

HELEN SELINDE TOXOPEUS

Financing sustainable innovation

From a principal-agent to a collective action perspective



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From a principal-agent to a collective action perspective

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From a principal-agent to a collective action perspective

Financieren van duurzame innovatie

Van een principaal-agent naar een collectieve actie perspectief

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Helen Selinde Toxopeus
born in Cairo, Egypt

Erasmus University Rotterdam



Doctoral Committee

Doctoral dissertation supervisor:

Prof. dr. H.R. Commandeur

Other members:

Dr. R. Huisman

Prof. dr. B.W. Lensink

Prof. dr. F.C. Stam

Co-supervisor:

Dr. K.E.H. Maas

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1 Introduction

The call for a transition to a sustainable economy has become increasingly urgent in recent decades (IPCC, 2014; Stern, 2008). Such sustainable development¹ has been more specifically defined as an economy which safeguards the ecological life-support system while satisfying basic human needs and providing equity within and between generations (Costanza & Patten, 1995; Holden, Linnerud, & Banister, 2014). This requires rethinking the way in which we live, work and organize to shift to an economy that functions within planetary boundaries (Wijffels & Toxopeus, 2014). The global challenge of lowering greenhouse gas emissions exemplifies the worldwide struggle to realize sustainable economic development (Ostrom, 2010b; Stern, 2008).

While a transition to a sustainable economy requires action at multiple levels (Geels, Hekkert, & Jacobsson, 2008; Ostrom, 2010b), sustainable entrepreneurship has emerged as an important ingredient for such a transition (Hall, Daneke, & Lenox, 2010; Pacheco, Dean, & Payne, 2010; Shepherd & Patzelt, 2011). Sustainable enterprises can solve market failures by innovating so that business activities generate financial profits and simultaneously govern collective goods such as nature (biodiversity, ecosystems), sources of life support (clean air, global fish stocks) and communities (culture, networks, personal identity) (Shepherd & Patzelt, 2011).

In order to engage in entrepreneurial activity and simultaneously deliver social and/or environmental benefits, enterprises must innovate (Hall et al., 2010; Hall & Vredenburg, 2003; Shepherd & Patzelt, 2011). Both innovation and sustainability demands facing a certain industry need to be addressed (Hall & Vredenburg, 2003) and innovation in the form of new technologies and organisational/social practices are needed to address environmental or social market failures (Dean & McMullen, 2007).

Sustainable innovation by entrepreneurs can be carried out in several ways. One approach is to address market failures by transforming institutions such as prevailing norms, property

¹ While conceptualized in different ways, the most commonly used definition of what constitutes sustainable development is given in the Brundtland Report (1987:43): “*Development which meets the needs of the present without compromising the ability of future generations to meet their own needs*”.

rights and government legislation (Pacheco et al., 2010). The redirection of technological progress towards sustainability objectives is another approach, where smart innovations and clean technologies that ‘close material loops’ aim to create win-win situations for entrepreneurs and society at large (Geels et al., 2008). A third perspective on sustainable innovation focuses on stimulating behavioural change and ‘green’ values, taking a social rather than technological perspective (Geels et al., 2008). Finally, sustainable or circular business models innovate the way in which firms define, deliver and capture value (Bocken et al., 2014; Boons & Lüdeke-Freund, 2013; Kortmann & Piller, 2016). For example, shifting from a sales to a product-service business model is expected to incentivize producers to extend the lifetime of their products (Tukker, 2015). Business model innovation based on sharing are often also viewed as sustainable, due to more efficient use of products and underlying materials (Frenken, 2017; Frenken & Schor, 2017). Finally, innovating to realize a sustainable economy is perceived as a larger, systemic socio-technological shift, requiring action by multiple actors to affect cultural change, consumer behaviour, technological adaptation, and regulation in parallel (Geels et al., 2008).

While sustainable innovation is recognized as an important ingredient for realizing sustainable economic activity, financing such innovation is seen as an important constraint (Hall, 2010; Schumpeter, 1934). Independent of whether innovation is sustainable, the innovation finance constraint is diagnosed to have two main causes: a market failure – credit rationing - due to firm-financier principal-agent problems (B. H. Hall, 2010; Stiglitz & Weiss, 1981) and a market failure due to the public good nature of innovation (B. H. Hall, Moncada-Paternò-Castello, Montesor, & Vezzani, 2016). Furthermore, sustainable innovation finance faces a second externality problem due to the provision of (collective) environmental and/or social goods. We discuss each in turn, and give an overview of these different types of market failure in Figure 1-1.

Principal-agent problems

Firstly, credit rationing exists in the face of principal-agent problems such as adverse selection, moral hazard and asymmetric information (Stiglitz & Weiss, 1981) and is especially problematic for high risk, innovative activity (B. H. Hall, 2010; B. H. Hall et al., 2016). Firstly, *adverse selection* refers to the difficulty of using higher interest rates to compensate for the high innovation risk, since entrepreneur willingness to accept higher

interest payments could reflect higher probabilities of default (Stiglitz & Weiss, 1981). Second, *moral hazard* problems occur in high risk, innovative lending due to an incentive misalignment between entrepreneurs and external financiers: higher interest rates dampen business profits, which can incentivize entrepreneurs to choose high risk – high payoff activities with a lower probability of success (Stiglitz & Weiss, 1981). *Asymmetric information* problems arise because the entrepreneur/manager requesting funds is better able to judge the probability of success of their business activity than a potential financier, in particular in the case of innovation (B. H. Hall & Lerner, 2010). Innovative entrepreneurs cannot display financial track record yet, their strategies are risky and firm assets are often intangible or firm-specific (Brancati, 2015; G. Giudici & Paleari, 2000; B. H. Hall & Lerner, 2010).

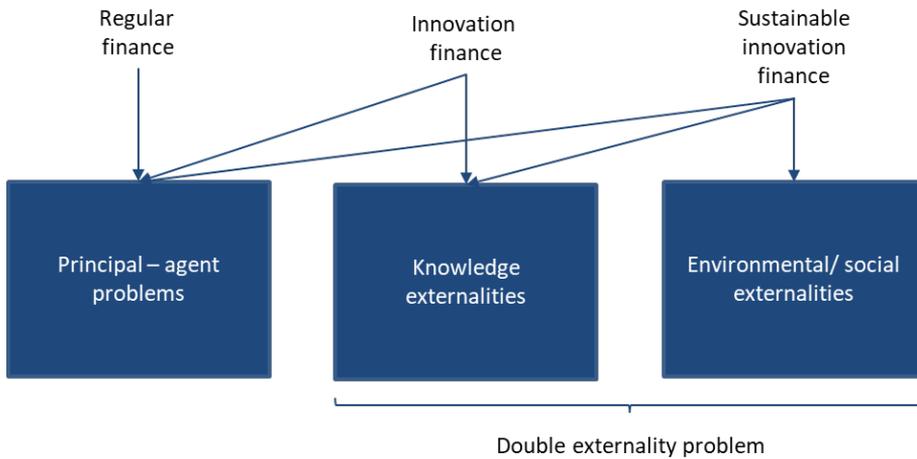


Figure 1-1 Three types of market failure embedded in sustainable innovation finance.

Knowledge externalities

For innovation finance, financial constraints are aggravated due to a *second* type of market failure, on top of the principal-agent problems described above. Investment into R&D and innovation generates knowledge externalities that easily spill over to others firms and sectors (Hall, 2010). Much of innovation spending goes to wages to develop knowledge with employees, an intangible asset which is lost in case of failure or if employees decide to leave (Hall, 2010). Although in the aggregate, investment into innovative entrepreneurial activity is a key factor driving economic growth (King & Levine, 1993), most innovations fail,

making individual investments unattractive and diversification difficult (Carpenter & Petersen, 2002a; B. H. Hall, 2010; Mazzucato, 2013). This difficulty to capture value from innovative entrepreneurial activity gives it public good characteristics, making it difficult to finance privately.

Environmental and social externalities

While building on insights from the innovation finance literature, this dissertation aims to address financing constraints of *sustainable* innovation, specifically. Sustainable innovation finance faces a *third* type of market failure, on top of the principal-agent problems and knowledge externalities that regular innovation finance is confronted with (Figure 1-1). Enterprises carrying out sustainable innovation aim to create environmental and/or social value, also referred to as ‘positive’ externalities, equivalent to collective goods such as clean air (lower greenhouse gas emissions), sustained natural resources and/or local cultures (Geels et al., 2008; Shepherd & Patzelt, 2011). Sustainable innovation therefore faces a *double externality problem*, producing both knowledge and social/environmental externalities (Faber & Frenken, 2009; Rennings, 2000).

While the innovation finance literature often addresses the inherent principal-agent problems, an additional theoretical perspective is needed to address the externality problems. The double externality constraint in sustainable innovation finance can be best viewed as a collective action problem (Hardin, 1971; Olson, 2009; Ostrom, 2010a). If the majority of financiers would invest in sustainable innovation, this would, in the aggregate, create value for society on the long term since some of the innovations will be successful. However, the value creation and capture *per investment* is highly uncertain and benefits will spread over a larger community than just the financier. This lowers the incentive for individual financiers, in particular if uncertainty exists regarding the sustainable investment behaviour of others. This conditionality of returns of sustainable innovation on cooperative behaviour of others – incentivizing free-rider behaviour - characterizes a collective action dilemma (Ostrom, 2010a; Pacheco et al., 2010).

Since innovation is a crucial ingredient for a shift to a sustainable economy (Geels et al., 2008; Hall & Vredenburg, 2003) and access to finance a key enabler of such innovation (Mazzucato, 2013; Schumpeter, 1912) the market failures that constrain sustainable

innovation finance need to be addressed. Based on the problem analysis above, this dissertation sets out to understand, and where possible, alleviate principal-agent and collective action problems that constrain sustainable innovation finance. Its urgency and importance is high: if most innovations are bound to fail (Mazzucato, 2013), a successful sustainability transition is in need of a large diversity of sustainable innovations.

There are two main reasons that this research is timely and fills a gap. First, there exist empirically well-defined mechanisms for solving collective action problems that could be applied to sustainable innovation finance (Ostrom, 2010a). While this cross-fertilization towards the financial sector has been suggested (Cauwels & Sornette, 2012), it has not yet been applied in this specific context. Second, technological developments are driving the emergence of new players in entrepreneurial finance (Block, Colombo, Cumming, & Vismara, 2017; Mollick & Robb, 2016), which could improve access to finance for sustainable innovation, both by overcoming principal-agent problems and by enabling collective action. It is therefore that this dissertation addresses the research question: *What factors enable enterprise access to finance for sustainable innovation?*

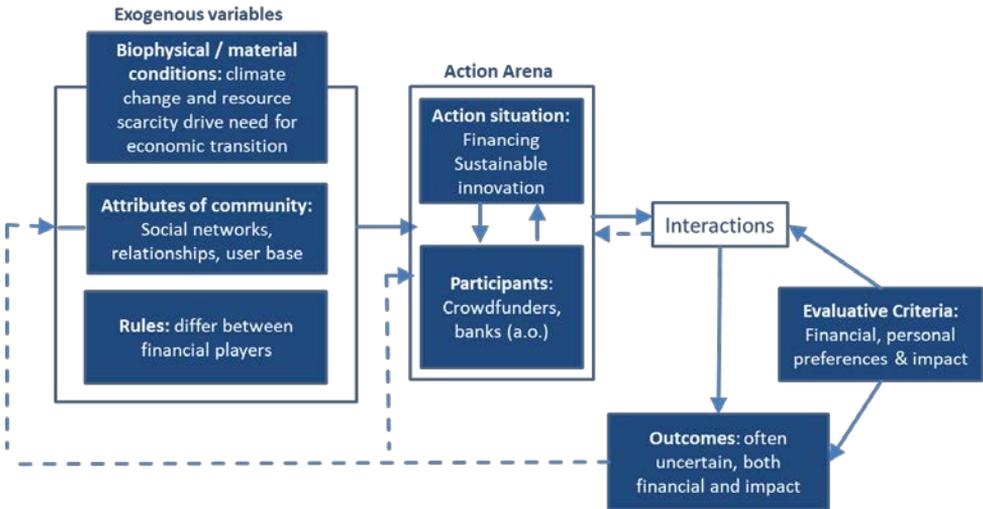


Figure 1-2 Applying the IAD Framework to sustainable innovation finance

To address this research question, the institutional analysis and development (IAD) framework, developed to structurally analyse action situations (Ostrom, 2010a) is applied to

Chapter 1

the action situation ‘financing sustainable innovation’. This allows for a novel perspective on financing sustainable innovation, taking into account participants and contextual (exogenous) variables (Ostrom, 2010a). This framework indicates that biophysical conditions, attributes of the community, rules and participant characteristics may affect outcomes of the financing decision (Figure 1-2).

While Figure 1-2 (based on Ostrom, 2010a) gives a broad overview of potential enablers of sustainable innovation finance, Figure 1-3 further specifies the action situation “financing sustainable innovation” to represent the analytical framework for this dissertation. Within the action situation *financing sustainable innovation*, three participant types are described: funders, innovating enterprises, and financial intermediaries. Additionally, this framework specifies the two main theoretical lenses that will be used to find enablers of sustainable innovation finance. First, principal-agent theory for financial intermediation will be employed to address regular finance constraints that innovative enterprises face, with a main focus on overcoming asymmetric information. Second, collective action theory will be used to address the double externality problem by uncovering mechanisms that improve the willingness of financiers to contribute. Furthermore, within each theoretical lens we engage with other relevant theories, such as signaling or motivational theory, whenever they seem instrumental in uncovering enablers for financing sustainable innovation from either theoretical lens.

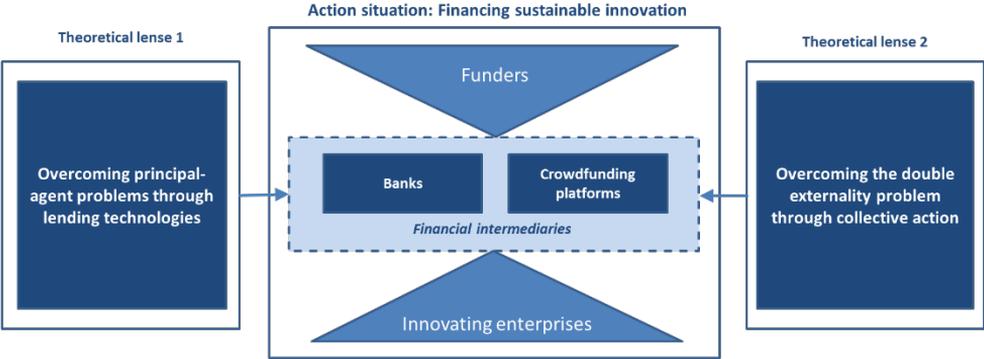


Figure 1-3 Analytical framework: addressing sustainable innovation finance constraints

Enablers for sustainable innovation finance will result from an interplay between participants in the defined action situation: funders, innovating enterprises and financial

intermediaries. Different financial players provide finance in different stages in a venture's lifetime, depending on size, risk level, duration and debt/equity finance (Polzin, 2017). In this dissertation I focus on banks and crowdfunding, even though other important financial players for innovation finance exist, as well including venture capitalists, philanthropists and governments (e.g. in the form of subsidies and tax breaks). Although their importance is recognized, they lie largely outside the scope of this dissertation. I explain my choice below.

Firstly, this dissertation studies *banks* because they are an established player in the field of SME lending, where the largest financing constraint also lies for innovation (Brancati, 2015). Even though debt-based finance is generally not well-suited for high-risk activities such as innovation, in practice banks still play a large role due to lack of alternatives, in particular in bank-based Europe (Cincera & Santos, 2015). Furthermore, the lion's share of research about overcoming principal-agent problems such as informational asymmetries and moral hazard has been undertaken in the field of bank lending (Berger & Udell, 2014; Stiglitz & Weiss, 1988), offering a rich background based on which to further understand how to enable sustainable innovation finance in the face of these constraints.

Secondly, this dissertation studies *crowdfunding*, a fast growing type of entrepreneurial finance, which allows many - often small - investors to pledge money to an enterprise or project via internet (Mollick, 2014). The relevance of crowdfunding for sustainable innovation finance can be explained from both the innovation and the sustainability perspective. Firstly, crowdfunding has evolved as a promising source of finance in particular for innovative ventures (Mollick & Robb, 2016). Some research suggests that crowdfunders are able to select high-quality ventures as well as experts, in particular in sectors where they are end users (Mollick & Nanda, 2015). From a sustainability perspective, recent conceptual and empirical studies point towards crowdfunding as an enabler of sustainability-driven entrepreneurship in particular (Calic & Mosakowski, 2016; Lehner, 2013; Lehner & Nicholls, 2014; Polzin, Sanders, & Täube, 2017). Due to the collective nature of crowdfunding, this type of finance is interesting to study from a collective action perspective to address the double externality problem. Also, research on overcoming principal-agent problems in crowdfunding is evolving. The high failure rate of (in particular early stage) innovation underscores this challenge - indeed regulators fear that (non-professional) crowdfunders may underestimate the risk of their investments (AFM, 2014; Friesz, 2015).

Therefore, crowdfunding is chosen due to its potential role for addressing both principal-agent and collective action problems. This could make crowdfunding a promising intermediary for sustainable innovation finance, in particular, and allows us to study it using both theoretical lenses. Furthermore, since crowdfunding-related policy is currently evolving, insights regarding its potential to finance sustainable innovation can provide input to such governance decisions.

While this dissertation focuses on finance for sustainable innovation as a general concept, not all types of sustainable innovation are the same and this will affect the type of financing they can attract. This dissertation builds on existing research to decide which types of sustainable innovation to address. Classifications of sustainable innovations are applied from a sustainable / circular business model perspective (Bocken et al., 2014; Boons & Lüdeke-Freund, 2013; Roome & Louche, 2016) and from a product / process innovation perspective (Achterberg et al., 2016; Ewen, Ossenblok, Braam, Karen Maas, & Toxopeus, 2017). The type of sustainable innovation that an enterprise chooses to focus on will affect their need for finance as well as its duration, risk level and asset base. This in turn affects which financial intermediaries best fit the enterprise and what lending/financing techniques (technologies) are most likely to provide successful finance.

Finally, a decision needs to be made how to pinpoint enablers for sustainable innovation finance. Using the two theoretical lenses, we look for fine-grained approaches in the literature to overcome principal-agent problems on the one hand, and collective action problems on the other. This is elaborated in the different chapters of this dissertation using principal-agent theory and collective action theory. Building on the finance literature (Berger & Udell, 2006), three main lending techniques are differentiated: cash-flow, asset and relationship-based lending. Banks employ (combinations of) different lending techniques depending on the types of ventures/firms and financing needs (Berger & Black, 2011; Berger, Miller, Petersen, Rajan, & Stein, 2005). Similarly, existing empirical and theoretical findings are used to build insights into overcoming collective action dilemmas in innovation finance (Ostrom, 2010a, 2010b).

This dissertation aims to be the start of a framework of enablers through which sustainable innovation can be financed, by addressing both principal-agent and collective action

Chapter 1

problems. Furthermore, this is used as a basis to suggest innovation in financial techniques and structures that can speed up financing of sustainable innovation. By increasing collective understanding of the provision of sustainable innovation finance, in particular through crowdfunding and banks – two major players - sustainable enterprises and financiers alike obtain a tool for financial decision-making to accelerate the transition to a sustainable economy.

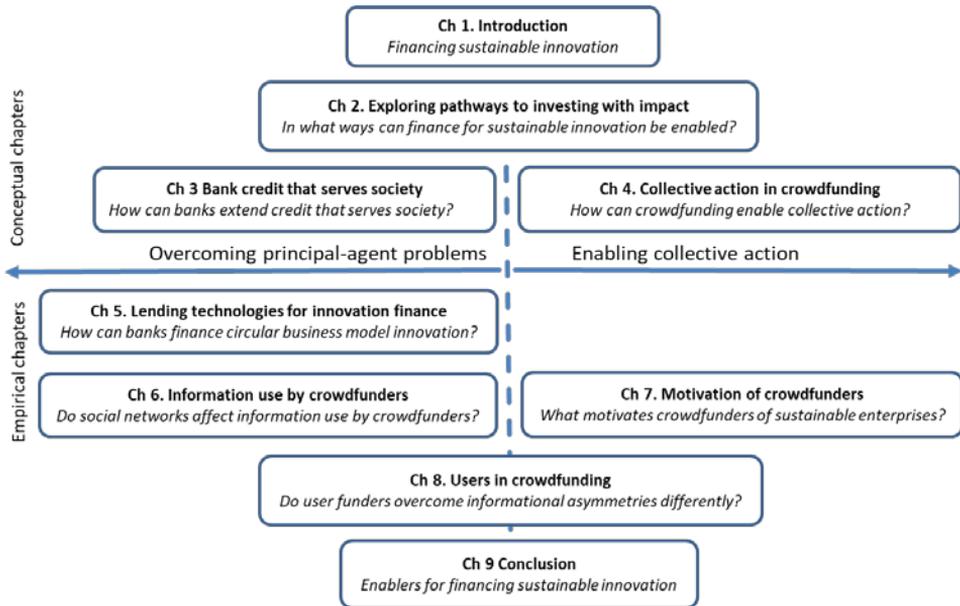


Figure 1-4 Schematic overview of this dissertation

Figure 1-4 gives a schematic overview of this dissertation. In the first part of this dissertation (Ch 2, 3, 4) the conceptual work is presented. Chapter two discusses financial innovations that enable impact investing (Toxopeus, Liket, & Maas, 2015). In chapter three, both relationship-based and transaction-based credit allocation approaches are analysed for their ability to provide loans that serve society (Toxopeus & Blom, 2016). In chapter four, an institutional rule-based analysis of crowdfunding is carried out to understand how collective action can be enabled when crowdfunding sustainable enterprises (Toxopeus & Maas, 2018).

The second part of this dissertation (Ch 5-8) consists of empirical work aimed at furthering our understanding of sustainable innovation finance. Chapter five analyses how different

lending technologies can be employed for extending bank credit to enterprises with undertake different types of sustainable (business model) innovation. This article includes qualitative field work with banks and enterprises who applied for bank credit to finance their business model innovation. In the next three chapters, this dissertation studies crowdfunding, a financial tool that is expected to be particularly well suited for financing sustainability (Calic & Mosakowski, 2016; Lehner, 2013). In chapter six, we obtain insight into the role of social networks (relationships) for overcoming informational asymmetries in financing decisions of crowdfunders, an analysis which we extend towards sustainable enterprises (Polzin, Toxopeus, & Stam, 2017). Chapter seven looks into the role of societal impact motivation and financial motivation of sustainable enterprise crowdfunders in their investment decisions. Chapter eight analyses a successful crowdfunding campaign of a sharing platform to understand the role of users as funders of sustainable ventures, and how this relates to overcoming informational asymmetries for the funding decision.

Based on both the conceptual work (part one) and empirical work (part two) main conclusions are drawn (chapter nine) regarding promising mechanisms and enablers for financing sustainable innovation in the conclusion of this dissertation. Furthermore, this chapter provides practical insights for financial intermediaries, enterprises wishing to finance sustainable innovation and crowdfunders, as well as limitations of the current dissertation and further research directions.

Table 1-1 Overview of dissertation chapters

Ch. Title	Research question	Theoretical perspective	Methodology	Data	Conclusions	Co-authors	Status & outlet
1 Introduction							
2 Innovating for impact investing: financial institutions and beyond	How can financial institutions allocate capital for impact?	Collective action theory	N.A.	N.A.	Impact investing by financial institutions should be non-speculative, contribute to wellbeing (social) and to common goods (ecological). Pricing the commons, public-private and community finance can increase impact investments.	Kellie Liket, Karen Maas	Published as book chapter in <i>Principles and Practice of Impact Investing</i> (Greenleaf, 2016)
3 'Credit that serves' cannot do without relationships	Can both transaction-based and relationship-based credit bring about credit that serves?	Principal-agent theory; informational asymmetries	Reflective essay	N.A.	We find a natural match between relationship banking and credit that serves due to availability of contextual information. Transaction-based banking that serves requires hard information about a firm's context to be made available.	Peter Blom	Published in <i>Management & Organisations</i> (2016) in Dutch
4 Crowdfunding sustainable enterprises as a form of collective action	How does collective action theory help us explain the potential success of crowdfunding for sustainable enterprises?	Collective action theory	Rule classification analysis	N.A.	Three main mechanisms seems to facilitate collective action in crowdfunding: (1) use of social networks (2) heterogeneity of contributions and payoffs (3) aggregation within thresholds.	Karen Maas	Book chapter in <i>Designing a sustainable financial system: Development goals and socio-ecological responsibility</i> (Palgrave, 2018)
5 Unlocking bank finance for circular business model innovation	How can firms obtain bank finance for circular business model innovation?	Principal-agent theory; Lending technologies; business model literature	Case study-based theory-refining approach (qualitative)	Archival documents, interviews and workshops (focus groups) at banks; interviews at firms	Business model (components) are important for obtaining bank finance. Business Model Innovation (BMI) finance is facilitated by proof of future cash flows and relationships with customers, suppliers and banks. Asset-based lending for circular BMI is promising due to longevity of assets but requires secondary asset market development.	Elisa Acherberg, Friedemann Polzin	Submitted to: <i>Academy of Management Discoveries (Special Issue on Sustainable Development)</i>
6 The wisdom of the crowd in funding information heterogeneity and social networks of crowdfunding	How does the type of information used by crowdfunding vary with the strength of their ties to project creators?	Principal-agent theory; Signaling theory; social network theory	Ordinal logistic regression analysis	Survey data among crowdfunding in the Netherlands (2013)	Relationships facilitate information exchange about entrepreneurs/project creators in crowdfunding. For debt and equity crowdfunding, out-crowd funders attach more importance to financial and risk information than in-crowd funders. Funders investing in ecological projects attach more importance to information about a project and its objectives compared to funders in other projects.	Friedemann Polzin, Erik Stamm	Published in <i>Small Business Economics</i> (2017)

Table 1-1 (continued)

Ch.	Title	Research question	Theoretical perspective	Methodology	Data	Conclusions	Co-authors	Status & outlet
7	Societal impact or financial return: what motivates sustainable enterprise crowdfunding?	What motivates crowdfunding to invest in sustainable enterprises; societal impact and/or financial return?	Motivational theory	Ordinal logistic regression analysis	Survey data among crowdfunding in the Netherlands (2016) and project/enterprise codes	Crowdfunders of sustainable enterprises report both higher impact motivation and higher financial motivation than crowdfunders of regular enterprises. We find a trade-off between financial and impact motivation for regular enterprise crowdfunding, but not for sustainable enterprise crowdfunding. We confirm a 'value-seeking' or even 'value-stacking' approach for crowdfunders of sustainable enterprises.	Karen Maas	Target Journal: <i>Business & Society</i> [benefited from peer-review at <i>Journal of Business Venturing</i>]
8	User crowdfunding: insiders or idealists?	How do (differently motivated) user crowdfunding overcome informational asymmetries?	Principal-agent theory; User innovation; absorptive capacity	Ordinal logistic regression analysis	Investment, user and survey data on one large crowdfunding campaign (2016)	User crowdfunding exert lower information search effort than non-user crowdfunders, in line with the expectation that they access local 'sticky' information. Users have less investment experience but are not less financially literate, confirming this to be a 'new' investment group that self-selects based on absorptive capacity. Furthermore, financially motivated user crowdfunders are more financially literate than other funders.	Friedemann Polzin	Target Journal: <i>Research policy</i>
9	Conclusion							

1.1 Declaration of contribution and co-authorship

In this section, I declare my contribution to the different chapters of this dissertation and acknowledge the contribution of other parties. My promotor Harry Commandeur and co-promotor Karen Maas contributed by providing guidance and feedback throughout the dissertation process.

Chapter 1 and 9 were written independently by me, with guidance and feedback from my promotor Harry Commandeur. Chapter 2 was developed conceptually together with my co-author Kellie Liket and my co-promotor and co-author Karen Maas. It was mainly written by me with input from my co-authors. Chapter 3 was conceptually developed with my co-author Peter Blom. I developed the theoretical background and wrote the chapter, with feedback from my co-author. Chapter 4 was conceptually developed and written by myself. My co-promotor and co-author Karen Maas helped structure the paper and provided extensive feedback.

Chapter 5 was developed conceptually and written by myself together with my co-authors Elisa Achterberg and Friedemann Polzin, (I took a lead role). Data collection at banks (interviews and workshops) was carried out by the three authors with help from Rens van Tilburg and Aglaia Fischer. Data collection at firms (interviews) was split between members of the author team of the management book *Route Circulaire*: notably Dionne Ewen, Lieke Ossenblok, Guido Braam and myself. I coded all the data and carried out the data analysis. I wrote the discussion and conclusion, which my co-authors in multiple feedback rounds contributed to which improved the focus of the paper.

Chapter 6 was developed conceptually by myself and my co-authors Erik Stam and Friedemann Polzin. Erik Stam pointed us to the (existing) dataset and helped develop a frame for the paper. Friedemann Polzin and I wrote the theoretical framework and carried out the data analysis (based on an existing data set) and wrote the results, discussion and conclusion section with approximately similar efforts. We both carried out the revisions that were required for publication in *Small Business Economics*.

Chapter 7 was conceptually developed by myself with input from Karen Maas. The data collection (*Nationaal Crowdfunding Onderzoek*) was a joint effort between the Hogeschool van Amsterdam, Universiteit Utrecht (Sustainable Finance Lab), CrowdfundingHub and

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Impact Centre Erasmus. I took a lead role in developing the survey and collecting the data. I wrote most of the paper, Karen Maas provided written input on the theory section.

Chapter 8 was developed conceptually by myself. I carried out the literature review and wrote the theoretical framework. I carried out the data collection and analysis and wrote the results and discussion. My co-author Friedemann Polzin helped structure the paper, wrote part of the methods section and provided feedback on all sections.

2 Innovating for impact investing: financial institutions and beyond²

Abstract

Financial institutions can create positive impact for our society by allocating capital and spreading risks. However, in many cases, financial institutions fail to optimally invest in maximizing society's wellbeing. Impact investing has arisen as a supplement to traditional financial institutions in order to direct capital allocation more towards society's wellbeing. We define three main conditions under which financial institutions invest with impact and we explore directions in which financial innovations may cause more effective allocation of capital to impactful investments. We distinguish four areas of impact investing: 1) investments that meet individual needs, thereby increasing wellbeing (regular finance), 2) mechanisms to reduce investment in products and services that individuals purchase but which decreases their or other people's wellbeing (e.g. carbon credit trading), 3) Investments which increase wellbeing of those who possess no purchasing power (e.g. Social Impact Bonds), 4) Investments that contribute to the common good (e.g. through crowdfunding).

2.1 Introduction

Money makes the world go round. In the wrong hands, it brings down countries, finances wars and degrades environments. But, in the right hands, it finances sustainable sources of energy, spurs innovation and saves lives.

Impact investing is the deliberate allocation of capital in initiatives that positively impact the world. Moreover, we focus specifically on the capital allocation of financial institutions, thus not including the investments of other institutions such as philanthropic foundations and governments.

² This chapter is joint work with Karen Maas and Kellie Liket and was published as a book chapter: Toxopeus, H., Liket, K., & Maas, K. (2015). Innovating in impact investing: financial institutions and beyond. In *Principles and Practice of Impact Investing: A Catalytic Revolution*. Greenleaf Publishers.

The responsibility of financial institutions to take into account the impact of their investments is an increasingly hot topic of debate (Borgers & Pownall, 2014; Scholtens, 2006; Scholtens, Cerin, & Hassel, 2008; G. Williams, 2007). Traditionally, financial institutions focus on maximising financial return when making investments, and often argue that they are kept to this objective by fiduciary duty (for a discussion, see Amalric, 2006). Therefore, financial institutions often invest in activities that are, in their current form, not beneficial to society, because of externalities such as environmental damage or because they are unbeneficial to the wellbeing of individuals, such as unhealthy or addictive foods. As a result of this, an increasing number of scholars investigate the inclusion of social and ecological criteria into the capital allocation decision (Borgers & Pownall, 2014; Scholtens, 2006).

While many have argued that impact investing is a distinct activity from regular investing based on its 'intent' to create such an impact (Global Impact Investing Network, 2015; Graham & Anderson, 2015) we believe that the term 'impact investing' is most useful as a concept when it refers to investments which actually make a positive impact compared to a relevant benchmark investment, based on research and evaluations. Actual positive results, by some pre-defined standard, are what define impact investments in their core, not only their (self-reported) intention to create such results.

Defining impact investment as being results-based should not be confused with definitions that include measurability (i.e. World Economic Forum, 2013). When impact measurement is included in the definition of impact investment, this still leaves us with two important uncertainties. First, an impact investment defined this way could mean both measuring output or results (i.e. measuring the number of mosquito nets distributed versus actual decrease in malaria incidence as a result of net distribution), Second, by including just impact measurement in the definition of impact investing, we also include investments as being impact investments where results are measured, but, after measurement took place, turn out not to have the positive impact they envisioned.

We realise that defining an impact investment *ex post*, by its actual realised result, is a strict focus, and that results evaluation is costly. However, we believe this narrow focus to be necessary in order to steer resources where they are used most effectively in reaching what

we think is the goal of most impact investors—maximising the amount of impact. We also see a clear role for the financial sector as an intermediary in this definition of impact investing.

How can financial institutions innovate to increasingly engage in impact investing? Since we define impact investing as those investments with actual positive impact, some regular investments with a positive impact may count as impact investments. However, this is not a *carte blanche* to financial institutions to put an ‘impact’ stamp on their investments because they ‘add value’. Many investments that regular financial institutions undertake may produce profits for their investors but are detrimental for either individual wellbeing or the common good. As an answer to these shortcomings, alternative financing structures have emerged that are able to undertake impact investments that regular financial institutions cannot make. The two key topics for our chapter are therefore (1) the role of the regular financial sector and (2) financial innovations in impact investing.

In the first part of this chapter we analyse impact investing by regular financial institutions. We expose three conditions under which we classify their investments as impact investments. We then focus on two types of misalignment under which regular financial institutions have difficulty making impact investments due to insufficient expected financial return on investment. In the second part we discuss financial innovations that may widen the amount of impactful investments beyond what regular financial institutions are able to do within their regular financial investment process. Finally, we give some recommendations for future financial innovation that may increase the positive impact of investments.

2.2 Focusing on impact investing in regular financial institutions

Financial institutions add great value to our society. The financial sector provides us with deposit, payment and insurance services. They ascertain which individuals or enterprises are worthy of credit, in the case of banks (Stiglitz & Weiss, 1988) or capital, in the case of banks and many types of investment funds. Financial institutions create trust for individuals and organizations by taking on, and spreading risks. This allows individuals and businesses to coordinate their actions across time and space. In this way, productive activities are developed, such as new medications, technological innovations and sustainable energy sources, increasing the individual and collective wellbeing in our society.

However, we cannot classify all investments by financial institutions as impactful. Financial institutions also invest in activities that have a negative impact on society. At the same time, other, potentially impactful, investments are not made because they do not fulfil expected profit requirements of financial institutions. Both the investment in activities with negative impact and the lack of finance for potential impact investments with lower direct financial profit result in suboptimal capital allocation from a wellbeing perspective (and in the long-run, even from a financial perspective).

Based on our experience in the field of impact evaluation and the financial sector, we identified three general conditions that should be met by an investment to be classified as an impact investment: (1) the investment is channelled towards non-speculative activity; (2) the activity contributes to the wellbeing of its consumers or users; (3) in the course of production and consumption, the activity underlying the investment has a neutral or positive effect on collective wellbeing (in particular, the environment). We classify investments made by financial institutions as impact investments when they fulfil all of these three conditions. We will discuss each condition below.

Non-speculative activities

Financial institutions finance both productive and trading activities. When financing productive activity, the expected future sale of goods and services is the basis of the investment. Trading activities include speculation on financial and commodity markets, but also financing of the transfer of existing assets to new end users (such as houses, using mortgages). In practice there can be a thin line between the two. We define speculation as the purchase of a good or asset for later resale (rather than for use), in the expectation of profiting from an intervening price change. The main societal function of speculation is that it improves the functioning of markets by creating market liquidity by providing counterparties to trade with (Mehrling, 2011). This liquidity can potentially improve the efficiency of trade of goods and services in global markets. However, in practice, speculation can entail large risk-taking and herding by financial parties, leading to prices moving away from underlying value, potentially harming that same trade or, in the worst case, leading to finance-induced economic crises (Rajan, 2005; Reinhart & Rogoff, 2009).

Not all trade is speculative, however. When issuing mortgages for existing housing stock, financial institutions are financing individual trades on the housing market. Mortgages add value by enabling households to take an advance on future incomes, thus providing them with a long-term place to live. By re-allocating the existing housing stock efficiently and passing them down to following generations, houses are sustainable, long-term assets that contribute to a basic need. Of course, mortgages need to be issued in line with the income generating capacity of its owners, and do carry risks. Large house price fluctuations driven by excessive mortgage financing and ensuing financial volatility lead to harmful wealth and debt redistributions, as in the case of The Netherlands or Ireland, where 30% and 50% of house mortgages were higher than the market value of the house in 2014, respectively (De Nederlandsche Bank, 2014). Under these circumstances, investment in mortgages cannot be automatically assumed to have only a positive effect on society's wellbeing, and the housing markets needs to be watched with scrutiny to protect its positive impact.

Based on the arguments above, we classify the financing of productive activity and the financing of trade, when connected to an end-user, as potential impact investments. In result, our first condition for any impact investment that it is directed towards non-speculative activity.

Contribution to wellbeing

Even when financial institutions invest in non-speculative activities, these activities may not be impact investments when they are detrimental to their consumers' wellbeing. Examples are the adverse long-term effects of some products, such as health deteriorations resulting from the consumption of sugary soft drinks or addictive drugs. Most countries have regulatory institutions that prohibit their financial institutions to invest in products and services that result in overwhelming negative impact, such as coal, tar sands or doubtful humanitarian regimes. Unfortunately, it does not follow automatically that investments that *are* allowed, are automatically beneficial to its users or stakeholders. There exists ample political lobbying to allow productive activities even if their long-term negative effect on wellbeing has been scientifically proven, like in the case of tobacco (Palazzo & Richter, 2005). Investment in tobacco is not prohibited, even though the World Health Organisation (2002) estimates that tobacco kills about half of its users during their lifetime. It is up to

financial institutions themselves to decide to refrain from investing in this type of health-detrimental production.

The reason that we cannot only leave it up to consumers themselves to decide what is good for them is that people are often unable to make rational decisions (Tversky & Kahneman, 1981). Their preferences change, unrelated to the underlying value proposition, simply as a reaction to the ‘framing’ of the product (Levin, Gaeth, Schreiber, & Lauriola, 2002). Furthermore, consumers are able to choose between products and services that have made it to the market, which are for a large part those activities which financial institutions were willing to finance. Consumers cannot buy products that did not make it to the market in the first place.

We therefore argue that financial institutions play a shaping role in the direction of economic development, not just consumer demand. Schumpeter, (1912) is often cited as the first economist to pinpoint the powerful role of the financial sector as an enabler of entrepreneurial innovation. Although much discussion on the topic exists, evidence shows that financial intermediation and markets indeed affect economic growth (Levine, 2005). For financial intermediation to not only increase economic growth, but lead to *impactful* growth, we argue that the wellbeing of consumers should be taken into account in the investment decision.

If financial institutions select those investments that do not only enable non-speculative activity for which there is demand, but also add to wellbeing of consumers, two of the conditions of impact investing are fulfilled.

Contribution to common goods

Productive activities that contribute to the wellbeing of their consumers might still not be impact investments if they negatively affect common goods. We define common goods, or common-pool resources, as goods from which it is difficult to exclude others, unlike private goods, and which are subtractive, unlike public goods (Ostrom, 2010a). Clean air, wild fish stocks and public drinking water basins are examples of common goods. Their consumption leaves less for others to consume, both in the short term and sometimes in the long term, if consumption is above regeneration levels. Many productive activities, even if they represent

private goods and cater to important basic demands, affect our common goods negatively at some point in their production or consumption process.

We illustrate this with two of our basic needs, energy and food production. Energy production results in increased economic activity and mobility but, in the case of fossil fuels, affects our air quality and contributes to climate change (Stern, 2008). Food production, such as livestock or wheat, is a productive activity that usually adds to the wellbeing of its consumers, but when produced at the detriment of common-pool resources (through air pollution and deforestation) at scales that create climate change (Stern, 2008) should still not be classified as an impact investment.

At the same time, innovative, sustainable production and consumption of both energy and food can create a more positive impact on our commons that regular production processes do. Sometimes this sustainable innovation may even lead to more profit as well, but not always.

In conclusion, financial institutions can increase the impact of their investments by screening and searching for projects that fulfil these three conditions—non-speculative activities, contribution to wellbeing, and a contribution to common goods—next to their own criteria on financial profitability.

2.3 Innovating for more impact investing

In the first part of this chapter, we have outlined the conditions that need to be met to classify investments by financial institutions as impactful. However, to improve society's wellbeing we need to increase the amount of impact investments beyond what financial institutions can do by redirecting their portfolios within their current structures, and focus on the impactful investments that could potentially be made.

In this second part of the chapter, we therefore focus on financial innovations that could enable us to create more impact through impact investing. We describe potentially impactful investments that adhere to the three core conditions (non-speculative activity, contribution to wellbeing and contribution to commons) but will not be financed by financial institutions due to inadequate financial returns. This lack of profit is due to two types of misalignment between purchasing power and wellbeing:

1. **Willingness to pay for common goods is missing.** The benefits of the activity that seeks financing accrue partly to the common good, and consumers are unwilling to pay the extra costs that allow for governance of the common good during production and consumption.
2. **Ability to pay for wellbeing is missing.** The benefits of the activity that seeks financing accrue largely to the benefit of its potential consumers, but those in demand of this productive activity lack the purchasing power to pay for it.

Impact investments that suffer from one of the above misalignments (or the combination of the two) often lie beyond the scope of mainstream finance. Financial institutions cannot invest when consumers are unable or unwilling to use their purchasing power to pay for the product or service being financed. Financial institutions operate within solvency, liquidity and (often) shareholder requirements, forcing them to focus on financial benefits that flow back to them directly. Therefore, expected (or real) purchasing decisions of consumers are the dealmaker or –breaker in investments, not the level of contribution to wellbeing or the commons of these investments.

Some argue that investment in products and services that contribute to wellbeing and the common good, that individuals cannot or are unwilling to pay for, is the responsibility of government and philanthropic organizations. Indeed, these large financiers are less stringent on financial returns and aim for wellbeing or common good governance at some geographical level. They therefore present important solutions. However, when applying financial innovations to these two misalignments, financial institutions can play a role in allocating capital to impactful investments, in addition to government and philanthropy.

Below (Table 2-1) we illustrate how innovations in finance can help the financial sector to make impactful investments even when individual ability or willingness to pay for individual wellbeing or the common good, are missing. On the horizontal axis, we distinguish between investments that contribute to individual wellbeing or common goods. On the vertical axis, we distinguish between the type purchasing power that is addressed to pay for the impactful investments: individual or collective purchasing power.

Chapter 2

This creates four scenarios in which different types of financial innovation may be employed to organise impactful investments through the financial sector. We will describe the financial innovations that answer to each of these scenarios.

Table 2-1 How financial innovations may solve purchasing power misalignments

	Individual Wellbeing	Common goods
Individual purchasing power	1. Regular impact investing	2. Pricing the commons
Collective purchasing power	3. Public – Private Finance	4. Community Finance

1. Regular impact investing

In the first of these four scenarios (top-left quadrant), individual purchasing power is available and used to improve individual wellbeing, and sufficient expected financial return is generated by the enterprise involved. Here, regular finance provides impact investments by fulfilling the three core conditions: non-speculative activity, contribution to wellbeing and the common good. This is the type of impact investment we described in the first part of this chapter. Under these conditions the investment can be made without financial innovation.

2. Pricing the commons

In the second quadrant (top-right), individual purchasing power is addressed to pay (extra) for collective wellbeing. The strategy here is to incorporate the cost of sustaining our common goods into the price of products and services and ask companies and consumers to pay for this cost on an individual basis. We give two examples of this strategy. Firstly, markets are created to create a price tag for externalities such as CO₂ or sulphur dioxide emissions. Companies trade carbon credits depending on their pollution levels, thereby entering (decreased) emissions into economic calculations by giving them a price (MacKenzie, 2009). This translates the cost of sustainable governance of our commons into a price in terms of currency (euro, dollars).

In other instances, the costs of creating a positive impact on collective wellbeing is quantified and integrated in the price of a product by producers, themselves, without a

market where this impact is traded. Consumers are asked to pay extra for products that have no negative impact or even a positive impact on collective wellbeing, such as biological eggs, milk and meat; carbon compensation for flights; sustaining rainforests by buying certified wood; fair trade chocolate. Furthermore, by either institutionalizing communicating this additional aspect of the product convincingly to the consumer, producers ask consumers to pay extra for this. The success of this strategy is dependent on the ability and willingness of the individual to pay a premium for this positive impact (i.e. De Pelsmacker, Driesen, & Rayp, 2005).

3. Public—private finance

In the third quadrant (bottom-left), collective purchasing power is addressed to improve individual wellbeing. This quadrant is of importance when a product or service can improve the wellbeing of individuals, but these individuals have no purchasing power available to invest in their wellbeing, themselves. Regular financial institutions cannot finance this productive activity without some type of purchasing power. Traditionally, this is the quadrant of government spending (i.e. welfare payments). By combining private and public investment in an innovative way, private sector financing can play a role and potentially make the investment more impactful than if made solely through the government. The main example in this category is the Social Impact Bond (SIB). Here, a private investment is made to reach some public goal (Jackson, 2013; Warner, 2013), such as higher levels of youth employment through a mentoring programme. If the investment turns out to obtain the intended result (i.e. a higher level of employment is achieved due to the intervention), the government pays a results-based financial return to the private financier. In this way, collective purchasing power via the government is only spent when results are achieved and unnecessary costs are saved while obtaining impact for society. Also, the risk of the investment and part of the return is shifted to the financial sector. Individual wellbeing of the youth improves, because they move from receiving unemployment benefits to being able to generate their own income, and costs are saved for government due to lower unemployment benefit payments.

These types of investments allow wellbeing of those with little purchasing power to be improved by **solving** or **preventing** problems (investing in training, developing a vaccine), instead of collectively paying for problems that are not being solved (high unemployment

benefits and high healthcare costs). Using collective purchasing power to improve individual wellbeing in an innovative way through the financial sector allows investments to be results-based **and** give a financial return. It links the improvement of individual wellbeing to financial return by using the public funds more efficiently than otherwise if continuously needing to deal with persisting problems.

4. Community finance

In the fourth (bottom-right) quadrant, collective purchasing power is addressed to contribute to common goods. Again, often governments provide funds to improve our common goods, such as infrastructure or governance of ecological systems. Nevertheless, governments, due to political priorities and lack of public funding, do not fund many potential improvements in collective wellbeing, even if they may lead to lower public spending needs on the longer term. Also, governments are not always able to identify and execute the most impactful investments at community levels. At an individual level, people may be unwilling or unable to reach some threshold investment needed to organise a common good.

Through community finance, the financial sector is able to make impactful investments happen that individuals and governments cannot. Crowdfunding is the main example of this type of innovation where financing is provided through a network or community. It refers to efforts by entrepreneurial individuals and groups—cultural, social, and for-profit—to fund their projects online by drawing on relatively small contributions from a relatively large number of individuals in exchange for financial and/or in-kind return (adapted from (Mollick, 2014). Although crowdfunding can be used for funding all kinds of initiatives, there are elements in its structure that seem to increase willingness to invest in common goods (adapted from Toxopeus & Maas, 2017):

- a. Diversity of payoff structures creates room for coordinated investment in the commons based on tailor-made, hybrid payoffs, two-way information flows and specific matching of costs and benefits. Due to the ability to give in-kind return or ‘community benefits’, it might be easier to convince stakeholders to fund, even when expected financial return is lower (for a theoretical model see (Belleflamme, Lambert, & Schwenbacher, 2014).

- b. Its flexible project-based investment structure makes it very suitable for adjusting to different levels and sizes of cooperation needed that lead to collective impact. Bringing benefits and costs in line with each other at the level where in-kind benefits are received or judged important (depending on preferences), is a way to create a ‘fair share’ financing structure, where everyone contributes to provide a larger good.
- c. The public nature of the investment process, where potential investors can view who has invested already, can improve individual propensity to cooperate in financing the commons. Behavioural research shows that almost half of the population can be described as ‘conditional co-operators’, meaning that they mimic cooperation levels of other individuals around them (S. S. Levine & Prietula, 2014). A public list of previous investors can therefore influence the investment behaviour of others.

Since investment of this kind is voluntary, not all who benefit will contribute. As long as a significant group carries the cost of the investment in common goods together, some free riding will be tolerated. However, if not enough ‘co-operators’ emerge, cooperation is likely to break down (Vollan & Ostrom, 2010). Creating smart financial structures that increase the willingness to financing the commons, using behavioural economic insights, can contribute to the amount of impactful investments that are made.

2.4 Conclusion and discussion

Money makes our world go round, but it does not automatically create its optimal amount of impact. In this chapter we have outlined conditions under which regular financial institutions allocate capital to investments that have a positive impact in our world. However, because of the current form of financial institutions, there are limits to which they can engage in impact investing. Therefore, we have also shown how financial innovations, such as social impact bonds and crowdfunding, can extend the ability of the financial sector to allocate capital in an impactful way.

Describing ways for regular and innovative financial institutions to make impact investments is only the starting point. The next question is how this can be extended to new innovations, scaled up, and improved. We suggest two main directions in which progress could be made.

1. Create a well-organised learning loop for optimizing impact. Money has a natural learning loop (if we aim to earn more money, we know *ex post* if we succeeded or not). If we want to improve the impact of our investments, we need to know which investments, *ex post*, actually turned out to really be impact investments (and why). Building up, sharing and applying impact knowledge, through evaluations and research, will make investments more impactful. This impact knowledge will help regular financial institutions and financial innovations (such as social impact bonds and crowdfunding) to improve the causality between their capital allocation decision-making to real impactful results.
2. Continue to develop financial innovation that increases and improves credit and capital allocation to create impactful results. For instance, impact investing can also take place in other types of money systems than the one we are used to (euro's, dollars). Complementary currencies and mutual credit systems have existed for decades, often aimed at providing purchasing power to those individuals and companies that lack this in the dominant money system, in cash-poor regions or during economic downturns (Stodder, 2009). Alternative money systems allow productive activity to take place by creating an alternative form of trust. The development of information technology and ensuing lower transaction costs involved, has given a boost to the development of a diversity of alternative currencies and credit systems, such as the Blockchain-based Bitcoin (Nakamoto, 2008) and mutual credit systems such as Sardex (Littera, Sartori, Dini, & Antoniadis, 2014). Regional mutual credit systems like Sardex in Sardinia and more historically, the *Wirtschaftsring* (WIR) in Switzerland, have a focus on regional, productive activity by design (Littera et al., 2014; Stodder, 2009). Intuition suggests that some of these credit systems may support production and trade that adheres to our core conditions: non-speculative, contributing to wellbeing and positive effect on our commons. Speculative activity is excluded by design, and production and trade is regional which means that wellbeing effects will be more transparent to buyers and producers, possibly leading to higher considerations of individual and collective wellbeing. Other innovative currencies, such as the bitcoin, are currently highly volatile and speculative. More research is

needed to find out whether new types of innovations could help us make impactful investments and under what circumstances.

