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ON THE INFORMATIVE ROLE OF REWARD-BASED CROWDFUNDING

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PREFACE

This dissertation is submitted for the degree of Doctor of Philosophy at the Department of Engineering – University of Palermo. The research described here was conducted under the supervision of Professor Paolo Roma and Professor Giovanni Perrone of the University of Palermo (Italy), and the external advisory of Professor Christos Kolympiris of the Warwick Business School - University of Warwick (Coventry, UK).

Particularly, this thesis presents the results of four research papers I worked on during my three years of Ph.D. studies:

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CHAPTER 1

INTRODUCTION

In less than a decade, the way of financing innovation and entrepreneurial initiatives has been significantly shaped by the rise of the crowdfunding (CF) phenomenon. CF supports individuals, organizations, and firms undertaking an innovative project in soliciting funding from other individuals (i.e., the crowd) often in exchange for future rewards, equity or other forms of returns (Belleflamme et al., 2014). In the last years, the CF phenomenon has surged so prominently that the global CF market was valued at 13.9 billion US\$ in 2019 and it is expected to grow up to 41.8 billion US\$ by the end of 2026 (Statista, 2020a).

The rapid growth characterizing this phenomenon and its economic relevance have generated an overwhelming interest in the academia in the last decade. In particular, the literature has explained that, in addition to its financing function, a crowdfunding campaign (especially in the reward-based form, where funding is provided in exchange for non-monetary rewards) can work as a *signal informing about the market potential* of the new product that the project proponent intends to commercialize using the funds raised (Drover et al., 2017; Strausz, 2017; Roma et al., 2017, 2018; Viotto da Cruz, 2018; Stanko and Henard, 2017; Chemla and Tinn, 2019). This *informative function* of reward-based CF has been highlighted mostly in theoretical studies, whereas little empirical research evidence exists. Most of the empirical studies investigating the informative function of the performance in reward-based CF have been conducted in the context of the venture capital search (e.g., Drover et al., 2017; Roma et al., 2017). However, two issues are still unclear and deserve further investigation. First, given the certification of unobserved quality provided by a successful performance in reward-based CF, it is unclear how this certification effect compares to that exerted by a first infusion of funds from early-stage venture capitalists (VCs) in terms of attraction for follow up investments from professional investors, such as VCs. Thanks to its informative function, a positive performance in CF can indeed enhance the odds of the new ventures of being financed by professional investors after the CF campaign. However, it is largely recognized that professional investors, especially VCs, usually make only limited investments and often in firms where other VCs have invested previously (Franke et al., 2008; Guerini and Quas, 2016; Mäkelä and Maula, 2008; Powell et al., 2002; Ragozzino and Reuer, 2011; Zider, 1998). Therefore, it is important understand if new ventures who choose to rely on reward-based CF for financing their new product idea would be equally attractive in the eyes of subsequent VCs, as compared to similar new ventures funded initially by VCs. In other words, will VCs systematically prefer to invest in one of the two groups, for instance, in new ventures initially funded by VCs? If this is the case, how could crowdfunded ventures mitigate their disadvantage? Answering these questions would increase the awareness of new entrepreneurial ventures regarding the possible advantages/disadvantages deriving from the

choice of a specific financing channel (when this is not a mandatory choice), also providing useful information on the characteristics new ventures should display to reduce or cancel their disadvantage. The second unexplored issue concerns the role that reward-based CF, by virtue of its informative function, may play in effectively anticipating market demand of new product ideas. In this respect, there exists just one recent empirical work, which however has examined whether the performance in reward-based CF positively reflects the market performance without using archival data on the actual revenues obtained from the sale of the products financed through CF campaigns (Stanko and Henard, 2017). Providing evidence on the informative role of the CF performance with respect to the subsequent actual product market performance is of considerable importance for new ventures who engage in CF, as it helps them in estimating future product market demand and, ultimately, in their decision on whether to invest in the project after the campaign.

Recently, the reward-based CF has been emphasized as a useful tool to finance environmental sustainability-oriented (ESO) new ventures (Calic and Mosakowski, 2016; Lam and Law, 2016; Lehner, 2013; Vasileiadou et al., 2015). According to a stream of literature, CF should compensate the lack of funding from traditional channels, of which such ventures would suffer, or should complement this type of investments (Butticè et al., 2019; Calic and Mosakowski, 2016). However, no consensus about whether and how CF can effectively support ESO new ventures has been reached in literature so far. In particular, it is still unclear which role reward-based CF may play, in light of its informative function, in facilitating (or in hindering) the access of ESO new ventures to subsequent funding from professional investors after the campaign. Given the growing trend toward sustainable entrepreneurship and the increasing number of new ventures who pursue green products, shedding light on such issue is of considerable importance, because it may help ESO ventures to understand how investors (e.g., backers) perceive the feature of environmental sustainability, and how this will reflect on their chances of being financed by professional investors after the campaign.

In light of the above, the overall goal of this thesis is to investigate the role that the performance in reward-based CF may play, by virtue of its informative function, in the attainment of subsequent venture capital funding (especially, as compared to initial funding from VCs or in the context of ESO ventures) and in anticipating product market performance of new entrepreneurial ventures. In this respect, this thesis identifies and examines three relevant but still unanswered research questions, which are summarized as it follows:

RQ1: Are ventures initially funded through reward-based CF equally likely to raise later stage funds compared to ventures initially funded by Early-stage VCs? If so, why and under which conditions?

RQ2: Can the performance in reward-based CF anticipate the market performance of new products? Moreover, how would the relationship between the performance in reward-based CF and the market performance be moderated by the degree of product innovativeness?

RQ3: How may the feature of ESO influence new ventures' ability to secure funding in reward-based CF campaigns and how critical some attributes of products pursued within sustainability-oriented initiatives are to increase their odds of success in reward-based CF? Moreover, how would the performance in reward-based CF mediate the relationship between new ventures' ESO and their ability to receive subsequent venture capital funding from professional investors?

In order to address the first research question, a research framework and a set of hypotheses are developed. Specifically, by grounding on the comparative informational benefits that the two different sources of funding may generate in the eyes of subsequent professional investors, this thesis advances that new ventures initially funded through reward-based CF are less likely to receive subsequent funding from VCs, as compared to new ventures similar to them but initially funded by VCs. However, if crowdfunded new ventures are able to complement the certification of existence-of-a-market derived from a good performance in CF with other important attributes of new venture's quality, such as patents and/or strong entrepreneurial team, the certification gap between them and new ventures initially financed by VCs diminishes, and may even disappear completely. The choice of these two specific moderators is based on the evidence that per se they shape the funding decisions of VCs and certify new venture's features that reward-based CF does not (Audretsch et al., 2012; Conti et al., 2013a; Hsu, 2007; Hsu & Ziedonis, 2013; Kolympiris et al., 2018; Shane & Cable, 2002; Stuart et al., 1999). To test these hypotheses, it was employed an ad-hoc built dataset, encompassing 625 new hardware ventures, either crowdfunded (via Kickstarter platform) or initially funded by VCs. Hardware ventures were selected because they are the most suitable to the scope of the study. Indeed, since they are characterized by high capital requirements (Wakabayash, 2014) and CF money is largely insufficient to fully support their growth process, they need to seek subsequent external funding from VCs after the campaign. Finding confirm the comparatively lower certification effect of reward-based CF, suggesting that VCs tend to trust more their peers rather than the crowd. This is because, despite the informational benefit of reward-based CF with regard to the market prospect, (Strausz, 2017; Drover et al., 2017a; Roma et al., 2017; Viotto da Cruz, 2018), in the eyes of subsequent professional investors, this benefit is per se largely insufficient to compensate the "stamp of approval" provided by VCs who have previously funded the new venture. As a matter of fact, VCs share similar background, expertise, and more comprehensive investment criteria, which go beyond market demand estimation. However, when crowdfunded new ventures display other attributes

usually considered by VCs to evaluate technical and managerial capabilities of the new venture, such as intellectual property protection and a founding team with track record of success, the certification gap between crowdfunded new ventures and those initially funded by VCs lessens and can even be overcome.

As regards the second research question, a research framework and a set of hypotheses are developed by grounding the arguments on the similarities between CF performance and online word-of-mouth (eWOM), as well as on the contrasting effects typically associated with product innovativeness (from consumers' perspective) (Calantone et al., 2006; Chan and Parhankangas, 2017; Chemla and Tinn, 2019; Delmestri et al., 2005; Lee and Colarelli O'Connor, 2003; Liu, 2006; Roma et al., 2018; Stanko and Henard, 2017; Strausz, 2017; Szymanski et al., 2007). Specifically, this thesis advances that the performance of a product in the reward-based CF campaign is positively associated with its subsequent market performance. Given that product innovativeness affects consumers' purchase attitudes toward the new product, it may also shape the ability of CF performance to anticipate the market performance because investors in reward-based CF are typically consumers who are interested in the new product. In particular, this thesis advances that the relationship between reward-based CF performance and market performance is moderated by the degree of innovativeness of the product in an inverted U-shaped manner. To test the above hypotheses, archival data on both amount collected by the CF campaign (performance in CF) and the revenues from the product sales are employed. In particular, it was built a new dataset including 1,137 movie projects from Kickstarter (of which 152 released to theaters). The choice of focusing on such projects is based on the fact that movie industry is an industry where reward-based CF has become increasingly popular to fund movie development and commercialization. Moreover, such industry is typically characterized by large product quality uncertainty, high information asymmetry between firms and consumers, as well as very short product life cycles. Findings confirmed the hypotheses, suggesting that in line with theoretical predictions (Strausz, 2017; Roma et al., 2018; Chemla and Tinn, 2019) the reward-based CF performance is a significant predictor of the future market performance of new movies, to some extent paralleling the role of online word-of-mouth (eWOM) for this type of products (Liu, 2006; Stanko and Henard, 2017). In addition, findings suggest that such predictive power of the reward-based CF performance is stronger for moderately innovative products rather than for highly innovative products. This is because the degree of product innovativeness influences the extent to which contributors active in reward-based CF campaigns are representative of the consumers active when the new product is commercialized. Specifically, consistent with prior literature (Lee and Colarelli O'Connor, 2003; Delmestri et al., 2005; Chan and Parhankangas, 2017) when products are too much innovative, CF campaign will be more likely to attract only a niche of consumers (e.g., hardcore fans) not reflecting

the preferences of consumers active in the future market. This is because too highly innovative products may be too ‘far ahead of their time’ to be understood by general consumers (Delmestri et al., 2005). In this case, the movie may perform well in CF as contributors are a very distinctive market niche, while not succeeding at the box office.

Finally, as regards to the third research question, two different studies are conducted. First, in order to investigate how the feature of ESO influences new ventures’ ability to secure funding in reward-based CF campaigns and the subsequent attainment of venture capital funding, this thesis conceptualizes a research framework and develops a number of hypotheses by relying on the economic theory of the rational choice and on the purchasing decisions of technological products applied in the context of reward-based CF. Specifically, this thesis advances that, as compared with their non-environmentally oriented counterparts, ESO new ventures are less likely of being funded in reward-based CF. Moreover, this thesis argues that for new ventures using reward-based CF, the feature of ESO has a direct positive effect on the likelihood of securing subsequent venture capital funding after CF, whereas has a negative indirect effect mediated by the CF performance on the same likelihood. To test these hypotheses, a new ad-hoc built dataset consisting of data of 508 new hardware ventures from Kickstarter platform was employed. Since the focus of this study is determining how the performance in reward-based CF mediates the relationship between ESO and the attainment of subsequent venture capital funding, hardware ventures are selected (as in the previous study) to guarantee that ventures in the sample necessitate venture capital funding after the CF campaign to scale-up. Results of this study confirmed the hypotheses. First, in line with the theory of rational choice and the financing of public goods, the feature of ESO negatively affects the performance in CF of new ventures. This is particularly true for tangible technology products because, in this case, backers behave essentially like early adopters interested in acquiring the ownership of a good that satisfies a concrete individual need, rather than seeking environmental sustainability attributes. Second, for new hardware ventures using reward-based CF, the feature of ESO has double effect on the likelihood of securing subsequent venture capital funding after CF. It has a direct positive effect, in line with the recent growing interest of VCs in green innovations (Mrkajic et al., 2019; Petkova et al., 2014). However, given that the presence of ESO results in negative performance in CF and, by virtue of its informative function, a negative performance in CF acts as a negative signal for subsequent potential investors, ESO has also a negative indirect effect mediated by the CF performance. The second study has investigated how specific attributes of products/services featured in the CF campaigns could influence the success of such sustainability-oriented initiatives in CF. To address such issue, an in-depth qualitative content analysis on 235 sustainability-oriented food CF campaigns was conducted. The choice of focusing on food CF campaigns lies on the fact that food

industry is probably the area where environmental issues (e.g., those related to the production of safer food without pesticide residues or carbon- neutral food contributing to mitigating climate change) apply more than to any other human activities (Aiking and De Boer, 2004; Notarnicola et al., 2017). Food provision is indeed the human activity with the single largest environmental impact (Notarnicola et al., 2017). Findings of this analysis suggested that some attributes of products/services pursued within sustainability-oriented campaigns actually affect the CF success of these campaigns. In particular, consistent with the literature on consumer purchase decisions of sustainable products (Combris et al., 2009; Hobbs et al., 2006), results suggested that sustainability-oriented initiatives may be more successful in CF when they emphasizing egoistic/self-centered product attributes (which are likely to provide individual benefits) more than altruistic/society-centered attributes. However, the emphasis on altruistic attributes emerges to be more beneficial for locally oriented initiatives. The rest of the thesis unfolds as follows. Chapter 2 gives an overview of the crowdfunding phenomenon and reviews the previous research literature on the topic. Moreover, it defines the CF research questions that this thesis aims to examine and the methodology applied. Chapter 3 is based on the research article by Vasi et al. (2020) and it addresses RQ1. Chapter 4 is based on the research article by Roma et al (2020a) and it addresses RQ2. Chapter 5 addresses RQ3 and is based on the research articles by Roma et al (2020b) and Testa et al. (2020). Chapter 6 begins with the summary and conclusions of the research; then it presents the main theoretical contributions and implications of the thesis, and concludes with its limitation and the directions for future researches.

CHAPTER 2

**THE CROWDFUNDING PHENOMENON:
LITERATURE REVIEW, RESEARCH
OBJECTIVES AND METHODOLOGIES OF THE
THESIS.**

2.1 The Crowdfunding phenomenon

Crowdfunding (CF) is a new method for financing new ventures and projects, which allows to raise money over the internet through a number of dedicated platforms (Belleflamme et al., 2014). Basically, in CF a small number of big professional investors are usually substituted by a very large number of individuals, mostly geographically dispersed ordinary citizens, each supplying relatively small amounts of capital, in some cases in exchange for future rewards or equity (Mollick, 2014). The use of crowdfunding has grown quite a lot in the last decade and a wide range of projects have been fund: from entrepreneurial initiatives to artistic and creative projects, research projects, medical expenses and sustainability-oriented projects. Moreover, CF has shown to be particularly effective as alternative early-stage financing method for new entrepreneurial ventures, which usually suffer from the dearth of funds from traditional professional investors (Agrawal et al., 2014; Vulkan et al., 2016). According to Cholakova and Clarysse (2015), CF can be broadly divided into four main models: reward, equity, donation, and lending-based CF. In Reward-based CF the individual contributes money with the expectation that he/she will receive a tangible (but non-financial) reward, e.g., a product or service. Since individuals do not seek financial returns for their contributions, rather contribute to campaigns in exchange for pre-ordering products, reward-based CF can be viewed as a channel for early access to products and a form of pre-sale (Lin et al., 2019; Roma et al., 2018). Reward-based crowdfunding has been used for financing a wide range of projects, including movies, software, new technology products, scientific research, and civic projects. The most popular reward-based CF platforms is Kickstarter (see next section), followed by Crowdfunder, Indiegogo, Fundable and Patreon (Schmidt, 2020a). All platforms work more or less the same way. When a project creator launches a CF campaigns on the platform, he (she) has to provide detailed description (text and video) of the project idea for which he (she) is seeking funds, decide the fundraising goal, the deadline of the campaign, and the reward scheme (all the rewards provided to investors for each level of amount pledged). In general, campaigns last from 1 to 60 days. If the project is successfully funded, the platform will collected a fee from the total amount pledged. The main difference between reward-based CF platforms lies in their CF models: All-or-Nothing or Keep-it-all. With the Keep-it-all model, the project creators set a fundraising goal and keep the entire amount pledged even if they do not meet their goal within the campaign deadline; conversely, with the “All-or-Nothing” model project creators can keep money only if the fundraising goal is achieved, and they keep nothing otherwise. With regard to the Equity-based CF, the individual makes a small investment in a project in order to have a stock in the project. This form of financing, also referred to as crowd-investing, enables small investors to fund private early-stage companies and small businesses, in exchange for equity, thus complementing or substituting the financing from private equity firms for such companies. Because

of the Equity-based CF involves the sale of equity securities, it is often subject to some financial regulations. US Equity-based CF platforms emerged after the the JOBS Act in 2016, and the most popular ones are WeFunder, StartEngine, SeedInvest and Republic. With regard to European Equity-based CF platforms, the most popular are Seedrs, Crowdcube, FundedbyMe, Companisto and Invesdor (Schmidt, 2020b). In the Lending-based CF, the individual lends a small amount of money to other individuals or companies, with the expectation of being paid back with interests. Lenders and borrowers are directly connected through the online platform, with no need of intermediary such as traditional bank. The credit risk and interest rate of the borrowers' loan are assigned by the platform system, which also take a percentage of the loan and a loan servicing fee. Finally, in the Donation-based CF, the individual donates money to a specific project with no expectation of financial or material returns, but just for altruistic reasons. The donation is made indeed to help charitable causes, varying from social, environmental, to healthcare causes.

Crowdfunding statistics showed a market in rapid growth in all regions of the world. In particular, global CF market was valued at 13.9 billion US\$ in 2019 (compared to 10.2 billion US\$ the previous year) and was forecast to triple by the end of 2026. (Bloomberg, 2019; Statista, 2020). The largest crowdfunding markets in 2019 were North America and Asia (Statista, 2020).

2.2 Kickstarter.

Kickstarter is the most popular American reward-based CF platform. It was launched in April 2009 by Perry Chen, Yancey Strickler, and Charles Adler, with the explicit mission of "helping bring creative projects to life" (Kickstarter, 2020a). The platform is currently open for project creators from a small selection of countries, including US, UK, Canada, Australia, Mexico and some European countries, but project backing is available internationally (Statista, 2019).

As of October 2020, the total amount pledged on Kickstarter was more than \$5.4 billion with a number of backers just over 18.8 million. Since its inception, Kickstarter platform has hosted more than 504,000 projects, with a success rate of 37.9% (success rate is calculated as the number of projects that reached their set goal over the total number of projects launched on the platform) (Kickstarter Stats, 2020). Such projects are classified in 8 categories and 15 subcategories. Main categories are: Arts, Comics and illustrations, Design and technology, Movie, Food and creations, Games, Music, Publishing. Of these categories, the most popular were Games and Design & Technology, which accounted for over half the money raised. Music and Cinema & Video were instead the categories with the highest number of successful projects (Kickstarter Stats, 2020).

Kickstarter platform adopt an All-or-Nothing CF model, meaning that, project creators collect funds only if the fundraising goal is met within the deadline. If the campaign is successful, Kickstarter applies a 5% fee on the total amount of the funds raised, and an additional 3–5% fee during the

payments process (Kickstarter, 2020b). People who back Kickstarter projects contribute to the projects in exchange of tangible rewards, including for instance custom editions and early releases of the projects as well as special experiences (Statista, 2019). However, Kickstarter do not guarantee that people who post projects on Kickstarter will deliver on their projects and rewards will provided to contributors. At any rate, according to Mollick (2015) only for 9% of the projects, rewards are not delivered whereas most of the contributors agree on the fact that reward is delivered on time.

2.3 Literature review on Crowdfunding

Because of the economic relevance and rapid growth of the CF phenomenon, academic literature on CF has flourished in the last decade. By analyzing the most influential theoretical and empirical studies on CF through a systematic literature review (Tranfield et al., 2003), it was possible to identify the main topics that scholars have addressed in this context¹. The papers selection process started with the identification of the contributes through the submission of a number of queries to the Google Scholar database by means of the software Publish or Perish version 6 (queries submitted on September 2018). Key words used for queries encompassed the terms “crowdfunding”, “peer to peer lending”, “microfinance” and “early-stage financing” among others. After removing duplicates, returned records were screened using data contained in the title, abstracts and conclusions to ensure that only conceptually valid and appropriate papers, published in English after 2007, with a >10 citations per year were included in the review. Afterthat, through a full-text review, papers were catalogued and themed based on their focus, theoretical framework and key findings. As a result of this process, three main streams of literature were identified. A first stream of literature concerns factors influencing engagement in CF, motivations and behaviour of backers and projects creators/entrepreneurs, respectively. A second stream of literature has focused on the determinants of the success of the CF campaign, including campaign design and choice of funding mechanism, among others. Finally, a third stream of literature has concerned the outcomes/consequences of the CF campaign, such as the relationships and impacts on the financial system, among others.

With regard to the motivations and behavior of both backers and project creators, many studied have been conducted especially in the context of reward-based CF and equity-based CF. Despite the general belief that backers in reward-based CF fund projects also for altruistic or normative reasons (e.g., Lehner, 2013, Belleflamme et al., 2014), according to Cholakova and Clarysse (2014) such motivations seem to play little role. A product centric motivation has shown to be the key driver of the funding decision: backers decide to contribute in order “to make the product happen” (Zvilichovsky et al., 2018) and/or because they are interested in the products or services offered as

¹ Note that, studies on the donation-based model are not considered in this review.

reward (e.g., Agrawal et al., 2014; Chan and Parhankangas, 2017). More egoistical motivations such as personal image, recognition, and anticipation of a reward have been shown to play a key role also in the context of Equity-based CF (Bretschneider and Leimeister, 2017). Both in the equity-based CF and lending-based CF contexts, the presence of backers' herding behavior was found (Bretschneider and Leimeister, 2017; Herzenstein et al., 2011; Jiang et al., 2018; Lee and Lee, 2012; Liu et al., 2015; Mohammadi and Shafi, 2018; Vulkan et al., 2016; Yum et al. 2012; Zhang and Liu 2012). In particular, in lending-based CF, herding behavior is more frequent when less information about credit worthiness are available, while it diminishes with more information disclosure and stricter operating standards (Jiang et al., 2018; Yum et al. 2012).

Many researchers have investigated also issues concerning entrepreneurs/project creators' motivations to engage in CF campaigns. In reward-based CF, most of the studies agreed on the fact that, besides being motivated by financial purpose, entrepreneurs/projects creators decide to run a CF campaign because of the informative benefits they can gain during and after the campaign (Belleflamme et al., 2013; Cumming et al., 2016; Gamble et al., 2017; Nucciarelli et al. 2017; Mollick and Nanda, 2016; Viotto da Cruz, 2018). As a matter of fact, since backers in reward-based CF behave as consumers, which contribute to projects because of the reward promised (usually, the new product/service), reward-based CF performance provides a reliable information about the market prospects of the new product, thus serving as market test (Roma et al., 2017; Viotto da Cruz, 2018). However, for a specific group of project creators, i.e., the serial entrepreneurs, financial purpose remain the main driver of the decision to engage (Stanko and Henard, 2017). When it comes to Equity-based CF, obtaining financial capital and other benefits such as company valuation are shown to play an important role (Brown et al., 2018). In addition, a number of factors seems to influence the decision to engage in this context. For instance, entrepreneurs are more likely to pursue CF campaigns in CF market characterized by high level of maturity and when equity-based CF legislation is strong (Kshetri, 2018; Hornuf and Schwenbacher 2017; Vismara, 2016), as well as when they are able to retain majority ownership and control (Belleflamme et al., 2014). Moreover, evidence suggests that firms who are less profitable, more indebted, and with less intangible assets are more prone to pursue CF campaigns (Walthoff-Borm et al., 2018).

The second main stream of CF literature concerns the factors influencing the CF campaign success. This topic has been widely investigated across the different CF models (lending, equity and reward). A number of factors related to the entrepreneur/borrower and their team, the CF campaign design, and the project pursued within the CF campaign among others, do appear to play an important signalling role in the CF context. As regards the entrepreneur/borrower characteristics, race, appearance and gender seem to influence the likelihood of CF success (Duarte et al., 2012; Greenberg

and Mollick, 2017; Johnson et al., 2018; Pope and Syndor, 2011). For instance, both in reward-based CF and in lending-based CF, women are more likely to succeed mostly in industries where they are under-represented; whereas non-white males are less likely to obtain funding in CF even when their projects are qualitatively similar to those of white males (Greenberg and Mollick, 2017; Johnson et al., 2018; Pope and Syndor, 2011; Younkin and Kuppuswamy, 2017). Moreover, projects pursued by entrepreneurs with higher education level and entrepreneurial experience as well as a larger network of social ties usually result in better outcomes in CF (Bi et al., 2017; Butticè et al., 2017; Colombo et al., 2015; Courtney et al., 2016; Giudici et al., 2018; Kang et al., 2017; Kromidha and Robson, 2016; Mollick, 2014; Mollick and Robb, 2016; Piva and Rossi-Lamastra, 2018; Polzin et al., 2018; Roma et al., 2017; Skirnevskiy et al., 2017; Vismara, 2016; Zheng et al., 2014;). The human and social capital, especially in the form of entrepreneur's track record and third-party endorsements, can indeed mitigate backer concerns about project quality and founder credibility (Courtney et al., 2016), thus resulting in higher funding and lower interest rate (Lin et al., 2013). With regard to the factors related to the campaign design, extant studies has underscored a number of factors influencing CF performance, such as the choice of the reward levels, campaign duration, funding goal, the communication strategy as well as the narrative framing and linguistic style/approach (Allison., 2014; Anglin et al., 2018; Barbi and Bigelli, 2017; Bi et al., 2017; Block et al., 2018; Chen et al., 2017; Dorfleitner et al., 2016; Fisher et al., 2017; Hornuf and Schwienbacher, 2018; Iyer et al., 2016; Kuppuswamy and Bayus, 2017; Li et al., 2017; Lukkarinen et al., 2016; Manning and Bejarano, 2017; Michels, 2012; Mollick, 2014; Moss et al, 2015, 2018; Tu et al., 2018; Yuan et al., 2016; Zhou et al., 2018). Concerning factors related to the project, studies have highlighted the positive effect of the project creativity and its degree of innovativeness on the reward-based CF performance (Mollick, 2014; Chan and Parhankangas, 2017; Davis et al., 2017). However, according to Chan and Parhankangas (2017), radical innovativeness products are not appreciated by backers, resulting in less favourable funding outcomes. Besides innovativeness, as a response to the increasing trends towards sustainable entrepreneurship, many studies have also investigated whether exhibiting the feature of sustainability orientation positively influences the CF success (Calic and Mosakowski, 2016; Lagazio and Querci, 2018; Lehner, 2013; Hörisch, 2015). However, results of existing studies are controversial and no consensus has been reached at all. Finally, in the context of equity-based CF, other important factors have been shown to affect CF campaign success; they include geographical distance between entrepreneurs and backers, the share of investment accumulated in week one, the largest amount pledged by single backer and number of backers, the share of equity retained by the entrepreneurs and the presence of a detailed risk analysis (Agrawal et al., 2014; Ahlers et al., 2015; Burtch et al., 2014; Guenther et al., 2018; Josefy et al., 2016; Lin and Viswanathan, 2016; Vismara,

2016; Vulkan et al., 2016). Finally, some factors related to the crowdfunding platform, e.g., platform design factors, are shown to influence the likelihood of success of CF campaigns (Loher; 2017; Wessel et al., 2017; Xu and Chau, 2018).

