essential way of searching for information, and have been studied in a variety of contexts, ranging from political, health care to mobile app choices (Jonas, Graupmann and Frey, 2006; Jonas et al., 2006; Nickerson, 1998; Yin, Mitra and Zhang, 2016). Our understanding of how these heuristics affect investment choices is however limited, with only two notable exceptions that examine the reliance on the confirmation heuristic in a stock exchange context (Park et al., 2013; Pouget et al., 2017). We also reinstate the importance of the disconfirmation heuristic, which has received less scholarly attention as compared to the confirmation heuristic. This is unfortunate, as research suggests that a

“healthy skepticism” could entail sound reasoning, and lower proneness to errors in decision-making (Dawson, Gilovich and Regan, 2002), particularly when decision makers are highly motivated to be accurate (Hart et al., 2009).

Lastly, we advance research on heuristic decision-making by introducing a new heuristic, the selectivity heuristic. The selectivity heuristic implies a ranking in order of importance of categories of informational cues, and the uneven distribution of time across these categories. The selectivity heuristic can be seen as a more inclusive variant of the lexicographic heuristic, which involves ranking of all cues in the order of importance, and then selecting the alternative with the highest score on the most important cue (Fishburn, 1974; Gigerenzer et al., 1990). Unlike the lexicographic heuristic, the selectivity heuristic is conceptualized to entail the ranking of categories of cues, not of cues directly, and integrates all categories in the assessment, not only the category deemed the most important.

4.2 Heuristics in Decision-Making

Heuristics are typically defined as cognitive effort saving strategies that allow individuals to operate in conditions of limited time and cognitive resources. While research initially posited that heuristics lead to erroneous decisions (Tversky and Kahneman, 1974), other work has argued that heuristics may support decision makers by enabling them to make decisions “more quickly, frugally, and/or accurately than more complex methods” (Gigerenzer and Gaissmaier, 2011). Heuristics can entail examining fewer cues, reducing the effort of retrieving these cues, simplifying the weighting of cues, integrating less information, and/or examining fewer alternatives (Shah and Oppenheimer, 2008; Simon, 1990).

Two complementary perspectives on heuristic decision-making that have received substantial scholarly attention are the heuristic-and-biases and the fast-and-frugal views (Kelman, 2011). The heuristics-and-biases paradigm builds on the concept of bounded rationality and equates heuristics with biases in decision-making (Kahneman, 2011; Kahneman and Tversky, 1984; Simon, 1956; Simon, 1991). According to this perspective the choice for heuristic processing over an analytical approach involves a trade-off between accuracy and effort (Chaiken, 1980; Payne, Bettman and Johnson, 1993; Shah and Oppenheimer, 2008; Tversky and Kahneman, 1974). Individuals opt for heuristic decision-

making when the costs of effort associated with non-heuristic decision-making are higher than the gains in accuracy (Payne, Bettman and Johnson, 1993). The fast-and-frugal perspective (Gigerenzer and Brighton, 2009; Gigerenzer and Goldstein, 1996; Gigerenzer, Hertwig and Pachur, 2011), on the other hand, builds on the notion of ecological rationality and emphasizes the role of the environment in determining the appropriateness of heuristics. According to this perspective, the use of heuristics may result in efficient and effective decision-making, particularly in uncertain, complex, or urgent situations (Brown and Smith, 2011; Gigerenzer et al., 1999; Karelaia, 2006; Klayman, and Ha, 1987; Kleinmuntz, 1985). To illustrate this “less is more logic”, Benartzi and Thaler (2001) showed that when deciding to allocate a total investment across N options, employing a 1/N heuristic (i.e., allocate the total amount equally among the N options) produced financial returns comparable with those resulting from applying complex optimizing financial models. While the aforementioned two perspectives are not mutually exclusive, proponents of the heuristics-and-biases perspective focus on environments where the heuristics of under investigation are detrimental and result in erroneous decisions (Wyer, 2004), and proponents of the fast-and-frugal perspective highlight environments where the heuristics under investigation are beneficial and result in accurate decisions (Gigerenzer and Brighton, 2009).

4.2.1 Heuristics in Equity Crowdfunding

Heuristics are ubiquitous in the decision-making process of investors, such as venture capitalists, business angels, or stock exchange investors (Benartzi and Thaler, 2001; Bisiere, Décamps and Lovo, 2014; Chan and Park, 2015; Grandori & Cholakova, 2013; Franke et al., 2006; Maxwell, Jeffrey, and Lévesque, 2011; Murnieks et al., 2011; Zacharakis and Shepherd, 2001). While present research is relatively silent about the decision-making process of crowd investors (Drover et al., 2017), there are several reasons to expect that crowd investors employ heuristics when assessing crowdfunding projects. First, crowd investors typically cannot draw upon neither the experience, nor the social capital that professional investors possess. As such, they may be even more prone to rely on certain shortcuts when forming their decision-making process (Gigerenzer, and Gaissmaier, 2011). Second, equity crowdfunding would qualify as a context of high uncertainty, where a heuristic decision-making may be particularly helpful (Grandori and Cholakova, 2013;

Huang and Pearce, 2015; Maitland and Sammartino, 2015). Because crowd investors tend to invest in projects that are relatively early-stage and in entrepreneurs they do not know personally (unlike venture capitalists and business angels), there is limited information about these projects to begin with, and the information asymmetries between entrepreneurs and investors are higher.

In order to test the presence and influence of such heuristics on the decision-making process of crowd investors, we build on both the heuristics-and-biases and the fast-and-frugal perspectives, to elucidate which heuristics are employed by crowd investors, and how the reliance on these heuristics affects their investment performance. We follow the prescriptions of the fast-and-frugal view (Gigerenzer, and Gaissmaier, 2011; Todd and Gigerenzer, 2012), which posits that heuristics are neither good nor bad, and that their effectiveness depends on the fit with the environment (i.e. the decision-making context). In certain environments, specific heuristics may be beneficial while in others they may be detrimental. The fast-and-frugal perspective however, has been mostly applied in prior research for contexts in which the heuristics under examination were generally beneficial (Gigerenzer and Brighton, 2009). While this theoretical lens does not exclude the coexistence of detrimental and beneficial heuristics in the same context, it does not provide in-depth insights as to when positive and negative consequences may be observed. Relatedly, the fast-and frugal perspective implies learning, meaning that, with sufficient experience, individuals are assumed to learn to select the heuristics that are most appropriate in a given context (Gigerenzer, and Gaissmaier, 2011). However, learning may be challenging for crowd investors. One reason is that crowd investors can only learn (reflected in an improved selection of heuristics), if they have a clear understanding of how well they perform in investing. Yet, crowd investors cannot easily access information on their own performance as early-stage ventures often require several years before specific success indicators, including further financing and growth can be observed. Another reason is that, crowd investors may not only prefer heuristics that help them identify high-quality projects, but also heuristics that enable them to save considerable cognitive effort and/or time. Therefore, crowd investors may employ both “beneficial” and “detrimental” heuristics when assessing investment opportunities and may not easily divest detrimental heuristics. We turn to the heuristics and biases perspective (Kahneman, 2011; Kahneman and Tversky, 1984; Simon,

1956; Simon, 1991) to address these two shortcomings as this theoretical lens extensively explains why heuristics can fail (i.e. result in errors in decision-making), and does not assume learning.

4.2.2 Confirmation, Disconfirmation and Selectivity in Equity Crowdfunding

In equity crowdfunding, crowd investors are faced with a large number of projects to choose from, each with a relatively complex and lengthy project description. The information included in the description is typically provided exclusively by the members of the entrepreneurial team, individuals whose interests may diverge from those of crowd investors. As platforms do not enforce stringent requirements regarding the content of the provided information, entrepreneurs may share information about their firm that varies in non-redundancy, accuracy and relevance for the investment decision. Since crowd investors rely mostly on information available online on the crowdfunding platform, their strategies in searching and interpreting this information is expected to affect their investment performance.