Despite our attempt to illustrate the wide range of impact investments that financial institutions, through smart innovation, can allocate capital to, some impact investments will remain out of scope for them. Here, philanthropic organizations or governments are needed to act as (co-)investors. In spite of all efforts to bring enough stakeholders with purchasing power aboard to bear the costs of investment, beyond doubt there will remain cases where a country, region or sector is so devoid of stakeholders with purchasing power that government, civil society and philanthropy are needed, or that they are best positioned to make an investment. But in an increasingly interconnected world with growing opportunities for networks, and increasingly smart technologies, the evolving role of innovative, impactful finance may fill more gaps than we can currently imagine.

3 Credit that serves society requires relationships³

Abstract

Good credit provision involves not only a successful transaction but also requires taking into account the larger context in which this credit is granted. The authors describe this as ‘credit that serves society’ and follow the literature that assigns a broad societal responsibility to credit, not only from a social and sustainable point of view but also in terms of a well-functioning economy in the longer term. They substantiate the concept of ‘credit that serves society’ in terms of knowing, trusting and serving (Rupert et al., 2016). The authors explore the conditions under which knowing, trusting and serving can be developed within both relationship banking and transaction banking. Their conclusion is that in order to serve society, it is crucial to embed the credit in a relationship.

3.1 Introduction

A Buddhist community in Great Britain recently obtained a loan at a bank. This was possible because they were able to demonstrate to the bank that they contributed to the lives of their members in a meaningful way and that stable cash flows from the members had been contributed (voluntarily) to this community for many years. Had the credit application been based on a standardised credit model, it would probably have been rejected. In banking terms, the loan was sound because the social embeddedness of this credit was recognised as an important security instrument for the bank. By focusing on the larger picture in which the credit application took place, the ‘relationship banker’ was able to literally value the existing relationships, while a ‘transaction banker’ might have assessed the non-contractual cash flows as too risky. For a bank, extending credit that serves society means being willing and able to assess the significance of an organisation in a larger context.

³ This essay was published (in Dutch) in *Management & Organisatie* as Toxopeus & Blom (2016) “Dienstbaar krediet kan niet zonder relaties”. It is based on conversations between the authors about credit allocation and on a joint presentation at the ERGO III Conference in September 2015. Many thanks to Thomas Steiner and Christine van Waveren for their contributions.

Spotcap, an online business credit provider, recently entered the Dutch market. On the basis of company data provided online, an entrepreneur can – within two working days – get access to a line of credit which can be flexibly drawn down and repaid. The credit is provided on the basis of an algorithm that analyses current business data and publicly accessible information about the entrepreneur. No meetings or conversations are required.

Since the rise of transaction banking in the 1980s the playing field of banks has changed significantly due to deregulation, internationalisation, new forms of capital provision and technological developments that continuously reduce the costs of storing and processing information (Rajan, 2005). It is no coincidence that the term ‘relationship banking’ arose around the time when other forms of banking were introduced (Boot, 2000). Today, relationship banking is only one of several possible lending techniques to provide credit. Credit decisions can, for example, also be made primarily on the basis of financial data, a company’s credit score or valuation of the collateral (Berger & Udell, 2006). If the theologian and philosopher Augustine had known about transaction-based lending, he would probably have wondered where the ‘love’ was in this credit decision. We are also asking that question here, only we are replacing the notion of ‘love’ in the context of bank lending with the notion of ‘serving society’. Our research question is as follows: *does credit that serves society emerge both from relationship banking and transaction banking, and if so, under which circumstances?*

In this article, we first describe the credit function of banks and go into detail about how relationship banking and transaction banking are different institutional settings for the credit process. We then define the concept of ‘credit that serves society’ and further specify this into the three qualities of knowing, trusting and serving. We then use this interpretation of credit that serves society and our understanding of relationship lending versus transaction lending to answer our main question. We close the article with a discussion and the conclusion that without relationships, credit that serves society is not possible.

3.2 Banks as lenders

One of the most influential roles of banks in our society is determining who is creditworthy and thus which of the applicants can carry out the economic activity they had planned. This was formulated by Stiglitz & Weiss (1988) as follows: “To gain access over current

resources (...) one simply has to convince others that one will fulfil one's promise to deliver goods (money) in the future in return for what one receives today – that one is, in other words, creditworthy. And it is natural, given the economic importance of ascertaining whether individuals or firms are creditworthy, that institutions develop which specialize in ascertaining creditworthiness.”

In practice, determining creditworthiness means dealing with asymmetric information between lender and borrower (Stiglitz & Weiss, 1981). Lenders assess the quality of the borrower (to counter adverse selection) and monitor whether the credit is used in the agreed manner to prevent moral hazard (Berger & Udell, 2002).

In this article, we focus specifically on the bank as a lender. Banks are not the only intermediaries that provide credit – credit can also be raised on financial markets by issuing corporate bonds – but they can be considered influential because of the possibility to create ‘new credit’ by increasing their balance sheet (Bernanke, 2007; McLeay, Radia, & Thomas, 2014). Financial markets are also often inaccessible to smaller companies, so banks are often the only possible source of credit for these companies (Berger & Udell, 2002; Brancati, 2015), although the growth of peer-to-peer and crowdfunding markets is changing this (Forbes, 2015; Massolution, 2015).

3.3 Instrumental credit or credit that serves society?

Creditworthiness is often determined solely on the basis of the probability of repayment. However, we go one step further and use the term ‘credit that serves society’ in line with the literature that assigns broader responsibility to lending (Campiglio, 2016; Scholtens, 2006; Weber, Diaz, & Schwegler, 2014).

Lending influences the success of credit providers and credit applicants, but also steers the type of economic activity that takes place. Wider developments in society, such as the amount of clean air, high-quality jobs, products, services, cultural development and how we develop the living environment are indirectly determined by who receives credit and who does not.

How far does the responsibility of banks reach when it comes to the broader effects of their lending? We distinguish two visions – a narrow responsibility and a broad responsibility.

Narrow responsibility (instrumental credit)

From this perspective, banks are responsible for keeping their own balance sheet financially sound. Any externalities arising from operations, whether financed or not, are the responsibility of non-governmental organisations (NGOs) or public authorities. NGOs do this through philanthropy and actions in the public domain on topics that affect people, groups and society as a whole.

The government can address externalities through taxation, subsidies or establishing markets. A price can be assigned to public goods through regulated markets, which means that they are handled more carefully in business operations (as in the case of CO₂ emissions; see MacKenzie, 2009).

Markets are thus the regulatory mechanism; the government corrects imperfections exposed by NGOs and market players – including banks – are expected to follow the market according to the laws of supply and demand.

Broad responsibility (credit that serves society)

In addition to the narrow responsibility mentioned above, banks also bear indirect responsibility for the externalities of the companies they finance. Therefore, they should include the impact on society – of which the company is part – in credit decisions, even if the externalities do not affect the company's repayment capacity (Campiglio, 2016).

This way of thinking and acting can, for instance, be found among banks that are members of the Global Alliance of Banking on Values (GABV) and among banks that subscribe to the Equator principles, a covenant for responsible project financing (Scholtens & Dam, 2007; Weber, 2013). The Bankers' Oath, a moral code developed by the Dutch banking sector, also aims to appeal to a broader responsibility of banks towards customers and society (Boatright, 2013).

In this article, we define a broad responsibility in lending by judging the significance of the credit in society as a whole - including those effects that do not directly benefit the bank or the borrower - as credit that serves society. We see this interpretation of the bank balance sheet as a critical ingredient for socially engaged banking. We examine what credit that

serves society means in practice and whether – and if so, how – this can be achieved through both relationship banking and transaction banking.

3.4 Relationship lending versus transaction lending

A bank loan can be granted in various ways; the lending technique used often depends on the bank itself and the type of enterprise applying for credit. Banks' lending techniques can be classified according to the following four factors (Berger & Udell, 2006):2946):

1. Primary information source (such as relationship or financial reporting);
2. Screening and underwriting policies/procedures (such as track record and assessed collateral value);
3. Structure of the loan contract (such as ownership and collateral);
4. Monitoring strategies and mechanisms.

Relationship banking is characterised mainly by establishing and maintaining a relationship with the borrower as a primary source of information and monitoring strategy. (Boot, 2000):10) defines relationship banking as 'the provision of financial services by a financial intermediary that (i) invests in obtaining customer-specific information, often proprietary in nature; and (ii) evaluates the profitability of this customer-specific time investment on the basis of multiple interactions with this customer over time and/or across products'. In the case of relationship lending, the information is often difficult to transfer ('soft') and can also be gathered through direct contact with the stakeholders connected to the entrepreneur, such as suppliers, customers and related companies (Berger & Udell, 2006).

Within transaction lending several different lending technologies can be distinguished (Berger & Udell, 2006). Banks obtain the information for transaction-based credit decisions primarily by gathering various types of transferable ('hard') information. The best known transaction lending technology is financial statement lending, where, as a primary source of information and risk assessment, consideration is given to financial reporting – in particular the relationship between equity and debt – and the ability to repay the credit from expected future cash flows. In credit scoring, the credit history of (the owner of) the company is obtained, often via credit registration agencies, and the personal repayment capacity is seen as security. In asset-based lending, credit is provided primarily on the basis of the value of

a subset of the assets of a firm, such as property, inventories and receivables. The value of this collateral is monitored during the term of the loan and determines the credit amount. Fixed-asset lending is similar but only involves assets that are not sold in the normal course of business, such as vehicles and real estate. In factoring, accounts receivable are sold to generate liquidity for a borrower based on the value of the borrower's accounts receivable. Finally, leasing is a transaction lending technique strongly linked to the property, where the lender becomes the owner and leases the property instead of financing it, with all possible intermediary forms (Berger & Udell, 2006).

All these lending technologies, based either on transactions or relationships, are ways of dealing with asymmetric information and ensure that the bank can properly assess credit risk, such as the probability of default and loss in case of default for the bank.

3.5 Credit that serves society in relationship banking and transaction banking

Can credit that serves society be provided in relationship banking and transaction banking, and if so, how? To answer this question, it is necessary to further substantiate the concept of 'credit that serves society'. In order to do this we draw inspiration from Rupert et al., (2016), who study Augustine's concept of 'caritas', and apply it to the firm as an entity (p. 23): "As part of society, a firm serves the interests of various groups in society and is, at the same time, dependent on those groups. It is therefore necessary to *know* those groups and to have, place and maintain *trust* in them. Reciprocity is most explicitly expressed in the ability to *serve* these groups, as this encompasses a service to oneself."

We thus apply the concepts of knowing ('to know'), trusting ('to trust') and serving ('to serve') as key requirements in defining the concept of credit that serves society. This is in line with the introductory article of this theme issue (van Geest, Commandeur, & Langerak, 2016). We examine whether and how these conditions can be shaped in the lending process for both relationship banking and transaction banking.

To know

Augustine interpreted 'knowing' in a much broader sense than rational or intellectual knowledge; he referred to knowing what goes on in others' minds, such as desires, fears,

plans, thoughts, emotions and reflections (Rupert et al., 2016). 'To know' originates from love and respect for the other, rather than it being merely an instrument of self-interest. Knowing the borrower is the first step in a process of lending characterised by overcoming asymmetric information (Stiglitz & Weiss, 1981). The key requirement for knowing the entrepreneur is therefore: does the lender have access to the information needed to make a credit decision that serves society?

In relationship banking, 'knowing' arises through building a relationship with the entrepreneur. As a result, the bank will understand the significance of the credit in a larger context, i.e. not only from the bank's experience but also from the perception of the entrepreneur and his surroundings. The entrepreneur will respond to unexpected circumstances in the context of his surroundings; understanding this is essential for the bank when it comes to trust.

Information about the broader context of the credit will logically become part of the information-gathering process of the bank. It seems impossible to limit the provision of information to hard facts and figures when banker and entrepreneur are in a one-to-one conversation. In theory, a conversation can be limited to the transmission of hard facts that are important from the perspective of collateral for the bank, but the question is whether this makes the conversation worthwhile. Meaningful 'knowing' arises when the relationship is also about discussing 'what goes on in the other person' (Rupert et al., 2016). What motivates the entrepreneur to develop the company? What is the worldview of the entrepreneur? What is the entrepreneur's relevance in the larger context in which he operates? How does the entrepreneur experience this? In what way are opportunities created for others and for future generations?

In relationship banking, 'knowing' involves both instrumental information and information about the broader significance of the credit. The art of lending is to relate these different information types to each other. Where and how is the entrepreneur's passion expressed in the figures? Examples are overly high expectations of an ambitious, opportunistic entrepreneur, or excessive buffers and too little ideas and innovation when there is fear of entrepreneurship and associated risks.

Insight into repayment capacity is a prerequisite for providing credit. Moreover, understanding the socio-economic context in which the loan is given can provide more certainty about how the entrepreneur will deal with unexpected circumstances, whether he is well embedded in the market and whether he has a good relationship with relevant stakeholders. It is important for the entrepreneur that the bank, too, provides insight into the larger context. The bank is often better placed to identify sector-wide and macroeconomic developments and the challenges facing the sector in which the entrepreneur operates.

We conclude that obtaining information about the broader embeddedness of the credit and about the entrepreneur in relationship banking occurs naturally, provided that the relationship banker seeks this information in his contact with the entrepreneur and relevant stakeholders and that the entrepreneur shares this information.

Within transaction banking, information about the broader significance of the credit and the entrepreneur must first be expressed in hard, transferable facts to facilitate knowing the broader societal context. But is this possible? We believe, to a certain extent, that it is, but that it is a major challenge. Measurable environmental factors are, for instance, indicators like CO₂ emissions, the number of jobs created by the company, or the weight and composition of the company's waste streams. There are countless initiatives, companies and scientists that focus on rigorously researching the environmental and societal effects of companies, striving to make this measurable and reporting on such impacts (Maas & Liket, 2010, 2011) so that lenders can use this information to inform their credit decisions.

At the same time, the way in which the loan will impact the broader context in which the entrepreneur acts, is often so diverse and complex that many of these effects cannot (yet) be quantified. If we want to get a grasp of 'knowing' during transaction-based lending, with attention for the broader context, gathering factual, transferable information will often be insufficient.

In transaction banking, information about the broader impact of the credit is not automatically obtained during the information-gathering process, unlike in relationship banking. When information is gathered – sometimes through external parties – for instance about credit history, value of the collateral or debtors, no information is provided about matters such as the entrepreneur's motives or the expected societal impact of his company.

The lender should therefore be prepared to look beyond existing sources of information or involve external parties (such as specialised credit bureaus) to gather information about the broader significance of the credit.

The extent to which this contextual information can be made hard and transferable, as well as the question of who will gather this information and bear the associated costs, are major challenges in transaction-based banking for assessing whether the entrepreneur is sufficiently capable of undertaking meaningful action in a changing economic reality.

To trust

Trust is an important prerequisite for truly getting to know each other: it allows people to open up and let their guard down. At the same time, trust stems from the process of knowing, which ‘creates a relationship on the basis of an intrinsic motivation to be meaningful to the other’ (Rupert et al., 2016). Trusting draws on vulnerability and courage based on love, rather than on fear (Bovenberg, 2014).

We formulate the central condition of trust as follows: is the lender able, given the information available, to make an embedded credit decision that takes the societal context into account? Dealing with facts and figures in a manner that serves society is a key requirement. In this case, trust builds on the future and how the entrepreneur will deal with this uncertain future.

Trust is the cornerstone of every credit relationship and can have different origins, ranging from the valuation of the collateral to the assessment of the company’s financial projections and the quality of the entrepreneur. When does this trust serve society? For trust that ‘serves’, it must arise for both parties out of motivation to be meaningful to the other. This means that the bank not only makes its decision based on availability of guarantees (such as collateral) but is confident that the loan serves the entrepreneur and that the company or project for which it is intended has a real chance of success.

During the lending process, trust needs to emerge regarding the significance of the economic activity for others. This includes the trust that the enterprise that receives the bank credit will make a positive difference for consumers and maintain a good relationship with suppliers, and is meaningful for future generations through consideration of the environment in which the enterprise operates. By embedding the credit transaction in the dimensions of space and

time, its significance for society and future generations, such as issues like climate and the relationship between rich and poor, will be considered naturally by bankers and entrepreneurs.

An important condition for granting a loan in this way is the lender's ability to develop well-founded trust in the entrepreneur, given the context for which the loan is granted. The lender must first be able to obtain this information (to know) and then to interpret it carefully (to trust).

In the case of relationship banking, the relationship banker is the appropriate person to assess the impact of the credit on the larger context in which it is provided. During the relationship with the (prospective) borrower, information is collected based on which the relationship banker's understanding and trust can grow. These may involve personal conversations or company visits, but also getting to know the direct stakeholders and the sector in which the company operates.

Although valuation of collateral, financial reporting and other factual information are all part of the credit process in relationship banking, extending credit that serves society requires a process in which the lender should not only trust the entrepreneur's ability to repay but also the added value of the economic activity that is undertaken with the credit. Precisely when hard, predictive data are lacking, the relationship banker's individual judgement becomes crucial. From this point of view, the most experienced relationship bankers should focus on start-ups and younger entrepreneurs, for whom it is often difficult to demonstrate creditworthiness. The recruitment, training and development of high quality relationship bankers is therefore an important condition for extending trust for credit that serves society.

In the case of transaction banking, hard transferable information is gathered during the loan application process, on the basis of which trust is (or is not) created. This is usually done by processing this information according to standardised models. The development of serviceable trust in transaction banking depends on the ability of credit decision models, and the bankers who construct these models, to carefully weigh the available contextual information in the credit model. Stakeholder references and data provided by the entrepreneur and public online information can be a surrogate for a relational approach and can, in part, be effective because such information can deliver objective insights. As soon as

the information about the larger context in which entrepreneurs operate can be digitised and transferred, this information can serve the transaction.

The significance we attach to this information, for example by programming algorithms into credit models, remains highly important. It is a challenge to quantify the expected value to society and to take this value into account in models, even if this increases the risk or lowers the short-term financial return. Without a careful and broad interpretation of such hard, transferable information, trust can become focused too much on data and not enough on people, the environment and the relevance of the economic activity, and their interrelationships.

To serve

Serving others involves giving others the opportunity to develop their talent while helping them learn from their mistakes (Rupert et al., 2016). In a broader context, ‘to serve’ means facilitating and doing justice to mankind’s cultural mandate. This aspect is also strongly reflected in the definition of ‘agapè’ of Govert Buijs (2012), as being a person’s concrete commitment to the flourishing of someone or something else, on the way to shared joy (also and especially when this flourishing and joy are threatened).

We formulate the central condition for serving society in the credit process as follows: are the lender and borrower willing to enter into a mutually beneficial credit process and to carry it out in such a way that knowing and trusting are constantly verified? This predominantly involves a process that serves each other and society, an interaction between two parties and the pursuit of a common larger goal, with mutual understanding of each other’s interests.

For a long time, economic theory was focused on markets and how subjects behave in these markets. The rational pursuit of self-interest would, ultimately, be in everyone’s interest. In recent decades, however, relational principles have increasingly become a part of economic theory, such as the principle of cooperation (Axelrod & Hamilton, 1981; Vollaard & Ostrom, 2010).

The mutual aid model was introduced much earlier by ecologist Kropotkin (1908) in response to the Darwinist ‘survival of the fittest’ theory. Mutual aid is, in essence, an economy that has cooperation, with and for each other, as a starting point. Understood in this way, the economy is a social phenomenon.

The concept of ‘to serve’, defined as ‘the needs of one’s fellow human beings as a motive for one’s own actions’, goes back to the social gesture that underpins every economic activity (Brüll, 1984). Joy is shared when serving the other is mutual; by making interests run parallel, both parties benefit from the exchange (Bovenberg, 2014). Intentionally pursuing both one’s own and the other’s well-being results in good relationships and institutional forms of cooperation, and leads to a well-functioning economy at a macro level (Bovenberg, 2015).

When we define the economy as serving mutual interests, banks fulfil a special role in this respect. Banks are not ordinary enterprises; as a sector, they have obtained an unwritten social contract of mutual service. Banks provide financing for the real economy and, implicitly, society acts as a lender of last resort for banks – but only in extreme situations and when capital buffers are exhausted. The 2008 crisis has shown that these buffers were not strong enough. The Committee for Dutch Banking Structure’s main recommendation is therefore to strive for a stable banking system that serves society, where the Committee defines serving society as ‘banks operating in the Netherlands are to provide all banking products and services required by the Dutch economy, citizens and businesses in their development in a socially responsible manner’ (Commissie Structuur Nederlandse Banken, 2013).

Banks serve society when they enable (business) activities by providing credit on the basis of careful information-gathering, credit assessment and entering into a credit agreement, taking into account both the transaction and the significance of the credit in the broader context.

Finally, credit also needs to serve society when dealing with unexpected circumstances. Credit contracts are never complete, and in the event of setbacks, win-win situations should be sought within a credit agreement – within the possibilities of both parties – rather than focusing solely on self-interest. An important condition for ‘serving’ in credit provision, therefore, is that banks must be willing to be of service to society and that both parties to the credit agreement should interact with each other in a way that serves the other. This also implies that entrepreneurs take out a bank loan in a responsible way. By financing itself through a bank and becoming part of a larger loan portfolio, the entrepreneur allows risks to

be taken on, spreading them and making them acceptable, thereby enabling society to develop further.

Within relationship banking, willingness to take into account the contextual significance of the loan is positively influenced by a long-term embeddedness of the banker in the community, as well as in the sector in which the entrepreneur operates. Serving the entrepreneur during the credit relationship, including in adverse circumstances, is facilitated when the credit relationship is embedded in a long-term relationship, allowing the situation to be placed in a broader context and enabling help. Serving each other in the credit process evolves from long-term involvement in the entrepreneur's development and the goals the bank achieves in doing so, for example for savers and shareholders. With a good knowledge of each other's motivation and ambition to serve the larger whole, there is a greater chance that win-win situations will naturally be sought during the credit process. The success of both parties is intertwined.

The ability to serve each other and society in transaction-based banking is highly dependent on the way in which, in spite of its transactional orientation, a bank is prepared to include the long-term societal ambitions of both the bank and the company in the credit decision. This may be at the expense of short-term financial profits. Moreover, banks and companies do not always have a long-term relationship in the case of transaction-based banking. This willingness to serve each other and society does not arise automatically in a transactional credit and it is difficult to implement because of current limitations of quantifying the broader impact of the credit. Given the data-driven way in which credit is provided, there is the pitfall that a bank does not handle unexpected circumstances (such as collateral that is downgraded) in a way that takes into consideration the larger context of the loan, due to a lack of insight and involvement with the entrepreneur.

Based on the analysis above, we summarise the conditions that credit decisions in relationship-based banking and transaction-based banking must meet in order to serve society (Table 3-1).

Table 3-1 Conditions for credit that serves society in relationship and transaction banking

Conditions for credit that serves society	Relationship-based banking	Transaction-based banking
To know (the ability of getting to know the credit applicant)	The banker explores the broader significance of the entrepreneur and the credit, and the entrepreneur and stakeholders are willing to share information.	Information on the broader significance of the credit is standardised, made transferable (hard figures) and gathered, for instance through new sources of information.
To trust (the ability to take the broader significance of the credit into account in credit decisions)	The banker has the expertise to carefully judge the broader significance of the credit in the decision.	Credit decision models are designed and programmed in such a way that the broader significance of credit is carefully considered in the decision.
To serve (willingness to maintain the relationship in the long term and also bear the associated uncertainty)	Embedding the credit in a relationship ensures long-term commitment and insight into the broader impact of the credit.	Information-gathering and decision models are purposely organised in such a way that the broader impact of the credit is measured and taken into account (both when taking out and during the term of the loan).

3.6 Discussion: the future of credit that serves society

This article aims to answer the question: can relationship and transaction banking both provide credit that serves society, and if so, under which conditions? We define credit that serves society as taking on a broad responsibility by judging the significance of the credit in society as a whole, including those effects that do not directly benefit the bank or the borrower. We distinguished relationship-based banking and transaction-based banking by means of the primary source of information used for extending the credit, namely the relationship with the entrepreneur (relationship-based banking) on the one hand and transferable data about the entrepreneur (transaction-based banking) on the other. By operationalizing ‘credit that serves society’ into the three underlying concepts of ‘to know’, ‘to trust’ and ‘to serve’ for both relationship-based and transaction-based banking, we obtain three conditions for credit that serves. A bank must:

- (a) be able to gather information about the broader significance of the credit (to know)
- (b) have the capacity to carefully integrate this contextual information in the credit decision (to trust)

- (c) be prepared to grant and maintain the credit in a way that serves both parties and society (to serve).

When we perceive relationship-based and transaction-based lending from these three conditions, we find a natural match between credit that serves society and relationship-based banking. This is due to the embeddedness of the information-gathering and credit process in the relationship between bank and entrepreneur and also because the long-term engagement with the entrepreneur can facilitate a serving attitude of the bank. An important point of attention in relationship-based banking is the banker's ability to gather information and integrate this into credit decisions using his or her own judgment. If the aim is to provide credit that serves society, it is therefore crucial to invest in the development and training of relationship bankers.

Meeting the conditions of 'credit that serves' in transaction banking is more challenging. First, due to limited data availability it is complicated to really know a business based on hard data describing the broader context of the credit, especially in the case of start-ups or small companies. There are many initiatives aimed at making 'hard' information about societal effects of companies more widely available and more meaningful, such as True Price, which integrates societal costs and benefits into pricing (De Pelsmacker, Driesen & Rayp, 2005; True Price, Deloitte, EY & PwC, 2014). This might provide improved understanding. The actual significance (impact) of the entrepreneur for his context often remains difficult to assess, in spite of ongoing development of such measurements (Maas & Liket, 2011).

The second condition for credit that serves society is that the credit decision must be made thoughtfully (trust) and contextual information must be carefully incorporated into decision models, even if this is at the expense of short-term financial returns. This requires a conscious strategic decision on the part of the bank. Finally, the same applies to mutual serving between the bank and the borrower: without a long-term relationship with the entrepreneur, there is no natural involvement of the bank, and investments in the customer relationship cannot be spread over the longer term. Isolated events that call for commitment on the part of the bank – for example if the entrepreneur runs into financial difficulties – are often circumstances in which the 'numbers no longer add up'. In that case the bank must be

prepared to make an assessment of the situation that takes the interest of all parties into account. At the same time, we are aware that increasing availability of data - if carefully interpreted and integrated into the decision making - can also result in transaction-based banking increasingly extending credit that serves society.

What does this analysis mean for the future of credit that serves society? We pinpoint three societal developments that can contribute to the future of credit that serves: technological support, robust but non-rigid regulation and cultural change and increasing awareness of role on the part of banks.

Technological support

By lowering transaction and information costs, technology can facilitate 'looking the other into the eyes'. Information costs continue to decrease, which leads to Big Data but also to inexpensive one-to-one contact (such as a personal loan interview via Skype). When companies' production, consumption, distribution and waste chains – and information about the impact of their products and services – become transparent, it automatically becomes easier to take this information into account in a credit decision. However, technology can also lead to anonymity, which decreases the importance of insight into the larger context of a credit.

The way technology impact credit decisions depends on how we use it: what information is made available and what information is taken into account in credit decisions? Do our decision models 'serve' society? When algorithms are developed to enable fast credit decisions based on personal credit scores, different credit decisions are made than when investors watch personal video messages (as is common on many crowdfunding platforms). The first is useful from the point of view of the transaction and the second – if properly applied – can help financiers interpret the broader context in which an entrepreneur operates.

Technology can support credit that serves society when it ensures that information about the broader significance of the credit is taken into account in a credit decision and when it can bring together parties who, by entering into a credit agreement, want to strengthen each other's goals. For example, users of SnappCar, a car share company, were able to purchase subordinated bonds through crowdfunding and were perhaps willing to take more risk because of their involvement.

Successfully completing a crowdfunding campaign can, for transaction-based banking, also be considered 'hard' information about the broader relevance of the entrepreneur for a subsequent credit application with a bank. After all, the entrepreneur has shown the ability to get people committed to his company. In transaction-based banking, the importance of relationships may thus come in again through the back door.

Robust but non-rigid regulation

Regulation is a natural consequence of the mutual dependence of banks and society. Society needs banks and banks need the government. Credit that serves society in relationship-based banking specifically requires principle-based supervision, with a strong focus on culture. Transaction-based banking requires more attention to the integrity of the underlying data and models.

Setting higher capital requirements for banks has societal advantages and disadvantages. One advantage is less risk to society in the short term, and one disadvantage is a risk-averse society with less development in the longer term. The stacking of regulations is detrimental to the dynamism and diversity of the banking system. Banks can become large and sluggish and in danger of turning into protocol machines, with little room for focusing their credit on serving society.

A level playing field does not mean a *uniform* playing field, but an equivalent starting position for small and large, specialised or general. In this respect, supervision is about proportionality, while allowing for diversity. While robust regulation is needed, the pitfall is wanting to control the reality of credit allocation in all its aspects.

Cultural change and increasing awareness of purpose

Greater awareness of the societal relevance and potential for initiating change in banks and credit allocation, both among the general public and banks themselves, helps realise credit that serves society. Without a clear sense of the purpose of banks, cultural change cannot be steered in the right direction. When banks feel a shared responsibility for combating climate change, for instance, they can help achieve this by adjusting their credit allocation process accordingly.

Risk models will become more focused on systemic long-term risks related to credit provision, reflecting the growing importance of the broader significance of the credit

(UNEP, 2015). If banks invest in improving their assessment of the broader context of a credit, both through the relationship and the transaction, this can lead to better insights and perhaps also better choices.

3.7 Conclusion

In this article, we have examined the possibility of extending credit that serves society in relationship-based banking as well as transaction-based banking, operationalised in terms of ‘to know’, ‘to trust’ and ‘to serve’ (Rupert et al., 2016). We see a natural role for relationship banking in providing credit that serves society. Taking into account the impact on the larger context is self-evident when the credit decision is made on the basis of a longer-term relationship with the entrepreneur; moreover, contextual information becomes available naturally through relationships.

Whether or not a relationship-based loan is provided in a way that serves society, depends to a large extent on the quality and individual judgment of the relationship banker. Transaction-based lending requires transferable and proactively gathered information about the broader relevance of the credit, even if this information does not directly affect creditworthiness. The challenge lies in willingness – and ability – to take this information into account, while in many cases the societal impact of a credit is not (yet) properly measurable. Technological development, regulation and cultural change, if used effectively, can lead to greater willingness on the part of banks, smarter information-gathering and more credit decisions that serve society.

Ultimately, if credit is not about people and what happens between people when they work together with genuine interest, it cannot serve society. “For where two or three are gathered together in my name, I am there among them” is a promise made by Jesus (Matthew 18:20) which indicates this condition for love and serving. Relationship-based banking brings people together; transaction-based banking brings information and models together. Without relationships, credit that serves society is not possible. This in no way precludes the emancipatory and technological possibilities inherent in transaction-based banking, but these possibilities should not become an end in itself. Currently, data-driven development is so powerful that it requires renewed attention on and appreciation of the human relationship – where it can be known, results in trust and leads to mutual serving.

4 Crowdfunding sustainable enterprises as a form of collective action⁴

Abstract

Crowdfunding is viewed as a promising source of finance for sustainable enterprises. We apply collective action theory to crowdfunding to better understand its expected potential for financing sustainable enterprises. By carrying out a rule classification analysis, we find three main mechanisms through which crowdfunding seems to facilitate collective action in funding, namely through (1) use of social networks (2) heterogeneity of contributions and payoffs and (3) aggregation within thresholds. Our findings improve the conceptual understanding of sustainable entrepreneurial finance and provide guidance for social enterprises looking to obtain funds as well as for sustainable crowdfunding platforms as intermediaries.

4.1 Introduction

The necessity of transitioning to a low carbon, sustainable economy has become more urgent in recent years (Andersen, 2006; Ellen MacArthur Foundation, 2012; Stern, 2008). Existing or nascent enterprises are increasingly trying to change or set up their business in a sustainable manner to contribute to global sustainability goals. However, one of the main impediments of building a sustainable enterprise is finding external financiers willing to carry the risks of transitioning to doing business in a low carbon, sustainable way (Campiglio, 2016; O. Mont, Dalhammar, & Jacobsson, 2006; Scholtens, 2006; Tukker, 2015). Different approaches can be taken to stimulate investments towards sustainability, such as regulation, taxes and subsidies, and influencing consumer preferences. Many studies aim to find out whether sustainable investments deliver higher financial returns for the investor in comparison to non-sustainable investment, which would provide a straightforward argument to invest in sustainable enterprises. A recent study, based on

⁴ Joint work with Karen Maas. Published as Toxopeus, H., & Maas, K. (2018). Crowdfunding sustainable enterprises as a form of collective action. In T. Walker, S. D. Kibsey, & R. Crichton (Eds.), *Designing a Sustainable Financial System: Development Goals and Socio-Ecological Responsibility*. Palgrave Macmillan.

established US firms, shows that sustainable companies attain better financial results compared to a comparable non-sustainable set of firms, but that it takes on average five to seven years to achieve this (Eccles et al., 2011).

However, inevitable to any transition, many sustainable enterprises are early stage, innovative businesses, trying to change the way business is being done in a certain sector. These smaller, early stage sustainable enterprises arguably face a more difficult financing constraint than established firms moving towards sustainability. One part of the financing constraint of sustainable small and medium-sized enterprises is related to general innovation-specific issues such as lack of track record and collateral, high technological risk and risk of spillover of R&D investment to other firms (Brancati, 2015; Cincera & Santos, 2015; G. Giudici & Paleari, 2000). The second part of the financing constraint is specific to sustainable enterprises and relates to their objective of creating societal impact (positive externalities) in their course of business. Rational choice theory predicts that financiers are not willing to invest in collective payoffs unless they can be fully appropriated, thus creating a 'double externality problem' (Faber & Frenken, 2009; Rennings, 2000). This means that the time horizons for small-scale sustainable enterprises to appropriate financial payoffs from their innovative, sustainable activity are generally long-term and uncertain. Nevertheless, sustainable innovation by small and midsized enterprises is crucial for transitioning towards a sustainable economy. Due to the small scale and high-risk nature of these type of businesses we believe that the 'higher financial return' argument, used as rationale for investment in established sustainable firms, cannot be the sole driver behind investments in these enterprises.

We argue it is time to shift focus away from monetary payoffs as the main driver for investors in sustainable investments and towards a more complex and behavioral view on how investment decisions for sustainable enterprises can be supported. In order to better understand how to move towards a sustainable financial system supportive for sustainable enterprises, we direct our focus towards crowdfunding, which has been argued to be especially well positioned to financing sustainable enterprises (Calic & Mosakowski, 2016; Lehner, 2013). This can be partly explained by the fact that crowdfunding is a particularly suitable financing tool for early ventures (J. H. Block et al., 2017; Bruton, Khavul, Siegel, & Wright, 2015), referring back to the innovation-related part of the financing constraint.

However, on top of that, some authors suggest there to be a particularly good match between crowdfunding and sustainable enterprises, which has been mainly explained using legitimacy theory (Calic & Mosakowski, 2016; Lehner, 2013). This feeds back into the second – sustainability – part of the financing constraint, which we focus on in this chapter.

More work is needed to understand what may drive sustainable enterprise crowdfunding. Legitimacy theory argues that individual crowdfunders may be particularly willing to fund sustainable enterprises in line with growing societal support for social entrepreneurship (Calic & Mosakowski, 2016). Although this explanation takes into account the decentralization of the financing decision to small non-professional investors, it lacks a more structured analysis of crowdfunding as different institutional setting which leads to a different type of decision-making than in traditional financial institutions.

In the current chapter, we therefore use collective action theory (Olson, 2009; Ostrom, 2010a) to analyze the institutional setting of crowdfunding to understand how this can be a potential successful way of funding sustainable enterprises. We believe collective action theory allows for a structured answer to the question of why crowdfunding can be a good fit with financing sustainable enterprises. This therefore leads to the core question of this chapter: How does collective action theory help us explain the potential success of crowdfunding for sustainable enterprises?

We continue this chapter as follows: First, we give an overview of the existing literature on crowdfunding for sustainable enterprises. Next, we give an overview of the findings of collective action theory in order to apply this to sustainable enterprise finance. We explain our methodological framework and undertake a rule-based analysis of crowdfunding to find matches and mechanisms that can drive successful collective action in crowdfunding. We conclude with recommendations for the design of financial decision-making for collective action based on our current analysis of crowdfunding.

4.2 Why do crowdfunders invest in sustainable enterprises?

In the past ten years, the development of crowdfunding markets has raised the question of whether crowdfunding is particularly well suited to finance sustainable enterprises, and if

so, why? Current research suggests several mechanisms that could explain why crowdfunders might be particularly willing to fund sustainable enterprises.

The legitimacy theory perspective argues that the focus of crowdfunders on the mission and core values of an enterprise, as well as the ‘democracy’ of having many small funders, fits finance social enterprises well (Calic & Mosakowski, 2016; Lehner, 2013). In the case of renewable energy crowdfunding, a combination of normative, gain and hedonic motivations is found (Dóci, Vasileiadou, & Petersen, 2015; Vasileiadou, Huijben, & Raven, 2016). Also, the limited monetary motivations of social entrepreneurs can be a strong signal that they are more outcome-focused, reducing the risks of moral hazard and increasing legitimacy of the investment as perceived by the crowdfunder (Lehner, 2013).

Obtaining community benefits has also been proposed as a motivation for crowdfunders to invest in a crowdfunding project (Belleflamme et al., 2014). The utility of crowdfunders increases through the consumption/investment experience that they undergo as part of their funding decision (Ordanini et al., 2011). A prerequisite for this additional utility is that they become part of the community of the enterprise and are thus in some way connected to its social network (Belleflamme et al., 2014; Ordanini et al., 2011). Arguably, creating a community around an enterprise is easier if some collective benefit is to be created, which is implicitly the case for sustainable enterprises.

Contract failure theory predicts that non-profit oriented sustainable enterprises are more focused on quality and outcomes and therefore are better at obtaining funds from the public (Belleflamme et al., 2014; Hörisch, 2015). Rational choice theory, on the other hand, predicts that crowdfunders will not prefer sustainable enterprises to general enterprises based on any other motivation than that they deliver at least competitive financial payoffs. From this perspective, enterprises that focus (partly) on providing or contributing to a common good that investors cannot capture in the form of individual financial return, will be less successful in finding investors compared to purely for-profit enterprises.

Empirical evidence about the potential of crowdfunding to finance sustainable enterprises show mixed results. Calic & Mosakowski (2016) find that technological and film/video crowdfunding projects on Kickstarter with an environmental or social focus are funded more successfully than projects without such a focus, partly mediated by creativity and third party

endorsements. On the other hand, (Hörisch, 2015), finds no significant relationship between environmental focus and funding success of projects on the crowdfunding website Indiegogo (www.indiegogo.com). Our current understanding of crowdfunding for sustainable enterprises is still in its infancy and begs refinement. With this study we aim to build on existing knowledge by developing an enhanced model to understand the different routes to sustainable finance by analysing crowdfunding through a collective action lens.

4.3 Collective action theory as a lens for sustainable enterprise crowdfunding

Collective action theory, based on work by Olson (2009) and Hardin (1971) departs from rational choice theory by empirically identifying three behavioural types (S. S. Levine & Prietula, 2014; Vollan & Ostrom, 2010): (1) co-operators, who will unconditionally add their share to provide a collective good, (2) conditional co-operators, who copy the (expected) behaviour of others; and (3) free or easy riders, who will contribute (next-to) nothing – behaviour predicted by rational choice theory. Field and lab experiments show that the second type, conditional co-operators (also referred to as reciprocators) are usually around half of the population (Fischbacher, Gächter, & Fehr, 2001; Frey & Meier, 2004). They play a crucial role in generating either low or high levels of collective action, since their behaviour is conditional upon the behaviour of others. The incidence, visibility and expectations of the share of co-operators and “free riders” in the population will affect whether they cooperate, or not (Vollan & Ostrom, 2010).

Collective action theory has increased our understanding about institutional arrangements that improve our ability to organize collective action (Ansell & Torfing, 2016; Ostrom, 2014). In the area of natural resource management, for example, design principles have been identified that improve the ability of groups to successfully undertake collective action (Cox et al., 2010; Ostrom, 2010, 2014; Vollan & Ostrom, 2010). More generally, empirical studies have shown that some institutional arrangements, such as face-to-face communication between participants in a social dilemma, improve cooperative outcomes (Balliet, 2010; Fehr & Gächter, 1999; Fehr & Schmidt, 1999; Fischbacher et al., 2001; Nowak, 2006).

The willingness of crowdfunders to finance sustainable enterprises can be framed as a social dilemma. Collective payoffs created through the investment cannot be appropriated by the

enterprise and nor by the individual investor. Nevertheless, funders seem willing to invest in sustainable enterprises through crowdfunding. This fuels our hypothesis that crowdfunding is an institutional arrangement which fosters collective action, such as sustainable enterprise funding. Therefore, we structurally analyze what aspects of the institutional structure of crowdfunding could be driving successful collective action. If we find institutional arrangements for collective action in crowdfunding, this can be applied strategically in order to successfully obtain funding for sustainable enterprises.

We give an overview of the most important institutional arrangements that have been empirically shown to lead to increased collective action (Table 4-1). For each arrangement, we provide the most relevant (if available, meta-analytical) source. Not all of these arrangements will be applicable to crowdfunding. We use this overview of design principles for collective action as a starting point for an institutional analysis of crowdfunding.

4.4 Methodology: Rule classification of crowdfunding

Following literature on cooperation for the commons (Kitsing & Schweik, 2010; Volla & Ostrom, 2010), we apply the rule classification approach to crowdfunding. The rule classification method was developed by Ostrom and Crawford (2005) as part of the Institutional Analysis and Development framework (Ostrom, 2010a). Rule classification allows for a structured analysis of an institutional setting. Rules are defined as ‘shared understandings among those involved about what actions are required, prohibited or permitted’ (Ostrom, 2010a). Crawford and Ostrom (2005) distinguish seven types of rules that can be used to describe the institutional arrangements of any type of action situation:

1. Position rules: what positions can be taken by participants?
2. Boundary rules: how can participants enter or exit positions?
3. Choice rules: who has the authority to make decisions?
4. Aggregation rules: are there any joint decisions in the decision process?
5. Information rules: what information flows between participants?
6. Payoff rules: what rewards exist for different actions?
7. Scope rules: what outcomes are accepted?

We apply rule classification to crowdfunding, describing the different rules for crowdfunding to understand how crowdfunding may facilitate sustainable enterprise finance through collective action. Figure 4-1 indicates how the different rules influence different aspects of any action situation. A classification of rules allows us to analyze the playing field for collective action in crowdfunding. We analyze the seven different types of rules for crowdfunding in turn (Ostrom & Crawford, 2005). We base our rule description on international peer-reviewed academic literature about crowdfunding (Belleflamme, Omrani, & Peitz, 2015; Mollick, 2014; Moritz & Block, 2016; Polzin, Toxopeus, et al., 2017).

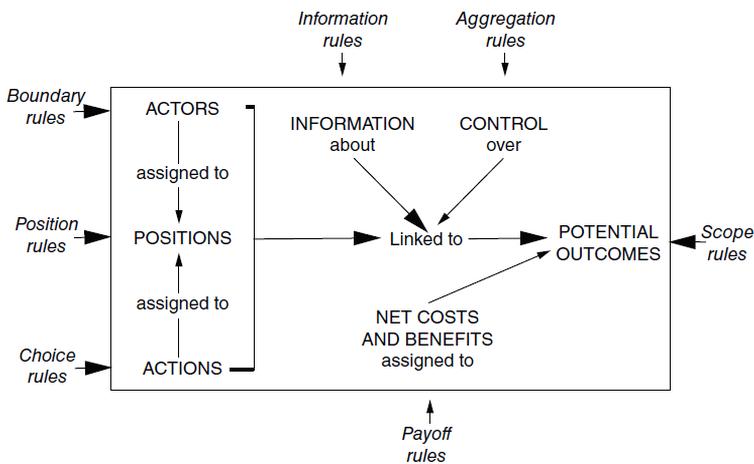


Figure 4-1 Rules as exogenous variables affecting the elements of an action situation (illustration from Ostrom, 2010a)

4.5 Analysis: rule classification and potential for collective action

Our analysis consists out of two steps. First, we carry out a rule classification of crowdfunding. Second, we match existing findings from collective action theory to the rules found in crowdfunding to understand the potential of crowdfunding for bringing about collective action in finance.

Description of rules in crowdfunding

There are three types of positions that can be taken by participants in crowdfunding (**position rules**). The first position is that of the entrepreneur looking for funds. The second position is that of the funders who pledge money. The third position belongs to the crowdfunding

platform who acts a financial intermediary by brokering the relationships between entrepreneurs and funders.

The entry requirements (**boundary rules**) for each position are similar or lower compared to other financial intermediaries (such as banks). Entrepreneurs are screened by the crowdfunding platform before being permitted to attract funds via their website. For crowdfunding platforms, there are national legal requirements but these are generally less stringent than for other financial intermediaries and depend on jurisdiction, the type of crowdfunding and the size of the funds being attracted. For funders, the most important entry requirement is that of having a minimum amount of funds available to pledge.

The authority to make decisions (**choice rules**) which generate the final funding decision is divided between the three types of participants in crowdfunding. Platforms decide which entrepreneurs get to present their enterprise on their website, based on pre-screening on aspects such as risk/return profile and scope of the enterprise. Entrepreneurs choose which platform they want to fund on for which amount, and what they want to offer their funders in return (i.e. interest rate, size of equity stake, type of reward). Crowdfunders decide per enterprise whether they want to invest and what amount (against what return).

Crowdfunding is a typical case of joint decision-making (**aggregation rules**) since crowdfunders invest sequentially and in the aggregate decide whether an enterprise obtains funds, and how much. Most platforms employ a threshold (all-or-nothing) mechanism for campaigns. Only if a group of funders jointly commits enough funds to reach the minimum amount that the enterprise needs is a positive funding decision reached, usually within a timeslot (i.e. thirty days). If this threshold is not reached, the enterprise receives no funds, not even those that were pledged.

Information rules in crowdfunding affect this aggregation process, since potential crowdfunders have real-time publicly available information about how many funders have pledged what amounts up to that moment (per person and in total). This information often includes the identity of funders who have already pledged to participate, depending on whether funders choose to be anonymous or not. Furthermore, funders are able to ask questions in public to the entrepreneur; these Q&As become publicly available information on the crowdfunding website and/or social media. Furthermore, entrepreneurs provide

potential funders with information about the enterprise and the project to be funded using a project description including information about the entrepreneurs, an investment sheet, a video and information about the payoff offered per amount pledged.

The costs and benefits for each of the three participants (**payoff rules**) depend on the type of crowdfunding that the entrepreneur chooses to employ: donation, reward, debt or equity. In general, platforms obtain a success fee for each successfully funded enterprise, framed as a percentage of the amount pledged, in exchange for the cost they make in screening the enterprise and marketing the enterprise to their crowd. Entrepreneurs incur costs to be screened by the crowdfunding platform, market themselves to the crowd and answer questions. Also, they pay for the brokering services of the platform and commit a certain return to the crowd. Crowdfunder payoff is heterogeneous and can consist of both tangible and intangible benefits. Tangible benefits can include a product or service, a fixed interest payment, profit sharing or buy-out but also provision of a collective/public good. Intangible benefits include warm glow (Andreoni, 1990), community benefits, such as feeling part of a group or being allowed to give input to production decisions (Belleflamme et al., 2014), and build-up of social capital (Colombo, Franzoni, & Rossi-Lamastra, 2015).

Finally, **scope rules** in crowdfunding define what types of enterprises or projects can be funded on certain platforms, which often have criteria based on type of crowdfunding, amount funded, sector or risk level. Based on their funding scope, i.e. only rewards (www.kickstarter.com) or only an impact-focus (www.oneplanetcrowd.com), we find many different types of crowdfunding platforms who each facilitate different types of investment decisions.

Matching collective action theory to crowdfunding rules

Although rule classification applied to a new institutional setting in itself is insightful (Kitsing & Schweik, 2010), our goal in this chapter is to use this rule classification to find overlap between crowdfunding rules on the one hand and institutional arrangements which improve collective action, on the other. Through a literature search on collective action and social dilemmas we create an overview of arrangements that are found to increase collective action or cooperation between actors (Table 4-1). Next, we match these collective action – enhancing institutional arrangements with crowdfunding rules (Table 4-2).

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Table 4-1 Overview of institutional arrangements for collective action

Institutional arrangement	Design principle or mechanism	Main source(s)
Clear boundaries for users and resources	Clear and locally understood boundaries between legitimate users and nonusers. Boundaries separate a specific common-pool resource from a larger social-ecological system.	Ostrom, 2010a
Balanced provision and appropriation	Appropriation rules are congruent with provision rules; the distribution of costs is proportional to the distribution of benefits. Appropriation and provision rules are congruent with local social and environmental conditions.	Ostrom, 2010a
Collective choice arrangements	Most individuals affected by a resource regime are authorized to participate in making and modifying its rules.	Ostrom, 2010a
Monitoring (users and resources)	Individuals who are accountable to or are the users monitor the appropriation and provision levels of the users and the condition of the resource.	Ostrom, 2010a
Graduated sanctions	Sanctions for rule violations start very low but become stronger if a user repeatedly violates a rule.	Ostrom, 2010a
Conflict resolution mechanisms	Rapid, low cost, local arenas exist for resolving conflicts among users or with officials.	Ostrom, 2010a
Minimal recognition of rights	The rights of local users to make their own rules are recognized by the government.	Ostrom, 2010a
Nested enterprises	When a common-pool resource is closely connected to a larger social-ecological system, governance activities are organized in multiple nested layers.	Ostrom, 2010a
Group size	In smaller groups/communities, more frequent interaction allows for increased trust through reputation building and mutual monitoring, and participants are more likely to believe their contribution will make a difference. However, group size needs to be large enough to enable natural resource provision even if only a subset of the group participates.	Poteete & Ostrom, 2004
Group heterogeneity	Shared social, cultural or economic characteristics increase predictability of behavior and imply common interest and/or higher trust levels which can improve collective action. However, resource and interest heterogeneity can also lead to better collective action by a subset of the population when some participants have higher benefits from cooperating and/or more resources to share.	Oliver, Marwell, & Teixeira, 1985; Poteete & Ostrom, 2004
Communication	Communication prior to and during social dilemmas increase cooperation levels between participants, in particular for larger group sizes and for face-to-face (versus written) communication	Balliet, 2010

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Sequential decision-making	Participants take account of whether and how much others contribute to determine their own contribution to a collective action.	Granovetter, 1978; Oliver et al., 1985
Contribution size	For smaller endowments / effort sizes, contributing to collective action is more likely.	Ostrom, 2014
Activation thresholds	All-or-nothing mechanism ensures risk-free commitment; a contribution is only activated if the minimally needed commitment is pledged.	Cheng & Bernstein, 2014

From this full overview of ‘matches’ between crowdfunding and institutional arrangements that foster collective action, we find quite some overlap and combinations to be made between the different aspects of the institutional arrangements. Many matches between crowdfunding rules and collective action arrangements are partly driven by the same underlying rules. In particular, the low *boundary rules* for becoming a crowdfunder (low amount of funds needed per investment decision) in combination with a funders ability to make enterprise-specific funding decisions (*choice rules*) seems to create ample opportunity for collective action, simply because direct provision of finance for enterprises is opened to more individual participants than before.