The third main stream of CF literature concerns the implications and outcome of the CF campaign. For instance, Di Pietro et al. (2018) have shown that new ventures may increase their likelihood of survival after the CF campaign, by exploiting the different input provided during the CF campaign (e.g., backers comment and suggestion, backers network ties, etc) while Bitterl and Schreier (2018) have found that significant post-funding relationship exists between backers and ventures. Another stream of recent studies have found that a positive performance in CF (both reward-based and equity-based) increases the likelihood of follow on funding from professional investors such as venture capitalists and business angels (Roma et al., 2017; Drover et al., 2017; Signori and Vismara, 2018). These studies explain that subsequent professional investors are reassured to invest in such a venture because the successful performance in CF mitigates their uncertainty about the market potential of the new product idea the new venture intends to commercialize. However, despite a positive performance in CF has been shown to effectively certify new ventures in the eyes of subsequent professional investors (Drover et al., 2017), no study has investigated the certification role of CF related to other traditional sources of new ventures' funding. Finally, the ability of CF performance to anticipate the market performance of the product after the campaign has been underscored in several theoretical studies (Drover et al., 2017; Strausz, 2017), but little empirical research evidence exists (Stanko and Henard, 2017; Viotto da Cruz, 2018).

2.4 Defining unexplored crowdfunding issues and research objectives of the thesis

Drawing inspiration from some gaps found in the existing literature, this thesis identifies three unexplored issues which are worthy of being investigated. Specifically, based on gaps found in the third stream of literature mentioned above and related to the economic and financial outcomes of the CF campaign, the first unexplored issue concerns the comparison between the certification role exerted by reward-based CF (by means of its informative function on the market prospect), and more traditional funding sources (e.g., funding from venture capitalists), while the second issue concerns providing empirical evidence regarding the ability of the CF performance to effectively anticipate the future market performance of the product pursued within the CF campaign. Finally, based on the gap emerged from the second stream of literature on the factors determining the success of the CF campaign, i.e., the controversial evidence on the ability of sustainability-oriented new ventures to succeed in CF and above all, based on the gap found in the third stream of literature concerning the absence of studies investigating the post-funding outcome of such ventures, the third issue concerns understanding the role of reward-based CF in supporting sustainability-oriented ventures, and, in light

of its informative function, in facilitating (or in hindering) their access to subsequent funding from professional investors after the campaign. A detailed description of each unexplored issue and the related research questions to which this thesis aims to answer is provided below.

2.4.1 The certification role of crowdfunding vs initial funding from VCs.

Prior literature has suggested that, besides its substantive financial function, the funding new ventures receive from prior formal (e.g., VC funding) and informal (e.g., family & friends funding and CF) investors can act as a certification about the potential of the new venture in front of subsequent professional investors, thus reducing their restraints to invest (Conti et al., 2013a; Lerner, 2002; Guerini and Quas, 2016; Drover et al., 2017a; Roma et al., 2017). For instance, Guerini and Quas (2016) have documented the potential certification ability of governmental venture capital and its role in increasing early stage ventures' likelihood of securing a second round of private venture capital. In the same vein, Conti et al. (2013b) have highlighted the positive effect exerted by the receipt of family and friends money on subsequent investment from business angels. Kerr et al. (2014) have instead underscored the positive certification effect of business angel investments on subsequent financing rounds. As regards to CF, Drover et al. (2017) have experimentally found a positive certification effect of both business angel investments and crowdfunding on VC's screening decisions, whereas Roma et al. (2017) and Colombo and Shafi (2019), have suggested that a better performance in CF can serve as a market signal that can attract funding from professional investors. Despite these studies largely confirm the certification power of *single funding sources*, scarce evidence is available on the comparative effectiveness of different types of funding in their function of certifying the potential of the new venture in the eyes of subsequent professional investors.

Given the rise of reward-based CF as a mechanism to raise early-stage capital and inform subsequent professional investors on the market prospects of the new venture, it would be very interesting comparing its certification function with that exerted by traditional forms of new venture financing. In particular, this thesis aims to shed light on whether, compared with their counterparts initially funded by VCs, new ventures engaging in reward-based CF possess higher or lower odds of securing subsequent funding rounds. Moreover, this thesis also examines whether other new venture attributes usually evaluated by VCs in their funding decisions moderate this potential difference in the certification effectiveness of the two different funding sources considered. Specifically, it is investigated whether, to the purpose of securing subsequent funding from VCs, the presence of two attributes, namely the presence of patents granted to the new venture (Lee et al., 2001; Audretsch et al., 2012; Conti et al., 2013a; Haeussler et al., 2014) and the past experience of the entrepreneurial team in securing funding and/or successfully exiting from previously founded ventures (Stuart et al.,

1999; Shane and Cable, 2002; Hsu, 2007), is more valuable to crowdfunded new ventures or to new ventures initially backed by VCs.

2.4.2 The role of CF performance in anticipating market performance

As discussed above, extant literature has underscored that, besides its financial function, the CF performance (specifically, the reward-based CF performance) can work as a signal apt to provide information about the market potential of new product ideas (e.g., Drover et al., 2017; Roma et al., 2017, 2018; Viotto da Cruz, 2018). However, the study of whether the performance in reward-based CF can effectively anticipate the future product's market performance has been mostly confined to theoretical predictions. Specifically, a number of game-theoretical studies have investigated the effectiveness of CF as a tool for learning about consumers' preferences and predict future demand (Strausz, 2017; Roma et al., 2018; Chemla and Tinn, 2019; Chakraborty and Swinney, 2020). For instance, Strausz (2017) and Roma et al. (2018) have underscored the role of reward-based CF in informing about future product demand and complementing traditional forms of financing. Similarly, Chemla and Tinn (2019) point out that, by working as a credible consumer survey, reward-based CF helps firms in their decision on whether to invest in the project after the campaign. The rationale underlying these studies is that investors in reward-based CF are essentially consumers (investor-as-consumer perspective) investing a considerable amount of money in order to "buy" a product, yet to be developed (Chan and Parhankangas, 2017; Roma et al., 2017). In fact, as mentioned, in reward-based CF the reward scheme offered to investors usually includes the product that the project creator intends to commercialize (Roma et al., 2017). In this case, CF enables economic commitment from consumers, who pre-order a new product early in advance even at the risk that the new product will not be developed. As such, by directly eliciting consumer preferences, the CF performance is a more reliable source of information about market prospects than other marketing research tools, such as traditional consumer surveys (Wertenbroch and Skiera, 2002; Strausz, 2017; Roma et al., 2018; Chemla and Tinn, 2019).

Empirical validation of this theoretical prediction is rare. Most of the empirical evidence provided to support it pertains to the relationship between the CF performance and the attainment of subsequent venture capital. However, these studies provide an indirect evidence, since they rely on the argument that subsequent VCs use the CF performance to evaluate the market prospect of the new product, and ultimately to decide whether financing or not. Conversely, few exceptions pertain to the consequences of the CF performance on the future market performance of the new product (Viotto da Cruz, 2018; Stanko and Henard, 2017). In particular, by examining project creators' decisions to release a product in the market after the campaign, Viotto da Cruz (2018) showed that, even if not successful in CF, project creators may decide to release the product if feedback from backers (e.g., in terms of

comments, suggestions and questions) received during the campaign suggest positive valuation from the crowd. Stanko and Henard (2017) have gone a step further by studying whether the performance in crowdfunding positively reflects the actual market performance of the product, when it is commercialized. They examined this aspect by combining the CF campaign data with a survey where project proponents were asked to evaluate financial returns of their crowdfunded product, and found that the number of backers in the CF campaign positively affects the performance of the new product in the market. However, no empirical study has investigated whether the performance in reward-based CF can actually serve as a market validation by using *archival data* of both performance in CF and actual market performance. This thesis aims to fill this gap. In addition, given that reward-based CF platforms hosted mainly innovative projects, and product innovativeness influences the market performance of new products (Szymanski et al., 2007; McNally et al., 2010), this thesis examines how the relationship between CF performance and market performance is moderated by the degree of innovativeness of the product that the firm intends to commercialize. Actually, since product innovativeness affects consumers' purchase attitudes toward the new product, it may also shape the ability of CF performance to anticipate the market performance because investors in reward-based CF behave typically like consumers who are interested in the new product.

2.4.3 The role of CF in supporting environmental sustainability-oriented new ventures

Environmental sustainability issues have become very important in society and business in recent years (Driessen et al., 2013; Amankwah-Amoah et al., 2019). As a matter of fact, numerous firms have started to invest in “green” innovation (Demirel et al., 2019; Gast et al., 2017), i.e., innovation with a focus on energy efficiency, waste reduction, use of materials/processes having lower pollution impact, etc. (Chu et al., 2018; Louw, 2018; Xiao et al., 2019). Nevertheless, whether these ventures are exposed to the same opportunities to secure financial resources as compared to ventures not pursuing environmental sustainability goals is still debated (Mrkajic et al., 2019; Testa et al., 2019). Specifically, with regard to the likelihood of being financed through CF, contrasting views emerged. According to a first stream of literature CF may effectively support ESO new ventures, thus compensating the lack of funding from traditional channels or complementing this type of investments (Butticè et al., 2019; Calic and Mosakowski, 2016; Lam and Law, 2016; Vasileiadou et al., 2015). In this respect, some studies have documented a positive relationship between ESO and the likelihood of success of CF projects (Calic and Mosakowski, 2016; Lehner, 2013). On the contrary, according to a second stream of literature, ESO projects do not have a significant advantage in terms of CF success, but they may rather suffer from a disadvantage (Hörisch, 2015; Lagazio and Querci, 2018; Vismara, 2019). From the above, it emerges that whether and how the feature of ESO of the new ventures influences the likelihood of success in reward-based CF is still unclear and

deserves further investigation. In addition, little is known also about the post-funding outcome of the CF campaign for ESO new ventures especially in terms of access to subsequent funding.

Grounding on this limited knowledge on the role of CF in supporting ESO new ventures directly, and indirectly as mean for accessing subsequent funding from professional investors, this thesis aims to unravel the role that reward-based CF may play in the financing of ESO new ventures and in facilitating (or in hindering) the access of such ventures to subsequent funding from professional investors after the campaign. Specifically, the goal is twofold: 1) study whether and how the feature of ESO may influence new ventures' ability to secure funding in reward-based CF campaigns and 2) examine the mediating role of reward-based CF performance in the relationship between new ventures' ESO and their ability to receive subsequent venture capital funding from professional investors. Therefore, this thesis does not only shed light on whether ESO new ventures have higher or lower likelihood of succeeding in reward-based CF, as compared to more commercial-oriented ventures, and how they can enhance their chances of success in CF. It also elucidates whether, for new ventures using reward-based CF, the effect of ESO on the likelihood of securing funding from subsequent professional investors is mediated by the performance in the CF campaign.

2.5 Research objectives and relevance of the thesis

The overall purpose of this thesis is to deepen the knowledge on the role that the performance in reward-based CF may play, by virtue of its informative function, in the attainment of subsequent VC (especially, as compared to initial funding from VCs or in the context of ESO ventures) and in anticipating product market performance of new entrepreneurial ventures. A synthesis of the three different issues investigated in the thesis and their relevance is described below.

First, literature has investigated the informative function of reward-based CF mainly in the context of the venture capital search, underscoring the salutary role of reward-based CF in favoring the attainment of subsequent funding from professional investors (e.g., Drover et al., 2017; Roma et al., 2017). According to these studies, CF can offer a certification of unobserved quality of the new venture that attracts later-stage professional investors. This thesis takes a step forward by investigating how the attraction of CF for follow up investments compares to the attraction realized when the first infusion of funds originates from VCs. Moreover, by assuming that a certification gap actually could exist (to the detriment of CF), this thesis investigates whether and how the presence of additional new venture's attributes, which influence the decision making of VCs per se, can moderate such difference in the certification effectiveness of the two considered initial funding sources. For this purpose, this thesis focuses on two attributes of the new ventures, namely patents and strong founding team. Summing up, the first research question this thesis aims to address can be formulate as it follows:

RQ1: Are ventures initially funded through reward-based CF equally likely to raise later stage funds compared to ventures initially funded by Early-stage VCs? If so, why and under which conditions?

Answering the above questions is of considerable importance for new ventures, which usually face difficulties in raising funds necessary to scale-up and growth. Actually, since VCs make only limited investments and often in firms where other VCs have invested previously (Franke et al., 2008; Guerini and Quas, 2016; Mäkelä and Maula, 2008; Powell et al., 2002; Ragozzino and Reuer, 2011; Zider, 1998), promising new entrepreneurial ventures may be forgone or not scale up if they are not funded initially by VCs. Therefore understanding whether and how CF can allow ventures not funded initially by VCs to better compete with those funded initially by VCs to attract later stage funds from VCs is very important. Moreover, from a theoretical point of view, enhancing understanding on these issues is also important because there may exist significant differences in the characteristics and funding motivations between investors active in CF and VCs (McKenny et al., 2017). As a consequence, differences are likely to emerge also in the underlying mechanisms and in the efficacy of CF and funding from VCs as certification means, thus calling for an explicit comparison.

As discussed earlier, literature has started underscoring that the performance in reward-based CF can work as a signal apt to inform new ventures about market potential of the new product they intend to make by using the funds raised (Drover et al., 2017; Strausz, 2017; Stanko and Henard, 2017; Chemla and Tinn, 2019). However, most of the studies that have been conducted so far are game-theoretical studies, whereas empirical validation of their theoretical predictions is very rare (Stanko and Henard, 2017; Viotto da Cruz, 2018). Based on this research gap, the thesis aims at providing empirical evidence of the ability of the performance in reward-based CF to anticipate product market performance, by relying on *archival data* on both the amount pledged in CF and the actual revenues from product sales, as it has never been done. In addition, this thesis examines how the relationship between reward-based CF performance and actual product market performance is moderated by the degree of innovativeness of the product that the firm intends to commercialize. The choice of this moderator is based on the fact that the product innovativeness has been largely shown to influence (directly or indirectly) the market performance of new products since it affects consumers' purchase attitudes toward the new product (Szymanski et al., 2007; McNally et al., 2010). Consequently, given that investors in reward-based CF are typically consumers who are interested in the new product, and hence they are likely to be representative of the consumers that will be active when the product will be commercialized, product innovativeness may moderate the ability of CF performance to anticipate the market performance. Summing up, the second research questions addressed in this thesis can be formulated as it follows:

RQ2: Can the performance in reward-based CF anticipate the market performance of new products? Moreover, how would the relationship between the performance in reward-based CF and the market performance be moderated by the degree of product innovativeness?

Answering the above questions is of considerable importance for new ventures, who operate in settings characterized by high product quality uncertainty and who create innovative products. As a matter of fact, enhancing understanding on whether a good reward-based CF performance may translate into a better product market performance may help new ventures running a CF campaign in estimating future product demand and, ultimately, in their decision on whether to invest in the project after the campaign.

Extant literature has started investigating whether ESO new ventures are equally likely to raise funds in reward-based CF compared to their non-ESO counterparts, but contrasting results have been found (Calic and Mosakowski, 2016; Lagazio and Querci, 2018; Lehner, 2013; Hörisch, 2015; Vismara, 2019). Similarly, whether ESO new ventures are equally likely of being exposed to subsequent funding from professional investors as compared to more commercial-oriented ventures have been largely discussed in academic literature, and no consensus has been reached even in this case. In light of the growing trends towards sustainable entrepreneurship, this thesis aims to unravel whether and under which conditions CF can effectively benefit the ESO new ventures. More importantly, this thesis investigates the role of the performance in CF in facilitating (or in hindering) the access of ESO new ventures to subsequent funding from professional investors after the campaign. Therefore, the third research question this thesis aims to address is the following:

RQ3: How may the feature of ESO influence new ventures' ability to secure funding in reward-based CF campaigns and how critical some attributes of products pursued within sustainability-oriented initiatives are to increase their odds of success in reward-based CF? Moreover, how would the performance in reward-based CF mediate the relationship between new ventures' ESO and their ability to receive subsequent venture capital funding from professional investors?

Investigating this issue is critical not only for understanding whether green new ventures are more or less exposed to funding in CF campaigns than their non-environmentally oriented counterparts, and which attributes of the products may enhance the chances of success in CF of sustainability-oriented initiatives. But also for unveiling the role of the performance in CF as a facilitator (or as an obstacle) that makes green new ventures using reward-based CF more (or less) attractive also in the eyes of professional investors and ignite (or reduce) their financing propensity. Therefore, shedding light on this issue is of considerable importance for sustainable entrepreneurs as it informs them on whether

and how they can enhance their chances of being successful funded both in reward-based CF and by professional investors after the CF campaign.

2.6 Methodologies

In order to investigate the above mentioned research questions, this thesis employs both quantitative and qualitative research methods. The quantitative research is based on the empirical validation of three research frameworks developed by grounding on existing literature. Such research frameworks and the related hypotheses are empirically validate by means of a number of econometric analyses based on secondary data retrieved from different sources. Specifically, since the observation unit of this thesis is either a project launched on the CF platform or a venture (funded in CF or not), the first main source of data is the CF platform, i.e., Kickstarter. In addition, according to the specific research question, there were collected data also from LinkedIn, USPTO database and online tech databases such as CrunchbasePro, (research questions 1, 3) and from movie databases like Imdb.com (professional version), BoxOfficeMojo, Rotten Tomatoes, and The Numbers (research question 2). Concerning the methods used for testing hypothesis, econometric models such as probit, probit with sample selection, and OLS models are developed. Moreover, several analyses are performed to check robustness of the result obtained. Finally, since endogeneity concerns may arise in the context, matching procedure as well as treatment effect models are used to mitigate this concern. The qualitative research conducted in this thesis concerned only the study of the ability of the attributes of product/service pursued within the CF campaign, of enhancing the chances of success in CF of sustainability-oriented initiatives (part of the research question 3). The goal of this qualitative research is to explore the phenomenon under investigation, by moving from specific observations to a number of propositions, which are next confronted with existing literature to determine and delineate the contribution of each propositions (Shepherd and Sutcliffe, 2011; Whetten, 1989). For this purpose, an in-depth qualitative content analysis of the sustainability-oriented CF projects is performed. The analysis is based on both deductive and data-driven inductive approaches for the data coding (Boyatzis, 1998; Crabtree and Miller, 1999).

CHAPTER 3
**THE CERTIFICATION ROLE OF REWARD-BASED
CROWDFUNDING VS INITIAL FUNDING FROM
VENTURE CAPITALISTS (VCs)**

3.1 Introduction

This chapter is based on the research article titled “On the certification effect of reward-based crowdfunding: Do subsequent professional investors rely more on the crowd or their peers?”. This chapter aims to investigate the effectiveness in terms of attraction for follow up investments, of reward-based CF compared to a first infusion of funds that originates from professional investors such as VCs. Specifically, it examines whether and *under which conditions* ventures initially funded through CF are equally likely to raise later stage funds compared to ventures initially funded by Early-stage VCs. Since promising entrepreneurial ventures may be forgone/not scale up if they are not funded by Early-stage VCs in the first place as VCs make only limited investments and often in firms where other VCs have invested previously (Franke et al., 2008; Guerini & Quas, 2016; Mäkelä & Maula, 2008; Powell et al., 2002; Ragozzino & Reuer, 2011; Zider, 1998), shedding light on whether and how CF can allow ventures not funded initially by VCs to attract later stage funds from VCs is important.

To investigate the above issue, this chapter conceptualizes a research framework and develops a number of hypotheses by grounding the arguments on the different certification effect that different sources of funding may generate in the eyes of subsequent VCs, and on the complementarity of different signals. The research framework and the relationships hypothesized are showed in Figure 1. Such research framework is empirically assessed through a new ad-hoc built dataset that combines data from different sources. To test the hypotheses, econometric analysis are employed. Specifically, as endogeneity concerns could emerged in the setting, matching methods and treatment effect regression models have been used. Moreover, a marginal effect analysis was run to reinforce interpretation of findings. Finally, a number of robustness check have been conducted to demonstrate the robustness of the results.

The chapter is organized as it follows. Firstly, a set of hypotheses is developed. Secondly, sample data and variables, empirical analysis and results are presented. Finally, findings of the study are discussed.

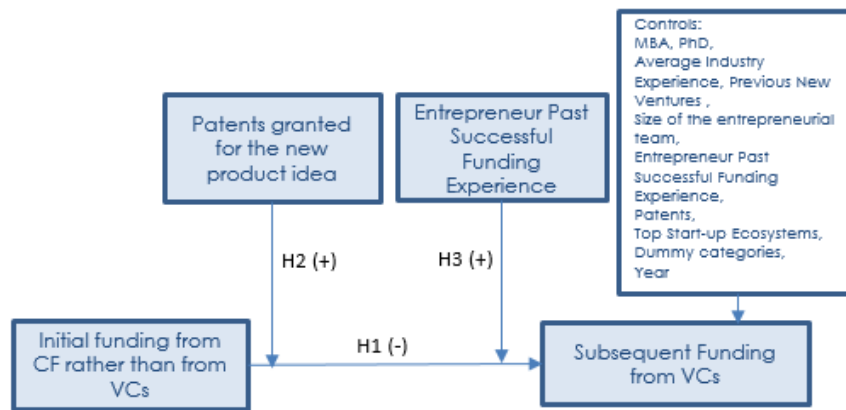


Figure 1: Research Framework (RQ1)

3.2 Hypothesis 1. The certification effect: reward-based CF versus funding from Early-stage VCs

VCs are generally recognized to play a crucial role in identifying promising new ventures (Zacharakis and Meyer, 2000). However, since the quality of new ventures often cannot be directly observed, VCs need to turn to accessible information related to ventures' observable attributes "thought to co-vary with their underlying but unknown quality" (Stuart et al., 1999, p. 317), in order to mitigate the numerous sources of uncertainty surrounding them. Such attributes include for instance industry features, founding team characteristics, the business model as well as potential target market (Bernstein et al., 2017; Hsu, 2007; Kolympiris et al., 2018; MacMillan et al., 1985; Shane & Cable, 2002; Zider, 1998).

In addition to these attributes, VCs evaluate positively previous initial funding received by a new venture as it can serve as a certification about its potential (Conti et al., 2013a; Drover et al., 2017b; Guerini & Quas, 2016; Kerr et al., 2014; Lerner, 2002; Megginson & Weiss, 1991; Roma et al., 2017). However, since different sources of initial funding certify different attributes of a given venture, it is argued that there are differences in the strength of the certification effect in the eyes of subsequent VCs, between different sources of initial funding. Accordingly, subsequent VCs may evaluate ventures initially backed by Early-stage VCs and crowdfunded ventures differently in terms of attractiveness for funding. There are two major sources behind such different evaluation, related to 1) the characteristics of the funding providers (funding motives and screening strategies) and 2) the difference in degree of involvement in the venture past investment across funders. In turn, these differences influence the value of "stamp of approval" that different sources of initial funding convey to subsequent potential investors.

3.2.1 Differences in the motives for funding and screening strategies

Regarding the characteristics of the funding providers, it is well-known that VCs and crowds have divergent objectives, assessment capabilities, and consequently activate different funding decision-making processes (Drover et al., 2017a).

Generally, VCs are trained experts that spend considerable time and effort into screening their potential portfolios (Amit et al., 1990; Hall & Hofer, 1993; Kaplan & Stromberg, 2001). They tend to focus on specific industries and/or geographic locations, thus developing context-specific screening capabilities that enable them to conduct extensive due diligence and discover the most promising new ventures (Amit et al., 1998; Colombo & Grilli, 2010; Sorenson & Stuart, 2001). In this respect, they are often viewed as scouts of business opportunities (Baum & Silverman, 2004). When making funding decisions, VCs rely on a broad set of venture characteristics as evaluation criteria. Besides estimating the market potential of the new venture and the potential financial returns of their investment, VCs consider three types of attributes, namely intellectual, human, and social capital (Ahlers et al., 2015; Baum & Silverman, 2004; Petty & Gruber, 2011). Intellectual capital mainly refers to the technological aspects related to the innovation proposed by the new venture and to the technological know-how background of the people involved in it. For instance, VCs often consider the presence of patents granted for the product idea to infer the entrepreneurial team's innovative capabilities as well as value appropriability and technological viability (Baum & Silverman, 2004; Conti et al., 2013a; Hoenen et al., 2014; Hsu & Ziedonis, 2013). They also carefully scrutinize the characteristics of the startup team, e.g., education, experience and past successes of founders, which represent the new venture's human capital (Franke et al., 2008; Kolympiris et al., 2018; Zacharakis & Meyer, 2000). Social capital refers to new venture's alliance and connections to third parties, such as other PIs, suppliers, partners, and other resource providers that may play a relevant role in the new venture's business. VCs significantly value the presence of such kind of connections as they favor access to valuable resources and knowledge critical to the success of the new venture and serve as external endorsements (Baum & Silverman, 2004; Chang, 2004; Inkpen & Tsang, 2005; McFadyen & Cannella Jr, 2004; Reagans & McEvily, 2003).

On the other hand, reward-based CF campaigns involve a large number of investors making individual decisions and providing relatively small contributions. These investors, referred to as backers, are usually not experienced or sophisticated investors, as compared with VCs. Lacking adequate expertise, they typically do not assess entrepreneurial ventures comprehensively, and often fail to consider important aspects related to new venture's quality such as the composition and preparedness of the entrepreneurial team, the technological viability of the project as well as the access to strategic resources (Ahlers et al., 2015). This holds in part because backers are not always motivated by pursuing financial returns (Gerber et al., 2012). Instead, they are often guided by

passion, thus they may like better giving their money for prosocial reasons, in order to support creators and causes (Colombo et al., 2015; Galak et al., 2011; Gerber et al., 2012). More importantly, crowds' funding decisions in reward-based CF are regularly driven by the interest for the reward offered by the projects seeking funding (oftentimes the product the new venture aims to commercialize) (Agrawal et al., 2014; Allison et al., 2017; Cholakova & Clarysse, 2015; Roma et al., 2017). Therefore, crowds' motivations to participate are clearly different from those of VCs, who instead seek mostly economic return on their investments.

In summary, initial VC funding is the outcome of a sophisticated and comprehensive process whereas initial CF funding is not. These considerations on the screening capabilities of the two compared funding sources should lead subsequent VCs to trust more the certification of the new venture's value provided by their peers than that obtainable from reward-based CF. Comparatively speaking, VCs are more qualified to evaluate new ventures' potential and share more similar financial goals and assessment criteria among each other, which increases the chances of reciprocal recognition and trust.

3.2.2 Differences in the ex-post involvement

The second element playing a role in the alleged different certification effectiveness of the two types of funding mechanisms concerns the different degree of involvement that prior VCs and crowd, respectively, put in the new venture they have financed, and the different benefits that these two groups can bring to it. Early-stage VCs are shareholders and active investors who coach entrepreneurs, provide assistance and guidance in order for the firm's potential to realize (Bertoni et al., 2011; Croce et al., 2013; Gompers & Lerner, 2001; Hellmann, 2000). Indeed, Early-stage VCs not only contribute to the managerial professionalization of new ventures by providing them with management skills and governance (Colombo & Grilli, 2010; Hellmann & Puri, 2002) but also use their own social capital to facilitate new ventures' access to external resources, competencies and, ultimately, to further funding (Alexy et al., 2012; Bottazzi et al., 2008; Hsu, 2007). Besides such substantive benefits, the coaching and networking functions of Early-stage VCs can also have a certification effect in the eyes of subsequent VCs. Observing the activism of previous Early-stage VCs, subsequent VCs become more convinced that the new venture has been trained to possess better entrepreneurial skills and enjoys a larger network to access strategic resources to successfully implement the business initiative (Jääskeläinen & Maula, 2014).