Prior research on heuristic decision-making (Hart et al., 2009) has shown that when searching for information, individuals prioritize informational cues based on several criteria. One such criterion is the relationship between the informational cues and the individual's prior attitudes, beliefs, or behaviors (Hart et al., 2009; Karelaia, 2006). In our study, we focus on the confirmation and disconfirmation heuristics to capture how investors' prior beliefs shape the way they search for information about crowdfunding projects. These heuristics are particularly relevant for our context as they capture two fundamental approaches for seeking and interpreting information about an investment opportunity (Park et al., 2013; Pouget et al., 2017). The confirmation heuristic entails the tendency to seek information that confirms one's beliefs, whereas the disconfirmation heuristic refers to the tendency to seek information that contradicts one's beliefs (Klayman and Ha, 1987; Hart et al., 2009).

Another criterion is the relationship between the informational cues and the category they pertain to (Shah and Oppenheimer, 2011). Even when no explicit categories (i.e. categories of cues) are provided, individuals still tend to categorize informational cues themselves when incorporating information into their decision-making (Shah and

Oppenheimer, 2011). To study this, we introduce the selectivity heuristic, which entails the tendency of individuals to prioritize cues pertaining to specific categories of information when assessing opportunities. For instance, a crowd investor may devote considerable time to information about the product and the entrepreneur (or entrepreneurial team), and little time to information about the customers, competitors, and financial growth potential.

The aforementioned heuristics belong to the broader class of information search heuristics because they provide rules, which guide an investor's search for information about a certain project (Gigerenzer et al., 1990). The confirmation heuristic guides investors towards information that confirms initial attitudes, beliefs and behaviors (i.e., consonant information, also called congenial information in Hart et al., 2009), the disconfirmation heuristic guides them toward information that disconfirms initial attitudes, beliefs and behaviors (i.e., dissonant information, also called uncongenial information in Hart et al., 2009), and the selectivity heuristic guides them towards information pertaining to specific categories of content. The confirmation and disconfirmation heuristics reduce cognitive effort because they involve the analysis of fewer cues and the integration of less information (Shah and Oppenheimer, 2008), whereas the selectivity heuristic reduces cognitive effort because it entails the analysis of fewer cues and the simplification of the weighing of cues.

4.2.3 Confirmatory Search and Investment Performance

Prior research shows that individuals tend to approach favorable propositions with a tendency towards confirmation (Dawson, Gilovich and Regan, 2002; Ditto and Lopez, 1992; Hart et al., 2009; Yin, Mitra and Zhang, 2016; Bisiere, Décamps and Lovo, 2014), particularly when the propositions concern cherished positive beliefs (Galdi, Gawronski, Arcuri and Friese, 2012; Taber and Lodge, 2006). For instance, Frimer and colleagues (2017) find that individuals holding a specific political ideology are even willing to give up the chance to earn money to avoid being exposed to the opinion of a person with a contrasting political ideology. In their meta-analysis Hart and colleagues (2009) find that when searching for information, individuals are twice as likely to select information that supports, rather than information that contradicts, their beliefs, attitudes or expectations. Hence, when initial beliefs are positive, individuals tend to uncritically accept supportive information and

downplay contradictory information, which can lead to errors in decision-making (Park et al., 2013; Wyer, 2004).

While research has demonstrated that, in certain situations, confirmatory search can enhance decision-making quality (Karelaia, 2006; Navarro and Perfors, 2011), the majority of studies have found a negative effect instead (Nickerson, 1998; Park et al., 2013; Wyer, 2004). We expect that, in the equity crowdfunding context, the confirmation heuristic will also be detrimental for two main reasons. First, a focus on consonant information may prevent investors from uncovering any dissonant information about the project (Pouget et al., 2017). As their environment is dominated by consonant information, supplied by entrepreneurs seeking financing for their projects, investors are unlikely to identify dissonant information when they do not search for it explicitly. Without access to dissonant information, investors will not be able to differentiate among projects that all have favorable descriptions, and will be more likely to overlook fatal flaws in the projects they evaluate. Second, even when exposed to dissonant information, investors relying on confirmatory search are more likely to avoid reading it (Frimer et al., 2017; Park et al., 2013), or downplay its relevance for their decision (Bisiere et al., 2014; Greitemeyer, 2014; Hart et al., 2009; Pouget et al., 2017).

Prior research on stock exchange investors has shown that investors relying on confirmatory search are more likely to overestimate their projected financial earnings (Park et al., 2013), less likely to revise their financial projected earnings when confronted with dissonant information (Pouget et al., 2017), and generally trade with higher frequency than investors not engaging in confirmatory search (Park et al., 2013). Therefore, we expect that crowd investors who engage in confirmatory search will similarly display a lower investment performance. We conceptualize the investment performance of crowd investors in two ways. First, we examine whether investors contributed to any project that was funded quickly (i.e. in maximum 30 days), on the premise that these projects are regarded as higher-quality by the crowd (Allison, McKenny and Short, 2013; Allison et al., 2015). Second, we examine whether investors contributed to any project that received additional funding via crowdfunding, on the premise that these projects are regarded as higher-quality by a larger crowd, and over a longer period of time. We therefore hypothesize:

Hypothesis 1a. Crowd investors with a greater reliance on confirmatory search, are less likely to invest in projects that reach their goal amount in maximum 30 days.

Hypothesis 1b. Crowd investors with a greater reliance on confirmatory search, are less likely to invest in projects that subsequently raise additional financing.

4.2.4 Disconfirmatory Search and Investment Performance

Because individuals strive to be validated, they are less likely to engage in disconfirmatory search when their initial beliefs and attitudes are positive (Hart et al., 2009; Taber and Lodge, 2006). Even when standing to lose or win real money, Park and colleagues (2013) found that only 19% of stock exchange investors who had strong positive beliefs about a specific stock clicked on disconfirming messages about this stock posted on a stock message board. Individuals are however more likely to engage in disconfirmatory search, when they exhibit a high accuracy motivation, i.e. desire to form accurate assessments of opportunities; this motivation increases when the utility of dissonant information for a certain task is higher than that of consonant information and when the task is linked to a personal outcome, such as winning a prize (Chaiken, 1980; Hart et al., 2009).

We expect that disconfirmatory search may be particularly beneficial for crowd investors. In a crowdfunding setting, it is likely that investors first screen the projects, and engage in a more detailed evaluation process for the projects they have positive beliefs about. Investors have direct gains (i.e. expected returns from their equity stake) that should motivate them further to favor accuracy over validity in their investment decisions. More particularly, we expect disconfirmatory search to help investors in at least two ways. First, the explicit search for dissonant information enhances the likelihood that investors will identify the flaws and thus develop an accurate assessment of crowdfunding projects (Dawson, Gilovich and Regan, 2002; Hart et al., 2009)). If these flaws are deemed fatal (i.e., no positive characteristics of the project can compensate for these flaws), entrepreneurs can reject the investment opportunity and instead evaluate other opportunities available on the crowdfunding platform. Even when these flaws are not fatal, investors can still into their overall evaluation of a crowdfunding project. Second, investors with a greater reliance on disconfirmatory search may place a higher emphasis on the quality of information (e.g., the

credibility of the information provider, the completeness and accuracy of information). These individuals are confronted more frequently with conflicting pieces of information, and are thus more likely to refer to their respective quality to discriminate among them. Prior research suggests overall that disconfirmatory search could enhance individuals' ability to identify illusory correlations and avoid generalizations from small numbers (Dawson, Gilovich and Regan, 2002), building credence to the idea that individuals with greater disconfirmatory tendencies emphasize aspects related to the quality of information more. This is particularly important for equity crowdfunding, where the number of sources of information is limited (the majority of information is provided by the entrepreneur or entrepreneurial team). In addition, the entrepreneurial team is likely to be affected by self-serving biases, and present the information in a way that is conducive to achieving their goals (i.e. raise the goal amount). Even when entrepreneurs aim to be as objective as possible, they are still likely to be affected by the endowment bias, tendency to value a good you own more than a good you can acquire (Carmon and Ariely, 2000; Kahneman, Knetsch and Thaler, 1990); this in turn would determine entrepreneurs to value their project more than potential investors would. Due to these reasons, we expect that crowd investors that engage in disconfirmatory search will display a higher investment performance.

