

## PART I

### Diversity and innovation in different contexts

## 2. Gender and innovation strategy in crowdfunding

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### 1. INTRODUCTION

Crowdfunding is now understood as a distinct and foundational aspect of entrepreneurial finance (Pollack et al., 2019) and is an increasingly important financing source for nascent ventures (Block et al., 2018). More specifically, crowdfunding aids the development of new innovative businesses at their earliest stage, alleviating the financial challenges commonly faced by entrepreneurs (Schwienbacher & Larralde, 2010). As crowdfunding platforms continue to grow and evolve, they allow a wide range of potential investors an unprecedented opportunity to participate in early-stage innovations directly. Crowdfunding offers a world-wide audience (commonly referred to as ‘backers’) as it is conducted virtually through Internet-based platforms. As such, crowdfunding alleviates traditional barriers like the geography (Sorenson et al., 2016) and social connections (Colombo et al., 2015) of the entrepreneurs. Further, backers on crowdfunding platforms tend to use community logic rather than the market-based logic often employed by professional investors (Vismara, 2019). Community logic emphasizes a commitment to values, trust, and a sense of group membership. Market-based logic instead places pecuniary outcomes center stage. In sum, crowdfunding has the potential to be a democratizing force in financing risky, but innovative ideas that might be shunned by other types of finance (Mollick & Robb, 2016).

The nature of crowdfunding is unique; thus, the theoretical assumptions of traditional methods of entrepreneurial finance might not hold in this context (Drover et al., 2017). Two such paradoxes have recently emerged in crowdfunding literature. First, research on traditional entrepreneurial finance suggests that male entrepreneurs have an edge. Not only are female entrepreneurs drastically underrepresented (Brush et al., 2018), but even displays of femininity can impair success (Balachandra et al., 2019). However, the very recent studies centered on gender in crowdfunding show a more democratic funding process. Thirty-five percent of project leaders on the Kickstarter platform

are women, and female founders proposing technological projects are more likely to succeed than men (Greenberg & Mollick, 2017). Moreover, studies highlight that gender not only influences the outcomes of a campaign but will also influence the way the entrepreneur approaches the campaign (Gafni et al., 2019; Moss et al., 2019). Critically, the advantages held by male entrepreneurs in traditional finance dissipate in the crowdfunding context – and potentially even work against them (Johnson et al., 2018).

Second, numerous studies in entrepreneurial finance highlight the positive role of sources of intellectual property, such as patents, in attracting external finance. Signaling a patent reduces information asymmetry between investors and potential entrepreneurs, and acts as an attractive quality signal to prospective external investors (Hsu & Ziedonis, 2013). However, recent evidence on crowdfunding suggests a negative signaling role of intellectual property in accessing funds on crowdfunding platforms (Meoli et al., 2019). Crowdfunding investors are the earliest possible adopters of innovations, directly participating in the development process (Stanko & Henard, 2017) and view engagement as an important attribute of the campaigns they support (Song & Tian, 2020). It follows that these investors would instead prefer open innovation strategies in which they can directly participate. For example, projects in the open-source software movement typically offer to make their source code open to the general public with a non-restrictive license. This software can then be modified freely, and the lifecycle of the project is typically driven by the community interested in the software, rather the solely the corporation who originally developed the product (Lerner & Tirole, 2002).

Taken together, we suggest that crowdfunding is a highly relevant context to glean insights into the relationship between gender and innovation strategies and propose that female entrepreneurs who pursue innovation strategies that are more open in the crowdfunding context will have optimal outcomes. In particular, the community logic affecting the crowdfunding dynamics is in line with open innovation strategies as they have a social orientation. Females on crowdfunding seem to be more inclined and likely to build a community for the project development, both in terms of project financing and support. To test this proposition, we leverage automated web-harvesting techniques and statistical matching techniques (cf. Meoli et al., 2019) to construct a large and representative sample of rewards-based crowdfunding projects signaling their innovation strategy.

This chapter proceeds as follows. First, we review the recent literature concerning female crowdfunding entrepreneurs (e.g., *creators*) and contrast those findings to those found in traditional entrepreneurial finance. Next, we examine the nature of innovations in crowdfunding and how these innovations are perceived by crowdfunding investors (e.g., *backers*). We then build our core proposition, which is then supported by our large sample of crowdfunding

data. Last, we outline an agenda for future empirical research and conclude with a discussion on the practical application of this work, highlighting the opportunities that lie ahead for female founders pursuing innovative new ventures.