While, in light of their limited business competences, crowds can hardly be involved in the new venture management. As mentioned above, the main benefit of reward-based CF lies in the information value it provides (Strausz, 2017). Specifically, it can provide entrepreneurs with information about consumers' preferences and the market potential of new entrepreneurial projects, regardless of their success in achieving their campaign goal (Agrawal et al., 2014; Drover et al.,

2017b; Roma et al., 2017). This is because backers often represent customers who show real interest in the new product idea, given that the rewards in these campaigns are often tied to the products that new ventures aim to commercialize. When deciding to contribute to a reward-based CF campaign, they commit themselves to invest funds to buy the product in advance at some risk (Roma et al., 2017). As their payoffs depend on their invested amounts, reward-based CF is an incentive-aligned mechanism similar to those used in marketing to elicit consumer preferences (Roma et al., 2017; Viotto da Cruz, 2018). This feature of enabling a direct preference-eliciting test is a noteworthy benefit of crowdfunded new ventures, which is often not available to new ventures funded through traditional funding channels. In turn, such benefit should provide a comparative advantage to reward-based crowdfunding with regard to the ability to mitigate uncertainty related to market potential. Moreover, running a CF campaign can lead to an additional benefit. Indeed, backers can leave on the campaign page important feedback for the entrepreneurs allowing them to improve their initial ideas in order to commercialize a product that better matches consumers' preferences, and thus is more likely to succeed in the market (Stanko & Henard, 2017).

Combining the considerations above, despite the informational benefit derived from a positive performance in the campaign, reward-based CF is unable to compensate the certification advantages a new venture can gain when initially funded by Early-stage VCs. This is because, in spite of its strong informational value regarding the market potential, reward-based CF is completely silent about other important informational aspects concerning the new venture's capabilities. Conversely, the ex-ante new venture's screening made by Early-stage VCs is usually much more sophisticated and comprehensive and it is followed by ex-post coaching and networking. Consequently, it is hypothesized that, *ceteris paribus*, subsequent VCs are more inclined to trust on the certification effect provided by their peers rather than on that obtained through reward-based CF. Accordingly, the first hypothesis is formulated as follows:

H1. The likelihood of receiving subsequent funding from VCs is, *ceteris paribus*, lower for ventures funded through reward-based CF than for those initially funded by VCs.

3.3 Hypotheses 2 and 3. The moderating role of patents and past successful funding experience of the entrepreneurial team

It has been hypothesized that reward-based CF will exhibit a weaker certification effect when compared to initial funding from Early-stage VCs. Next, grounding on the complementarity of different signals (Bapna, 2019), it is argued that when initially crowdfunded ventures complement the positive quality certification obtained from a successful CF campaign with other attributes VCs consider in their decision to invest, and which certify what CF *di per se* does not, i.e., the human, social and intellectual capital of the new venture, the certification gap between initially crowdfunded

ventures and those initially backed by Early-stage VCs will be mitigated. Specifically, we study the complementary effect of patents and past successful funding experience of the entrepreneurial team because, by informing on the appropriability, technical strengths and managerial merits of the new venture, these attributes act as signals of intellectual, human and social capital respectively.

First it is argued that, for the purpose of certifying the potential of the new venture to subsequent VCs, the presence of patents granted for the new product idea should be more beneficial to crowdfunded new ventures rather than to similar new ventures previously funded by Early-stage VCs. The presence of patents increases the odds of access to funding from professional investors as it informs them about the new venture's capability to develop technological solutions that are novel and capable of industrial application, and it reveals that the new venture may benefit from an exclusive protection over certain markets, thus reducing this type of uncertainties surrounding the new venture (Audretsch et al., 2012; Conti et al., 2013b; Haeussler et al., 2014; Hoenen et al., 2014; Lee et al., 2001; Mann and Sager, 2007). In other words, patents help certify the technological viability of the project and its relative value appropriation (Graham and Sichelman, 2008; Helmers and Rogers, 2011; Hoenig and Henkel, 2015; Hsu and Ziedonis, 2013; Lee et al., 2001). Compared to similar ventures initially backed by Early-stage VCs, a crowdfunded new venture should gain larger benefits from these positive effects of patents because a successful reward-based CF campaign provides indications of the market potential of the entrepreneurial project, but it is silent on whether the new venture is technologically capable to turn the new product idea into an final product (Bapna, 2019).

Therefore, the assessment obtained via CF does not reassure subsequent potential VCs, who instead, due to their characteristics and investment objectives, require additional positive indications also with regard to technological viability and appropriability issues to possibly avail funding. In contrast, before securing initial funding, a new venture previously funded by VCs has been carefully scrutinized on multiple aspects, including those related to the technical viability of the entire new entrepreneurial idea. As a result, the fact that a new venture has previously raised capital from VCs already certify the technological viability of the entrepreneurial project in the eyes of subsequent VCs, thus decreasing the value of an additional attribute aimed to mitigate this specific source of uncertainty. Hence, comparatively speaking, crowdfunded new ventures derive higher benefits from patenting, and the gap in the certification effect between funding from VCs and reward-based CF should be mitigated when patents have been granted to the new venture. Accordingly, the second hypothesis is formulated as it follows:

H2. The presence of patents reduces the negative gap in terms of likelihood of securing subsequent funding from VCs between crowdfunded ventures and similar ventures initially funded by VCs.

Another new venture's attribute that should act to mitigate the certification disadvantage of crowdfunded new ventures is the presence of an entrepreneurial team with a positive track record in securing professional funding for (or successfully selling) previously-founded ventures. Prior research has indeed underscored that, compared to novice entrepreneurs, entrepreneurs with prior successful experience have developed better entrepreneurial skills and social connections that can facilitate access to external funding in the future (Shane and Cable, 2002; Zhang, 2011). In fact, in their previous experiences entrepreneurs have likely gotten in touch with a wide range of people and organizations (Hsu, 2007), through which they can acquire competences and be more exposed to the exploitation of strategic resources necessary to succeed in an entrepreneurial initiative (Elfring & Hulsink, 2003; Nahapiet & Ghoshal, 1998). More specifically, entrepreneurs able to secure funding from VCs for their past ventures have been able to establish close relationships with VCs, thus benefiting from their coaching function and the access to their network of ties (e.g., Shane and Cable, 2002; Sorenson and Stuart, 2001; Stuart et al., 1999). As well, a significant record of previous venture capital funding received (or a successful exit) for previously founded new ventures can act as an endorsement that increases the trust of subsequent potential investors in the current venture's capabilities (Gompers et al., 2010; Ko & McKelvie, 2018).

Similar to the case of patents, a crowdfunded new venture derives higher benefits than similar ventures initially funded by Early-stage VCs when it is founded by an entrepreneurial team with a positive track record in either securing venture capital funding or successfully selling previously founded ventures. As explained, information obtained through a successful CF campaign is limited to reveal market prospects of the entrepreneurial project. Such information is hardly enough for subsequent VCs who assess potential target firms more comprehensively. But, a strong founding team can complement the marketability indications that a CF campaign offers and thus be of value to VCs considering investing in previously crowdfunded new ventures. Indeed, we expect the added value of a strong founding team to be of smaller relevance for ventures initially funded by Early-stage VCs. The indications of firm-specific unobserved abilities offered by such team are already assessed by the early funders. This, in turn, decreases the necessity for subsequent VCs to look deeply into the past experience of the entrepreneurial team. Accordingly:

H3. Past successful experience of the entrepreneurial team in securing venture capital or exiting from previously founded ventures reduces the negative gap existing in the likelihood of securing subsequent funding from VCs between crowdfunded ventures and similar ventures initially funded by VCs.

3.4 Empirical investigation

3.4.1 Data and Variables

To test the above hypotheses, a new cross sectional dataset that combines two samples was constructed. The first sample includes early stage technology ventures that have been founded between 2005 and 2014 and have secured initial funds by launching successful campaigns in the category Hardware of the most popular reward-based CF platform, i.e., Kickstarter, starting from its inception in 2009 to the end of 2014. The second sample includes early stage technology ventures, which never launched any CF campaign, have been founded in the same period as their crowdfunded counterparts, have received at least one round of funding from Early-stage VCs, and fall in the category Hardware of CrunchbasePro, i.e., the online tech company database that includes data about the startup ecosystem consisting of companies, investors, incubators, key people, funding rounds and events. Given that the focus is on the certification effect of reward-based CF relative to that of initial funding from Early-stage VCs, the two samples above include only ventures that have received an initial round of funding: the former sample through reward-based CF and the latter sample through Early-stage VCs. Conceptually, the two cohorts of ventures are early stage firms within the same industry during the same period. In other words, these firms are roughly at the prototype / early concept stage. At this stage, financing needs are typically rather limited and they are covered by a crowdfunding campaign or by a VC investing in early stage ventures. However, for both cohorts the next step is VC as CF is not a viable option for scaling up.

Dataset includes technology-based ventures as such ventures need follow-up funds to scale irrespective of the source of initial funding. The Hardware categories on Kickstarter and CrunchbasePro address this point as they include applications such as consumer electronics and computer hardware, which necessitate large investments for setting up of prototypes, engineering and manufacturing processes. More broadly, Hardware includes entrepreneurial projects where the amount of funds required to support growth is expected to be relevant, thus representing potentially attractive investment opportunities for VCs (PwC, 2014). Beside focusing on Hardware category, additional restrictions were made to further reduce decreases the risk of including in the sample entrepreneurial projects not seeking additional capital after their initial funding. Specifically, among crowdfunded new ventures, only projects collecting a sufficiently high amount (at least \$5,000) of funds in the campaign were selected, in order to exclude small recreational projects. Moreover, projects related to non-profit organizations, those of new entrepreneurial ventures that were no longer active at the end of our period of observation (December 2017) were excluded. Finally, new entrepreneurial ventures which received funds from the same VCs for both the first and second funding round were excluded, to prevent that follow up investments were due to reasons not related

to certification. After removing also projects for which full information was not available, the final sample includes 625 new hardware ventures, of which 325 were initially funded via crowdfunding and 300 initially funded by Early-stage VCs.

The *dependent variable* is a dummy (Subsequent Funding from VCs) taking value of 1 whether a new venture has received subsequent funding from VCs (until the end of our period of observation, December 2017) after its initial funding provided either via CF or by Early-stage VCs, 0 otherwise. Data related to this variable have been retrieved using CrunchbasePro, in combination with ThomsonOne – VentureXpert, Angel.co, and, when available, the press section on the website of each new venture.

The main *independent variable* is a dichotomous variable (Crowdfunding) taking value of 1 if the given new venture has received initial funds via reward-based CF, and 0 if it has been initially funded by Early-stage VCs. To test H2, the variable Crowdfunding was interacted with a dummy variable (Patents) equal to 1 if, irrespective of the first type of funding source, the new venture had been already granted at least one patent related to the new product idea before (possibly) receiving a subsequent funding from VCs, 0 otherwise. For new ventures that received subsequent funding, the presence of patents was measured before subsequent funding took place. For new ventures that did not attract subsequent funds within the sample period, the presence of patents was measured within a 2-year window since the initial inflow of funds. A 2-year horizon was chosen because this is the average time elapsed between initial funding and follow up funding for sample firms that attracted subsequent funds. The information about the presence of granted patents was retrieved from the USPTO database, since the great majority of entrepreneurial projects in the sample were geographically located in the United States.

Before discussing the interaction term used to test our hypothesis H3, it is important to note that numerous new ventures are founded and managed by a team of individuals, e.g., the entrepreneurial team, rather than a single entrepreneur. The entrepreneurial team includes the founder(s) and top management figures of the given new venture, such as the CEO and the President (in the case they do not coincide with the founders). For instance, in the sample, the size of entrepreneurial team varies from one to six. In the presence of more than one leading person, data about each member of the entrepreneurial team were gathered. Similar to the case of patents, all the time-varying team characteristics explaining follow up investments by VCs were measured before subsequent funding took place (or the equivalent 2-year period for ventures that did not receive subsequent funds).

To test H3, it was introduced the interaction term between the variable Crowdfunding and a dummy variable (Entrepreneur Past Successful Funding Experience). The latter take value equal to 1 if, irrespective of the first type of funding source, at least one team member of the given new venture

has received funding from professional investors such as VCs and business angels for previously founded new ventures and/or such previous new ventures have been successfully sold to established firms, 0 otherwise. This variable captures the history of the entrepreneurial teams and, specifically, their ability to secure funding from professional investors or successfully sell ventures founded (and managed) in the past. Data related to this variable have been retrieved by combining information available on the LinkedIn profiles of each member of the entrepreneurial team with that available on CrunchbasePro (and the other mentioned databases).

In addition to the variables of interest, it is crucial to control for the relevant quality aspects of the new ventures as well as for other factors that may affect the likelihood of securing subsequent funding from VCs. The relevant quality aspects of the new venture were controlled by including the set of characteristics utilized by venture capitalists to assess technology startup quality, namely intellectual, social, and human capital (Conti et al., 2013a; Conti et al., 2013b; Hsu, 2007; Hsu & Ziedonis, 2013; Kolympiris et al., 2018; Pollack et al., 2012). Regarding the entrepreneur human capital built before the subsequent funding from VCs was (possibly) received, a set of control variables was introduced. Specifically, two variables control for the entrepreneurial team's educational background, i.e., whether at least one member of the entrepreneurial team has received an MBA (MBA) and whether at least one member of the entrepreneurial team has received a Ph.D. (PhD), (Hall & Hofer, 1993; Kolympiris et al., 2018). In line with the previous studies (e.g., Conti et al., 2013a; Conti et al., 2013b), it is controlled also for the average industry experience of the entrepreneurial team (Average Industry Experience) and for whether at least one team member has founded and/or managed previous new ventures in the past (Previous New Ventures). Indeed, knowledge and skills acquired from past entrepreneurial experience affect entrepreneurs' personal capacity to manage their current enterprises (Hsu, 2007; Ahlers, 2015). The variable Size of the Entrepreneurial Team is also introduced to broadly capture the amount of human capital (Ahlers et al., 2015). Finally, in order to control for the direct effect of the variable Entrepreneur Past Successful Funding Experience, this variable was used in its level form. This variable informs VCs on whether the entrepreneurial story of the team has been successful in the past, thus providing again a valuable quality indication on the entrepreneurial ability, also with regard to the current project (Hsu, 2007; Hsu & Ziedonis, 2013).

The latter two variables, Size of the Entrepreneurial Team and Entrepreneur Past Successful Funding Experience, are also useful to control for the entrepreneur social capital. Indeed, as argued by Baum and Silverman (2004), larger management teams are not only likely to possess higher human capital, but at the same time, they may have more social capital as the number of social connections tends to increase with the number of team members (Ahlers et al., 2015). Likewise, as discussed earlier, the ability to secure funding from professional investors for past ventures also positively impacts on the

entrepreneurial team's social capital, as affiliation to professional investors allows entrepreneurs to more easily get in touch with suppliers, customers, professionals and thus access a broader network of ties (Elfring & Hulsink, 2003; Shane & Cable, 2002). Consequently, these variables not only serve as proxies for human capital, but they also indicate the potential network surrounding the new venture and the relative strategic resources that will favor the successful implementation of the business initiative (Inkpen & Tsang, 2005; McFadyen & Cannella Jr, 2004; Reagans & McEvily, 2003). In addition to introducing its interaction with the variable Crowdfunding, the variable Patents was included within the control variables because it captures the intellectual capital of the new venture (Ahlers et al., 2015).

In addition to the main control variables introduced above, the empirical specifications include a number of controls related to other new venture attributes. Since new ventures located in different entrepreneurial ecosystems may face a different probability of receiving subsequent funding from VCs because venture capital is not equally accessible for startups, but its availability varies across different geographical regions (Cumming & Dai, 2010; Kolympiris et al., 2011; Tian, 2011), it was introduced a dummy variable (Top Startup Ecosystems) indicating whether the new venture is located in the metropolitan area of one of the top 20 ecosystems worldwide for establishing and nurturing a startup, according to the Startup Genome Report (Marmer et al., 2012). It was controlled also for the year of new venture establishment by introducing ten dummies (Year of Establishment 200x), which help control for the different stages of new ventures' lifecycle. Finally, in spite of the fact that projects are already restricted to the Hardware categories on Kickstarter and CrunchbasePro databases, four dummies indicating the type of product/applications related to each venture were introduced. These dummies, namely Consumer Electronics & Hardware, 3D Printing & Robotics, Medical Devices, and Aerospace Applications, help to further take into account the heterogeneity related to the project nature.

3.4.2 Testing hypotheses: econometric analysis and findings

The descriptive statistics of the sample and the correlation matrix are provided in Table 1 and 2, respectively.

Table 1: Descriptive statistics for the full sample

Variables	PANEL A New ventures engaging in crowdfunding (325 observations)				PANEL B New ventures not engaging in crowdfunding (300 observations)			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Subsequent Funding from VCs (Dep. variable)	0.188	0.391	0	1	0.593	0.492	0	1
Top Startup Ecosystems	0.471	0.500	0	1	0.477	0.500	0	1
Average Industry Experience	7.458	6.096	0	33.5	13.410	9.081	1	38
MBA	0.101	0.302	0	1	0.233	0.424	0	1
PhD	0.111	0.314	0	1	0.227	0.419	0	1
Size of the Entrepreneurial Team	1.585	0.866	1	6	1.830	0.847	1	5
Previous New Ventures Entrepreneur Past Successful Funding Experience	0.400	0.491	0	1	0.553	0.498	0	1
Patents	0.086	0.281	0	1	0.183	0.387	0	1
B2B (used for treatment effect regression model)	0.037	0.189	0	1	0.117	0.321	0	1
Consumer Electronics & Hardware	0.258	0.438	0	1	0.473	0.500	0	1
3D Printing & Robotics	0.738	0.440	0	1	0.740	0.439	0	1
Medical Devices	0.225	0.418	0	1	0.070	0.255	0	1
Aerospace Applications	0.006	0.078	0	1	0.177	0.382	0	1
Year of Est. 2005	0.031	0.173	0	1	0.013	0.115	0	1
Year of Est. 2006	0.028	0.164	0	1	0.080	0.272	0	1
Year of Est. 2007	0.028	0.164	0	1	0.080	0.272	0	1
Year of Est. 2008	0.025	0.155	0	1	0.080	0.272	0	1
Year of Est. 2009	0.028	0.164	0	1	0.087	0.282	0	1
Year of Est. 2010	0.074	0.262	0	1	0.107	0.309	0	1
Year of Est. 2011	0.114	0.318	0	1	0.113	0.317	0	1
Year of Est. 2012	0.157	0.364	0	1	0.200	0.401	0	1
Year of Est. 2013	0.273	0.447	0	1	0.083	0.277	0	1
Year of Est. 2014	0.181	0.386	0	1	0.120	0.325	0	1
Year of Est. 2014	0.092	0.290	0	1	0.050	0.218	0	1

Table 2: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Crowdfunding												
(2) Top Startup Ecosystems	-0.02											
(3) Average Industry Experience	-0.36***	-0.01										
(4) MBA	-0.18***	0.04	0.08									
(5) PhD	-0.15***	-0.03	0.12**	-0.03								
(6) Size of the Entrepreneurial Team	-0.15***	0.07	0.01	0.14***	0.14***							
(7) Previous New Ventures Entrepreneur	-0.16***	0.08*	0.10*	0.09*	0.07	0.22***						
(8) Past Successful Funding Experience	-0.15***	0.06	0.17***	0.08*	0.04	0.17***	0.35***					
(9) Patents	-0.15***	-0.02	0.24***	0.09*	-0.03	-0.03	-0.01	0.07				
(10) Consumer Electronics & Hardware	-0.01	-0.01	0.01	-0.01	-0.02	0.04	0.02	-0.04	0.02			
(11) 3D Printing & Robotics	0.22***	-0.02	-0.12**	-0.09*	-0.02	-0.05	-0.04	0.02	-0.07	-0.71***		
(12) Medical Devices	-0.30***	-0.03	0.15***	0.12**	0.04	0.02	0.05	0.03	0.08*	-0.52***	-0.13**	
(13) Aerospace Applications	0.06	0.03	-0.02	0.02	0.02	-0.01	-0.05	0.01	-0.04	-0.25***	-0.06	-0.05

* p < 0.05, ** p < 0.01, *** p < 0.001.

The correlation matrix does not suggest a considerable degree of correlation, except for the case of two control variables. The descriptive statistics reveals significant differences between crowdfunded new ventures and new ventures initially funded by Early-stage VCs. Overall, compared with crowdfunded new ventures, new ventures initially funded by Early-stage VCs are more likely to receive subsequent funding from VCs, to be granted a patent, have been founded and managed by an entrepreneurial team with larger industry experience, a better education background, and more able to secure funding for previously founded ventures. These descriptive statistics intuitively highlight the fact that whether a new venture is initially funded through reward-based CF or by Early-stage VCs is not a random outcome, thus potentially introducing endogeneity bias to the analysis. To mitigate this concern, matching procedure as well as treatment effect regression models were used. The matching procedure allows to analyze a new sample in which each crowdfunded new venture is matched with a new venture initially funded by Early-stage VCs of similar quality. Following previous contributions (e.g. Croce et al., 2013; Guerini & Quas, 2016), a Propensity Score Matching (PSM) algorithm was employed (Rosenbaum & Rubin, 1984). This procedure finds a non-treated unit (in this applications, a new venture initially funded by Early-stage VCs) that is similar to a treated unit (in this application, a crowdfunded new venture) across several dimensions, by constructing a propensity score. The propensity score is computed based on all the right-hand side variables introduced in the previous section (except for the variable Crowdfunding), which encompass the most relevant characteristics utilized by venture capitalists to assess technology startup quality. The

underlying assumption of matching procedures is that matching over observed characteristics allows matching also for unobserved characteristics, isolating the treatment as the only remaining difference between treated and non-treated units. This assumption should hold also in this setting, because at least from the perspective of the factors considered by VCs, new venture's unobserved characteristics should be highly correlated to the observed characteristics. Table 3 reports descriptive statistics of the matched sample, which consists of 290 new ventures, 145 crowdfunded ventures and 145 Early-stage VCs-backed ventures. Using a two-sample T-test with groups, for all the variables we cannot reject the hypothesis that the two subsamples have the same mean, meaning that each crowdfunded new venture is matched with the most similar non-crowdfunded.

Table 3: Descriptive statistics for the matched sample

Variables	PANEL A	PANEL B	Two sample T-Test with groups (p-value)
	New ventures engaging in Crowdfunding (145 observations)	New ventures not engaging in Crowdfunding (145 observations)	
	Mean	Mean	
Top Startup Ecosystems	0.517	0.490	0.640
Average Industry Experience	10.255	9.903	0.680
MBA	0.152	0.110	0.298
PhD	0.152	0.145	0.869
Size of the Entrepreneurial Team	1.841	1.800	0.706
Previous New Ventures	0.476	0.545	0.242
Entrepreneur Past Successful Funding Experience	0.159	0.138	0.621
Patents	0.021	0.027	0.703
Consumer Electronics & Hardware	0.869	0.848	0.615
3D Printing & Robotics	0.083	0.096	0.682
Medical Devices	0.014	0.027	0.411
Aerospace Applications	0.034	0.027	0.736
Year of Est. 2005	0.027	0.041	0.521
Year of Est. 2006	0.034	0.055	0.396
Year of Est. 2007	0.034	0.034	1.000
Year of Est. 2008	0.055	0.034	0.396
Year of Est. 2009	0.090	0.103	0.692
Year of Est. 2010	0.117	0.117	1.000
Year of Est. 2011	0.234	0.207	0.573
Year of Est. 2012	0.165	0.145	0.628
Year of Est. 2013	0.186	0.193	0.881
Year of Est. 2014	0.055	0.069	0.628

Table 4 presents the analysis. Given the cross-sectional nature of our dataset and the binary nature of the dependent variable, different specifications of a robust probit regression model are employed. In

the first column, the dummy variable Crowdfunding is introduced in addition to the discussed control variables. The coefficients of control variables largely display the expected sign and significance. For instance, the odds of receiving subsequent funding from VCs are higher for new ventures located in top startup ecosystems, holding patents for their product idea, founded and managed by a larger entrepreneurial team possessing better education background (PhD, in particular), lower number of years of industry experience, but, at the same time, able to obtain professional funding and/or ensure successful exit for previously founded ventures. With regard to the dummy variable *Crowdfunding*, its coefficient is shown to be largely negative and significant, thus suggesting that, compared to their counterparts, crowdfunded new ventures display lower probability of receiving subsequent funding from VCs. In columns 2-4, the interaction terms between the dummy Crowdfunding and the variables Patents and Entrepreneur Past Successful Funding Experience are gradually introduced. As results are consistent across these columns, only results of the fourth column where both interactions are included are discussed. The direct effect of the dummy Crowdfunding is still largely negative and significant, whereas the coefficients of the two interaction terms, which represent the effect of Patents and Entrepreneur Past Successful Funding Experience for crowdfunded new ventures, respectively, are positive and significant. Overall, this would confirm that, to the purpose of gathering subsequent funding from VCs, attributes, such as the presence of patents granted to the new venture and the entrepreneurial team's successful experience in securing professional funding and/or exiting from previously founded ventures, are more valuable to crowdfunded ventures rather than ventures initially funded by VCs. These results support all three hypotheses, suggesting that VCs tend to rely more on their peers than on the crowd, in light of the fact that they share with the former more similar background, expertise, and thus assessment criteria. But crowdfunded ventures can mitigate this disadvantage when displaying important quality attributes such as patents and strong founding team.

Table 4: Probit regression models for the matched sample (threshold on pledged amount in crowdfunding equal to \$5,000)

	No interactions	Crowdfunding interacted with Patents	Crowdfunding interacted with Entrepreneur Past Successful Funding Experience	All interactions
Top Startup Ecosystems	0.136 (0.168)	0.171 (0.169)	0.125 (0.170)	0.158 (0.171)
Average Industry Experience	-0.021* (0.012)	-0.017 (0.012)	-0.018 (0.012)	-0.014 (0.012)
MBA	0.029 (0.254)	-0.030 (0.261)	0.062 (0.262)	-0.005 (0.268)
PhD	0.183 (0.224)	0.183 (0.231)	0.209 (0.226)	0.210 (0.233)
Size of the Entrepreneurial Team	0.239** (0.096)	0.258*** (0.099)	0.278*** (0.098)	0.292*** (0.099)
Previous New Ventures	0.119 (0.177)	0.120 (0.177)	0.067 (0.182)	0.080 (0.182)
Entrepreneur Past Successful Funding Experience	0.882*** (0.272)	0.834*** (0.275)	0.280 (0.352)	0.268 (0.352)
Patents	0.772** (0.386)	-0.114 (0.442)	0.702* (0.395)	-0.135 (0.438)
Crowdfunding	-0.971*** (0.167)	-1.098*** (0.176)	-1.167*** (0.184)	-1.279*** (0.193)
Crowdfunding X Patents	-	2.197*** (0.747)	-	2.177*** (0.771)
Crowdfunding X Entrepreneur Past Successful Funding Experience	-	-	1.244*** (0.463)	1.192** (0.470)
Year of Establishment (dummies)	Included	Included	Included	Included
Subcategories (dummies)	Included	Included	Included	Included
Constant	-0.762 (0.774)	-0.644 (0.735)	-0.792 (0.769)	-0.669 (0.736)
<i>N. obs initial sample</i>	625	625	625	625
<i>N. obs initial sample of crowd-funded new ventures</i>	325	325	325	325
<i>N. obs one-to-one matched sample</i>	290	290	290	290
<i>Pseudo R²</i>	0.206	0.228	0.222	0.242

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The second exercise used for reduce the potential endogeneity bias was the treatment effect regression models, which explicitly account for the drivers of initial funding by means of two-stage regressions (Wooldridge, 2010, pp. 265 - 266). Table 5 presents estimates of this model. In the first stage the probability of being initially funded through reward-based CF or by Early-stage VCs is regressed against a number of factors expected to affect the likelihood of selection between CF and funding from Early-stage VCs as initial funding source, whereas the second stage regression is simply the regression of interest but it is now corrected to consider that new ventures might have different probability of being exposed to different types of initial funding. To correctly apply the treatment

effect regression models, the first stage regression must include at least one additional predictor that is not correlated with the outcome of the second-stage regression. In this respect, the variable B2B is used. This variable takes value equal to 1 if the market of the new venture is mainly business-to-business, 0 if it is mainly business-to-consumers (B2C). Because of the reward mechanism, reward-based CF is expected to be mostly suitable for consumer products. This intuition is confirmed by descriptive statistics that indicate that approximately 3 out of 4 of the “kickstarted” new ventures in the sample focus on the B2C market, whereas approximately half of the entrepreneurial ventures not engaging in CF operate in the B2C market. Therefore, while the type of market clearly should influence the likelihood to select reward-based CF as initial funding source, there is no strong theoretical argument that it should directly influence the investment decision of VCs. The negative and strongly significant coefficient of B2B in the first-stage regressions of the treatment effect models in Table 5 increases our confidence that the dummy B2B satisfy the exclusion restriction of the treatment effect regression models. In addition to this variable, the first stage regression includes all the variables also utilized in the second stage regression, but in this case, when necessary, these are computed right before the time of the first funding to capture their influence on the decision to use CF. The estimates, again, support hypotheses.