Hypothesis 2a. Crowd investors with a greater reliance on disconfirmatory search, are more likely to invest in projects that reach their funding goal in maximum 30 days.

Hypothesis 2b. Crowd investors with a greater reliance on disconfirmatory search, are more likely to invest in projects that subsequently raise additional capital.

4.2.5 Selective Search and Investment Performance

Decision-making research has identified several heuristics, which entail ordering informational cues, based on their weight in decision making. We highlight that the order can vary across participants performing the same task, as each participant can weigh the relevance of cues in a different manner. For instance, the lexicographic heuristic involves

ranking of all cues in the order of importance, and then selecting the alternative with the highest score on the most important cue on which the alternatives differ (Fishburn, 1974; Gigerenzer et al., 1999). The selectivity heuristic we introduce in our study is a more inclusive variant of the lexicographic heuristic. Our conceptualization differs from the lexicographic heuristic in two important ways. First, the selectivity heuristic involves the ranking of *categories* of cues (each containing several informational cues) as opposed to the cues themselves. Extant research showed that individuals weigh categories of cues instead of individual cues; even when categories are not explicitly provided, individuals tend to spontaneously group informational cues into categories (Fox and Clemen, 2005; Fox, Ratner and Lieb, 2005; Shah and Oppenheimer, 2001). In the context of equity crowdfunding cue categorization may be particularly prevalent because investors are confronted with a large number of cues, and the project description is explicitly presented following specific categories on the crowdfunding platform. Second, unlike the lexicographic heuristic, the selectivity heuristic does not involve a pre-defined stop rule (the number of cues and categories to be assessed in order to reach a decision is not pre-set). While one-cue ordering heuristics have proven their relevance for screening investment opportunities, they appear to be less important for final investment decisions (Maxwell et al., 2011). Post-screening, it is likely that crowd investors engage in the assessment of a variety of cues, and a variety of categories of cues. Investors may still do this in an unbalanced manner, showing preference for specific categories and the cues pertaining to them. In our study, selective search (i.e. selectivity heuristic) refers to the unequal distribution of time spent across different categories of content (e.g. content about the team, the product, and the competitors).

The selectivity heuristic may be particularly helpful for crowd investors. First, crowd investors may favor informational cues pertaining to certain categories, when these categories have a high perceived relevance for the project evaluation (i.e. categories that have a higher weight in their decision-making process). A more in-depth search of the categories of content deemed most relevant, should equip these investors to identify the most important favorable and unfavorable informational cues about a project. We note however, that the most “relevant” categories of content are not universal but vary across investors, depending on their experience and competences. Second, crowd investors may prefer specific categories of content because they perceive these categories to be characterized by

a high quality of information, in terms of accuracy, completeness, or credibility of the information providers. By allocating less time to categories consisting of informational cues of uncertain quality, crowd investors can shield themselves from “noisy” information that could bias their decisions. Third, crowd investors may also prioritize specific categories of content, because these categories contain a high perceived variance in information across projects. Investors are faced with a great number of projects to choose from, many of which display homogeneous descriptions and offer comparable deals (e.g. in terms of valuation of the firm). Focusing on the categories of content that are perceived as more dissimilar across projects, may help investors discriminate easier among projects, to remove the low-quality ones sooner from their consideration and to focus their cognitive resources on the narrower set of projects that are of highest quality. We therefore hypothesize:

Hypothesis 3a. Crowd investors with a greater reliance on selective search, are more likely to invest in projects that reach their funding goal in maximum 30 days.

Hypothesis 3b. Crowd investors with a greater reliance on selective search, are more likely to invest in projects that subsequently raise additional capital.

4.3 Methods

4.3.1 Sample and Data Collection

We distributed a survey via a weekly newsletter to the members of a European equity crowdfunding platform. The data was collected over a period of two months, during November and December 2015. The survey data was complemented by archival data on the behavior of members on the crowdfunding platform (e.g. the number and amount of individual investments). In total, 617 members completed our survey. For 12 members, it was not possible to match the survey information with the archival data (members did not provide in the survey the email address used to log in on the crowdfunding platform). Out of the remaining 605 members, 129 had not invested in any project on the platform at that time.

Therefore, the final sample for this study consists of 476 members that invested at least once on the equity platform, which we refer to as “investors”. Of the total number of investors, 8% invested only in projects founded by an entrepreneur they knew beforehand, via their offline network. The average investor included in our sample had registered on the crowdfunding platform 510 days before participating in our study and had contributed to 3.86 crowdfunding projects, whereas the median investor had registered on the crowdfunding platform 417 days before participating in our study and had contributed to 2 crowdfunding projects. These statistics suggest these crowd investors spent a reasonable time on the crowdfunding platform evaluating and investing in projects and thus are well-informed participants for our study.

4.3.2 Measures and Validation of Scales

Confirmatory and disconfirmatory search. Prior studies in psychology often employed repeated choice-based measures for confirmatory and disconfirmatory search, treating them as mutually exclusive (Jonas, Graupmann and Frey, 2006; Jonas et al., 2008; Sherer et al., 2013). Participants in lab experiments had to self-assess their beliefs on a particular topic and then choose between information to read that was either supportive of, or conflicting with, their views. For instance, Scherer and colleagues (2013) had participants rate artworks, to derive their initial beliefs about the artworks in question. After, participants were exposed to several titles of articles concerning each artwork and they had to choose based on their titles, which articles they want to read. The titles of the articles were designed purposefully to convey either positive or negative information about the artwork. A participant choosing to read articles containing information consistent with his/her evaluation of the artworks would score high on the confirmation heuristic (and implicitly low on the disconfirmation heuristic).

We preferred to use self-assessed multiple-item scales instead of repeated choice-based measures for two reasons. First, from a theoretical standpoint, the confirmation and disconfirmation heuristics are not necessarily mutually exclusive, and can co-exist (Hart et al., 2009; Klayman and Ha, 1987). In a natural setting, such as crowdfunding, an investor could simultaneously look for information that supports and contradicts his or her initial positive beliefs, or not prioritize information in relation with his/her initial positive beliefs.

Second, repeated choice-based measures typically include only pieces of information that are explicitly either favorable or unfavorable and build on the assumption that these pieces of information are factually accurate. When evaluating a crowdfunding project, investors may also encounter information that is redundant, not explicitly favorable or unfavorable, or information of uncertain quality (e.g., provided by an unreliable source). To the best of our knowledge, there is no scale available to measure confirmatory or disconfirmatory search separately.

We developed two new scales to assess the extent to which investors search for information that confirms or contradicts their initial beliefs. Following Pouget, Suavagnant and Villeneuve (2017), who examined confirmation bias among traders on the stock exchange, we also start from the premise that investors initially hold positive beliefs about an investment opportunity. Because evaluating and investing in firms is voluntary, an investor will be willing to spend time and cognitive effort on assessing a crowdfunding project only if his/her initial beliefs about the project are positive. Sample items for the 4-item confirmation scale ($\alpha = 0.82$) are “I generally look for information that backs up the main strengths of the project” and “When I like a project, I tend to look for information that confirms my positive beliefs”. Sample items for the 4-item disconfirmation scale ($\alpha = 0.82$) are “I tend to look for information that contradicts my beliefs about the project, even when I am enthusiastic about it” and “I always look for potential weaknesses of the project”. We consider confirmatory and disconfirmatory search as distinct, but not mutually exclusive evaluation strategies.