For a comprehensive overview of our findings as described in Table 4-2, we combine them into three mechanisms through which crowdfunding can foster collective action for sustainable enterprise finance: (1) use of social networks (2) heterogeneous contributions and payoffs, and (3) aggregation within thresholds. Also, we indicate which rules are driving each mechanism (Table 4-3).

Mechanism 1: collective action through social networks

Since crowdfunding is often network-based, collective action can be enhanced in several ways. Information distributed about the enterprise, especially for early backers, often comes from the entrepreneur who mobilizes existing strong and weak ties (family, friends, clients, previous investors or business relations). First, knowing the person(s) behind the enterprise has been shown to affect the information used for the decision-making and can decrease fears of moral hazard (Granovetter, 2005; Polzin et al., 2017). Secondly, the homogeneity of actors within a social network may be larger, which increases trust about expected

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Table 4-2 Overview arrangement for collective action matched to rules in crowdfunding

Rules	Matching rules in crowdfunding to collective action mechanisms
Clear boundaries for users and resources	<p>Enterprise-specific crowdfunding campaigns makes it very clear what money is pledged for (and which sustainability goal is addressed)</p> <p>Boundaries to enter as crowdfunder are low due to small starting amounts</p> <p>Boundaries to become a crowdfunding platform are relatively low, leading to a heterogeneous crowdfunding market with each platform defining its scope</p>
Balanced provision and appropriation	<p>A large crowd of potential funders (low entry boundaries) allows for selection of funders who have a higher payoff / preference from a certain type of collective action based on region, network, sector or interest which can improve willingness to fund</p> <p>Different types of payoff can be formulated in order to best address the preferences of potential funders and investment sizes</p>
Collective choice arrangements	<p>Low boundaries to fund “democratizes” the funding decision making it a potential collective choice (but depends on spending power)</p> <p>Spread of information in regional or thematic networks involves a large group of potential funders</p>
Monitoring (users and resources)	<p>The inclusion of an entrepreneur’s social networks and/or users in the funding community allows for informal monitoring through repeated interaction</p>
Graduated sanctions	<p>Not applicable</p>
Conflict resolution mechanisms	<p>Crowdfunding platform provides legal contracts defining agreements made regarding use of money and payback period or profit sharing, but not regarding sustainability milestones</p>
Minimal recognition of rights	<p>Most jurisdictions have officially created laws for crowdfunding as a financial tool.</p>
Nested enterprises	<p>Sustainable enterprises often address one specific sustainability need, located within a sector or business lines (creating a sustainable version of an existing product). This enterprise-specific approach leads to multiple governance layers each addressing a subset of existing sustainable goals.</p>
Group size	<p>The low entry boundaries for crowdfunders in general allow for a large potential group of funders, of which only a small part needs to participate to provide enough funding for the enterprise</p> <p>When a crowdfunding campaign targets a specific crowd (i.e. local neighborhood or client group), repeated interaction can increase reputation building, trust and/or mutual monitoring; furthermore participants are more likely to believe their contribution will make a difference</p>
Group heterogeneity	<p>Low boundaries to entry and heterogeneous potential funding participants means that funders can self-select into a sustainable enterprise funding campaign that best fits their preferences</p>

	Network or interest-based crowdfunding around a common sustainability goal addressed by an enterprise can increase predictability of behavior and therefore mutual trust through homogeneity <i>within</i> the funding community
Communication	Cheap talk can occur both face-to-face in social networks surrounding the sustainable enterprise as well as online on social media and on the crowdfunding page of the enterprise, where crowdfunders can communicate their (intent to) pledge to other potential funders.
Sequential decision-making	Crowdfunding makes it transparent in real-time how many other funders have already contributed, the amounts and in which time period. Furthermore, identities of previous funders are sometimes known
Contribution size	Crowdfunding allows for contributions to specific enterprises starting at very small amounts (for enterprises usually between 100-250 Euro).
Activation thresholds	All-or-nothing mechanism means a pledge is only activated if a minimum amount of funding has been reached, lowering the risk that the money will not be spent well. A timeslot (i.e. 30 days) increases the urgency to contribute within a fixed time period (deadline).

behaviour and can therefore facilitate collective action, if participants fund based on the expectation that others will put in their share of the funds as well (Poteete & Ostrom, 2004). Third, smaller, well-defined group size is argued to be conducive to collective action because a single contribution is expected to make a real difference (Olson, 2009; Ostrom, 2010a) and opportunities for frequent interaction rise as group size decreases, which leads to a higher importance of reputation (Poteete & Ostrom, 2004). However, the group size of the potential funding community still needs to be large enough to include enough contributors and to allow for self-selection of funders who receive the highest payoff from contribution to collective action i.e. due to preferences or reputation (Oliver et al., 1985). Furthermore, resource heterogeneity within a potential funding network can be useful since higher resource endowments make it easier to pledge funds (Oliver et al., 1985).

Mechanism 2: Collective action through heterogeneous contributions and payoffs

Heterogeneity of choice and payoff rules in crowdfunding may improve collective action for sustainable crowdfunding by allowing for fine-grained matching of investor contribution and payoff preferences in line with enterprise characteristics. By designing the contribution and/or payoff structure of a crowdfunding campaign based on specifically targeted funders such as users, clients, believers or regional inhabitants, the benefit for a funder of joining a campaign can be maximized, enhancing collective action. Bringing *appropriation* (benefits)

and *provision* (costs) in line with each other by locating costs within the community that will profit from shared benefits, is one of Ostrom's design principles for governing natural resources (Ostrom, 2010a) and may also facilitate collective action in crowdfunding. For example, consumers or players in a certain value chain that wish to use a sustainable product or want to be part of an inspiring community, may be willing to invest in or pre-purchase the product since they are motivated to bring it to market. Crowdfunding platforms are able to offer multiple types of payoff (i.e. products) to create niche markets targeted at specific segments (such as users). Furthermore, size of contributions to a crowdfunding campaign may vary considerably, depending both on a participant's financial endowment and willingness to contribute. In general, more people are willing to make smaller contributions (Ostrom, 2014), therefore the option to pledge heterogeneous amounts is likely to facilitate collective action in crowdfunding.

Furthermore, crowdfunding platforms can define their scope by selecting enterprises that fit the preferences of a specific crowd, making it easier to match funders to sustainable enterprises based on their preferences and payoff expectations. As an example, Oneplanetcrowd, a Dutch sustainable crowdfunding platform, invited all funders of a car sharing initiative to invest in a tool sharing platform based on their previously revealed funding preferences (type of enterprise and type of payoff).

This payoff-mechanism is likely to interact with the first network-mechanism, since increasing individual payoffs through niches can mean that individuals who benefit most from a collective cause are already part of an enterprise's existing social network as members, clients, believers or local inhabitants. However, we need to distinguish between them because the underlying rules driving the two mechanisms are different. The network-mechanism is relationship-driven, conveying information, trust and reputation to stimulate collective action; the payoff-mechanism is driven by heterogeneous payoff (cost and benefit) rules that can positively affect the willingness to contribute.

Mechanism 3: Collective action through aggregation within thresholds

The sequential, online and transparent aggregation and information rules of crowdfunding in a threshold model may improve collective action due to conditional cooperation between individual crowdfunders (Cheng & Bernstein, 2014; Frey & Meier, 2004; Keser & Van

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Winden, 2000). Crowdfunders who observe the investment of others may decide to add their funds to contribute to societal impact in a similar way as communication between actors can lead to cooperation in common-pool resource dilemmas (Vollan & Ostrom, 2010). Within this mechanism, the legitimacy argument can play a role: if others choose to invest, this creates a quality signal that the enterprise may be effective in reaching its goal (Lehner, 2013).

Furthermore, information about previous funder decisions is skewed: potential funders see only the ‘cooperating’ funders who decided to invest, not the ones who considered funding but decided not to join the funding initiative. There is therefore a larger chance that conditional co-operators will follow the example of the previous funders if they feel that many funders have joined within a short time frame (proxying for a high percentage of funders that considered funding that actually funded), even though they do not know how many funders decided *not* to fund. This selective information provision can help collective action come based on the behaviour of the unconditional co-operators, namely early backers. Mirroring this process, low numbers of funders during the first time period of a crowdfunding campaign means collective action will probably not come about, since conditional co-operators will gauge there to be too little cooperation going on and fail to add their funds.

Table 4-3 Three main mechanisms for collective action in crowdfunding

Rules \ Collective Action mechanism	Network-based funding	Heterogeneous contribution and payoffs	Aggregation in thresholds
Position rules			
Boundary rules	●	●	●
Choice rules	●	●	●
Aggregation rules			●
Information rules	●		●
Payoff rules		●	
Scope rules		●	

4.6 Discussion: What rules lead to collective action in crowdfunding?

In this paper, we apply findings from collective action theory to the institutional arrangements of crowdfunding in order to explain why and under what circumstances sustainable enterprises are more likely to be successfully funded than mainstream enterprises. Previous work on sustainable enterprise crowdfunding uses (mainly) legitimacy theory to explain why sustainable, social or environmental enterprises could be more successful than mainstream enterprises at crowdfunding, despite predictions from rational choice theory (Calic & Mosakowski, 2016; Hörisch, 2015; Lehner, 2013). However, empirical evidence on this question is scarce and mixed.

We apply collective action theory to understand the potential contribution of crowdfunding to sustainable finance. We discuss what institutional arrangements within a crowdfunding campaign can lead to successful funding based on institutional arrangements that foster collective action. Our analysis results in three main mechanisms that can explain why sustainable enterprises may be crowdfunded easier than mainstream enterprises. Each mechanism consists of several rules embedded in crowdfunding. Here, we briefly discuss our findings and their implications.

The easy access to crowdfunding for individual participants, due to the small starting amounts, creates a large diversity of potential crowdfunders. We find that the boundary and choice rule architecture of crowdfunding is a key institutional driver behind all three mechanisms for collective action in this type of finance. Increased access to financial decision-making, starting at small amounts, has been framed as ‘democratization of finance’ by some (Shiller, 2013), although it diverts from real democracy since participation depends on individual resources (Hörisch, 2015). Nevertheless, investment decision-making is opened to a much larger ‘crowd’ compared to when this was restricted to traditional financial players. This in itself is likely to influence which enterprise gets funded.

The first mechanism, network-based funding, builds on this increased access to create circumstances for collective action. Information about the crowdfunding campaign is distributed through existing ties and becomes embedded in a longer term relationship, which changes the incentive structure of the financing decision and increases trust levels. We are not the first to conclude that crowdfunding is a network-based. On the contrary, it has been

brought forward as a defining aspect of crowdfunding (Moritz & Block, 2016; Wal, Alexy, Block, & Sandner, 2016). However, the link between crowdfunding being network-based and its potential for organizing collective action/sustainable finance is novel.

The second mechanism, collective action through heterogeneous contributions and payoffs, links back to one of the design principles from successful collective action in natural resource management, namely balanced provision and appropriation (Ostrom, 2010a). It is also in line with the concept of ‘fairness’, which has been studied empirically in the cooperation literature (Fehr & Schmidt, 1999). The larger flexibility to create niche matches between entrepreneurs and specific groups of funders creates an opportunity to increase the individual payoffs to a funder who can then value a particular mix of (non-financial) payoffs that fit a specific enterprise (Geobey et al., 2012). Renewable energy projects are an example of sustainable entrepreneurial projects that can generate financial payoff, climate change mitigation and community benefits for its crowdfunders (Dóci et al., 2015).

Finally, the third mechanism, collective action through aggregation in thresholds, is dependent on the aggregation and scope rules in crowdfunding. This mechanism can be traced back to research carried out on critical mass (P. Oliver et al., 1985) and to findings on conditional cooperation (S. S. Levine & Prietula, 2014; Ostrom, 2014; Vollan & Ostrom, 2010). Furthermore, aggregation in thresholds has been pinpointed as a successful strategy in the context of crowdfunding (Cheng & Bernstein, 2014). The tendency of crowdfunding campaigns to either succeed in bringing together the money or fail to do so with a wide gap is generally attributed to information cascades and increased trust through signaling by early backers (Colombo et al., 2015; Vismara, 2015). Signaling by early backers, influencing the investment decision of subsequent funders, is also commonplace outside sustainable enterprise funding. However, if we find that sustainable enterprises are more successful at bringing together funds than mainstream enterprises – all else being equal – our hypothesis is that an additional part of this ‘herding’ behaviour in crowdfunding can be attributed to collective action surrounding sustainable goals. Empirical evidence is needed to unravel these two different relationships.

Another aspect that needs further attention is distinguishing between collective action for innovative entrepreneurship, in general, and sustainable innovative entrepreneurship

specifically. The provision of innovation to a society can also be framed as a collective action, since more people benefit than just the investors, and the high-risk levels of innovation finance are often not compensated by its returns. In particular, for a transition towards a sustainable economy, which needs a lot of product and service innovation, an argument can be made that the collective action being organized here is partly due to sustainability, and partly due to innovation in general. This also links back to the argument made by (Calic & Mosakowski, 2016) that the willingness of funders to invest in social enterprises is partly mediated by creativity levels, and this split is also pinpointed in the double externality problem (Faber & Frenken, 2009).

One important practical finding from our analysis is that collective action for sustainable enterprise finance does not happen automatically by opening a project page on a crowdfunding platform. In order to ‘put to work’ the rules and mechanisms in crowdfunding for a sustainable enterprise, a campaign strategy needs to be well thought through and targeted towards a specific audience. Also, some sustainable enterprises will be better suited for crowdfunding than others. For one, building up a community that is committed to the sustainable enterprise for idealistic or practical reasons, such as users or fans, is a key ingredient. Building up a social network is important in general, since the entrepreneur can inform individuals personally about their campaign thereby greatly improve collective action both from a network-based and payoff perspective. Getting early backers within this community to commit, preferably with their identity known, will stimulate conditional co-operators to follow. The bigger an entrepreneur’s community or network is, the easier it is to get at least a small part of them to participate. Also, crowdfunding of a sustainable consumer product or service is likely to be easier than a business-to-business product or service, since individuals are more likely to become involved if they see themselves as potential consumers and therefore understand/support the value proposition (Ordanini et al., 2011).

4.7 Conclusion

This chapter is a conceptual exercise to understand potential mechanisms that enhance sustainable finance by applying collective action theory to crowdfunding. We use a rule classification framework to indicate which institutional arrangements in crowdfunding

appear conducive to organizing collective action. By diverting from rational choice behavioural assumptions and combining collective action theory with the growing body of academic literature on crowdfunding, we argue that understanding the application of rules embedded in crowdfunding can foster increased investments in sustainable entrepreneurship through network-based funding, heterogeneous contribution and payoff and aggregation in thresholds. Below, we provide limitations and future directions of our research.

Limitations

Our study has some important limitations. For one, the conceptual analysis is conducted for crowdfunding in general, whereas in practice, rules between platforms can differ. Also, since this is an industry that still needs to mature, rules may evolve. Also, we focus on crowdfunding via intermediary platforms, whereas not all projects are mediated, leading to different funding incentives (and lack of screening) if there is no platform involved.

Secondly, by undertaking a rule classification of crowdfunding we leave out other external variables that strongly affect the ability of an institutional setting to create collective action, such as biophysical conditions and attributes of the community (Ostrom, 2010a). These variables need to be taken into account in further research.

Third, we lean strongly on theory and evidence from common-pool resource research – notably the work of Elinor Ostrom – whereas collective action for crowdfunding sustainable enterprises concerns many different types of social or environmental payoffs that are not as clearly defined as many common-pool resource dilemmas. Although we limit ourselves to analysing collective action (which can involve commons), more work needs to be done to understand how the specific social and environmental payoffs produced by sustainable enterprises affect the ability to create collective action. A further step is to improve our understanding regarding what type of sustainable enterprises and business models are well suited for crowdfunding using collective action dynamics.

Future directions

Conceptually applying existing insights from collective action to finance is just a first step. We briefly state three main research directions from which to continue from here.

First, empirical evidence is needed to test the hypothesis that collective action is indeed taking place in sustainable enterprise crowdfunding. It is particularly important to be able to

distinguish collective action from other dynamics in crowdfunding such as herding, since early backers also play other important signaling roles (Colombo et al., 2015; Vismara, 2015). One way to do this is through a field or lab experiment with two versions of a project: one framed as ‘sustainable’ and one with no mention of sustainability at all, and analysing participation rate of funders.

Second, existing insights about collective action should not only be applied but also further developed in new innovative institutional settings. As technological advancements increase the speed and ease of information transmission and lower transaction costs, crowdfunding (and other financial innovations) can improve and develop as new institutional settings for collective action that were previously not possible in an offline environment. If designed smartly, financial innovation could pave the way for intelligent collective action for sustainable enterprise finance. Crowdfunding and other types of decentralized financial innovation can be used to empirically test and improve upon collective action mechanisms. The next step is to collect and create empirical evidence that can give more insight into how we can improve collective action in finance in order to speed up a transition towards a sustainable economy. This goes beyond collective action in crowdfunding, which will not suffice as a solution to creating sustainable finance but is an important step, in particular for understanding increased decentralization in financial decision-making. Smart use of technology to improve collective action should not only be understood through crowdfunding but also through other types of ‘fintech’, such as development of local and/or blockchain-based currencies and innovation by traditional players like banks and pension funds.

Furthermore, there is a diversity of sustainable enterprises that will have different abilities to fund themselves using collective action dynamics in crowdfunding. We need to improve our understanding of how different mechanisms to obtain finance for sustainable entrepreneurship can be best applied in practice, including these collective action mechanisms. This can relate to the type of business model that the enterprise is setting up, as well as its stage of growth or the level of involvement of its customers. A better understanding for sustainable enterprises of when to search for what type of finance will increase the number that make it to the market.

Finally, the ultimate goal of more sustainable finance is the actual societal impact of the enterprises and projects being financed. More research is needed to reach a better prior understanding of whether a decision to finance a sustainable enterprise is likely to lead to a positive societal impact so that this can be included as a criterion in the investment decision (Maas & Liket, 2010; Toxopeus et al., 2015).

5 Unlocking bank finance for circular business model innovation⁵

Abstract

In the current wave of circular business model innovation (BMI), access to finance for BMI emerged as a key constraint but remains unaddressed in the literature. We fill that gap by studying access to bank finance for BMI using the current wave of circular BMI as an empirical base. We study the importance of different business model components for bank lending techniques using qualitative data obtained from banks and firms engaged in circular BMI. On the one hand, we assess bank willingness and lending technologies used to lend to enterprises that innovate towards circular business models. On the other hand, we document financing challenges of circular enterprises that applied for bank credit. Our results show that finance for circular business model innovation creates a shift from assessment based on (standardized) assets towards (future) cash flows in bank lending. We also find that depending on the lending technology, different components of the business model are assessed by banks. Banks mostly assess BMI based on proof of future cash flows (ability to capture value) and, in the case of account receivables, on contract terms and quality of customers. Furthermore, building relationships with banks, suppliers and customers emerges as a promising route for financing BMI. Asset-based lending for BMI is underdeveloped due to innovative firm- and context-specific assets (resources) but can be improved by standardization, modularity and flexibility as well as secondary market development. Our findings have strategic implications for innovative firms looking for bank finance and banks aiming to finance (circular) BMI.

5.1 Introduction

Business model innovation (BMI) is a crucial activity for firms to sustain competitive advantage in the market place under changing circumstances (Chesbrough, 2010; Schneider & Spieth, 2013; Teece, 2010; Wirtz et al., 2016). Much of the BMI literature emerged during

⁵ Joint work with Elisa Achterberg and Friedemann Polzin. It was presented and discussed at OIKOS sustainable finance academy and at the PHD workshop of ARCS at RSM, June 2017.

the shift towards internet-based companies in the 90s and 00s (Achtenhagen, Melin, & Naldi, 2013; Foss & Saebi, 2017). In a similar vein, the BMI literature is currently fuelled by a need for companies to deal with worldwide environmental challenges and adjust their operations to create value for a closed-loop (circular) economy while at the same time capturing value for the firm itself (Bocken et al., 2014; J. Hall & Wagner, 2012; Kortmann & Piller, 2016; Rauter, Jonker, & Baumgartner, 2017; Schaltegger, Hansen, & Lüdeke-Freund, 2015).

A crucial and well-known constraint of innovation is obtaining external finance (Colombo & Grilli, 2007; B. H. Hall, 2010), especially for SME's and young firms (Angilella & Mazzù, 2015; Beck & Demirguc-Kunt, 2006; Brown, Fazzari, & Petersen, 2009; Lee, Sameen, & Cowling, 2015). Credit constraints arise primarily from informational opaqueness between the firm and its potential financiers, moral hazard issues and high transaction costs (Carpenter & Petersen, 2002a; B. H. Hall & Lerner, 2010; Myers & Majluf, 1984; Stiglitz & Weiss, 1981). Lack of collateral and financial track record inherent to intangible R&D investments aggravate these constraints (Brancati, 2015; Cincera & Santos, 2015; B. H. Hall & Lerner, 2010; Lahr & Mina, 2014; Mina, Lahr, & Hughes, 2013).

Although access to external finance has been recognized in the business model literature as a crucial constraint for BMI (Bocken et al., 2014; Linder & Williander, 2015; Schneider & Spieth, 2013; Zott & Amit, 2010), it is remarkable that to date there has been little structured effort to analyse how to improve firm access to external finance for BMI. As part of the emerging literature on undertaking BMI as an approach for solving environmental challenges while reaping profits (Foss & Saebi, 2017; J. Hall & Wagner, 2012), understanding how to improve access to finance for BMI is crucial.

In this paper, we study *circular* (also referred to as closed-loop supply chain) BMI to 'jumpstart' academic understanding of the relationship between BMI and finance. In particular, we focus on the role of banks in providing external finance, building on the innovation finance literature in this field (Brancati, 2015) and noting the large role of banks in providing business funding, in particular to SMEs (Cincera & Santos, 2015; de la Torre, Martínez Pería, & Schmukler, 2010; Giudici & Paleari, 2000). Credit constraints for innovation are empirically understudied and often with indirect measures, due to the

difficulty of observing credit demand and supply (Brancati, 2015). Our qualitative data collection approach allows us to collect fine-grained insights about bank lending decisions that are otherwise difficult to access. We study the current wave of circular BMI to address the following research question: *How can firms obtain bank finance for circular business model innovation?*

The remainder of this paper is structured as follows. The theoretical framework consists of an overview of the BMI literature, with a focus on circular (sustainable) BMI, as well as an overview of lending technologies used by banks to evaluate potential clients. Section 3 describes our case-study methodology. In our findings section, we elaborate on the role of business model components in the bank credit decision and discuss these in section 5. We find that bank lending for BMI is indeed a constraint, mainly due to lack of track record of innovating firms and specificity of assets. We discover two key routes to improved access to bank finance for BMI are crucial: firstly through relationship building with both value chain partners (suppliers and customers) and banks, and secondly by ‘proving’ capture of future cash flows (through customer contracts/orders). Asset-based lending is less successful but can be enhanced by secondary markets that indicate residual values as well as by standardization, flexibility and/or modularity of assets.

5.2 Theoretical background

Business model innovation (BMI): generic, sustainable and circular

Firms commercialise new ideas and products through their business model but also innovate the business model itself to stay competitive in the market place (Chesbrough, 2010). The business model concept has evolved over the past few decades, with considerable efforts undertaken to merge towards a common definition and understanding (Wirtz et al., 2016; Zott, Amit, & Massa, 2011). Within this field, BMI has become a key topic (Amit & Zott, 2015), with particular attention given to the components of a business model that can be affected during the innovation process (Gambardella & McGahan, 2010; Osterwalder, Pigneur, & Tucci, 2005; Schneider & Spieth, 2013; Teece, 2010). A review of the business model literature by Wirtz et al. (2016, p. 41) resulted in the following definition of a business model, which we adhere to in our paper:

“A business model is a simplified and aggregated representation of the relevant activities of a company. It describes how marketable information, products and/or services are generated by means of a company’s value-added component. In addition to the architecture of value creation, strategic as well as customer and market components are taken into consideration, in order to achieve the superordinate goal of generating, or rather, securing the competitive advantage.”

A business model is often defined in terms of its components, which allows us to be more specific about where in the firm business model innovation is taking place (and how this relates to access to bank finance). We apply the review article of Wirtz et al. (2016) and interpretations of others (Bocken et al., 2014; Osterwalder et al., 2005) to define three main parts of a business model and their subordinate business model components (see Figure 5-1). *First*, the value proposition describes the market offering of the company. *Second*, the value creation and delivery includes the firms’ strategy, resources, network (partners) and target customers. *Third*, the value capture component includes revenues and costs.

Value proposition	Value creation and delivery				Value capture	
Market offering	Strategy	Resources	Network	Customers	Revenues	Costs

Figure 5-1 Business model components. Based on Bocken et al., 2014; Osterwalder et al., 2005; Wirtz et al., 2016

Within the business model literature, BMI that addresses environmental and/or social challenges receives increasing attention both in academia and practice. This type of BMI is being addressed from different angles: sustainable business models (Bocken et al., 2014; Boons & Lüdeke-Freund, 2013; Rauter et al., 2017; Schaltegger et al., 2015); circular business models (Linder & Williander, 2015; Murray, Skene, & Haynes, 2017) and business models for closed-loop supply chains (Kortmann & Piller, 2016; Wells & Seitz, 2005). These literature streams have in common that different (archetypes of) business models are developed and analysed for their ability to create societal value, with a common assumption that BMI should allow societal value creation and private value capture to co-exist in a firm’s business model (Bocken et al., 2014; Rauter et al., 2017).

Many firms are currently strategizing to shift from a 'linear' business model to a 'circular' business model. In a linear business model, value creation is based on an incoming virgin material flow, which is manufactured, consumed and deposited as 'waste'. In a circular business model, "value creation is based on utilizing economic value retained in products after use in the production of new offerings" (Linder & Williander, 2015). This means that firms carrying out circular BMI act or collaborate in one or more parts of the value chain to optimize use and recover value from their product. This is very similar to the concept of closed-loop supply chains, in which firms take responsibility for the entire lifecycle of the products they produce, both to save the environment and to maximally recover their investments into a high quality product (Guide, Harrison, & Van Wassenhove, 2003; Kortmann & Piller, 2016). Just like closed-loop supply chains, circular BMI can be categorized based on their place in the value chain: *pre-use* (design and manufacturing), *use* (during customer use) and *post-use* (refurbishment and recycling) product phases (Achterberg et al., 2016). Often, circular enterprises strive to retain product ownership since this increases their incentives to increase the product longevity and improves their ability to organize the return logistics of their products (Linder & Williander, 2015; Tukker, 2015).

The three types of circular BMI (pre-use, use and post-use) affect business model components differently. Table 5-1 describe the different business model components in linear and (different types of) circular BMI. In the design and manufacturing phase (*pre-use*), products (tangible resources) are designed, developed and manufactured in such a way to increase longevity and/or ease of maintenance, repair, upgrades, refurbishment, remanufacturing or recycling (Achterberg et al., 2016). This affects the *resources* used in the business model: materials are developed and/or sourced according to a set of criteria e.g. renewables, bio-based, low resource intensiveness or full recyclability (Achterberg et al., 2016; Bocken et al., 2014; Lewandowski, 2016). Additionally, the *value proposition* can change when aiming to address a customer need with lowered resource use, which can also affect the target group of *customers*. *Costs* arise due to investments into (re-)design of a product, mostly related to R&D. *Revenues* may be affected if the customer base needs to be grown from scratch and depending on the pricing strategy.

When carrying out BMI in the *use* phase of a product, shifting from sales to retained producer ownership and servicing of products is a common strategy of producers (Mont,

2002; Tukker, 2015). Services such as repair and maintenance, upgrades, extensions or extended support are added to the value proposition to increase the product lifecycle. Product-service system (PSS) BMI entails a (full or partly) shift from selling a product to servicing a product (Ceschin, 2013; Gaiardelli, Resta, Martinez, Pinto, & Albores, 2014; Maxwell & van der Vorst, 2003; Reim, Parida, & Örtqvist, 2015; Tukker, 2015). This ownership shift creates a financial incentive for the firm to invest in longevity and re-use of products and materials (Baines et al., 2007; Bocken et al., 2014; O. K. Mont, 2002; Tukker, 2004; Williams, 2007). However, it also entails tying up large amounts of capital, leading to a shift of financial risk from the customer to the firm (Linder & Williander, 2015). Increased contract length can lower this risk but may lead to a less attractive customer value proposition (Besch, 2005). Also, cost and revenue uncertainty are high compared to investments required (Linder & Williander, 2015). In the context of baby prams, Mont et al. (2006) note that the shift from a sales to a service model leads to higher expected profits but delays incoming *revenue*, creating an external finance need. Furthermore, the pram design is adjusted to increase longevity and decrease *cost* of upgrading between users to make the service model more feasible (Mont et al., 2006). Other ‘use’ BMI types are: sell/buyback, sharing platforms, lifetime extension and tracing facilities (Achterberg et al., 2016; Bocken et al., 2014; Lewandowski, 2016). BMI in the ‘use’ or customer phase affects the *value proposition* and *strategy* by setting up an integrated product service solution and increasing customer engagement/retention. It entails intensive use of specific partner *networks* to deliver an integrated product service offering. Finally, a shift in *revenue* structure occurs when moving from sales to servicing which also affects its *costs* (high upfront investment costs and long payback period). Circular *post-use* BMI increases the added value of a product at the end of its lifecycle. Revenue is generated through recapturing and refurbishing products, components or material, recycling or second-hand sales (Achterberg et al., 2016; Bocken et al., 2014; Lewandowski, 2016). This process requires an accessible take-back program and technological expertise. Some products might not be suitable for this type of business model, such as fast-moving consumer goods (Linder & Williander, 2015).

Table 5-1 'Linear' vs. circular business models; (framework based on Bocken et al., 2014; Linder & Williander, 2015; Wirtz et al., 2016)

Business model/ business model components	Value creation and delivery					Value capture	
	market offering	strategy	resources	network	customers	revenues	costs
Generic (linear)	Product or service	Create company value added/ serving a market	Tangible and intangible assets	Mostly uni-directional (selling), limited interaction	Linear relationship, selling point, limited after sales	For the firm (economic value), sales oriented	Materials, labour
Pre-use (design and manufacturing)	Longevity, reparability, re-usability of product, high price, product category restriction	Serving a market, lowering resources dependency, solving resource depletion and facilitating resource recovery	Tangible assets, designed for longevity and/or modularity and/or recyclability	Mostly uni-directional (selling), long-term customer relationship, partner restrictions	Linear relationship, selling point, customer restrictions	Higher prices, longer time between sales due to durable product / material, possible service revenue	Higher upfront costs for design and manufacture of durable materials / components / products
Use (services)	Integrated product and service solution, product category restriction	Serving a market and solving a lifecycle problem	Combination of intangible assets (services) with tangible assets (not necessarily owned)	Bi-directional, partner restrictions, large customer network / economies of scale for sharing platforms	Over lifetime, customer restrictions	Services, solutions, long-term spread out cash flow from contracts and fees	Labour, high upfront investment for products, ICT investment for sharing platforms and/or monitoring
Post-use (refurbishment)	Recycled materials, re-furnished products, higher residual value, product category restriction	Serving a market and solving a waste problem	Tangible assets, recycling technologies	Bi-directional, partner restrictions	Closing the loop, possibly customer restrictions	From recaptured of used materials / components / products	Lower costs due to use of recycled materials, higher costs for collection and/or refurbishment/ recycling

Post-use business model innovation may impact the *value proposition* and the *customer base* if the recovered products, components or materials lead to alternative, non-virgin material use. Recovering materials as input for a new value proposition requires building unique supplier and logistical *networks*. Furthermore, the *cost* structure shifts away from material costs (since ‘waste’ is used) towards refurbishing and/or recycling costs, which can require high upfront investments into infrastructure (e.g. refurbishing plant). *Revenue* can be affected depending on whether the value proposition and the target customer are altered due to marketing recycled material, components or products.

Bank finance for BMI

Firms, especially SMEs and start-ups, rely on external sources of finance both to fund day to day business activities (i.e. working capital) and for investments into innovation (Cincera & Santos, 2015). Bank credit represents the major share of external finance for SMEs in Europe and over 80% in the Netherlands (Beck & Demirguc-Kunt, 2006; Cincera & Santos, 2015; DNB, 2015; European Commission, 2014).

Strategies of innovative firms are high risk (Brancati, 2015); the majority of innovations fail (Mazzucato, 2013). High expenditures on wages and salaries, uncertainty about the outcome of the investment and intangible capital creation in the form of tacit knowledge of employees create financing constraints for innovative activities (B. H. Hall, 2010). The high uncertainty of return at a project level is argued to be particularly problematic for SMEs since they are not able to build an innovation portfolio like large firms (Lee et al., 2015). Innovative firms invest in intangible (R&D) and tangible firm-specific assets (*resources*), whose context-specificity makes them difficult to use as collateral (Brancati, 2015; Carpenter & Petersen, 2002a). Even when R&D investments are registered as patents, their salvage value is likely to be low if the firm goes bankrupt (B. H. Hall, 2010). Lack of historical cash flow data (*revenues* and *costs*) is mentioned specifically as an obstacle to financing innovation (B. H. Hall et al., 2016). These aspects are summarized in the BMI framework (section 2.1).

Banks invest in proprietary information gathering (Boot, 2000) and develop different methodologies for extending credit, referred to as lending technologies (Berger & Black, 2011; Berger & Udell, 2006), to reduce credit/default risk (Angilella & Mazzù, 2015; Chaibi & Ftiti, 2015). We group these lending technologies into cash flow-based, asset-based and

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relationship-based. Table 5-2 depicts which elements of the business model components would be relevant for banks per lending technology. The mechanisms will be described below. In practice, different lending technologies will often be combined, e.g. a relationship banker will ask for collateral and will want to see financial statements of a firm. However, there are differences in what the primary lending technique is, and these can lead to different credit decisions. We therefore take an in-depth perspective on lending technologies and view how these can be understood to improve access to finance for (circular) BMI.

Table 5-2 Theoretical relationship between business model components and lending technologies

Business Model components	Value proposition	Value creation and delivery				Value capture	
		Market offering	Strategy	Resources	Network	Customers	Revenues
Cash flow-based <ul style="list-style-type: none"> Financial statement lending Client contracts Credit scoring 		●		●	●	●	●
Asset-based <ul style="list-style-type: none"> Fixed asset lending Inventory Personal assets Leasing 	●		●		●	●	
Relationship-based	●	●	●	●	●	●	●

Cash flow-based lending

Banks deploy financial statement analysis (cash flow-based lending technologies) when audited financial statements are available as a primary information source upon which funding decisions can be based. Collateral and/or personal guarantees might be used to secure the loan and monitoring is done on the basis of loan repayments. In general, this lending technology can be applied to firms that offer a transparent *value proposition* and *value capture*. When audited financial statements are not available, banks can still assess cash flows through credit scoring. Credit scoring uses automated procedures to screen an entrepreneur's personal financial information together with the available data on the firm itself to determine credibility and is often used for (opaque) small businesses (Berger & Frame, 2007; Frame, Srinivasan, & Woosley, 2001). The rise of big data is increasing the potential of this lending technology (Mayer-Schönberger & Cukier, 2013). If *past* cash flows

and/or credit scores are not available or not sufficient for lending, banks can still extend a loan based on already secured future cash flows in the form of accounts receivable, in particular client contracts, which are a crucial part of circular *use* business models. Hence, the (quality of the) *customer* component of the business model plays an important role in the loan application process as well as the terms of the client contract (the essence of the *value proposition* to the client). Cash flow-based lending (financial statement lending) for innovation is challenging for banks due to lack of track record (B. H. Hall & Lerner, 2010).

Asset-based lending

In asset-based lending, banks use valuation and pledging of underlying (physical) assets of the enterprise (owner) as a basis for the lending decision. *Fixed-asset lending* uses physical assets of an enterprise that are not sold in the course of business as collateral for the loan such as real estate, machinery or equipment or vehicles (Berger & Udell, 2006). The asset is often uniquely identified and the size of the loan is dependent on its liquidation or market value, with repayment tied to the amortization schedule of the asset. *Leasing* is a lending technology based on assets where the asset ownership is transferred to the bank for the duration of the loan, often with a buyback construction at the end of the contract (Chemmanur & Yan, 2000; Hendel & Lizzeri, 1998). When using *asset-based lending*, working capital loans are provided based on the current value of assets used in the course of business such as inventory. All asset-based lending technologies focus on the tangible *resources* used in the business model, creating room for an enterprise to obtain finance even when the value capture of the enterprise (*revenues*) does not (yet) allow for this. Asset-based lending for innovative projects might be difficult for banks because the context-specificity of assets makes their market value uncertain (Lee et al., 2015; Mina et al., 2013).

Relationship-based lending

In relationship-based lending the lending decision is undertaken based primarily on proprietary information known only to the bank and the borrower (Boot & Thakor, 2000). Boot (2000:10) defines relationship banking as “the provision of financial services by a financial intermediary that (i) invests in obtaining customer-specific information, often proprietary; and (ii) evaluates the profitability of these investments through multiple interactions”. The financier takes a long-term perspective in its lending decision, creating

the opportunity to benefit over time from the information gathered, in particular in multiple lending decisions (Petersen & Rajan, 1994). Monitoring of the loan is operationalized through continued direct contact and observation of the SME's performance, taking a holistic approach that encompasses most business model components. Relationship lending allows banks to provide additional services such as market intelligence, access to customers and other stakeholder crucial for the firm's success and sector expertise, similar to a venture capitalist or business angel (Boot & Thakor, 2000). Relationship lending is also associated with small, opaque and/or innovative firms due to the use of 'soft' information which is particularly valuable if hard information about track record, assets or cash flows are lacking (Brancati, 2015). Strong relationships between banks and firms are shown to increase bank willingness to take risks/lend for innovation since potential costs (of default) are spread out over a longer period of bank earnings from a client (Brancati, 2015; Jiménez & Saurina, 2004; Petersen & Rajan, 1994). Also, relationships are shown to lower collateral amounts requested by banks (Berger & Udell, 1995). However, it can be difficult for young, innovative firms to build up a strong banking relationship if they require major capital injections early in their existence (Carpenter & Petersen, 2002a).

To sum up, although the innovation finance literature, including lending technologies, has a rich empirical base, there is no explicit understanding of how firms that carry out business model innovation should strategize at a business model component level to increase their access to external (bank) finance. By addressing this question in the current paper we add unique empirical richness to our understanding of access to external finance, as an important requirement for carrying out BMI (Foss & Saebi, 2017).

5.3 Method

To understand the effect of business model innovation on a firm's access to bank credit, we employ a case-study based theory-refining approach, building on the BMI and lending technologies frameworks and focusing on the actual decision as the unit of analysis (Flyvbjerg, 2011; Yin, 2014). This fits well with the process-oriented nature of the underlying research question, the aim of building additional theory (Suddaby, 2006) and the limited accessibility for researchers of companies and financiers (especially banks) via more quantitatively oriented instruments (Bettis, Gambardella, Helfat, & Mitchell, 2015;

Eisenhardt, 1989). We outline the steps that we have taken to operationalize our research design and its relevance for the research context below.

Research context

The research reported here was conducted as part of two research projects running from 2015-2017. The first project formed part of the Nederland Circulair! consortium, which was financed by the Dutch Ministry of Infrastructure and Environment. Focusing on financing barriers experienced by circular businesses, this looked at 13 circular business cases and brought them together with financiers to (potentially) solve these barriers. The second project, financed by the Confederation of Netherlands Industry and Employers (VNO-NCW) focused on similar issues, analysing 31 company cases (not banks).

Case selection

To unravel the mechanisms underlying a credit decision and consequently answering our research question, we used purposeful theoretical sampling (Eisenhardt, 1989; Siggelkow, 2007). Hence, we included companies innovating their business models as well as banks. The use of multiple cases allows us to ground the research empirically and to generate sufficiently complex theory (Eisenhardt, 1989).

To observe actual financing decisions in the companies, we applied an information-oriented selection (Flyvbjerg, 2011; Seawright & Gerring, 2008). We collected evidence from SMEs, start-ups and established corporations representing the three types of circular business model innovation (pre-use, in-use, post-use) as explained in section 2.1, that had an (external) financing need (Achterberg & van Tilburg, 2016; Bocken et al., 2014).

Regarding financiers, we focused on banks due to their important roles in providing corporate finance in general (European Commission, 2014), and for financing a big part of the transition to a more sustainable, long-term efficient economy (Campiglio, 2016). The banks deploy lending technologies to make their financing decision as described in section 2.2. In this regard, the Netherlands is a particular interesting case study, as it possesses one of the most developed bank-oriented financial sectors in Europe and the world (DNB, 2015). In addition, Dutch banks have expressed both individual and joint commitment in their willingness to finance the circular economy (ABN AMRO, 2015; ING, 2015; MVO Nederland, 2016; Rabobank, 2015). To obtain a representative sample, we contacted

representatives from all major banks active in business banking in the Netherlands. The four banks that agreed to cooperate are the four largest players in business banking in the country, representing at least 61.4% market share (DNB, 2016). Both sustainability-oriented banks as well as generic commercial banks were included to account for the fact that circular BMI may be financed only by niche-banks that have a mission-driven focus to do so. This increases the transferability of our findings.

Data collection

Data collection encompassed three distinctive elements to allow for data triangulation (Gibbert, Ruigrok, & Wicki, 2008; Patton, 2002; Yin, 2014); see Figure 5-2 for an overview. First, we used archival documents of all the organizations as well as additional stakeholders such as think tanks and NGOs to pinpoint the most relevant characteristics of circular business models and their financing challenges. From the banks, we also obtained confidential archival documents such as documentation about companies and credit assessment process documents.

Second, 32 interviews were held both with company representatives and bank employees. They lasted between 1-2 hours and were recorded and transcribed verbatim. See appendix for a full (anonymized) list of interviewees. For each company, an interview took place that included questions on whether there had been or is a financing need and whether they applied for bank credit. If so, we asked follow-up questions on the amount, the bank that financed them, and why they were financed. If they did not receive credit, we asked why the bank rejected their application or what prerequisites were asked for in order to obtain credit in the future. In this way, we collected evidence about financing decisions for innovative (circular) business models based on real loan applications from enterprises developing a circular business model.

For each bank, representatives from the credit committee were interviewed. These included experienced bankers with sustainability, commercial and legal backgrounds, such as loan officers, (sector) managers, as well as legal department, risk management and front office (commercial) staff. Questions revolved around credit decision processes and included perspectives on companies innovating their business model to become more 'circular'.

Third, the author team organized four workshops (focus groups) with the four participating banks (Geissler & Zinkhan, 1998; Greenbaum, 1998). These lasted between 2-4 hours and included a representative sample from each bank's credit committee discussing the business model cases (between 6-20 participants). The workshops were recorded and transcribed verbatim. Transcripts were sent to participants to verify accuracy ('member checking') (Vuori & Huy, 2016). We asked broad questions regarding past credit applications of circular enterprises at their bank and their credit decision-making process (lending technologies) in general. For each workshop, together with our bank contact person we selected two representative companies that had recently been looking for credit as part of their developing a circular business model. We asked each bank to explain their credit decision-making based on these two representative cases. We elaborated on the challenges, opportunities and solutions of financing these enterprises. Finally, we determined the basis by which bank participants were most likely to extend credit (assets, contracts, relationship, financial statements/going concern). Characteristic shortcomings of focus groups-based research – such as participants publicly agreeing to views of the group despite private disagreement, and limited data validity due to the formation of a consensus view in group interaction – have been mitigated by creating a private space/atmosphere for open exchanges and encouraging the discussion of different views (Geissler & Zinkhan, 1998; Greenbaum, 1998).

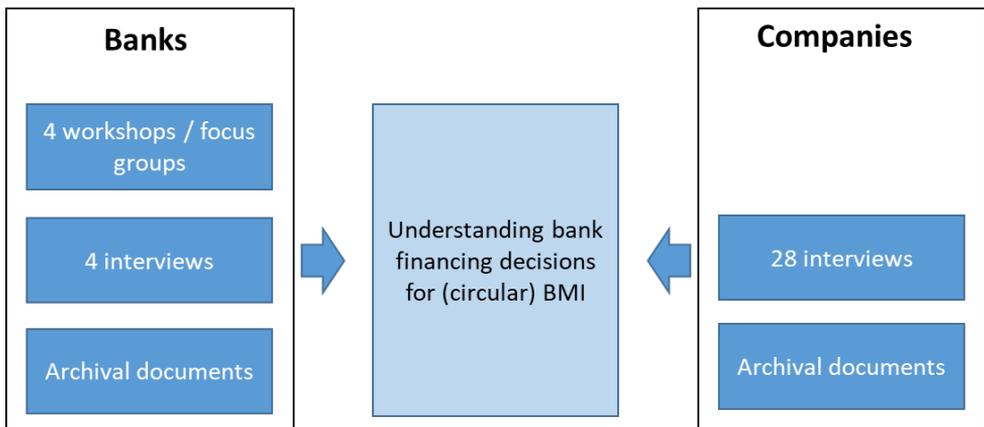


Figure 5-2 Overview of data collection

Through a combination of insights from archival documents, interviews and workshops with representatives from the banks' credit committees and other employees involved in the credit decision, feedback was obtained on their ability and willingness to finance different circular enterprises, which we related to the business model of these enterprises (Moran-Ellis et al., 2006).

Data analysis

Corresponding to the theory-refining approach, data analysis followed an abductive procedure (Dougherty, 2002; Mantere, 2008). We started with BMI components and bank lending techniques as an initial frame of reference (Suddaby, 2006) and made new linkages between the main theoretical concepts (theory building), by detecting patterns and matching them with the data. These steps involved a constant back and forth between theory and the collected data, which ensured internal validity of our study. To ensure reliability of analysis, a case study database was developed using Nvivo 11 that allowed for the integration of the different data sources (archival documents, interview and workshop transcripts) and corresponding perspectives (Gibbert et al., 2008; Jick, 1979; Moran-Ellis et al., 2006).

Archival documents, interview and workshop transcripts were screened as bottom-up codes for central topics, such as factors in the decision-making process, to derive implications of how lending technologies are deployed and how differences in generic business models vs. innovative circular business models were seen. We developed bottom-up codes from the insights in shifting to a circular business model, potential financing challenges and credit allocation processes at banks and specific lending technologies or approaches which are consolidated under top-down codes (BMI/lending technologies) from our theoretical framework. This process of coding and revisiting our initial frame of reference developed in several rounds (Dougherty, 2002). The overlap between BMI codes and lending technology codes allowed us to establish an empirical link. The coding procedure⁶ of archival documents, interviews and focus groups resulted in 1155 coded segments.

Three researchers carried out the data analysis, one of them present at each interview/workshop. At each workshop/interview one researcher was absent to add an

⁶ The coding scheme is available from the authors upon request.

‘unbiased’ view to data analysis to ensure inter-coder reliability and construct validity (Gibbert et al., 2008; Yin, 2014). We also reflected our findings to a group of finance sector experts (key informants in the FinanCE working group) to verify and extend them. The findings from banks were anonymized during the process (Bank A-D are reported). To improve external validity, we also compared sustainability oriented vs. classical commercial banks in a cross-case analysis. The authors are fully aware that the findings are context-dependent (Flyvbjerg, 2011), however the research contributes to a larger understanding of a bank’s perspective on BMI in general.

5.4 Findings

In the following section, we report our findings on the role of business model components and the use of different lending technologies for circular BMI. In general, bank interviewees and entrepreneurs recognize the three types of circular BMI (pre-use, use, post-use), which confirms part of our theoretical framework. Also, they recognize the financing challenge created by circular BMI due to the changing nature of cash flows, increased capital needs and legal issues surrounding collateral and its value (bank C, circular economy document). Furthermore, the importance of several business model components – strategy, value capture - for the loan decision is confirmed by internal credit process documentation (Bank D, credit process document).

We report on the most important BMI components from a bank finance perspective, specified per lending technology. The BMI components and their financing challenges are illustrated with quotes from firms and banks (Table 5-3 through Table 5-9). The quotes refer to the bank interviewees and workshop participants listed (anonymized) in Table 5-11 and Table 5-12 (in the appendix). A summary of all findings (BMI components/lending technologies) is reported in Table 5-10 (at the end of the findings section). To answer our research question, we look at each business model component in turn.

Value proposition

The *value proposition (or market offering)* plays an important role in bank finance for circular business models. At the sustainability-oriented bank in our sample lending is oriented specifically at circular and sustainable businesses; therefore the value proposition is screened to confirm that it is in line with their values. In the face of resource scarcity and

climate change, even mainstream banks have an urgency to move to a more sustainable/circular way of doing business, based on expectations that this will be profitable in the long-term. However, for them it is not central to all their lending decisions; rather it is something they want to move towards with part of their lending portfolio. Recognizing the circularity of a value proposition is therefore a screening approach that banks want to develop further, e.g. by training their relationship bankers to understand and recognize circular BMI.

The value proposition embodied in circular BMI plays a part in the lending decision due to expectations of *higher levels of value creation and capture*. This expectation is based on the logic that circular business models should lead to optimal value management because of better incentives and resource management. Both banks and enterprises note that the increased value and lifetime of the underlying product – due to its circularity – is expected to increase the value of the business over the product’s lifetime – especially if this increased lifespan is brought to market in a product-service model or within a buyback construction. The benefit of this increased value can be shared between the producer and the consumer, making both the market offering and the revenue model competitive. Therefore, a value proposition that embodies a circular product-as-a-service is generally perceived by banks as value enhancing and with some potential to generate profits in the future. However, this interest does not automatically translate into a positive lending decision; proof of market potential (*customers*) is needed.

More specifically, the client contracts that are offered in a service model are a crucial part of the value proposition to be assessed by banks. In service models, *the conditions of the client contract* embody the specific value proposition to the client in terms of service versus costs and flexibility of opting out of the product after a certain time period. Contract conditions, in particular duration and opt-out clauses, affect the perceived riskiness of future cash flows (accounts receivables). For clients, it is generally beneficial for conditions to be formulated as flexibly as possible; however, from a bank’s perception, stringent conditions increase the security of future cash flows. Banks are used to lending on the basis of contracts that have the same duration as the economic lifetime of the underlying asset, offering robust future cash flows. In circular BMI, assets are expected to last longer and produce cash flows in (multiple) consecutive client contracts, which means future cash flows are potentially

higher. However, at the time of the lending decision these contracts have not yet been signed. The ratio between the signed contract and the asset value becomes important in the lending decision. Also, in the case of a buyback construction, the future value of the asset at the end of its (first) use cycle needs to be assessed and compared with the future cash outflow corresponding to the buyback price.