Table 5: Treatment effect regression model (threshold on pledged amount in crowdfunding equal to \$5,000)

	No interaction		Crowdfunding interacted with Patents		Crowdfunding interacted with Entrepreneur Past Successful Funding Experience		All interactions	
	2 nd stage	1 st stage	2 nd stage	1 st stage	2 nd stage	1 st stage	2 nd stage	1 st stage
Top Startup Ecosystems	0.045	0.004	0.046	0.003	0.045	0.005	0.045	0.004
	(0.034)	(0.114)	(0.034)	(0.114)	(0.034)	(0.114)	(0.033)	(0.114)
Average Industry Experience	-0.003	-0.044 ^{***}	-0.002	-0.044 ^{***}	-0.003	-0.044 ^{***}	-0.002	-0.044 ^{***}
	(0.003)	(0.008)	(0.003)	(0.008)	(0.003)	(0.008)	(0.003)	(0.008)
MBA	0.088 [*]	-0.510 ^{***}	0.088 [*]	-0.510 ^{***}	0.096 [*]	-0.510 ^{***}	0.096 [*]	-0.509 ^{***}
	(0.050)	(0.157)	(0.050)	(0.157)	(0.049)	(0.157)	(0.049)	(0.157)
PhD	0.136 ^{***}	-0.292 [*]	0.130 ^{**}	-0.291 [*]	0.142 ^{***}	-0.294 [*]	0.136 ^{***}	-0.293 [*]
	(0.048)	(0.160)	(0.047)	(0.160)	(0.047)	(0.159)	(0.047)	(0.159)
Size of the Entrepreneurial Team	0.098 ^{***}	-0.169 ^{**}	0.099 ^{***}	-0.169 ^{**}	0.102 ^{***}	-0.169 ^{**}	0.102 ^{***}	-0.169 ^{**}
	(0.021)	(0.066)	(0.021)	(0.066)	(0.021)	(0.066)	(0.021)	(0.066)
Previous New Ventures	0.071 [*]	-0.271 ^{**}	0.073 [*]	-0.270 ^{**}	0.063 [*]	-0.271 ^{**}	0.066 [*]	-0.271 ^{**}
	(0.037)	(0.122)	(0.037)	(0.122)	(0.037)	(0.122)	(0.037)	(0.122)
Entrepreneur Past Successful Funding Experience	0.121 ^{**}	-0.084	0.102 [*]	-0.085	0.001	-0.086	-0.003	-0.087
	(0.054)	(0.177)	(0.053)	(0.177)	(0.064)	(0.177)	(0.064)	(0.177)
Patents	0.139 ^{**}	-0.121	0.002	-0.130	0.121 [*]	-0.121	0.002	-0.133
	(0.067)	(0.379)	(0.078)	(0.382)	(0.066)	(0.376)	(0.077)	(0.380)
B2B	-	-0.596 ^{***}	-	-0.596 ^{***}	-	-0.599 ^{***}	-	-0.598 ^{***}
	-	(0.119)	-	(0.119)	-	(0.118)	-	(0.118)
Crowdfunding	-0.261 ^{**}	-	-0.291 ^{**}	-	-0.278 ^{***}	-	-0.302 ^{***}	-
	(0.112)	-	(0.113)	-	(0.106)	-	(0.107)	-
Crowdfunding X Patents	-	-	0.482 ^{***}	-	-	-	0.429 ^{***}	-
	-	-	(0.144)	-	-	-	(0.144)	-
Crowdfunding X Entrepreneur Past Successful Funding Experience	-	-	-	-	0.350 ^{***}	-	0.312 ^{***}	-
	-	-	-	-	(0.104)	-	(0.104)	-
Year of Establishment (dummies)	Included	Included	Included	Included	Included	Included	Included	Included
Subcategories (dummies)	Included	Included	Included	Included	Included	Included	Included	Included
Constant	0.417 ^{***}	0.897 ^{***}	0.431 ^{***}	0.897 ^{***}	0.411 ^{***}	0.894 ^{***}	0.423 ^{***}	0.894 ^{***}
	(0.132)	(0.313)	(0.131)	(0.313)	(0.128)	(0.314)	(0.128)	(0.314)
<i>N. obs. initial sample</i>	625	625	625	625	625	625	625	625
<i>N. obs. initial sample of crowd-funded new ventures</i>	325	325	325	325	325	325	325	325
<i>LR test of independent equations (p-value)</i>	0.604	-	0.630	-	0.423	-	0.458	-

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

3.4.3 Marginal effects

The above results and consequent considerations rely on observing the coefficients of direct and interaction terms in a probit regression model under a matched sample. However, in a probit model coefficients do not provide a sufficient basis to draw reliable statistical conclusions on the interaction effects (Zelner, 2009). Therefore, to increase reliability of the results, following the approach suggested in the literature (e.g., Zelner, 2009) it was verified the statistical significance of the marginal change in the likelihood of securing subsequent funding from VCs when switching from being a VC-backed venture to being a CF-backed venture (moving the variable Crowdfunding from zero to one), at different values of the variables Patents and Entrepreneur Past Successful Funding Experience, while setting the remaining variables equal to zero if binary (except baseline year and industry dummies), or to the sample mean if continuous or integer. As such, based on the estimates obtained under the matched sample (see last column of Table 4), Figure 2 present four scenarios where the two moderators take values of 0 or 1 and then the values of the vertical axis measure the change in probability of attracting follow up funds from VCs when switching the Crowdfunding variable from 0 to 1. To illustrate, when the variable Entrepreneur Past Successful Funding Experience is 0 and there is at least one patent (right part of Figure 1a) the switch from no CF to CF has no effect on the probability of raising follow up funds as the confidence interval (i.e., the vertical bar) includes 0. This implies that as long as there is a patent, being funded through CF is equivalent to being initially funded by VCs in the eyes of subsequent VCs. Similarly, as shown in Figure 1b, as long as there is successful funding experience of the entrepreneurial team, whether initial funds originate from Early-stage VCs or CF makes no difference in the eyes of subsequent VCs, irrespective of whether there is a patent or not. Overall, the marginal effects analysis further strengthens the findings, adding the important point that the presence of patents and the entrepreneurial team's experience in securing funding for and/or successfully selling previously founded ventures, can increase the certification effect of reward-based CF and make it equivalent to that of prior funding from VCs.

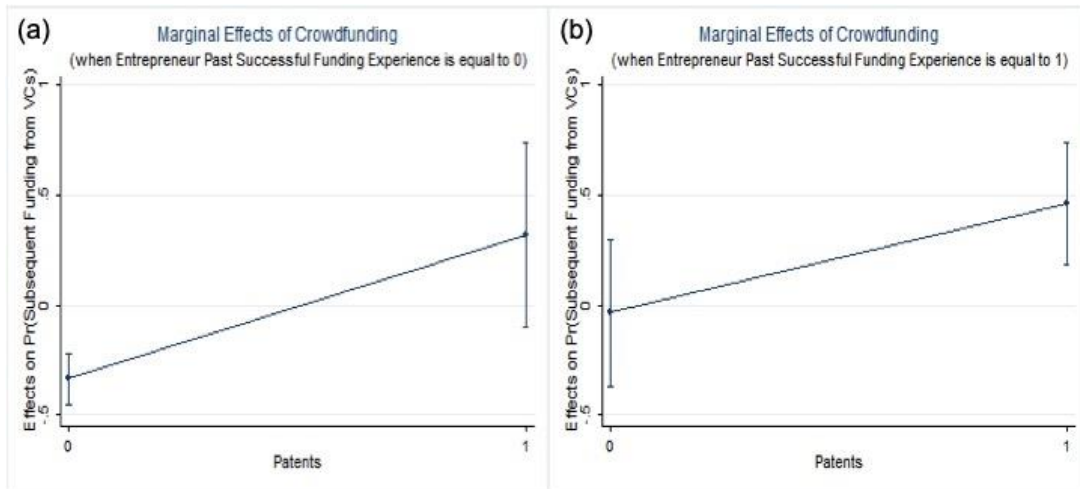


Figure 2: Marginal effects (RQ1)

3.4.4 Robustness checks

This section provides additional evidence to increase the confidence that the results obtained under the matched samples are robust to different sample specifications. Specifically, robustness of the results is tested by considering different thresholds for including crowdfunded ventures in the sample. First, to further reduce the risk of considering non-entrepreneurial crowdfunded projects, two additional probit analyses were performed where the selection threshold on the pledged amount is increased to \$10,000 and \$20,000, respectively. As showed in Table 6 and 7, findings are fully robust across these different sample specifications. Furthermore, the results in Table 8 and 9 demonstrate robustness of findings also when the goal rather than the pledged amount is utilized as a threshold for inclusion among the crowdfunded ventures. Specifically, in line with previous CF studies (e.g., Mollick & Nanda, 2016) the \$5,000 threshold on the raised amount was replaced with a \$5,000 threshold on the campaign goal and both empirical exercises of previous section were conducted. Conclusions remain again intact. Finally, a new probit analysis was run on the matched sample obtained by including in the matching criteria also the amount raised for the first infusion of finance. The premise is that ventures that have raised similar amounts either from Early-stage VCs or from CF, may be at similar odds of attracting follow up funds. Table 10 presents the results of such analysis, which confirm again the conclusions.

Table 6: Probit regression models for the matched sample (threshold on pledged amount in crowdfunding equal to \$10,000)

	No interactions	<i>Crowdfunding interacted with Patents</i>	<i>Crowdfunding interacted with Entrepreneur Past Successful Funding Experience</i>	All interactions
Top Startup Ecosystems	0.055 (0.181)	0.043 (0.184)	0.033 (0.182)	0.028 (0.185)
Average Industry Experience	-0.021 (0.012)	-0.015 (0.013)	-0.021 (0.013)	-0.015 (0.013)
MBA	0.245 (0.264)	0.296 (0.270)	0.262 (0.268)	0.306 (0.273)
PhD	0.045 (0.254)	0.074 (0.256)	0.090 (0.254)	0.121 (0.257)
Size of the Entrepreneurial Team	0.256** (0.103)	0.276*** (0.106)	0.278*** (0.102)	0.294*** (0.104)
Previous New Ventures	0.203 (0.184)	0.232 (0.186)	0.170 (0.190)	0.210 (0.191)
Entrepreneur Past Successful Funding Experience	0.904*** (0.274)	0.810*** (0.280)	0.386 (0.349)	0.341 (0.354)
Patents	0.532 (0.362)	-0.336 (0.443)	0.452 (0.367)	-0.366 (0.432)
Crowdfunding	-0.995*** (0.178)	-1.187*** (0.190)	-1.197*** (0.200)	-1.373*** (0.211)
Crowdfunding X Patents	- -	2.554*** (0.738)	- -	2.546*** (0.742)
Crowdfunding X Entrepreneur Past Successful Funding Experience	- -	- -	1.155** (0.480)	1.090** (0.485)
Year of Establishment (dummies)	Included	Included	Included	Included
Subcategories (dummies)	Included	Included	Included	Included
Constant	-0.282 (0.736)	-0.284 (0.693)	-0.266 (0.738)	-0.262 (0.697)
<i>N. obs initial sample</i>	616	616	616	616
<i>N. obs initial sample of crowdfunded new ventures</i>	316	316	316	316
<i>N. obs one-to-one matched sample</i>	278	278	278	278
<i>Pseudo R²</i>	0.234	0.268	0.249	0.281

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Probit regression models for matched sample (threshold on pledged amount in crowdfunding equal to \$20,000)

	No interactions	Crowdfunding interacted with Patents	Crowdfunding interacted with Entrepreneur Past Successful Funding Experience	All interactions
Top Startup Ecosystems	0.122 (0.175)	0.132 (0.178)	0.113 (0.175)	0.123 (0.179)
Average Industry Experience	-0.016 (0.013)	-0.013 (0.013)	-0.016 (0.013)	-0.012 (0.013)
MBA	0.287 (0.262)	0.309 (0.257)	0.340 (0.263)	0.350 (0.259)
PhD	0.045 (0.282)	0.144 (0.293)	0.124 (0.277)	0.217 (0.289)
Size of the Entrepreneurial Team	0.289*** (0.100)	0.324*** (0.104)	0.306*** (0.102)	0.337*** (0.107)
Previous New Ventures	0.295 (0.190)	0.333* (0.191)	0.277 (0.192)	0.326* (0.194)
Entrepreneur Past Successful Funding Experience	0.515* (0.291)	0.344 (0.301)	-0.064 (0.361)	-0.161 (0.365)
Patents	0.996** (0.461)	-0.079 (0.493)	0.861* (0.475)	-0.135 (0.494)
Crowdfunding	-1.170*** (0.184)	-1.361*** (0.200)	-1.341*** (0.203)	-1.521*** (0.220)
Crowdfunding X Patents	- -	2.712*** (0.801)	- -	2.696*** (0.815)
Crowdfunding X Entrepreneur Past Successful Funding Experience	- -	- -	1.251** (0.496)	1.184** (0.504)
Year of Establishment (dummies)	Included	Included	Included	Included
Subcategories (dummies)	Included	Included	Included	Included
Constant	-0.695 (0.662)	-0.998 (0.674)	-0.806 (0.669)	-1.090 (0.685)
<i>N. obs initial sample</i>	590	590	590	590
<i>N. obs initial sample of crowd-funded new ventures</i>	290	290	290	290
<i>N. obs one-to-one matched sample</i>	276	276	276	276
<i>Pseudo R²</i>	0.245	0.277	0.258	0.289

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Probit regression models for matched sample (threshold on goal in crowdfunding equal to \$5,000)

	No interactions	Crowdfunding interacted with Patents	Crowdfunding interacted with Entrepreneur Past Successful Funding Experience	All interactions
Top Startup Ecosystems	0.223 (0.165)	0.177 (0.169)	0.227 (0.167)	0.185 (0.170)
Average Industry Experience	-0.015 (0.013)	-0.014 (0.014)	-0.016 (0.013)	-0.015 (0.013)
MBA	0.293 (0.231)	0.233 (0.237)	0.361 (0.240)	0.290 (0.245)
PhD	0.400* (0.232)	0.452* (0.231)	0.414* (0.240)	0.468* (0.239)
Size of the Entrepreneurial Team	0.273*** (0.089)	0.283*** (0.091)	0.301*** (0.090)	0.307*** (0.092)
Previous New Ventures	0.186 (0.173)	0.204 (0.174)	0.166 (0.178)	0.192 (0.180)
Entrepreneur Past Successful Funding Experience	0.591** (0.262)	0.499* (0.270)	-0.095 (0.338)	-0.127 (0.339)
Patents	0.672* (0.403)	-0.304 (0.514)	0.541 (0.400)	-0.342 (0.500)
Crowdfunding	-0.994*** (0.164)	-1.121*** (0.172)	-1.219*** (0.184)	-1.324*** (0.191)
Crowdfunding X Patents	-	2.477*** (0.830)	-	2.402*** (0.822)
Crowdfunding X Entrepreneur Past Successful Funding Experience	-	-	1.520*** (0.476)	1.427*** (0.480)
Year of Establishment (dummies)	Included	Included	Included	Included
Subcategories (dummies)	Included	Included	Included	Included
Constant	-0.949 (0.801)	-1.046 (0.809)	-0.850 (0.720)	-0.952 (0.736)
<i>N. obs initial sample</i>	613	613	613	613
<i>N. obs initial sample of crowdfunded new ventures</i>	313	313	313	313
<i>N. obs one-to-one matched sample</i>	302	302	302	302
<i>Pseudo R²</i>	0.197	0.221	0.220	0.241

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Treatment effect regression model (threshold on goal in crowdfunding equal to \$5,000)

	No interaction		Crowdfunding interacted with Patents		Crowdfunding interacted with Entrepreneur Past Successful Funding Experience		All interactions	
	2 nd stage	1 st stage	2 nd stage	1 st stage	2 nd stage	1 st stage	2 nd stage	1 st stage
Top Startup Ecosystems	0.042	0.021	0.043	0.020	0.042	0.022	0.042	0.022
	(0.035)	(0.116)	(0.034)	(0.116)	(0.034)	(0.116)	(0.034)	(0.116)
Average Industry Experience	-0.003	-0.045***	-0.002	-0.046***	-0.003	-0.046***	-0.002	-0.046***
	(0.003)	(0.009)	(0.003)	(0.008)	(0.003)	(0.008)	(0.003)	(0.008)
MBA	0.088*	-0.498***	0.089*	-0.498***	0.096*	-0.497***	0.096*	-0.497***
	(0.051)	(0.158)	(0.050)	(0.158)	(0.050)	(0.159)	(0.050)	(0.159)
PhD	0.138***	-0.312*	0.132***	-0.311*	0.145***	-0.314*	0.139***	-0.313*
	(0.048)	(0.161)	(0.048)	(0.161)	(0.048)	(0.161)	(0.048)	(0.161)
Size of the Entrepreneurial Team	0.098***	-0.167**	0.099***	-0.167**	0.102***	-0.168**	0.102***	-0.168**
	(0.021)	(0.067)	(0.021)	(0.067)	(0.021)	(0.067)	(0.021)	(0.067)
Previous New Ventures	0.072*	-0.272**	0.074*	-0.272**	0.065*	-0.273**	0.067*	-0.272**
	(0.038)	(0.124)	(0.038)	(0.124)	(0.038)	(0.123)	(0.038)	(0.123)
Entrepreneur Past Successful Funding Experience	0.118**	-0.053	0.099*	-0.055	-0.000	-0.056	-0.004	-0.057
	(0.054)	(0.178)	(0.054)	(0.178)	(0.065)	(0.178)	(0.064)	(0.178)
Patents	0.137**	-0.108	0.002	-0.118	0.119*	-0.108	0.001	-0.120
	(0.067)	(0.381)	(0.078)	(0.384)	(0.067)	(0.377)	(0.078)	(0.382)
B2B	-	-0.618***	-	-0.617***	-	-0.620***	-	-0.619***
	-	(0.120)	-	(0.120)	-	(0.120)	-	(0.120)
Crowdfunding	-0.256**	-	-0.287**	-	-0.272**	-	-0.296***	-
	(0.114)	-	(0.116)	-	(0.108)	-	(0.109)	-
Crowdfunding X Patents	-	-	0.478***	-	-	-	0.426***	-
	-	-	(0.145)	-	-	-	(0.145)	-
Crowdfunding X Entrepreneur Past Successful Funding Experience	-	-	-	-	0.345***	-	0.307***	-
	-	-	-	-	(0.105)	-	(0.105)	-
Year of Establishment (dummies)	Included	Included	Included	Included	Included	Included	Included	Included
Subcategories (dummies)	Included	Included	Included	Included	Included	Included	Included	Included
Constant	0.415***	0.910***	0.429***	0.910***	0.408***	0.906***	0.420***	0.907***
	(0.134)	(0.317)	(0.133)	(0.317)	(0.130)	(0.317)	(0.130)	(0.318)
<i>N. obs. initial sample</i>	613	613	613	613	613	613	613	613
<i>N. obs initial sample of crowdfunded new ventures</i>	313	313	313	313	313	313	313	313
<i>LR test of independent equations (p-value)</i>	0.618	-	0.647	-	0.430	-	0.469	-

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Note that, in the first stage regression, when necessary, the variables are computed right before the time of the first funding to properly capture their influence on the decision to use CF.

Table 10: Probit regression models for the matched sample (matching also for the amount received in the first round)

	No interactions	Crowdfunding interacted with Patents	Crowdfunding interacted with Entrepreneur Past Successful Funding Experience	All interactions
Top Startup Ecosystems	0.133 (0.225)	0.124 (0.229)	0.110 (0.231)	0.097 (0.234)
Average Industry Experience	-0.014 (0.017)	-0.006 (0.018)	-0.013 (0.017)	-0.007 (0.018)
MBA	0.146 (0.346)	0.181 (0.346)	0.256 (0.355)	0.262 (0.353)
PhD	0.082 (0.291)	0.052 (0.300)	0.082 (0.308)	0.054 (0.313)
Size of the Entrepreneurial Team	0.315** (0.129)	0.341*** (0.132)	0.362*** (0.136)	0.378*** (0.137)
Previous New Ventures	0.224 (0.228)	0.207 (0.229)	0.192 (0.233)	0.196 (0.235)
Entrepreneur Past Successful Funding Experience	1.468*** (0.436)	1.458*** (0.433)	0.498 (0.493)	0.554 (0.512)
Patents	0.536 (0.445)	-0.629 (0.579)	0.437 (0.466)	-0.511 (0.598)
Crowdfunding	-0.927*** (0.212)	-1.104*** (0.229)	-1.116*** (0.228)	-1.253*** (0.243)
Crowdfunding X Patents		1.980*** (0.763)		1.738** (0.806)
Crowdfunding X Entrepreneur Past Successful Funding Experience			2.247*** (0.700)	2.011*** (0.676)
Year of Establishment (dummies)	Included	Included	Included	Included
Subcategories (dummies)	Included	Included	Included	Included
Constant	-1.678* (0.982)	-1.917* (1.002)	-2.039** (0.974)	-2.164** (0.995)
<i>N. obs initial sample</i>	562	562	562	562
<i>N. obs initial sample of crowdfunding new ventures</i>	316	316	316	316
<i>N. obs one-to-one matched sample</i>	186	186	186	186
<i>Pseudo R²</i>	0.268	0.289	0.295	0.309

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3.5 Discussion

The objective of this chapter was comparing the certification effects of different initial funding sources: reward-based CF vs Initial funding from Early-stage VCs. Moreover, this chapter aims to highlight the conditions under which the two funding sources may have the same certification value in the eyes of subsequent VCs. Relying on careful sample selection, matching procedures and treatment effect regression models, applied on a new dataset of 625 hardware ventures, it was demonstrated that securing early funding from reward-based CF rather than from VCs lowers the

likelihood of receiving subsequent funding from such investors. This result evidences a higher certification effect of prior funding from Early-stage VCs compared to reward-based CF. Moreover, findings also suggest that the certification gap between new ventures initially funded by VCs and crowdfunded ones can be diminished by the presence of additional important new venture's attributes, and may even disappear completely. In particular, this occurs when crowdfunded new ventures are able to complement the good performance in CF with patents and entrepreneurial team characteristics (specifically, the past experience of the entrepreneurial team in securing venture capital funding and/or successfully exiting from previously founded ventures), respectively. The mitigating effect of these new venture's attributes indicates that they are more valuable to ventures initially funded via CF than to ventures initially funded by Early-stage VCs. Indeed, while providing important informational benefits related to the market potential of the new venture, a successful crowdfunding campaign is less able than previous funding from Early-stage VCs to reduce the multiple sources of uncertainty suffering subsequent VCs. Thus, it requires the presence of other complementary attributes to a greater extent.

From the results discussed in this chapter, critical contributions to previous literature and several managerial implications for entrepreneurs engaging in crowdfunding can be derived. Such potential contributions and implications are discussed in the final chapter of this thesis.

CHAPTER 4
THE ROLE OF CROWDFUNDING PERFORMANCE
IN ANTICIPATING MARKET PERFORMANCE

4.1 Introduction

This chapter is based on the research article titled “Crowdfunding performance, market performance, and the moderating role of product innovativeness: Evidence from movie industry”. The objective of this chapter is to examine the relationship between reward-based crowdfunding (CF) performance and the future product market performance, and how this relationship is moderated by the degree of innovativeness of the product that the firm intends to commercialize. To investigate the above issue, this chapter conceptualizes a research framework (Figure 3), by grounding the arguments on the similarities between CF performance and online word-of-mouth (eWOM), as well as on the contrasting effects typically associated with product innovativeness (from consumers’ perspective) (Calantone et al., 2006; Chan and Parhankangas, 2017; Chemla and Tinn, 2019; Delmestri et al., 2005; Lee and Colarelli O’Connor, 2003; Liu, 2006; Roma et al., 2018; Stanko and Henard, 2017; Strausz, 2017; Szymanski et al., 2007). This research framework is empirically assessed through a new dataset encompassing data on movie projects. The choice of focusing on such projects is mostly based on the fact that movie industry is typically characterized by large product quality uncertainty, high information asymmetry between firms and consumers, as well as very short product life cycles, thus making movie projects very suitable for the scope of the study. To test the hypotheses, econometric analysis are employed. Specifically, OLS regression models were performed. In addition, as sample selection bias concerns could emerged in the setting, Heckman selection regression models have been used. Moreover, a marginal effect analysis was run to reinforce interpretation of findings.

The chapter is organized as it follows. Firstly, hypotheses are developed. Secondly, sample data and variables, empirical analysis and results are presented. Finally, findings of the study are discussed.

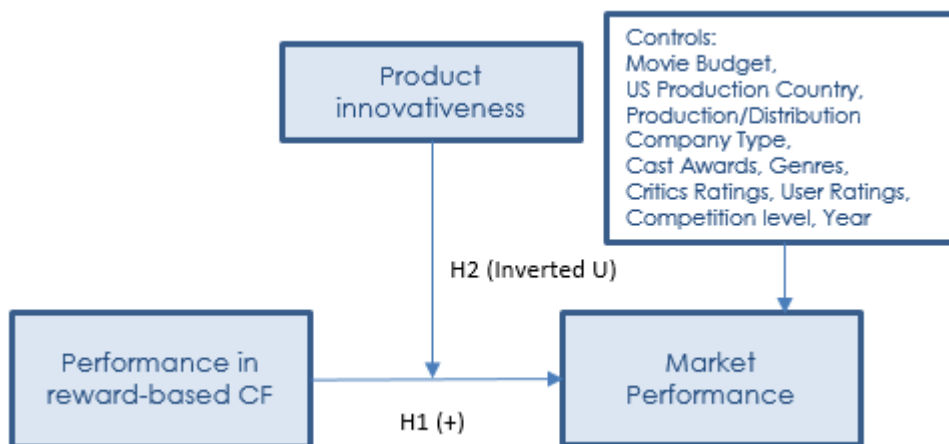


Figure 3: Research Framework (RQ2)

4.2 H1: The role of reward-based CF as a predictor of market performance

This thesis advances that the reward-based CF performance can predict the future market performance of the commercialized product, and this should hold particularly for experience goods, such as movies. Movies are indeed characterized by considerable demand uncertainty and product-quality information asymmetry between firms and consumers (e.g., Basuroy et al., 2006), implying that, when consumers decide to buy movie tickets, they need to rely on (firm and movie) observable attributes to infer their product quality. As such, movie industry represent a suitable setting for testing the effect of new signals (e.g., the reward-based CF performance) on the future market performance of a new product; as a matter of fact, it has been used in many studies investigating the effect of other quality signals (such as production and advertising budgets, star power, critics judgment, awards, and eWOM, among others) on the market performance (Eliashberg and Shugan, 1997; Basuroy et al., 2003, 2006; Reinstein and Snyder, 2005; Liu, 2006; Duan et al., 2008; Gemser et al., 2008; Hennig-Thurau et al., 2009, 2015; Chintagunta et al., 2010; Moon et al., 2010; Broekhuizen et al., 2011; Karniouchina, 2011a, 2011b; Chen et al., 2012; Akdeniz et al., 2013; Liu et al., 2015; Bharadwaj et al., 2017). Beyond the theoretical prediction (Chemla and Tinn, 2017; Strausz, 2017), the argumentations supporting the effectiveness of the performance in reward-based CF as quality signal that can influence the market performance of a product, are based on the similarities between the CF performance and another effective quality signal for experience goods, i.e., eWOM (Reinstein and Snyder, 2005; Liu, 2006; Chen et al., 2012; Hennig-Thurau et al., 2015). First, both signals reflect the voice of consumers because they are typically sent by the potential (reward-based CF) or actual (eWOM) consumers of the product. Second, both signals should be powerful signals as they refer to mechanisms able to spread reliable information to other potential consumers: on the one hand, eWOM especially in movie industry is often generated by consumers who, driven by enthusiasm or negative feelings, share within their networks their opinions shortly after they have “consumed” the product (Liu, 2006); on the other hand, as largely discussed, the reward-based CF performance is the result of a risky and early-in-advance economic commitment from consumers (Strausz, 2017). In addition, similar to eWOM channels, CF platforms are conceived to activate and exploit the full power of word-of-mouth within and outside the CF community, by including comments sections and links to social media (Burtch et al., 2013; Stanko and Henard, 2017; Gleasure et al., 2019). The main difference between eWOM and reward-based CF performance lies in the time in which the signal is sent. That is, eWOM is usually generated right before and even shortly after the movie is released (e.g., Basuroy et al., 2006; Bharadwaj et al., 2017), whereas reward-based CF performance occurs much earlier than the (possible) release in the market (Strausz, 2017; Roma et al., 2018). This may

imply a comparatively less effectiveness of the CF performance signal, because the crowdfunded movie project may still fail or result in a product that does not meet fans' early expectations in terms of quality due to a number of technical and/or contractual reasons occurring during the development (Strausz, 2017; Chemla and Tinn, 2019). Nevertheless, this potential predictive disadvantage can be compensated by the fact that consumers in reward-based CF commit to invest their money to pre-order the product before its development is completed, thus facing the risk of losing their investment if the development process fails. Such an early and risky commitment of some consumers should offer valuable indication of product quality to consumers who are potentially active upon product commercialization. On the contrary, eWOM information is generated at no risk and commitment for consumers, which should decrease its signaling efficacy, comparatively speaking. Therefore, it is argued that, balancing between the positive and negative aspects of its nature of early and risky signal, the reward-based CF performance can work as an indication of movie quality in a manner similar to eWOM, and thus effectively anticipate the movie box office performance. Accordingly, the first hypothesis is formulated as it follows:

H1: The performance of a movie project in the reward-based CF campaign is positively associated with its subsequent box office performance.