We performed exploratory factor analysis (EFA) on the 8 items pertaining to the two scales, using principal axis factoring and an oblique rotation, suppressing coefficients lower than 0.4. We selected “Promax” as the rotation method rather than a varimax method, as Promax offers solutions, where the components/factors can be correlated. Our analyses support a 2-factor solution (with eigen values greater than 1), which explains 54.68% of the variance. The pattern and structure matrices provide comparable results, with the confirmatory search items loading on one factor and the disconfirmatory search items on the other, with cross loadings below .40. Please consult Table 4.1 for the results of the EFA. We also performed confirmatory factor analysis (CFA) in STATA 14.1 for the items used to measure confirmatory and disconfirmatory search (restricted to load on the proposed

constructs, on confirmatory and disconfirmatory search). The results indicate a good fit with the data ($\chi^2(19) = 135.59$, $p < 0.001$; comparative fit index (CFI) = 0.92; Tucker-Lewis index (TLI) = 0.88, root mean square error of approximation (RMSEA) = 0.11; coefficient of determination (CD) = 0.97. Also, all item loadings on the proposed indicators were significant ($p < 0.001$). The results of the CFA support the constructs' discriminant and convergent validity.

Table 4.1 EFA for Confirmatory and Disconfirmatory Search

	Pattern Matrix		Structure Matrix	
	1	2	1	2
CONF1: When I like a project, I tend to look for information that confirms my positive beliefs		.650		.690
CONF2: I pay more attention to people who are enthusiastic about the project than to people who are not		.741		.717
CONF3: I generally look for information that backs up the main strengths of the project		.740		.778
CONF4: I pay less attention to negative than to positive information about the project		.782		.740
DISCONF1: I always look for potential weaknesses of the project	.625		.625	
DISCONF2: I tend to look for information that contradicts my beliefs about the project, even when I am enthusiastic about it	.752		.749	
DISCONF3: I always try to understand why other people are skeptical about the project	.785		.774	
DISCONF4: When confronted with negative information about the project, I always check it in detail	.751		.758	

Note: Extraction method: Principal axis factoring; Rotation method: Promax with Kaiser Normalization. For the Pattern Matrix, Rotation converged in 3 iterations.

Selective search. We followed two steps to capture the extent to which investors tend to prioritize specific categories of content, when evaluating crowdfunding opportunities. First, we asked investors how much time they spend on six different categories of content (from 1 = very little time to 7 = a lot of time). In selecting the six categories, we targeted content that (a) entrepreneurs actually provide on the equity crowdfunding platform of interest and that (b) investors spend most of their time on when evaluating a firm. We built on prior research on the investment criteria of venture capitalists (Muzyka, Birley and Leleux, 1996) and business angels (Maxwell, Jeffrey, and Lévesque, 2011; Carpentier and Suret, 2015) to develop a list of categories. We also consulted the official crowdfunding platform recommendations in terms of what content entrepreneurs should include; additionally, we informally asked one of the members of the management team of the crowdfunding platform to confirm that investors do indeed consider these categories of content and not others, and that entrepreneurs cover these categories in their campaign description. As a result, we included the following categories: entrepreneur (or entrepreneurial team), product (or service), customers, competitors, the firm's financial growth potential (financial forecasts, expected returns) and the firm's strategy. Our categorization closely mirrors the framework used for business angels in Carpentier and Suret (2015) that identifies investment criteria pertaining to the following areas: product and strategy model (in our study we included 2 separate items: product and strategy), market (in our study we included two separate items: customers and competitors), financial (in our study labeled as financial growth potential) and the team (labeled the same in our study). Post-hoc analyses (see Table 3) show that investors report spending considerable time on all these categories of content on average. Second, we computed for each investor the standard deviation for his/her answers concerning the time spent on the above-mentioned categories. A low score on Selective search means that the investor spends an equal amount of time assessing all six categories of content, whereas a high score means that the investor spends a lot of time on some categories, and very little time on other categories.

Investment Performance. Similar to the behavior of investors on other crowdfunding platforms (Mollick, 2014), on the platform in our study projects that fail to raise the goal amount do so by a large margin. The average failed project on the platform was unable to raise 95% of the goal amount. As a result, the individual contributions on the

platform are clustered in the projects that raised their goal amount; projects that failed to do so only add up to less than 1% of the total capital invested on the platform. Consequently, in our sample the investors invested predominantly in projects that indeed raised the goal amount, with 95% of respondents investing in at least one project that raised the goal amount, and 66% of them not investing in any project that failed to raise the goal amount. It follows, that while reaching the goal amount is of utmost importance for the performance of entrepreneurs, investing in projects that do raise the goal amount is not a very informative outcome in order to assess the performance of investors. Crowd investors do not incur a financial loss if they invest in a project that fails, as in this situation their investment is returned to them. They do, however, incur a financial gain if the projects they invest in perform well from a financial stand-point, which may translate into dividends, or profit from selling their equity share.

We employ two measures to capture (short term) investment performance, computed based on the archival data on investor behavior and project performance. First, we build on the assumption that projects that reach their funding goal earlier (in number of days from the launch of the project) are more successful than projects that reach their goal later (or do not reach their goal at all). Several prior studies on crowdfunding built on the premise that quickly funded projects are more attractive to investors, and measured project performance as the number of days from the launch day necessary to reach the goal amount (Allison, McKenny and Short, 2013; Allison et al., 2015; Moss, Neubaum and Meyskens, 2015; Ahlers et al., 2015; Galak, Small and Stephen, 2011). The crowdfunding platform itself implicitly considers projects funded quickly as of higher quality and offers a discount on their commission for projects that manage to raise financing in a short period of time. We differentiate between projects that reached their goal amount in maximum 30 days, and projects that required longer than 30 days to reach their goal amount. The former category represents 11.88% of the total number of projects that raised their goal amount. As we are interested in investors', and not in projects' performance, our variable, *Early funding*, captures whether an investor contributed to at least one project that raised its goal amount in maximum 30 days. In our sample, 88 out of 476 investors (18.5%) invested in a project that was funded in maximum 30 days.

Second, we posit that crowdfunding projects that managed to raise additional capital in subsequent funding rounds are more successful (or with better growth prospects), compared with projects that did not raise additional capital. Projects that have two or more crowdfunding campaigns typically persuade a larger pool of investors that they are viable investment opportunities. To identify the projects with additional funding rounds, we manually checked for all projects that reached their goal amount, if they raised additional capital. From the total number of projects on the platform that raised the goal amount, 18.81% experienced an additional successful crowdfunding campaign. *Additional funding* measures whether an investor contributed to at least one project that raised additional funding on the same crowdfunding platform during a follow-up fundraising campaign. In our sample, 99 out of 476 investors (20.8%) invested in a least one project that had a follow-up fundraising campaign on the same platform.