## 2. CROWDFUNDING AND THE FEMALE CREATOR

There is a growing interest among scholars investigating female entrepreneurs' access to external capital (e.g., Alsos et al., 2017; Jennings & Brush, 2017). Several studies offer empirical evidence showing a substantial gender gap in terms of financial resources acquisition. In comparison, women seem to face several setbacks. First, differences exist in terms of financial ambitions (Jennings & Brush, 2017) and as a result, female entrepreneurs tend to obtain a comparatively lower amount of financial resources (e.g., Alsos et al., 2017; Fairlie & Robb, 2009; Verheul & Thurik, 2001). Next, in terms of the method used to finance the venture, research notes that women are less likely to receive funds from traditional sources of external finance, as bank financing and private equity funding (Coleman & Robb, 2012).

Looking specifically at debt financing, women experience more difficulty obtaining loans from the bank: they have to pay higher interest rates than their male counterparts (Coleman, 2000), and provide more collaterals than men when seeking a bank loan (Calcagnini et al., 2015). Remarkable differences are observable with private equity financing as well: less than 3 percent of venture capital backed companies in the United States had a female CEO (Greene et al., 2001). Moreover, the investments in such ventures tend to be for smaller amounts, with women receiving less than 5 percent of venture capital funds distributed annually (Brush et al., 2004). Over the last thirty years, women have made progress in attracting venture capital. The number of businesses managed by women and receiving capital funds almost tripled; still, a significant gap exists between a business run by women and those operated by men (Brush et al., 2018). Last, attributes associated with female entrepreneurs are more likely to lead to creditability problems (Carter & Rosa, 1998) and some level of discrimination (Balachandra et al., 2019; Malmström et al., 2017).

Despite the field's progress on the relationship between gender and finance, much remains unknown (Malmström et al., 2017), including how this relationship plays out in the crowdfunding context (Pollack et al., 2019). Crowdfunding takes four major forms, such as reward-based, equity-based, lending-based, and donation-based. In reward-based crowdfunding, backers act as early customers receiving a reward or a thank-you note for their financial contribution (Mollick, 2014). In equity-based crowdfunding, the investors purchase the equity of new firms or become part of a profit-sharing agreement

(Drover et al., 2017). Finally, as for the lending and donation models, the first regards offering loans for the development of a project taking as compensation the interest payments; the second consists of pure donations, without any expectation from the project (Pelizzon et al., 2016). While all of these different forms of crowdfunding are useful in understanding how the innovation process unfold and the specific relationship between gender and financing, this research will focus on reward-based crowdfunding.

Crowdfunding scholars argue that this relatively new method of entrepreneurial finance has the potential to democratize access to capital as it lends itself to inclusivity. One key reason is the way project backers in crowdfunding view investment in comparison to professional investors (Vismara, 2019). In crowdfunding, creators mobilize financial resources for the project through a community creation process (Murray et al., 2020). As these communities grow in size, entrepreneurs are more likely to find their ‘crowd’ – this can instead be an advantage for female entrepreneurs (Greenberg & Mollick, 2017). Murray and colleagues (2020) theorize a three-step process concerning resource acquisition in crowdfunding that provides some important clues of why this might be the case.

First, the entrepreneur must build a community of like-minded individuals to support the project. With this support, comes a degree risk – crowdfunding backers must have faith that the project creator will deliver on their promises. Thus, trust is an important part of launching a community, and evidence highlights that females have an advantage in this context (Johnson et al., 2018). Second, the entrepreneur must engage with the community in a meaningful way. Community engagement can be time-consuming and might not yield direct financial gain. However, efforts spent engaging with the community offers intrinsic rewards, and such can be a fulfilling part of the entrepreneurial process (Bort et al., 2021). Further, previous research notes that female entrepreneurs place emphasis on social, rather than economic goals (Hechavarría et al., 2017). Taken together, this suggests that female creators derive more value from the community building process, and therefore engage with it in a more authentic manner. Third, the community must continuously expand to draw in a broader audience. Individuals are drawn to these platforms in part because supporting these projects has the potential to support their own intrinsic needs (Allison et al., 2015). Thus, by fulfilling the first two elements – building a community and then engaging with it, backers searching for interesting projects to support will have something important to be drawn to ultimately leading to growth.