4.3 H2 The moderating role of product innovativeness

In addition to the above argument, it is argued that the positive relationship between reward-based CF performance and market performance is moderated in a non-trivial manner by the degree of product innovativeness. Actually, the ability of the reward-based CF performance of anticipating market performance depends on how novel the product is to the targeted market, and specifically, on how the degree of novelty of the product affects the extent to which the consumers contributing to the campaign reflect consumers in the final market (i.e., when the product is fully commercialized). To elaborate in greater detail this arguments, it is useful to discuss first the effects of product innovativeness on product market performance, both as a direct driver of higher or lower performance and as a moderator of other determinants.

The effect of product innovativeness on market performance has been largely investigated in innovation management literature, with contrasting results (Szymanski et al., 2007; Rubera and Kirca, 2012). Both positive and negative effects have been documented, as well as insignificant effect (Song and Montoya-Weiss 1998; Henard and Szymanski, 2001; Szymanski et al., 2007; McNally et al., 2010). According to some authors, the insignificance of the relationship may stem from different reasons. For instance, it may depend on the perspective considered when evaluating innovativeness (i.e., consumers versus firms perspectives) or on the emergence of two main contrasting effects. This study consider product innovativeness from consumers' perspective, that is, how novel the product

is to consumers and how much they have to change their behavior to adapt to the new product (Garcia and Calantone, 2002; McNally et al., 2010; Menguc et al., 2014). When the effect of product innovativeness is examined from this perspective, two contrasting effects emerge. On the one hand, the novelty of the product can be naturally beneficial to consumers by improving their ability to satisfy their needs/wants, and thus their overall utility (Szymanski et al., 2007). Consequently, product innovativeness can confer product advantage (i.e., superiority over competitors' offerings) to firms, and thus indirectly influences market performance (Calantone et al., 2006). On the other hand, highly innovative products are usually hardly understood by consumers and, at the same time, they may require them to change habits, views and/or too high learning costs (Calantone et al., 2006; Delmestri et al., 2005; Menguc et al., 2014). Balancing between these two opposite effects, Kleinschmidt and Cooper (1991) have documented that the relationship between product innovativeness and product market performance, is U-shaped, meaning that both higher and lesser innovative products are likely to perform better than those moderately innovative. More recently, product innovativeness has been decomposed in technological, marketing and customer discontinuities, and marketing discontinuity have been shown to negatively influence product market performance (McNally et al., 2010). Interestingly, an inverted U-shaped relationship between product innovativeness and market performance has been instead documented when looking at product innovativeness from firm perspective (Story et al., 2015).

Some recent CF studies have examined the role of product innovativeness on the reward-based CF performance, assimilating the CF campaign to a market and using arguments similar to those discussed above (Chan and Parhankangas, 2017; Oo et al., 2019). For instance, Chan and Parhankangas (2017) have found that more innovative products are riskier to develop, harder for crowdfunders to understand, and thus likely result in less favorable funding outcomes.

The role of product innovativeness as a moderator has received much less attention (Olson et al., 1995; Lee and Colarelli O'Connor, 2003; Langerak and Hultink, 2006; Salomo et al., 2007). For instance, Olson et al. (1995) have documented that more participative mechanisms in new product development result in more effective market outcomes when developing product concepts that are unfamiliar to both firm and potential customers. Lee and Colarelli O'Connor (2003) have instead shown that product innovativeness moderates the impact of different communication strategies adopted for new product launch on its market performance. Specifically, firms developing more innovative products would benefit more from pre-announcing the new product launch as well as from emotional rather than functional advertising, in part due to the negative effects of product innovativeness (Lee and Colarelli O'Connor, 2003).

By grounding on the contrasting effects typically associated with product innovativeness (from consumers' perspective), this study advances that product innovativeness moderates the relationship between performance in reward-based CF and market performance of experience goods, such as movies, in a non-trivial manner. In particular, it is argued that when product innovativeness is relatively small, an increase in this variable triggers the ability of the reward-based CF performance to predict the future product market performance. Due to the natural benefits associated with product novelty (Calantone et al., 2006; Szymanski et al., 2007), a higher degree of product innovativeness should attract to contribute in the campaign not only product hardcore fans (or aficionados, pioneers, expert consumers), but also consumers more representative of the future market when the new product will be commercialized. However, if product innovativeness increases too much, only hardcore fans are likely to contribute to the projects, given that they possess the attitudes/knowledge/passion to understand the innovative features and meanings of the new movie. On the contrary, general consumers will be less likely attracted to contribute to the CF campaign because, in this case, they hardly understand (and hence appreciate) project features and meanings which are completely unfamiliar to them, and that require to spend much effort for learning them (Lee and Colarelli O'Connor, 2003; Delmestri et al., 2005; Chan and Parhankangas, 2017). As such, consumer less representative of the future market (e.g., hardcore fans) will contribute to the CF campaign, thus reducing the predictive ability of the reward-based CF performance. In other words, the predictive ability of reward-based CF performance relies on the extent of representativeness of the crowd with respect to the consumers that will be active when the product will be fully commercialized; this predictive ability increases with product innovativeness as long as the latter is not too high. Therefore, the second hypothesis is formulated as it follows:

H2: The degree of innovativeness of a movie moderates the relationship between reward-based CF performance and box office performance in an inverted U-shaped manner.

4.4 Empirical investigation

4.4.1 Data and Variables

To test the above hypotheses, it was built a new dataset encompassing data on CF campaigns displayed in the category Cinema & Video of Kickstarter platform from January 2010 until the end of April 2017. Data were gathered from Kickstarter because it is one of the most popular reward-based CF platforms, with a long record of movie projects campaigns promoted. During the considered period, 15,239 CF campaigns belonging to such category were founded on Kickstarter. However, after deleting projects that were not related to movies (e.g., those included in the subcategories of Cinema & Video, such as Festivals, Music Videos, Television and Webseries), and those for which necessary information on movie characteristics were missing, the final dataset comprises 1,137 movie

campaigns. According to prior related research, data on movie projects were retrieved from some dedicated movie databases, namely Imdb.com (professional version), BoxOfficeMojo, Rotten Tomatoes, and The Numbers (e.g., Karniouchina, 2011b; Akdeniz et al., 2013; Bharadwaj et al., 2017).

The 1,137 movie projects encompass both movies first released through cinemas (152) and movies commercialized directly through other distribution channels, e.g., video streaming platforms, TVs, etc. (985). Since the goal is to investigate the role of the CF performance as a predictor of the market performance of movie projects (e.g., their generated revenue), analyses will focus mainly on the subgroup of movies released to *cinemas*. This is because revenue of these movies is easily accessible through box office results, whereas information on revenue is usually undisclosed for movies commercialized through other distribution channels. However, given that potential endogeneity concerns may affect estimates (as explained in the next section), Heckman selection regression model including all the 1,137 observations was run. At any rate, note that the size of the sample of movies released to theater is fully consistent with all prior related literature on movie industry (e.g., Basuroy et al., 2003, 2006; Liu, 2006; Gemser et al., 2008; Hennig-Thurau et al., 2015; Chintagunta et al., 2010; Moon et al., 2010; Karniouchina, 2011a; Chen et al., 2012; Liu et al., 2015; Bharadwaj et al., 2017).

The *dependent variable*, i.e., the market performance of the movies released to theaters (*Box Office Gross*) is measured by relying on the information about box office revenues provided by the above mentioned movie databases.

The main *independent variable* used to test both hypotheses H1 and H2, is the performance in the reward-based CF campaign, measured by the amount of money reached at the end of the campaign irrespective of whether the goal has been met or not (*Pledged Amount*). Data regarding this variable are retrieved directly from Kickstarter².

To test hypothesis H2, it was introduced both linear and quadratic interactions of the above variable *Pledged Amount* with a measure of the degree of movie innovativeness (*N_i Inverse Innovativeness*). Such a measure takes into account how much frequent the combination of keywords and genres of a given movie is in the entire universe of movies included in ImdbPro. To build this variable, first, data about all the movies available in the ImdbPro database and released in the years 2010-2018 were

² The performance in reward-based CF is the sum of the contributions provided by backers usually in exchange of a reward, e.g., the ticket for the movie or the possibility to watch the movie in streaming. The box office revenues of the movie does not account for the tickets already sold through the CF platform, which instead are part of the budget spent for developing and producing the movie. This evidence allows to exclude that backers contributions determine both the CF performance and the market performance of the movie.

collected. Specifically, for all these movies, there were retrieved 1) genres, which identify the main narrative and stylistic categories as well as the main driving forces of the movie story and 2) keywords, describing in detail the topics treated by the movie. Second, by considering all genres and keywords of movies listed in ImdbPro, it was built a matrix containing the number of occurrences of each possible genre-keyword couple and thus to compute the number of occurrences of the genre-keyword couples for each movie in the sample (1,137 movies). The rationale behind using the number of occurrences of its genre-keyword couples to measure the degree of innovativeness of a movie is that the less frequent a given topic (as captured by the keywords) is in association with the genres where the given movie is categorized (e.g., movies addressing topics less considered in the cinema history or movies dealing with frequent topics but under new narrative and/or stylistic perspectives), the higher the innovativeness of the movie. Finally, to take into account the fact that some genres (keywords) are more frequent irrespective of their combination with a specific keyword (genre), the number of occurrences of each genre-keyword couple in our sample was weighted by the total occurrences of the given genre and the given keyword, respectively. Therefore, mathematically, the degree of innovativeness is computed as:

$$N_i = \sum_{g \in G_i} \sum_{k \in K_i} \left(\frac{\sum_{g=1}^G f_{gk} \cdot \sum_{k=1}^K f_{gk}}{\left(\sum_{g=1}^G \sum_{k=1}^K f_{gk} \right)^2} f_{gk} \right)$$

where g indicates the given genre, k indicates the given keyword, i is the subscript indicating the given movie in our sample, G is the total number of genres available in the movie universe of ImdbPro, K is the total number of keywords available in the same movie universe, G_i is the set of genres associated with movie i , K_i is the set of keywords associated with movie i , f_{gk} is the number of occurrences of the couple identified by genre g and keyword k , and N_i is the resulting measure of innovativeness of movie i (Roma et al., 2020a). This measure is, by construction, inversely related to the innovativeness of movie because, as mentioned, the higher the frequency of the genre-keyword couples associated with a movie, the lower its degree of innovativeness. The use of such a complex measure of movie innovativeness reflects the challenging task of operationalizing product innovativeness (McNally et al., 2010). Previous work have usually measured product innovativeness by relying on the qualitative assessment of managers/experts/consumers by means of surveys (Kleinschmidt and Cooper, 1991; Calantone et al., 2006; McNally et al., 2010; Chan and Parhankangas, 2017), but this approach is hardly applicable to movie projects as it requires watching each movie. At any rate, similar approach to that used in this context has been used in other studies focusing on innovation issues in movie industry (e.g., Perretti and Negro, 2007).

In addition to the variables of interest, in line with the prior literature, a number of control variables was introduced for controlling for movie characteristics that may influence the market performance of a movie. Specifically, it was controlled for the total budget spent for the movie production (*Movie Budget*) and for the production country, i.e., whether the movie is produced in the US or in another country (*US Production Country*). Since movie projects produced and distributed by more relevant companies may have higher odds of success in the market, it was also controlled for the different relevance of different producers/distributors. In particular, by relying on the traditional industry classification of these companies in Major, Mini-Major and Independent production/distribution companies (e.g., Wherry and Schor, 2015), it was introduced an ordinal variable (*Production/Distribution Company Type*), which is equal to 2, 1, or 0 depending on whether the company producing/distributing the given movie is classified as Major, Mini Major or Independent, respectively. Major producers/distributors are those often referred as the “Big Six”, namely: Universal Pictures, Paramount Pictures, 20th Century Fox, Columbia Pictures, Warner Bros. Pictures, Walt Disney Pictures (Katz, 2017). Mini Major include: Lionsgate Films, Metro-Goldwyn-Mayer, DreamWorks SKG, The Weinstein Company (Wherry and Schor, 2015). Finally, the Independent category encompasses all the other cinematographic producers/distributors. Moreover, it was also introduced a dummy variable (*Actors/Directors/Writers Nominations/Awards*) which accounts for the cast celebrity and their past successes (e.g., in terms of awards won or nominations). To calculate this variable, six of the most important international film award ceremonies/festivals were considered, namely the Academy Awards, the Golden Globes, the British Academy Film Awards, the Cannes Film Festival, and the Berlin International Film Festival, and the Venice Film Festival. In addition, it was introduced a variable (*N. of Movies in Theaters in the Same Months and Genre*) computed as the number of movies of the same genre released to theaters during the month when the movie was released for the first time, which accounts for the competition faced by each movie. Moreover, to control for the effect of both critics’ and early users’ ratings on the market performance of the movie, there were introduced two variables: “Critics Ratings”, measured by the average vote of professional critics for a given movie as provided by Rotten Tomatoes website, and “User Ratings”, computed as the vote casted by IMDb registered users for the given movie. In line with previous literature, it was also controlled for the direct effect of the product innovativeness by including the linear and quadratic level forms of the variable N_i *Inverse Innovativeness* (Kleinschmidt and Cooper, 1991). Finally, it was controlled for the different genres of each movie by introducing four dummies, namely “*Comedy and Musical*”, “*Drama*”, “*Documentary*” and “*Other Genres*”, and for the year when the movie was released to theaters by introducing nine dummies from 2010 to 2018 (*Year of release 201x*).

4.4.2 Testing hypotheses: econometric analysis and findings

Table 11 reports the correlation matrix of all the variables included in the analysis. It does not suggest a considerable degree of correlation. Variance Inflation Factor (VIF) computed after performing the regression models is indeed less than 10 for all the variables. Table 12 and 13 report the descriptive statistics for the subsample of movies released to theaters (152 movies) and for the full sample including also movie commercialized through other distribution channels (1,137 movies), respectively. As expected, it emerges that, compared to CF movie projects belonging to the full sample, movies first released to theaters have invested higher budgets for their production, have more prestigious members in the cast, and have been more successful in CF collecting a more than double amount pledged as compared to the others. Irrespective of the considered sample instead, movies are mostly produced/distributed in USA, by independent or mini-major companies, and belong mostly to *Documentary* and *Drama*’ categories.

Table 11: Correlation Matrix (for the sample of 152 movies released to theaters)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Pledged Amount (ln)												
(2) N_i (Inverse Innovativeness) (ln)	-0.04											
(3) Critics Ratings	-0.01	-0.01										
(4) User Ratings	0.02	-0.03	0.33*									
(5) N. Movies in Theaters in the Same Month and Genre (ln)	0.07	-0.01	0.09	-0.02								
(6) Movie Budget (ln)	0.35*	-0.10	-0.03	0.01	-0.09							
(7) US Production Country	-0.12	0.07	-0.14	-0.10	0.01	-0.07						
(8) Production/Distribution Company Type	-0.19*	-0.01	-0.07	-0.03	-0.16*	0.40*	0.02					
(9) Actors/Directors/Writers Nominations/Awards	0.05	0.09	-0.08	-0.04	0.01	0.25*	0.14	0.24*				
(10) Comedy and Musical	0.16	-0.05	-0.23*	-0.10	0.05	0.22*	-0.08	-0.05	0.07			
(11) Drama	-0.01	0.24*	-0.11	-0.30*	0.21*	0.06	0.16*	0.16*	0.16	-0.12		
(12) Documentary	-0.01	-0.22*	0.32*	0.44*	-0.01	-0.21*	-0.12	-0.24*	-0.19*	-0.28*	-0.82*	
(13) Other Genres	-0.09	0.04	-0.28*	-0.29*	-0.46*	0.13	0.02	0.26*	0.05	-0.04	-0.13	-0.30*

The significance level is equal to 0.05. For ease of exposition, the coefficients related to the Year of Release dummies are not included. However, they do not display correlation coefficients larger than 0.306 in absolute value.

Table 12: Descriptive Statistics (152 observations)

Variables	Mean	Std. Dev.	Min	Max
Box Office Gross (\$) (Dep. variable)	651,243.7	3,964,147	2,021	46,900,000
Pledged Amount	140,585.9	528,398.7	168	5,702,153
N_i (Inverse Innovativeness)	0.503	1.199	0	8.396
Critics Ratings	6.645	1.266	0	8.5
User Ratings	6.907	0.950	3.9	9
N. Movies in Theaters in the Same Month and Genre	448.947	425.126	12	3,593
Movie Budget	840,570.9	3,486,781	5,000	30,000,000
US Production Country	0.822	0.383	0	1
Production/Distribution Company Type	0.092	0.405	0	2
Actors/Directors/Writers Nominations/Awards	0.079	0.271	0	1
Comedy and Musical	0.039	0.195	0	1
Drama	0.263	0.442	0	1
Documentary	0.651	0.478	0	1
Other Genres	0.046	0.210	0	1
Release Year 2010	0.013	0.114	0	1
Release Year 2011	0.026	0.161	0	1
Release Year 2012	0.112	0.316	0	1
Release Year 2013	0.224	0.418	0	1
Release Year 2014	0.257	0.438	0	1
Release Year 2015	0.230	0.422	0	1
Release Year 2016	0.125	0.332	0	1
Release Year 2017	0.013	0.114	0	1
Release Year 2018	0.000	0.000	0	0

Table 13: Descriptive Statistics (1137 observations)

Variables	Mean	Std. Dev.	Min	Max
Pledged Amount (\$)	50,618	217,064.4	168	5,702,153
N_i (Inverse Innovativeness)	0.502	1.055	0	8.396
Movie Budget (S)	355,224.9	2,813,255	1000	65,100,000
US Production Country	0.828	0.379	0	1
Production/Distribution Company Type	0.031	0.226	0	2
Actors/Directors/Writers	0.040	0.197	0	1
Nominations/Awards				
Comedy and Musical	0.089	0.285	0	1
Drama	0.310	0.463	0	1
Documentary	0.473	0.499	0	1
Other Genres	0.128	0.335	0	1
Release Year 2010	0.010	0.098	0	1
Release Year 2011	0.037	0.189	0	1
Release Year 2012	0.087	0.282	0	1
Release Year 2013	0.154	0.361	0	1
Release Year 2014	0.179	0.384	0	1
Release Year 2015	0.212	0.409	0	1
Release Year 2016	0.210	0.408	0	1
Release Year 2017	0.096	0.295	0	1
Release Year 2018	0.014	0.118	0	1
Video Streaming Industry Size (millions of users)	66.157	26.549	20	139.26

As mentioned before, the first empirical test considers only the subsample of movie projects first released to theaters after the CF campaign (i.e., 152 movies). Given the cross-sectional nature of the dataset and the continuous nature of the dependent variable, a standard OLS regression was performed. Table 14 reports the baseline estimates. In the first column, the logarithmic transformation of the variable *Pledged Amount* is introduced in addition to the discussed control variables. Coefficients of the control variables display the expected sign and significance in most of the cases. The coefficients of the variable N_i *Inverse Innovativeness* (both linear and quadratic terms) are largely insignificant, thus contrasting the U-shaped relationship between product innovativeness and product market performance found by some prior literature (Kleinschmidt and Cooper, 1991). On the contrary, an insignificant effect emerges for movie projects (Henard and Szymanski, 2001; Szymanski et al., 2007). More importantly, the coefficient of the variable *Amount Pledged* is positive and significant, suggesting that the performance of a movie launched in the CF campaign is positively associated with its subsequent market performance at the box office, thus confirming hypothesis *H1*. In the second column, to test our hypothesis *H2* the interactions between the variable *Pledged Amount*

and the linear and quadratic terms of the variable N_i *Inverse Innovativeness*, respectively. Most of the control variables remain significant with the expected sign. A notable exception is represented by the linear and quadratic terms of the variable N_i , which now appears to be in accordance with the U-shaped relationship found in prior literature (Kleinschmidt and Cooper, 1991). However, since interaction terms are introduced, the interpretation of the linear and quadratic coefficients of N_i changes, because now they capture the effect of N_i when the variable *Pledged Amount* is set at zero. With regard to the coefficient of the variable *Pledged Amount*, it remains positive and significant. More importantly, the coefficients of the two interaction terms are both significant: the interaction of the variable *Pledged Amount* with the linear term of the variable N_i *Inverse Innovativeness* is positive, whereas the interaction of the same variable with the quadratic term of the measure of product innovativeness is negative. This confirms the hypothesis *H2*, suggesting that, the product innovativeness shapes the effect of a good CF performance on the market performance in an inverted U-shaped manner. That is, as the level of innovativeness of a movie increases (i.e., the inverse measure N_i decreases), the effect of the CF performance on the market performance becomes stronger up to a certain point, and after this point starts decreasing. This means that when the movie is lowly innovative, an increase in its level of innovativeness raises the ability of the reward-based CF performance to anticipate the movie market performance. Indeed, when the level of innovativeness of the product increases, the movie projects will attract to contribute to the CF campaign more contributors representative of the consumers that will be active when the product will be commercialized. However, if the level of innovativeness increases too much, the CF campaign will hardly be able to attract contributors representative of the future market: the extremely novel features and/or meanings of the movie may be too difficult for them to understand and/or appreciate. As a result, the ability of the reward-based CF to predict the success in the market will decrease in this case (Roma et al., 2020a).

Table 14: OLS regression models

	No interactions	All interactions
Pledged Amount (ln)	0.330*** (0.111)	0.598*** (0.168)
N_i (Inverse Innovativeness) (ln)	1.372 (0.977)	1.646** (0.757)
N_i² (Inverse Innovativeness)² (ln)	-0.979 (0.626)	-2.155*** (0.778)
Pledged Amount (ln) * N_i (ln)	-	1.635*** (0.577)
Pledged Amount (ln) * N_i² (ln)	-	-1.720*** (0.539)
Critics rating	0.404*** (0.121)	0.460*** (0.121)
User rating	0.381** (0.148)	0.441*** (0.149)
N. Movies in Theaters in the Same Month and Genre (ln)	-0.368* (0.204)	-0.123 (0.195)
Movie Budget (ln)	0.223** (0.090)	0.294*** (0.086)
US Production Country	0.636* (0.349)	0.803** (0.349)
Production/Distribution Company Type	1.066*** (0.374)	1.209*** (0.384)
Actors/Directors/Writers Nominations/Awards	-0.164 (0.514)	-0.135 (0.516)
Comedy and Musical	-0.398 (1.020)	-0.246 (1.025)
Drama	-1.265 (0.803)	-0.912 (0.824)
Documentary	-1.132 (0.811)	-0.902 (0.832)
Release Year 200x (dummies)	Included	Included
<i>N. obs</i>	152	152
<i>R²</i>	0.983	0.983
<i>adj. R²</i>	0.980	0.980
<i>F (p-value)</i>	0.000	0.000

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The constant has been removed from the regression as movie performance cannot be different from zero if all variables are zero (at any rate results are robust to the inclusion of the constant).

As anticipated earlier, potential bias concerns may arise in this context, due to the fact that some unobserved characteristics might drive both the performance in CF and the choice of the channel (cinemas or other channels) through which movies will be first released. That is, the case could be that movie creators self-select to release first the movie to theaters rather opting for other channels (or vice versa) based on unobserved characteristics, which are correlated to both CF performance and market performance. As a result, movie projects might have different probability of being exposed to different commercialization channels and empirical test should account for this. For this reason, the Heckman selection regression model with the full sample of 1,137 movies was run.

In the first stage the probability of being commercialized through theaters or other channels after the CF campaign is regressed against a number of factors expected to affect the likelihood of channel selection, whereas the second stage regression is simply the regression of interest but it is now corrected to consider that movie projects might have different probability of being exposed to different commercialization channels. To apply the Heckman selection regression model, the first stage regression must include at least one additional predictor that is not correlated with the outcome

of the second-stage regression. In this respect, it was used a proxy of the growth of the video streaming industry (*Video Streaming Industry Size*) by considering the number of paying subscribers of the most important platform in this industry, namely Netflix, within the same time period where the movies in the sample were released. This variable is suitable to the scope of the study for three reasons. First, it is well known that the way consumers gain access to movies and other entertainment products is deeply changed in the last years, with an increasingly larger base of consumers who stream contents via video streaming platforms like Netflix (Morgan, 2019). The growing size of the video streaming industry, is likely to influence the choice of the commercialization channel, since now movies creators have a new relevant distribution option for their product (Morgan, 2019). Second, the size of the video streaming industry should not influence the box office results of a specific movie. The box office gross has been indeed quite stable in the last decade, suggesting that for movies first released to theaters video streaming platforms are not direct substitutes. Third, this variable captures the growth of the video-streaming industry and, it cannot be influenced by the single movie creator based on its own (unobserved) characteristics. This enhance the confidence about its exogeneity (Larcker and Rusticus, 2010).

Table 15 report the results of both first and second stage regressions according to the Heckman procedure. Specifically, the first and second columns present results of regressions without interaction terms, whereas the last two columns shows results of regressions including interactions. As expected, in the first stage regressions, the coefficient of the variable *Video Streaming Industry Size* is negative and significant, suggesting that it is a strong predictor of the channel selection choice. The estimates are fully consistent (even with higher significance) with the baseline estimates, indicating that possible sample selection concerns do not affect results.