Control Variables. We control for several variables that are likely to influence investment performance. First, we control for demographics (i.e., the age and gender of investors) and human capital (captured by the number of years of experience as a business angel, entrepreneur, stock exchange investor or manager of a company). Second, we control for several crowdfunding specific variables. *Membership time* measures the number of days for which the investor had an account on the platform. Members that have an account for a long time were exposed to more promising crowdfunding investment opportunities compared to members that joined the platform at a later point in time. *Personal investor* is a dummy that equals 1 for investors that only contributed to projects launched by entrepreneurs they knew personally, before the crowdfunding campaign. Prior research confirms that these investors evaluate projects differently because they are driven by motivations such as the reinforcement of personal relationships or social obligations (Polzin, Toxopeus and Stam, 2017). We also control for *Evaluation time* (logarithm transformation), which captures the self-assessed number of hours spent on evaluating a project on average by each investor. We did so to disentangle the alternative explanation that heuristics may be beneficial simply because they save evaluation time, not cognitive effort. Furthermore, we control for *Prior investments*, that is, the number of projects an investor invested in total (logarithm transformation), as the likelihood to invest in high-quality projects increases with investors contributing to more projects in total. A full list of all the variables in our model

and their measurement is provided in Table 4.2, while their descriptive statistics are reported in Table 4.3.

Table 4.2 Measures and Items

Independent Variables (Source: Survey, self-reported)

Confirmatory search (1=strongly disagree to 7=strongly agree)

When evaluating a crowdfunding project I consider investing in,

When I like a project, I tend to look for information that confirms my positive beliefs
 I pay more attention to people who are enthusiastic about the project than to people who are not
 I generally look for information that backs up the main strengths of the project
 I pay less attention to negative than to positive information about the project

Disconfirmatory search (1=strongly disagree to 7=strongly agree)

When evaluating a crowdfunding project I consider investing in,

I always look for potential weaknesses of the project
 I tend to look for information that contradicts my beliefs about the project, even when I am enthusiastic about it
 I always try to understand why other people are skeptical about the project
 When confronted with negative information about the project, I always check it in detail

Selective search (1=very little time to 7= a lot of time)

Priory search captures whether the investor prioritizes in search time allocation specific categories of content; we measure it as the standard deviation of the answers for the 6 items below, such that a low value means the investor spends an equal amount of time assessing all the 5 categories of content, whereas a high value means the investor spends a lot of time evaluating some categories, and very little time on other categories.

When evaluating a crowdfunding project you consider investing in, how much time do you spend on,

the entrepreneur/entrepreneurial team
 the product or service
 the customers
 the competitors
 the firm's financial growth potential
 the firm's strategy

Dependent Variables (Source: Archival Data)

Early funding	Dummy equal to 1 if the investor contributed to at least one project that raised its goal amount in maximum 30 days
Additional funding	Dummy equal to 1 if then investor contributed to at least one project that raised additional funding on the same crowdfunding platform during a follow-up fundraising campaign

Table 4.3 Descriptive Statistics

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Confirmatory search	4.26	1.05	1												
2. Disconfirmatory search	4.41	1.21	.18**	1											
3. Selective search	1.02	0.57	.08	-0.03	1										
4. Age	44.02	12.98	-	-	-	1									
5. Gender	0.18	0.40	.11**	.11**	.14**	.07	1								
6. Education	2.26	0.87	-0.05	.01	.01	.06	-0.04	1							
7. Experience BA	2.22	4.40	.01	.05	-0.02	.31**	-	.04	1						
8. Experience entrepreneur	4.85	8.21	-0.02	-0.07	.02	.38**	-0.08	-0.00	.38**	1					
9. Experience stock exchange	8.81	10.59	-0.03	.09	-0.06	.40**	-	.18**	.35**	.20**	1				
10. Experience manager	6.61	9.98	-0.02	.01	-0.04	.46**	-	.21**	.29**	.40**	.39**	1			
11. Membership time	510.71	396.09	-0.01	.08	-0.07	.11*	-0.02	.08	.08	.06	.21**	.11*	1		
12. Personal investor	0.08	0.27	.07	.02	-0.05	.10*	.04	.07	.07	.09	.01	.12*	.02	1	
13. Evaluation time (LN)	0.95	0.96	.13*	.23*	-0.04	-0.00	.00	.01	.09*	.16**	.05	.04	.03	.12*	1
14. Prior investments (LN)	0.80	0.95	-0.06	.08	.03	-	-	.02	-0.04	-0.09	.10*	-0.01	.17**	-	.23**
						.18**	.25**								.14**

* p < .05, ** p < .01, *** p < .00

4.4 Analyses

To assess multicollinearity, we computed variance inflation factors (VIFs). The maximum VIF in the model was 1.68, which is well below the maximum accepted threshold level of 10 (Neter, Wasserman, and Kutner, 1990).

To test Hypotheses 1a, 2a, and 3a we conducted a logistic regression analysis with Early funding as the dependent variable (i.e. whether the investor invested in any projects that raised the required amount in maximum 30 days), and the set of controls outlined in the section above. We found no support for Hypothesis 1a, stating that confirmatory search is negatively related to Early funding ($\beta = -0.12$, $SE = 0.14$, odds ratio = 0.887, $p > 0.05$). We found support for Hypothesis 2a, predicting a positive relationship between disconfirmatory search and Early funding ($\beta = 0.28$, $SE = 0.13$, odds ratio = 1.321, $p < 0.05$). We also found support for Hypothesis 3a, which predicted a positive relationship between selective search and Early funding ($\beta = 0.54$, $SE = 0.26$, odds ratio = 1.709, $p < 0.05$). Models 1 and 2 in Table 4.4 include the results for Hypotheses, 1a, 2a and 3a.

We performed a logistic regression with Additional funding as dependent variable (i.e, whether the investor invested in at least one project that raised additional financing in a subsequent crowdfunding campaign) to test Hypotheses 1b, 2b and 3b, using the same controls as in the previous model. We found no support for Hypothesis 1b, predicting a negative effect of confirmatory search on Additional funding ($\beta = -0.01$, $SE = 0.14$, odds ratio = 0.990, $p > 0.05$), and no support for Hypothesis 2b, predicting a positive effect of disconfirmatory search on Additional funding ($\beta = -0.03$, $SE = 0.13$, odds ratio = 1.321, $p < 0.05$). We did find however support for Hypothesis 3b, showing that selective search enhances the likelihood of investment in projects with subsequent financing rounds ($\beta = 0.63$, $SE = 0.26$, odds ratio = 1.883, $p < 0.05$). Models 3 and 4 in Table 4.4 include the results for Hypotheses 1b, 2b, and 3b.

Table 4.4 Logistic Regressions

	Model 1 (Early f.)		Model 2 (Early f.)		Model 3 (Additional f.)		Model 4 (Additional f.)	
	β	Exp (β)	β	Exp (β)	β	Exp (β)	β	Exp (β)
Age	-0.01 (0.02)	.987	-0.01 (0.02)	.994	0.02 (0.01)	1.015	0.02 (0.02)	1.021
Gender	-19.14 (4143.85)	.000	-19.05 (4098.41)	.000	0.26 (0.44)	1.290	0.23 (0.44)	1.262
Education	-0.01(0.17)	.990	-0.02 (0.17)	.984	-0.07 (0.17)	.933	-0.08 (0.17)	.927
Experience BA	-0.02 (0.04)	.981	-0.01 (0.04)	.990	-0.05 (0.04)	.956	-0.05 (0.05)	.953
Experience entrepreneur	-0.02 (0.02)	.977	-0.03 (0.02)	.969	-0.00 (0.02)	.999	-0.00 (0.02)	.994
Experience stock exchange	0.01 (0.02)	1.007	0.01 (0.02)	1.006	0.00 (0.02)	1.000	0.01 (0.02)	1.001
Experience manager	0.01(0.02)	1.013	0.01 (0.02)	1.012	0.02 (0.02)	1.023	0.02 (0.02)	1.021
Membership time	-0.00*(0.00)	.999	-0.00*(0.00)	.999	0.00 (0.00)	1.002	0.00*** (0.00)	1.002
Personal investor	0.72 (0.61)	2.053	0.71 (0.63)	2.041	0.74 (0.58)	2.097	0.81 (0.58)	2.257
Evaluation time (LN)	-0.02 (0.16)	.976	-0.05 (0.16)	.954	0.21(0.15)	1.232	0.24 (0.15)	1.271
Prior investments (LN)	1.17*** (0.16)	3.205	1.17*** (0.16)	3.234	1.53 (0.18)	4.636	1.57*** (0.19)	4.805
Confirmatory search			-0.12(0.14)	.887			-0.01(0.14)	.990
Disconfirmatory search			0.28* (0.13)	1.321			-0.03 (0.13)	.971
Selective search			0.54* (0.26)	1.709			0.63* (0.26)	1.883
Nagelkerke RSq	0.370		0.394		0.435		0.449	

Note. N=476. ' β ' reports unstandardized β coefficients, with the standard errors included in parentheses, Exp (β) reports the odds ratios, * $p < .05$, ** $p < .01$, *** $p < .001$.