Table 5-3 Importance of the value proposition (market offering) for different lending technologies

Lending technology	Cash flows (future)	Assets	Relationships
Value proposition (market offering)	Terms of client contracts (duration, opt-out clause) in product-service BMI affect perceived risk level of future cash flows.	Level of standardization/modularity of market offering and underlying product affects its marketability in multiple rounds of use (and therefore lowers risk as collateral).	Value proposition is assessed on circularity/sustainability due to values and expected profitability.
Key quotes	“From a financial point of view this is a hard one. For example, a wind turbine. At least you want an offtake time of 5-10 years. Here it [the contract duration] is only 3 months. Your robustness of your cash flow is very low. [...] A newcomer could take all your customers, which makes it hard to finance.” - Head of Commercial Banking, Bank B3, workshop	“You can take the building apart in components or sell it in parts. Every part has a different residual value. Instead of a residual value of 0 or 1 (it is rented out or not) there is now a whole array of value propositions which makes the risk for the bank smaller.” - Director Sustainable Banking, Bank D1, interview	“Through conversations with many stakeholders we saw that the sustainability of a building is becoming a more dominant factor in its rentability. Investing in this is a future-based strategy to make sure our portfolio is robust.” - Director Sustainable Banking, Bank D1, interview

The (technical) specifications related to the asset in the value proposition/market offering can affect the *ability to finance the underlying asset*, and can be influenced through its level of standardization or modularity. Products offered to the market that have a long lifetime and are also very standardized, e.g. in terms of size, colour and material, are more marketable, including in a second or third round of use. For asset-based lending in particular, the value proposition (in terms of the asset offered to the market) can play an important role

since it affects the asset value and its (re-)marketability. The relevance of the value proposition is deemed particularly relevant in the context of circular real estate, where buildings are not only very attractive in the current market but are also designed to be multipurpose as a whole and at component level. This flexible value proposition lowers perceived risk for banks.

Value delivery

The four value delivery components – strategy, resources, customers and networks – impact the credit decision through particular lending technologies. We discuss findings for each component in turn.

Strategy

Banks seem to be more willing to finance circular BMI when existing, established clients strategize to shift gradually from linear business to circular business.

Through this strategy, banks obtain access to more established, secure cash flows from existing business to de-risk their loan. Also, bankers note that it is more worthwhile for them to invest time and funds in existing, larger clients since they are also obtaining revenue on other products. In contrast, bank interviewees also mention that circular initiatives set up by start-ups are very unlikely to get financed, and neither are initiatives by established businesses that are not expected to become a regular client of the bank. Phased transition from a linear to a circular business model is therefore a lending enhancing strategy available only to established firms with an existing bank relationship (or those aiming to obtain a bank relationship). The *strategy* becomes relevant in terms of how to organize the manufacturing process including which customers to target (notably B2C or B2B) and which materials to use. By using or combining existing/proven production processes, perceived technological risk can be lowered, which increases the chance of obtaining a bank loan.

Table 5-4 Importance of the strategy BM component for different lending technologies

Lending technology	Cash flows	Assets	Relationships
Strategy	Through gradual transition of firms from linear to circular, cash flows can be secured by existing (linear) cash flows from existing business units.	Strategizing to develop products that can be brought to market for many years affects its marketability in multiple rounds of use (and therefore lowers risk as collateral).	Phased transition of established firms from linear to circular in line with their existing strategy with an existing bank relationship is lending enhancing (i.e. same industry).
Key quotes	You believe in the solution. [...] It was a strategic decision of the client to stay in the same industry. [...] You are not too concerned about assets or contracts. You look at the debtor and what is happening.” Sector banker public banking, Bank D4, workshop	“The most circular product is one that you do not adjust, which can be used for very long in its current form. [...] In the pay-per-use construction the residual value increases if you take a <u>white</u> desk. We want to stimulate that because we can circulate it more easily. So, you can design products in such a way that they are timeless.” Ahrend, CEO AA1	“Who is our client and what is their relationship with our bank: existing or new, and why are they shifting banks?” Bank D, credit documents “Many of our clients are both linear and circular. They are making a phased transition to a circular business model. In particular the good clients who we have known for ages, who now realize they want to become circular, we are right in the in-between phase at the moment.” Senior Sustainable Business Strategist, Bank A1, workshop

Resources

Tangible resources

The most important tangible resources for a bank loan are the assets that are brought to market as part of circular BMI (e.g. washing machines, carpets, elevators or smartphones). This underlying asset is mentioned in product-service BMI in particular, since these assets remain on the balance sheet of the firm asking for a loan. In theory, these assets can be used as a security for the bank for asset-based lending, as in the traditional lease industry (for cars and printers). Sometimes resources can also be relevant for asset-based lending at a component or material level. Theoretically, asset-based lending seems a logical approach for

circular BMI since the materials, components and/or products are expected to retain their value longer. This can lead to lower depreciation costs and a longer period of cash flows from a single asset. However, our findings suggest that currently, using tangible assets as a basis for a lending decision instead leads to several challenges.

Firstly, underlying assets in BMI are often innovative, which leads to *a lack of historical/market data on their long-term value*. This makes it difficult for banks to lend based on past cash flows over the asset lifetime. The claim, that an asset will produce cash flows for a long period of time, is therefore difficult to prove.

Active second-hand markets in underlying products can increase the belief of banks that there is residual value to build on as part of a bank loan. Interestingly, the new and distinguishing characteristic of a product (its ability to be long-lasting or be easily reused) makes the product less attractive as collateral when it is still in an innovation stage and this long-term market value is unproven. Furthermore, banks prefer loan durations from 5-7 years whereas firms with long-lived assets need a financing term up to 20 years, which led to financing constraints as well.

Second, apart from uncertainty about their long-term value, the underlying assets in BMI may *suffer from characteristics that further lower their ability to serve as collateral*:

- a. Specificity – an elevator tailor-made for a building cannot be re-used at the product level
- b. Illiquidity – difficult to move, such as a carpet glued in a building, making re-use difficult
- c. Dispersion – washing machines situated at individual consumer homes make collateral collection costly.

Since these characteristics make assets less suitable as collateral, thinking about these characteristics already in the product design can help firms obtain a bank loan. One electronics firm designed their lighting solutions so that they can be easily removed from a building. Removable, standardized carpet tiles have a higher residual value than tailor-made fixed carpet. An elevator producer created a materials passport so that at the end of an elevator's lifetime they are able to value it at a material level. Bundles talked about a 'red button' option so that the service provided to non-paying customers terminates (since a washing machine is costly to collect). Fairphone could, for example, collaborate with a

network provider, who can switch off connectivity when a customer does not fulfil their payment obligations.

Third, *availability of parties who could take over the assets as part of a running business* was mentioned as a financing challenge related to resources. The underlying assets are worth more to a bank if they can be sold to other players in the same field (competitors) that are willing to buy them. Selling a client portfolio to a competitor retains more value than selling underlying assets separately, terminating client contracts. If the underlying product is innovative and there are no other parties offering the same type of services, the asset become less valuable for the bank as collateral.

Finally, one bank in our study has a special leasing division aiming to promote circular business models by leasing various types of business assets to customer firms - such as vehicles and agricultural or construction equipment – and encouraging clients to increase their lifetime through repair and alteration. By leasing crucial business assets from a bank, financial constraints of firms engaged in circular BMI can be alleviated.

Table 5-5 Importance of the resources BM component for different lending technologies

Lending technology	Assets
Tangible resources	The higher expected residual value of assets used in circular BMI in contrast to linear BMI can lower depreciation costs for firms and increase duration of cash flows. (1) Assets underlying in BMI are often novel, leading to a lack of historical data on their long-term/residual value. Banks do not easily include the long-term value as a security in a bank loan because of the uncertainty that this value will be captured (no second-hand contracts and no secondary markets). Long-lived assets need longer loan durations, which is a challenge for banks. (2) Assets are often costly to collect and therefore not deemed suitable as collateral. (3) The availability of other players that can take over the assets as part of a running business affects the riskiness of using these assets as collateral (and the value that banks are able to place on them). As an alternative route, firms can lease key business assets (vehicles, equipment) from banks to alleviate financing constraints.
Key quotes	<p>“When, in closed supply chains, the residual value of products increases, the basis for a loan improves” Circular Economy Guide, bank D</p> <p>“I expected this to be mentioned as a challenge, the residual value. When you take back your product to close the material loop, what will be its value? What do you dare to expect, what can you still use from it? That is really a challenge.” Sector banker construction, Bank D11, ws</p> <p>“[...] banks get stuck on financing these kinds of models. It is about a fixed asset with a period of minimum of 20 years. They are allergic for that, because it needs</p>

	<p>to fit with a period of 5-7 years and it needs to be mobile to serve as collateral. These are the tensions.” Sales manager Mitsubishi elevators, AC1</p> <p>“[...] what on earth do we do with 10,000 washing machines? [...] We cannot go selling them one by one and store them somewhere. So, the residual value for a bank is much lower, since we’re not specialized in selling 10,000 washing machines. Is there a market for the residual value?” Head of Commercial Banking, Bank B3, workshop</p> <p>“[...] All that is fixed to a building, loses directly its value. In a lease construction you need collateral, thus residual value. ‘Flooring as a service’ obviously has no residual value. [...] The bank helped us and calculated based on residual value of resources.” Director sustainability, Desso, office furniture firm AE1</p> <p>“[...] Traditional lease did not fit the financing need of our M-Use, elevators as a service, because the elevators are fixed in the building. It is not easy to attract funding for our proposition.” Sales manager Mitsubishi elevators, AC1</p> <p>“[...] An elevator is much more difficult: a copy machine you can easily remove, but an elevator cannot be easily removed. Additionally, copiers have an established second-hand market.” Vice president large & key accounts, Bank A19, workshop</p> <p>“That is exactly the core risk of the re-marketing, the ability to bring the asset to the market again, which is unknown and new. A bank is not going to take that risk.” Director Sustainable Finance, Bank C1, workshop</p> <p>“Bank C’s subsidiary promotes circular business models by offering its customers the opportunity to lease, rather than own, various types of business assets. Bank C’s subsidiary also encourages its customers to extend the economic lifetime of these assets [...]” Document on website bank C.</p>
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Intangible resources

The *quality and commitment of the entrepreneur* is a key factor for both relationship-based and future cash flow-based lending. (Personal) commitment from entrepreneurs is important to guarantee the continuation of the business, both through fundraising and personal financial support. One bank mentioned they put a lot of effort into judging the quality of the entrepreneur by looking at their skills, relevant experience and judging whether the team is effective. They also judge whether the entrepreneur ‘fits’ with the business she/he aims to carry out.

Table 5-5 (continued)

Lending technology	Cash flow (future)	Relationships
Intangible resources	Commitment of the entrepreneur to the business is needed to secure future cash flows.	The expertise, quality, ‘fit’ and track record of the entrepreneur and, if relevant, the team.
Key quotes	<p>“There is a client, but if the contracts are withdrawn, someone needs to take care that a new client is found for the machine, that payments come in every month, that someone carries out this whole operation. So, people say: what if you stop, that risk is too large. Then the washing machines are standing there and if no-one will collect the fees, how will I ever get my loan back?” Founder Bundles, washing service provider, Z1</p>	<p>“If there is one factor that would be most important to lend or not to lend, it is the quality of the entrepreneur or the combination of people who are running a business. [...] You could do any analysis of financials, but an accountant can help with that. If the entrepreneur doesn’t understand what he is doing, there is no way we are going to finance him.” Managing Director, Bank B4, workshop</p> <p>“[...] Not everyone has a team in which everyone has over 30 years of experience and two Harvard MBAs, which played a role in succeeding to attract a bank loan.” – CEO Black Bear Carbon, K1</p>

Customers

The customers targeted as part of a circular business model can serve three functions in the bank lending decision, mainly as a signal of revenue expectations and market demand. First, having customers willing to sign contracts creates a security for the bank (future cash flows). Second, their credit quality affects the quality of accounts receivable in case of client contracts. Third, their willingness to pre-finance a product can lower market risk and show proof of legitimacy.

Having *signed customer contracts* is an important signal for (future) cash flow-based lending. Both enterprises and banks mention signed customer contracts as a positive factor in obtaining a bank loan. A firm that upcycles used car tires into carbon black had large potential clients who carried out tests with their product and then confirmed they wanted to become a client. This helped them obtain a bank loan for building a factory. Similarly, Ioniqa - a plastics firm that developed (nano)technology to decolor plastic waste for reuse – mentioned the lack of willingness of future clients to commit as one of the reasons why they were not able to obtain a bank loan to finance their factory.

Table 5-6 Importance of customer BM component for different lending technologies

Lending technology	Cash flow (future)	Assets	Relationships
Customers	(1) Having signed contracts with customers. (2) The creditworthiness of clients targeted in a business model affects the perceived robustness of future cash flows.	Targeting B2B customers can lead to larger volumes thus less dispersion, easing collection of collateral in case of default.	Having committed, pre-ordering customers indicates market demand
Key quotes	<p>“The bankability of circular business models in many cases requires the acceptance of ‘contractual comfort’ instead of the right of legal ownership over assets in case things go wrong. Secondly, it requires a more cash flow based approach to finance rather than an approach based on collateral values.” Bank C, documentation</p> <p>“At this moment, in the lease, we agreed with the bank that they would do a credit check on every new client.” Ahrend, office furniture firm, product designer, AA2</p> <p>“[...] one of our challenges is to get clients to commit for future procurement. [...] Without market demand we cannot scale. [...] But without scale, clients will not commit. And without committed clients we cannot attract funding for building the factory.” CEO Ioniqa, H1</p> <p>“If an SME wants to market an online service for 3-5 years, he has to know instantly whether a client is creditworthy, as a financial sector we might need to develop tools for that.” Director Sustainable Banking, Bank D</p>	<p>“A carpet producer creates value from returning materials. But this is not value for the financier. For Fairphones/Iphones: if you receive enough back from the market you get 50-100 Euro per phone. As long as you get enough volume (10.000’s) you can send them to the refurbisher. With those volumes that is possible. With carpet that is not the case.” Vice president large & key accounts A19, bank A workshop</p>	<p>“[...] we had many test reports from large clients that tested our product who stated that ‘if that factory will be built, we want to become a client’. [...] this helped to mitigate market risk.” Blackbear Carbon, CEO K1</p> <p>“[...] the commitment from pre-paying customers was mentioned as a factor in the positive lending decision”. Fairphone, resource efficiency manager G1</p>

Banks also aim to screen the *credit quality of customers* who have committed to buying/leasing a product to assess the robustness of this future cash flow. It is always possible that this future cash flow will not materialize if customers do not pay, which can lead to loan default. However, screening credit quality of clients can be costly, and banks note that it either needs to be done automatically or is only viable for large deals/clients. A preference for B2B customers by banks stems from the fact that these can agree to longer contractual periods; consist of larger volumes and the collection of collateral in case of default is easier. However, development of credit scoring intelligence of B2C clients could be a potential business development undertaken by banks that improves firm and bank screening procedures for contracts and lending respectively. One bank noted that assessing creditworthiness of potential customers could even be developed as an automated tool they could offer to SMEs that want to sell subscriptions (director sustainable banking D1, bank D, workshop).

A third channel through which customers can affect access to bank loans is *when customers display willingness to pre-order* their product, i.e. through a reward crowdfunding campaign. In the case of one bank loan, customer commitment to pay in advance for their electronics product was considered by the bank to positively affect the lending decision as it signaled market demand. Similarly, positive test reports from large clients mitigated market risks for another firm.

Networks

Networks (and partnerships) play a role in obtaining bank credit in several ways. Firstly, we find that *partnerships/collaboration in the supply chain*, in particular with larger firms, can lower risks for banks. Shared ownership of underlying resources organized in the whole chain, for example through a joint venture, enables the inclusion of a larger balance sheet in risk assessment, lowering risk. In addition, it confirms the commitment of necessary partners to secure supply and bring to market a successful innovative product. For circular business models in particular, dedicated networks can increase the chance of delivering a circular value proposition.

Secondly, through a *buyback construction with a supplier* the underlying asset value for the bank can be increased, facilitating asset-based lending. In the course of this research project

a buyback construction between a washing machine service provider and the washing machine producer was set up, which led to a series of successful debt crowdfunding campaigns for the service provider.

Third, evidence of *embeddedness* of a firm within a (local) community or network lowers the perceived risk of default. A firm that is well embedded in a community is less likely to suffer from withdrawal of funds, customers and (local government) support. This is a crucial factor in the credit decision making process of at least one of the banks researched.

Table 5-7 Importance of the networks BM component for different lending technologies

Lending technology	Cash flow (past)	Assets	Relationships
Network	Joint venture (shared balance sheet) with established supply chain partners can lower risk for the bank.	Buyback constructions with the supplier of the product brought to market can increase asset values (lower risk) for a bank.	(1) Embeddedness of a firm in networks indicate business proposition relevance to others (2) Involve relevant parties (in and outside the bank) at early stage of loan request.
Key quotes	<p>“[...] we set up a joint venture with an existing party, who had a balance sheet” CEO, Black Bear Carbon, K1</p> <p>“Define the extended credit base: all other parties whose financial health is a prerequisite for repayment of our loan. These need to be included in the analysis.” Bank D, credit process document</p>	<p>“I think there is an elementary role for Miele [washing machine producer] in the financing, it is key that there is a buyback obligation from Miele against a certain price. That would improve the financeability [of Bundles] substantially.” Relationship manager corporate banking, Bank A18, workshop</p>	<p>“I think what we did especially well – and this is quite extraordinary, especially at banks – is that we involved all people internally in the bank in a very early stage.” CEO, Black Bear Carbon K1</p>

Value capture

Revenues

Proof of ability to generate *revenues* (through past or confirmed future customers) is deemed crucial by all banks and enterprises for a positive credit decision. The absence of robust historical revenue data is also seen as a key challenge for financing BMI. Because historical revenue data is lacking, loan applications for BMI often do not fit in the standard financing models. Also, BMI towards a product-service model leads to cash flows (revenues) coming in later, which makes the financing gap that needs to be covered, longer. There are two main ways that were reported by our interviewees in which lack of past revenue data for BMI is circumvented.

BMI within a larger firm benefits from an existing track record from other business lines. In both cases, a bank loan may benefit from the bank's incentive to nurture or start a long-term relationship with the established firm that carries out/partners in the (circular) business model innovation.

Furthermore, reliability of (future) revenues can be improved by *structuring client contracts to optimize future cash flows*. A longer duration of contracts and a costly opt-out clause can lower the risk for banks that cash flows will not materialize. Also, improved data on the 'stick rate' of customers can improve reliability of future cash flows (i.e. knowing what percentage of customers end their contract in each time period). Confirmed or expected orders from clients can be viewed as proof of future cash flows, in particular if a customer is large and creditworthy.

We found that many banks – and also large firms that fund BMI internally – are more willing to fund a certain type of BMI when they believe in *the 'logic' of the business case and its potential to create revenue*. This increases their willingness to take risks. We see this in particular in the shift from a for sales- to a product-service business model: there is a general understanding that a product-service model allows firms to capture more value from a product that is durable and/or modular than a sales model is able to capture for a linear (short-lasting) product. Our finding is that the general belief that circular BMI is an attractive and logical business case that will create revenues, increases the willingness of both firms and banks to invest 'learning money' into understanding how to finance this type of BMI.

Table 5-8 Importance of the revenues BM component for different lending technologies

Lending technology	Cash-flow (past)	Cash-flow (future)	Assets	Relationships
Revenue	Banks prefer to have historical cash flow data but this is often not available for BMI. Joint ventures with supply chain partners and BMI with(in) existing firms alleviate this challenge.	(1) Optimizing contract terms and customer portfolio signal robust and predictable cash flows. 2) Belief in the revenue-generating capacity of a particular type of BMI.	Lack of secondary markets makes BMI residual values insecure. It is important what part of the asset value is recovered within an existing contract, and expected 'stick rate' of the assets after the contract ends.	Banks are more willing to invest in BMI for an existing client or a large potential client than non-clients and/or small firms because it is more likely to create additional business/revenues.
Key quote	“The process of the bank is filling in the model by historical facts. For new business models there is no historical data. For those data you have to look into the future (or into the entrepreneur).” Sustainable Business Manager, Bank A2, interview	“In the first conversation with the bank they told me, you don't exist for two years, period. I came back after two years, but then I didn't have a track record in cash flows. After two years of track record of cash flows, I again returned, and then was told: 'Sure you now have this track record, but you have no secured cash flows for the future.’” Bundles, founder/CEO Z1	“Residual value is fictive, after five years there is no market. [...]. Two things are important: (1) strong clients and (2) do I get the assets back in the first place? We say: 'they bet on the stick rate' - after five years these assets are still in there.” Philips Capital, Head of financial sourcing, in workshop Bank D	“We will never finance an individual firm that arranges all its banking business elsewhere. [...] And the smaller the firm the stronger is that rule. If it is, for example, Apple, we might see what we can do.” Director Sustainable Banking, Bank D1, interview

The expected revenue captured from the first client is important; this is ‘secure’ revenue that has already been contracted. Assets in BMI often have no secondary markets, which makes residual values insecure. The revenue-generating capacity of assets therefore depends more on what part of the asset value will be recovered within an existing contract, and what the ‘stick rate’ of the client is expected to be after the contract ends.

Costs

Finally, *costs* enter into the credit decision when *high upfront investment costs* for BMI lead to large loan sizes in relation to (expected) incoming revenue. This generally increases the duration and perceived riskiness of the loan, which makes it less attractive for the bank. This problem was mentioned for both infrastructural investments (for factories) and for shifting to a product-service model. The high upfront investment cost of shifting from a for sales- to a product-service business proposition is seen as an important funding constraint, even though banks agree that this model can be attractive in the long-term since it can lead to steady cash flows from lasting customer relationships and durable products. Also, BMI in the post-use phase (processing of products, components and materials for re-use) requires large infrastructural investments for scaling up, in particular for setting up factories for carrying out large-scale processing. Here, banks concentrate on market, technological and operational risks: they want proof of market demand and scalability.

We find that firms perceive the longer lifetime of assets as financially attractive due to lower yearly *depreciation costs* of assets. However, for banks, the willingness to spread out depreciation over a longer time period depends on the residual value financiers are willing to account for – and this often depends on the duration and flexibility of contracts. Firms who use internal finance indicate higher willingness to depreciate assets over a longer period than banks. Firms such as Mitsubishi and Fairphone also mention that *lower repair costs* due to smart, modular and/or durable design and proactive repair and maintenance make the business case for a product-service model more attractive.

Just-in-time asset holding lowers financing costs. Shifting to a service model can mean that firms are holding many assets on their balance sheet. Bank employees suggest that a preferred strategy from a financing perspective is to only hold those assets on the balance sheet which are contracted out to clients. This creates a more specific and smaller financing

need instead of pre-financing a larger amount of assets, which are not yet bringing in any revenues.

Table 5-9 Importance of the costs BM component for different lending technologies

Lending technology	Cash flow (future)	Assets
Costs	(1) BMI takes time to prove itself, which makes it costly and difficult to finance upfront. (2) In a product-service business model, growth will entail high upfront investment costs. Long-term costs are expected to be more stable due to efficient maintenance. (3) Lower financing costs can be reached by pre-financing only assets that are <i>actually</i> set out to customers.	Lower depreciation and repair costs in a product-service model make financing of this type of BMI more attractive.
Key quote	“Why would Bundles buy in 200 washing machines? Why not buy in stock-based, directly from Miele.[...] It creates a more focused and smaller financing need. Now you would finance 200 machines and already pay interest to the bank while you do not yet have 200 contracts signed.” Assistent Accountmanager A15, bank A, workshop	“We think there is a much healthier model with the leasing construction especially with a device which is so easy to repair. [...] When you would take 100 phones back from Unilever because they had the leasing contract, and 50 of those have a scratched screen, we need to change those, and for Fairphone 1 that would take 30 minutes. For Fairphone 2 only 10 seconds, so that decreases the repair costs.” Fairphone, Resource Efficiency Manager G1

Table 5-10 Empirical mechanisms in the relationship between BMI and lending technologies

Lending technologies		Cash-flow based			Asset-based	Relationship-based
		Past	Future			
Value proposition	Market offering	-	Terms of client contract affect security of incoming cash flows; expected higher profits through better value management	Standardized/modular product improves value of collateral	Circularity screening due to bank values	
	Strategy	-	Gradual transition from linear to circular, existing (linear) cash flows secure circular cash flows	Developing long-term marketable products improves collateral value	Finance existing bank clients who carry out BMI as part of business	
Value delivery	Resources	Tangible	-	Long-term asset values depend on market value, specificity, moveability and competitors	-	
		Intangible	Commitment of entrepreneur needed to secure cash flows	-	Expertise, quality and 'fit' of entrepreneur is screened	
	Customers	-	Signed and creditworthy customer contracts signal robust future cash flows	Targeting larger (B2B) customers lowers dispersion, creates scale and eases collateral collection	Having committed, pre-ordering customers indicates demand	
Value capture	Network	Joint ventures with large supply chain partners provide robust balance sheet	-	Buyback constructions with product supplier lowers risk for a bank.	Embeddedness in networks improves BMI relevance and support by bank	
	Revenues	Historical cash flow data available for BMI within existing firms or JV's	Optimized contract terms and customer portfolio, and logic of business case signal robust cash flows	Size and diversity of contract portfolio i.r.t. asset value and expected 'stick rate' signal revenues	Existing, large clients are more likely to get a BMI loan due to additional revenue expectations	
	Costs	-	Often high upfront investment costs; expectations of future cash flows determine bank loan willingness	Lower depreciation and repair costs and 'just-in-time' stock make financing more attractive	-	

5.5 Discussion, conclusions and implications

The research question guiding our inquiry was: *How can firms obtain bank finance for (circular) BMI?* We find that all components of the business model (value proposition, value delivery and value capture) can positively affect the bank lending decision, which makes it relevant for business model innovators at firms to understand how to optimize their business model to obtain (bank) finance.

Access to bank credit for (circular) BMI

The way banks make financing decisions based on how they perceive a firm's BMI is of strategic importance for companies (Chesbrough, 2010; Teece, 2010). Our findings confirm finance to be a major challenge in (circular) BMI, in particular in the shift from a sales to a service model (Linder & Williander, 2015). Innovative (circular) business models differ from traditional business models in ways that are highly relevant for financiers. A lack of financial track record (value capture) is a crucial challenge experienced by most innovative businesses in their search for bank credit. The higher expected lifetime of underlying assets in the case of circular BMI in general does not yet alleviate financing constraints. A shift to a product service business model – a common objective of circular enterprises – leads to additional financial challenges such as long-term asset holdings on the balance sheet, higher retained value of assets and cash flows from contracts versus sales (Bocken et al., 2014; Rauter et al., 2017). Long-term asset holdings are seen by banks as a technological and financial risk rather than as valuable collateral, due to a lack of secondary markets for these assets and high collection costs (low value per product distributed across consumers and/or buildings). Furthermore, the duration of credit need is too long for banks that expect a 5-7 year payback period, whereas most of the innovative (circular) business models need time to scale up and expect a long life and therefore payback period for their products.

The shift to a circular product-service business model leads banks to rely on confirmed future cash flows: the quality, duration and size of contracts with clients. Even for circular enterprises that carry out a sales model, confirmed orders/clients create more trust than collateral value. This focus on cash flow-based lending can be seen as a major impediment for innovative circular business models as their aim is to 'close the material loop': to increase the (market and use) value of underlying resources. Banks do not adhere to this value yet, as

it may need time to develop and for secondary markets to grow. Our evidence shows that enterprises starting as or shifting towards circular business models have difficulty finding the necessary financial resources due to the longer payback period and lack of experience in evaluating financial risks (Linder & Williander, 2015) a finding which is in line with the literature on innovation finance (Brancati, 2015; B. H. Hall, 2010).

The relationship between lending technologies and BM components

Our study highlights that successful financing of BMI is improved by awareness of entrepreneurs and managers about how banks screen based on different business model components. Our research bridges the strategic management and innovation finance literature by integrating business model components and bank lending technologies in one theoretical framework (Bocken et al., 2014; Linder & Williander, 2015; Wirtz et al., 2016). It also adds empirical rigour to the emerging debate through in-depth, qualitative empirical insights on access to bank finance for BMI (Gambardella & McGahan, 2010; Osterwalder et al., 2005; Schneider & Spieth, 2013).

The *value proposition (market offering)* can influence a lending decision if: a bank is (un)favourable towards the *type* of innovation carried out; the value proposition is stable over time; the asset is standardized or modular, leading to higher expected asset values; or it embodies contractual terms that indicate stable future cash flows. The relevance of signed client contracts for financing a service model confirms earlier findings in the PSS literature (Linder & Williander, 2015). Banks offer concrete suggestions such as adjusting contractual terms to make them more secure for financiers – although this may be unattractive for clients (Besch, 2005) – and gathering data on ‘stick rates’ of customers that give more robustness to future cash flow information. Also, we find delaying of incoming revenues in the shift from a sales to a service model is seen by banks as problematic in the short term (O. Mont et al., 2006) but attractive in the long term due to higher stability of cash flows and client retention. Banks report they are particularly willing to engage with firms and develop sector expertise if they believe this ‘type’ of BMI (i.e. service models) (Bocken et al., 2014; Lewandowski, 2016; Wirtz et al., 2016) is promising from a cash flow perspective.

In the *value delivery* part of the business model, two *strategies* were found to help firms obtain bank finance for BMI (Bocken et al., 2014; Lewandowski, 2016; Wirtz et al., 2016):

existing firms and clients that strategize to gradually shift towards BMI, and strategizing to position standardized/modular products increases collateral values of underlying assets. *Tangible resources* developed/used in the process of BMI can theoretically serve as collateral but BMI-related assets are often found to suffer from context- and firm-specificity as well as from lack of secondary markets and players that would be able to take over assets as part of a running business in case of default. Their ability to serve as collateral depends largely on characteristics such as specificity, movability, dispersion and (il-)liquidity. *Intangible resources* play a role in bank lending – largely in terms of the commitment and quality of the entrepreneur to make sure that BMI is executed as planned. Our findings confirm the problem of firm-specific resources (assets) employed in BMI, making assets less suitable as collateral for a bank loan (Brancati, 2015; Carpenter & Petersen, 2002a). Which *customers* are targeted as part of BMI is also important for a bank lending decision: their creditworthiness and willingness to sign client contracts/pre-order are important signals for a bank to judge future cash flows. Location and size of customers matter for service models, since dispersed collateral makes collection in case of default costlier. Successful engagement of *networks* (partners) can be a crucial factor for obtaining a bank loan since joint ventures or buyback constructions with supply chain partners (Kortmann & Piller, 2016) can deliver a more robust balance sheet and increase underlying asset values. Furthermore, embeddedness in (social) networks can signal the relevance and potential success (future cash flows) of the BMI. Our study underlines the important role of relationships/networks (Bocken et al., 2014; Osterwalder et al., 2005) for bank finance for (BM) innovation, in particular for obtaining borrower-specific ‘soft’ information about the innovating firm (Berger & Udell, 2006; Boot, 2000; Brancati, 2015). Specific types of information banks look for are quality and commitment of the entrepreneur, a hitherto neglected aspect in the BMI literature (Amit & Zott, 2015). Banks use formal and informal commitments from the firm’s network to determine their credit decision. Networks and embeddedness have been suggested in the literature to enhance access to finance (Berger & Udell, 2002; Uzzi, 1999).

The *value capture* part of the business model is highly relevant for obtaining bank finance for BMI which has been indicated by earlier work (Schneider & Spieth, 2013; Zott & Amit, 2010). Banks prefer historical cash flow data, which can be available when established firms gradually innovate their business model or in the case of joint ventures with established

firms. Signed contracts and orders from clients are useful signals of future cash flows: the size, expected growth and ‘stick rate’ of the portfolio of contracts in relation to the underlying asset that needs financing is an important factor for obtaining bank finance. We confirm the lack of historical cash flow data as an obstacle to bank finance (B. H. Hall et al., 2016). This problem can sometimes be overcome by setting up joint ventures with established supply chain partners or by carrying out BMI within an established firm (Kortmann & Piller, 2016). Finally, BMI-related *costs* are highly relevant since they determine the size of the financing need. Timing of costs (upfront or periodical) also affects the size and duration of the financing need and lower operational costs can shorten payback periods, which lowers risk for the bank. However, we find a larger willingness to engage in ‘risky’ lending with existing and relatively large clients due to the ability to spread out costs over time and across products, which confirms relationship banking theory (Boot, 2000). The larger, hierarchical banks in our sample confirm the need to automate the lending process to this type of BMI in the middle- to longer term in order to make it cost-effective, which is in line with the literature on bank organizational structure (Brancati, 2015).

Limitations and future research

Our study has several limitations and offers avenues for future research. One limitation of our study is the degree to which our insights – coming from empirical data on circular BMI – are transferable to BMI, in general (Bocken et al., 2014; Linder & Williander, 2015). Since we find that many of the financing constraints faced by the firms in our sample are similar to those pinpointed in the innovation finance literature in general, we think this problem is manageable. Nevertheless, a similar study using data from firms who carry out different types of BMI (e.g. based on digitalisation, artificial intelligence, blockchain) would further our understanding of BMI finance and how this is affected by firm / BMI characteristics. Just like previous BMI literature evolved out of the development of internet technology in the 90’s, empirical data collection in this field is limited to BMI that is occurring.

A second limitation is that our data collection is partly self-reported by banks (workshops and publications about circular economy). It could be possible that in the workshops, banks report to be more positive about their willingness to finance circular BMI than their ‘real’ loan decision show. However, bank willingness to finance circular BMI is not higher than the outcomes of the real credit decisions as reported by the entrepreneurs/firms. We do find

that the public publications of banks about circular economy seem somewhat more optimistic than their real decisions and the workshops, but these are also less concrete.

Future research could delve further into alleviation of financing constraints for BMI using all three types of lending technologies: cash flow, asset and relationship-based. From a cash flow perspective, we recommend setting up and testing quantitative models for cash flow prediction of service models (see e.g. Fischer & Achterberg, 2017). From an asset perspective, improved understanding is needed about how asset characteristics influence their ability to serve as collateral for access to finance. Our study shows that there are large differences between types of assets and their ability to serve as collateral in bank loans. Since increased asset lifetimes can serve sustainability purposes, firm profits and collateral value, further research should delve into specific asset characteristics that optimize all three. Finally, further research should aim to improve our understanding of how relationships facilitate bank financing decisions for BMI. Our study does not provide enough data to clarify what are the parameters that decide which firms are able to get finance based on relationships with banks, suppliers and customers, and how these relationships interact (Kortmann & Piller, 2016). Finally, the current study limits itself to bank loans, whereas other sources of finance for BMI – such as venture capital and crowdfunding – should be studied as well, including combinations and pecking orders between them.

Managerial implications

For entrepreneurs and managers

Entrepreneurs wanting to attract credit for BMI can undertake several concrete actions to make their business model more financeable. Firstly, engagement of customers and networks will help obtain a bank loan. Engaging a bank at an early stage can create buy-in and willingness to develop insight into the particular type of BMI. Commitment from value chain players such as (potential) customers and suppliers – as a signal of future cash flows – will help lower risks from a bank perspective. This can be organized by building customer communities, running (pre-order) crowdfunding campaigns and setting up joint ventures or buyback constructions with suppliers. Identifying similar market players that could potentially take over running the business in case of default may also help obtain a bank loan. Secondly, entrepreneurs wanting to finance their BMI should consider how their value

proposition and strategy could be designed to optimize the value of underlying assets and increase robustness of future cash flows. By marketing assets that are durable, flexible, moveable, modular and/or at some level standardized means these assets can embody multiple 'value propositions' in the future, which may increase their collateral value for the bank. A materials passport can also improve residual value of assets. At the same time, the value proposition still needs to be distinguishing enough to merit financing without fear of competitors capturing their market share – a challenge that entrepreneurs need to navigate.

However, the most important signal found to improve access for BMI bank finance is robustness of future cash flows. This means that – in service models – contracts need to be designed in such a way that they guarantee long-term revenues, while also keeping the terms attractive for clients. It can also mean that if entrepreneurs obtain commitment from launching customers that are large and/or creditworthy, this can have a positive influence on access to bank finance, as well as data collection on the 'stick rate' of clients – all signals of robust future cash flows. One strategic option for innovative firms offering product-service business value proposition is to first obtain long-term B2B contracts (i.e. service all smartphones for a large firm or all washing machines for a housing corporation), which gives a bank the security of future revenue and allows for free cash flow to grow the B2C market. Joint ventures and buyback constructions with suppliers also increase future cash flow robustness.

For banks

To overcome financing challenges residing within innovative (circular) business models, banks that wish to lend to a certain type of BMI should develop product/sector expertise and innovate their use of lending technologies to best overcome information asymmetries. In practice, this can mean learning to determine quality of future cash flows (accounts receivable), assessing creditworthiness of clients and evaluating collateral values of new products for asset-based lending.

Our research indicates that building relationships with innovative firms can help banks understand this type of BMI and also increases the chance of them being able to extend credit based on multiple components of the business models, since cash flow or assets will often be insufficiently available. Banks therefore need to invest in expertise to be able to screen

technological innovations to gauge their potential for creating future cash flows enabling them to service a loan. With time, the increased investments into relationships with innovating firms can pay off in the form of expertise on this specific type of innovation leading to a larger and growing market (share) in the future and can be used to develop automated lending models once this type of business model has mainstreamed. In addition, a bank could develop additional services for firms, such as client acceptance procedures based on credit scoring models, which can improve the competitive position of the firm.

Another way to lend to BMI is by sharing risks with other financial and market players. Buyback constructions and joint ventures with suppliers, (pre-)orders from customers, syndication between banks and other financial players as well as re-selling to long-term financiers such as state investment banks or pensions, are ways to share BMI financial risk.

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5.6 Appendix

Table 5-11 List of interviewees/workshop participants (face-to-face) (49)

Code	Role	Date	Interviewers	Type
A1	Senior Sustainable Business Strategist	Dec 2015	3	Interview
		Sep 2016	2	Workshop
A2	Sustainable Business Manager	Dec 2015	3	Interview
A3	Account manager	Sep 2016	2	Workshop
A4	Account manager	Sep 2016	2	Workshop
A5	Innovation manager	Sep 2016	2	Workshop
A6	Innovation manager	Sep 2016	2	Workshop
A7	Asset manager	Sep 2016	2	Workshop
A8	Account manager	Sep 2016	2	Workshop
A9	Financial specialist	Sep 2016	2	Workshop
A10	Marketing manager	Sep 2016	2	Workshop
A11	Account manager	Sep 2016	2	Workshop
A12	Account manager	Sep 2016	2	Workshop
A13	Sustainability Program Manager	Sep 2016	2	Workshop
A14	Credit analyst	Sep 2016	2	Workshop
A15	Assistant Account manager	Sep 2016	2	Workshop
A16	Young Professional Trainee	Sep 2016	2	Workshop
A17	Economist	Sep 2016	2	Workshop
A18	Relationship manager corporate banking	Sep 2016	2	Workshop
A19	Vice president large & key accounts	Sep 2016	2	Workshop
B1	Manager Innovation Lab	Jan 2016	2	Interview
		Feb 2016	2	Workshop
B2	Intern Innovation Lab	Jan 2016	2	Interview
		Feb 2016	2	Workshop
B3	Head of Commercial Banking	Feb 2016	2	Workshop
B4	Managing Director	Feb 2016	2	Workshop
B5	Sector manager business banking	Feb 2016	4	Workshop

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B6	Senior relationship manager SME banking	Feb 2016	4	Workshop
B7	Senior relationship manager SME banking	Feb 2016	4	Workshop
B8	Relationship manager SME banking	Feb 2016	4	Workshop
B9	Director operations, investment management	Feb 2016	4	Workshop
B10	Corporate Communication & Strategy Intern	Feb 2016	4	Workshop
B11	Controller investment management	Feb 2016	4	Workshop
C1	Director Sustainable Finance	Jan 2016	2	Interview
		Aug 2017	2	Workshop
C2	Director Sustainable Lending	Jan 2016	2	Interview
C3	Manager Sustainable Finance	Aug 2017	2	Workshop
C4	Senior Risk Manager	Aug 2017	2	Workshop
C5	Sector Banker	Aug 2017	2	Workshop
D1	Director Sustainable Banking	Jan 2016	2	Interview
		Jun 2016	3	Workshop
D2	Head of Sustainability Corporate Banking	Jan 2016	2	Interview
		Jun 2016	3	Workshop
D3	Sector banker industry	Jun 2016	3	Workshop
D4	Sector banker public banking	Jun 2016	3	Workshop
D5	Senior Procurement Consultant	Jun 2016	3	Workshop
D6	Director Corporate Lending	Jun 2016	3	Workshop
D7	Director Strategy & Business Development	Jun 2016	3	Workshop
D8	Procurement consultant	Jun 2016	3	Workshop
D9	Sector banker industry	Jun 2016	3	Workshop
D10	Head Real Estate Risk & Portfolio Management	Jun 2016	3	Workshop
D11	Sector banker construction	Jun 2016	3	Workshop
D12	Product manager maintenance corporate buildings	Jun 2016	3	Workshop
D13	Innovation manager	Jun 2016	3	Workshop
D14	Risk management	Jun 2016	3	Workshop

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Table 5-12 List of interviewees at firms (face-to-face) (37)

Code	Firm name	Role	Sector	Date	# Inter-viewers
E1	Auping	Product Development	Bed producer	Nov 2016	2
E2	Auping	Procurement	Bed producer	Nov 2016	2
F1	DSM	Manager Circular Economy	Chemicals	Oct 2016	2
G1	Fairphone	Resource efficiency manager	Consumer electronics	Nov 2016	2
H1	Ioniqa	CEO	Plastics	Dec 2017	2
I1	Gyproc	Sustainability Manager	Building materials	Dec 2017	2
J1	Rockwool	Public affairs	Building materials	Oct 2016	2
K1	Black Bear Carbon	CEO	Car tire upcycler	Nov 2016	2
L1	Interface	Sustainable Development	Carpets	Nov 2016	2
M1	Coolrec	Directeur	Waste recovery	Jan 2017	2
N1	Closing The Loop	Founder	Electronics recovery	Aug 2016	2
O1	HVC	CEO	Waste	Oct 2016	2
P1	Canon	Sustainability Manager	Electronics	Dec 2016	2
P2	Canon	Sustainability Manager	Electronics	Dec 2016	2
P3	Canon Lease	Business Controller Solutions Financing	Electronics	Jan 2017	2
Q1	Gerrard Street	Founder	Consumer electronics	Sep 2016	2
Q2	Gerrard Street	Founder	Consumer electronics	Sep 2016	2
R	Desko	General Directeur	Office furniture	Nov 2016	2
S1	Philips	CEO	Electronics	Nov 2016	3
S2	Philips	Global Head Sustainability	Electronics	Nov 2016	3
S3	Philips	Director Sustainability	Electronics	Nov 2016	3

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S4	Philips (Lighting)	Director Sustainability	Electronics	Feb 2017	2
S5	Philips (Lighting)	Head of Global Public & Government Affairs	Electronics	Feb 2017	2
T1	van de Sant	Founder	Furniture	Jan 2017	2
U1	Greenwheels	Business development manager	Car sharing	Mar 2017	2
V1	Peerby	Founder / CEO	Sharing platform	Dec 2016	2
W1	United Wardrobe	Founder / CEO	Clothing resale platform	Oct 2016	2
X1	Blabla car	Country Manager	Car sharing	Dec 2016	2
Y1	NS: OV fiets	Sustainable business manager	Bicycle renting	Dec 2016	2
Z1	Bundles	Founder / CEO	Washing service provider	Dec 2016	2
AA1	Ahrend	CEO	Office furniture	Feb 2017	2
AA2	Ahrend	Product Design	Office furniture	Feb 2017	2
AA3	Ahrend	MVO	Office furniture	Feb 2017	2
AB1	Gispem	Manager Circularity	Office furniture	Nov 2016	2
AC1	Mitsubishi electronics	Sales Manager	Elevator firm	Mar 2017	2
AE1	Desso	Director sustainability	Office furniture	Jan 2017	2
AF1	Philips Capital	Head of Financial Sourcing	Office Lighting	Jun 2016	3

6 The wisdom of the crowd in funding: information heterogeneity and social networks of crowdfunders⁷

Abstract

Crowdfunding has enabled large crowds to fund innovative projects. This type of funding might tap into the wisdom of crowds who were previously disconnected from the funding process. We distinguish between in-crowd and out-crowd funders (with and without ties to project creators) in order to test for heterogeneity in their information use. Based on the analysis of a large-scale survey amongst project funders, this paper shows that in-crowd investors rely more on information about the project creator than out-crowd investors. Out-crowd investors do not seem to attach more importance to information about the project itself than in-crowd investors, except in the case of donation-based crowdfunding. For financial-return crowdfunding, financial information becomes less important once a strong relationship with the project creator is established. Our study allows project creators to target information to specific audiences based on their relationship strength across different types of crowdfunding projects.

6.1 Introduction

The funding of innovative start-ups has always been challenging due to a lack of track record, collateral and technological uncertainty (Engel & Stiebale 2014; Hall 2002; Giudici & Paleari 2000). More generally, small and medium sized firms face greater capital constraints than large firms, lacking access to market-based funding due to the high fixed costs associated with issuing equity and the unwillingness of institutional investors to take small holdings. This leaves start-ups highly dependent on bank credit, venture capital funds, angel investors and bootstrapping for their liquidity needs (Chittenden, Hall, & Hutchinson, 1996; Ebben & Johnson, 2006; G. Giudici & Paleari, 2000; Keasey & McGuinness, 1990). Access to bank credit has become more transactional in recent decades with increased

⁷ Joint work with Friedemann Polzin and Erik Stam. Published as Polzin, F., Toxopeus, H., & Stam, E. (2017). The wisdom of the crowd in funding: information heterogeneity and social networks of crowdfunders. *Small Business Economics*, 1–23.

centralization and computerized assessment of creditworthiness (Bhidé, 2010), and is often restricted due to a lack of profit and collateral. This shift severely affects innovative small firms due to their disproportionate reliance on soft information in the lending process (Brancati, 2015; Cosci, Meliciani, & Sabato, 2016). Furthermore, the willingness of venture capitalists to fund start-ups is often limited to certain sectors (Huyghebaert, Gucht, & Hulle, 2007) and there is evidence that the financial crisis has dampened their willingness to invest, particularly in follow-up rounds (J. Block & Sandner, 2009; Cowling, Liu, Minniti, & Zhang, 2016; Migendt, Schock, Täube, von Flotow, & Polzin, 2014). Structural financing constraints for small firms impede economic growth when firms downplay their growth strategy to match available funds (Beck & Demircuc-Kunt, 2006; Binks & Ennew, 1996; Chittenden et al., 1996; Rostamkalaei & Freel, 2015).

The rise of crowdfunding over the past decade in part addresses this funding gap by offering entrepreneurs an alternative to traditional finance channels. Crowdfunding caters well to innovative, opaque, small firms and makes use of social networks in the funding process (Colombo et al., 2015; Vismara, 2016). It builds on and expands beyond the traditional ‘in-crowd’ of family and friends by allowing both in- and out-crowd investors to provide finance through digital platforms (Bruton et al., 2015; Salomon, 2016). Furthermore, it has lowered the transaction costs for entrepreneurs to collect small investment amounts from a dispersed set of investors and is becoming an increasingly sizable source of funding for start-ups and other bottom-up initiatives in the economy (Massolution, 2015; Wardrop, Zhang, Rau, & Gray, 2015). However, it is unclear whether crowdfunding provides access to the wisdom of the crowd, or whether it opens up a wider audience of fools alongside the usual family and friends in-crowd.

In line with the growth of crowdfunding, academic research directed at understanding this phenomenon has emerged in recent years (Moritz & Block, 2016). Much of this literature focuses on success factors driving crowdfunding campaigns, such as the role of early contributions (Agrawal, Catalini, & Goldfarb, 2015; Cholakova & Clarysse, 2015; Colombo et al., 2015). There is also considerable attention on the role of social networks in crowdfunding (Agrawal et al., 2015; Horvát, Uparna, & Uzzi, 2015; Hui, Gerber, & Gergle, 2014) and on overcoming informational asymmetries (Ahlers, Cumming, Günther, & Schweizer, 2015; Lin, Prabhala, & Viswanathan, 2012; Vismara, 2015). Lacking attention

until now is the bridge between these two topics, namely how social networks affect the type of information used by investors in crowdfunding decision-making. Although there are suggestions regarding crowdfunding information mechanisms and the role of social networks (Ter Wal, Alexy, Block, & Sandner, 2016), there is little empirical evidence about the type of information that funders use to make investment decisions. Are crowdfunders well informed about the project they invest in, or are they jumping on a band-wagon set in motion by other investors in a campaign?

This study offers the first detailed empirical analysis on heterogeneity in information use by crowdfunders and how this is affected by their social networks. The ability to distinguish between investors based on their interpersonal ties to the entrepreneur offers insights into the application of theories about information asymmetries and social networks in funding decisions, and serves as input for public policy for entrepreneurship and finance. Our main research question is: *How does the type of information used by crowdfunders vary with the strength of their ties to project creators?*

This article is structured as follows: first, we review the relevant literature and introduce the theoretical framework. Next, we present the research design including our quantitative research approach and data. We then display the results which form the basis for the conclusions in the final section.

6.2 Literature review and theoretical framework

Signaling in early stage finance and information cascades

The way entrepreneurs obtain capital when forming a new firm has important implications for future performance (Bosma, Praag, Thurik, & Wit, 2004; Cassar, 2004). Their search for external finance is characterised by agency problems between the entrepreneur and funder due to information asymmetries that lead to adverse selection and moral hazard (Denis, 2004; Jensen & Meckling, 1976; Parker, 2009). This is especially the case for new firms that face high financing costs (Rostamkalaei & Freel, 2015) driven by cumbersome information gathering, a lack of track record and, often, collateral (Blumberg & Letterie, 2007; Cassar, 2004).

Scholars suggest signaling can overcome these agency problems (Akerlof, 1970; Amit, Glosten, & Muller, 1990; Gompers, 1995; Myers & Majluf, 1984; Stiglitz & Weiss, 1981). Signaling can take place using different kinds of information, for example the availability of patents and prototypes, or the track record of entrepreneurial team (Audretsch, Bönte, & Mahagaonkar, 2012; Becker-Blease & Sohl, 2015; Busenitz, Fiet, & Moesel, 2005; Gompers & Lerner, 2001; Spence, 1973). Many studies in the signaling literature establish a positive relationship between early-stage investments and firm success (Bernstein et al. 2015a; Bosma et al. 2004; Kerr et al. 2014; Kortum and Lerner 2000; Samila and Sorenson 2010) and link an entrepreneur's characteristics, such as human capital, to venture performance (Becker-Blease & Sohl, 2015; Ouimet & Zarutskie, 2014; Pukthuanthong, 2006). Bernstein et al. (2015b) examine venture attributes used to signal quality to investors, i.e. the team, track-record of the venture and identity of current investors. They suggest that information about the person(s) behind the venture is crucially important for obtaining external finance, which is in line with the practice of VC and business angels (Alexy, Block, Sandner, & Ter Wal, 2012; Becker-Blease & Sohl, 2015; Vismara, 2016).

Crowdfunding⁸ as a new form of seed finance, acts as a platform (agent) between investors and entrepreneurs (Bruton et al., 2015; Cumming, Pandes, & Robinson, 2015; Harrison, 2013; Salomon, 2016). A growing interest and body of research is emerging into this new form of entrepreneurial finance (for a review see Kuppuswamy & Bayus, 2015; Moritz & Block, 2016). Crowdfunding combines features of a two-sided market platform with underlying networking technologies. The real-time, open and online insight into the commitment of previous funders, as well as extensive targeted descriptions of the fundraising campaign, are specific signals of crowdfunding (Bruton et al., 2015). The quality of these signals as input into investment decisions is questionable since the crowd might not have expertise in production, marketing and competition, nor are they likely to invest in due diligence given high fixed costs (Belleflamme, Lambert, & Schwienbacher, 2013; Vismara,

⁸ Following previous work we distinguish four types of crowdfunding (Ahlers, Cumming, Günther, & Schweizer, 2015; Belleflamme, Lambert, & Schwienbacher, 2014; E. Mollick, 2014; Nesta, 2014): Purely donation-based crowdfunding exists that involves only intangible returns. Reward-based crowdfunding (or pre-ordering) consists of pledging an amount of money in exchange for future products. Lending-based crowdfunding can be compared to micro-loans, where the backer lends a certain amount of money to the project creator. Equity-based crowdfunding issues shares in the company behind the call, which are distributed among the funders according to the value of their contributions. The latter two are combined throughout this paper and referred to as 'financial crowdfunding'.