Structurally speaking, female entrepreneurs are better represented in crowdfunding, and are more likely to hit their funding target (Mollick & Robb, 2016). Further, and consistent with the findings of Johnson and colleagues (2018), women on crowdfunding are perceived as more trustworthy than

men, facilitating the willingness to provide finance. Perhaps just as important, females are also well represented among the population of backers (Gafni et al., 2019). Greenberg and Mollick (2017) theorize that homophily plays a role in investing decisions; thus, having a large pool of female backers increases the potential size of the communities, and thus the success of the project. It is worth noting that there are nuances in fund-raising success depending on the crowdfunding form (e.g., rewards-based versus equity). Initial evidence on equity crowdfunding shows that female entrepreneurs perform more closely to what is found in traditional methods of finance (Cumming et al., 2019). This is likely due to the different motives of crowd-based equity finance, which we address further as we discuss our theoretical model and outline an agenda for future research.

## **2.1 The Unique Nature of Innovation Strategy and Crowdfunding**

In the realm of entrepreneurial finance, crowdfunding is generally used in the early stage of development, similar to angel investing and venture capital (Block et al., 2018; Mollick & Robb, 2016). In turn, many high-risk, but innovative projects look to the ‘crowd’ for support as access to traditional finance might not be feasible due to social or geographic constraints. However, there are relevant differences should an entrepreneur pursue this avenue to fund an innovative venture.

First, while crowdfunding is an important vehicle for obtaining financial sources, raising financial resources are not the only benefit from a crowdfunding campaign. Crowdfunding platforms also serve as a tool for entrepreneurs to bring risky, highly innovative products to an eager and supportive audience (e.g., backers) (Lee et al., 2015). Because backers are central to a campaign’s success, it is important to understand their role in the market process. Crowdfunding platforms operate under different business models, with the largest consumer-oriented platforms using a rewards-based model. In other words, the investors in these highly innovative new ventures are more likely to be interested in the end product rather than the company itself. As such, the backers of a project play a participatory role in shaping the project’s development (Stanko & Henard, 2017).

Next, differences occur in terms of contractual arrangements. Crowdfunding involves many small investments from a large number of amateur investors with who the creator ultimately has no formal contract (e.g., if the creator doesn’t deliver, any intellectual property remains with the creator). Professional investors, on the other hand, employ contractual covenants that protect their investments and may stake a claim on any of the firms’ assets, including intellectual property (Hornuf & Schwienbacher, 2018). Second, very well supported theoretical mechanisms for evaluating intellectual property

differ. Professional investors typically utilize a quality signal (e.g., patents) to reduce information asymmetry as they evaluate potential innovations (cf. Hsu & Ziedonis, 2013). However, recent exploratory evidence suggests this does not seem to apply when analyzing amateur investors participating in crowdfunding. Meoli et al. (2019) found that crowdfunding campaigns that offered a signal that innovation was closed (e.g., patented, patent-pending, or even the desire to obtain a patent) were those campaigns less likely to be fully funded.

Last, there are nuances among crowdfunding models. The equity crowdfunding model differs from the reward-based model as for the commitment and engagement with the project. In rewards-based crowdfunding, backers are looking for new projects to invest in and contribute – investors aim to support product development providing feedback for future iterations of the products directly with the entrepreneurs who launched the campaign. On the other hand, equity-based crowdfunding investors tend to be professional investors who are less interested in product development and more interested in typical venture outcomes (e.g., financial returns).

Though the studies focusing on the intersection of innovation and crowdfunding remain sparse, studies thus far highlight that the true value of the crowdfunding model is less about the initial financial benefits, but instead the number of backers and their involvement in the campaign (Stanko & Henard, 2017). Small-scale investors in early-stage product development are essentially beta-testers. Whereas a large scale firm would typically employ individuals to test these products, the small-scale crowdfunding investor not only pays to back to the project but more importantly is enthusiastically engaged, viewing the opportunity to provide feedback as another perk (Agrawal et al., 2013; Gerber et al., 2012).

As we highlight above, crowdfunding defies some long-held theories on entrepreneurial finance. The presence of a patent, for example, in a project on the platform, might signal to the crowd that the development activities are already completed and might alienate potential backers from the participation they enjoy (Meoli et al., 2019). Backers are on the front lines of innovation, as they not only provide financial support, but they bring knowledge and ideas that aid the creator's product development. Thus, the innovation strategy can play an important role not only in the initial success of the campaign but might also play a role in sustainability after the campaign ends (Stanko & Henard, 2017). These stark differences in the way innovation is evaluated call for further theoretical refinement, and the differences are likely to be influenced by the creator's gender.