4.4.1 Supplementary Analyses

To assess the role of the selectivity heuristic for investment performance we performed two additional analyses. First, individuals who score high on selectivity, may still invest most of their time in only one category of content and very little time on the other types, thus converting the selectivity heuristic into a minor variant of the lexicographic heuristic (Fishburn, 1974). Crowd investors in our sample do not appear to behave in such a manner, as individuals that score the highest on selective search, typically score high on three categories and low on the other three categories. In addition, the correlations of each category of content and selective search are also moderate, ranging from $-.30$ to $+.22$, providing further evidence that the score on selective search is not driven by one category only. Second, individuals could score high on selectivity because they spent considerable time on checking the same categories, and very little time on the remaining categories. Thus, these individuals simply figure out that certain categories are always more relevant than others. To test this, we ran the same analyses as for hypotheses 3a and 3b, but with the six categories as independent variables instead of the selective search variable. None of these categories had a significant effect on investment performance, suggesting that there is no “recipe-fits-all”, and it is the uneven distribution of time across different categories that actually matters. Table 4.5 includes the descriptive statistics for selective search and for the categories employed to compute the selective search variable.

Table 4.5 Descriptive Statistics for Selective Search

	N	Min	Max	Mean	% investors filling 7 = a lot of time	entrepreneur or team	product or service	customers	competitors	financial growth	strategy
entrepreneur or team	476	1	7	4.61	10.5	1					
product or service	476	1	7	5.37	17	.50**	1				
customers	476	1	7	4.19	3.6	.38**	.50**	1			
competitors	476	1	7	4.29	3.8	.35**	.48**	.59**	1		
financial growth	476	1	7	5.30	17.2	.39**	.59**	.50**	.48**	1	
firm's strategy	476	1	7	5.26	15.1	.43**	.61**	.47**	.48**	.73**	1
Selective search	476	0	2.99	1.02		-.13**	.22**	-.30**	-.27**	.20**	.18**

* p < .05, ** p < .01, *** p < .001

We conducted further analyses to investigate potential complementarities or trade-offs in the use of the three heuristics. We tested the interaction effects between any two heuristics included in our study on Early funding and Additional funding. We found no significant effect for any of these interactions; it appears that while these heuristics can be beneficial for investment performance, the concomitant reliance on two of them, does neither prohibit, nor enhance investment performance.

Lastly, we conducted additional analyses to examine the potential influence of the temporal patterns of investment on their ability to contribute to projects funded in less than 30 days. Some investors may need more time than 30 days to conduct their evaluation. This is unlikely however, in the context of crowdfunding, as the average investor in our sample spends only five hours on evaluating one project, below the 30 days threshold we use in our study to identify the best-performing projects. We run a regression with the same independent variables and controls as in our main models, but with the number of days from the start of the campaign an investor contributes to a project on average as a dependent variable. Our results show no significant effect of evaluation time (i.e. number of hours spent on due diligence) on how early investors contribute on average ($\beta = -1.45$, $SE = 3.21$, $p > 0.05$).

4.5 Conclusion

Our study aimed to investigate the heuristics employed by equity crowd investors when evaluating crowdfunding investment opportunities, and to understand better how the use of these heuristics affects their ability to identify high-quality projects. We found no support for our prediction that the engagement in confirmatory search diminishes the investment performance of crowd investors (measured as either Early funding or Additional funding). This is contrary to the dominant view in heuristic decision-making research, that reliance on confirmatory search reduces decision-making quality (Wyer, 2004). We found that crowd investors with a greater reliance on disconfirmatory search, are more likely to invest in projects that raise their goal amount quickly (in up to 30 days), but they are *not* more likely to invest in projects that have subsequent, successful financing rounds. It appears

that disconfirmatory search alone, when the available information is limited, is not sufficient to identify the projects which will perform well, after the initial crowdfunding campaign. Finally, we found consistent support for our prediction that selective search enhances the investment performance of crowd investors (measured either with Early funding or Additional funding). That is, investors who spend time unevenly assessing different categories of content (by spending more time on certain categories of content and spending less on others), perform better than investors who spend their time evenly assessing the same six categories of content.

4.5.1 Theoretical Implications

Our study provides evidence for the use of three heuristics that guide crowd investors' search for information, the confirmation, disconfirmation and selectivity heuristics. While these heuristics enable decision-makers to reduce cognitive effort, this does not automatically translate into better or worse investment decisions. We thus respond to calls for research detailing the heuristics used by individuals in entrepreneurial settings and untangling their potential benefits (Shepherd et al., 2012; Shepherd, Williams and Patzelt, 2015; Zhang and Cueto, 2017). Specifically, we provide further evidence that helps to qualify the effects of different heuristics in the context of equity crowdfunding and provide specific guidelines as to their distinct use and benefits across different decision-making tasks.

While the confirmation heuristic is prevalent among crowd investors, its effect on investment performance remains unclear. One potential explanation for the lack of effect relates to the sources of information crowd investors employ. Crowd investors rely mostly on online sources of information, which in our case means the information on the crowdfunding platform and the website of the firm (if applicable). This information is generally supplied or approved by the entrepreneurs, who have a strong incentive to present their firm in a favorable way. As consonant information predominates their environment, a tendency towards confirmation may not imply a significant disadvantage for crowd investors. Investors that do not display a tendency towards confirmatory search will still be exposed principally to consonant information, irrespectively of whether they seek such information or not. Another explanation connects more to the measurement of confirmatory

Heuristics in the Decision-Making Process of Crowd Investors

search approach used in prior research. Because confirmation and disconfirmation have often been operationalized as mutually exclusive, papers that found a negative effect of confirmatory search, may have partially captured a negative effect of the absence of disconfirmatory search. Our paper supports the view that, at least in an equity crowdfunding context, these two heuristics can co-exist, are comparably prevalent, and entail different outcomes.

Crowd investors engaging more in disconfirmatory search are more likely to invest in the projects that are funded the quickest, and thus are considered by the crowd as having higher quality. In a similar way to individuals performing the Wason selection task, which requires participants to turn over the cards that can verify a proposition (see Dawson et al., 2002), crowd investors seem to benefit from seeking deliberately information that contradicts their initial beliefs and prevents them from acting driven by overconfidence (Park et al., 2013). We do not find, however that crowd investors with a tendency towards disconfirmation are also more likely to invest in projects that incur a subsequent financing round. It could be that crowd investors situated in an environment dominated by consonant information, may be constrained in their search for dissonant information. Thus, investors willing to spend substantial time and cognitive effort on disconfirmatory search, may still access a limited amount of dissonant information, because this information is unavailable or difficult to retrieve (Park et al., 2013). Henceforth, we highlight another important implication of our study, not only the task (i.e. the evaluation of investment opportunities in equity crowdfunding) matters, but also the way we measure decision-making quality. Investors employing disconfirmatory search appear efficient at identifying the projects perceived by the crowd as high-quality during the campaign (i.e. projects funded in 30 days or less), but are nonetheless unable to single out the projects perceived by the crowd as high-quality after the original campaign (i.e. projects that have additional funding rounds).