2016). As such, the wisdom of the crowd is not self-evident. On the one hand, the crowd could represent new customers, delivering knowledge about the market potential of an offering by signing up as funders. On the other, they could be free-riding on the – potentially unwise – investment decisions of others, and ‘herd’ without adding any new information to a decision process (Bikhchandani, Hirshleifer, & Welch, 1992).

Hornuf & Schwienbacher (2015) find that specific kinds of information, such as updates to investors, significantly drive investment as funders update their preferences in the light of project assessment. Moritz et al. (2015) examined investor communication in equity crowdfunding, highlighting that perceived sympathy, openness and trustworthiness in the relationship between venture and investor reduced perceived information asymmetries. They also found that third-party communication influences the decision making process of crowdfunders. Furthermore, allowing crowdfunders to adjust privacy settings regarding information about their contribution deters some investors but increases average contribution size (Burtch, Ghose, & Wattal, 2015).

This suggests that some form of quality signaling between project creator and crowdfunder occurs which relates to the general notion of the ‘wisdom of the crowd’ in funding decisions (E. R. Mollick & Nanda, 2015; Surowiecki, 2005). But how does the crowd gather its ‘wisdom’? Literature on investment processes suggest that this is facilitated by the social networks of both entrepreneur and investor (Alexy et al., 2012; Colombo et al., 2015; Ter Wal et al., 2016; Uzzi, 1999).

Ties that bind, ties that blind: Social networks and information

Social networks strongly influence an entrepreneur’s funding success as these provide access to resources such as finance, knowledge and partners (Davidsson & Honig, 2003; Dubini & Aldrich, 1991; Huang & Knight, 2015; Kwon & Arenius, 2010; Shane & Cable, 2002). Social network theory provides a possible lens to study the role of information in the relationship between funder and venture (M. S. Granovetter, 1973; Hoang & Antoncic, 2003; Jack & Anderson, 2002; Kwon & Arenius, 2010; Uzzi, 1999). Granovetter (1973:1361) defines the notion of ‘strength’ of interpersonal ties based on ‘a combination of the amount of time, the emotional intensity, the intimacy and the reciprocal services which characterize the tie’.

Social networks, comprising both strong and weak ties, may affect the type of information used in a financing decision through three mechanisms. First, the funder's motivation for investing, for example for financial return or to strengthen an existing relationship, will affect the information required (Belleflamme et al., 2014; Shane & Cable, 2002). Second, the extent to which interpersonal ties develop and enforce common norms of behaviour will affect the perceived moral hazard of an investment (Bernstein, Giroud, et al., 2015; M. Granovetter, 2005; Uzzi, 1999). This may make obtaining information about the entrepreneur more attractive than information about the project, its objectives, risk and finance. Third, the way in which quality signals are disseminated and received may vary based on the strength of the relationship, affecting informational asymmetries (Ter Wal et al., 2016). For example, funders with weak ties to the project creator consume novel information more readily than those with stronger ties (Alexy et al. 2012; Granovetter 1973; Ter Wal et al. 2016). However, in situations of risk and uncertainty, reliance on multiple, more trustworthy information sources may favour funders with stronger ties to the project creator (Centola & Macy, 2007; Ter Wal et al., 2016).

Crowdfunding could be classified as a new form of relationship-based financial intermediation, exploiting the local knowledge and trust embedded in social networks to provide quality signals about the project creator and their project. The mechanisms at play could be similar to those seen in venture capital and angel investment. Relationships are built between financier and venture as well as between syndicates of financiers to mitigate information asymmetries (Alexy et al. 2012; Gompers 1995; Gompers and Lerner 2001; Yao-Wen 2010). Social ties between investors are formed every time they are attracted to the same target company (Sorenson & Stuart, 2008; Ter Wal et al., 2016).

Several scholars (Agrawal et al., 2015; Belleflamme et al., 2014; Lin et al., 2012; E. Mollick, 2014; Ordanini et al., 2011; Vismara, 2016) show that the size of a founder's social network is positively associated with the capital raised for a project and the subsequent success of the project in both reward-based and equity crowdfunding; this effect does not hold in a donation-based setting (Burtch, Ghose, & Wattal, 2013; Kuppuswamy & Bayus, 2015).

Furthermore, the relationship between funders and project creators affects investment sequencing through information cascades. Individual funders possess different levels of

information, hence some investors have an advantage over others (Cumming et al. 2015a; Hildebrand et al. 2016). When professional investors with industry experience and track-record enter relatively early in a crowdfunding campaign, their public visibility attracts other investors (Vismara, 2015), in a similar way as in other online market places (Dellarocas, 2003; Lin et al., 2012). This suggests that the quality indication process with crowdfunding is staged, with an in-crowd to out-crowd sequence, using different types of information and levels of expertise to make a funding decision.

In-crowd information needs

We define the in-crowd as those project funders who have strong or weak interpersonal ties with the project creator. On crowdfunding platforms, investors base their decisions on information provided by the project creator in the form of updates during the campaign and on the investment behavior and comments of other crowd investors (Hornuf & Schwenbacher, 2015). In-crowd information requirements could be affected by the three mechanisms outlined above: funder motivation, project creator intentions and information flow.

Firstly, the in-crowd may have different motivations than wanting to contribute to a successful project, such as reinforcing their relationship with the project creator, social obligation or altruism (Belleflamme et al., 2014; Gartner, Frid, & Alexander, 2011; Klyver, Lindsay, Kassicieh, & Hancock, 2016; Shane & Cable, 2002). This could make them less inclined to search for quality signals about the project itself, and focus more on information about the person behind the project. Secondly, we expect that funding decisions embedded within a social network will decrease fears of negative behaviour by the project creator (Bernstein, Giroud, et al., 2015; M. Granovetter, 1985; Uzzi, 1999). This motivates the funder to seek information about the person behind the venture, increasing trust along with relationship strength. Third, and central to our argument, social networks support the flow of information which signal quality of projects and entrepreneurs (Alexy et al., 2012; Ter Wal et al., 2016). Instead of relying on formal sources of information (such as project websites and media), in-crowd funders may place higher weight on information coming through their personal relationship with the project creator, which they expect to be more accurate and proprietary, giving them an edge over publicly available information. In line

with Ahlers et al. (2015), Cholakova & Clarysse (2015a) and Cumming et al. (2015) we expect the in-crowd to gather (soft) information about the characteristics of a project's management (track record, size or level of education) as this affects probability of success of the venture. Due to existing ties, obtaining and processing this person-to-person information about management or initiators is less costly than for out-crowd funders. Additionally, relationships may imply a longer term commitment to the entrepreneur and therefore a longer term perspective on the costs and benefits of investing in information gathering about the entrepreneur (Boot, 2000; Brancati, 2015; Scholtens, 1999).

H1 In-crowd funders are more likely to rely on information about the person(s) behind the project than out-crowd funders.

Out-crowd information needs

We define the out-crowd as those project funders who have no personal ties to the project owner. We expect this to lead to different information needs through the same three mechanisms. First, without the funding decision embedded in a social relationship, the motivation is more likely to be based on expected results, such as financial return (Cholakova & Clarysse, 2015), a finished product or societal impact rather than social capital (Apinunmahakul & Devlin, 2008) or community benefits (Belleflamme et al., 2014). Information about the project, its objectives, finance and risk will be more relevant as it gives insight into the expected return of the project (Ahlers et al., 2015; Belleflamme et al., 2013, 2014). Secondly, information gathering about the project team is unlikely to reduce moral hazard as there is no relationship to enforce social reward or punishment (Belleflamme et al., 2014; Vismara, 2016). Third, as the out-crowd lacks direct insights from the project creator, they depend on information that reaches them through formal direct (project websites, newsletters) or indirect (media) channels (Hornuf & Schwienbacher, 2015). Information about the project creator obtained through formal channels is often perceived as less trustworthy and more difficult to interpret as a quality signal than when obtained through interpersonal ties. As such, it loses its advantage over more general information about the project and its objectives (Hornuf & Schwienbacher, 2015; Vismara, 2016). We expect out-crowd funders to be less motivated than in-crowd funders to gather information about the

project team and to instead focus more on ‘traditional’ quality signals such as the nature of the project or venture and its strategy (Ahlers et al., 2015; Hornuf & Schwienbacher, 2015).

H2 Out-crowd funders are more likely to rely on information about the project and its objectives than in-crowd funders.

Furthermore, we expect out-crowd funders to rely more on information about financial planning and risk than in-crowd funders due to stronger instrumental (results-based) motivation and a lack of personal access to the project owner. A recent study on equity crowdfunding shows that the decision to invest is positively associated with the funders’ interest in rewards (Cholakova & Clarysse, 2015). Ahlers et al. (2015) study the effectiveness of quality attributes and the level of uncertainty in offer documents used to encourage (small) investors to invest in an equity crowdfunding context. They highlight the importance of financial projections for crowdfunding success. The absence of ties to the project owner creates an incentive to look for alternative, objective quality signals and leads funders to investigate information about financial planning and risk more thoroughly than in-crowd funders (Ahlers et al., 2015; Busenitz et al., 2005; Hornuf & Schwienbacher, 2015).

Besides proving a quality signal, information about financials and risk can also reduce the perceived risk of moral hazard by revealing the commitment level of the project creator, such as whether or not they provide personal collateral and/or invest their own resources (Blumberg & Letterie, 2007). We therefore expect that out-crowd funders rely more on information about financial planning and risks than in-crowd funders, looking both for quality signals and to reduce perceived moral hazard risk.

H3 Out-crowd funders are more likely to rely on information about financial planning and risks than in-crowd funders.

6.3 Methodology

Research design

In this paper, we seek to understand the effect of the strength of interpersonal ties on the information used by crowdfunders. In order to test the hypotheses formulated above, we constructed the analytical model presented in Figure 1. Most of the literature to date uses project-level investment data that includes varying degrees of information about the project and its creator, however, this type of data does not convey much information about the project funders themselves. To analyse the hypothesized relations, we used a large-scale survey of crowdfunders (Cholakova & Clarysse, 2015; E. Mollick, 2015). We note that this methodological approach is potentially vulnerable to common method bias (i.e. gathering all information for this analysis via one survey) which has been shown to affect survey data (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Whilst we could not conceptually identify any underlying factors that the predictor and criterion variables had in common, we adopted several measures to reduce potential bias. We started by minimizing item ambiguity which included avoiding vague concepts, complicated syntax and unfamiliar terms. We deliberately used simple, specific and concise questions to measure the constructs. The respondents were also guaranteed anonymity.

Data

We use data from a large-scale survey called the ‘National Crowdfunding Research’ conducted in 2013 in The Netherlands with 1278 individual respondents.⁹ Respondents were surveyed regarding their participation in crowdfunding, on topics such as their investments, motivation and use of information in investment decisions. It targeted both crowdfunders as well as non-crowdfunders. A snowball sampling method was used which drew on the personal and organisational networks of participating organisations. About 300 responses included our variables of interest (see Figure 1). Of these, the respondents had participated in either donation, reward-based or financial return (debt and equity) crowdfunding through

⁹ The questionnaire is published at: <http://www.crowdfundingonderzoek.nl/>

all types of platforms (mainly, but not only, Dutch platforms). The sample is representative of other active crowdfunders in terms of age and education (Mollick, 2015).

Dependent variable

We created several dependent variables as proxies for use of information, with a distinct question in the survey where respondents rated the importance of six different types of information in their decision to crowdfund. These types of information were: (1) information about the project or the company, (2) information about the objectives of the project or the company (Ahlers et al., 2015; Hornuf & Schwienbacher, 2015), (3) information about the person or organization behind the project or the company, (4) information about previous projects of the person or organization behind it (Bernstein, Korteweg, et al., 2015; Cholakova & Clarysse, 2015), (5) information about the financial planning of the project or the company, and (6) information about the risks associated with the project or the company (Ahlers et al., 2015). Using factor analysis we created the following additional ‘information use’ dependent variables from these responses: (1) information about project and objectives ‘infoprojobj’, (2) information about person and their track record ‘infopersprev’, and (3) information about financial planning and risks ‘infofinrisk’.

Independent variables

To determine the influence of interpersonal ties on the information use of funders, we included the relationship to project creator as an independent variable (‘What was your relationship with the project owner or business owner before making your financial contribution through crowdfunding?’). We combine the individual answer categories to create new variables measuring relationship strength, aggregating different types of relationship to strong ties, weak ties or no ties (a similar approach has been taken by Klyver et al., 2016). ‘Strong ties’ included family, friends, initiator of the project or employee (Kuppuswamy & Bayus, 2015). ‘Weak ties’ consists of people who indicate that they know the person behind the project or are a friend of friend, a business relationship, customer, fan or visitor (Bruton et al., 2015). If there was no relationship we coded it as ‘no ties’. We created one extra answer category based on manual answers entered in the category ‘other’, namely ‘initiator/employee’. In the case that there were multiple relationships indicated, we

always selected the strongest (i.e. if someone responded both ‘friend’ and ‘fan’, we used ‘friend’).

Control variables

To account for the effect of other characteristics of the funders, we include a number of control variables from the survey such as age, gender (Klyver et al., 2016), education level, (E. Mollick, 2014), type of project invested in, amount funded, type of return (donation, in-kind, financial) (Vismara, 2015, 2016), motivation, investment of others and risk awareness.

Following earlier work (Calic & Mosakowski, 2016; Hörisch, 2015), we distinguish between for-profit, social, cultural and ecological projects and coded all projects into these categories as follows: (1) For-profit, (2) Social, (3) Cultural, (4) Ecological. Multiple answers were not coded. We asked an external researcher to validate our coding and used this feedback to improve our coding process (Patton, 2002). If there was only a description of the specific project (without a name) we searched for a crowdfunding project which matched that description and the time period, and if we found a plausible match, we coded this project.

By including instrumental (vs. value-based) motivation as a control variable, we control for one of the mechanisms through which we expect relationship strength to influence the type of informational need. We do this in order to focus on the behavioural intention of the project funder and quality signals as key mechanisms to overcome informational asymmetries in our model (Vismara, 2016). We use ‘importance of security of getting a promised return’ (securityreturn) as a proxy for instrumental motivation. Consistent with cognitive evaluation theory, the intrinsic motivation of lenders to provide capital is undermined when entrepreneurs focus on future extrinsic rewards associated with lending (Allison, Davis, Short, & Webb, 2015). We also control for the influence of others investing in the project (herding effect) (Bikhchandani et al., 1992; Vismara, 2015) by including the variable ‘knowing the financial contributions made by others’ (knowingfincontriboth) in our analysis.

Finally, we control for risk awareness (professionalism) of crowdfunders, since we expect experienced investors to use more information than amateur investors. We use the statement ‘I keep in mind the consideration that to invest through crowdfunding in a company can be a high risk investment’ as a proxy for risk awareness.

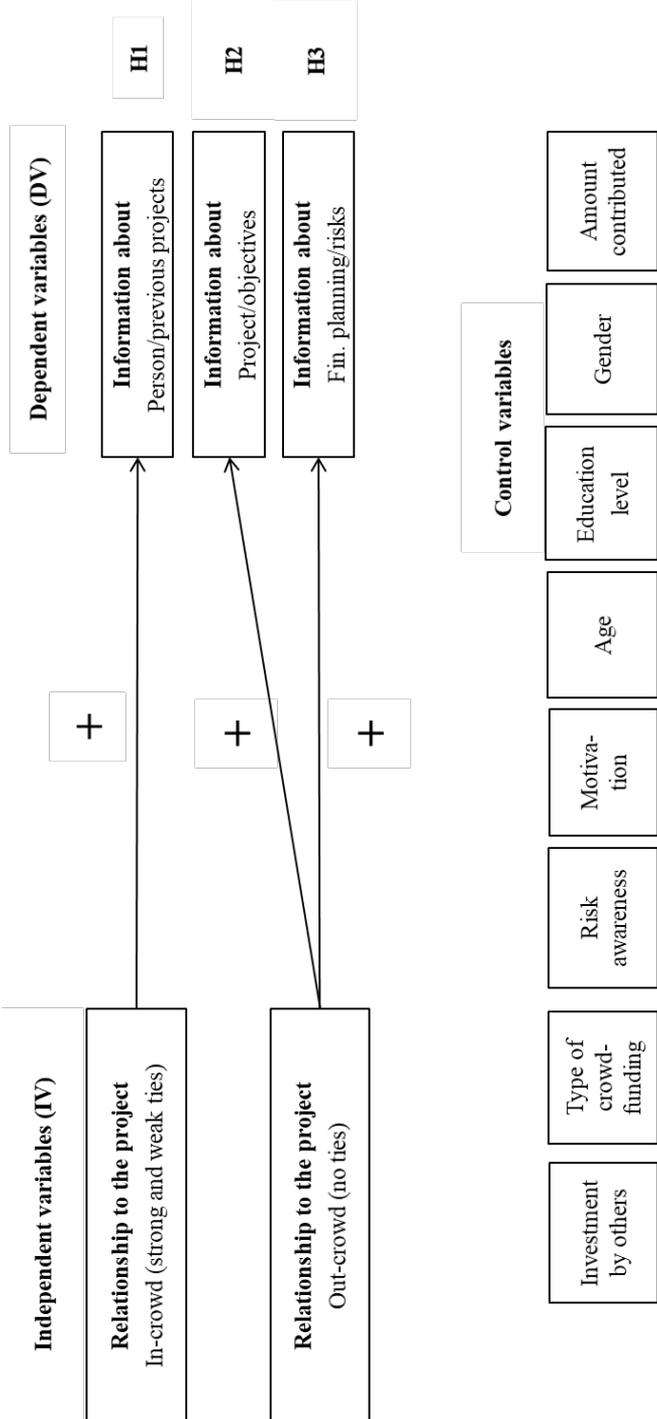


Figure 6-1 Analytical model

Data analysis

Most variables were assessed on a 5-point Likert scale (Dillman, 2000). The level of ties (strong, weak and no ties) and type of crowdfunding (donation, reward and financial return) were entered as dummy variables, with reward-based crowdfunding being the reference case. Amount invested, gender, education and social media types have different scales. The data analysis was conducted in several steps (Hair, 2010). First, we thoroughly screened the dataset: cases with missing values have been excluded. Second, we recorded central variables based on our theoretical framework. Third, we used a factor analysis to determine influential variables and to eliminate redundancy among variables in the survey, in particular to define factor loadings for the various dependent variables describing 'informational use'. Fourth, we conducted exploratory data analysis, highlighting how crowdfunders with different relationship strengths to the project owner (in-crowd, out-crowd; differently defined) differ with respect to: motivation, objectives, amount invested, personal characteristics, etc., followed by a more structured correlation analysis (see Table 6-4 in the appendix). Finally, as our dependent variable is of ordinal nature, we conducted ordered logistic regressions to determine the explanatory power of our independent variables (Agresti, 2010; Hair, 2010). Ordered logistic regression does not require normally distributed variables and can deal with metric and non-metric independent variables as well as non-linear effects. It also has relaxed assumptions regarding heteroskedastic variables (Hair, 2010).

6.4 Results

Descriptive statistics

Table 6-3 (appendix) provides descriptive statistics of our dependent, independent and control variables. The first three rows are our dependent variables measuring the information use of funders. The next three rows describe our independent variables (strong, weak and no ties). The remainder of the rows describe our control variables. In our full model 283 observations report on all variables, of which 72 funders engaged in donation-based crowdfunding, 163 contributed to reward-based projects and 48 contributed to campaigns that are expected to yield a financial return. The importance of information about the project and its objective is generally very high (mean of 4.3) followed by information about the

entrepreneur (3.7) and information about the financial aspects and risks of the campaign (3.3). Whilst very few investors have low information needs on all dimensions, only 40% of funders score highly (4 to 5) on the importance of all information for their decision-making. About 18% of the respondents have strong ties to the project creator, about one half have weak ties, and approximately one third of all respondents have no ties. The average amount invested lies in the range of €101 - €250. There is a slight bias towards male respondents (63%). The average age of respondents lies in the range of 35 – 44 years old. Respondents are on average highly educated, holding a University Bachelor degree. The correlation table including all dependent, independent and control variables is presented in Table 6-3 (appendix). Several statistically significant correlations between our dependent variables and relationship strength are reported. Some control variables are also statistically significantly correlated with at least one of the information variables.

Determinants of information use of crowdfunders

Our models (1-6, see Table 6-1) allow analysis of the importance of several types of information used by crowdfunders according to relationship strength between funder and project owner. We enter both strong and weak ties into the regression as dummy variables, using no ties as a reference case. Our results show that relationship strength has significant effects on the importance of different types of information.

First, our regression model shows that funders with strong or weak ties attach significantly higher importance to information about the project creator and their previous projects than funders with no ties. This supports our hypothesis 1 (H1). We differentiate this result across crowdfunding types in two steps. As a first step, in our regression model we add dummy variables for both financial return and donation crowdfunding, using reward-based crowdfunding as a base case (this is the largest sample). We find significantly higher information is required about the person and their previous projects for both financial return and donation crowdfunding compared to the reference reward crowdfunding case (independent of ties). As a second step, to analyse the effect of ties on information needs within each type of crowdfunding, we computed the full model again specifically for the subsets of donation-based, reward-based and financial-return crowdfunding respectively (Table 6-5 to Table 6-7 in the appendix). For donation-based crowdfunding we find no statistically significant effect of relationship strength on information about the person behind

the project and their track record. Within reward-based crowdfunding, both funders with strong and weak ties attach more importance to the information about the project creator than those with no ties. In financial-return crowdfunding campaigns, funders with strong ties attach more importance to information about the person than those with no ties, whereas funders with weak ties show no significant difference in information needs about the project creator compared to those without ties. We therefore conclude that relationship strength drives an increased need for information about the project team, in particular for reward and financial (debt and equity) crowdfunding.

Second, only for donation crowdfunding do we find evidence that out-crowd funders rely more on information about the project and its objectives compared to in-crowd funders (an effect in line with hypothesis 2). This is driven by the significantly lower need for information about the project and its objectives in donation crowdfunding by funders with weak ties, who rely less on this information than those with strong ties or no ties (a U-shaped relationship between project information need and the strength of ties).

Overall, and for reward and financial return crowdfunding individually, we find no evidence that out-crowd funders rely more on information about the project than in-crowd funders. We therefore reject our second hypothesis (H2) both for our aggregated model and for reward and financial return crowdfunding; a higher information need about the project and its objectives only holds for those funders with no ties participating in donation crowdfunding, in relation to funders with weak ties in donation crowdfunding.

Third, we find evidence that in financial return crowdfunding, out-crowd funders rely more on information about financial planning and risk than in-crowd funders. This result is driven mostly by funders with strong ties, who indicate a significantly lower information need for financial planning and risk than funders with no ties. This decreased information need is not observed for funders with weak ties. For donation and reward crowdfunding, and in our model that includes all types of crowdfunding, we find no significant differences in information needs about financial planning and risks for any strength of ties. Hence our hypothesis 3 (H3) is supported for financial return (debt and equity) crowdfunding and rejected for reward and donation crowdfunding.

Table 6-1 Results for all types of crowdfunding

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	infoprojobj	infopersprev	infofinrisk	infoprojobj	infopersprev	infofinrisk
strongties	0.134 (0.347)	1.185*** (0.331)	0.101 (0.330)			
weakties	-0.377 (0.258)	0.903*** (0.247)	0.196 (0.244)			
noties				0.308 (0.247)	-0.940*** (0.235)	-0.176 (0.233)
keepinmindrisk	0.110 (0.101)	0.120 (0.0994)	-0.0404 (0.100)	0.118 (0.101)	0.127 (0.0993)	-0.0418 (0.0999)
knowingfincontriboth	0.108 (0.111)	0.0287 (0.109)	0.384*** (0.108)	0.117 (0.111)	0.0365 (0.109)	0.383*** (0.108)
profit	-0.654* (0.346)	-0.143 (0.330)	-0.430 (0.333)	-0.659* (0.346)	-0.179 (0.331)	-0.439 (0.332)
social	0.452 (0.307)	0.0647 (0.290)	-0.396 (0.295)	0.505 (0.308)	0.0634 (0.291)	-0.409 (0.295)
cultural	0.124 (0.381)	-0.241 (0.365)	-0.570 (0.369)	0.227 (0.378)	-0.209 (0.362)	-0.593 (0.367)
ecological	0.825*** (0.318)	-0.386 (0.299)	0.141 (0.303)	0.838*** (0.317)	-0.357 (0.299)	0.144 (0.302)
amount	-0.0261 (0.0496)	0.0160 (0.0475)	0.132*** (0.0489)	-0.0184 (0.0494)	0.0129 (0.0476)	0.131*** (0.0490)
gender	0.300 (0.241)	0.303 (0.229)	0.139 (0.233)	0.310 (0.241)	0.301 (0.229)	0.139 (0.233)
age	0.269** (0.113)	0.174* (0.105)	0.177* (0.107)	0.270** (0.113)	0.184* (0.105)	0.175 (0.107)
education	0.0244 (0.0709)	-0.103 (0.0685)	-0.0202 (0.0663)	0.0169 (0.0704)	-0.0977 (0.0684)	-0.0193 (0.0664)
securityreturn	0.533*** (0.117)	0.506*** (0.110)	0.456*** (0.109)	0.510*** (0.117)	0.499*** (0.109)	0.458*** (0.110)
donation	0.149 (0.295)	0.809*** (0.286)	0.451 (0.294)	0.123 (0.293)	0.776*** (0.285)	0.447 (0.293)
financialreturn	0.260 (0.344)	0.584* (0.313)	0.878*** (0.317)	0.225 (0.343)	0.557* (0.313)	0.884*** (0.316)
Observations	287	287	283	287	287	283
Pseudo R2	0.0633	0.0536	0.0599	0.0607	0.0519	0.0598
LR Chi2	53.59	57.29	67.01	51.38	55.47	66.93
Prob < Chi2	3.07e-06	7.33e-07	1.51e-08	3.58e-06	7.19e-07	6.90e-09

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Types of crowdfunding projects

We also investigated the influence of different types of projects on the use of information about the project, entrepreneur and financial planning and risks by funders with different strength of ties. We carried out this analysis by adding project type dummies to the full model (profit, social, ecological and cultural). First, we find no influence of project type on the information need about the project owner. Second, we find that the importance of information about the project and its objectives varies with the project type. In for-profit campaigns funders attach less importance to information about the project and its objectives. In campaigns with an ecological purpose, this effect is reversed. These effects are consistent across all relationship types. In donation-based and reward-based crowdfunding, the coefficients for both for-profit and ecological projects are higher. The importance of information about the project and its objectives is high in donation-based crowdfunding for ecological projects. Also, in the presence of strong ties, the negative coefficient for for-profit projects disappears. Third, the importance of information about finance and risks does not vary with the type of project in our full model that includes all crowdfunding types. Interestingly, within reward-based crowdfunding (our largest subset), funders of cultural and for-profit projects attach less importance to information about finance and risks than those funding social and ecological projects. This could indicate that these projects display higher informational asymmetries related to their social and ecological goals versus cultural and for profit projects. Financial-return crowdfunding exhibits no significantly different information use based on the type of project, except for a decreased information use about the owner and her track record.

Control variables

As for our control variables, age and security of a promised return (which we interpret as instrumental motivation) show a statistically significant positive relationship to nearly all information variables in our full model. Age is only insignificant for information needs about finance and risk. When we split up the data into different types of crowdfunding, age loses most of its significance. The positive significant relationship between instrumental motivation and information needs remains consistent in all types of crowdfunding, except for information about finance and risks in financial-return crowdfunding. This is probably due to lack of variation within this category (financial return funders are likely to be

instrumentally motivated). We find a strong positive moderating relationship for donation- and financial return crowdfunding regarding information about the entrepreneur and track-record as well as information about financials and risk in financial-return crowdfunding. As expected, the size of the investment (amount) drives the importance of information about financial planning and risks. Risk awareness is not significantly correlated with the importance of information in general. Knowing the financial contribution of others increases the importance of information about financial planning and risks, indicating some additionality between knowing the contribution of others and information gathering for particularly out-crowd, instrumentally motivated funders – the contribution of others increases the chance that the project will be fully funded, and therefore increases the expected payoff of time taken to gather financial and risk information.

Robustness checks

In order to check the robustness of our findings, we checked for multi-collinearity i.e. the correlation among explanatory variables. Investigating the variance inflation factors (VIFs) reveals no multicollinearity, given the mean VIF of 1.5 in models including all types of crowdfunding and 1.6, 1.5, 1.7 in models using donation-based, reward based and financial-return crowdfunding respectively (see Kutner et al. 2005). We also divided relationship dependent variables into in-crowd and out-crowd and calculated the models again. The results remained consistent. As a robustness check for the dependent variables (importance of information) we included measures that incorporate these types of information (quality of the project, reasons for the existence of the project, information about the project/objectives, knowledge and skills of the project creator and their passion, information about the person/track record). Strong and weak ties positively influence the importance of the knowledge and skills of the entrepreneur and thus confirm our main results. In the case of no ties to the project, this coefficient becomes negative, which is also consistent with our results. As an alternative measure of our relationship strength variable, we included the self-reported importance of the relationship for the funding decision. A higher value drives the information about the entrepreneur and previous projects, consistent with our main results.

6.5 Discussion

The guiding research question was: how does the type of information used by crowdfunders vary with the strength of their ties to project creators? Overcoming information asymmetries, prevalent in the relationship between financier and entrepreneur, especially for young and innovative firms, has traditionally been a role of venture capitalists that screen, select and monitor potential targets and syndicate with other investors through social networks to pool resources, exchange information and spread the risks (Alexy et al., 2012; Gompers & Lerner, 2001; Manigart & Wright, 2011; Shane & Cable, 2002; Ter Wal et al., 2016). Our research adds to the informal investor and crowdfunding literature on overcoming information asymmetries in social networks by disentangling quality signals used by crowdfunders to judge project quality (Audretsch et al., 2012; Becker-Blease & Sohl, 2015).

Information heterogeneity and social networks of crowdfunders

First, researchers stressed the role of internal social capital (early backers) as signals for funding success (Ahlers et al., 2015; Colombo et al., 2015; Cumming, Leboeuf, et al., 2015; Vismara, 2015, 2016). We add to this line of research by differentiating types of information required by potential investors, based on their relationship with the project creator. Whereas in-crowd funders rely on information about the person behind the campaign and previous projects, there is no increased use of information about financials and associated risks. These results are in line with previous research on crowdfunding motivation (Cholakova & Clarysse, 2015). Our results show that in-crowd funders are not just involved out of sympathy or relationship building (we control for instrumental motivation) but also search for information that signals project quality or behavioural intentions thereby complementing earlier work that found a positive relationship between strength of ties and altruistic investment behaviour (Klyver et al., 2016). The inclusion of the entrepreneur's social network informs the funding decision in a similar way to the VC-entrepreneur relationship (Huang & Knight, 2015; Manigart & Wright, 2011; Shane & Cable, 2002).

We extend previous work on the 'wisdom of the crowd' in collective funding decisions (Mollick & Nanda, 2015; Surowiecki, 2005) with regards to the use of information about the project and the project creator. Our research confirms the notion that relationships between investors and project creators facilitate the exchange of information about the

entrepreneur and their track record, a mechanism prevalent in VC/angel investor-relationships (Bernstein, Korteweg, et al., 2015; Vismara, 2016). Our findings suggest that the in-crowd gathers (soft) information about the management of the venture (Ahlers et al., 2015; Cholakova & Clarysse, 2015; Cumming, Leboeuf, et al., 2015).

Second, we find no consistent evidence for our hypothesis that out-crowd funders rely more on information about the project and its objectives in decision-making than in-crowd funders. This in contrast to predictions from previous studies (Ahlers et al., 2015; Hornuf & Schwienbacher, 2015). Even though they do rely significantly less on information about the person than in-crowd investors, this is not being compensated by a greater reliance on information about the project. It raises concerns with regard to the quality of decision-making of out-crowd funders contrary to findings in previous studies (Mollick & Nanda, 2015).

Third, we hypothesized that out-crowd funders investigate information about financial planning and risk more thoroughly to search for quality signals and commitment (Ahlers et al., 2015; Blumberg & Letterie, 2007; Busenitz et al., 2005; Hornuf & Schwienbacher, 2015). We find that this hypothesis holds for financial crowdfunding. In our full model, we find no support for this notion and also find that funders in general – with or without ties – attach a lower importance to this type of information.

Crowdfunding decision making can thus be characterised as relationship-driven (Bernstein, Korteweg, et al., 2015; Colombo et al., 2015). In this regard crowdfunders, when aggregated across all types, apparently behave differently to professional (VC) investors who rely also on financial due diligence and an alignment of goals between venture and investor (Audretsch et al., 2012; Bernstein, Korteweg, et al., 2015; Busenitz et al., 2005). This study also reveals interesting differences regarding the use of information of distinct types of campaigns, which adds to the understanding of funding dynamics (Belleflamme et al., 2014; Calic & Mosakowski, 2016; Hornuf & Schwienbacher, 2015; E. Mollick, 2014). For-profit project funders are significantly less interested in information about the projects and its objectives than others, particularly compared to ecological project funders who attach a significantly higher importance to the objective of a project. This could be explained by either warm-glow or impact motivations (Andreoni, 1990; Maas & Liket, 2010). These

effects are strongest in donation-based crowdfunding. Our findings corroborate recent studies on crowdfunding social and environmental enterprises and projects reporting mixed evidence of funding success to sustainability orientation and goals (Calic & Mosakowski, 2016; Hörisch, 2015).

Information heterogeneity across types of crowdfunding

We find more support for our hypotheses when we separate distinct types of crowdfunding. The mechanisms through which we expect social networks to affect informational needs (motivation, intention of the project owner and quality of the project) seem to lead to different information needs for donation, reward, and financial (debt and equity) crowdfunding decisions. Donation-based crowdfunding is often associated with non-financial motivations and non-profit organisations, whereas reward-based and financial crowdfunding are more commonly associated with for-profit or social entrepreneurs and financial motivation (Ahlers et al., 2015; Cholakova & Clarysse, 2015; E. R. Mollick & Nanda, 2015). In financial - debt or equity - crowdfunding, return for funders depends on the ability of the venture to generate enough profit to pay back a loan (debt) or create an exit scenario (equity). These crowdfunders rank the support to family, friends or local business very low as a motivation to invest (Nesta, 2014; Vismara, 2015). Others distinguish between equity and reward-based crowdfunding and find that both are driven by extrinsic motives, whether in-kind or financial (Cholakova & Clarysse, 2015).

Before accounting for relationship strength, we find significant differences in information needs between crowdfunding types. In general, financial return (debt and equity) funders have higher information needs about the entrepreneur than reward funders. This is in line with VC literature predictions (Alexy et al. 2012; Bernstein et al. 2015; Busenitz et al. 2005; Shane and Cable 2002) as well as Ahlers et al. (2015) who indicate that financial return crowdfunding leads to higher concerns of moral hazard and a greater need for quality signals compared to reward and donation crowdfunding due to the long-term commitment to the enterprise, higher risk and expected returns. Low fears of moral hazard and a focus on product information render all types of reward crowdfunders less interested in information about the project owner.

Our granular models, in which we account for the effect of relationship strength per type of crowdfunding, show that in both reward and financial return crowdfunding, in-crowd funders have a significantly higher information need about the person behind the project than out-crowd funders. This suggests that even at the lower level of informational need within reward-based crowdfunding, relationship strength plays a role, thus adding a novel insight to the literature on the role of social networks in crowdfunding.

Interestingly, donation-based funders show significantly higher levels of information need about the person behind the project than reward-based funders, at similar levels as financial return crowdfunding. This is counter to expectations of (Belleflamme et al., 2014) and Ahlers (2015), who argue that in donation-based crowdfunding the degree of asymmetric information is of little importance because other intangible factors increase the funders' utility. We explain this from a motivation perspective. Donation crowdfunding can be likened to philanthropy, where 'returns' can be in the form of 'warm glow' (Andreoni, 1990), societal impact (Maas & Liket, 2010) or community benefits (Belleflamme et al., 2014). Donation funders interested in the (social, cultural or ecological) impact of their donation are more likely to be motivated to look for quality signals, indicating that their money will be well spent, before pledging their funds.

When we look at the effect of strength of ties on information needs in donation-based crowdfunding, we find no increased demand for information on either the project creator or financial planning and risks. However, for out-crowd donation-based crowdfunding we find a significantly higher information need about the project and its objectives than for in-crowd funders. This is driven by a negative effect of weak ties in particular. This lower interest of weak tie funders in information about the project may point to a (weak) relationship motivation to donate instead of interest in the project and its impact. This is in contrast to, on the one hand, strong tie funders who may display interest in the project due to their strong relationship and, on the other hand, due to out-crowd funders who donate primarily out of interest in the project, without a social relationship.

We also find that, compared to reward-based and donation crowdfunding, financial return funders, with and without ties, are significantly more interested in information about financial planning and risks. The risk profile of reward-based crowdfunding is lower than

debt or equity crowdfunding since they can be seen as early adopting consumers (Hornuf & Schwienbacher, 2015; Vismara, 2016) and their return does not depend on the long-term profitability of the enterprise, only on the ability to deliver the promised product. Non-delivery rates on the largest reward-based platform Kickstarter are approximately 9% (Mollick, 2015), which points to a much lower risk than average venture failure rates (Aldrich & Ruef, 2006). Within the subset of financial return crowdfunding, we find that out-crowd funders have a higher need for information about finance and risk than in-crowd funders. Our results indicate that a strong relationship appears to substitute financial due diligence and complements the importance of teams quality signals as financial return funders with strong ties are less interested in information about finance and risk (Ahlers et al., 2015; Bernstein, Korteweg, et al., 2015; Uzzi, 1999).

6.6 Conclusions and implications

Conclusions

Our study offers the first detailed analysis of the heterogeneity in information use by crowdfunders, and more particular how information use is affected by social networks within different types of crowdfunding.

This paper highlights the heterogeneity in information use by crowdfunders that are differently connected to the project creator. Funders from the in-crowd attach more importance to information about the project creator, as expected, but funders from the out-crowd do not rely more on information about the project, except for donation-based crowdfunding. Our findings suggest a trade-off between strong ties and the importance of information about financial planning and risks in the context of financial return (equity and debt) crowdfunding. In general, this information is perceived as less important and is not influenced by social network ties between crowdfunder and project for donation and reward crowdfunding. Donation and financial return crowdfunders attach more importance to the information about the person behind the project which reflects a relationship-based funding approach, whereas reward-based crowdfunders care significantly less about the project creator as they focus on the product as specific output with lower information asymmetry issues. Additionally, the information use of crowdfunders is influenced by the type of project

they invest in. For-profit project funders need less information about a project and its objectives whereas ecological projects exhibit a higher need for this type of information.

Implications

Our research has important implications for project developers, platform managers and policy makers. Based on the results of our research, platform managers and project owners can customize their campaign directly to the group of funders they would like to attract, based on their relationship strength and also on insights from our control variables (age, gender, education, instrumental motivation or financial means). More importantly, it is possible to deploy a tailored and staged in-crowd/out-crowd process of crowdfunding (see Figure 2). We indicate ‘average’ information use when coefficients are small or not significant.

Table 6-2 Information use heterogeneity of crowdfunders with different strength of ties to project creator

Information use regarding:	Project & objectives	Person & previous projects	Financial planning & risks
Strong ties	Average (all)	High (all) Average (donation)	Average (all) Low (financial)
Weak ties	Average (all) Low (donation)	High (all) Average (financial)	Average (all)
No ties	Average (all) High (donation)	Low (all) Average (donation)	Average (all)

Project creators can focus on providing detailed information about themselves and their previous projects to potential in-crowd funders (strong and weak ties) and display more summarized information about the project, its objectives, financial planning and risks. For potential out-crowd funders, the campaign should instead focus on information about the project and its objectives (especially for donation-based campaigns) and financial planning/risks (for financial return crowdfunding), and summarise personal information about the project creator.

6.7 Limitations and future research

Although this research provides new empirical evidence on decision-making by crowdfunders, there are some limitations to our study and interesting pathways for further

research. Limitations arise firstly from the use of the survey instrument, where we cannot control for non-response or social-desirability bias. Secondly, as the sampling followed a snowball method, the composition of groups (age, gender, education, experience with crowdfunding) do not necessarily represent the general population of crowdfunders. Our sub-samples within crowdfunding types are relatively small (50-160 respondents) which limits the statistical power of our analyses. Third, our dataset was collected in 2013, a time at which crowdfunding was emergent. More recent datasets will probably provide different insights as the phenomenon of crowdfunding has become more widespread, in particular equity crowdfunding. Broader samples could give more insights into the motivations and behaviour of crowdfunders, including barriers to crowdfunding. A weakness of the survey itself is that we cannot compare the use of information by funders with the use of information of those that decided not to fund, since this question was only asked to the funders. Finally, we cannot distinguish between early and late-stage funders, as information about investment timing is missing.

To further this research, a combination of field experiment and real-time data from platforms where we could observe the relationship between use of information, strength of ties and commitment of others during the funding decision in real life, would provide more insight into the causality of the relations found in this study. Combining project-level investment data with survey data about the funders would elicit a clearer and more robust picture of funding decisions (Jick, 1979) and eliminate potential common method bias (Podsakoff et al., 2003). Finally, it would be valuable to explore other institutional contexts outside of the Netherlands, with differently developed financial markets (including angel investing and venture capital), levels of entrepreneurship, and regulation of financial markets and crowdfunding in particular.

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6.8 Appendix

Descriptive statistics*Table 6-3 Number of cases, means, standard deviations*

Variable	Obs	Mean	Std. Dev.	Min	Max	Variable description
infoprojobj	283	4.30	0.79	1	5	Likert scale (1-5) average of importance of information about (1) the project or company and (2) objectives of project or company
infopersprev	281	3.71	0.90	1	5	Likert scale (1-5) average of importance of information about (1) the person or organization behind the project or the company and (2) previous projects of the person or organization behind it
infofinrisk	283	3.31	1.02	1	5	Likert scale (1-5) average of importance of information about (1) financial planning of the project or company and (2) risks associated with the project or the company
strongties	283	0.18	0.39	0	1	Dummy: 1 is strong ties (family, friend, initiator/employee)
weakties	283	0.48	0.50	0	1	Dummy: 1 is weak ties (I know the person, friend of friend, business relationship)
noties	283	0.34	0.48	0	1	Dummy: 1 is no ties (There is no relationship)
knowingfincontriboth	283	2.50	1.06	1	5	Likert scale 1-5: How important is knowing the financial contribution by others
keepinmindrisk	283	3.67	1.23	1	5	Likert scale (1-5): I keep in mind the consideration that investing through crowdfunding in a company can be a high risk investment
profit	283	0.37	0.48	0	1	Dummy. Type of project invested in. 1 = for-profit, 0 other.
social	283	0.44	0.50	0	1	Dummy. Type of project invested in. 1 = social, 0 other.
cultural	283	0.33	0.47	0	1	Dummy. Type of project invested in. 1 = cultural, 0 other.
ecological	283	0.24	0.43	0	1	Dummy. Type of project invested in. 1 = ecological, 0 other.
amount	283	5.19	2.52	1	11	Scale (1-7): less than €10 / €11 - €25 / €26 - €50 / €51 - €100 / €101 - €250 / €251 - €500 / More than €500
gender	283	1.39	0.49	1	2	Dummy Male = 1; Female = 2
age	283	4.04	1.06	1	7	Scale (1-7): Under 18 years / 18-24 year / 25-34 years / 35-44 years / 45-54 years / 55-64 years / Over 65 years

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education	283	8.01	1.58	1	10	Scale (1-10): Lower education or primary edn / Lower Vocational Edn / High school or VMBO / HAVO / VWO / MBO / HBO / Univ. Bachelor / Univ.master's or doctoral / Post-doc
securityreturn	283	3.60	1.09	1	5	Importance of the security that there is a promised return
donation	283	0.25	0.44	0	1	Dummy: What type of financial return have you received or will you receive in exchange for your financial contribution? Answer: No reward
reward	283	0.58	0.50	0	1	Dummy: What type of financial return have you received or will you receive in exchange for your financial contribution? Answer: Reward (e. g. a product, service or mention your name)
financialreturn	283	0.17	0.38	0	1	Dummy: What type of financial return have you received or will you receive in exchange for your financial contribution? Answer: A financial return (e. g. in the case of a loan or investment)

Table 6-4 Correlations for all crowdfunding types

	infoprojobj	infopersprev	infofinrisk	strongties	weakties	noties	keepinmind	knowing	profit	social
	infopersprev	infofinrisk	strongties	weakties	noties	keepinmind	knowing	profit	social	
infoprojobj	1.00									
infopersprev	0.56***	1.00								
infofinrisk	0.41***	0.56***	1.00							
strongties	0.10***	0.14***	0.01	1.00						
weakties	-0.12**	0.10***	-0.03	-0.23***	1.00					
noties	0.09	-0.19***	0.01	-0.32***	-0.76***	1.00				
keepinmindrisk	0.17***	0.14***	0.13	0.06	-0.09	0.04	1.00			
Knowingfincontri	0.17***	0.14***	0.24***	0.06	-0.02	0.20***	0.09	1.00		
profit	-0.06	-0.05	0.11**	-0.18***	-0.11**	0.20***	0.06	-0.02	1.00	
social	0.03	0.11**	0.02	0.09*	-0.09	-0.12	0.06	0.06	-0.11**	1.00
cultural	-0.03	-0.06	-0.14***	0.14***	0.05	-0.12	-0.17***	-0.02	-0.46***	-0.48***
ecological	0.17***	0.02	0.13***	-0.05	0.01	0.03	0.12**	0.07	0.46***	0.01
amount	0.02	0.08	0.22***	0.01	0.08	-0.01	0.19***	0.05	0.23***	0.02
gender	0.05	0.08	-0.03	0.08	-0.10*	0.05	-0.07	0.02	-0.22***	0.03
age	0.09	0.12**	0.19***	0.08	-0.07	0.06	0.05	0.05	-0.01	0.03
education	0.04	-0.03	0.02	-0.06	-0.04	0.05	0.12**	0.12**	0.06	0.03
Securityreturn	0.31***	0.20***	0.27***	-0.06	-0.08	0.12**	0.11**	0.15***	0.13**	-0.15***
donation	0.05	0.12**	0.02	0.02	0.01	-0.02	-0.14***	-0.01	-0.33***	0.23***
Reward	-0.12**	-0.18***	-0.20***	0.04	0.07	-0.07	-0.10*	-0.09*	0.10**	-0.29***
Financialreturn	0.10*	0.10*	0.23***	-0.08	-0.10**	0.11**	0.29***	0.13***	0.27***	0.12**

	cultural	ecological	amount	gender	age	education	Security	reward	Financial
	ecological	amount	gender	age	education	Security	reward	Financial	return
cultural	1.00								
ecological	-0.39***	1.00							
amount	-0.26***	0.16***	1.00						
gender	0.14***	-0.01	-0.12	1.00					
age	-0.06	0.07	0.21***	-0.09***	1.00				
education	-0.07	0.17***	0.07	0.02	-0.14***	1.00			
Securityreturn	0.06	0.15***	0.09*	-0.04	0.10**	1.00			
donation	-0.05	-0.15***	-0.19***	0.06	-0.02	-0.19***	1.00		
Reward	0.20***	0.01	0.03	0.01	-0.12**	0.11**	1.00		
Financialreturn	-0.20***	0.16***	0.18***	-0.09*	0.12**	0.07	-0.27***	1.00	

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Differentiated analyses

Table 6-5 Results for donation-based crowdfunding

VARIABLES	infoprojobj	infopersprev	infofinrisk	infoprojobj	infopersprev	infofinrisk
Strongties	-0.719 (0.760)	1.063 (0.709)	0.315 (0.673)			
weakties	-1.048* (0.556)	0.155 (0.495)	0.350 (0.525)			
noties				0.976* (0.534)	-0.374 (0.468)	-0.340 (0.489)
keepinmindrisk	-0.0788 (0.201)	0.207 (0.182)	-0.235 (0.189)	-0.0824 (0.200)	0.196 (0.181)	-0.234 (0.189)
knowingfincontriboth	-0.422* (0.237)	0.00908 (0.240)	0.0197 (0.227)	-0.412* (0.236)	0.0294 (0.242)	0.0198 (0.227)
profit	-1.602* (0.950)	-1.057 (0.913)	0.205 (1.040)	-1.619* (0.948)	-1.129 (0.911)	0.208 (1.038)
social	1.179 (0.837)	-0.415 (0.793)	-0.926 (0.862)	1.197 (0.838)	-0.391 (0.802)	-0.929 (0.860)
cultural	1.159 (0.928)	-0.903 (0.867)	-0.940 (0.917)	1.252 (0.910)	-0.695 (0.863)	-0.947 (0.909)
ecological	1.866** (0.853)	0.526 (0.831)	-0.801 (0.899)	1.895** (0.848)	0.562 (0.827)	-0.800 (0.899)
amount	0.0637 (0.103)	0.0947 (0.101)	0.125 (0.0999)	0.0635 (0.103)	0.0951 (0.102)	0.126 (0.0987)
gender	0.298 (0.498)	0.766 (0.486)	0.636 (0.468)	0.292 (0.497)	0.742 (0.484)	0.635 (0.467)
age	0.185 (0.235)	-0.132 (0.216)	0.327 (0.226)	0.207 (0.230)	-0.0993 (0.214)	0.324 (0.220)
education	-0.0767 (0.163)	-0.211 (0.157)	0.0676 (0.143)	-0.0893 (0.161)	-0.250 (0.156)	0.0692 (0.139)
securityreturn	0.621*** (0.224)	0.691*** (0.206)	0.759*** (0.220)	0.617*** (0.224)	0.675*** (0.204)	0.758*** (0.220)
Observations	74	74	72	74	74	72
Pseudo R2	0.101	0.0925	0.0863	0.100	0.0858	0.0863
LR Chi2	21.12	24.64	24.38	20.90	22.86	24.38
Prob < Chi2	0.0705	0.0257	0.0278	0.0519	0.0289	0.0180

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

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Table 6-6 Results for reward-based crowdfunding

VARIABLES	infoprojobj	infopersprev	infofinrisk	infoprojobj	infopersprev	infofinrisk
strongties	0.316 (0.457)	1.013** (0.427)	-0.0798 (0.439)			
weakties	-0.354 (0.352)	1.194*** (0.337)	0.0959 (0.330)			
noties				0.198 (0.339)	-1.145*** (0.320)	-0.0562 (0.318)
keepinmindrisk	0.262* (0.136)	0.187 (0.133)	-0.0310 (0.130)	0.282** (0.135)	0.181 (0.132)	-0.0361 (0.129)
knowingfincontriboth	0.225 (0.157)	-0.0781 (0.150)	0.501*** (0.148)	0.230 (0.157)	-0.0760 (0.150)	0.503*** (0.148)
profit	-0.769* (0.463)	-0.314 (0.436)	-0.764* (0.457)	-0.807* (0.461)	-0.311 (0.435)	-0.758* (0.456)
social	0.329 (0.402)	0.193 (0.377)	-0.362 (0.383)	0.403 (0.401)	0.173 (0.373)	-0.386 (0.378)
cultural	0.0381 (0.495)	-0.241 (0.466)	-0.831* (0.481)	0.0889 (0.491)	-0.261 (0.464)	-0.854* (0.478)
ecological	1.022** (0.432)	-0.408 (0.403)	0.252 (0.406)	0.947** (0.429)	-0.391 (0.400)	0.272 (0.403)
amount	0.00523 (0.0688)	0.0277 (0.0666)	0.116* (0.0695)	0.0182 (0.0684)	0.0264 (0.0664)	0.112 (0.0689)
gender	0.329 (0.322)	0.135 (0.307)	0.106 (0.316)	0.346 (0.321)	0.135 (0.308)	0.107 (0.317)
age	0.217 (0.155)	0.178 (0.145)	0.194 (0.149)	0.209 (0.155)	0.177 (0.145)	0.191 (0.148)
education	0.0653 (0.0897)	-0.0850 (0.0895)	-0.00993 (0.0876)	0.0677 (0.0887)	-0.0889 (0.0894)	-0.0146 (0.0871)
securityreturn	0.595*** (0.167)	0.359** (0.156)	0.354** (0.155)	0.572*** (0.166)	0.362** (0.156)	0.355** (0.155)
Observations	165	164	163	165	164	163
Pseudo R2	0.0798	0.0386	0.0461	0.0742	0.0382	0.0457
LR Chi2	40.94	23.92	30.28	38.08	23.71	30.07
Prob < Chi2	9.74e-05	0.0318	0.00430	0.000149	0.0223	0.00272

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Chapter 6

Table 6-7 Results for financial-return (debt and equity) crowdfunding

VARIABLES	infoprojobj	infopersprev	infofinrisk	infoprojobj	infopersprev	infofinrisk
strongties	1.363 (1.343)	2.714** (1.114)	-2.158* (1.236)			
weakties	0.989 (0.797)	0.899 (0.745)	-0.669 (0.720)			
noties				-1.030 (0.787)	-1.187* (0.720)	0.746 (0.718)
keepinmindrisk	0.542 (0.497)	-0.368 (0.458)	0.190 (0.457)	0.546 (0.496)	-0.266 (0.448)	0.119 (0.449)
knowingfincontriboth	0.285 (0.290)	0.158 (0.265)	0.743** (0.294)	0.292 (0.290)	0.193 (0.266)	0.667** (0.281)
profit	0.832 (1.107)	0.534 (0.952)	0.199 (0.933)	0.852 (1.111)	0.600 (0.938)	0.121 (0.931)
social	0.446 (0.943)	0.100 (0.827)	-0.112 (0.825)	0.483 (0.937)	0.167 (0.811)	-0.136 (0.831)
cultural	-0.0182 (1.509)	-0.964 (1.350)	1.277 (1.348)	0.0300 (1.499)	-0.844 (1.317)	1.030 (1.322)
ecological	-0.975 (0.889)	-1.529** (0.779)	1.214 (0.801)	-0.894 (0.849)	-1.184 (0.742)	0.793 (0.730)
amount	-0.255 (0.167)	0.00886 (0.149)	0.316** (0.152)	-0.245 (0.164)	0.0515 (0.144)	0.264* (0.145)
gender	1.624* (0.838)	0.294 (0.718)	-1.085 (0.730)	1.592* (0.828)	0.245 (0.701)	-0.913 (0.711)
age	1.037*** (0.380)	0.360 (0.308)	-0.235 (0.313)	1.051*** (0.379)	0.454 (0.305)	-0.281 (0.309)
education	-0.121 (0.248)	-0.0629 (0.200)	-0.463** (0.230)	-0.124 (0.248)	-0.0640 (0.197)	-0.410* (0.224)
securityreturn	0.866** (0.435)	1.057*** (0.355)	0.288 (0.373)	0.846* (0.433)	0.938*** (0.350)	0.400 (0.363)
Observations	48	49	48	48	49	48
Pseudo R2	0.211	0.150	0.157	0.210	0.125	0.144
LR Chi2	22.62	22.78	23.13	22.52	18.98	21.21
Prob < Chi2	0.0465	0.0444	0.0402	0.0321	0.0890	0.0474

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

7 What motivates crowdfunders of sustainable enterprises: societal impact or financial return?¹⁰

Abstract

We use survey data to show that crowdfunders of sustainable enterprises report to be more motivated by creating societal impact than by obtaining financial returns. At the same time, crowdfunders of sustainable enterprises also indicate that they are not less motivated by financial return as crowdfunders of regular enterprises. We document no trade-off between financial motivation and impact motivation for sustainable enterprise crowdfunders, a finding which runs counter to motivational theory that extrinsic motivation crowds out intrinsic motivation. This suggests that the motivations of crowdfunders of sustainable enterprises instead follow the sustainable enterprise narrative that societal impact and financial return (should) go hand in hand.