## **2.2 Innovative Female Project Creators and Innovation Strategy**

Highly innovative startups have higher levels of uncertainty and as such, experience higher failure rates (Hyytinen et al., 2015). However, not all innovation strategies are created equal. A closed innovation strategy is based on the view that innovations take place exclusively inside the company, from the idea generation and development, to the marketing activities. On the other side, an open innovation strategy refers to opening oneself or a firm self to external ideas, processes and technologies throughout the innovation process (Chesbrough, 2003). As for the crowdfunding setting, while closed innovation strategies seem to dissuade potential crowdfunding investors from backing a project (Meoli et al., 2019), the same might not hold for projects utilizing an open innovation strategy (Stanko & Henard, 2017). For several reasons, we argue that projects utilizing an open innovation strategy and led by females will have a competitive advantage in the crowdfunding context.

Individuals who are attracted to open innovations are typically drawn to them for philosophical reasons, that is, the ideology of free and open is important (Stewart & Gosain, 2006). Whereas closed innovations provide a tangible benefit to the owner, open innovations provide a tangible benefit to society at large. Ownership is more akin to stewardship in the context of open innovation, where the owner directs the project, and the beneficiaries are essentially unlimited. This advantage has the potential to manifest in two primary ways. First, evidence suggests that crowdfunding backers utilize communal logics rather than market-based logics. Open innovation is by definition a communal effort – groups of individuals volunteer to manage, contribute, and maintain large-scale open projects, with no direct financial incentive to do so (Lerner & Tirole, 2002). An open strategy offers a more robust communal element for backers, who are predisposed to participating in projects (cf. Eiteneyer et al., 2019), to join in. Next, crowdfunding is participatory by its nature. Backers are early adopters of new and innovative technologies and place value on the ability to shape the development of the project. Open innovations allow individuals to contribute to projects with a great deal of freedom as these projects are typically offered with no licensing requirements and source materials available free of charge. Thus, the combination of a participatory method of finance, along with intrinsic benefits from participation, is likely to be attractive to these individuals.

Second, female crowdfunding entrepreneurs find an advantage in terms of their perceived trustworthiness (Johnson et al., 2018). This is not only important as crowdfunding projects require a degree of faith in the creator's ability to deliver after the campaign ends, but is also important for open innovation. Contributors to open innovations are typically volunteers and offer their work with no expectation of future payment based on their contributions. Project



leaders are then stewards of these resources, and trust that they will be good stewards of these efforts is critical (Fleming & Waguespack, 2007). Last, this community of contributors is also an avenue to overcome resource constraints common in early ventures (Baker & Nelson, 2005). Female entrepreneurs generally raise less money (Mollick & Robb, 2016), but they can potentially make up for this with the resources from their communities of low or no cost contributors (Lifshitz-Assaf, 2018). Thus, we offer the following propositions:

*Proposition 1: Female creators pursuing innovative projects will have superior funding performance than males.*

*Proposition 2: Female creators pursuing innovative projects using an open innovation strategy will have superior funding performance.*

### 3. RESEARCH DESIGN

Our propositions are concerned with both the gender of the founder, and their innovation strategy within the crowdfunding context. Thus, we gathered data from Kickstarter, a rewards-based platform founded in 2009 for funding creative projects in the arts, technology, game and publishing. Project creators build funding pages that offer numerous details pertaining to the project. Included among these are textual narratives that offer various signals about the project, including the project's innovation strategy (Meoli et al., 2019). More specifically, some projects are completely open source, and others guard their intellectual property through the use of a patent. Project creators can also offer personal information about themselves to potential backers, including their gender.

One exemplar project demonstrating a female creator utilizing an open innovation strategy is 'Osloom,' an open-source loom utilized to weave fabric. The project successfully met its funding goal, raising US\$10,000 from 197 backers. Leveraging a non-restrictive license, creator Margarita Benitez blended her interests in technology and weaving into a project that builds, and encourages a community to flourish, as she highlights in her pitch:

I believe that in order for a loom such as OSLOOM to have the greatest amount of impact it would need to operate on an open-source platform. Therefore, the software to operate the loom will be GPL (General Public Licensed) and the hardware will be OHL (Open Hardware Licensed). This would allow other individuals or groups to create this loom or to further develop this loom in the form of a derivative loom. (<https://www.kickstarter.com/projects/mbenitez/osloom-an-open-source-jacquard-loom-diy-electrom>)

Table 2.1 Average treatment effect of gender (matched sample)

Test	Gender*	ATE (Success)		<i>p</i>
		Male	Female	
Full Matched Sample (N=888)		0.21	0.30	0.010
Closed Innovation (N=609)		0.17	0.25	0.030
Open Innovation (N=279)		0.29	0.47	0.024
	N	222	666	

Note: \* Gender determined algorithmically by the R package Gender (Mullen, 2020).