We showed that investors that engage in selective search (i.e. allocate uneven time to the evaluation of different categories of content) are more likely to identify high-quality projects (measured as investing in either quickly funded projects, or projects with subsequent financing rounds). It appears that due to the limited time and associated opportunity costs, crowd investors benefit from attending to specific categories more than to others. This entails important implications for research on investor decision-making in general. There does not

seem to be a “winning” category of content that all investors should prioritize; rather, investors should allocate their time across different categories depending on how the cues pertaining to these categories weight in and inform their own decision-making. In a similar vein, Maxwell and colleagues (2011) have shown that even though business angels rely on the elimination-by-aspects heuristic (i.e., eliminate all opportunities that score below a certain threshold on one important cue), the actual cue(s) considered for this heuristic varied across investors. It follows, that heuristics such as the selectivity heuristic can be beneficial for all crowd investors, but the categories of cues entailed by this heuristic and the number of categories may vary substantially across investors.

4.5.2 Practical Implications

The main practical implication of our study is that crowd investors can benefit from the use of heuristics when evaluating investment opportunities; this also holds for the “real crowd”, meaning individuals with no investment experience outside crowdfunding. For these individuals, heuristics may prove particularly valuable, as they lack the expertise and professional networks of small investors. A related implication is that using heuristics simply to save time may not be a fruitful strategy. Our study shows that particularly the confirmation and disconfirmation heuristics are actually positively correlated with the average time spend on project evaluation. Heuristics are meant at saving cognitive effort, not time per se (Shah and Oppenheimer, 2008; see also Eisenhadrt, 1989; Gradori and Cholakova, 2013), thus individuals engaging in confirmatory and/or disconfirmatory search may save time when compared to individuals engaging in a more deliberate evaluation, but not necessarily when compared to individuals who assess the information in a neither comprehensive, nor selective manner (i.e. individuals with no explicit information search strategy).

4.5.3 Limitations and Further Research

Our study specifically examined the prevalence and effects of three heuristics on investment performance. It is likely that other heuristics may prove valuable for crowd investors, and we therefore encourage future research to address further the role of heuristics in this novel

Heuristics in the Decision-Making Process of Crowd Investors

investment context. Similarly, we focused on the post-screening phase of the investment process, as we were interested in the heuristics that affect investors' ability to select the most promising projects. Thus far, we know very little about how investors screen projects, in other words what factors drive an investor to determine that a project is "interesting enough" to warrant a more detailed investigation. As crowdfunding is becoming increasingly popular, crowd investors will be faced with more and more projects to choose from, and understanding what factors "qualify" a project for further examination may pose great practical importance for entrepreneurs and crowdfunding platforms.

The disconfirmation heuristic proved beneficial in equity crowdfunding. As any heuristic, there are biases associated with it as well that may result in negative consequences in other contexts. Prior research is relatively silent about potential drawbacks of employing disconfirmatory search; nonetheless in certain contexts overreliance on disconfirmation may lead to a delayed decision-making process, or even failure to make a choice when making a choice is compulsory or preferable. Even though, we found no significant effect of confirmatory search on investment performance, we would not dismiss the applicability of this heuristic entirely. The confirmation heuristic may actually be useful in contexts that are more balanced in terms of favorable and unfavorable information, or contexts with a higher number of information providers. As equity crowdfunding is still in its nascent stage, it may well become such a context. Institutional pressures from national states, aimed at investor protection and competitive pressures from rival platforms, are increasingly pushing equity crowdfunding platforms to provide accurate and transparent descriptions of the investment opportunities they promote.

Lastly, in this study we focus on "short-term" investment performance, meaning performance captured either at the end of the campaign, or in a subsequent financing round. The nascent stage of equity crowdfunding did not enable us to examine long-term investment performance. Ultimately, for investors the financial performance is reflected either in a successful exit or in advantageous profit-sharing (as dividends or other forms). Therefore, future research can also dwell into the long-term performance implications of using heuristics when evaluating crowdfunding opportunities.

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Summary

Summary

Companies such as Qualtrics or GoPro were started with modest personal savings and managed to grow to valuations of billion dollars, before accessing any external capital. How did they do it? In this dissertation, I dwell into the ways entrepreneurs can overcome resource constraints, without relying extensively on capital from “traditional” equity investors. In particular, I build on research on creative resourcing (i.e., bricolage, bootstrapping) and on literature on equity crowdfunding, to investigate (1) how do bricolage and bootstrapping affect firm-level outcomes, (2) How do top management team (TMT) attributes influence the reliance of firms on bricolage and bootstrapping, and (3) How do crowd investors (i.e. investors in equity crowdfunding) identify high-quality opportunities to invest in.

The findings from the first two studies show that bootstrapping and bricolage are prevalent resourcing behaviors in small and medium-sized enterprises, and that these behaviors differentially affect firm outcomes. More specifically, bricolage enables firms to balance exploration and exploitation, and positively effects firm performance, whereas bootstrapping has a negative effect on firm performance. I also found supporting evidence that the socio-cognitive attributes of the TMTs fundamentally shape the willingness and ability of these teams to engage in bricolage and bootstrapping. Overall, these findings suggest that creative resourcing could support firms in overcoming resource constraints and reducing dependency on traditional resource providers. However, not all management teams are equally equipped to engage in creative resourcing, my research shows that cognitive diversity, well-developed networking, and improvisational skills help teams to engage in creative resourcing. The findings from the third study in my dissertation support the contention that crowd investors use heuristics (i.e. mental shortcuts aimed at reducing the effort required for a task), when evaluating investment opportunities. Most importantly, several heuristics, such as the disconfirmation and selectivity heuristics, help investors identify the more promising investment opportunities. These findings have important practical implications for investors, but also for entrepreneurs and crowdfunding platforms that can improve the way they interact with and engage investors.

Samenvatting

Bedrijven als Qualtrics of GoPro zijn met een bescheiden hoeveelheid spaargeld uitgegroeid tot miljarden bedrijven. Hoe hebben ze dit gedaan? In dit proefschrift onderzoek ik de manier waarop ondernemers financiële restricties kunnen overwinnen zonder intensief gebruik te maken van extern kapitaal verstrekt door angels, venture capitalists of private equity investeringsfondsen. In mijn proefschrift baseer ik me voornamelijk op onderzoek naar creative resourcing (i.e., bricolage, bootstrapping) en onderzoek naar equity crowdfunding om te bepalen (1) hoe bricolage en bootstrapping de bedrijfsprestaties beïnvloeden, (2) hoe de kenmerken van top management teams (TMTs) invloed uitoefenen op de mate waarin bedrijven bricolage en bootstrapping toepassen, en (3) hoe crowdfunders (in equity crowdfunding) kwalitatief hoogwaardige investeringskansen identificeren.

Uit de eerste twee studies blijkt dat bootstrapping en bricolage veel voorkomen in kleine en middelgrote bedrijven (het MKB) en dat deze twee vormen van ‘creative resourcing’ de bedrijfsresultaten op een andere manier beïnvloeden. Meer specifiek, waar bricolage bedrijven in staat stelt om een goede balans te creëren tussen exploratie en exploitatie (wat een positieve invloed heeft op het bedrijfsresultaat), heeft bootstrapping juist een negatieve invloed op het bedrijfsresultaat. Daarnaast vind ik in mijn onderzoek dat sociaal-cognitieve kenmerken van TMTs een fundamentele invloed hebben op de bereidheid en het vermogen van deze teams om zich bezig te houden met bricolage en bootstrapping. Deze bevindingen suggereren dat ‘creative resourcing’ bedrijven kan ondersteunen bij het overwinnen van hun ‘resource restrictions’ en het verminderen van de afhankelijkheid van meer traditionele bronnen van kapitaal. Echter, niet alle top management teams zijn toegerust om ‘creative resourcing’ effectief toe te passen. Mijn onderzoek laat zien dat cognitieve diversiteit, netwerken en het vermogen tot improviseren doorslaggevend zijn voor succesvolle ‘creative resourcing’. De resultaten uit mijn derde en laatste studie laten zien dat crowdfunders gebruik maken van heuristics (i.e. mentale shortcuts) bij het evalueren van investeringsmogelijkheden. Hier zien we dat zogenaamde ‘disconfirmation’ en ‘selectivity’ heuristics investeerders helpen bij het identificeren van de meest veelbelovende kansen.