7.1 Introduction

The urgency for sustainable entrepreneurship and sustainable innovation has strongly increased with the ascent of climate agreements (COP21) and momentum surrounding sustainability-based innovation such as that around renewable energy (Mazzucato & Semieniuk, 2017; Polzin, 2017) and circular economy (Ellen MacArthur Foundation & McKinsey & Company, 2014; Geissdoerfer, Savaget, Bocken, & Hultink, 2017). Finance for sustainable entrepreneurship and innovation, however, faces challenges due to high risk levels, lack of track record, collateral and R&D investment constraints (Arena, Bengo, Calderini, & Chiodo, 2017; Brancati, 2015; Hall, 2010). These financing challenges are further enhanced by externality problems such as the inability to privately capture the societal value created by sustainable enterprises (Pacheco et al., 2010; Polzin, 2017). In the case of *innovative* sustainable enterprises, the creation of knowledge externalities is yet another hurdle (Faber & Frenken, 2009; Rennings, 2000).

¹⁰ Joint work with Karen Maas. This chapter has benefited from peer-review at the Journal of Business Venturing.

In the light of these financing constraints, some researchers indicate crowdfunders to be particularly willing to fund sustainable entrepreneurial activity (Calic & Mosakowski, 2016; Hörisch, 2015; Lehner, 2013). Since sustainable entrepreneurs are usually innovating in their sector, this willingness can be partly attributed the fact that crowdfunding is seen as a particularly suitable financing tool for early ventures (J. H. Block et al., 2017; Bruton et al., 2015) and early stage innovations, in general (Davis, Hmieleski, Webb, & Coombs, 2017). On top of that, however, some authors suggest there is a particularly good match between crowdfunding and sustainable enterprises, mainly based on legitimacy theory (Calic & Mosakowski, 2016; Lehner, 2013). Legitimacy theory perspectives argue that the focus of crowdfunders on the mission and core values of an enterprise, as well as the ‘democracy’ of having many small funders, fits well with sustainable projects and enterprises (Calic & Mosakowski, 2016; Lehner, 2013). In the case of renewable energy crowdfunding, a combination of normative, gain and hedonic motivations is found (Dóci et al., 2015; Vasileiadou et al., 2016). The limited monetary motivations of sustainable entrepreneurs can be a strong signal that they are more outcome-focused, reducing the risks of moral hazard and increasing legitimacy of the investment as perceived by the crowdfunder (Hörisch, 2015; Lehner, 2013).

Several mechanisms for successful crowdfunding of sustainable enterprises and projects have been pointed out. From a project perspective, the already mentioned legitimacy of crowdfunding sustainable enterprises and projects is proposed as a channel through which funders are being attracted (Calic & Mosakowski, 2016; Lehner & Nicholls, 2014). From a platform perspective, the micro-institutional setting of crowdfunding can stimulate collective action for sustainable enterprise finance through transparency about participating investors and threshold settings such as funding deadlines and target amounts (Carr, 2013; Cheng & Bernstein, 2014; Toxopeus & Maas, 2017). From a crowdfunder perspective, the literature has established the importance of social networks in funding success (Giancarlo Giudici, Guerini, & Rossi-Lamastra, 2017; Lin et al., 2012; Polzin, Toxopeus, et al., 2017; Vismara, 2016) and has analysed pro-social and financial motivations of crowdfunders (Allison et al., 2015; Belleflamme et al., 2013; Cholakova & Clarysse, 2015; Gerber & Hui, 2013). However, there is little research documenting funders’ motivation in the context of crowdfunding for sustainable enterprises (Calic & Mosakowski, 2016; Hörisch, 2015).

In this paper, we therefore focus on the research question: what motivates crowdfunders to invest in sustainable enterprises: societal impact and/or financial return? We also investigate whether there exists a trade-off between the two motivations. This study adds theoretical and empirical understanding of motivations of crowdfunders of sustainable enterprises, bridging motivational theory (Bénabou and Tirole, 2003), crowdfunding (Cholakova & Clarysse, 2015) and sustainable entrepreneurship (Shepherd and Patzelt, 2011).

7.2 Theory

Despite the divergent perspectives on the exact definition of sustainable entrepreneurship (Dean & McMullen, 2007; Pacheco et al., 2010) and similar concepts such as green entrepreneurship (Allen & Malin, 2008), environmental entrepreneurship (Keogh and Polonsky, 1998; Meek et al., 2010), ecopreneurship (Dixon & Clifford, 2007; Schaltegger, 2002; Schaper, 2002), shared value (Porter & Kramer, 2011) and social entrepreneurship (Austin, Stevenson, & Wei-Skillern, 2006; Peredo & McLean, 2006), there are several commonalities across definitions. All concepts refer to (1) carrying out entrepreneurial activity (Hall et al., 2010; Keogh & Polonsky, 1998; Shepherd & Patzelt, 2011), and (2) innovativeness (Alvord, Brown, & Letts, 2004; Austin et al., 2006; Chell, Nicolopoulou, & Karataş-Özkan, 2010; Keskin, Diehl, & Molenaar, 2013), in order to simultaneously deliver (3) social or environmental value for individuals, communities or society (Hall et al., 2010; Shepherd & Patzelt, 2011). Within these different concepts, social entrepreneurship definitions generally – but not always – focus more on delivering social rather than environmental value (Alvord et al., 2004; Maas & Grieco, 2017; Peredo & McLean, 2006; Zahra, Gedajlovic, Neubaum, & Shulman, 2009), whereas ecopreneurship, green entrepreneurship and environmental entrepreneurship primarily target environmental problems (Allen & Malin, 2008; Keogh & Polonsky, 1998; Schaltegger, 2002).

Sustainable enterprises are thus understood as being innovative organizations that produce societal – social or environmental – value by using a business model as a vehicle to address a market failure and achieving financial sustainability to scale their societal impact (Cohen & Winn, 2007; Dean & McMullen, 2007). Sustainable enterprises are presumed to have more societal impact on the economic, environmental or social dimension than regular

enterprises or established firms (J. K. Hall et al., 2010; Kuckertz & Wagner, 2010; Maas & Grieco, 2017).

In this paper, we explore the role of financial motivation and impact motivation of crowdfunders (Allison et al., 2015; Cholakova & Clarysse, 2015; Gerber & Hui, 2013), specifically in sustainable enterprises (Calic & Mosakowski, 2016; Hörisch, 2015) as opposed to regular enterprises. Secondly, we investigate the trade-off between financial motivation and impact motivation for both subgroups (Allison et al., 2015; Bénabou & Tirole, 2003; York & Venkataraman, 2010).

Impact motivation as a driver of sustainable enterprise crowdfunding

Individuals can be encouraged to provide funding to a particular campaign through the use of narratives (Frydrych, Bock, Kinder, & Koeck, 2014), linguistic style (Parhankangas & Hellström, 2007), pitches (Davis et al., 2017) and other persuasion techniques (Allison, Davis, Webb, & Short, 2017). More specifically, researchers use different theoretical concepts to understand non-financial motivations for providing sustainable crowdfunding. Some key concepts used are: intrinsic versus extrinsic motivation, based on social determination theory (Allison et al., 2015; Cholakova & Clarysse, 2015); legitimacy (Calic & Mosakowski, 2016; Lehner & Nicholls, 2014); localized altruism and social capital (Giudici et al., 2017), and community benefits (Belleflamme et al., 2014).

Although a large portion of previous research does not focus specifically on crowdfunding of sustainable enterprises, but instead uses a broader lens such as equity crowdfunding (Vulkan, Åstebro, & Sierra, 2016) or slightly different ones like pro-social lending (Allison et al., 2015; Kuppuswamy & Bayus, 2017), motivations for crowdfunding sustainable enterprise are likely to build on these previous efforts. At the same time, we propose that the distinguishing factor of sustainable enterprises – their objective to create a positive social or environmental impact alongside creating financial return – is likely to make investments in such enterprises attractive for impact-motivated crowdfunders.

In more established financial markets, socially responsible investments (SRI) and impact investments have increased substantially in the past decade (Höchstädter & Scheck, 2015; Mudaliar, Pineiro, & Bass, 2016). Impact investing, as a subset of SRI, has especially gained traction (Höchstädter & Scheck, 2015; Hummels, 2016). Three different types of motivation

of SRI investors have been outlined (Kinder, 2005; Oh, Park, & Ghauri, 2013). Investors with a *value-based* or *impact* motivation invest based on personal, moral or ethical standards, leading to the inclusion of non-financial parameters in the investment decision (Oh et al., 2013; Toxopeus, Liket and Maas, 2017). *Value-seeking* investors use social or environmental screens to improve their financial returns, based on the assumption – and mixed evidence – that companies with high ESG scores outperform the market (Ameer & Othman, 2012; Fulton, Kahn, & Sharples, 2012; Renneboog, Ter Horst, & Zhang, 2008a, 2008b, 2011). *Value-enhancing* investors undertake strategies to improve the social and environmental performance of the firms they invest in, i.e. by engaging in dialogue and filing shareholder resolutions (Scholtens, 2006). On top of these three motivation types, warm-glow theory suggest that people mainly invest in sustainability in order to feel good about themselves (Allison, McKenny, & Short, 2013; Andreoni, 1990).

At least some of these motivations are likely to play a role for crowdfunders of sustainable enterprises. Some evidence suggests that the emergence of crowdfunding benefits pro-social, sustainability-oriented or impactful projects in particular (Allison et al., 2015; Calic & Mosakowski, 2016; Gerber & Hui, 2013). Research across several academic domains indicates that people engage in prosocial behaviour when they believe their actions make a positive impact (Kuppuswamy & Bayus, 2017). Others expect a relationship between sustainability orientation and crowdfunding success from theory, but do not find it empirically (Cholakova & Clarysse, 2015; Hörisch, 2015). One of the main mechanisms through which scholars expect crowdfunding to be exceptionally successful for sustainable projects and ventures is through building *legitimacy*, which is arguably easier for sustainable than for regular enterprises (Dart, 2004; Lehner & Nicholls, 2014). This mechanism requires funders to be motivated to support enterprises that undertake activities that are perceived as legitimate, as part of ‘a socially constructed system of norms, values, beliefs and definitions’ (Suchman, 1995).

Crowdfunders are expected to respond positively to the legitimacy claims of sustainable enterprises if they themselves are motivated to create societal impact. We therefore propose impact motivation to be a key motivation driving crowdfunding of sustainable enterprises, leading to our first hypothesis:

H1: Crowdfunders of sustainable enterprises are significantly more impact motivated than crowdfunders of regular enterprises.

Financial motivation as a driver of sustainable enterprise crowdfunding

‘Supporting a good cause’ (Gerber & Hui, 2013) may not suffice as the sole motivation for funders or investors to fund sustainable enterprises (Toxopeus et al., 2015). Financial motivations often play a role for investors in sustainable or ethical firms (Nilsson, 2008); otherwise money could have been donated through philanthropy or charity (Maas & Grieco, 2017). However, research on this topic is still in its infancy and the question remains how important financial returns are as a motivation for crowdfunders of sustainable enterprises. This runs parallel to the discussion in traditional financial markets whether SRI and impact investors expect financial returns (Renneboog et al., 2008a, 2008b, 2011; G. Williams, 2007). Many studies analysed the performance of SRI mutual funds and non-SRI mutual funds. Most of those studies, with a small number of exceptions (e.g. Renneboog et al., 2008b) find no significant differences in risk-adjusted returns between SRI funds and conventional funds. Similar results have been found in the US (Statman, 2000), UK (Mallin, Saadouni, & Briston, 1995), Continental Europe (Bauer et al, 2005) and Canada (Bauer, Derwall, & Otten, 2007). At firm level, some evidence suggests a positive relationship between sustainability practices and firm performance (Ameer & Othman, 2012).

Although we expect positive utility of societal impact for crowdfunders, existing theory and evidence does not paint a clear picture whether this implies that the *financial motivation* to crowdfund sustainable enterprises (as opposed to regular enterprises) is similar to that in regular enterprises. Most empirical evidence documents the existence of financial motivations for sustainable investments, but do not compare its importance to motivations for regular investments (Allison et al., 2015; Dóci & Vasileiadou, 2015).

We argue that investors are not willing to forgo expected financial return when they invest in sustainable enterprises and may instead ‘double up’ their benefits, in line with the *value-seeking* investor perspective (Oh et al., 2013; Maas, Perego and Kim, 2017). This means their investment is *also* financially motivated and crowdfunders expect a sustainable enterprise to deliver the same financial returns as regular firms (Nilsson, 2008). One reason to expect that crowdfunders do not want to forgo financial return in exchange for societal

impact is that it could serve as an explanation as to why crowdfunding campaigns of sustainable enterprises may be more successful than crowdfunding campaigns of regular enterprises: total utility will be higher if expected financial returns remain similar. Another reason to expect upholding of financial return requirements is that this the motivations of crowdfunders of sustainable enterprises would in essence follow the sustainable enterprise narrative of their ability to create 'shared value', both financial and societal (Dart, 2004; Porter & Kramer, 2011).

This leads us to the following hypothesis:

H2: Crowdfunders of sustainable enterprises are just as financially motivated as crowdfunders of regular enterprises.

Does financial motivation crowd out impact motivation?

The fact that sustainable enterprises offer both financial and societal return expectations to their investors begs the question whether financial (extrinsic) rewards will crowd out impact (intrinsic) motivations to invest (Bénabou & Tirole, 2003). There has been ample research on the question of whether responsible investments pays off financially (Renneboog et al., 2008b, 2008a, 2011). Research has provided evidence of the ethical, normative, social, warm-glow or intrinsic motivations of investors (Allison et al., 2015, 2013; Borgers & Pownall, 2014; Dóci & Vasileiadou, 2015; Nilsson, 2008). However, it is unclear from the literature whether financial motivation crowds out impact motivation for crowdfunders of sustainable enterprises.

There exist theoretical predictions on the crowding out of intrinsic motivation by extrinsic motivations in general (Bénabou & Tirole, 2003); empirical studies apply this prediction to prosocial crowdfunding (Allison et al., 2015) and reward versus equity crowdfunding (Cholakova & Clarysse, 2015). The context of prosocial lending provides evidence of a crowding out of intrinsic motivation due to extrinsic cues, but in a different empirical setting than sustainable entrepreneurship since lenders obtain no financial returns (Allison et al., 2015). Others find a trade-off between financial and psychic (i.e. happiness) returns in SRI (Beal, Michelle Goyen, & Philips, 2009). In general, extrinsic rewards or cues do seem to crowd out intrinsic motivation.

It is unclear how this ‘crowding out effect’ translates to sustainable enterprise crowdfunding, a setting where both financial return and societal impact are defining characteristics of the investment object (Shepherd & Patzelt, 2011). Understanding whether financial motivation crowds out impact motivation for the crowdfunding of sustainable enterprises is highly relevant for at least two reasons. Firstly, if this crowding out effect exists in the sustainable enterprise crowdfunding context, the narrative used to attract crowdfunders should take this into account, since we expect impact motivation to be highly relevant for such investors. By directing the attention in the campaign to the expected financial return, crowdfunders motivated intrinsically to create societal impact may not invest. Second, understanding of this trade-off affects which investors should be targeted in the first place. If crowdfunders of sustainable enterprises are willing to accept lower financial returns due to utility derived from expected societal impact (Geobey et al., 2012), this means a different – less financially demanding – investor segment can be targeted.

A general intuition seems to be that for sustainable investments, the crowding out effect may actually work in the opposite directions. When moving from regular to sustainable enterprise crowdfunding, the additional benefit of creating societal value may lead to lower financial return motivations (Gerber & Hui, 2013). In the realm of SRI, researchers find that some pension beneficiaries report willingness to give up a percentage of their pension in return for sustainable investments (Borgers & Pownall, 2014). Other researchers document SRI investors to be less concerned with negative returns for SRI investors than conventional investors (Renneboog et al., 2011).

However, the main distinguishing promise of sustainable enterprises (as opposed to regular enterprises) is that societal impact, both social and environmental, can go hand in hand with profitable financial returns (Bocken et al., 2014; Choi & Gray, 2008; B. Cohen & Winn, 2007; Dean & McMullen, 2007; Porter & Kramer, 2011). This ‘win-win’ approach positions sustainable enterprises between regular for-profit enterprises and non-profit organizations as an increasingly popular strategy for delivering societal value (Brugmann & Prahalad, 2007; J. K. Hall et al., 2010; Porter & Kramer, 2011). If the sustainable enterprise narrative claims delivery of shared value as a key objective, we expect investors who value both financial and societal return to step in. This is most in line with findings in the context of renewable energy investments, where both financial and environmental motivations were documented

as driving investments (Dóci & Vasileiadou, 2015). Although we expect financial motivation to crowd out impact motivation for regular enterprises, we hypothesize that this does not hold for sustainable enterprises due to the sustainable enterprise narrative. This leads to our third and fourth hypotheses:

H3: There exists a significant negative trade-off between impact motivation and financial motivation for enterprise crowdfunders.

H4: The trade-off between impact motivation and financial motivation is moderated by whether the crowdfunding object is a sustainable or a regular enterprise. Where the object is a sustainable enterprise, we expect the trade-off to disappear.

7.3 Methodology

Research design

To test our hypotheses, we carried out a large-scale survey on decision-making by crowdfunders. While a lot of crowdfunding research uses project-level data obtained from crowdfunding websites, sometimes linked to social media content (Lin, Prabhala, & Viswanathan, 2009), detailed information about the crowdfunders themselves is generally lacking, with some exceptions (Cholakova & Clarysse, 2015; Mollick, 2015; Polzin, Toxopeus, et al., 2017). A survey approach allows for broad and detailed insight into how an individual investment decision is made, which is very difficult to obtain using methods other than self-reporting. However, this approach also has some drawbacks, in particular regarding social desirability response bias (Arnold & Feldman, 1981; Steenkamp, de Jong, & Baumgartner, 2010; van de Mortel, 2008) and common method bias (Conway & Lance, 2010; Podsakoff et al., 2003). Whereas social desirability bias is particularly salient in research where respondents report on sensitive issues (such as ethics, racial attitudes or weight), variables such as investment motivations, use of information and relationships are less prone to dominant social norms. It may, however, appear socially desirable for crowdfunders to report being impact motivated (rather than financially motivated). To minimize these issues, we select variables that do not overlap in their operationalization and we use simple, direct questions to assure internal validity by preventing item ambiguity. To reduce social desirability bias, we provide respondents with full anonymity (Conway & Lance, 2010). Furthermore, to reduce common method and self-reporting bias we code all

the projects / enterprises reported by respondents themselves as sustainable or regular (we also asked respondents to classify their projects).

Data

We collected survey data in 2016 in The Netherlands about crowdfunding motivations and decision-making. We approached respondents by email through the networks of the four research institutions involved, and asked them to fill in a survey online. Of the people we approached, 686 filled in the survey and 276 respondents indicated they had crowdfunded. 265 respondents gave us the name of the specific initiative (enterprise or project) that they had invested in. Of this group, 143 indicated they had crowdfunded in a for-profit project/enterprise (and therefore were able to answer the questions of interest for this study). We then asked questions about this specific investment, such as the amount, their motives to invest and the information that was important in making their investment decision. We also asked them to describe the project they invested in according to pre-set options. Additionally, we asked them some personal information such as age, gender and income. In the questionnaire, it was emphasized that answers would be treated strictly confidential with anonymity being assured. Using the names of the projects/enterprises given by respondents, we looked up each initiative and coded all projects as ‘sustainable’ or ‘regular’ using a coding protocol (instead of using the self-reported descriptions).

Variables

As explained below, we used specific questions from our questionnaire to operationalize the variables in our hypotheses.

To select our sample of interest from the broader survey data we took several steps. First, in order to make sure we are analysing entrepreneurial activity (versus non-profit activities), we included only respondents who classified the project or enterprise they invested in as ‘for profit’ (versus ‘not for profit’). Next, we coded each project as either regular or sustainable using the question: “How would you describe the project or enterprise (multiple answers possible: commercial/sustainable/social/circular/innovative/cultural)?” If respondents answered *at least one* of the categories sustainable, circular, social, commercial and innovative, we included the observation in our analysis.

Next, we took all the project names and coded them ourselves as sustainable or regular based on a predefined coding protocol based on Calic and Mosakowski (2016). This protocol can be found in the appendix. The coding was carried out by one of the authors and a student assistant specializing in sustainable entrepreneurship, based on existing definitions of sustainable entrepreneurship (Kates and Parris, 2003; Shepherd and Patzelt, 2011). We self-coded this variable to prevent common method bias (Podsakoff et al., 2003), although we also asked respondents to classify the project they invested in.

The coding took place as follows. We look up the crowdfunding campaign website of each project (or, if no longer available, the project itself) in our sample and code these as ‘sustainable’ (1) or ‘regular’ (0) based on the following questions:

Environmental: Does the project in some way benefit the environment – nature and the Earth’s life support systems (For example: saves trees, plants, bees, whales, the ecosystem, reduces pollution, makes recycling easier, etc.)? (1=Yes; 0=No)

Social: Does the project in some way benefit people (For example: improves education, fights discrimination, donates to the needy)? (1=Yes; 0=No)

If respondents reported more than one project, we code it if all of them are either sustainable or regular. If respondents reported only the crowdfunding platform (i.e. ‘a Kiva project’), we code this as sustainable or regular only if *all* projects on this website fall within one of these categories (i.e. on Kiva, all projects are meant to support the livelihood of people in developing countries, which leads to coding as ‘sustainable’).

Only if we could not find any information on the reported project/enterprise, we reverted to the self-reported coding of the respondents (in 7 cases). This back-up variable was created as follows: if the respondent categorized the project in at least one of the categories sustainable, circular, social, we classified the project as ‘sustainable’. If respondents answered ‘commercial’ and/or ‘innovative’ but did not answer sustainable/circular/social at the same time, we classified the project as ‘regular’. This means that projects that were both commercial/innovative *and* sustainable, circular or social are classified as sustainable projects.

Next, we measure the degree by which a crowdfunder is motivated by societal impact or financial return by asking the question (in Dutch): how important were the following motivations for your decision to invest in this crowdfunding project? We then provided several potential motivations, including ‘societal impact’ and ‘financial return’, and asked respondents to rate the importance of each motivation on a Likert scale from 1 to 5 (1 – not at all important; 5 – very important).

Our control variables were determined based on variables that were shown in earlier crowdfunding and/or investment research to have a significant relationship with contribution patterns in crowdfunding or which we expect to affect motivations. These include amount invested (Polzin, Toxopeus, et al., 2017), type of crowdfunding (Cholakova & Clarysse, 2015; van der Lijn et al., 2016), gender (Barber & Odean, 2001; Mohammadi & Shafi, 2017), age (Korniotis & Kumar, 2011), investment experience (Hodge & Pronk, 2006) and crowdfunding experience.

Amount invested was operationalized using the question: how much did you invest in this specific project/enterprise? (In Euros: 0-50/51-100/101-500/501-1,000/1,001-5,000/5,000-10,000/10,000<). ‘Type of crowdfunding’ dummies were based on the question: what type of return did you or will you receive for your contribution? (No return/mention of name/symbolic or small return/product or service/interest/interest with option to convert to equity (convertible loan)/equity in the enterprise). We categorized ‘no return/mention of name/symbolic or small return’ as donation crowdfunding; ‘product/service’ as reward crowdfunding; ‘interest’ as loan crowdfunding and ‘convertible loan/equity’ as equity crowdfunding. In the case that respondents reported to receive multiple types of return (i.e. symbolic *and* product), they were coded within both types (25 cases). If respondents specified an ‘other’ type of return, they were not included in any specific crowdfunding type (2 cases).

Gender was reported as female (0) or male (1). Age was reported in categories (0-18/18-24/25-34/35-44/45-54/55-64/65<). Investment experience was measured by combining two questions: whether they had any stock market experience (yes/no) and whether they had any informal investment experience (yes/no). We added these responses together to create an ordinal variable as a proxy for investment experience (between 0-2). Crowdfunding

experience was measured using the question: how often have you invested in crowdfunding? (1/2-5/6-10/10-50/more than 50 times).

Data analysis

Since our first dependent variable (sustainable enterprise) is a dummy variable, we use a logit model to test hypotheses 1 and 2. For hypotheses 3 and 4 our dependent variables (impact motivation and financial motivation) are ordinal (Likert scales from 1-5), which is why we use an ordered logit regression model (Hill, Griffiths, & Judge, 2001). First, we defined our variables (see above). Second, we excluded any missing variables from the dataset based on our variables of interest. Next, we conducted exploratory data analysis to better understand variations in the data, such as summary statistics and correlations. After that we set up our (ordered) logit regression models to determine the explanatory power of our independent variables: impact motivation and financial motivation of crowdfunders, in relation to our dependent variable (sustainable enterprise versus regular enterprise crowdfunding). To be able to account for different crowdfunding types in our results, we use equity crowdfunding as a base case and enter donation, reward and loan crowdfunding into the model as dummies.

7.4 Results

Descriptive results

In Table 7-1 we outline the descriptive characteristics of our variables of interest for our full sample. In Table 7-2, we describe the variables in the two subsets of interest: sustainable (sustainable/circular/social) and regular enterprises (only commercial/innovative).

We find the dataset splits right through the middle in terms of sustainable versus regular enterprises funded by respondents. While quite convenient for our analysis, it is somewhat surprising that sustainable enterprises are so highly represented. Although our dataset is not a representative panel, and perhaps displays a bias towards sustainability networks in our data collection, it provides some affirmation of the importance of crowdfunding for sustainable entrepreneurial activity.

On average in the full dataset, respondents rate impact motivation as more important than financial motivation. When we look further into the subsets (sustainable/regular enterprises)

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we find that crowdfunders in the regular enterprise subset rate impact motivation slightly higher than financial motivation. Within the sustainable enterprise subset, impact motivation increases by more than 1 point (on a 5-point Likert scale). Financial motivation is marginally higher for sustainable enterprise crowdfunders than for regular enterprise crowdfunders (0.09 points on a 5-point Likert scale).

Table 7-1 Descriptive statistics of variables of interest (sustainable and regular enterprises)

Variable	Obs	Mean	Std. Dev.	Min	Max
sustainable enterprise	135	0,50	0,50	0	1
impact motivation	129	3,43	1,28	1	5
financial motivation	129	2,86	1,49	1	5
gender	116	0,69	0,46	0	1
age	135	4,03	1,17	1	7
amount	131	2,98	1,40	1	7
donation dummy	135	0,20	0,40	0	1
reward dummy	135	0,39	0,49	0	1
loan dummy	135	0,15	0,36	0	1
equity dummy	135	0,24	0,43	0	1
investment experience	116	0,82	0,75	0	2
crowdfunding experience	135	2,29	1,01	1	5

We find a slight over-representation of males in the full dataset, in line with general characteristics of crowdfunders. This imbalance decreases in the subset of sustainable enterprise crowdfunding (79% male crowdfunders in the regular subset as opposed to 59% in the sustainable subset).

Pairwise correlations

Next, we carry out pairwise correlations for our variables of interest (see Table 7-5 in appendix). We find a significant positive correlation between sustainable enterprise crowdfunding and impact motivation, and not between sustainable enterprise crowdfunding and financial motivation (a coefficient near zero). We find no significant pairwise correlation

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between impact motivation and financial motivation for the whole group of enterprise crowdfunders (sustainable and regular). However, when we split up the dataset and correlate the two motivations in each subset separately, we find that within crowdfunding for regular enterprises there is a significant negative correlation, but within crowdfunding for sustainable enterprises this significant correlation disappears and the coefficient goes to near zero.

Furthermore, we find that all our control variables are significantly correlated with at least one of our main dependent and independent variables (impact motivation, financial motivation and sustainable enterprise crowdfunding). This confirms our set of control variables.

Table 7-2 Descriptive statistics of variables of interest (sustainable versus regular enterprises)

Variable	sustainable enterprise crowdfunding					regular enterprise crowdfunding				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
impact motivation	64	3,88	1,20	1	5	65	3,00	1,21	1	5
financial motivation	64	2,90	1,40	1	5	65	2,81	1,59	1	5
gender	69	0,59	0,49	0	1	66	0,79	0,41	0	1
age	69	4,19	1,07	1	7	66	3,86	1,25	2	7
amount	67	2,99	1,41	1	7	64	2,98	1,41	1	7
donation dummy	69	0,25	0,43	0	1	66	0,15	0,36	0	1
reward dummy	69	0,38	0,49	0	1	66	0,39	0,49	0	1
loan dummy	69	0,33	0,47	0	1	66	0,36	0,48	0	1
equity dummy	69	0,32	0,47	0	1	66	0,17	0,38	0	1
investment experience	59	0,76	0,82	0	2	57	0,88	0,68	0	2
crowdfunding experience	69	2,36	0,98	1	5	66	2,21	1,03	1	5

Empirical results

We run a full logistic regression model for hypotheses 1 and 2, first separately and then together (Table 7-3.). As expected, we find that impact motivation is significantly higher for crowdfunders of sustainable enterprises than those in regular enterprises, confirming our first hypothesis (H1). In the model where we only include financial motivation (and not impact motivation), we find no significant difference in financial motivation (importance of financial return) between crowdfunders of sustainable and regular enterprises, which is in line with H2. However, when we include both impact motivation and financial motivation

(thus controlling for impact motivation while testing for financial motivation), we find that sustainable enterprise crowdfunders not only report to be more impact motivated and *also* more financial motivation than regular enterprise crowdfunders, albeit with a smaller coefficient. This result runs counter to our hypothesis (H2) that financial motivation is the same between the two subgroups, but it does not rule out the underlying reasoning that crowdfunders in sustainable enterprises are actually *value-seeking* (looking for financial return through their sustainable investment).

Table 7-3 Main models based on hypotheses 1-2

VARIABLES	Sustainable enterprise (vs regular enterprise) crowdfunding		
	H1	H2	H1&2
Impact motivation	0.658*** (0.209)		0.760*** (0.224)
Financial motivation		0.190 (0.182)	0.382* (0.207)
Age	0.0972 (0.204)	0.187 (0.198)	0.181 (0.214)
Gender	-0.656 (0.502)	-1.064** (0.477)	-0.741 (0.514)
Amount	0.0832 (0.201)	0.116 (0.190)	-0.00878 (0.208)
Donation crowdfunding	0.617 (0.631)	0.974 (0.617)	0.735 (0.653)
Reward crowdfunding	-0.251 (0.585)	-0.0168 (0.613)	0.336 (0.678)
Loan crowdfunding	-0.318 (0.526)	-0.727 (0.503)	-0.367 (0.537)
Investment experience	-0.364 (0.336)	-0.245 (0.312)	-0.383 (0.340)
Crowdfunding experience	0.121 (0.229)	0.150 (0.217)	0.0735 (0.230)
Constant	-2.402* (1.292)	-0.938 (1.195)	-3.981** (1.626)
R-squared	0.1488	0.0828	0.1715
Observations	113	113	113

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

As an additional result, we find that female crowdfunders invest significantly more often in sustainable enterprises than male crowdfunders since this gender effect shows up when we

test only for financial motivation (second column in Table 7 -3) This suggests that impact motivation is overrepresented in female crowdfunders, which is why the gender effect disappears when we add impact motivation to our model (first and third column in Table 7-3).

Table 7-4 Trade-off between financial motivation and impact motivation (H3&4)

Variables	Impact motivation (dependent variable)		
	H3	H4	H4
	<i>all enterprises</i>	<i>sustainable subset</i>	<i>regular subset</i>
financial motivation	-0.545*** (0.171)	-0.340 (0.242)	-0.706*** (0.253)
sustainable enterprise	1.529*** (0.408)		
age	0.0379 (0.181)	0.0296 (0.293)	0.105 (0.234)
gender	-0.847* (0.450)	-1.063* (0.639)	-0.862 (0.675)
amount	0.349* (0.178)	0.756*** (0.281)	-0.0140 (0.242)
donationcf	0.523 (0.550)	0.965 (0.758)	0.512 (0.907)
rewardcf	-1.007* (0.556)	-0.466 (0.742)	-0.993 (0.901)
loancf	-0.832* (0.451)	-0.948 (0.641)	-0.298 (0.774)
investment experience	0.361 (0.285)	0.324 (0.389)	0.485 (0.455)
crowdfunding experience	0.250 (0.195)	0.473 (0.315)	0.130 (0.260)
R-squared	0.1379	0.1398	0.0956
Observations	113	58	55

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1 □

We find a strong significant negative relationship between financial and impact motivation for the full dataset, which confirms our H3 that in general there is a trade-off between these two motivations for enterprise crowdfunders. However, when we test for moderation by

splitting the sample into regular and sustainable enterprises, we find that this significant negative relationship between impact motivation and financial motivation is driven entirely by a significant negative relationship within the subset of regular enterprise crowdfunding. Within the subset of sustainable enterprise crowdfunding – our main object of study – there is no trade-off between financial and impact motivation, which was to be expected after our H2 result. It confirms our hypothesis (H4) that for sustainable enterprise crowdfunding, financial and impact motivation do not crowd each other out and instead coincide (‘double up’), while for regular enterprises, we do witness a trade-off between impact and financial motivation (H3).

7.5 Discussion and conclusion

In this paper we shed light on two motivations of crowdfunders to invest in sustainable (versus regular) enterprises: motivation to create societal impact (impact motivation) and motivation to obtain financial return (financial motivation). Our study offers the first empirical analysis of financial motivation versus impact motivation of crowdfunders of sustainable enterprises. Furthermore, we compare crowdfunder motivations for funding sustainable enterprises to crowdfunder motivations for funding regular enterprises. We find that impact motivation is reported by the average crowdfunder as their main motivation to invest *and* that this motivation is significantly higher for crowdfunders of sustainable enterprises than for crowdfunders of regular enterprises. At the same time - and unexpectedly - crowdfunders of sustainable enterprises also report a higher *financial* motivation than crowdfunders of regular enterprises. We find a trade-off between impact motivation and financial motivation for regular enterprise crowdfunders but not for crowdfunders of sustainable enterprises. Our results suggest that crowdfunders of sustainable enterprises do not expect to forgo financial return for societal impact and are instead motivated to obtain both types of return, both more so than crowdfunders of regular (non-sustainable) enterprises. We discuss this result in light of previous literature on crowdfunding motivations and sustainable enterprises to pinpoint our academic and practical contribution. Our findings suggest that intrinsic / extrinsic crowdfunder motivations are far from homogeneous: the type of crowdfunding platform, and whether the crowdfunded activity is non-profit or for-profit leads to different motivations of the crowdfunders involved. The

higher impact and financial motivation of sustainable enterprise crowdfunders contradicts previous evidence in the context of a pro-social lending platform that a focus on extrinsic motivation (through project language) crowds out the intrinsic motivation of crowdfunders (Allison et al., 2015). This study was carried out on a platform where investors provide zero-interest loans (Kiva.org), where crowdfunder contributions are not for-profit. Our finding suggests that this evidence of crowding out of intrinsic motivation in the context of prosocial lending is not transferable to for-profit crowdfunding (reward / loan / equity). This lack of transferability between platform types is confirmed by another empirical study in an equity / reward crowdfunding context, where financial motives were found to be the main driver behind crowdfunder decision-making, with non-financial motives only playing a secondary role (Cholakova & Clarysse, 2015). Here, authors note that their setting – a general crowdfunding platform that is not specifically social or environmental – might explain the absence of non-financial motivations of funders. Our setting combines the pro-social (Allison et al., 2015) and for-profit (Cholakova & Clarysse, 2015) characteristics of these earlier studies and finds that impact and financial motivations can co-exist. Our results are mostly in line with evidence from renewable energy investment at a community level, where both financial and societal motivations of funders are reported (Dóci & Vasileiadou, 2015). More generally, our findings confirm that crowdfunding motivations, and trade-offs between them, are heterogeneous across crowdfunding and project types.

We interpret our result as follows. Of the existing categorizations of SRI investors, crowdfunders in sustainable enterprises somewhat fit the definition of *value-seeking* investors (Oh et al., 2013), but perhaps a better term to coin based on our result is as *value-stacking* investors. Sustainable enterprise crowdfunders are trying to obtain financial value by choosing sustainable investments (*value-seeking*) but at the same time indicate they want to generate societal impact (*value-based*). We describe sustainable enterprise crowdfunders as *value-stacking* investors because they essentially take over the narrative of sustainable entrepreneurs, with the objective to create sustainable business in both a societal and financial sense (Bocken et al., 2014; Cohen & Winn, 2007; J. K. Hall et al., 2010). We expect this win-win narrative, embedded into the field of sustainable entrepreneurship both at a macro level and based on individual firm stories, to attract and perhaps help grow an investor community that is motivated by both entrepreneurial objectives without crowding

the other objective out (Fletcher, 2007; Martens, Jennings, & Jennings, 2007; Steyaert, 2007). This interpretation is strengthened by the fact that we find an increased financial and impact motivation in the subset of sustainable enterprise crowdfunding only: within regular enterprises, a negative trade-off between impact and financial motivation holds. Our results could serve as an explanation for the relative success of crowdfunding campaigns of sustainable enterprises: funders are investing to obtain double benefits. Since there is very little track record on realized financial return for sustainable enterprises, let alone societal impact, time will tell whether these expectations will actually materialize. Increased transparency and track record on actual value creation by sustainable enterprises – both financial and societal – is likely to affect which type of crowdfunder will decide to contribute.

Implications

Our study is relevant for crowdfunding platforms that facilitate crowdfunding for sustainable enterprises and sustainable enterprises wishing to run a successful crowdfunding campaign. Based on our results, sustainable enterprises should communicate both their expected societal impact on their crowdfunding page *and* their financial return objectives. Financial motivations of sustainable enterprise crowdfunders are also relevant for financial regulators, who need insight into expectations and the decision-making processes of investors in order to know whether certain investors should be protected from potentially uninformed investment decisions. Our study indicates that understanding the decisions of sustainable enterprise crowdfunders is relevant, especially since many sustainable enterprises are innovative and therefore high risk, and may not deliver on their financial promises. For the sustainable enterprise subset, crowdfunders need to have enough financial and risk literacy to increase the chance that their sustainable crowdfunding delivers on their financial return expectations. Similarly, societal value creation as narrated by the entrepreneur may be overly optimistic (J. K. Hall et al., 2010). Impact evaluations and experience with sustainable enterprise value creation can improve the decision-making of crowdfunders aiming for impact.

Limitations and further research

Our study has several limitations. Firstly, our study is carried out only in the Netherlands. Although the respondents in our dataset also crowdfunded abroad, a next step would be to

compare our results to similar studies in other countries or to carry out an international study ourselves. Secondly, although anonymous survey research is a standard way of identifying motivations of individuals, self-reporting bias could be influencing our results: crowdfunders may be tempted to report a higher impact motivation and a lower financial motivation than they have in reality. To solve self-reporting bias, a future research approach would be to obtain data from crowdfunding platforms that carry out campaigns for both sustainable and regular enterprises. This way, we could monitor how success rates are related to the financial and societal return promises of regular and sustainable enterprises while keeping platform characteristics and investor characteristics constant. It can also add value to run controlled and randomized experiments to isolate enterprise characteristics, such as different levels and narratives of financial return and societal impact.

The third limitation is our focus on just two types of motivation. Although this focus is chosen deliberately at this stage of the crowdfunding research realm, future research can lead to a better understanding of the variety of mechanisms and motivations driving sustainable enterprise crowdfunding and how they interact. A relevant long-term goal would be to strive for a full evidence-based motivational model for sustainable enterprise crowdfunding in a similar way to that which has been carried out for philanthropy (Bekkers & Wiepking, 2011).

7.6 Appendix

Coding Protocol Sustainable versus regular enterprises (dummy)

Look up each project campaign page (if no longer available, the project website) and answer the following questions:

Environmental: Does the project in some way benefit the environment – nature and the Earth’s life support systems (For example: saves trees, plants, bees, whales, the ecosystem, reduces pollution, makes recycling easier, etc.)? (1=Yes; 0=No)

Social: Does the project in some way benefit people (For example: improves education, fights discrimination, donates to the needy)? (1=Yes; 0=No)

Code a project as sustainable (1) if the answer is YES to *either* environmental or social (or both). Code the project as regular (0) if the answer to *both* questions is NO.

Before coding, browse through the following articles (Kates & Parris, 2003; Shepherd & Patzelt, 2011) for an understanding of ‘sustainable’ and for relevant examples.

What if the description of the project as found online is unclear?

- If the crowdfunding website is mentioned, and this is a website for only sustainable projects (KIVA, lendahand, oneplanetcrowd) code the project as *sustainable*.

- If a vague description has been given without the name (i.e. “biological supermarket”), use the description to decide whether it is sustainable or not (i.e. biological benefits ecosystems, so yes, sustainable)

- If a vague description has been given but is not sufficient to code it as sustainable or not, follow the coding that the respondent gave.

Table 7-5 Pairwise correlation of variables of interest

	sustent CF	impactmot	financialmot	gender	age	amount	donationcf	rewardcf	loancf	equitycf	investexp	cfexp
sustainable enterprise CF	1.00											
impact motivation	0.3431***	1.00										
financial motivation	0.0305	-0.1152	1.00									
gender	-0.2091**	-0.1985**	0.2269***	1.00								
age	0.1391	0.1896**	-0.1525*	-0.1337*	1.00							
amount	0.0003	0.0641	0.3698***	0.1680*	0.2139**	1.00						
donation crowdfunding	0.1185	0.0866	-0.0958	0.0160	0.0825	-0.2547***	1.00					
reward crowdfunding	-0.0176	-0.0213	-0.5350***	-0.0599	0.0190	-0.2813***	-0.2055**	1.00				
loan crowdfunding	0.0318	0.0911	0.3753***	0.0127	0.0319	0.2839***	-0.0933	-0.4506***	1.00			
equity crowdfunding	0.1770**	0.1643*	0.3576***	0.1589*	-0.0587	0.2604***	-0.0689	-0.3440***	0.3071***	1.00		
investment experience	-0.0763	0.0448	0.1828*	0.2970***	0.1628*	0.1750*	0.0875	-0.3033***	0.0425	0.1874**	1.00	
crowdfunding experience	0.0749	0.0784	0.2843***	0.2415***	-0.0200	0.1753**	0.0037	-0.1825**	0.2392***	0.1112	0.2188**	1.00

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

8 User crowdfunders: insiders or idealists?¹¹

Abstract

Crowdfunding has attracted new types of investors into the innovation and entrepreneurial finance space, notably users/customers of ventures and investors with societal impact motivations. These new investors represent a promising additional source of finance for innovation, but their contribution to this investment space depends on the quality of their investment decision-making. We know little about how (differently motivated) users may overcome the high levels of informational asymmetry that characterizes innovation finance. By combining investment, user and survey data on a large, successful crowdfunding campaign of a sharing platform, we are able to differentiate between user and non-user crowdfunders and their investment motivation. We find evidence of lower information search effort for users, which we explain based on their access to local ‘sticky’ information about the venture as evidenced in the user innovation literature. Although both users and impact-motivated funders have less investment experience – and therefore are ‘new’ investors – we find no significantly lower financial literacy than non-user crowdfunders. This confirms evidence from the financial literacy literature that investors self-select based on their financial literacy. Financially motivated users show higher financial literacy than both non-users and impact-motivated users, signaling that this group may represent a high quality additional source of innovation finance. Our results inform policy development for innovation finance and crowdfunding regulation.

8.1 Introduction

In the past decades, there has been a paradigm shift from a producer-focused innovation process to innovation carried out by users (Baldwin & von Hippel, 2011). The role of users in the innovation process has been documented to be large, containing billions of dollars of investment by users each year for enhancement of their products (von Hippel, de Jong, & Flowers, 2012). Communities of users report to voluntarily assist each other in this innovation

¹¹ Joint work with Friedemann Polzin.

process due to social norms and enjoyment in this process, rather than for monetary profits (Franke & Shah, 2003). The rise of low cost internet technologies has also enabled the rise of crowdsourcing (Poetz & Schreier, 2012), open source software (S. S. Levine & Prietula, 2014) and multi-sided platform ventures (Frenken & Schor, 2017; Hagi, 2014). Platforms enable peer-to-peer sharing, renting and buying of goods and services; within the connotation of the ‘sharing economy’ this is expected to deliver not only economic, but also environmental and social value (Frenken & Schor, 2017). The influence of users and consumers in the innovation process has also expanded to its financing (Brem, Bilgram, & Marchuk, 2017; Ordanini et al., 2011). Starting in the reward-based crowdfunding industry with pre-ordering, user financiers now engage in debt and equity crowdfunding. Surprisingly, the emerging crowdfunding literature and the user innovation literatures have only just begun to explore how users *fund* innovation (Brem et al., 2017).

We put three perspectives at the forefront of our study. First, we want to understand whether user crowdfunders overcome asymmetric information problems in a different way than non-users. In the crowdfunding literature, the role of social networks in overcoming informational asymmetries has been highlighted (Lin et al., 2012; Polzin, Toxopeus, et al., 2017). Also, research has been conducted on whether crowds are able to select high quality projects as compared to experts (Ethan Mollick & Nanda, 2015). Users – in particular of online platforms - have first-hand experience with the value proposition and delivery of a firm, which allows them to privately assess the quality of the product or service. The user innovation literature highlights the development of local “sticky” information of users, which can bring them in a good position to innovate (Lüthje, Herstatt, & von Hippel, 2005; von Hippel, 1994, 1998).

Second, we explore different characteristics of users with regard to their absorptive capacity – ability to process new information based on prior experience and expertise (Cohen & Levinthal, 1990). The ability to process obtained information is a crucial aspect of ability to judge venture quality. Whereas for reward crowdfunders need to be able to judge whether producing a product (value delivery) is feasible, for debt/equity crowdfunders, it is necessary to judge as well whether the venture will be able to generate profits and survive (value capture). It is unclear whether certain users self-select as funders based on their ability to judge this venture quality, or that user crowdfunders are simply a less experienced and less

financially literate ‘crowd’. We therefore explore differences in financial literacy (van Rooij, Lusardi, & Alessie, 2011) and investment experience (Hodge & Pronk, 2006) of user and non-user crowdfunders.

Third, we expect the primary investment motivation of funders to alter efforts and ability to overcome informational asymmetries. While financial theory assumes monetary profit to be the key driver of investments, the crowdfunding literature has unveiled diverse non-financial motivations of funders (Dóci & Vasileiadou, 2015; Gerber & Hui, 2013; Jian & Shin, 2015). Some evidence suggests that sustainable/social ventures are particularly successful at crowdfunding (Calic & Mosakowski, 2016), suggesting crowdfunder willingness to contribute to provision of collective goods through entrepreneurial activity (Olson, 2009; Ostrom, 2010a). Also, the institutional setting of crowdfunding – using a threshold and providing transparency about behaviour of other funders – may stimulate collective action (Cheng & Bernstein, 2014; Toxopeus & Maas, 2018).