### 3.1 Sample

To test our propositions, we closely replicate the matching approach utilized by Meoli et al. (2019), differing primarily in that gender serves as the treatment effect. The sample consisted of 1,316 crowdfunding projects where gender could be algorithmically identified, collected from Kickstarter.com, and represent the years 2009 to 2018. These projects signaled either a patent or an open innovation in their text descriptions, which was found via the Kickstarter search engine and then harvested via automated tools. The matching technique resulted in a three-to-one (male to female, consistent with representation in crowdfunding) gender matched sample of 888 projects.

## 4. RESULTS

Table 2.1 displays tests of average treatment effects.<sup>1</sup> First, consistent with general trends in the crowdfunding literature, female creators were more successful at hitting their funding threshold across the sample. This suggests that regardless of innovation strategy, female creators are likely to find an advantage over their male counterparts in a rewards-based crowdfunding context, supporting our first proposition. Next, while both genders face a penalty for a closed innovation strategy, consistent with Meoli et al. (2019), the penalty is less severe for female creators in comparison with males. Around 25 percent of female lead projects found success, while only male success was around 17 percent. Last, and most notable – nearly half of the female creators who pursue an open innovation strategy were successful in obtaining their funding threshold, supporting our second proposition.

In sum, the results show substantial economic effects and offer promising support for our propositions. However, our tests are limited to the rewards-based crowdfunding context, focus only on the initial success of the campaign, and only offer a correlation rather than cause. Next, we suggest

ways to fill these important gaps and further extend knowledge of the nexus of innovation, gender, and crowdfunding.

## 5. GENDER AND INNOVATION IN CROWDFUNDING: LOOKING AHEAD

The goal of this chapter is to highlight the recent developments regarding gender and innovation in the crowdfunding context. More specifically, we argue that innovation strategy has potential to influence fund-raising performance. Supplemented by the evidence presented, we offer a first step in demonstrating that crowdfunding offers promising opportunities for innovative female entrepreneurs, and that they may have advantages not found in certain traditional entrepreneurial finance settings. However, much remains unknown and important research questions remain.

First, rewards-based crowdfunding has served as the primary context for theoretical development in this burgeoning phenomenon. While rewards-based platforms are by far the most popular, equity-based crowdfunding platforms continue to grow in popularity as regulation catches up to innovation. However, initial evidence suggests that these platforms have their own nuances (Bapna & Ganco, 2020), and thus require separate empirical exploration. Rewards-based crowdfunding is generally low-stakes in comparison to equity investment and is likely to change investment motivation. While we highlight that open innovation is advantageous to female entrepreneurs in reward-based models, this might not hold across all crowdfunding models.

Second, the most studied outcome in crowdfunding thus far has been whether the campaign met its fund-raising goal (Pollack et al., 2019). This outcome is crucial as large crowdfunding platforms typically operate on an all-or-nothing funding model. While we suggest that females pursuing an open innovation strategy are likely to find an advantage for this important outcome, it is also likely that they will flourish after the campaign ends. Communities typically contribute their human capital back to open innovations at a very low, or even no cost to the project itself. In turn, this could be an important source of slack resource, which may then spurn future growth (George, 2005), and ultimately lead to more sustainable ventures as backers continue to contribute to the product development after the campaign ends. Thus, longitudinal or ethnographic studies following the development of female lead open innovation projects after they raise their initial funds offer a promising route to answering this question.

Third, a growing number of firms are pursuing social and financial goals simultaneously (Moss et al., 2019) and data show that female entrepreneurs also perform remarkably well within prosocial crowdfunding. Open innovations are inherently prosocial as most elements of the project are offered free

of charge for anyone to build upon. However, it remains unknown if explicit social goals, for example, open innovations in food packaging intended to benefit those in the middle of a disaster, would be more attractive than projects that are more consumer-oriented. Therefore, measuring the projects hybridity (cf. Shepherd et al., 2019), and whether that moderates the overall campaign performance – the success of the campaign in terms of money gathered – would be a fruitful avenue to pursue this question.

## 6. CONCLUSION

Crowdfunding is one of the most important evolutions of entrepreneurial finance. It's significance spans both theory and practice, as it is now one of the largest sources of capital for aspiring entrepreneurs. Further, crowdfunding one of the most suitable avenues for innovation, as it draws support from a population of early adopters who often hold an intrinsic interest in seeing a project succeed. As such, biases found elsewhere are less likely to exist and allow virtually any aspiring entrepreneur an audience to pitch their innovative creations.

## NOTE

1. Details on the matching procedure, including criteria and diagnostics, can be obtained directly from authors.

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