Table 15: Heckman selection regression models

	First stage (no interactions)	Second stage (no interactions)	First stage (all interactions)	Second stage (all interactions)
Pledged Amount (ln)	0.363*** (0.052)	0.410*** (0.117)	0.363*** (0.052)	1.004*** (0.241)
N_i (Inverse Innovativeness) (ln)	0.156 (0.122)	1.641* (0.919)	0.156 (0.122)	2.075*** (0.718)
N_i² (Inverse Innovativeness)² (ln)	-	-1.157** (0.588)	-	-2.468*** (0.722)
Pledged Amount (ln) * N_i (ln)	-	-	-	1.341** (0.537)
Pledged Amount (ln) * N_i² (ln)	-	-	-	-1.504*** (0.487)
Critics Ratings	-	0.382*** (0.114)	-	0.419*** (0.112)
User Ratings	-	0.292** (0.149)	-	0.305** (0.145)
N. Movies in Theaters in the Same Month and Genre (ln)	-	-0.511** (0.212)	-	-0.376* (0.208)
Movie Budget (ln)	0.183*** (0.037)	0.259*** (0.088)	0.183*** (0.037)	0.429*** (0.098)
US Production Country	-0.024 (0.143)	0.529 (0.335)	-0.024 (0.143)	0.623* (0.367)
Production/Distribution Company Type	0.195 (0.194)	1.123*** (0.356)	0.195 (0.194)	1.243*** (0.415)
Actors/Directors/Writers Nominations/Awards	0.244 (0.239)	-0.007 (0.497)	0.244 (0.239)	0.238 (0.570)
Comedy and Musical	0.093 (0.325)	-0.207 (0.962)	0.093 (0.325)	-0.110 (1.007)
Drama	0.595** (0.238)	-0.902 (0.789)	0.595** (0.238)	-0.186 (0.863)
Documentary	0.776*** (0.223)	-0.657 (0.821)	0.776*** (0.223)	0.122 (0.911)
Video Streaming Industry Size	-0.014*** (0.002)	-	-0.014*** (0.002)	-
Year of release (dummies)	-	Included	-	Included
Constant	-6.641*** (0.628)	-	-6.641*** (0.628)	-
<i>Total obs.</i>	-	1137	-	1137
<i>Censored</i>	-	985	-	985
<i>Uncensored</i>	-	152	-	152
<i>Wald Chi-square</i>	-	1254.32	-	986.18
<i>p-value</i>	-	0.000	-	0.000
<i>lambda (p-value)</i>	-	0.557 (0.134)	-	1.631 (0.015)
<i>rho</i>	-	0.366	-	0.823
<i>sigma</i>	-	1.522	-	1.980

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01. The constant has been removed from the first stage regression as movie performance cannot be different from zero if all variables are zero (at any rate results are robust to the inclusion of the constant).

4.4.3 Marginal effect analysis

To further test the reliability of the results, it was tested the statistical significance of the marginal change in the likelihood of obtaining higher box office results when switching from low to higher levels of amount pledged (i.e., the reward-based CF performance), at different values of the inverse measure of product innovativeness, while the remaining variables are held to their mean value if continuous or integer, or are set equal to zero if binary (except baseline dummies). Based on the estimate in Table 3 (All interactions), Figure 4 shows that, by reading the plot from right to left, when the variable Inverse Innovativeness decreases (i.e., product innovativeness increases), the marginal effect of an increase in the amount pledged in CF on the subsequent box office gross is statistically significant and increases until a certain point, and after reduces. Hence, Hypothesis 2 is again confirmed.

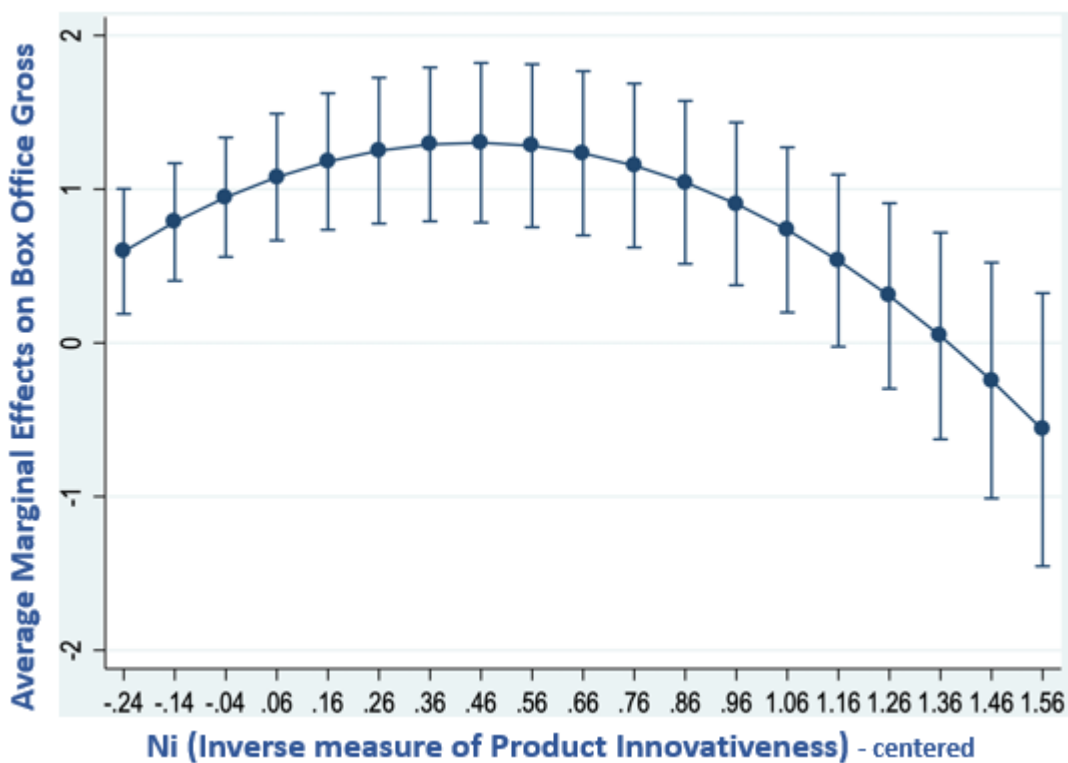


Figure 4: Marginal Effects (RQ2)

4.5 Discussion and conclusion

This chapter have examined the ability of the reward-based CF performance to anticipate the market performance of new products and how this informative function of reward-based CF is non-trivially moderated by the degree of product innovativeness. These questions were addressed in the movie

industry; an industry where reward-based CF has become increasingly popular to fund movie development and commercialization, and that is typically characterized by large product quality uncertainty and significant information asymmetry. Relying on a sample of 1,137 movies (of which 152 released to theaters), it was demonstrate that the reward-based CF performance is a significant predictor of the future market performance of new movies, to some extent paralleling the role of online word-of-mouth (eWOM) for this type of products (Liu, 2006; Stanko and Henard, 2017). Therefore, in line with theoretical predictions (Strausz, 2017; Roma et al., 2018; Chemla and Tinn, 2019), the reward-based CF performance has a positive informative function not only for securing follow up funding as demonstrated by prior literature, but also with regard to the actual product commercialization. In addition, it was also demonstrate that the predictive power of the reward-based CF performance is stronger for moderately innovative products rather than for lowly or highly innovative products, because the degree of product innovativeness influences the extent to which contributors active in reward-based CF campaigns are representative of the consumers active when the new product is commercialized. Indeed, when products are too much innovative, CF campaign will be more likely to attract only a niche of consumers (e.g., hardcore fans) not reflecting the preferences of consumers active in the future market, because too highly innovative products may be too 'far ahead of their time' to be understood by general consumers. In this case, the movie may perform well in CF as contributors are a very distinctive market niche, while not succeeding at the box office. These results have remarkable implications for both theory and practice that will be discussed in the last chapter of the thesis.

CHAPTER 5

**THE ROLE OF REWARD-BASED
CROWDFUNDING IN SUPPORTING NEW
VENTURES CHARACTERIZED BY
ENVIRONMENTAL SUSTAINABILITY
ORIENTATION (ESO)**

5.1 Introduction

This chapter is based on two research articles titled “Environmental sustainability orientation, reward-based crowdfunding, and venture capital: The mediating role of crowdfunding performance for new technology ventures” and “Crowdfunding as a tool to support sustainability-oriented initiatives: Preliminary insights into the role of product/service attributes”. The purpose of this chapter is to investigate 1) how the feature of ESO influences new technology-based ventures’ ability to secure funding in reward-based CF campaigns, and 2) how the CF performance mediates the effect of ESO on attracting subsequent venture capital. In addition, it examines 3) how critical are some attributes of products pursued within CF campaigns to increasing sustainability-oriented initiatives odds of success in CF. Unravelling these aspects is important because it would not simply allow understanding whether green new ventures are more or less exposed to funding in CF campaigns than their non-environmentally oriented counterparts and what kind of attributes they need to show for enhancing their chances of success in CF. But it would also unveil the role of the performance in CF as a facilitator (or as an obstacle) that makes green new ventures using reward-based CF more (or less) attractive also in the eyes of professional investors and ignite (or reduce) their financing propensity.

To investigate the first two issues, this chapter conceptualizes a research framework and develops a number of hypotheses by relying on the economic theory of the rational choice and on the purchasing decisions of technological products applied in the context of reward-based CF. The research framework and the relationships hypothesized are showed in Figure 5. The research framework has been empirically assessed through a new ad-hoc built dataset consisting of data of new hardware ventures from Kickstarter platform. To test the hypotheses, econometric analysis were employed. To test (negative) mediation a variant of the approach proposed in Baron and Kenny (1986) as well as Hayes PROCESS macro were run. Specifically, given the cross-sectional nature of the dataset, robust OLS or probit regression models were used depending on whether the dependent variable is continuous or dichotomous.

To investigate the third issue, namely, examining how specific attributes of products/services featured in the campaigns could influence the success of sustainability oriented initiatives in CF, the chapter performs an in-depth qualitative analysis based on a new sample of sustainability-oriented campaigns from Kickstarter platform. Based on the analysis of the data, some observations about these attributes were made. Then, such observations were translated into propositions (following Whetten, 1989) and confronted with existing literature to determine and delineate the contribution of each propositions (Shepherd and Sutcliffe, 2011). The analysis results in a number of preliminary insights.

The chapter is organized as it follows. Section 5.2 focuses on the first two research questions and presents hypotheses, data and variables, finding and relative discussion. Section 5.3 focuses on the last research question and presents the key inspiring concepts of the study (namely, product/service attributes affecting purchasing decisions of sustainable products/services), methodology, findings and discussion of them.

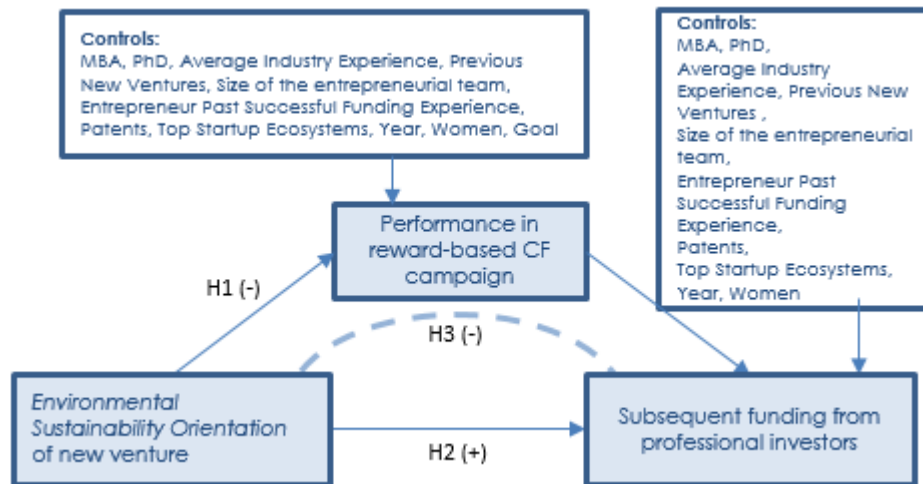


Figure 5: Research Framework (RQ3)

5.2 The role of ESO in influencing CF performance and the likelihood of subsequent VC funding after the campaign.

5.2.1 Hypothesis 1. The effect of Environmental sustainability orientation on CF performance

Academic research has recently started examining whether new ventures focusing on environmental sustainability have higher or lower chances of success in CF campaigns as compared with their non-environmentally oriented counterparts. However, early results document opposite views, with some studies documenting a positive effect of ESO on CF performance, and other studies reporting negative or insignificant effect of such new venture characteristic. By relying on the economic theory of rational choice and the financing of public goods from one hand, and by using the lens of purchasing decisions of technological products applied in the context of reward-based CF, this thesis hypothesizes and argues a negative effect of environmental sustainability on CF performance.

According to the rational choice theory (Vriend, 1996; Blume and Easley, 2008; Sen, 2008), contributors to CF campaigns should have less incentive to invest in projects or new ventures providing public goods as outcomes because the relative benefits of such projects will also be available to those who did not contribute to fund the project. Economic theory shows indeed rational

underinvestment in public goods due to the existence of free-riding behaviour, i.e., the possibility to appropriate collectively benefits derived from public goods without participating to the funding (Tassey, 2004). Since new ventures pursuing environmental sustainability aim to provide goods protecting and preserving the environment, they are more likely to satisfy more collective needs (Perman et al., 2003; Geels, 2011). Hence, for the rational choice theory, contributors to CF campaigns should be less prone to fund ESO projects rather than non-environmentally oriented projects.

The argument above is further reinforced by an “investor-as-consumer” perspective adopted in recent works (Chan and Parhankangas, 2017, Zhang and Chen, 2019; Testa et al, 2020), according to which “crowdfunders in reward-based CF mainly contribute in exchange for future products or services, meaning that they behave like general consumers.” (Chan and Parhankangas, 2017, p. 238). In this sense, reward-based CF can be viewed as a channel for early access to products (Lin et al., 2019). Therefore, contributors to CF projects, despite being generally perceived as investors, behave more like consumers, since they do not seek financial returns for their contributions, rather contribute to campaigns in exchange for pre-ordering products (Zhang and Chen, 2019; Lin et al., 2019; Roma et al., 2018). As noted in Chan and Parhankangas (2017), there are indeed more similarities between crowdfunders on reward-based platforms and online shopping consumers than between crowdfunders on reward-based platforms and professional investors.

Referring to consumer behaviour literature, consumers make their purchase decisions, by considering both tangible and intangible attributes of products (Rosen, 1974; Crane, 2001; Auger et al., 2008). As products become more physically similar, intangible attributes play an increasingly stronger role in consumer purchase decisions (Testa et al., 2020). Among intangible attributes, there is a specific group referred by some authors as ‘social’ (Auger et al., 2008; Auger et al., 2003; Ubilava et al., 2010) or ‘ethical’ (Crane, 2001) or ‘green’ attributes (Schuitema and De Groot, 2015; Arruda Filho et al., 2017). In this thesis, they are referred to as sustainability attributes. Concerning these sustainability attributes of products, there is no consensus about their role into affecting consumer purchase decisions [Auger et al., 2008; Schuitema and De Groot, 2015; Olson, 2013]. However, referring to *technology-based consumer products* (Young et al., 2010), prior literature seems to be rather unanimous though rare. Sustainability attributes are claimed to be a nice addition (Wever et al, 2007), but they should not conflict with the product’s primary functionality, which can be any combination of its physical, economical, immaterial and emotional functionalities (Stevens, 2003). If the sustainability attributes compromise the primary functionality or are negatively correlated with the conventional attributes (e.g. price, quality and performance), or if consumers perceive them as such, a large part of the potential market is lost (Olson, 2013). In addition, consumers should place

less value on products' environmental attributes in the case of purchasing high involvement products (such as technology-based products) than in the case of frequently purchased products. In particular, literature focusing on the adoption of new technology-based consumer products (such as those under investigation here), claims that early consumers (Rogers, 1995) are mainly attracted in their purchase decisions by the technology itself, either for hedonic reasons or because driven by utilitarian needs, and then, attributes related to environmental sustainability tend to be of no interest (Barboza and Arruda Filho, 2019). Since contributors (of new hardware ventures) on reward-based CF platforms commit themselves to buy the given new technology-based consumer product before it is commercially available, they can be viewed as very early-stage consumers (Stanko and Henard, 2017). Therefore, the salient characteristics of early adopters (i.e., focus on technology, focus on hedonic and utilitarian product attributes, rather than on sustainability attributes) are intrinsically intensified for crowdfunders (Stanko and Henard, 2017). As a results, reward-based CF contributors should be more likely to show low interest toward projects emphasizing environmental sustainability attributes and thus towards sustainability-oriented new ventures, rather than on projects offering more individual/conventional product attributes (Messeni Petruzzelli et al., 2019).

It is worth noting that, recent literature on consumer behaviours claims that green buying (or more broadly sustainable buying) is often done for individual/emotional “feel-good” purposes (Andreoni, 1990). However, it is assumed that this would not play a relevant role in the context of early adopters of innovative technologies, while may act as an effective driver of buying decision of other types of products, such as food and mature consumer electronics (e.g. Elfenbein et al, 2010; Iweala et al., 2019).

Summing up, as compared with their non-environmentally oriented counterparts, new hardware ventures oriented to environmental sustainability may have more difficulty in persuading the crowd to fund their projects. Based on these considerations, the first hypothesis is formulated as follows:

Hypothesis 1 (H1): The likelihood of a positive performance in reward-based CF, in terms of both success in the campaign and reached amount is, *ceteris paribus*, lower for new hardware ventures oriented to environmental sustainability than for those with no environmental sustainability orientation.

5.2.2 Hypotheses 2 and 3. Environmental sustainability orientation and access to subsequent venture capital funding: The (negative) mediating role of reward-based CF performance

The body of literature studying the ability of environmental sustainability-oriented new ventures to access external finance through traditional funding channels (e.g., business angels, venture capitalists) is not fully developed and documents contrasting views. As anticipated earlier, despite

initial works point out the difficulties encountered by these new ventures in securing funding from professional investors, as compared with their non-environmentally oriented counterparts (Austin et al., 2006; Bergset, 2015; Moore and Wüstenhagen, 2004), other studies contrast this view and suggest that green innovations represent a novel and promising business, and thus may be more attractive than non-green innovations in the eyes of venture capitalists (Petkova et al., 2014). The growing trends toward more environmentally sustainable entrepreneurship driven by the increasing concerns toward scarcity of natural resources, pollution and global warming (Dean and McMullen, 2007; Hockerts and Wüstenhagen, 2010; Petkova et al., 2014; Sunny and Shu, 2019) seem to confirm this view. The investments in environmentally friendly technologies have indeed grown significantly in recent years (Mrkajic et al., 2019; Cumming et al., 2016), with an increasing number of venture capitalists operating under the logic of the triple bottom line of economic, environmental and social value creation (Bocken, 2015). Specifically, recent works have highlighted that reputable venture capitalists may have incentive to invest in green businesses and also the cost of capital should be lower for green ventures because environmental innovations can confer competitive advantage (Petkova et al., 2014; Ambec and Lanoie, 2008).

This thesis espouses this latter view and advances that the recent trends toward more sustainable entrepreneurship and its potentially higher business opportunities should make professional investors more prone to invest in environmental sustainability-oriented new ventures than in those with no sustainability orientation. More specifically, by focusing on new hardware ventures that have previously launched a reward-based CF campaign and naturally necessitate subsequent venture capital funding to scale up, it is assumed that ESO should have a positive direct influence on the likelihood of receiving this additional type of funding. According, the second hypothesis is formulated as follows:

Hypothesis 2 (H2): For new hardware ventures that have engaged in reward-based CF and necessitate subsequent venture capital funding, the likelihood of receiving this additional type of funding is, *ceteris paribus*, higher for ventures oriented to environmental sustainability than for those with no environmental sustainability orientation.

The above hypothesis captures the direct effect of new venture's ESO on the likelihood of receiving subsequent venture capital funding from professional investors. However, since the new ventures of our interest have engaged in reward-based CF campaigns before any potential subsequent funding, there may also exist an indirect effect of the ESO.

Literature claims that the success of a project through a reward-based CF campaign implies an increase in the likelihood that VCs will finance that project subsequently (Drover et al., 2017; Roma et al., 2017; Thies et al., 2019). The fact that new venture's ESO is theorized to negatively influence

the performance in reward-based CF (hypothesis H1) and that, in turn, the latter has been shown to increase the likelihood of attracting subsequent venture capital funding hints at the possible existence of a negative mediating role of the CF performance in the relationship between new venture's ESO and the attainment of subsequent VC funding after the campaign. Indeed, assuming that ESO negatively affects CF performance of new hardware venture means that such a bad performance in CF will have a negative repercussions also on VC financing, given that VCs cannot use prior funding success on CF as a signal in favour of the venture's attractiveness as an investment object. In other words, besides the positive direct effect theorized in hypothesis H2, there should emerge a negative indirect effect of ESO mediated by the CF performance. Accordingly, the third hypothesis is formulated as follows:

Hypothesis 3 (H3): For new hardware ventures, the effect of environmental sustainability orientation on the likelihood of receiving subsequent venture capital funding is negatively mediated by their performance in reward-based CF.

5.2.3 Empirical investigation

5.2.3.1 Data and Variables

To test the above hypotheses, it was built a new dataset encompassing data of early stage technology ventures that have been founded in a period 2005-2014 and have launched campaigns in the category Hardware of reward-based CF platform, i.e., Kickstarter, starting from its inception in 2009 to the end of 2014. The date December 2014 for including campaigns was chosen in order to guarantee a sufficiently long period of observation (at least about 4 years) after the CF campaign for gathering reliable information about the possible attainment of subsequent venture capital funding, in line with prior similar studies (Roma et al., 2017). Data were gathered from Kickstarter because this platform has been largely considered in prior literature focusing on environmental sustainability and CF (Hörisch, 2015; Calic and Mosakowski, 2016; Buttice et al., 2019), and thus results obtained in this context allows broad comparison. More importantly, hardware ventures (including ventures aiming at manufacturing consumer electronics, robotics, 3D printing, etc...) were selected because such ventures are characterized by high capital requirements (Wakabayash, 2014) and CF money is largely insufficient to fully support their growth process, which instead requires the injection of large amounts of capital (Drover et al., 2017; Roma et al., 2017; Colombo and Shafi, 2019). Therefore, these new ventures need to complement the amount possibly collected through reward-based CF with subsequent external funding provided by professional investors, thus being the most suitable template for this study. Besides new technology-based entrepreneurial projects, Kickstarter hosts a multitude of small recreational projects, which are never potential targets of subsequent investors because of their non-entrepreneurial nature (Calic and Mosakowski, 2016; Roma et al., 2017; Colombo and

Shafi, 2019; Mollick and Nanda, 2016). In order to exclude such kind of projects and avoid potential bias concerns, only projects setting a goal (i.e., the declared money target a project proponent aims to collect) at least equal to \$5,000 were selected. Finally, new ventures that were no longer alive at the end of the period of observation and those for which adequate information was not available were excluded. The final sample encompasses 508 new hardware ventures.

The *dependent variable* introduced to test hypotheses H2 and H3 is a dummy variable (namely Subsequent Venture Capital Funding) equal to one if the given new venture has received any type of funding from professional investors until October 2018, zero otherwise. Data about traditional venture funding rounds secured after the CF campaign were gathered from ThomsonOne-VentureXpert and CrunchbasePro databases. Moreover, to ensure consistency of the data, other databases, such as Angel.co, as well as the press section on the website of each new venture were checked.

The main *independent variable* is the dummy variable ESO taking the value of one if the new venture displayed the presence of factors characterizing environmental sustainability such as green products and/or processes that would benefit the environment, the nature and the Earth's life support systems; zero otherwise. This variable was constructed through an assessment procedure involving three experts carefully informed about the objectives of the research, but not communicating with each other. In line with prior studies (e.g., Calic and Mosakowski, 2016), each coder was instructed to read the project descriptions, review project videos, and code each project with 1 or 0 for environmental sustainability orientation. In identifying the factors characterizing environmental sustainability, experts had to strictly refer to the definitions provided by the U.S. Bureau of Labor Statistics (<http://www.bls.gov/green/>) in assessing the projects, as done for instance in (Mrkajic et al., 2019). According to this classification, projects involving products or processes controlling and/or reducing pollution as well as the consumption of natural resources, promoting energy efficiency, favouring the use of renewable energy, making recycling easier, creating the conditions for a cleaner environment (spaces, air, water, etc..), and improving the hygiene and health conditions of people and animals were considered as having environmental sustainability orientation (Shepherd and Patzelt, 2011). Coders completed their work within four weeks. Like Calic and Mosakowski (2016), Cronbach's alpha across the three coders was calculated to measure inter-rater reliability (Krippendorff, 1980). This measure was 0.79, falling above an acceptability threshold of 0.70 commonly found in the entrepreneurship literature (Davidsson, 2006). In the cases of disagreement among the coders, the natural majority rule (two out of three) was utilized.

The *mediator* is the performance in the CF campaign. Like Calic and Mosakowski (2016), it is measured using two alternative variables, which helps increase robustness of the findings. First, it

was used the amount pledged in the CF campaign (the variable Pledged Amount), namely the amount of money reached at the end of the campaign irrespective of whether the goal has been met or not (similarly to Calic and Mosakowski (2016), it was taken the logarithmic transformation of the variable Pledged Amount because of its skewness) (Drover et al., 2017; Roma et al., 2017; Viotto da Cruz, 2018). Second, a dummy variable (Crowdfunding Success) indicating whether the amount pledged in the campaign has equalized or exceeded the campaign goal was used. The data regarding these two variables of CF performance were retrieved directly from Kickstarter. Note also that these variables are used as dependent variables to test the hypothesis H1, whereas are used as independent variables to test hypotheses H2 and H3.

In addition to the variables of interest, in line with the prior literature, a number of control variables was introduced for controlling for relevant quality aspects of the new venture. These variables include a set of characteristics normally utilized by investors to assess technology startup quality (including those with environmental orientation), namely intellectual, social, and human capital (Ahlers et al., 2015; Baum and Silverman, 2004; Hsu, 2004). Note that, although the same control variables can be used for testing both hypothesis H1 (when the performance in CF is the dependent variable) and hypotheses H2 and H3 (when the dummy variable Subsequent Venture Capital Funding is the dependent variable), they should refer (when reasonable) to different periods to eliminate the risk of reverse causality. According, in the first case, they were computed at the time of the launch of the CF campaign, whereas in the second case they were computed right before the subsequent funding from professional investors was received or within an equivalent period for new ventures that did not receive subsequent funding.

Regard to the entrepreneur human capital, in order to control for educational background and management experience and capability of the entrepreneurial team, it was introduced a set of variables. Specifically: whether at least one member of the entrepreneurial team has received an MBA (MBA); whether at least one of member of the entrepreneurial team has received a Ph.D. (PhD); whether at least one team member has founded previous new ventures in the past (Previous New Ventures); whether at least one member of the given new venture has received funding from professional investors for previously founded new ventures and/or such previous new ventures have been successfully sold to established firms (Entrepreneur Past Successful Funding Experience); the average industry experience of the entrepreneurial team (Average Industry Experience); the size of the entrepreneurial team (Size of the Entrepreneurial Team); the presence of women in the entrepreneurial team (Women) (Ahlers et al., 2015; Hall and Hofer, 1993; Hsu, 2004). The variables Size of the Entrepreneurial Team and Entrepreneur Past Successful Funding Experience are also useful to control the entrepreneur social capital. Indeed, larger management teams are likely to

possess higher social capital as the number of social connections tends to increase with the number of team members (Baum and Silverman, 2004; Ahlers et al., 2015). Similarly, the ability to secure funding from professional investors for past ventures also enhances the entrepreneurial team's social capital, because relationships with professional investors facilitate access to suppliers, customers, professionals and thus to a broader network of ties and strategic resources (Hsu, 2004; Shane and Cable, 2002; Elfring and Hulsink, 2003; McEvily and Marcus, 2005; Bandera and Thomas, 2019). Finally, retrieving information from USPTO database, it was controlled for the effect of patents granted for the given product idea (before and after the CF campaign using the dummies Patents before Crowdfunding and Patents after Crowdfunding), which captures the intellectual capital of the new venture (Ahlers et al., 2015; Conti et al., 2013b).

Similarly to Conti et al. (2013a,b) and Mollick (2014), in order to control for the different probability of securing capital that new ventures located in different geographic areas may face, it was included a dummy variable (Top Startup Areas), equal to one if the new venture is located in the metropolitan area of one of the top 20 cities worldwide for establishing and nurturing a startup, according to the Startup Genome Report (Marmer, 2012); zero otherwise. Finally, in order to control for the year of new venture establishment there were introduced ten dummies (Year of Establishment 200x), which help control for the different stages of new ventures' lifecycle.