By combining three datasets (investment, user and survey data) on one large, successful crowdfunding campaign of a sharing platform venture, we quantitatively answer the following research question: *Are information search efforts and absorptive capacity of user crowdfunders different than for non-user crowdfunders?* Using logistic regression analysis, we document lower information search effort both for users and impact-motivated funders. Also, we find that financially motivated user funders are more financially literate than non-users, whereas impact motivated user funders have approximately the same financial literacy. Both users and impact motivated funders have less investment experience than financially motivated non-user crowdfunders. Furthermore, we find a female overrepresentation in the impact-motivated user group, with significantly lower financial literacy and investment experience.

The remainder of this article is structured as follows. First, we review the relevant literature and introduce our theoretical framework (section two). In section three, the research design and the data are described. Finally we present the results (section four) which we discuss in the light of prior research and we draw conclusions (section five).

8.2 Literature review and theoretical framework

Overcoming informational asymmetries for innovative ventures

Obtaining access to external finance is often a constraint for start-up enterprises due to lack of profitable track record, collateral and their innovative, high risk nature in rapidly changing markets (Brancati, 2015; Carpenter & Petersen, 2002b; Engel & Stiebale, 2014; Giudici & Paleari, 2000; Gompers & Lerner, 2001). Early stage ventures and their potential financiers attempt to overcome informational asymmetries, adverse selection and moral hazard by using signaling (Ahlers et al., 2015; Akerlof, 1970; Spence, 1973, 2002). Ventures lacking track record and collateral may use different types of signals to attract investors such as patents, prototypes, track record of entrepreneurial team and commitment from other investors or clients (Audretsch et al., 2012; Connelly, Certo, Ireland, & Reutzel, 2011).

In the past decade, crowdfunding has grown to become a significant source of finance for early-stage ventures, offering online capital markets that match many - small and large - funders to a venture at relatively low cost (Bruton et al., 2015). The research on crowdfunding is emerging (for reviews see J. H. Block et al., 2017; McKenny, Allison, Ketchen, Short, & Ireland, 2017; Moritz & Block, 2016; Short, Ketchen, McKenny, Allison, & Ireland, 2017) and one of the key questions surrounding this new type of capital is if – and how – informational asymmetries and moral hazard problems are overcome between entrepreneur and investors. This is relevant in particular since the incentive for the individual investor to do extensive screening and monitoring on a small investment is low (Agrawal et al., 2015; Vismara, 2016). The ability of inexperienced funders to gauge the quality of the venture is questionable, and motivations of funders to invest appear more diverse than in ‘traditional’ finance.

Crowdfunding platforms offer a wide set of signals to potential investors on the basis of which they can judge quality of the venture, such as a video, an investment sheet, a project description and insight into amount, identity and comments of other funders (Butticè, Colombo, & Wright, 2017; Colombo et al., 2015; Hornuf & Schwienbacher, 2015). Furthermore, funders may search for other information sources to undertake due diligence or use information and advice from their personal social network to make an investment decision (Vismara, 2016, 2015).

Overcoming informational asymmetries by user funders

Crowdfunding has led to the entrance of a new type of financier: funders who are familiar with a venture as a user or customer (Belleflamme et al., 2014; Ordanini et al., 2011). However, it is unclear whether users are able to judge the investment quality of a venture, and if so, how. The question of how users are able to overcome informational asymmetries has its parallels in the user innovation literature. A key explanation for decentralized user-driven innovation – as opposed to innovation by experts - is that users possess ‘sticky’ local information which lowers innovation cost for users (von Hippel, 1994, 1998). This information is ‘local’ because it is obtained in the course of using the product or service, and it is ‘sticky’ because of the high costs involved to transfer this information (Lüthje et al., 2005). Information can be divided into two types: ‘need’ information, often localized with users and ‘solution’ information, traditionally assumed to be located with producers but found to be located with users as well (Lüthje et al., 2005). This local, sticky information is argued to be a key reason why decentralized innovation processes exist.

The user innovation literature begs the question whether user *crowdfunders* are also able to employ ‘local, sticky’ information to inform investment decisions in innovative enterprises which they are familiar with as users. A decision whether to finance a venture can be seen as a type of problem-solving, like innovating. The ‘problem’ of selecting high quality innovative ventures is large: obtaining access to external finance is often a constraint for start-up enterprises due to lack of profitable track record, collateral and their innovative, high risk nature in rapidly changing markets (Brancati, 2015; Carpenter & Petersen, 2002b; G. Giudici & Paleari, 2000; Gompers & Lerner, 2001). Technological change provides high uncertainty for all the economic actors involved in a venture, including investors (Mazzucato, 2013).

In the case of finance for innovation – characterized by high informational asymmetries - users could add valuable insight to a financing decision. If we see the financing decision as ‘problem solving’ this may explain why the locus of the financing decision in some cases shifts towards users of innovative ventures (von Hippel, 1994). A tacit understanding of venture quality can allow users to invest in ventures which are deemed too uncertain by experienced investors who are less familiar with the venture. This is particularly the case for *platform* ventures, since users are creating value themselves and therefore very familiar with

the value proposition and its delivery. Furthermore, user crowdfunders all have their own, unique experience and therefore understanding of the quality of the venture, which makes ‘task partitioning’ between user funders reasonable (von Hippel, 1994). Each user is willing to contribute to the required funding, but the crowdfunding project will only take place if enough users (and non-users) decide that the quality of the venture is high enough to invest, which in the aggregate solves the ‘problem’ of whether a venture merits financing, or not.

H1. User crowdfunders undertake a lower informational search effort than non-users due to access to local ‘sticky’ information.

Absorptive capacity of user crowdfunders

The quality of the investment decision of users (versus non-users) not only depends on their access to information, but also on their capacity to judge the investment quality of a venture. Although engagement of users in debt/equity crowdfunding might seem promising due to user familiarity with the enterprise and its additionality as a funding source, policymakers fear users will underestimate enterprise risks (AFM, 2014). Indeed, users – activated as funders – may well be non-professional investors and/or lack the financial literacy to judge the quality of their investment (Lusardi & Mitchell, 2007; van Rooij et al., 2011). Also, user familiarity with an enterprise could create a home bias effect in their investment decision (Coval & Moskowitz, 1999; Lin & Viswanathan, 2015). However, Mollick and Nanda (2015) document that in the context of reward crowdfunding, the quality of projects selected by a crowd is similar to the expert selection. Even more interesting, the crowd is willing to invest in a larger amount of projects, and additional projects are not of lower quality (Ethan Mollick & Nanda, 2015). This suggests additionality of funds without investment quality loss, albeit in a theatre context.

The ability of crowdfunders – both users and non-users - to judge the quality of a venture as an investor depends on their *absorptive capacity*: their ability to ‘recognize the value of new, external information, assimilate it and apply it for commercial purposes’ (Cohen and Levinthal, 1990, p128). Importantly, not all users of a venture choose to crowdfund. The best positioned user crowdfunders are those who not only possess local ‘sticky’ information about the venture but also are able to apply this information as part of an investment decision because they are sufficiently financially literate (Lusardi & Mitchell, 2011). In spite of fears

that user crowdfunders may invest without enough expertise to judge the quality of their investment, we expect that only users who are financially literate enough to judge the investment proposal, will invest. This expectation is partly founded on evidence on stock market participation which shows that illiterate households self-select out of investing in stocks (van Rooij et al., 2011). Based on the absorptive capacity argument, financial literacy lowers the costs for user crowdfunders to take a well-informed investment decision.

Building on this evidence, we expect user crowdfunders to self-select into debt/equity crowdfunding based on their financial literacy, and therefore have a similar financial literacy than other (non-user) crowdfunders.

H2. User crowdfunders are just as financially literate as non-user crowdfunders.

Impact motivation as a moderator of information search effort and financial literacy

When it comes to debt and equity crowdfunding, financial motivation is assumed to be the most important driver for debt/equity crowdfunders to join a campaign (Cholakova & Clarysse, 2015). However, both theoretical and empirical work suggests that crowdfunding is a successful funding strategy for ventures with a social/sustainable orientation, in particular (Allison et al., 2015; Calic & Mosakowski, 2016; Lehner, 2013). This success could be partly driven by non-financial motivation of funders. Research shows that crowdfunders can be motivated to contribute to the socio-economic goals of entrepreneurial activity (Calic & Mosakowski, 2016; Dóci & Vasileiadou, 2015). Crowdfunders obtain additional (non-financial) benefits from funding such as helping others, being part of a community ('community benefits') and supporting a cause (Belleflamme et al., 2014; Gerber & Hui, 2013). In an empirical study comparing reward and equity crowdfunding, Cholakova & Clarysse (2015) find that extrinsic motivation (receiving a reward/product or financial payoff) is the main driver of crowdfunder participation, rather than intrinsic factors (such as supporting a cause or helping others). Localized social capital and local altruism is found to drive investment in reward-based crowdfunding campaigns (Giudici et al., 2017). In the context of decentralized renewable energy investments, crowdfunders have been found to invest both for 'gain' (obtaining lower energy prices) as well as for normative (environmental) reasons (Dóci & Vasileiadou, 2015).

If the main investment motive of some crowdfunders is to deliver societal benefits ('impact'), we expect this to lower their information search efforts as opposed to (primarily) financially motivated crowdfunders. Other types of information are relevant to judge venture quality if the investment objective is societal impact: socially/environmentally motivated investors apply multiple 'screens' for their investments (Borgers & Pownall, 2014). Knowing what the societal impact objective is important information to judge the investment, as well as evidence on whether this objective can be reached with the proposed strategy.

Also, information about the expected impact of an investment is often hard to obtain since - unlike financial return - societal impact is not automatically reported by ventures (Toxopeus et al., 2015). Although various methods exist to measure social impact (Maas & Liket, 2011), it is difficult to predict the potential impact of a certain investment if this specific impact has not been measured in the past. We therefore expect impact motivated crowdfunders to proxy for expected impact of their investment by paying attention to the (often anecdotal) narrative/storytelling of the venture (Downing, 2005) as communicated in the crowdfunding campaign. For example, many follow the sustainable narrative of sharing platforms, whereas their realized impact is often still unknown (Frenken & Schor, 2017).

Finally, impact motivated funders may more easily be content with the information provided by the venture. The first reason for this is that the sustainable orientation of the venture may increase trust in the venture - reducing fears of moral hazard (Hörisch, 2015). A second reason for decreased information search is that impact motivated funders may engage in the investment-equivalent of warm-glow giving (Andreoni, 1990). Third, there could be an interaction effect between impact-motivated funders and their non-professional investor 'status': non-professional investors are more likely to act on information given to them - unlike professional investors with predefined information needs (Hodge & Pronk, 2006).

We expect impact motivation to have a negative relationship with information search effort and also impact motivation to be unevenly distributed between users and non-users. Users/consumers of sustainable enterprises may be part of social movements trying to create (sustainable) cultural change (Akemu, Whiteman, & Kennedy, 2016; Rao, Morrill, & Zald, 2000) whereas non-users are more likely to invest for financial reasons. If user crowdfunders

are more often impact-motivated than non-users, impact motivation could drive part of the relationship between usership on the one hand and information search on the other. This means we expect there to not only be a direct effect from impact motivation on information search effort but also a positive interaction effect between impact motivation and user level. This makes impact motivation a variable which *specifies* the relationship between user level and information search effort (Sharma et al., 1981). Specification variables can be classified in one of four dimensions, based on whether they predict the dependent (criterion) or independent (predictor) variable and whether they interact with the predictor variable (Sharma et al., 1981). Based on this specification typology, we expect impact-motivation to be a *quasi-moderator* of the negative relationship between user level and information search effort (H3).

H3 Impact motivation moderates the relationship between user level and information search effort (*impact-motivated user funders will carry out lower information search efforts than financially motivated user funders*)

Similarly, we expect impact-motivated users to be less financially literate than financially motivated users. Impact motivated users will accept a lower threshold of their own financial literacy, because their investment objective is different. Financially motivated users, however, we expect to be more critical of their own ability to judge the quality of a venture. We therefore expect impact motivation to also moderate the relationship between usership and financial literacy (H4):

H4 Impact motivation moderates the relationship between user level and financial literacy (*impact-motivated user funders will be less financially literate than financially motivated user funders*)

8.3 Methodology

Research context

As a research context we choose to study a crowdfunding campaign carried out by a sharing platform venture for in-depth analysis. Online sharing via platforms is defined as ‘*consumers granting each other temporary access to under-utilized physical assets, possibly for money*’ (Frenken & Schor, 2017). Much of the value created in (sharing) platforms is delivered by

users, themselves. They offer goods, take part in a market place and provide ratings to lower risks of transacting with unknown peers. However, in successful platforms, much of the value is captured by the platform itself, because it often obtains a natural monopoly due to strong network externalities (Frenken & Schor, 2017). Because of questionable distributional effects, an alternative proposed by (Frenken & Schor, 2017) is to distribute ownership of platforms to users through crowdfunding (Scholz, 2014). This could bring value creation in line with value capture (Lepak, Smith, & Taylor, 2007). However, considering the high-risk nature of such an investment (due to network externalities that define a platform's success) informational asymmetries are typically large. The importance of online platform ventures and their user funding are expected to grow further in the coming decades due to evolving online technologies. The high informational asymmetries, large involvement of users and the expected further growth of platform ventures makes it a suitable case to test our hypotheses.

We took a successful crowdfunding campaign (2016) carried out by a Dutch sharing platform called 'Peerby'. Peerby is a platform venture that exists since 2011 which allows neighbours to borrow goods from each other so that they do not have to buy it, which can lead to a higher resource-efficiency (Martin, 2016). Peerby is meant for sharing goods between citizens that often lie idle (spare capacity) such as screwdrivers, ladders and/or party tables. After piloting a new rental service between neighbours in a few large Dutch cities, the Peerby management decided to run a crowdfunding campaign to expand internationally with their rental service called 'PeerbyGo'. The campaign targeted a minimum of €300.000 and a maximum of €1,5 mln in funding (see Figure 2 in the appendix for a screenshot of the campaign website). In its crowdfunding campaign, Peerby offered funders convertible debt¹² starting at €250, for an interest rate of 6% (8% from €10.000 upwards). Debtors have the possibility to convert their loans into equity after four years.¹³

12 A convertible bond is a fixed-rate bond that may, at the option of the investor, be converted into the equity of the borrower or its parent. The price at which the bond is convertible into equity is set at the time of issue and typically will be at a premium to the market value of the equity at the time of issue (IMF, 2003)

13 It was also possible to fund €50 in return for vouchers for the rental service PeerbyGo as a form of reward crowdfunding but almost no-one did.

Before opening the campaign¹⁴ to the public, Peerby raised €160.000 from its existing investors, mostly informal investors and venture capitalists. From 12th of April 2016 onwards, existing investors from OnePlanetCrowd¹⁵ were allowed to fund. Within a few days the campaign opened up to the larger crowd, including the Peerby community (approximately 80.000 members). Between 15 – 22 April, 1055 crowdfunders joined the campaign for a total funding of €2 mn. Of these 1055 funders, 586 were members of Peerby before the campaign and 221 had used Peerby's sharing platform (the other members received updates but had not used the service).

Research design and data

To test our hypotheses, we need to be able to clearly distinguish user levels of an venture financed by crowdfunding (Gamble, Brennan, & McAdam, 2016; Ordanini et al., 2011). We choose for a platform venture since users have an active role in these types of ventures, since they are part of the value delivery, and here we are also able to differentiate between different levels of use. We collected three different datasets concerning the crowdfunding campaign of Peerby. First, we obtained the investment data of this campaign (amount, timing of investment in relation to other investors). Secondly, we obtained information about the usership for each investor. This included if they were a member of Peerby, and if so, whether they had used the platform to date and how often. Third, we sent all investors a survey within a few weeks of the campaign, which was completed by almost half of all investors (see appendix 1). To match the three datasets we used exact email address matches and unique combinations of postal codes and amounts. We found 421 matches between all three datasets for our main variables.

Full model

From our hypotheses we derive an analytical model which we test statistically (Figure 8-1). User crowdfunders are hypothesized to exert lower information search efforts due to their access to local 'sticky' information about the venture (H1). Furthermore, user crowdfunders

14 For the project website of the Peerby campaign, see: www.oneplanetcrowd.com/en/project/138624/description

15 <https://www.oneplanetcrowd.nl>. OnePlanetCrowd is a crowdfunding platform geared towards sustainable enterprises and facilitates reward, debt and equity (subordinated debt) crowdfunding campaigns.

are expected to be just as financially literate (H2) than non-user crowdfunders due to self-selection based on the absorptive capacity argument. We expect these relationships to be moderated by the motivation of funders: impact motivated funders are expected to carry out a lower information search effort and have a lower financial literacy.

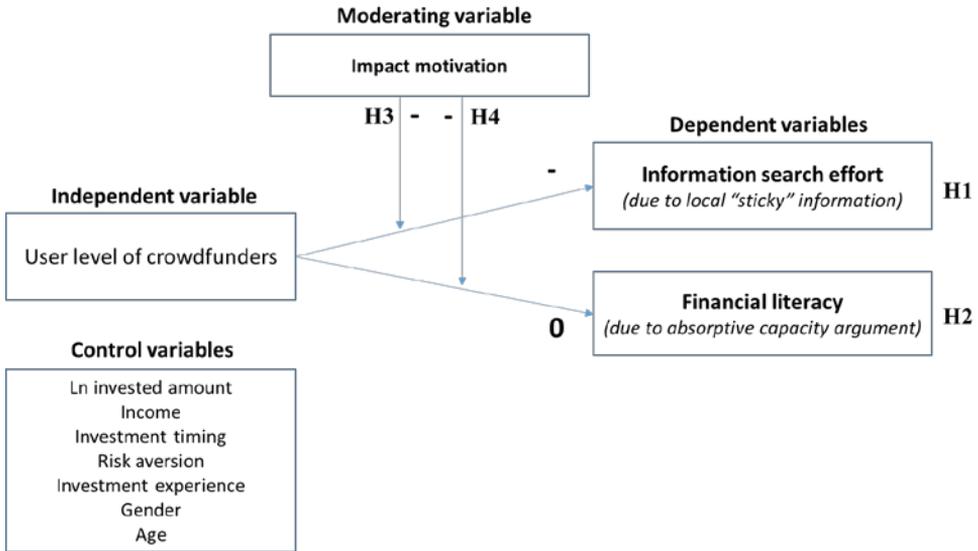


Figure 8-1 Analytical model

Dependent variables

Our first dependent variable aims to improve our understanding of informational search costs of user (versus non-user) crowdfunders. Although it is difficult to observe whether users have local ‘sticky’ information that lowers their information search costs, we are able to measure their information search efforts which are expected to be lower due to their access to user-based information. Information search effort was operationalised by asking for the extent to which investors took the effort to look for information themselves (Polzin, Toxopeus, et al., 2017): (‘Did you look for other information outside the crowdfunding website before making your investment decision?’ Yes/No). Searching for information yourself, instead of only relying on the information that the enterprise/platform provides on the crowdfunding website, indicates higher information search efforts.

Second, financial literacy gives an indication of the ability (absorptive capacity) of the funder to process the information obtained to make a well-informed investment decision (van Rooij et al., 2011). We select two existing financial literacy questions (Lusardi & Mitchell, 2011; van Rooij et al., 2011) which measure understanding of compound interest rates and portfolio diversification (see survey questions in appendix).

Independent variable

In order to measure user level of crowdfunders in Peerby, we deploy data on the actual usage of Peerby's services. There are different ways in which someone can use Peerby. The type of interactions we included as a 'use' are: the number of times a person sent out a sharing request; the number of times a person answered 'yes' to a sharing request of someone else; number of times person answered 'yes, but' to a sharing request of someone else. This unique empirical insight into user levels goes beyond existing work looking at user dynamics in crowdfunding campaigns (Giudici et al., 2017; Ordanini et al., 2011). We used this data to create a user level variable: 0=not a member/user, 1=a member but never used the service; 2= a user who at least once answered positively to a request or placed a request; everything above 2= natural log of number of times person actually used Peerby's services. We constructed the scale in these steps because we expect familiarity with the enterprise to increase once registered as a member (insight into value proposition), to increase drastically after using it at least once (insight into the value delivery of the enterprise) and to further increase after multiple use, but that familiarity increases only marginally after multiple uses.

Moderating variable

The *a priori* motivation to crowdfund in the enterprise Peerby is assumed to moderate the relationships between user levels and information search effort/financial literacy. Funding motivation may be primarily driven by societal impact or financial return (Calic & Mosakowski, 2016). To create this moderating variable we use the variable '_finvssocial' where respondents were asked to choose their main motivation of the two (What was more important in your investment decision: financial or societal return? 0=financial 1=don't know, 2=societal return). In order to distinguish two subgroups, we removed observations that answered "I don't know" (33 observations), which leaves us with a dummy variable as a moderator.

Control variables

To rule out other explanations besides usership that affect information search effort and financial literacy of (non-)user crowdfunders we add controls. Firstly, the amount (*ln_invamount*) impacts dependent variables significantly (Polzin, Toxopeus, et al., 2017; Vismara, 2016) as higher investments are associated with better information search and higher financial literacy. We control for income since this affects the relative size of the investment for the individual investor in relation to their wealth/portfolio. Investment timing (whether they were the first or the 1045th investor) was included to control for potential herding effects (Hott, 2009; Vismara, 2016). Furthermore, risk aversion is included as control using a basic risk aversion survey question (Kahneman & Tversky, 2012) because this is expected to affect information search effort. Investment experience influences the way crowdfunders perceive risks and gather information (Hodge & Pronk, 2006; Polzin, Toxopeus, et al., 2017; Vismara, 2016). We cumulate self-reported investment experience: in the stock market, as informal investors and in crowdfunding (all measured on a 5-point Likert scale, see survey questions in appendix 1) (Chan & Parhankangas, 2017; Polzin, Toxopeus, et al., 2017). We include gender and age since both are related to financial literacy (Lusardi & Mitchell, 2008) and investment experience (Barber & Odean, 2001; Korniotis & Kumar, 2011) and are used as standard control variables in crowdfunding research (E. Mollick, 2014; Polzin, Toxopeus, et al., 2017).

8.4 Results

After conducting a thorough descriptive analysis on our main and control variables (Table 8-1) we ran pairwise correlations (Table 8-4, appendix). Based on these results we executed (ordinal) logistic regression analyses (Table 8-2).

Descriptive statistics

The descriptive statistics (Table 8-1) give an overview of our main and control variables. This reveals that on average, respondents perceive their investment in Peerby as somewhat or quite risky. On the other hand, less than half of our sample searched for information that could inform their investment in Peerby outside of the information provided on the crowdfunding platform. Our main variable of interest shows that 63% of our respondents are registered members of Peerby, whereas 50% have used Peerby at least once. Whereas on

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the average, users used Peerby 20 times, the distribution is skewed due to some intense users. The median use is 6 times (excluding the non-users). We find that respondents are evenly split between having financial return or societal impact as the more important motivation to invest in Peerby. Investment amounts range between the minimum of €250 and €40.000 with an average slightly above €2000. Due to the skewed distribution we converted this into a logarithmic scale. 12% of the funders had no investment experience. Our sample is biased towards male investors (74%). 74% of the respondents are between 25 and 54 years old, in line with empirical findings in other studies (Polzin, Toxopeus, et al., 2017; van der Lijn et al., 2016).

Table 8-1 Descriptive statistics of main variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
Information search effort	388	0,39	0,49	0	1
Financial literacy	321	1,58	0,64	0	2
Impact motivation	387	1,02	1,00	0	2
User level	388	2,07	2,10	0	8,05
Ln Invested amount	379	6,68	1,27	3,91	10,60
Income	336	3,40	1,20	1	6
Investment experience	379	4,85	3,43	0	15
Investment timing	388	522	298	2	1045
Risk aversion	388	0,42	0,49	0	1
Gender	388	0,24	0,43	0	1
Age	388	3,46	1,28	1	6

The pairwise correlation analysis (Table 8-4, appendix) indicates that users have a lower likelihood of doing an extensive information search before investing and have a similar financial literacy as non-users. Also, increased user levels are significantly correlated with higher impact motivation (as opposed to financial motivation). Users are more often female, have lower investment experience, are more risk averse and invested slightly later in the campaign than non-users.

Determinants of information search and financial literacy of user crowdfunders

We carry out a logistic regression to test our information search hypothesis as well as our financial literacy hypothesis (Hair, 2010; Kutner et al., 2005). Our results (Table 8-2) show support for our first hypothesis: higher user levels are significantly related to lower information search levels (H1). We find support for our second hypothesis that no significant differences in financial literacy exist between users and non-users; also the coefficient is small (0.05) (H2).

Table 8-2 Full model results, without and with moderation tests (H1-4)

VARIABLES	H1 information search	H3 information search	H2 financial literacy	H4 financial literacy
user level	-0.160*** (0.0620)	-0.185** (0.0931)	0.0582 (0.0689)	0.227* (0.122)
impact motivation		-0.504*** (0.178)		0.345 (0.216)
impact mot*user level <i>(interaction term)</i>		0.0730 (0.128)		-0.282* (0.150)
invested amount	0.347*** (0.105)	0.325*** (0.107)	0.0407 (0.129)	0.0381 (0.133)
Income	-0.187 (0.114)	-0.208* (0.116)	0.177 (0.149)	0.158 (0.151)
Investment experience	0.0337 (0.0397)	0.0243 (0.0409)	0.168*** (0.0539)	0.186*** (0.0550)
Investment timing	0.000330 (0.000418)	0.000423 (0.000432)	-0.000606 (0.000470)	-0.000669 (0.000483)
Risk aversion	0.100 (0.258)	0.152 (0.267)	-0.507* (0.292)	-0.497* (0.300)
Gender	-0.337 (0.320)	-0.253 (0.330)	-1.302*** (0.328)	-1.229*** (0.332)
Age	-0.362*** (0.103)	-0.322*** (0.105)	0.0424 (0.114)	0.0505 (0.116)
Constant	-0.935 (0.789)	-0.425 (0.825)	-2.052** (1.018)	-1.756 (1.078)
R-squared	0.0838	0.1118	0.1608	0.1684
Observations	330	329	273	272

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Next, we test for an interaction effect of impact motivation on the relationship between user level on the one hand and information search / financial literacy on the other (Brambor, Clark, & Golder, 2006; Sharma et al., 1981). To test for moderation, we carry out moderated regression analysis (Sharma et al., 1981). We first add impact motivation as a separate

predictor variable (without interaction variable), and then add it as a moderating variable to test for interaction effects.

Our results show that impact motivation has a strong negative relationship with information search effort but we find no interaction effect (H3): the relationships between user level and impact motivation on the one hand and information search on the other, are independent.

Next, we carry out an interaction analysis between user level and impact motivation with financial literacy as a dependent variable. Although user level does not relate to financial literacy and impact motivation directly, we find a significant interaction effect between the two variables (H4). When we include this interaction term, we find that financially motivated users are on average *more* financially literate than non-users and impact motivated users are about as financially literate as non-users (the coefficients of the direct effect and the interaction effect approximately cancel each other out).

Control variables

Higher invested amounts are related to higher information search effort. Older funders and funders with a higher reported income carry out a lower information search effort, which could be explained by higher wealth: the investment may represent a less significant share of their investment portfolio. Investment experience and financial literacy are positively related whereas risk aversion is negatively related to financial literacy. Women are significantly less financially literate (Lusardi & Mitchell, 2008) and have less investment experience (Barber & Odean, 2001).

Robustness checks

To rule out correlations between our independent variables influencing the variance of our dependent variable (multi-collinearity) a variance-inflation factor test was carried out (Kutner et al., 2005). Individual values of maximum 1.32 and an average VIF of 1.19 remain below the suggested value 2 and the critical value of 5.

To further assess the robustness of our analysis, we repeat the analysis using different measures for our main variables. We generate an alternative user level variable from the survey data (Table 8-5 in appendix). Respondents self-reported whether they were involved in a sharing transaction on Peerby. This data is different from the main user level variable in two ways: (1) it is self-reported (and therefore prone to mistakes) but (2) it gives us insight

into successful transactions, whether the user data tells us how often Peerby members have *attempted* a sharing transaction. All Peerby member respondents were asked whether (and how often) they lent out or borrowed something on the Peerby platform (lentout, borrowed). We used this to create an alternative variable for Peerby user level ‘user_sur’ which measures the number of self-reported transactions, both borrowing and lending to others). Our direct results for information search effort are robust to this alternative ‘user level’ variable: we find significant negative coefficients for both user level and impact motivation with information search effort. However, in the interaction model, the significance of both user level and impact motivation disappears, even though the coefficient remains large. For financial literacy, we find no significant differences for user level and impact motivation, which is the same as in our main model, but we no longer find an interaction effect (that financially motivated users are more financially literate).

As a second alternative variable, we use a dummy variable obtained from the user data (Table 8-6 in appendix), taking a value of 1 if a funder has attempted to use Peerby at least once and a value of 0 if this is not the case (this dummy does not distinguish between members and non-members). We find that the coefficient in relation to information search effort remains negative but it is no longer significant. This suggests that variations in user level help explain information search effort. We do find a significant interaction effect with financial literacy: financially motivated users are more financially literate than non-users, impact-motivated users are less financially literate than non-users. This is in line with our previous result.

As an alternative variable to test the relationship between user level and information search effort we use the response to the question whether funders looked at the investment sheet, (included on the crowdfunding campaign website in a separate tab as a PDF) to make their investment decision (Table 8-7 in appendix). The investment sheet is part of the crowdfunding campaign website and contains organisational, strategic and financial information about the venture Peerby. Funders need to exert more effort to read the investment sheet than to read the – highly available and easy to process – project description and video. Therefore we use this dummy variable (yes/no) as a proxy for information search. We find no significant differences between user levels and their propensity to read the

investment sheet of the firm. We do find that financially motivated funders more often report to have read the investment sheet than impact motivated funders.

As an alternative measure for absorptive capacity, we use investment experience (now a control variable). This leads to slightly different results (Table 8-7 in appendix): both users and impact motivated funders have less investment experience, but we do not find an interaction effect between them. This gives additional insight into the absorptive capacity of users and impact motivated funders: although on average, financial literacy of users is the same as non-users, their investment experience is significantly lower. Furthermore, financially motivated users are more financially literate but do not have more investment experience than financially motivated non-user funders.

8.5 Discussion and conclusions

Users represent new sources of risk-carrying capacity for (impact-driven) innovation finance but at the same time their involvement in crowdfunding fuels concerns of uninformed investment decision-making. Therefore the main research question guiding our inquiry was: *Are information search efforts and absorptive capacity of user crowdfunders different than for non-user crowdfunders?* We also investigate the moderating role of impact motivation versus financial motivation as a primary reason to invest for both user and non-user crowdfunders. To analyse these questions empirically, we undertook an in-depth analysis of a successful crowdfunding campaign carried out by a sharing platform for neighbours in the Netherlands (Peerby).

By combining investment, user and survey data on this large campaign, we find that users put in lower information search efforts than non-users. Also, impact motivated funders put in significantly lower information search effort, independent of whether they are a user. Financially motivated users are on average *more* financially literate but have less investment experience than non-users; impact motivated users are *less* financially literate and have less investment experience than non-users. Our results indicate that users and impact motivated crowdfunders both represent newer –less experienced - investor groups, with variations in investment decision quality. Crowdfunders who are primarily impact motivated display lower financial literacy and lower investment experience, which could be explained by the lower importance of financial return. Our results are summarized in Table 8-3.

Table 8-3 Matrix of crowdfunder investment decision making characteristics

Primary motivation x Usership	Users	Non-users
Impact motivated	“Change agents”	“Idealists”
<i>Characteristics of investor</i>	Low financial literacy Low investment experience	Average financial literacy Low investment experience
<i>Investment decision characterized by</i>	Lowest information search effort	Low information search effort
Financially motivated	“Insiders”	“Profit-seekers”
<i>Characteristics of investor</i>	High financial literacy Low investment experience	Average financial literacy High investment experience
<i>Investment decision characterized by</i>	Below average information search effort	High information search efforts

The rise of crowdfunding as a source of financing for start-up ventures has raised the question how crowdfunders overcome informational asymmetries (Ahlers et al., 2015; Lin et al., 2012; Polzin, Toxopeus, et al., 2017; Vismara, 2016). Of particular interest are new, non-professional investors, recruited from a venture’s own users (Brem et al., 2017; Ordanini et al., 2011) and/or investing with different motivations (Allison et al., 2015; Calic & Mosakowski, 2016). There is little research on user funding which corresponds to scarce insight into ‘embedded’ investment decisions (Uzzi, 1999) of users.

The scarce research that there is to date focuses on how crowdfunding facilitates users to become entrepreneurs (Brem et al., 2017). We use unique empirical data to shed light on the quality of investment decisions by users versus non-users, with a focus on overcoming informational asymmetries. To the best of our knowledge, we are the first to quantitatively integrate insights from the user innovation literature into crowdfunding research to attempt to explain how user crowdfunders overcome informational asymmetries differently. We find that users exert lower information search effort than non-users, which could indicate their use of proprietary local ‘sticky’ information obtained as venture user (Lüthje et al., 2005; von Hippel, 1994, 1998).

We investigate the absorptive capacity (Cohen & Levinthal, 1990) of users by measuring their financial literacy and (alternatively) investment experience. We find no significant difference between financial literacy of user and non-user crowdfunders which is in line with research showing that investors self-select into equity investment based on their financial literacy (van Rooij et al., 2011). However, users have less investment experience than non-

users, which suggests that users are a ‘new’ investor group which self-selects based on its absorptive capacity.

Another defining characteristic of crowdfunders are their diverse motivations to invest in comparison to traditional financial markets. Research suggests crowdfunders may be more keen on investing in sustainable/social enterprises than regular enterprises due to affinity with a venture’s socio-economic goals (Calic & Mosakowski, 2016; Hörisch, 2015; Lehner, 2013). However there has been little effort undertaken to understand how motivation for ‘impact’ versus financial return relates to crowdfunder investment decision making. We pioneer this literature by showing that funders with an impact motivation – both users and non-users - put in a significantly *lower* information search effort than funders who are motivated primarily by financial return. This confirms our expectations from the literature based on several arguments. First, we expect information about expected impact of a sustainable venture to be more difficult to obtain (Frenken & Schor, 2017), leading crowdfunders to ‘proxy’ for impact using the narrative provided by the venture itself (Downing, 2005). Second, impact-motivated funders have different ‘screens’ (Borgers & Pownall, 2014) and based on these could be more satisfied with the information provided on the crowdfunding website (video, description) which lowers their information search effort, as well. Third, the sustainable orientation of a venture may increase trust/lower fears of moral hazard, therefore lowering information search efforts (Hörisch, 2015). Finally, impact motivated funders may be primarily interested in the ‘warm glow’ effect of their investment rather than realisation of impact, which makes overcoming informational asymmetries – and information search - less important (Allison et al., 2013; Andreoni, 1990).

As an additional result, we find that female investors display lower financial literacy (Lusardi & Mitchell, 2008) and have less investment experience (Barber & Odean, 2001). Females are overrepresented among both user and impact-motivated crowdfunders in our study; in other words, more ‘new’ investors in this crowdfunding population are women.

Policy implications

Based on our findings, investment decision making by crowdfunders with different characteristics can be better understood to inform policy and regulation. Policy makers worry that new, less experienced investor groups entering into debt/equity investing may not

be capable of assessing the risks they are taking (AFM, 2014). Our results confirm their lower investment experience but at the same time paint a nuanced picture of their financial literacy. In general, users that choose to crowdfund do not appear less financially literate. Financially motivated user crowdfunders are even more financially literate than non-users. Both users and impact-motivated funders exert lower information effort, something we expect to be due to usage of local information but this mechanism we cannot observe directly. While more research is needed, the direction that this study guides policymakers towards is recognition and inclusion of diverse motivations of investing into consumer (investment) protection regulatory frameworks. While crowdfunders need to be monitored with regard to their ability to judge the quality of an enterprise, this monitoring should recognize both financial and societal impact goals of crowdfunders. Regulators could develop free online education for crowdfunders how to screen (high risk) crowdfunding investments, including how to tailor their screening to their investment goals.

Users and impact-motivated funders represent new sources of innovation finance, thereby helping overcome a funding gap. From a macro-perspective, increased finance for innovation can lead to economic growth (King & Levine, 1993). However, crowds need to be able to select high quality projects (Mollick & Nanda, 2015), both from a financial and societal impact perspective. The challenge for policy makers lies in further understanding the decision-making of new investor groups and facilitating these groups to enter the field wisely, and protecting them from excessive risk-taking.

In particular impact-motivated investors may need more guidance in their investment decision-making. They show a lower information search effort, lower financial literacy and lower investment experience. There appears to be a large inflow of impact-motivated female funders with this profile. One implication could be that this group has lower financial return expectations (they invest lower amounts). At the same time, this group of retail investors may need guidance on how to invest smartly based on their personal preferences, because enterprises that are not able to sustain themselves financially will have difficulty to reach their societal goals, as well. Guidance on how to invest for societal impact in crowdfunding is currently missing, leading crowdfunders to rely on crowdfunding website descriptions. Furthermore, just like financial default rates in debt/equity crowdfunding are still opaque, societal impact of sustainable/social enterprises often remains unevaluated. The

development of methods to fill this gap is one of our main policy recommendations, to allow for using personal (impact) preferences smartly as a basis for investment decisions.

Limitations and further research

Our study has several limitations. Firstly, while the use of only one case is helpful to keep campaign and venture characteristics constant, it limits the transferability of our results to other crowdfunding investments. Therefore further research should build data on a larger set of crowdfunding campaigns, which can be compared using project fixed effects. Second, we do not have data on users that choose not to crowdfund, meaning that we cannot say anything about how the user crowdfunders relate to user non-crowdfunders in terms of absorptive capacity (financial literacy / investment experience). Third, the campaign was carried out using convertible debt, a financial tool which is quite uncommon in crowdfunding up to date (but its use is growing in the Netherlands). Convertible debt is a form of equity but also allows investors to choose not to convert, which means it can also be a debt agreement in the end. We expect there to be differences in information search effort and absorptive capacity of crowdfunders between debt and equity due to differences in risk levels. Therefore further research should make sure equity, debt and convertible debt campaigns are studied to complement our understanding of investment decision making of (user) crowdfunders. Finally, we need to develop measures that allow us to better understand the mechanisms behind differences in information search effort, which we are not able to confirm with our current instruments.

8.6 Appendix

The screenshot displays a crowdfunding campaign page for Peerby. The main heading is "PEERBY - AANDEELHOUDER IN SPULLEN DELEN" with the subtitle "PEERBY LIMITED uit London, Verenigd Koninkrijk". A video player features Daan Weddepohl, the founder, with the text "Daan Weddepohl Oprichter Peerby". To the right, the campaign has raised €641.884, which is 214% of the goal. The goal amount is €1,500,000, and the amount already raised is €300,000. The campaign is a "VOORVERKOOP / CONVERTEERBARE LENING" (pre-sale / convertible loan) with 302 funders and 59 days remaining. A purple button at the bottom right says "FINANCIER DIT PROJECT".

PEERBY - AANDEELHOUDER IN SPULLEN DELEN
PEERBY LIMITED uit London, Verenigd Koninkrijk

€ 641.884
GEFUND VAN € 300.000
DOELBEDRAG
STREEFBEDRAG: € 1.500.000

214%

VOORVERKOOP /
CONVERTEERBARE
LENING

302 FUNDERS

59 DAGEN
RESTEREND

FINANCIER DIT PROJECT

Figure 8-2 Screenshot of Peerby's campaign website (during campaign)

Table 8-4 Pairwise correlations of main variables

	information search effort	Financial literacy	Impact motivation	User level	Ln. Invested amount	Income	Investment experience	Investment timing	Risk aversion	Gender	Age
information search effort	1										
Financial literacy	-0.0521	1									
Impact motivation	0.3526	-0.0612	1								
User level	-0.2266	0.2748	0.1435	1							
Ln. Invested amount	0.0006	-0.0501	0.0047	-0.0648	1						
Income	0.1524	0.1728	-0.1503	0.2079	0.2735	1					
Investment experience	0.0029	0.0022	0.0034	-0.0584	0.0000	0.3459	1				
Investment timing	-0.0535	0.2467	-0.1075	0.2856	0.1856	0.0000	-0.1880	1			
Risk aversion	0.3278	0.0000	0.0493	-0.2061	0.0003	0.0000	0.0002	0.0283	1		
Gender	0.0532	0.3861	-0.1414	0.0059	-0.0654	-0.1129	0.0002	-0.1127	-0.0092	1	
Age	0.3017	0.0000	0.0097	0.1046	0.2040	0.0387	0.8572	0.0200	0.6950	0.0001	1
	0.0370	-0.1235	0.8498	0.0395	0.0584	0.0002	-0.2782	0.2000	0.0603	0.0968	0.0569
	0.4672	0.0269	0.1468	0.1304	-0.0973	-0.2014	0.0000	-0.1080	0.2364	0.0334	0.0569
	-0.0323	-0.1283	0.0038	0.0101	0.0584	0.0002	-0.2782	0.0200	0.0603	0.0968	0.0569
	0.5254	0.0214	0.0038	0.0101	0.0584	0.0002	-0.2782	0.0200	0.0603	0.0968	0.0569
	-0.1401	-0.3713	0.2015	0.1290	-0.1602	-0.2643	0.0000	0.0000	0.0000	0.0000	0.0569
	0.0057	0.0000	0.0001	0.0110	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0569
	-0.1865	0.0511	0.1183	0.0200	0.2089	0.1757	0.1326	-0.1080	0.0603	0.0968	0.0569
	0.0002	0.3616	0.0199	0.6940	0.0000	0.0012	0.0097	0.0334	0.2364	0.0334	0.0569

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Table 8-5 User level: survey data

VARIABLES	Information search effort			Financial literacy		
	(1)	(2)	(3)	(1)	(2)	(3)
User_survey	-0.206*** (0.0715)	-0.180** (0.0732)	-0.107 (0.100)	-0.0700 (0.0762)	-0.0872 (0.0771)	-0.127 (0.121)
Impact motivation		-0.417*** (0.127)	-0.280 (0.181)		0.0912 (0.153)	0.0206 (0.227)
User_survey*impact motivation			-0.156 (0.148)			0.0664 (0.158)
Invested amount	0.378*** (0.106)	0.351*** (0.107)	0.346*** (0.107)	0.0400 (0.129)	0.0467 (0.133)	0.0536 (0.134)
Income	-0.223* (0.115)	-0.239** (0.116)	-0.233** (0.116)	0.186 (0.150)	0.167 (0.150)	0.162 (0.150)
Investment experience	0.0350 (0.0396)	0.0285 (0.0405)	0.0330 (0.0407)	0.160*** (0.0541)	0.171*** (0.0548)	0.169*** (0.0551)
Investment timing	0.000324 (0.000418)	0.000371 (0.000427)	0.000343 (0.000429)	-0.000570 (0.000470)	-0.000468 (0.000473)	-0.000452 (0.000475)
Risk aversion	0.0915 (0.258)	0.158 (0.265)	0.182 (0.266)	-0.448 (0.291)	-0.521* (0.295)	-0.531* (0.296)
Gender	-0.399 (0.321)	-0.287 (0.328)	-0.277 (0.329)	-1.281*** (0.326)	-1.261*** (0.330)	-1.265*** (0.330)
Age	-0.351*** (0.103)	-0.310*** (0.105)	-0.311*** (0.104)	0.0558 (0.115)	0.0608 (0.116)	0.0635 (0.117)
R-squared	0.0881	0.1130	0.1156	0.1610	0.1619	0.1623
Observations	330	329	329	273	272	272

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

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Table 8-6 User level: dummy variable

VARIABLES	Information search effort			Financial literacy		
	(1)	(2)	(3)	(1)	(2)	(3)
User dummy (pbuserdum)	-0.374 (0.249)	-0.351 (0.254)	-0.557 (0.347)	0.220 (0.301)	0.169 (0.303)	0.938** (0.456)
Impact motivation		-0.451*** (0.125)	-0.561*** (0.178)		0.0638 (0.151)	0.418* (0.218)
User dummy*impact motivation			0.444 (0.505)			-1.399** (0.608)
Invested amount	0.351*** (0.104)	0.327*** (0.106)	0.330*** (0.107)	0.0437 (0.129)	0.0412 (0.132)	0.0310 (0.133)
Income	-0.183 (0.114)	-0.203* (0.116)	-0.206* (0.116)	0.170 (0.151)	0.155 (0.151)	0.156 (0.153)
Investment experience	0.0409 (0.0394)	0.0324 (0.0405)	0.0308 (0.0406)	0.168*** (0.0541)	0.178*** (0.0548)	0.182*** (0.0550)
Investment timing	0.000286 (0.000414)	0.000344 (0.000425)	0.000397 (0.000430)	-0.000620 (0.000472)	-0.000520 (0.000475)	-0.000694 (0.000487)
Risk aversion	0.0795 (0.257)	0.166 (0.264)	0.152 (0.265)	-0.510* (0.294)	-0.569* (0.298)	-0.516* (0.302)
Gender	-0.342 (0.318)	-0.237 (0.327)	-0.274 (0.329)	-1.308*** (0.329)	-1.273*** (0.333)	-1.196*** (0.336)
Age	-0.365*** (0.103)	-0.321*** (0.105)	-0.328*** (0.106)	0.0407 (0.115)	0.0470 (0.116)	0.0593 (0.117)
R-squared	0.0732	0.1030	0.1048	0.1603	0.1597	0.1722
Observations	330	329	329	273	272	272

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

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Table 8-7 Alternative variable information search effort: investment sheet

Variables	Investment sheet		
	(1)	(2)	(3)
User level	0.0419 (0.0604)	0.0566 (0.0617)	-0.139 (0.0973)
Impact motivation		-0.315** (0.126)	-0.653*** (0.186)
User level*impact motivation			0.325** (0.127)
Invested amount	0.605*** (0.120)	0.585*** (0.120)	0.597*** (0.122)
Income	0.0299 (0.114)	0.0123 (0.116)	0.0154 (0.117)
Investment experience	0.0614 (0.0396)	0.0569 (0.0402)	0.0486 (0.0409)
Investment timing	0.000790* (0.000416)	0.000841** (0.000423)	0.00102** (0.000434)
Risk aversion	-0.251 (0.251)	-0.201 (0.256)	-0.297 (0.262)
Gender	0.263 (0.308)	0.358 (0.315)	0.292 (0.318)
Age	-0.451*** (0.105)	-0.413*** (0.106)	-0.433*** (0.108)
R-squared	0,109	0,1225	0,1372
Observations	330	329	329

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 8-8 Absorptive capacity: investment experience

VARIABLES	Investment experience		
	(1)	(2)	(3)
User level	-0.159*** (0.0476)	-0.146*** (0.0479)	-0.234*** (0.0760)
Impact motivation		-0.165 (0.101)	-0.315** (0.142)
Impact motivation*user level			0.146 (0.0977)
Ln invested amount	0.0849 (0.0819)	0.0768 (0.0823)	0.0717 (0.0823)
Income	0.360*** (0.0898)	0.358*** (0.0896)	0.358*** (0.0901)
Investment timing	-0.00104*** (0.000339)	-0.00108*** (0.000339)	-0.000991*** (0.000345)
Risk aversion	-0.137 (0.208)	-0.0940 (0.208)	-0.131 (0.210)
Gender	-1.108*** (0.250)	-1.112*** (0.252)	-1.132*** (0.253)
Age	0.137* (0.0804)	0.149* (0.0810)	0.147* (0.0810)
R-squared	0.0554	0.0577	0.0591
Observations	330	329	329

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

9 Conclusion

This dissertation set out to address the research question: *What factors enable enterprise access to finance for sustainable innovation?* To address this question, both conceptual and empirical work were undertaken. The Institutional Analysis and Development (IAD) framework developed by Ostrom (2010a) was used to map the institutional setting of finance for sustainable innovation. Building on the innovation finance literature, principal-agent theory and collective action theory, three important market failures facing sustainable innovation finance were identified (see also Figure 1-1 in the introduction). First, credit rationing occurs for innovation finance due to principal-agent problems (adverse selection, moral hazard and informational asymmetries), in particular in the case of innovation finance due to lack of track record and collateral (B. H. Hall, 2010). Second, a market failure occurs due to the public good nature of innovation leading to knowledge externalities: investment into knowledge is easily spread to other sectors/firms and its value is very uncertain due to high failure rates (Mazzucato, 2013). Third, environmental/social (‘positive’) externalities arise in the context of sustainable innovation. While this is indeed the objective of sustainable innovation, for financiers it raises the question whether they will capture enough financial value from the environmental/social value that is created. In the context of eco-innovation the simultaneous occurrence of these externality problems has been referred to as the *double externality problem* (Faber & Frenken, 2009; Rennings, 2000).

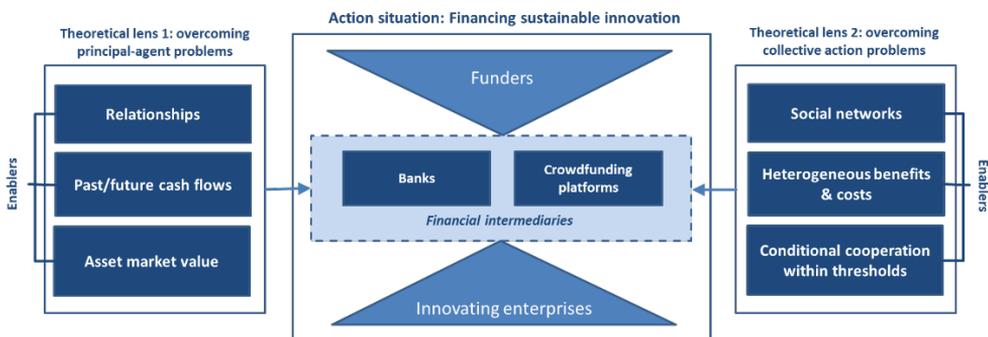


Figure 9-1 Three enablers of sustainable innovation finance per theoretical lens

In this dissertation, banks and crowdfunding platforms were studied because these financial intermediaries can realistically provide finance for sustainable innovation; they are the

largest and the fastest growing providers of entrepreneurial finance, respectively. In the course of this dissertation, for each of the two theoretical lenses (principal agent and collective action) three main enablers for sustainable innovation finance were identified (Figure 9-1). These enablers were derived conceptually (Ch 4&5) and studied empirically from different angles (Ch 5-8).

9.1 Lens 1: Overcoming principal-agent problems for sustainable innovation finance

To find ways to overcome principal-agent problems for sustainable innovation finance (lens 1), we grouped the screening mechanisms used by **banks** into cash flow-based, asset-based and relationship-based lending technologies (Ch 5). All three types of lending technologies – and combinations between them - provide opportunities for alleviating principal-agent problems to access innovation finance. Although financing based on *past* cash flows is difficult for innovative activities due to lack of track record, financing can sometimes be obtained through partnerships with players in the supply chain (Ch 5). Enabling access through partnerships can be particularly relevant for *sustainable* innovation finance, since cooperation in the supply chain is often required to shift towards a sustainable production process. Another situation in which *past* cash flows can be used as a basis for financing is when innovative activity is carried out within an established firm: banks show more willingness to finance innovative activities if such innovation is in line with existing business that is already generating cash flows. This enabler is not unique to sustainable innovation but enables innovation finance, in general. It shows that for existing firms, alignment of sustainable innovation activities with existing (profitable) business can enable access to external finance.