About the Author



Roxana Turturea received a Master's degree in Entrepreneurship and New Business Venturing from Rotterdam School of Management, the Netherlands, and a Bachelor's degree in Business Administration from the Academy of Economic Studies, Romania. In 2012, she started her PhD at the Department of Strategy and Entrepreneurship, Rotterdam School of Management (RSM), working together with Professor Dr. Pursey Heugens, Professor Dr. Justin Jansen, and Dr. Ingrid Verheul. As part of her PhD trajectory, she was also a visiting scholar at Kelley School of Business, Indiana University, USA. Roxana is currently working as a post-doctor researcher at Aalto University School of Science.

Roxana's research interests center around entrepreneurial finance, creative resourcing, entrepreneurial decision-making, and corporate governance. In particular she investigates how entrepreneurs overcome resource constraints by either making creative use of resources or by using novel sources of finance such as crowdfunding. A related strand of her research examines the strategies investors employ when examining investment opportunities. She has experience in quantitative methods, and has worked on survey-based, archival-based, and meta-analytic studies. Her papers have been presented at several international conferences including Academy of Management (AoM) Annual Meeting, Babson College Entrepreneurship Research Conference, and Strategic Management Society (SMS) Annual Meeting, and are under review at top-tier journals.

Portfolio

Portfolio

Published papers

Verheul I., Block J., Burmeister-Lamp K., Thurik R., Tiemeier H., & Turturea R. (2015). ADHD-like Behavior and Entrepreneurial Intentions. *Small Business Economics*, 45(1), 85-101.

Heugens P.P.M.A.R., Engelen P.J., Turturea R., van Essen M., & Bailey, N. (2018). The impact of stakeholders' temporal orientation on short- and long-term IPO outcomes: A meta-analysis. *Long Range Planning*, Accepted.

Sauerwald S, Heugens P.P.M.A.R., Turturea R, & van Essen M (2018). Are all private benefits of control ineffective? Principal-principal benefits, external governance quality, and firm performance. *Journal of Management Studies*, Accepted.

Working papers

Dissertation-based papers:

Top Management Team Attributes, Bricolage and Ambidexterity in Small and Medium-Sized Enterprises. (with Justin Jansen, Ingrid Verheul)

TMT Improvisation, Resource Management and Performance in SMEs: A Mediated Model. (with Justin Jansen, Ingrid Verheul)

Heuristics in the Decision-Making Process of Crowd Investors. (with Magdalena Cholakova, Justin Jansen, Ingrid Verheul)

Other working papers:

Playing Hard to Get: The Persuading Role of Scarcity in Reward-Based Crowdfunding. (with Mark Boons and Dimitrios Tsekouras)

Does State Ownership Hurt or Help Minority Shareholders? International Evidence from Control Block Acquisitions. (with Steve Sauerwald, Pursey Heugens, Marc van Essen)

State Ownership and Political Connections (with Laszlo Tihanyi, Ruth Aguilera, Pursey Heugens, Marc van Essen, Steve Sauerwald, Patricio Duran)

Research visit

From March 2015 to May 2015, research visit to Kelley School of Business, Indiana University, Bloomington, USA, invited by Dean Shepherd

Teaching & supervising activities

Strategic Business Plan (Bachelor's Program), 2013-2014

Entrepreneurship Skills Course (Bachelor's Program), 2013-2014

Master Thesis Supervision (Topic: Financing Start-Ups), 2013-2014

Master Thesis Supervision (Topic: Crowdfunding), 2014-2015, 2015-2016, 2016-2017

Conference presentations

Does It Pay To Be Cheap, How Financial Bootstrapping Affects The Performance of New Ventures. Presented at:

- Babson College Entrepreneurship Research Conference (BCERC), June 2012, Fort Worth, Texas, USA.

ADHD-like Behavior and Entrepreneurial Intentions. Presented at:

- IZA Conference, June 2012, Potsdam, Germany.

Top Management Team Attributes, Bricolage and Ambidexterity in Small and Medium-Sized Enterprises. Presented at:

- Babson College Entrepreneurship Research Conference (BCERC), June 2014, London, Ontario, Canada. (Best Paper Proceedings, Frontiers of Entrepreneurship Research)
- Strategic Management Society (SMS) Annual International Conference, September 2014, Madrid, Spain.
- RENT, November 2014, Luxembourg, Grand Duchy of Luxembourg.
- Academy of Management (AOM) Annual Meeting, August 2015, Vancouver, Canada. (Best Paper Proceedings, Entrepreneurship Division)

TMT Improvisation, Resource Management and Performance in SMEs. Presented at:

- Babson College Entrepreneurship Research Conference (BCERC), June 2015, Natick, Massachusetts, USA. (Best Paper Proceedings, Frontiers of Entrepreneurship Research)
- Strategic Management Society (SMS) Annual International Conference, October 2015, Denver, Colorado, USA.
- Academy of Management (AOM) Annual Meeting, August 2016, Anaheim, USA.

PhD courses

Publishing strategy

English

Advanced Topics of Research in Strategy

Advances in the Economics of Entrepreneurship

Eden Doctoral Seminar on Entrepreneurship

Advanced Qualitative Methods

Social Networks and Market Competition

Multilevel Analysis

Meta-analysis for Theory Advancement in Business and Economic Research

Mediation and Moderation Analysis

Event History and Survival Analysis

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Dissertations in the last four years

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Promotors: Prof. L.G. Kroon & Prof. A.P.M. Wagelmans, EPS-2014-325-LIS,
<http://repub.eur.nl/pub/76927>

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Promotor: Prof. J.C.M. van den Ende, EPS-2014-321-LIS, <http://repub.eur.nl/pub/76076>

Akemu, O., *Corporate Responses to Social Issues: Essays in Social Entrepreneurship and Corporate Social Responsibility*, Promotors: Prof. G.M. Whiteman & Dr S.P. Kennedy,
EPS-2017-392-ORG, <https://repub.eur.nl/pub/95768>

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Alexander, L., *People, Politics, and Innovation: A Process Perspective*,
Promotors: Prof. H.G. Barkema & Prof. D.L. van Knippenberg, EPS-2014-331-S&E,
<http://repub.eur.nl/pub/77209>

Alexiou, A. *Management of Emerging Technologies and the Learning Organization: Lessons from the Cloud and Serious Games Technology*, Promotors: Prof. S.J. Magala, Prof. M.C. Schippers and Dr I. Oshri, EPS-2016-404-ORG, <http://repub.eur.nl/pub/93818>

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Avcı, E., *Surveillance of Complex Auction Markets: a Market Policy Analytics Approach*,

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Promotors: Prof. K.I.M. Rhode, Prof. H.R. Commandeur, Prof. M. Keil & Dr A.L.P.
Nuijten, EPS-2015-375-S&E, <http://repub.eur.nl/pub/79408>

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Erasmus Research Institute of Management
Mandeville (T) Building
Burgemeester Oudlaan 50
3062 PA Rotterdam, The Netherlands

P.O. Box 1738
3000 DR Rotterdam, The Netherlands
T +31 10 408 1182
E info@erim.eur.nl
W www.erim.eur.nl