5.2.3.2 Testing hypotheses: econometric analysis and findings

Table 16 and Table 17 report the descriptive statistics and the correlation matrix regarding variables of the sample. In line with prior studies (Calic and Mosakowski, 2016), it can be noted that 9% of the new ventures considered in the sample have been assessed as oriented to environmental sustainability, whereas approximately 70% have succeeded in CF and almost 20% have received subsequent venture capital funding from professional investors after the CF campaign. The mean pledged amount slightly exceeds \$150,000, which suggests that reward-based CF operates as a seed capital channel. Moreover, due to the rapid growth of the CF phenomenon, it is not surprising that most new ventures using CF have been founded in the last three years considered in our sample. The correlation matrix does not suggest a considerable degree of correlation. Variance Inflation Factor (VIF) computed after performing our regression models is indeed less than 10 for the variables included in the analysis.

Table 16: Descriptive statistics

Variables	Mean	Std. Dev.	Min	Max
Subsequent Venture Capital Funding	0.197	0.398	0	1
Pledged Amount (\$)	157018	330221	37	3400000
Crowdfunding Success	0.701	0.458	0	1
Goal (\$)	90837	254011	5000	5000000
Environmental Sustainability Orientation	0.093	0.290	0	1
Top Startup Areas	0.470	0.500	0	1
Average Industry Experience	8.007	6.416	0	35
MBA	0.108	0.311	0	1
PhD	0.138	0.345	0	1
Size of the Entrepreneurial Team	1.596	0.895	1	6
Women	0.096	0.300	0	1
Previous New Ventures	0.421	0.494	0	1
Entrepreneur Past Successful Funding Experience	0.089	0.284	0	1
Patents after Crowdfunding	0.031	0.175	0	1
Patents before Crowdfunding	0.006	0.077	0	1
Year of Est. 2005	0.026	0.158	0	1
Year of Est. 2006	0.024	0.152	0	1
Year of Est. 2007	0.035	0.185	0	1
Year of Est. 2008	0.039	0.195	0	1
Year of Est. 2009	0.067	0.250	0	1
Year of Est. 2010	0.110	0.313	0	1
Year of Est. 2011	0.150	0.357	0	1
Year of Est. 2012	0.264	0.441	0	1
Year of Est. 2013	0.197	0.398	0	1
Year of Est. 2014	0.089	0.284	0	1

Table 17: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	
(1) Pledged Amount (\$)																								
(2) Crowdfunding Success	0.63*																							
(3) Goal (\$)	0.25*	-0.30*																						
(4) Environmental Sustainability Orientation	-0.10*	-0.09*	0.05																					
(5) Top Startup Ecosystems	0.12*	0.06	0.05	-0.00																				
(6) Average Industry Experience	-0.06	-0.13*	0.12*	0.03	0.01																			
(7) MBA	0.03	-0.02	0.11*	0.02	-0.01	0.02																		
(8) PhD	0.07	-0.01	0.03	0.05	-0.06	0.00	-0.03																	
(9) Size of the Entrepreneurial Team	0.28*	0.17*	0.10*	-0.02	0.07	-0.07	0.14*	0.19*																
(10) Women	0.02	0.02	0.01	-0.01	0.09*	-0.12*	0.12*	0.00	0.24*															
(11) Previous New Ventures	0.05	0.02	0.08	0.07	0.03	0.16*	0.09*	-0.02	0.20*	0.06														
(12) Entrepreneur Past Successful Funding Experience	0.22*	0.11*	0.17*	0.02	0.07	0.18*	0.00	0.04	0.11*	-0.05	0.35*													
(13) Patents after Crowdfunding	0.13*	0.04	0.10*	-0.02	0.06	0.12*	0.01	-0.01	0.01	-0.06	0.03	0.14*												
(14) Patents before Crowdfunding	0.01	-0.01	0.03	-0.02	0.03	0.09*	-0.03	-0.03	-0.05	-0.03	0.04	0.07	0.43*											
(15) Year of Est. 2005	-0.00	-0.00	-0.03	0.03	0.02	0.15*	-0.02	0.01	-0.07	-0.01	-0.01	0.08	0.04	-0.01										
(16) Year of Est. 2006	0.05	0.07	0.01	-0.00	0.04	0.07	0.03	-0.02	0.01	-0.01	0.05	-0.00	0.05	-0.01	-0.03									
(17) Year of Est. 2007	-0.05	-0.04	0.00	0.05	0.03	0.12*	-0.07	-0.01	-0.04	-0.06	0.01	0.13*	0.21*	0.26*	-0.03	-0.03								

(18)	Year of Est. 2008	-0.02	-0.04	0.13*	0.11*	0.09*	0.12*	-0.01	0.07	-0.06	-0.03	-0.05	-0.03	0.02	-0.02	-0.03	-0.03	-0.04									
(19)	Year of Est. 2009	0.02	0.09*	0.04	0.05	0.00	0.04	-0.02	0.01	-0.04	-0.01	0.04	-0.00	0.04	0.08	-0.04	-0.04	-0.05	-0.05								
(20)	Year of Est. 2010	-0.01	-0.03	-0.03	0.02	-0.02	0.08	-0.06	0.04	0.01	-0.01	0.01	-0.07	-0.03	-0.03	-0.06	-0.05	-0.07	-0.07	-0.09*							
(21)	Year of Est. 2011	0.05	0.01	0.02	-0.02	-0.02	0.03	0.07	-0.02	0.10*	-0.10*	-0.00	0.02	0.02	-0.03	-0.07	-0.07	-0.08	-0.08	-0.11*	-0.15*						
(22)	Year of Est. 2012	0.01	0.07	-0.10*	-0.04	-0.07	-0.08	-0.04	-0.03	0.01	0.03	-0.08	-0.03	-0.06	-0.05	-0.10*	-0.09*	-0.11*	-0.12*	-0.16*	-0.21*	-0.25*					
(23)	Year of Est. 2013	-0.01	-0.08	0.04	-0.02	-0.00	-0.15*	0.03	0.03	0.01	0.12*	0.02	0.02	-0.09*	-0.04	-0.08	-0.08	-0.09*	-0.10*	-0.13*	-0.17*	-0.21*	-0.30*				
(24)	Year of Est. 2014	-0.03	-0.04	-0.01	-0.08	0.04	-0.10*	0.05	-0.04	-0.03	-0.01	0.06	-0.05	-0.02	-0.02	-0.05	-0.05	-0.06	-0.06	-0.08	-0.11*	-0.13*	-0.19*	-0.15*			

To test the (negative) mediating role of CF performance, a variant of the approach proposed in Baron and Kenny (1986), was followed (McFatter, 1979; Judd and Kenny, 1981; MacKinnon, 2000). Specifically, a) first, in order to support hypothesis H1, the effect of ESO on CF performance was tested. Then, b) the effect of ESO on the likelihood of securing subsequent venture capital from professional investors was tested, without controlling for the CF performance. Finally, c) this effect was tested again, but now controlling for the effect of the CF performance in order to disentangle the direct and mediated effects of ESO on the odds of securing subsequent venture capital. Compared with the original procedure in Baron and Kenny (1986), the sequence of tests a) and b) was inverted to follow the sequence of hypotheses. Obviously, this has no effect on results, as they are separate regressions, according to Baron and Kenny (1986).

Table 18 reports the results regarding hypothesis H1. Specifically, the first column reports the results when the CF performance is measured using the amount pledged in the campaign, whereas the second column shows the results when the dummy Crowdfunding Success is utilized. The effect of ESO is shown to negatively and significantly affect the CF performance under both measures, thus confirming hypothesis H1. That is, new hardware ventures focusing on environmental sustainability should display a lower performance in reward-based CF, as compared with their non-environmentally oriented counterparts.

Table 19 reports the results regarding hypothesis H2 and H3. Specifically, the first column reports the results when no measure of CF performance is introduced, whereas the second and third columns reports results when the variables Pledged Amount and Crowdfunding Success, respectively, were added in addition to the dummy ESO and the control variables. The effect of the control variables is consistent with prior studies. More importantly, the sign and significance of the variables of interest confirm the hypotheses. Indeed, the first column shows that, when the variables measuring CF performance are excluded from the list of control variables, the effect of ESO is insignificant. According to the methodological literature on negative mediation (McFatter, 1979; Judd and Kenny, 1981; MacKinnon, 2000), this is because, in the absence of the mediator (i.e., the CF performance measure), the dummy ESO captures both direct and (negatively) mediated effects leading to overall insignificance, given that these effects are conflicting. The second and third columns show that when the CF performance measure is added (Pledged Amount and Crowdfunding Success, respectively), the direct effect of the variable ESO becomes positive and significant as the mediating effect is now disentangled. This confirms hypothesis H2, suggesting that the ESO of new hardware ventures using reward-based CF would per se increase their likelihood of receiving subsequent funding from professional investors.

Support to hypothesis H3 is provided combining Tables 18 and 19. As explained above, Table 18 shows that ESO reduces the CF performance of new hardware ventures using this funding channel for initial capital search. Consistent with prior studies (e.g., Drover et al., 2017; Roma et al., 2017), Table 19 shows that the performance in CF is positively related to the likelihood of securing subsequent funding from professional investors. In addition, it shows that the positive direct effect of ESO on the likelihood of securing subsequent funding from professional investors emerges when the CF performance (the negative mediator) is accounted for, while it is insignificant when this factor is not controlled. Therefore, the ESO has also an indirect negative effect on the odds of receiving subsequent venture capital for new hardware ventures, via its negative influence on the performance in CF.

Table 18: Regression models with crowdfunding performance as a dependent variable

	<i>OLS regression with Pledged Amount (Ln) as a dependent variable</i>	<i>Probit regression with Crowdfunding Success as a dependent variable</i>
Environmental Sustainability Orientation	-0.588** (0.292)	-0.461** (0.210)
Goal (Ln)	0.346*** (0.074)	-0.519*** (0.070)
Top Startup Areas	0.308** (0.144)	0.179 (0.132)
Size of the Entrepreneurial Team	0.473*** (0.071)	0.464*** (0.094)
Average Industry Experience	-0.197* (0.108)	-0.283*** (0.095)
MBA	-0.103 (0.262)	-0.029 (0.217)
PhD	0.086 (0.212)	-0.229 (0.190)
Women	-0.240 (0.256)	-0.113 (0.234)
Previous New Ventures	-0.237 (0.164)	-0.169 (0.144)
Entrepreneur Past Successful Funding Experience	1.151*** (0.212)	1.249*** (0.281)
Patents before Crowdfunding	0.392 (1.019)	0.351 (0.716)
Year of Establishment (dummies)	Included	Included
Constant	6.828*** (0.916)	5.957*** (0.938)
<i>N. obs</i>	508	508
<i>R² / Pseudo R²</i>	0.192	0.198

Standard errors in parentheses - * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 19: Regression models with Subsequent Venture Capital Funding as a dependent variable

	<i>Without including any crowdfunding performance variable</i>	<i>Including the variable Pledged Amount (Ln)</i>	<i>Including the variable Crowdfunding Success</i>
Environmental Sustainability Orientation	0.337	0.460**	0.418*
	(0.234)	(0.231)	(0.235)
Pledged Amount (Ln)		0.271***	
		(0.068)	
Crowdfunding Success			0.538***
			(0.195)
Top Startup Areas	0.201	0.123	0.175
	(0.143)	(0.147)	(0.144)
Size of the Entrepreneurial Team	0.398***	0.302***	0.364***
	(0.083)	(0.085)	(0.083)
Average Industry Experience	-0.050***	-0.039**	-0.043***
	(0.015)	(0.016)	(0.015)
MBA	0.030	0.023	0.044
	(0.231)	(0.228)	(0.232)
PhD	0.504***	0.478**	0.525***
	(0.192)	(0.196)	(0.192)
Women	-0.041	0.025	-0.028
	(0.560)	(0.243)	(0.245)
Previous New Ventures	0.243	0.272	0.235
	(0.156)	(0.167)	(0.159)
Entrepreneur Past Successful Funding Experience	0.789***	0.520*	0.685***
	(0.267)	(0.270)	(0.266)
Patents after Crowdfunding	1.886***	1.705***	1.875***
	(0.442)	(0.432)	(0.420)
Year of Establishment (dummies)	Included	Included	Included
Constant	-2.308***	-5.269***	2.729***
	(0.560)	(0.875)	(0.527)
<i>N. obs</i>	508	508	508
<i>Pseudo R²</i>	0.222	0.276	0.239

Standard errors in parentheses - * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Hayes's SPSS single-mediator PROCESS macro (model 4) was employed to further test for direct and indirect effects of new hardware ventures' ESO on the likelihood to attract VC funding after the CF campaign. Specifically, mediation model was tested with the bootstrapped sample equal to 1000 at a confidence interval of 90 percent. Given that PROCESS macro do not allow for dichotomous mediators, only the variable Pledged Amount was used for measuring the CF performance. Moreover, since the dependent variable, namely Subsequent Venture Capital Funding, is dichotomous, total effect model is not available. Table 20 below shows the output of the mediation model where direct and indirect (mediated) effects are highlighted. Results again confirm hypotheses. Specifically, ESO negatively and significantly affects the crowdfunding performance (H1). The direct effect of ESO on the likelihood of securing subsequent funding from professional investors is positive and significant (H2). The performance in CF positively and significantly affects the likelihood of securing

subsequent funding from professional investors. Finally, as confidence intervals range between -0.736 and -0.027 and do not contain 0, the negative mediating effect is significant (H3).

Table 20: Hayes's SPSS single-mediator PROCESS macro

	<i>Variable Pledged Amount (Ln) as mediator</i>	
	<i>DV: Pledged Amount (Ln)</i>	<i>DV: Subsequent Venture Capital Funding</i>
ESO	-0.543** (0.254)	0.870* (0.447)
Pledged Amount (Ln)		0.635*** (0.113)
Top Startup Areas	0.315** (0.148)	0.216 (0.278)
Size of the Entrepreneurial Team	0.497*** (0.089)	0.500*** (0.149)
Average Industry Experience	-0.025** (0.012)	-0.093*** (0.030)
MBA	0.010 (0.239)	0.147 (0.412)
PhD	0.092 (0.217)	0.899** (0.356)
Women	-0.251 (0.259)	0.079 (0.436)
Previous New Ventures	-0.236 (0.163)	0.413 (0.307)
Entrepreneur Past Successful Funding Experience	1.392*** (0.280)	1.168** (0.473)
Patents	0.600 (0.985)	21.460 (826.613)
Year of Establishment (dummies)	Included	Included
Constant	10.206*** (0.500)	-10.178*** (1.760)
<i>N. obs</i>	508	508
<i>R² / Pseudo R²</i>	0.152	0.288

Standard errors in parentheses - * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Model	<i>R²/</i>		<i>90% CI</i>	
	<i>Pseudo R²</i>		<i>Lower</i>	<i>Upper</i>
<i>IV on mediator</i>				
ESO -> Pledged Amount	0.152	-0.543** (0.254)	-1.042	-0.045
<i>Mediator on DV</i>				
Pledged Amount -> Subsequent Venture Capital Funding	0.288	0.635*** (0.113)	0.414	0.857
<i>Direct effect of IV on DV</i>				
ESO -> Subsequent Venture Capital Funding		0.870* (0.447)	-0.006	1.745
<i>Indirect effect of IV on DV</i>				
		-0.345 (0.212)	-0.736	-0.027

Based on 1,000 bootstrap samples. Standard errors in parentheses - * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.2.3.3 Robustness checks

Despite the choice of using the goal as a threshold for inclusion in the sample is largely consistent with prior literature (Mollick and Nanda, 2016), however, it may be problematic in the context of Kickstarter. In fact, while the goal may indicate the amount of capital needed by the entrepreneur to support at least the very initial stages of the project, the fact that Kickstarter utilizes an all-or-nothing mechanism (i.e., the money is actually transferred to the entrepreneur only if the goal is reached) gives the incentive to hardware entrepreneurs to lower the goal to increase the probability of receiving the money. Therefore, more risk-averse entrepreneurs may lower the goal to a greater extent than less risk-averse entrepreneurs (Roma et al., 2017). This implies a risk of disregarding entrepreneurial hardware projects relevant to the scope of the study that set a low goal just because of the all-or-nothing mechanism utilized by Kickstarter. For this reason, robustness of the findings was checked by using the threshold on the pledged amount rather than on the goal. By applying this threshold for inclusion, the sample is reduced to 469 new ventures. Tables 21 and 22 report the results of the same regression models presented in Tables 18 and 19, respectively. The results remain qualitatively the same, with the only exception that, in Table 22, there emerges a positive and significant effect of the variable ESO on the likelihood of receiving subsequent venture capital after CF, even when the CF performance is not controlled. However, both the significance level and the magnitude of the coefficient of this variable are much lower in this case than in the case where the performance in CF is controlled. The difference is due to the fact that a threshold on the amount pledged rather than on the goal tends to increase the percentage of successful hardware projects in CF (78% versus 70% in our sample), naturally attenuating the negative mediating effect. At any rate, as the ESO still has a negative impact on CF performance and such performance is positively correlated to the odds of securing subsequent venture capital, this implies that both direct and mediated effects are at work and they oppose each other.

Table 21: Robustness check with crowdfunding performance as a dependent variable using the threshold on the Pledged Amount rather than on the Goal

	<i>OLS regression with Pledged Amount (Ln) as a dependent variable</i>	<i>Probit regression with Crowdfunding Success as a dependent variable</i>
Environmental Sustainability Orientation	-0.385** (0.194)	-0.450* (0.230)
Goal (Ln)	0.371*** (0.052)	-0.751*** (0.081)
Top Startup Areas	0.240** (0.109)	0.167 (0.155)
Size of the Entrepreneurial Team	0.283*** (0.058)	0.340*** (0.096)
Average Industry Experience (Ln)	-0.122 (0.076)	-0.283*** (0.011)
MBA	-0.022 (0.169)	-0.073 (0.250)
PhD	0.128 (0.172)	-0.257 (0.210)
Women	-0.075 (0.193)	0.044 (0.282)
Previous New Ventures	-0.135 (0.126)	-0.227 (0.167)
Entrepreneur Past Successful Funding Experience	0.679*** (0.182)	1.077*** (0.312)
Patents before Crowdfunding	1.140*** (0.184)	0.059 (0.813)
Year of Establishment (dummies)	Included	Included
Constant	7.112*** (0.694)	9.370*** (1.057)
<i>N. obs</i>	469	469
<i>R² / Pseudo R²</i>	0.245	0.281

Standard errors in parentheses - * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 22: Robustness check with Subsequent Venture Capital Funding as a dependent variable using the threshold on the Pledged Amount rather than on the Goal

	<i>Without including any crowdfunding performance variable</i>	<i>Including the variable Pledged Amount (Ln)</i>	<i>Including the variable Crowdfunding Success</i>
Environmental Sustainability Orientation	0.463*	0.593**	0.544**
	(0.260)	(0.253)	(0.262)
Pledged Amount (Ln)		0.401***	
		(0.068)	
Crowdfunding Success			0.564**
			(0.240)
Top Startup Areas	0.209	0.096	0.180
	(0.150)	(0.156)	(0.150)
Size of the Entrepreneurial Team	0.398***	0.312***	0.382***
	(0.085)	(0.092)	(0.086)
Average Industry Experience	-0.068***	-0.069***	-0.064***
	(0.016)	(0.017)	(0.016)
MBA	0.061	0.065	0.075
	(0.247)	(0.251)	(0.249)
PhD	0.567***	0.549***	0.598***
	(0.199)	(0.212)	(0.199)
Women	0.011	0.096	0.026
	(0.263)	(0.256)	(0.262)
Previous New Ventures	0.303*	0.343*	0.295*
	(0.164)	(0.176)	(0.167)
Entrepreneur Past Successful Funding Experience	0.897***	0.697**	0.837***
	(0.281)	(0.286)	(0.280)
Patents after Crowdfunding	1.800***	1.576***	1.808***
	(0.450)	(0.422)	(0.428)
Year of Establishment (dummies)	Included	Included	Included
Constant	-2.091***	-6.384***	-2.524***
	(0.616)	(0.943)	(0.583)
<i>N. obs</i>	469	469	469
<i>Pseudo R²</i>	0.240	0.316	0.255

Standard errors in parentheses - * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.2.4 Discussion

In this section, it was examined how the feature of ESO may influence new hardware ventures' ability to secure funding in reward-based CF campaigns and how the performance in this funding channel, by virtue of its informative role, mediates the effect of such feature on the likelihood of receiving subsequent funding from professional investors. To test the developed hypotheses, a sample of 508 new hardware ventures that have launched a campaign in the hardware category of Kickstarter was analyzed by means of a variant of the Baron and Kenny (1986)' procedure and the Hayes PROCESS Macro. Findings are as follows. First, ESO of new hardware ventures is shown to negatively affect their CF performance. This result corroborate prior evidence (e.g., Hörisch, 2015). However, while

previous research has explained it mainly considering the economic theory of rational choice and the financing of public goods, this thesis reinforces the findings by relying on an “investor-as-consumer” perspective. Specifically, for tangible technology products, campaign contributors behave essentially as early adopters interested in acquiring the ownership of a good that satisfies a concrete individual need, either utilitarian or hedonic, rather than seeking environmental sustainability attributes. Second, it is shown that, for new hardware ventures using reward-based CF, the feature of ESO has a direct positive effect on the likelihood of securing subsequent venture capital funding after CF. This is in line with the recent arguments that green innovations may be more attractive than their non-green counterparts in the eyes of venture capitalists (Mrkajic et al., 2019; Petkova et al., 2014). Moreover, there exists also a negative indirect effect of ESO mediated by the CF performance. Indeed, given that 1) ESO reduces CF performance and, 2) CF performance and the access to subsequent VC funding are positively related since CF performance is a signal of future market demand, the impact of ESO on the access to subsequent VC funding through the mediation path is negative. As a result, for new hardware ventures using reward-based CF, the net effect of ESO on the attainment of subsequent venture capital funding may be insignificant, or at least most attenuated.

The results presented in this section have remarkable implications for both theory and practice. Such implications will be discussed in the final chapter of this thesis.

5.3 The role of product/service attributes in influencing the success in CF of sustainability-oriented initiatives.

5.3.1 Product/service attributes affecting purchasing decisions of sustainable products/services.

As largely discussed in the literature review of this thesis, conflicting views have emerged in the extant research on whether and how CF can support sustainability-oriented initiatives. As shown in the previous section, by focusing on the new venture's feature of *environmental* sustainability orientation, this thesis support the stream of literature that claims that showing sustainability orientation reduces the chance of being successful in CF campaigns. However, beyond discovering whether CF may be beneficial or not for sustainability-oriented ventures/initiatives, it would be fruitful also shedding light on what attributes of the product/service pursued within CF campaigns may increase the odds of success in CF of such initiatives.

Prior literature has indeed showed that product/service attributes do have an impact on purchasing behavior of sustainability-oriented products (Auger et al., 2003; Auger et al., 2008, 2010; Bougherara and Combris, 2009; Crane, 2001; De Pelsmacker et al., 2005; Schäufele and Hamm, 2017). Refer to consumer behaviour literature for explaining the behaviour of contributors in reward-based CF is proper because reward-based CF can be likened to a channel for early access to products and a form of pre-sale (Zhang and Chen, 2019; Lin et al., 2019; Roma et al., 2018). As mentioned previously, this is in line with recent works where this investor-as-consumer perspective was adopted (Chan and Parhankangas, 2017, Zhang and Chen, 2019).

Each product can be viewed as a bundle of both tangible and intangible attributes (Auger et al., 2010; Crane, 2001; Rosen, 1974). Tangible attributes are concrete, physical, and objective, whereas intangible ones are abstract, subjective, and usually difficult to describe and characterize compared with tangible attributes (Auger et al., 2010). Consumers make their purchase decisions, by considering both tangible and intangible attributes of products (Rosen, 1974; Crane, 2001; Auger et al., 2008). However, as products become more physically similar, intangible attributes play an increasingly stronger role in consumer purchase decisions (Testa et al., 2020). Among intangible attributes, as mentioned, there are the sustainability attributes. They encompass, for example, attributes related to public health, environmental conservation, creation of employment, support to small-scale agriculture and local rural communities, workers' rights, and so forth. Some authors suggest that this specific category of attributes positively affects consumer purchase decisions (Auger et al., 2010; Howard and Allen, 2006; Van den Heuvel et al., 2007). On the contrary, other authors claim that consumers mainly consider egoistic attributes (i.e., those providing consumers with direct and visible individual benefits, which satisfy self-interest needs), such as quality, taste, price, status, and brand, rather than sustainability-related ones (Olson, 2013). Finally, a third group of authors

argue instead that, in their purchase decisions, consumers take into account also sustainability attributes but these attributes are often of a secondary importance if compared to egoistic product attributes (Schuitema and De Groot, 2015). In summary, according to this stream of literature sustainability attributes in general tend to influence purchasing decisions, but consumers are usually not willing to sacrifice basic functional attributes in favor of the sustainability ones (Auger et al., 2008; Dekhili & Achabou, 2013).

Within sustainability attributes, literature has shown that a small group of attributes are more likely to influence consumer purchasing decisions of sustainable products/services. Specifically, concerning food products, attributes of social fairness and environmental impact are positively associated with food purchasing decisions (Lusk and Briggeman, 2009). With regard to more specific attributes, organic, localness, animal welfare, as well as fair wages and trade are other attributes largely taken into account by consumers (Aertsens et al., 2009; Deemer and Lobao, 2011; Howard and Allen, 2010; Perrini et al., 2010; Willer and Kilcher, 2012).

By means of a qualitative analysis and applying the lens of consumer purchasing decisions of sustainable products to the context of CF, this section provide some relevant insights on the product/service attributes benefiting sustainability-oriented initiatives that seek funds through CF platforms.

5.3.2 Data and Methodology

In order to understand how critical are some attributes of products pursued within CF campaigns to increase sustainability-oriented initiatives odds of success in CF, it was conducted an in-depth qualitative content analysis on food CF campaigns launched in the period 2011–2015 on Kickstarter. The objective of this qualitative research was moving from specific observations to a number of propositions, which ultimately serve to a more generalized understanding of the phenomenon (Whetten, 1989; Yin, 2003). The choice of focusing on food CF campaigns lies on the fact that food industry is probably the area where environmental issues (e.g., those related to the production of safer food without pesticide residues or carbon- neutral food contributing to mitigating climate change) apply more than to any other human activities. (Aiking and De Boer, 2004; Notarnicola et al., 2017). Food provision is indeed the human activity with the single largest environmental impact (Notarnicola et al., 2017). During the considered period, 1,643 initiatives labeled as Food Initiatives were founded on Kickstarter. However, after deleting projects whose campaigns were cancelled or still in progress and those not explicitly aimed at commercializing food products directly by means of the CF platform, the final dataset comprises 1,113 campaigns.

As first step, project campaigns having a sustainability orientation (SO projects) were distinguished from those not having a sustainability orientation (NSO projects), by means of a careful content

analysis of their value propositions (i.e., product/service offering). This analysis involved two researchers (Duriau et al., 2007; Krippendorff, 2004). However, since each researcher interpreted the data according to his or her subjective perspective, it was necessary applying some techniques in order to reach agreement (Graneheim & Lundman, 2004). In particular, the researchers were invited to discuss together about the way in which the data should be labelled. In addition, it was used a research assistant to support coding issues (Graneheim and Lundman, 2004; Burla et al., 2008; Moritz et al., 2015). To determine whether the product/service pursued within the food CF campaigns may be classified as a “sustainable food and drink”, researchers followed practical criteria defined by DEFRA (2006) and Sustainable Development Commission (2005, 2009). According to them, sustainable food products are those originating from the closest practicable source; being safe and healthy; guaranteeing fair trade and respect for workers' rights; respecting environment as well as the highest standards of animal health and welfare compatible with the production of affordable food for all sectors of society. As result of this procedure, 235 initiatives were designated as having an SO (21% of the total).