In the absence of past cash flows, proof of *future* cash flows can enable access to finance. Signed client contracts and pre-orders are important signals to overcome asymmetric information between an innovating firm and a financier. Finance based on future cash flows is particularly relevant for financing sustainable product-service innovation since incoming cash flows become periodic, requiring a larger upfront investment. This shift from a sales to a service business model is aimed for by many production firms to profit financially from the often increased lifespan of a sustainable/circular product (Linder & Williander, 2015;

Tukker, 2015). The upfront financing that this type of innovation requires can be enabled by showing proof of expected incoming client payments based on signed contracts as well as by demonstration of stick rates along with contract design (Ch 5).

When turning to asset-based lending, empirical evidence in this dissertation (Ch 5) confirms existing evidence that innovative assets often suffer from uncertain residual value due to context- and firm specificity, making banks hesitant to lend (Carpenter & Petersen, 2002a). However, the longer lifetime of sustainable or circular assets – either durable, modular or standardized – has improved the underlying collateral value in some sectors, such as real estate and office furniture. To benefit from sustainable asset characteristics in asset-based lending more broadly, proof of long-term market value, e.g. through secondary asset markets or high contract stick rates, is needed to provide attractive residual (collateral) values. Since these markets are lacking for most innovative asset types, buyback constructions with suppliers are an alternative way to ascertain residual value for asset-based lending, both for banks and crowdfunders.

This dissertation confirms relationships to be an important enabler in overcoming principal-agent problems to obtain finance for innovation (Boot, 2000; Brancati, 2015). In *sustainable* innovation, in particular, relationships emerge as being crucial to understand the larger context within which a loan is provided, to ascertain that the economic activity to be funded ‘serves society’ (Ch 3). Empirical evidence in this dissertation suggests that many bank loans for enterprises engaged in circular business model innovation were facilitated by relationship building between the enterprise and a bank, through exchange of soft information and increased trust in uncertain innovation contexts (Ch 5). Furthermore, the relevance of relationships extends beyond the firm-financier relationship: relationships between the firm and its suppliers and/or clients increase trust in future cash flows and thereby facilitating access to finance (Ch 5).

Pre-existing relationships seem to enable successful crowdfunding, as well. We find that ties between an entrepreneur and crowdfunders alter informational needs of funders, indicating different ways of overcoming asymmetric information (Ch 6). Crowdfunders with pre-existing ties to an entrepreneur attach more importance to information about the entrepreneur than crowdfunders without such ties. Furthermore, empirical evidence from a crowdfunding

campaign of a sharing platform suggests that users of such a platform are less likely than non-users to look for objective information about the venture before investing (Ch 8). The user innovation literature predicts the presence of ‘sticky’ local information with users, which we offer as a mechanism explaining the above result (von Hippel, 1994, 1998). Although both users and impact-motivated funders have less investment experience than financially motivated non-user crowdfunders – indicating that these are novel investor segments - we find no significantly lower financial literacy than for non-user crowdfunders (Ch 8). Financially motivated user crowdfunders show to be more financially literate than other funder categories. Our results suggest that engaging social networks can help overcome informational asymmetries in crowdfunding of sustainable innovation.

9.2 Lens 2: Overcoming collective action problems for sustainable innovation finance

Collective action theory was used to discover three enablers in the institutional setting of crowdfunding that can enhance collective action for sustainable enterprise (including innovation) finance: use of social networks; heterogeneous costs and benefits; and aggregation within thresholds (Ch 4). Building on this conceptual contribution, three empirical chapters (Ch 6,7,8) investigate crowdfunding decision making in the light of these enablers as well as in relation to overcoming informational asymmetries between firm and financier.

Pre-existing ties (social networks) between crowdfunders and entrepreneurs are widespread and relate to different informational needs of crowdfunders (Ch 6). Furthermore, in survey data, sustainable enterprise crowdfunders report to be more impact motivated *and* more financially motivated than crowdfunders in regular enterprises. While theory predicts a trade-off between intrinsic and extrinsic motivation (Bénabou & Tirole, 2003) and we do find such a trade-off between financial motivation and impact motivation for crowdfunders of regular enterprise, this does not seem to be the case for crowdfunders of sustainable enterprises. This finding suggests that expectations of crowdfunders in sustainable enterprises follow the narrative of sustainable entrepreneurship, that societal value creation and financial value creation go hand in hand (Shepherd & Patzelt, 2011). This ‘value-stacking’ approach could perhaps explain the success of crowdfunding for sustainable

(versus regular) projects as documented by some researchers (Calic & Mosakowski, 2016). This finding also confirms the relevance of heterogeneous benefits for crowdfunders in sustainable enterprises that we derived theoretically as an enabler of collective action in crowdfunding (Ch 4).

The interaction between being part of a social (user) network of a sustainable platform enterprise and financial decision making was subject of study in Ch 8. We investigate a campaign where the user community of a (sustainable) platform enterprise represents a large proportion of the participating crowdfunders. While being part of a social network facilitates collective action according to our conceptual work (Ch 4), we also address the fear of policy makers that non-professional investors – such as users – have more difficulty to overcome asymmetric information problems. User crowdfunders report to be a ‘new’ investor group with less investment experience than non-user crowdfunders. At the same time, in this particular campaign, user crowdfunders are on average not less financially literate than non-user crowdfunders. User funders who are primarily financial motivated are even more financially literate than all other funders groups that we studied. This result suggests self-selection of user crowdfunders based on their investment capabilities, which is in line with findings on self-selection into stock market participation (van Rooij et al., 2011).

9.3 Key contributions of this dissertation

Table 9-1 gives a schematic overview of each chapter’s contribution to this framework. Across chapters, this dissertation offers the following key contributions.

Applying a new theoretical lens: collective action in sustainable innovation finance

While suggested by academics (Cauwels & Sornette, 2012), the application of collective action theory to research in the context of the financial sector has been minimal. This dissertation offers a novel and relevant application of collective action theory to address the double externality problem embedded in sustainable innovation finance. Collective action as an additional theoretical lens offers a ‘way out’ of the sole focus on enabling private value capture in financial decision-making (Friedman, 2007; Lepak et al., 2007). A collective action perspective does not rely on altruism, but is instead aimed at obtaining higher collective value through cooperation. By applying collective action theory to analyse the

Table 9-1 Topics covered per thesis chapter per participant and theoretical lens

Topics covered per thesis chapter	Action arena			Enabler: collective action			Enabler: lending technologies			
	Funders	Banks	Crowdfunding platforms	Innovating enterprises	Social networks	Heterogeneous benefits & costs	Conditional cooperation in thresholds	Relationships	Past/future cash flows	Asset market value
Chapter 1: Introduction	x	x	x	x	x	x	x	x	x	x
Chapter 2: Innovating for impact investing: financial institutions and beyond	x	x	x	x				x		x
Chapter 3: 'Credit that serves' cannot do without relationships	x	x	x	x	x	x	x			
Chapter 4: Financing sustainable enterprises as a form of collective action	x		x	x	x	x	x			
Chapter 5: Financing business model innovation: bank lending for firms shifting towards a circular economy		x		x				x	x	x
Chapter 6: Wisdom of the crowd in funding: information heterogeneity and social networks of crowdfunders	x		x	x	x					
Chapter 7: Social impact or financial return: what motivates sustainable enterprise crowdfunders?	x		x	x		x				
Chapter 8: User crowdfunders: insiders or idealists?	x		x	x	x	x				x
Chapter 9: Conclusion	x	x	x	x	x	x	x	x	x	x

institutional setting of crowdfunding as well as connecting these mechanisms – social networks, heterogeneous benefits – to the more traditional question of overcoming information asymmetries, this dissertation builds on and extends current research on (sustainable) innovation finance.

This dissertation suggests that innovating firms and crowdfunding platforms need to understand how to organize collective action between potential financiers of sustainable innovation. By drawing on insights from collective action theory, individuals (and financiers) can be stimulated to invest in sustainable (collective) benefits by creating the right institutional settings (Vollan & Ostrom, 2010). Collective action can create benefits for financiers at multiple levels (Ostrom, 2010b): at a global level, sustainable innovations are likely to improve long-term profits of large investors whereas at a local level, collective action for sustainable innovation can be enabled by offering local/individualized benefits (e.g. impact motivation, product user and/ or community benefits) or by engaging social networks (Ch 6,7,8). Furthermore, the institutional setting in which funding is requested can enable conditional cooperation through transparency and thresholds (Ch 4; Cheng & Bernstein, 2014).

Combining theoretical lenses: relationships as a ‘double’ enabler of sustainable innovation finance

By applying two theoretical lenses, this dissertation shows that relationships between financiers and sustainable entrepreneurs can help overcome asymmetric information (lens 1) *and* facilitate cooperation for investment to create societal value (lens 2). Relationships between financiers and an innovating enterprise emerge as an important enabler of access to finance, which confirms earlier findings in relation to banks (Brancati, 2015) and crowdfunders (Agrawal et al., 2015). The first reason is quite well known: innovation finance suffers from asymmetric information and moral hazard problems more than regular finance due to lack of track record and intangibility of assets, which relationships between a firm and both banks (Ch 3,5) and crowdfunders (Ch 6, 8) can help overcome. An additional result that emerges from this dissertation is that the *type* of relationships between firm and banks versus firm and crowdfunders is different. Bank-based relationship lending requires a formal relationship with bank professionals, specifically for the purpose of lending. In

crowdfunding, pre-existing relationships between firm and financiers (friends, acquaintances, users, customers) are mobilized to attract funding, indicating that ‘new’ investment groups enter the financing market place.

While these new entrants can alleviate financing constraints through collective action mechanisms (Ch 4), this raises the question how such less-experienced investors overcome principal-agent problems. Empirical evidence in this dissertation – based on one large crowdfunding campaign - suggests that on average, crowdfunders recruited from a firm’s own user network are not less financially literate than other crowdfunders in the same campaign (Ch 9) and may therefore be just as well positioned to make ‘wise’ financial decisions (Mollick & Nanda, 2015).

This dissertation also shows that the importance of relationships for obtaining sustainable innovation finance extends beyond the firm – financier relationship. It shows that relationships between firms and its value chain partners – such as suppliers, clients and users - also facilitate successful financing, both in the context of banks and crowdfunding. Joint ventures and/or buyback agreements with suppliers and pre-order/equity crowdfunding from customers and users are shown to facilitate bank loans and debt crowdfunding (Ch 5,8). Relationships with more established value chain partners can overcome lack of track record for start-up enterprises. Buyback agreements with producers of a (sustainable) product facilitate asset-based lending since this guarantees a minimum (residual) asset value. Pre-order crowdfunding alleviates market risk for subsequent financiers, whereas equity crowdfunding by users alleviates the financing challenge even more directly. Value chain relationships as an enabler of finance is particularly relevant for *sustainable* innovation since collaboration in the supply chain is often needed to deliver a sustainable value proposition, and thus can serve both the purposes of value delivery and financing.

Relationships also help overcome the ‘double externality problem’ by creating willingness to cooperate for innovation and societal value creation, benefits which are difficult to appropriate as a private financier (Faber & Frenken, 2009; Rennings, 2000). By examining the institutional setting of crowdfunding and applying empirical evidence from collective action theory, we find that social networks can help organize collective action in financing sustainable entrepreneurial activity (Ch 4).

Finally, relationship-based lending naturally allows lenders to include contextual information into their lending decision (Ch 3). Since relationships produce ‘soft’ information about the borrower and its context, this can be used to judge whether a loan is sustainable or not. Transaction-based lending requires hard information to screen an enterprise on its sustainability, which is often more difficult to obtain. Therefore screening for sustainability of an enterprise - in the absence of sustainability metrics - is facilitated through relationship lending.

Relationship-based finance in times of technological development

The importance of relationship-based finance for sustainable innovation runs counter to the current development of algorithm-driven financial decision-making (Ch 3). It points at a perhaps necessary split between lending technologies for innovation versus mainstream enterprise finance. Current developments show an increase in transaction-based lending which could lower the willingness to invest in contextual relationship-based lending decision for (sustainable) innovation. Relationships create both the information needed and the willingness to invest in sustainable innovation, dealing with opaqueness and lack of collateral as well as moral hazard and cooperative behaviour. Between bank lending and crowdfunding we witness relationships coming ‘online’, which lowers transaction costs of obtaining funding through (social) networks. The current dissertation raises the expectation that due to opaqueness, context-dependence and the double externality problem of sustainable innovation and entrepreneurship, relationships will remain a crucial enabler of sustainable innovation finance. However, standardization of sustainability-related data (i.e. greenhouse emission and material waste metrics) will facilitate more efficient funding and inclusion into transaction-based financing decisions.

Financing sustainable product innovation: two opposing effects for asset-based lending

An important contribution of this dissertation stems from Chapter 5, which identifies innovation for increased sustainability (durability, modularity and/or flexibility) of an asset to affect access to finance in two opposing directions. Intuitively, if assets last longer and therefore have a higher, longer market value, they should be able to serve as collateral more easily. However, the innovativeness that is needed to develop sustainable products often *decreases* their ability to serve as collateral, since innovative assets suffer from asset- and

firm-specificity, absence of secondary markets and therefore low market value when a firm defaults (Carpenter & Petersen, 2002a). These are opposing effects which need to be taken into account when enterprises try to obtain finance based on their assets.

Evidence in some markets shows that *longevity* and *flexibility* of assets, which are popular characteristics of sustainable product innovations, can increase access to finance. In the real estate sector for example, sustainable characteristics of office buildings - such as high energy efficiency and flexible usage of space - translate into lower market risk (high chance of having tenants) for a bank. In the office furniture and printer market – markets where assets generally last long but are not so innovative - the existence of secondary markets provides proof of long-term (‘timeless’) market value of assets. When a firm shifts an existing product from a sales to a service model, finance based on assets is easier when such market value has been displayed, and also through buyback guarantees with the producer. In sum, asset-based lending is a promising route for sustainable innovation finance but requires entrepreneurs to ‘prove’ long-term market value, first. Building on existing products that have such ‘proven’ value is therefore a promising route.

Motivations for investing into sustainable enterprises: financial and/or impact motivation?

This dissertation provides empirical insight into motivations of crowdfunders to invest in sustainable enterprises (Ch 7, 8). First we show that crowdfunders of sustainable enterprises are motivated by financial return and impact, both more so than crowdfunders of regular enterprises (Ch 7). Second, we relate the motivations of crowdfunders to invest in a sustainable enterprise to their investment experience and financial literacy (Ch 8). When we ask crowdfunders of one sustainable enterprise (a platform venture) to identify whether their *main* motivation is financial or impact, we find on average that crowdfunders of sustainable enterprises who indicate that impact is their main motivation have less investment experience and a lower financial literacy than those crowdfunders who indicate that financial return is the most important one of the two motivations. Chapters 7 and 8 together contribute to our understanding of why crowdfunders invest in sustainable enterprises, and how their motivations relate to their ability (investment experience and financial literacy) to screen the enterprise, in other words to overcome asymmetric information.

9.4 Classifying academic contributions of this dissertation

Conceptually the use of principal-agent and collective action theory is replicated. Chapter 5 contributes to the principal-agent literature by regrouping lending technologies ((Berger & Udell, 2006) into cash flow, asset and relationship-based lending technologies. Existing theories in finance are extended by building on collective action theory for crowdfunding of sustainable enterprises (Ch 4) and by combining the user innovation literature with (user) crowdfunding research (Ch 8).

From a *methodological* perspective, existing survey and qualitative research methods are replicated, using regression models and case study techniques for data analysis. Extending rule classification analysis - part of the Institutional Analysis and Development Framework (Ostrom & Crawford, 2005) to crowdfunding research (Ch 4) is a methodological innovation. Also, this dissertation includes a novel, qualitative approach for understanding bank lending decisions for circular innovation based on both enterprise interviews and workshops/focus groups with banks (Ch 5).

Table 9-2 Classification of contributions

	Replication	Extension	Innovation
Conceptual	Use of principal-agent, social network and collective action theory (all chapters)	Re-grouping lending technologies into cash flow- asset-, and relationship-based lending technologies (Ch 5)	Application of collective action theory to crowdfunding (Ch 4); combination of user innovation and crowdfunding literature (Ch 8)
Methods	Use of survey and qualitative research methods (empirical chapters 5,6,7,8)	Extending rule classification analysis (part of IAD) to crowdfunding research (Ch 4)	Use of qualitative research methods for bank lending research, in particular focus groups (Ch 5)
Applications	Fine-grained insight into information use and motivations of crowdfunders (Ch 6,7,8)		

The main contribution of this dissertation from an *application* perspective is to the young and evolving field of crowdfunding research, in particular adding fine-grained insight into

information use and motivations of crowdfunders, including their interaction with social networks and usership (Ch 6,7,8).

9.5 Practical implications

This dissertation has practical implications for financiers, innovating enterprises and policy makers.

Practical implications for innovating enterprises

Firms need to develop sustainable/circular business models to make their sustainable innovations profitable (Bocken et al., 2014; Boons & Lüdeke-Freund, 2013). If value can be captured privately in the process of societal value creation (Lepak et al., 2007), enterprises and their financiers become more willing to innovate sustainably. This can be done by innovating within the current system or even by changing the rules of the game in a specific sector to make certain sustainable business models financially lucrative (Pacheco et al., 2010). The business model that best exemplifies this approach for enterprises is the shift from a sales to a product-service model, a central example of circular business model innovation where incentives for producers are brought in line with sustainability objectives (Tukker, 2015).

Another implication of this dissertation for firms is that they need to think about how they expect to attract finance already *during* their innovation process, not afterwards. Product and contract design can affect access to financing, as does the creditworthiness of targeted clients and cooperation in the value chain, for example with suppliers (Ch 5). Innovation choices should not only be made from a standpoint of profitability but also taking risk levels (a financiers perspective) into account. Furthermore, building relationships in the value chain, with customers, suppliers and financiers, seems to be a crucial enabler of access to finance in the context of sustainable innovation. Relationships in the value chain do not only facilitate the delivery of sustainability objectives but also enables the sharing of risks (and benefits) of sustainable innovation. We see examples of external finance being facilitated by banks (loans), customers (crowdfunding) and suppliers (buyback constructions and joint ventures) alike (Ch 5,8). When all parties involved have a motivation to shift to a more sustainable way of doing business, such relationships create trust and enable risk sharing.

Table 9-3 Examples of innovating enterprise characteristics and ways to obtain finance

Characteristic of enterprise	Ways to obtain finance
Existing enterprise carrying out sustainable innovation	Loan from existing bank relationship Cash flow based lending based on other (steady) business Internal finance as a back-up / collateral
Innovate in partnership with established supply chain player(s)	Joint venture with large supply chain partner increases opportunities for cash flow-based lending
Innovating from sales to service model with an existing sustainable asset	Asset-based lending based on market value of assets and/or buyback agreement with (external) producer
Early stage consumer-facing product and service innovation	Engage early adopters through reward crowdfunding campaign
Growth phase for consumer-facing sustainable products and services	Reward/debt/equity crowdfunding campaign, engaging both user/consumers and mainstream crowdfunders
Community / platform-based innovation	Debt/equity crowdfunding campaign, engaging both user/consumers and mainstream crowdfunders

To make our results practical for individual innovating enterprises, enablers for obtaining finance should be matched to characteristics of innovating enterprises. This dissertation contributes to practitioners by providing concrete conclusions for examples of different innovation/enterprise characteristics that were encountered. This can be developed into a full-fledged typology in the future (Table 9-3).

Practical implications for financiers

Increasing the ability of financiers to finance sustainable innovation requires the inclusion of sustainability criteria (contextual information) into financial decision-making (Ch 3). Such assessment criteria can be an effort at the level of individual financial institutions or a collective effort to develop such metrics in a standardized way. Also, financial institutions need to develop a ‘learning loop’ for impact (Ch 2): by evaluating which investments delivered on their impact goals, their financial allocation can be improved for maximum impact.

Financiers need to develop expertise to assess whether sustainable innovations are expected to meet their financial risk-return requirements. Banks and crowdfunding platforms (and probably other financiers as well) therefore need to develop expertise surrounding

sustainable/circular business models, to become better at screening such innovations on their financial merit. If, for example, sustainable innovations lead to more valuable underlying assets, a financier needs to be able to account for this in their decision-making. Similarly, if sustainable innovation entails setting up cooperation or joint ventures between value chain players (which is often the case), financiers need to be able to value such cooperation as a crucial ingredient for successful delivery of a sustainable product or service.

Financiers could also play a role in advising innovating entrepreneurs / firms how to set up their sustainable innovation so that it becomes more financeable. In the context of banks this could for example be realised by advising existing firms on how to successfully shift from a sales to a circular product-service model by optimizing contract and asset design (Ch 5). Determining the creditworthiness of enterprise clients is a crucial part of lending for product service innovation of firms. Banks could even develop standardized credit scoring models and offer these to entrepreneurs as part of their client acceptance procedures, which can facilitate the firms access to finance. More generally, relationship building with innovating entrepreneurs and piloting new financing constructions with them can help make larger scale finance available in a tailored way for sustainable innovation (Ch 5). Also, selling off loan portfolios in aggregate to more long-term investors such as pension funds could facilitate banks to take on risks for sustainable innovation.

Within the context of crowdfunding platforms this can also mean assistance in how to build and communicate with a network as a basis for a successful crowdfunding campaign (Ch 6,8). Furthermore, (sustainable) crowdfunding platforms can advise sustainable entrepreneurs on how to set up their crowdfunding campaign so that it answers to both the impact motivation and the financial motivation of potential funders (Ch 7).

Finally, financial intermediaries need to continue to innovate their instruments so that they become a cornerstone in helping develop impactful and profitable sustainable innovation. One promising route to do this is by sharing risks between financial, government and market players for example through buyback constructions, guarantees, user crowdfunding and joint ventures (Ch 5,8).

Practical implications for policy makers

In the context of sustainable innovation finance, policy makers need to deal with two main issues. On the one hand policy makers can assist in creating conditions that stimulate private finance for sustainable innovation. While a thorough analysis of the policy requirements for sustainable innovation finance lie beyond the scope of this dissertation, regulation and policy which strengthen sustainability requirements of sectors will boost the profitability of sustainable innovation and their underlying business models. Also, regulatory support can signal to financial markets that sustainable innovation is inevitable and make such investments relatively more attractive in relation to non-sustainable investments.

Furthermore, policy makers should recognize that sustainable innovation in many cases requires a different way of doing business and obtaining finance, with increased cooperation in value chains and a longer lifetime of assets and their components. Both market and financial regulation should be continuously updated to facilitate and regulate capital allocation for sustainable innovation.

From a regulatory perspective, the rise of new financial intermediaries such as crowdfunding platforms have led to concerns with respect to investor protection (AFM, 2014). While crowdfunding platforms provide a promising alternative source of finance for sustainable innovation by enabling new investors, to enter (Ch 4,7) the lack of investment experience of some of these crowdfunders – such as users/customers - leads to fears of unwise investment decisions (Ch 8). The challenge for policy makers and regulators is how to protect inexperienced crowdfunders from investing with unrealistic financial return expectations, while enabling risk sharing among crowdfunders of sustainable innovations that they may be particularly willing to support (in spite of recognized risks). This dissertation confirms lower investment experience levels for crowdfunders that enter into campaigns through the user network of an enterprise, but also shows that these user crowdfunders are not less financially literate than others crowdfunders in the same campaign. Also, this dissertation proposes that in the context of (inherently high risk) innovation finance, user/consumers may be able to access certain proprietary (local, ‘sticky’) information through their familiarity with the enterprise, that could add ‘wisdom’ to the decision-making process as a whole (Mollick & Nanda, 2015). The suggestion to policy makers and regulators is therefore to understand both the motivations and the expertise of crowdfunders into sustainable

innovation, and allow for a different regulatory framework for smaller amounts than for large investments to allow for fine-grained collective action for sustainable innovation but protecting them from large financial losses.

9.6 Limitations and future research

In spite of its relevance, this research inevitably has its limitations. A straightforward limitation is the empirical research context which is the Netherlands; results can be improved by obtaining cross-country evidence, in particular in the young but growing field of crowdfunding research where comparative studies are still in development. Data sources need to be extended to encompass more and diverse crowdfunders and campaigns. Also, survey methodology was employed in three of the empirical studies and has its limitations as noted in the individual chapters (selection bias, common method bias), and therefore should be further enhanced through triangulation with other data sources (Jick, 1979).

Furthermore, within the theoretical lenses that we use some constraints and enablers have been addressed more than others. Within principal-agent problems, the main focus of this dissertation has been on alleviating asymmetric information. More research is needed to shed light on adverse selection and moral hazard in combination with sustainable innovation finance, in particular. Within the collective action lens, the empirical chapters zoom in on social networks and heterogeneous benefits as enablers of sustainable innovation finance. Aggregation in thresholds as an enablers has been identified conceptually based on empirical research from many other contexts, but needs to still be addressed empirically.

Below, key routes to promising future research are highlighted.

Experimental evidence to identify enablers of collective action in the financial sector

The motivational findings and collective action enablers pinpointed in this dissertation need further grounding using randomized, controlled experimental evidence, to observe real decision-making as opposed to self-reported motivation. Similarly, the enablers of collective action in crowdfunding derived (in Ch 4) using collective action theory and evidence need empirical testing and refinement. Future research in this field should include experiments which are able to capture individual mechanisms involved in enabling collective action for sustainable finance. Furthermore, these experiments should be able to isolate conditional

cooperation from herding behaviour by controlling for the sustainability aspect of the enterprise. Field experiments at financial institutions can more generally help understand what types of interventions really lead to financial decisions that serve society and clients (Harms et al., 2018).

Applying collective action theory to facilitate sustainable investments in the financial sector

Collective action (enablers) can also play a role in organizing increased sustainable investments from larger financial players such as banks, pension/investment funds and universal owners. One specific train of thought argues for collective action by universal owners: since these financial players own such a large part of the world's assets, they have an incentive to invest in common pool and public goods in order to secure their own financial profit on the long term (Hawley & Williams, 2007). The general argument that collective action is easier to realize in small groups is influenced by several important factors such as complexity and cost of providing a type of good and heterogeneity of players (Oliver & Marwell, 1988; Olson, 2009). Similarly, at levels of pension funds and banks there may be situations that coordination among players can lead to collectively higher levels of investment into common goods than if each one acts alone. This idea is not new: many banks have signed up to the Equator principles which were designed to assure project investment in line with sustainable development (Scholtens & Dam, 2007) and some financial institutions engage with the Sustainable Development Goals. However, an analysis of how collective action theory can be systematically applied to facilitate such processes successfully is missing: future research and engagement can fill this gap to understand and facilitate collective action for sustainable investments for different types of financial intermediaries.

Further specification of enablers of finance for different types of sustainable innovation

This dissertation builds a framework for enablers of sustainable innovation finance, in general. Sustainable innovation does create some common characteristics, such as more durable or flexible asset bases, a need for value chain collaboration to deliver on the sustainability promise and the frequent wish to shift to a service model. However, the empirical research that was carried out also unveiled a diversity of enterprises carrying out

sustainable (or circular) innovation based on size, sector, activities and asset base. This leads to a diversity in funding needs (and solutions) which begs for a more fine-grained and structured specification of financing enablers in relation to specific types of sustainable innovation. For example, when zooming into sustainable innovation that uses *nature* to innovate for reaching sustainability goals ('nature-based solutions'), finance for an extensive green roof could be provided through crowdfunding by neighbours (for aesthetic, community and air quality benefits), whereas large scale sustainable innovations such as sustainable drainage systems will often depend on larger amounts of (public) finance. Creating a typology of sustainable innovation characteristics, business models employed and potential funding types is a potentially impactful research avenue to enable sustainable innovation (Bocken et al., 2014; Toxopeus & Polzin, 2017). Finally, for addressing principal-agent problems and collective action problems simultaneously, an in-depth analysis of public-private financing solutions can be a promising route, as well.

English summary

In the past decades, the importance of transitioning to a sustainable economy has become increasingly urgent. A crucial ingredient of such a transition is sustainable innovation by new or existing enterprises, which allows enterprises to carry out their activities profitably and in line with sustainability goals. By innovating, sustainable enterprises can realise both financial value and societal value (e.g. biodiversity enhancement, climate change prevention or cultural value) simultaneously (Shepherd & Patzelt, 2011).

While sustainable innovation by enterprises is important for a transition to a more sustainable economy, obtaining finance for such innovation is often a challenge due to three main causes. Firstly, innovative firms struggle to obtain finance due to principal-agent problems such as asymmetric information, moral hazard and adverse selection. In short, this means that financiers have less information than the entrepreneurs do about the quality and risks of the enterprise as well as about the effort put in by the entrepreneur, making them hesitant to provide capital. While this is an issue for external finance in general, this problem is aggravated in the context of innovative activities due to lack of track record and collateral as ways to reduce these principal-agent problems (Hall, 2010).

Furthermore, finance for sustainable innovation suffers from two different types of externalities, also referred to as the 'double externality problem' (Faber & Frenken, 2009; Rennings, 2000). Innovation in general produces knowledge-based externalities, because R&D expenditures often also benefit the competitors in a market (for example when an employee leaves or because innovations are imitated). Secondly, sustainable innovations aim to develop societal (social and/or ecological) value, and the investment made into such value creation does not always lead to value capture for the enterprise itself and its financiers.

The lack of willingness of financiers to finance these externalities can be viewed as a collective action problem (Ostrom, 2010; Pacheco, Dean, & Payne, 2010). While society benefits collectively from having a high level of investments into sustainable innovation, the – financial and societal - return at the level of the individual financier is highly insecure. The total return of the individual investment into sustainable innovation depends on the willingness of others to also finance sustainable innovation to enable the sustainability transition.

In light of the above, this dissertation addresses the question: *What factors enable enterprise access to finance for sustainable innovation?* This question is approached from two main theoretical perspectives: principal-agent theory (in particular asymmetric information) and collective action theory. This dissertation researches two financial players who play an important role in enterprise finance: **banks** (because of the large size of their enterprise finance portfolios) and **crowdfunding platforms** (because of the fast growth as enterprise financier, in particular for sustainable innovation). The analysis in this dissertation consists of conceptual work (Chapter 2-5) and empirical work (Chapter 6-9), positioned within an overriding analytical framework that is based on the Institutional Analysis and Development (IAD) framework (Ostrom, 2010).

In this dissertation we distinguish three main types of lending technologies, adapted from Berger & Udell (2006): cash-flow-based, asset-based and relationship-based lending technologies. These lending technologies indicate how asymmetric information between a bank and a sustainable, innovative enterprise can be mitigated in order to enable financing.

In both the theoretical and the empirical analysis we conclude that building relationships between an enterprise and a bank is a crucial enabler of innovation finance, in particular when expected cash flows and underlying assets are insecure or missing. Additionally, we conclude that relationship building between an innovating firm and her suppliers and/or clients enables financing by lowering the perceived risk of future cash flows.

While sustainable innovation is often geared towards developing physical assets that last longer (by improving durability and/or shifting to a modular product), the value of such assets as collateral in the financing process is often obstructed by the innovative nature of these underlying assets. We conclude that the role of asset-based finance appears most relevant in those sectors with relatively slow product innovation (real estate, office furniture) where long-term market value has already been proven (for example through the existence of secondary asset markets and rental contracts). Another way to enable asset-based finance for sustainable innovation is through buyback agreements with producers of sustainable physical assets.

While past and expected cash flows of innovative enterprises are often too insecure to serve as an enabler of financing, we find that - in the context of product-service business models

- signed contracts with clients can build trust with financiers about future cash flows, thus enabling successful financing.

By applying collective action theory (Ostrom, 2010) to the context of crowdfunding, this dissertation identifies three ways in which the institutional setting of crowdfunding can facilitate finance for sustainable innovation, namely through engagement of social networks, delivery of different types of benefits (such as financial return, societal impact, products or services and feeling part of a community) and by making investments conditional to reaching a certain target within a set timeframe. These three institutional settings ('rules') that are embedded in crowdfunding have shown to be successful facilitators of collective action in other contexts and seem to play an important role again, here.

An important question for sustainable innovation finance is not only that it is enabled, but also that financiers are able to overcome informational asymmetries in order to make a well-founded financing decision. Relationships between crowdfunders and entrepreneurs often facilitate successful crowdfunding, and they influence the importance of different types of information for crowdfunders. We also find that specifically the user/client communities of sustainable, innovative enterprises are being engaged as a source of finance. While this is a logical step from a collective action perspective, it raises the questions whether users are able to make a sound judgment of the risks of their investment. Based on a large crowdfunding campaign of a sustainable sharing platform this dissertation concludes that users have less investment experience but on average are not less financially literate. However, we find a difference between financially motivated users – who are highly financially literate – and impact-motivated users, who are less financially literate (but also rate financial return as less important than impact). While some wise self-selection based on expertise seems to take place among users in their financing decision, broader research covering more diverse campaigns is needed.

This dissertation also researches and compares the motivations of crowdfunders in regular and sustainable enterprises. In line with expectations, crowdfunders of sustainable enterprises report to be more motivated to create societal impact than crowdfunders of regular enterprises. It is more surprising that crowdfunders of sustainable also report to be more financially motivated than crowdfunders for regular enterprises and that – in contrast

to crowdfunders in regular enterprises and theoretical expectations – no trade-off is found between these two motivations. The fact that crowdfunders of sustainable enterprises are motivated both by societal and financial return (heterogeneous benefits) could explain the relatively high success of crowdfunding campaigns of sustainable enterprises that is confirmed by some studies.

By applying collective action theory in the context of sustainable innovation finance, this dissertation offers a new perspective (and solution) to enable such financing. The dynamics of collective action appear particularly relevant in the emergence of decentralized financial instruments like crowdfunding and Initial Coin Offerings (ICO's). It will be crucial to continue to combine the collective action perspective with the more traditional principal-agent perspective to stimulate finance for sustainable innovation while safeguarding financial expertise and risk carrying capacity among financiers.

Nederlandse samenvatting

Het belang van een transitie naar een duurzame economie is in de afgelopen decennia steeds groter geworden. Duurzame innovatie, waarmee bedrijven hun activiteiten kunnen aanpassen zodat ze in lijn zijn met duurzaamheidsdoelstellingen, is een cruciaal ingrediënt van een dergelijke transitie. Door te innoveren richten duurzame ondernemers zich op zowel financiële als maatschappelijke waarde creatie, zoals biodiversiteit, voorkomen van klimaatverandering en culturele waarde (Shepherd & Patzelt, 2011).

Het financieren van duurzame innovatie is echter een struikelblok voor veel bedrijven; dit heeft drie hoofdoorzaken. Ten eerste is het voor innovatieve bedrijven lastig om financiering op te halen vanwege principaal-agent problemen zoals asymmetrische informatie, *moral hazard* en adverse selectie. Kort samengevat wil dit zeggen dat financiers minder informatie hebben dan de ondernemer zelf als het gaat om de kans van slagen van de innovatie en de kwaliteit en inzet van de ondernemer, waardoor ze niet durven te financieren. Dit is altijd een probleem bij externe financiering maar wordt bij innovatieve activiteiten verergerd vanwege gebrek aan zekerheid met betrekking tot toekomstige inkomsten en gebrek aan onderpand. Daarnaast heeft (financiering van) duurzame innovatie last van twee verschillende externaliteiten, ook wel het 'dubbele externaliteiten probleem' genoemd (Faber & Frenken, 2009; Rennings, 2000). Ten eerste produceert innovatie in het algemeen kennis-gerelateerde externaliteiten, omdat R&D uitgaven van innovatie ook vaak concurrentie ten goede komt (bijvoorbeeld als een medewerker vertrekt of doordat innovaties worden nagemaakt). Ten tweede is duurzame innovatie erop gericht om maatschappelijke – sociale of ecologische - waarde te creëren, en is het voor ondernemingen vaak lastig om deze maatschappelijke investering terug te verdienen voor haar financiers. Het gebrek aan bereidheid van financiers om deze externaliteiten te financieren is een collectieve actie probleem: hoewel we als samenleving gezamenlijk beter worden van investeringen in duurzame innovatie, is het verwachte individuele rendement op het niveau van de individuele financier en per project, hoogst onzeker. Het totale rendement van de eigen investering in duurzame innovatie is afhankelijk van de investering van anderen om de duurzaamheidstransitie als geheel te financieren: een klassiek collectieve actie probleem (Ostrom, 2010a; Pacheco et al., 2010).

Dit proefschrift adresseert de vraag: *hoe kan financiering van duurzame innovatie van ondernemingen worden gefaciliteerd?* Deze vraag wordt onderzocht vanuit het principaal-agent probleem (met name asymmetrische informatie) aan de ene kant en het collectieve actie probleem aan de andere kant. Er wordt in dit proefschrift onderzoek gedaan naar twee financiële spelers die hierbij een belangrijke rol spelen: **banken** (vanwege de omvang van bedrijfsfinancieringen) en **crowdfunding platformen** (vanwege de snelle groei als bedrijfsfinancier, zeker voor duurzame innovatie). In de analyse is zowel conceptueel (hoofdstuk 2-4) als empirisch werk verricht (hoofdstuk 5-8) binnen een overkoepelend analytisch model gebaseerd op het Institutional Analysis and Development (IAD) raamwerk (Ostrom, 2010a).

Vanuit de principaal-agent theorie onderscheidt dit proefschrift drie leen-technologieën, aangepast vanuit Berger & Udell (2006): gebaseerd op kasstromen, fysieke activa (assets) en relaties. Deze leen-technologieën geven in grote lijnen aan hoe asymmetrische informatie tussen een bank en een duurzaam, innovatief bedrijf kan worden gemitigeerd om deze te financieren.

In de empirische analyse concluderen we dat de opbouw van relaties tussen onderneming en bank vaak een cruciale facilitator is van de financiering van innovatie, met name wanneer kasstromen en fysieke activa te onzeker zijn. Daarnaast blijkt dat ook relaties tussen een onderneming en haar leveranciers of klanten financiering vergemakkelijken door de zekerheid over de realisatie van toekomstige kasstromen te verhogen. Hoewel duurzame innovatie er vaak op gericht is om de fysieke activa van een onderneming langer mee te laten gaan (door betere kwaliteit en/of modulaire opbouw van activa) wordt de waarde van deze activa als onderpand in de financiering vaak tegengewerkt door het innovatieve karakter van de onderliggende producten. Vooral in sectoren met relatief langzame product innovatie (vastgoed, kantoormeubilair) lijken duurzame/circulaire fysieke activa een rol te spelen als onderpand vanwege bewezen hoge marktwaarde op de langere termijn. Ook door middel van terugkoopafspraken met leveranciers kan de verhoogde waarde van duurzame fysieke activa worden ingezet voor succesvolle financiering. Hoewel kasstromen in innovatieve ondernemingen vaak te onzeker zijn om als basis voor financiering te dienen, kunnen contractafspraken met klanten in product-dienst innovatie meer zekerheid geven over toekomstige kasstromen, op basis waarvan soms financiering kan worden verstrekt.

Vanuit de collectieve actie theorie (Ostrom, 2010a) identificeert dit proefschrift drie manieren waarop de institutionele setting van crowdfunding collectieve actie voor financiering van duurzame innovatie kan faciliteren. Crowdfunding faciliteert collectieve actie voor duurzame innovatie door middel van de inzet van sociale netwerken, het aanbieden van verschillende soorten baten (zoals financieel rendement, maatschappelijke impact, producten/diensten en gemeenschapsgevoel) en conditionele bijdrages totdat het streefbedrag is gehaald. Deze onderdelen van de institutionele setting ('regels') van crowdfunding hebben zich in andere contexten bewezen als succesvolle facilitators van collectieve actie en lijken hier opnieuw een belangrijke rol te spelen.

Relaties (tussen crowdfunders en ondernemer) worden ook in crowdfunding ingezet om financiering te verkrijgen, en beïnvloeden het belang dat crowdfunders hechten aan verschillende types informatie. Ook het klant/gebruikersnetwerk van duurzame ondernemingen wordt ingezet als bron van financiering. Hoewel dit vanuit een collectieve actie perspectief een logische stap is, is de vraag of gebruikers wel in staat zijn om de risico's van hun investering voldoende in te schatten (principaal-agent perspectief). Op basis van een grote crowdfunding campagne van een deelplatform concludeert dit proefschrift dat gebruikers wel minder investeringservaring hebben, maar niet minder financieel geletterd zijn. Sterker nog, financieel gemotiveerde gebruikers zijn zelfs meer financieel geletterd dan de andere crowdfunders. Er lijkt bij gebruikers die crowdfunden een verstandige zelfselectie plaats te vinden op basis van de eigen investeringscapaciteit, al is breder onderzoek nodig om deze bevindingen te staven.

Tot slot onderzoekt dit proefschrift de motivaties van crowdfunders in reguliere en duurzame ondernemingen. Zoals verwacht leidt dit tot de conclusie dat de motivatie om maatschappelijke impact te creëren voor crowdfunders in duurzame ondernemingen, hoger is dan die van crowdfunders in reguliere ondernemingen. Het is wellicht verrassender dat crowdfunders in duurzame ondernemingen ook meer financieel gemotiveerd zijn dan crowdfunders in reguliere ondernemingen, en dat er – in tegenstelling tot bij crowdfunders in reguliere ondernemingen – geen wisselwerking plaatsvindt tussen deze twee motivaties. Dit is een mogelijke uitleg voor het succes van crowdfunding campagnes van duurzame ondernemingen: de (crowd)financiers verwachten dubbele (heterogene) baten - een verwachte facilitator van collectieve actie.

Het toepassen van collectieve actie theorie op financiering van duurzame innovatie is een belangrijke bijdrage van dit proefschrift, die daarmee een nieuwe kijk aanreikt voor het zoeken naar oplossingen om financiering voor duurzame innovatie te coördineren zodat de risico's - en ook de baten – gedeeld kunnen worden. De dynamiek van collectieve actie lijkt vooral betekenisvol voor het inzetten van decentrale financieringsinstrumenten zoals crowdfunding en Initial Coin Offerings (ICO's). Er zal steeds naar een evenwicht gezocht moeten worden tussen het stimuleren van collectieve actie voor impactvolle duurzame innovatie en het waarborgen van voldoende investeringskennis bij onervaren financiers.

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About the author

Helen Toxopeus (1980) holds a Master degree in International Economics and Business from the University of Groningen (cum laude) and a propedeuse (first-year diploma) in Sociology. After completing her studies in 2006 she worked at ABN AMRO bank, first as an M&A and strategy analyst and later as innovation manager. At ABN AMRO she initiated a crowdfunding platform for sustainable enterprises. She left



the bank in 2011 and wrote two books based on interviews with grass root innovators in the financial system: “Een verkenning van ons geldsysteem” capturing the ideas in the network Economy Transformers and “Een @nder soort geld” based on interviews with the director of the NGO Social Trade Organization, Henk van Arkel, describing their ideas, projects and technology for local currencies.

Helen wrote her PHD between 2013 and 2018 as a researcher within the Impact Centre Erasmus at Erasmus University Rotterdam. In parallel she co-authored the management book “Route Circulair: een roadmap voor circulaire bedrijfsmodellen” which was longlisted for Management Book of the Year 2017 and has been translated to English.

Her PHD focuses on how to finance sustainable innovation through banks and crowdfunding. Currently she is a post-doctoral researcher at the Sustainable Finance Lab at the Utrecht School of Economics where she studies finance and business models for nature-based innovation in cities (as part of the European research project NATURVATION). She teaches in the courses Sustainable Entrepreneurship and Qualitative Research Methods.

Helen was born in Cairo (Egypt) and grew up in various countries. She obtained her International Baccalaureate at Vienna International School (Austria). She lives in Utrecht with her husband and two children.



Portfolio

Academic publications

Polzin, F., Toxopeus, H., & Stam, E. (2017). The wisdom of the crowd in funding: information heterogeneity and social networks of crowdfunders. *Small Business Economics*, 1–23.

Academic book chapters

Toxopeus, H., & Maas, K. (2018). Crowdfunding Sustainable Enterprises as a Form of Collective Action. In *Designing a Sustainable Financial System* (pp. 263–287). Palgrave Macmillan, Cham.

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Toxopeus, H. S., & Lensink, R. (2008). Remittances and Financial Inclusion in Development. In T. Addison & G. Mavrotas (Eds.), *Development Finance in the Global Economy: The Road Ahead* (pp. 236–263). London: Palgrave Macmillan UK.

Forthcoming

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Working papers

Harms, J., Cohn, A., Fehr, E., Maréchal, M. A., Maas, K., & Toxopeus, H. (2018). Better Bankers: an ethics intervention in the field. ICE working paper.

Toxopeus, H., Achterberg, E., & Polzin, F. Unlocking bank finance for circular business model innovation.

Toxopeus, H. & Polzin, F. User crowdfunders: insiders or idealists?

Professional publications

Ewen, D., Ossenblok, L., Braam, G., Karen Maas, & Toxopeus, H. (2017). Route Circulair: Een routekaart naar een circulair bedrijfsmodel. Van Gorcum.

van der Lijn, S., Toxopeus, H., Polzin, F., Kleverlaan, R., Abid, J., Maas, K., de Graaf, F.-J. (2016). Nationaal Crowdfunding Onderzoek 2016 - Onderzoek naar de motivaties, risico inschattingen en besluitvorming van crowdfunders in Nederland. Amsterdam: CrowdfundingHub.

Bezemer, D., Bovenberg, L., Canoy, M., & Toxopeus, H. (2015). Economie draait niet om geld: relaties als principe voor een nieuwe economie. Amsterdam: ForumC.

Rotmans, J., van der Linden, M., & Toxopeus, H. (2014). Hoe kunnen we de financiële sector laten kantelen? In Nederland kantelt. Boxtel: Aeneas.

Toxopeus, H., & van Arkel, H. (2014). Een @nder soort geld. Utrecht: Jan van Arkel.

Toxopeus, H., & Toxopeus, S. (2012). Een verkenning van ons geldsysteem: problemen en mogelijke oplossingen (2e druk). Den Haag: Stichting Maatschappij en Onderneming.

Academic conference presentations

2014 – Presentation at ERGO II (joint with prof. Marcel Poorthuis)

2015 – Presentation at Growing Sustainable Businesses Conference, Tilburg University (Centre of Sustainability and Centre for Entrepreneurship)

2015 – Presentation at the CSR research seminar, IESEG (Paris)

2015 – Presentation at ERGO III (joint with Peter Blom)

2015 – Presentation at workshop ‘Embracing the variety of sustainable business models’ Vrije Universiteit (Brussel)

2016 – Presentation and session chair at DRUID 2016 (Copenhagen)

2016 – Presentation and discussant at OIKOS sustainable finance PHD seminar (Reading)

*Best presentation award

Portfolio

2017 – Presentation and discussant at ARCS PHD seminar, RSM (Rotterdam)

2017 – Presentation and discussant at OIKOS sustainable finance PHD seminar (Zurich)

2017 – Presentation at IABS, International Association for Business and Society (Amsterdam)

2017 – Presentation and discussant at ‘Practising the Commons’, Biennial IASC Conference (Utrecht)

Academic education

1999 – Propedeuse Sociologie, Rijksuniversiteit Groningen

2006 – Master International Economic and Business, Rijksuniversiteit Groningen, Cum Laude

2014 – Coursera certificate ‘The Economics of Money and Banking’; online course by Perry Mehrling, Columbia University

2014 – Coursera certificate ‘Financial Markets’; online course by Robert Shiller, Yale University

2015 - Tinbergen Summerschool Experimental Economics (UvA)

Guest lectures and teaching

2016 – Lecture for impact bootcamp, Impact Centre Erasmus, Rotterdam

2017 – Lecture minor ‘Transition towards a new economy’ ICE / DRIFT, Rotterdam

2017 – Guest lecture course ‘sustainable finance’, Rijksuniversiteit Groningen

2017 – Lecture Hogeschool van Amsterdam, alumni event

2017 – Guest lecture Qualitative Research Methods, Utrecht School of Economics

2018 – Lecturer Sustainable Entrepreneurship, master course Utrecht School of Economics

Media (selection)

2013 – Participation in television programme ‘Buitenhof’, about ‘de (on)mogelijkheid van anders bankieren’, in conversation with prof. Dirk Bezemer and Rene Frijters (oprichter KNAB Bank), 13 november 2013.

- 2015 –Presentation at live event of ‘De Correspondent’ evening about banking with Joris Luyendijk at the Stadsschouwburg Amsterdam (with live streaming) to be viewed at: <https://decorrespondent.nl/2583/kijk-hier-onze-avond-over-banken-met-joris-luyendijk-terug/72822519-7b2d3c2d>
- 2015 – Opinion piece in Het Financieele Dagblad (19 dec 2015) ‘Is delen samen spelen of het nieuwe stelen?’ together with Marcel Canoy.
- 2016 - Essay ‘Crowdfunding voor de lokale economie: kansen en uitdagingen’ in Tijdschrift Economisch Onderwijs i.s.m. Friedemann Polzin and Ronald Kleverlaan
- 2016 –Essay ‘Finance for Good’ in Backbone Magazine, corporate magazine of Erasmus School of Economics i.s.m. Karen Maas and Kellie Liket
- 2018 –Online lecture at the Universiteit van Nederland “Hoe maakt een groendak ons minder individualistisch?” about collective action for financing sustainability. To be viewed at: <https://www.youtube.com/watch?v=Qh4oOJYG4lk>
- 2018 –Participation in radio programme ‘BNR Zakendoen’ on crowdfunding for sustainability. Link: <https://www.bnr.nl/player/archief/201808011103301800>. (1st August 11:30 – 12:00 AM)
- 2018 – Opinion piece in dagblad Trouw 29 September 2018 “Investeren in duurzaamheid is geen risico, maar biedt garantie. Accessed at: <https://www.trouw.nl/opinie/investeren-in-duurzaam-is-geen-risico-maar-biedt-garantie~aa8c717f/>

The ERIM PhD Series

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Dissertations in the last four years

Abbink, E.J., *Crew Management in Passenger Rail Transport*,
Promotors: Prof. L.G. Kroon & Prof. A.P.M. Wagelmans, EPS-2014-325-LIS,
<http://repub.eur.nl/pub/76927>

Acar, O.A., *Crowdsourcing for Innovation: Unpacking Motivational, Knowledge and Relational Mechanisms of Innovative Behavior in Crowdsourcing Platforms*,
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The importance of transitioning to a sustainable economy - one which safeguards ecological life-support systems and provides equity within and between generations - has become increasingly urgent. A crucial ingredient of such a transition is sustainable innovation by new or existing enterprises, to develop business activities that realise both societal and financial value. However, obtaining finance for sustainable innovation is often a challenge due to both principal-agent and (double) externality problems. While society benefits from investments into sustainable innovation, the – financial and societal - return for individual financiers is highly insecure.

This dissertation explores how to enable finance for sustainable innovation, with a focus on banks and crowdfunding platforms. It makes use of two theoretical lenses. First, it studies how to overcome principal-agent problems through different lending technologies. Second, and more novel, it takes a collective action perspective to address the double externality problem embodied in sustainable innovation finance. This research fills a gap because there exist empirically well-defined mechanisms for solving collective action problems that have not yet been applied to the finance domain. Furthermore, the dynamics of collective action appear particularly relevant in the emergence of technologically driven, decentralized financial instruments like crowdfunding.

This dissertation draws conclusions regarding the role of relationships, cash flows and assets as enablers of sustainable innovation finance, as well as regarding motivations of crowdfunders to undertake such investments. It highlights the challenge of enabling sustainable innovation finance while guarding the quality of the investment decisions in line with the motivation of the financier.

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Erasmus University Rotterdam (EUR)
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