The second step consisted in a coding phase, aimed at classifying campaigns projects into a number of thematic clusters and sub-clusters. Both the deductive and data-driven inductive approach were used (Boyatzis, 1998; Crabtree and Miller, 1999). Following the deductive a priori template of codes approach of Crabtree and Miller (1999), researchers first classified projects campaigns according to a template (or codebook), which was developed based on the categories defined by Sustainable Development Commission (2009), namely, Healthy Food; Environmental Sustainability; Social Sustainability; and Animal Welfare. Secondly, they also assigned inductive codes (second-level codes) to segments of data describing a new theme observed (Boyatzis, 1998). These additional codes can either be independent from the first-level codes or expand them. As a result of this double coding phase, each project was assigned to one of the four first-level codes and to one of the 12 additional thematic sub-clusters. Moreover, as an additional code independent from the predetermined codes, the self-centered/individualistic orientation was identified.

Finally, the 235 SO campaigns were distinguished in successful (84 campaigns) and unsuccessful (151 campaigns), based on whether the campaigns goal was reached (or exceeded) or not.

5.3.3 Findings and Discussion

Table 23 and 24 provide summary statistics about SO projects and the number of successful projects split by top-level codes, respectively. As shown in Table 24, the most popular clusters are, in order, “Environment Sustainability” and “Healthy Food” The projects proposing products displaying an environmental sustainability are also the most successful.

Table 23: Summary statistics

	Mean	Min	Max	Median
Target goal (€)	33,271	54	1,000,000	10,000
Funding obtained (€)	4,699	0	154,521	435
Backers' number	68	0	1,139	9

Table 24: Sustainability-oriented projects split by first-level codes

	Total project	Successful project	Success rate (%)
Sustainability-oriented Projects	285	84	36
Healthy Food	61	22	36
Environment Sustainability	83	34	41
Social Sustainability	35	12	34
Animal welfare	56	16	29

With regard to the first-level code “Environment Sustainability,” most of the projects (81% of the Environment Sustainability projects) belong to two thematic clusters (“Maximize Material and Energy Efficiency” and “Create Value from Waste”) related to waste minimization and waste valorization. Concerning the top-level code “Healthy Food,” the thematic cluster encompassing the higher number of projects (43% of the Healthy Food projects) and the highest success rate is “Organic”. This is consistent with what claimed in prior research, that is organic feature is one of the sustainability attributes that has considerably increased in consumer awareness and purchase penetration over the last decades (Aertsens et al., 2009; Perrini et al., 2010; Willer & Kilcher, 2012). With regard to the first-level code “Social Sustainability,” the most popular thematic cluster is “Fair Trade” (40% of projects in this group). Finally, concerning the top-level code “Animal Welfare,” projects are almost equally distributed between two thematic clusters, i.e., “Improve Animal Welfare” and “Avoid Consumption of Animal Ingredients–Vegan Food”. The number of projects falling into each specific thematic sub-cluster and the success rate among the sub-clusters are highly heterogeneous. This suggests that both CF campaigns proponents and contributors do not view all sustainability attributes as equally legitimate and interesting. This is in line with previous literature claiming that a specific set of sustainability attributes might affect consumer purchasing decisions (Devinney et al., 2006).

Some observations come from this quality analysis. First, it was noticed that summing up projects of the two thematic sub-clusters “Supporting Local Communities” (10 projects in the “Social Sustainability” group) and “Local and Seasonal Food” (17 projects in the “Healthy Food” group), a great number of projects refer to locally oriented initiatives. Such projects had a relatively high success rate (37% vs. 36% of SO projects in general), suggesting a considerable interest of backers in products emphasizing localness attribute. However, by comparing the success rate of the “Supporting Local Communities” thematic cluster (50%) and that of the “Local and Seasonal Food” sub-clusters (29%), it emerges that a localness attribute emphasizing publicly oriented benefits (such as supporting local small farmers) rather than private benefits (such as healthiness) may better impinge upon consumer purchasing decisions, thus enhancing odds of success in CF. These observations result into the first two propositions:

P1a: “In reward -based CF, the sustainability attribute of localness increases the likelihood of SO projects of being financed” (Testa et al., 2019b p.10).

P1b: “In reward -based CF, the sustainability attribute of localness emphasizing support to local communities and cultures (public benefits ownership) positively influences backers' funding decisions more than that emphasizing healthiness (private benefits ownership)” (Testa et al., 2019b p.11).

The first proposition is in line with previous literature (e.g., Feldmann & Hamm, 2015). On the contrary, the second proposition contrasts with previous research, which claims that attributes providing individual/private benefits (such as healthiness and taste) drive purchasing of food products much more than attributes providing collective benefits (such as social fairness, environmental impact; Costanigro et al., 2011; Lusk and Briggeman, 2009). Such a contrast with previous literature for the specific attribute of localness may depend on two factors. Firstly, the growing emphasis in the public arena on the importance of purchasing local products to support local areas (Bellows and Hamm, 2001; Ilbery and Kneafsey, 1999; McDonagh and Commins, 1999; Murdoch, Marsden, & Banks, 2000). Secondly, since in the context of CF the given act is somewhat publicly observed, backers may be led to give greater importance to a publicly oriented attribute because it affects their perceived social reputation (Belk, 2013) or because they wish to send a social message (Vecchio and Annunziata, 2013).

Contrary to the findings for projects referring to locally oriented initiatives (P1b), data collected regarding all the other thematic clusters show that projects emphasizing egoistic/individualistic attributes, beyond sustainability attributes, are more successful compared with those that do not. Specifically, projects emphasizing products' attributes such as taste and using words such as

“delicious,” “tasteful,” and “gourmet” have a success rate almost double (47% vs 25%) of those projects that do not emphasize product's taste and other personal benefits. These observations result into the following proposition:

P2: “In reward-based CF, the emphasis on self-centered attributes beyond sustainability attributes increases the likelihood of SO projects of being financed” (Testa et al., 2019).

Such a proposition is consistent with the literature on consumer purchase decisions of sustainable products (Combris, Pinto, Fragata, & Giraud-Héraud, 2009; Hobbs, Sanderson, & Haghiri, 2006). Indeed, according to such literature, consumers buy sustainable products not only for altruistic reasons (e.g., for animal welfare) but also for self-centered reasons (such as personal taste benefits). In addition, literature claims that consumer purchase decisions are driven not only by purely altruistic or simply utilitarian motivations, but also by a sort of hybrid often based on the norm of reciprocity (Andreoni, 1990; Grant, 2013). Since the reward-based CF platforms foster reciprocal giving among their members (project proponents and backers), this “hybrid motivation” should play an important role in this context (André, Bureau, Gautier, & Rubel, 2017; Colombo et al., 2015). Taken together, these arguments suggest that backers in reward-based CF should be more prone to fund SO projects that endeavor to satisfy both self-centered (e.g., personal taste) and societal (e.g., sustainability) benefits, rather than SO projects exclusively targeting the latter type of benefits.

By summing up, results of this analysis suggest that some attributes of products/services pursued within sustainability-oriented campaigns affect the CF success of these campaigns. In particular, sustainability-oriented initiatives may be more successful in CF when they emphasizing egoistic/self-centered product attributes more than altruistic/society-centered attributes. However, the emphasis on altruistic attributes emerges to be more beneficial for locally oriented initiatives. These findings have a number of theoretical and practical implications, which will be discussed in the final chapter of the thesis.

CHAPTER 6

CONCLUSION

6.1 Introduction

This final chapter aims at drawing together findings and discussion derived from the investigation of the three explored crowdfunding issues. The main contributions and the managerial implications are presented and potential limitations of the thesis are highlighted. This chapter is divided into four sections. The first section presents a brief summary of the research questions addressed in this thesis and related findings. Hence, the second section presents the main theoretical contributions to literature offered by this thesis, while section three highlights the managerial implications. Finally, the limitations and suggestions for further research are outlined in the section four of this chapter.

6.2 Summary

The main purpose of this thesis is to deepen the knowledge on the role that the performance in reward-based CF may play, by virtue of its informative function, in the attainment of subsequent VC (in particular, as compared to initial funding from VCs or in the context of ESO ventures) and in anticipating product market performance of new entrepreneurial ventures. The three unexplored issues investigated in this thesis can be summarized in the following research questions:

RQ1: Are ventures initially funded through reward-based CF equally likely to raise later stage funds compared to ventures initially funded by Early-stage VCs? If so, why and under which conditions?

RQ2: Can the performance in reward-based CF anticipate the market performance of new products? Moreover, how would the relationship between the performance in reward-based CF and the market performance be moderated by the degree of product innovativeness?

RQ3: How may the feature of ESO influence new ventures' ability to secure funding in reward-based CF campaigns and how critical some attributes of products pursued within sustainability-oriented initiatives are to increase their odds of success in reward-based CF? Moreover, how would the performance in reward-based CF mediate the relationship between new ventures' ESO and their ability to receive subsequent venture capital funding from professional investors?

RQ1 is addressed in Chapter 3, which is based on the research article titled "On the certification effect of reward-based crowdfunding: Do later stage venture capitalists rely more on the crowd or their peers?" by Vasi et al. (2020). To answer this questions, a research framework was conceptualized and a set of hypotheses have been developed by grounding the arguments on the different certification effect that CF and funding from VCs may generate in the eyes of subsequent VCs. Hypotheses were tested by means of econometric analysis, by relying on a new ad-hoc built dataset including 625 new hardware ventures, either crowdfunded or initially funded by VCs. Findings suggested that, as compared to similar new ventures initially funded by VCs, crowdfunded new ventures are less likely to receive subsequent funding from VCs. However, if they complement the certification of existence-

of-a-market derived from a good performance in CF with patents and/or strong entrepreneurial team (which certify what CF does not, i.e., their technical and managerial capabilities), the certification gap diminishes, and may even disappear completely.

RQ2 is addressed in Chapter 4, which is based on the research article titled “Crowdfunding performance, market performance, and the moderating role of product innovativeness: Evidence from movie industry” by Roma et al. (2020). To answer this questions, a research framework was conceptualized and a set of hypotheses have been developed by grounding the arguments on the similarities between CF performance and online word-of-mouth (eWOM), as well as on the contrasting effects typically associated with product innovativeness (from consumers’ perspective) (Calantone et al., 2006; Chan and Parhankangas, 2017; Chemla and Tinn, 2019; Delmestri et al., 2005; Lee and Colarelli O’Connor, 2003; Liu, 2006; Roma et al., 2018; Stanko and Henard, 2017; Strausz, 2017; Szymanski et al., 2007). To test the hypotheses, a new dataset encompassing data of 1,137 movie projects was employed. Results suggested that the reward-based CF performance is a significant predictor of the future market performance of new movies, to some extent paralleling the role of online word-of-mouth (eWOM) for this type of products (Liu, 2006; Stanko and Henard, 2017). However, such predictive power of the reward-based CF performance is stronger for moderately innovative products rather than for lowly or highly innovative products, because the degree of product innovativeness influences the extent to which contributors active in reward-based CF campaigns are representative of the consumers active when the new product is commercialized.

RQ3 is addressed in Chapter 5, which is based on the research articles titled “Environmental sustainability orientation, reward-based crowdfunding, and venture capital: The mediating role of crowdfunding performance for new technology ventures.” by Roma et al. (2020) and “Crowdfunding as a tool to support sustainability-oriented initiatives: Preliminary insights into the role of product/service attributes.” by Testa et al. (2019). The first study has examined how the feature of ESO influences new ventures’ ability to secure funding in reward-based CF campaigns and how the CF performance mediates the relationship between ESO and the likelihood to access to subsequent venture capital funding. To address such issues, this thesis has conceptualized a research framework and developed a number of hypotheses by relying on the economic theory of the rational choice and on the purchasing decisions of technological products, applied in the context of reward-based CF . To test the hypotheses, a new ad-hoc built dataset including data of 508 new hardware ventures from Kickstarter platform was employed. Findings suggested that, as compared with their non-environmentally oriented counterparts, ESO new ventures are less likely of being funded in reward-based CF. Moreover, for new ventures using reward-based CF, the feature of ESO has a direct positive effect on the likelihood of securing subsequent venture capital funding after CF, whereas has a

negative indirect effect mediated by the CF performance on the same likelihood. The second study has examined how specific attributes of products/services featured in the campaigns could influence the success of sustainability oriented initiatives in CF. For this purpose, an in-depth qualitative content analysis based on a new sample of 235 sustainability-oriented food campaigns from Kickstarter was conducted. Results of this analysis suggested that some attributes of products/services pursued within sustainability-oriented campaigns affect the CF success of these campaigns. In particular, sustainability-oriented initiatives may be more successful in CF when they emphasize egoistic/self-centered product attributes more than altruistic/society-centered attributes. However, the emphasis on altruistic attributes emerges to be more beneficial for locally oriented initiatives.

6.3 Theoretical contribution

This thesis offers several important contributions to the literature. Specifically, this thesis provides theoretical contributions with reference to the three crowdfunding issues investigated: 1) the effectiveness of the certification of new venture's unobserved quality provided by reward-based CF as compared to that of initial funding from VCs; 2) the ability of the performance in reward-based CF of anticipating product market performance; 3) the role of CF in supporting environmental sustainability-orientated new ventures, also by facilitating (or in hindering) the access of ESO new ventures to subsequent funding from professional investors after the campaign. Theoretical contributions from each of the above described issues is discussed below.

6.3.1 Theoretical contribution from the issue “The certification role of reward-based CF vs initial funding from VCs”.

This thesis contributes to the literature on CF by informing about the certification effect of the reward-based CF. So far, literature on CF has remained mostly confined to the study of crowdfunded new ventures alone, even when the relationship of CF with traditional forms of new venture financing has been investigated (Drover et al., 2017b; Roma et al., 2017). This thesis explicitly compares crowdfunded new ventures with similar new ventures initially backed by early-stage VCs, and reveals a certification comparative disadvantage of reward-based CF, which however can be reduced and even overcome when the new venture complements the certification from CF with other means that can reduce uncertainty regarding its technological and managerial capabilities. In other words, this thesis adds to the extant knowledge that the reward-based CF can allow new entrepreneurial ventures without initial funding from VCs to compete with those with initial funding from VCs in attracting later stage funds from VCs, but only when the crowdfunded ventures have other attributes that transmit information about their technical and managerial merits.

This thesis contribute also to the general entrepreneurship literature on new venture financing by offering a unique comparison between the certification of new venture's unobserved quality provided

by novel (i.e., reward-based CF) and traditional (i.e., VCs) early-stage funding channels (Guerini and Quas, 2016; Lerner, 2002; Megginson and Weiss, 1991). Despite the increasing number of early-stage funding alternatives and their interconnectedness, extant literature has dedicated scant attention to the explicit comparison of different types of initial funding sources (Dutta and Folta, 2016; Drover et al., 2017a; McKenny et al., 2017). By focusing on reward-based CF as a new popular form of new venture financing, this thesis adds to this stream of literature that a gap exists in the certification effectiveness between the new and the traditional forms of new venture financing, but at the same time, explains under which conditions such gap can be overcome. Specifically, the thesis reveals that VCs tend to value more new ventures funded by their peers rather than those funded by the crowd. This is because VCs and backers in reward-based CF differ significantly in terms of both motivations to fund and screening strategy. Therefore, VCs are more prone to trust other VCs because of the similar background, expertise, and more comprehensive investment criteria they share. As a matter of fact, when crowdfunded new ventures display other attributes usually considered by VCs, such as intellectual property protection and a founding team with track record of success, the certification disadvantage of which reward-based CF suffer compared to initial funding from VCs lessens and can even be overcome.

Finally, the thesis also contribute to the literature on the role of patents and founding team characteristics as a way to reduce information asymmetries between funders and founders (e.g., Audretsch et al., 2012; Conti et al., 2013a; Haeussler et al., 2014; Hoenen et al., 2014; Hsu and Ziedonis, 2013; Kolympiris et al., 2018; Shane & Cable, 2002; Stuart et al., 1999). Specifically, this thesis adds to extant literature that patents and founding team characteristics (i.e., the past successful funding experience) not only influence investors' funding decision per se, working as certification means, but they also work as means that boost the effectiveness of other means of certification such as the initial funding through CF (Bapna, 2019).

6.3.2 Theoretical contribution from the issue “The role of CF performance in anticipating market performance”.

This thesis informs the extant literature on the informative function of reward-based CF (Chemla and Tinn, 2019; Drover et al., 2017; Stanko and Henard, 2017; Strausz, 2017; Viotto da Cruz, 2018), that the performance in reward-based CF works not only as effective signal of the existence-of-a-market that increases the propensity to funding of subsequent professional investors. But, it also works as product quality signal that reassures future potential consumers about their purchasing decisions of the new product. In this respect, the reward-based CF performance acts as an effective predictor of the actual product market performance. In addition, the thesis adds that the ability of the performance in reward-based CF of anticipating the future product market performance vary according to the

degree of innovativeness of the new product, given that this feature influences how much representative investors in reward-based CF are of consumers active when the product will be fully commercialized. Specifically, this thesis reveals that the predictive power of reward-based CF is likely to be higher for moderately innovative products, rather than for extremely innovative products, and explains that this stems from the different extent of representativeness of backers with respect to the targeted market in the two cases.

Secondly, this thesis contributes to the broad signaling literature in the movie industry (Eliashberg and Shugan, 1997; Basuroy et al., 2003, 2006; Reinstein and Snyder, 2005; Liu, 2006; Duan et al., 2008; Gemser et al., 2008; Hennig-Thurau et al., 2009, 2015; Chintagunta et al., 2010; Moon et al., 2010; Broekhuizen et al., 2011; Karniouchina, 2011a, 2011b; Chen et al., 2012; Akdeniz et al., 2013; Liu et al., 2015; Bharadwaj et al., 2017), by unveiling the impact of a new consumer-generated signal, i.e., the performance in reward-based CF that, sharing some notable similarities with eWOM, can be particularly effective as a predictor of future market success.

Finally, the thesis informs the innovation management literature that has focused on the effects of product innovativeness on market performance (Henard and Szymanski, 2001; McNally et al., 2010; Rubera and Kirca, 2012; Song and Montoya-Weiss 1998; Szymanski et al., 2007) that this important product feature not simply has an impact on their market performance, but it can work also as a moderator boosting or reducing the effectiveness of other consumer-generated signals.

6.3.3 Theoretical contribution from the issue “The role of reward-based CF in supporting ESO new ventures”.

This thesis provides novel evidence to the nascent, yet contrasting, literature on the relationships between environmental sustainability, reward-based CF, and venture capital funding (Austin et al., 2006; Bergset, 2015; Calic and Mosakowski, 2016; Lehner, 2013 Hörisch, 2015; Lagazio and Querci, 2018; Mrkajic et al., 2019; Testa et al., 2019; Vismara, 2019). Specifically, the thesis adds that, at least for new hardware ventures, reward-based CF is not suitable to support new entrepreneurial ventures pursuing environmental sustainability objectives. These ventures are indeed less likely to be successful funded in CF, as compared to more commercially oriented new ventures. This is because reward-based CF works as a pre-ordering mechanism, meaning that investors (i.e., backers) who fund CF campaigns behave like consumers particularly interested in having early access to new products to satisfy their individual consumption needs. This results in a comparative disadvantage for ESO new ventures, which naturally tend to provide more indirect and less individual benefits.

Besides demonstrating the comparative disadvantage of ESO new ventures, as compared to their non-environmentally oriented counterparts, this thesis have also investigated how some product/service attributes pursued within sustainability-oriented initiatives may influence the outcome of the reward-

based CF campaign. Previous literature has focused mainly on the study of the role of attributes related to the project (Calic and Mosakowski, 2016; Hörisch, 2015; Hörisch, 2018), the founder (Bonzanini et al., 2016; Calic and Mosakowski, 2016) and the platform (Bonzanini et al., 2016; Calic and Mosakowski, 2016; Vasileiadou et al., 2015) in affecting CF success of sustainability oriented initiatives. Hence, this thesis contributes to the above literature by providing the first empirical study investigating the role of a new type of attributes: the product/service attributes. In particular, in line with purchasing decisions literature (e.g., Annunziata and Scarpatò, 2014; Schuitema and De Groot, 2015), this thesis suggests that sustainability-oriented projects emphasizing more self-centered attributes than sustainability attributes are more likely of being financed in CF. Compared with egoistic/self-centered ones, altruistic/society-centered product attributes prevail only in the case of localness attribute, probably due to the dominant discourse around this sustainable attribute.

The thesis also contributes to the investor-as-consumer theory applied in the context of CF (Chan and A. Parhankangas, 2017; Lin et al., 2019; Roma et al., 2018; Testa et al., 2019; Zhang and Chen, 2019) by revealing that, in the case of technology based products, in order to understand the decision of providing finance or not, it is relevant to refer to the nature of the investors, in terms of the typologies introduced by Rogers. Backers of innovative technology products can be indeed likened to early adopters, meaning that their financing decisions are largely influenced by other rather than environmental attributes, as already shown in the consumer behaviour literature (Tran et al, 2013, Barboza and Arruda Filho, 2019).

Finally, this thesis informs the stream of literature concerning the relationship between the ESO and traditional sources of new venture financing that, for new hardware ventures using reward-based CF, the feature of ESO affects the attainment of venture capital funding after the campaign in two opposite ways. Specifically, ESO exerts a positive direct effect on the likelihood of accessing subsequent venture capital funding; moreover, due to its negative impact on the performance in CF, ESO exerts also negative indirect effect mediated by the CF performance on the same likelihood. Such effects counterbalance each other, thus resulting in an insignificant, or at most attenuated overall effect.

6.4 Implications for practice

This thesis provides a number of practical implications, which are of relevant interest for entrepreneurs relying on reward-based CF for financing their new product ideas.

First, results provided by this thesis are informative for technology entrepreneurs who aims to scale up their ventures by attracting later stage funds. According to the finding, such entrepreneurs should pay significant attention to the choice of their initial funding sources, and specifically on whether to use a reward-based CF channel (when it is not a last resort), because this may strongly affect the chances of raising subsequent capital from VCs. However, since the reward-based CF is emerging as

novel channel for financing early stage entrepreneurial ventures, an important guideline to entrepreneurs engaging in successful reward-based CF to enhance their chances of securing subsequent funding for their current ventures is that, they should endeavor to complement their successful CF performance with other positive attributes (patents and team features) capable of mitigating uncertainties about technical and managerial capabilities. In this case, new ventures initially funded through reward-based CF may have the same or even superior chances of receiving follow up funding of VCs-backed entrepreneurs.

Second, regarding entrepreneurs and artists (innovators), who intend to launch a reward-based CF to finance their innovative projects, this thesis suggest them to spend time and effort in designing attractive campaigns able to ignite commitments from the crowd, because this would help them not only to raise more funds in CF, but above all, to have a superior market performance. However, innovators should be aware that moderately innovative products will benefit more than others from the informative function of reward-based CF. To enhance the informative function of CF performance for highly innovative products, innovators should take specific marketing actions to attract to fund in the campaign not only hardcore fans (pioneers or more aficionado/expert consumers) of the new product, but also consumers who are more representative of the population of consumers that will be active upon product commercialization. For instance, they could communicate characteristics of the new product idea so that these can be better understood and perceived as more familiar by general consumers. In this case, consumers will be more willing to contribute to the CF campaign.

With regard to technology entrepreneurs who rely on reward-based CF to raise funds to develop and commercialize green products, this thesis suggest them to pay attention to the type of contributors accessing reward-based CF platforms and to design their campaign accordingly. Specifically, concerning the communication strategy, they should try to emphasize more potential personal benefits of their products for backers (self-centered attributes), as compared to the sustainability benefits of their products. Accordingly, they could also design the rewards scheme by offering rewards and products that are more in line with the individual consumption needs of contributors accessing these platforms. By implementing such strategies, entrepreneurs would reduce their CF performance gap with entrepreneurs pursuing non environmental sustainability-oriented products, would reduce the consequential negative mediating effect of reward-based CF performance, and thus comparatively enhance the access to subsequent funding from professional investors.

Finally, concerning entrepreneurs who pursue sustainability-oriented food product/service, this thesis suggest that they should try to emphasize product features related to local production and development of the product. However, if they target such localness attributes, they should place more emphasis on public benefits, rather than on personal benefits, for backers.

Summing up, this thesis provides three main managerial guidelines. According to them, entrepreneurs engaging in reward-based CF should:

1. Endeavor to complement a successful CF performance with other positive attributes (*patents and team features*) to reduce the certification gap with new ventures initially funded by Early-stage VCs.
2. (In case of high product quality uncertainty) Design *attractive campaigns* not only to attract higher funds, but especially because *this can translate into better future market performance*. Furthermore, compared to moderate innovators, radical innovators should activate strategies to attract to fund in the campaign consumers more representative of the targeted market.
3. (If pursuing *environmental sustainability* objectives) Properly design the campaign and the rewards scheme, by emphasizing mostly product attributes that can provide *individual benefits*, in order to enhance their chances of success in CF.

6.5 Limitations and avenues for future research

As for every research, there are certainly some limitations, which however offer remarkable opportunities for future research.

The first boundary condition of this thesis is that it focuses on specific industries, limiting the generalizability of the results. Specifically, to study 1) the certification effectiveness of reward-based CF as compared to that of initial funding from VCs and, 2) the role of reward-based CF in supporting ESO new ventures (also) in the attainment of subsequent venture capital funding, this research has focused on hardware new ventures. As explained, hardware is a fertile template to test the hypotheses because hardware new ventures necessitate subsequent venture capital funding after the CF campaign to scale up. However, the industry-specific idiosyncrasies makes the findings valid only in this context. As regards the study of the relationship between reward-based CF performance and market performance, and the moderating role of product innovativeness, this research has considered movie projects because 1) this industry is one of the most suitable templates for studying the role of (consumer-generated) signals; and 2) unlike other industries (such as hardware), information about actual revenues are easily accessible through public databases. However, also in this case, the specificity of the product setting causes that generalization of findings to other sectors should not be undertaken without further research. Finally, similar considerations apply for the study of the product/service attributes that influence the CF success of sustainability-oriented initiatives, which focuses on food projects. However, in this case, some of the results could arguably apply to other projects categories where sustainability issues play a relevant role. For instance, the P2 (on pag. 93) on the effect of emphasizing self-centered/egoistic benefits instead of sustainability-related attributes, may well apply to hardware device that improve energy efficiency or favor the use of renewable

energy. This is because the idea is that backers in CF need to be stimulated by more individual and tangible benefits, given that they tend to choose sustainable products (regardless of whether it is food or renewable energy, etc.) not only for altruistic or social reasons but also for selfish reasons (e.g., Combris et al., 2009; Hobbs et al., 2006). To conclude, in the attempt of further corroborating and generalizing findings, follow up works should analyze new ventures/innovative projects/sustainability-oriented initiatives outside the settings already analyzed.

Another limitation of this research is that it considers only campaigns related to hardware/movie/food projects launched on a single platform, i.e., Kickstarter. While this platform is the largest one among those focusing on reward-based CF, it differs from the other reward-based CF platforms (e.g., IndieGoGo) because of the (All-or-nothing) funding mechanism. Therefore, it would be worthwhile to check the robustness of the results using other different reward-based CF platforms. Moreover, although reward-based CF is still one of the most popular forms of CF, another prominent form of CF, i.e., equity-based CF is consolidating its role in early stage financing. Future research should address whether the same dynamics described in this thesis arise when such a different form of CF is considered. However, because of the more complex legal issues involved, equity-based CF tends to attract professional and accredited investors such as angel investors or VCs. Therefore, in this case, the funding providers would be mostly the same with or without CF; hence, adopting an investor-as-consumer perspective would not be appropriate, therefore calling for other sources of inspiration.

With regard to the study of how the product/service attributes influence the CF success of sustainability-oriented initiatives, it has involved a qualitative research, which has resulted in a number of propositions. Future studies should formalize hypotheses based on such propositions and test them by means of quantitative research methods in broader samples and perhaps different contexts. Finally, another limitation concerns the validity of the findings and relative implications for innovators or sustainable entrepreneurs not engaging in reward-based CF. To unravel the absolute effect of reward-based CF, future research could address similar questions by comparing innovators or sustainable entrepreneurs successfully engaging in reward-based CF with similar innovators or sustainable entrepreneurs that do not use this funding channel.

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