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Crowdfunding and Innovation

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Crowdfunding and Innovation

Abstract

Entrepreneurs have started relying on crowdfunding to fund their investments. This article surveys the literature linking crowdfunding with innovation in entrepreneurial firms. Two distinct areas are discussed. First, crowdfunding has the potential to foster innovation by offering new sources of capital to innovation-driven firms and thereby reduce the funding gap for innovative startups. Second, crowdfunding offers a way for the crowd to participate in the innovation process by providing feedback to the entrepreneur. This feedback can take various forms, including providing ideas on the development of the product during and after the campaign (in the spirit of crowdsourcing), and providing valuable information on the future demand for the new product.

JEL Classifications: O31, G2, G3

Keywords: crowdfunding, entrepreneurial finance, innovation

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1. Introduction

Finance and financial institutions are important for the economy since they not only play a role in the selection of investment opportunities and the allocation of resources, but also the financing of innovation (Schumpeter, 1912). The function of selecting the best projects is crucial for the economy since innovation is an important source of growth (King and Levine, 1993). Entrepreneurial, high-tech firms (mostly startups), and in particular those financially supported by private sources such as venture capital funds and business angels, contribute significantly to the development of innovation (Benson and Ziedonis, 2009; Kortum and Lerner, 2000; Block *et al.*, 2018a. Therefore, financial institutions participate in the development of innovation not only by providing financial support but also by mitigating the adverse selection of projects. In this article, we discuss innovation and growth generated in small, entrepreneurial firms by the means of a new form of financing: crowdfunding.

Although it is often claimed that for some forms of innovation, startups are better equipped to innovate, they also face their own difficulties. These difficulties stem from different sources (Lee *et al.*, 2015). First, innovation is strongly related to risk, which in itself makes financing very risky. This can disadvantage small firms, since larger ones can diversify their risk across other activities that either already generate revenues or across other research projects. Second, small innovative firms face more severe information asymmetry problems, which makes financing through traditional sources such as bank finance more difficult than for larger, more established firms (Carpenter and Petersen, 2002). Based on the *pecking order theory* (Myers, 1984), younger and smaller firms therefore need to rely more on equity finance, notably from business angels and venture capital funds, which tend to be more able to evaluate, assist, and monitor these firms. Otherwise, market failures may arise (Akerlof, 1970). And third, innovation can be very specific and can hardly be transferred nor sold. Often, innovation can only be implemented inside the firm that developed it in the first place. Thus, innovative startups cannot use their innovation as a form of collateral to secure outside financing in the form of bank finance. Since such startups often do not generate revenues in their first years, they are also not able to service interest payments on a regular basis.

Recently, crowdfunding has developed as a new form of entrepreneurial finance, which aligns with the financing needs of some innovative firms often unable to tap other forms of financing. Its development was accelerated after the financial crisis of 2008, possibly because the supply of traditional financing to small and medium-sized enterprises (SME) had dried up

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even more. Crowdfunding has the potential to provide funding to early-stage projects and thereby fill some of the funding gap that plague small, innovative firms (see Cressy, 2002, for a general discussion on funding gaps for SMEs). At first sight, crowdfunding appears as a mixture of other forms of financing (Harrison, 2013; Schwienbacher and Larralde, 2012). Today, we typically distinguish between different types of crowdfunding, ranging from reward-based crowdfunding, donation-based crowdfunding, loan-based crowdfunding and equity crowdfunding.[1] According to Short *et al.* (2017), the World Bank estimates the volume of crowdfunding to become $300 billion by 2025. Based on a different methodology, Rau (2017) identified over 1,300 platforms worldwide with a total volume of nearly $140 billion in 2015, although the bulk is loan-based crowdfunding. However, all segments exhibit strong growth, including equity crowdfunding. The latter also started a bit later, notably because it is the most regulated type and was therefore forbidden in many countries until recently. An obvious reason why different types of crowdfunding have emerged is because of the broad range of projects seeking money through crowdfunding. In fact, many projects are artistic and social, and thus do not involve an entrepreneurial aspect and are even less likely to include technological innovation. The focus of our article here is on crowdfunding that involves an entrepreneur with an innovative idea, and not purely, one-shot artistic or social projects. Thus, our discussion will not cover the full range of crowdfunding activities.

Crowdfunding is not a new phenomenon, as illustrated by the financing of the Statue of Liberty in New York. In 1884, due to financing problems in the construction of the Statue of Liberty, the newspaper editor Joseph Pulitzer (publisher of *New York World*) issued an open call to his readers to help finalize the project. This call led 125,000 individuals to donate over $100,000 in total, which was sufficient to cover the remaining costs. As a reward, all the contributors had their names cited in the newspaper. This example shows how the crowd can help in the financing of projects. Another feature of crowdfunding is that the crowd can be solicited to evaluate the project or at least provide feedback on the product to be produced (Mollick, 2014; Strausz, 2017; Vismara, 2016; see also Cumming *et al.*, 2017, for equity crowdfunding). This idea is also not new, since Galton (1907) showed that a crowd may be able to provide an accurate estimation and thus make good decisions when being subject to the right incentives. This phenomenon of *vox populi*, as labeled by Galton (1907) (later labeled *wisdom of crowds* by Surowiecki, 2004, although the term was already used by others before him; see Larrick *et al.*, 2011, for a comprehensive discussion), stems from the fact that errors made by

[1] More recently, real estate crowdfunding has emerged, offering the possibility to fund large real estate projects.

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individual members of the crowd are cancelled out when the crowd is sufficiently large and diverse, so that on average the crowd may get it right. The big question here though, is whether the crowd is also able to *be sufficiently wise* when it comes to the evaluation of innovation-driven projects, since it requires specific expertise.

For approximately the last ten years, academic research has been interested in the phenomenon of crowdfunding. Most of the earlier work focused on reward-based crowdfunding and loan-based crowdfunding, mainly because of the quicker availability of data (e.g., on projects funded on the platforms Kickstarter, Indiegogo, Prosper, and Kiva). In addition, the impact of project and entrepreneurial characteristics on campaign success was typically studied. These characteristics include funding goals, project presentation (e.g., the inclusion of a video, the length of the project description, and the complexity of the writing), geography, the size of the entrepreneur's social network and personality traits, and team characteristics (Agrawal *et al.*, 2015; Ahlers *et al.*, 2015; Allison *et al.*, 2015; Bapna, 2017; Bollaert *et al.*, 2017; Buttice *et al.*, 2017; Colombo *et al.*, 2015; Kuppuswamy and Bayus, 2017; Leung et Sharkey, 2014; Lin *et al.*, 2013; Lin and Viswanathan, 2015; Mollick, 2014; Moss *et al.*, 2015). Some of this literature examined whether crowdfunding helps "democratize" access to finance, by investigating whether individuals often discriminated by traditional financial institutions receive more when asking the crowd. This has led some researchers to explore specific individual characteristics of entrepreneurs such as gender and race. Empirical evidence suggests that women benefit proportionately more from crowdfunding, but that discrimination against racial minorities in the US remains (Greenberg and Mollick, 2017; Marom *et al.*, 2016; Pope and Sydnor, 2011; Younkin and Kuppuswamy, 2017). The crowdfunding's promise of democratization does not alleviate the underrepresentation of minority founders. The dynamics of crowdfunding campaigns have also been studied (Hornuf and Schwienbacher, 2017b; Kuppuswamy and Bayus, 2017; Vismara, 2016), showing that the pattern of contribution over the campaign time period is generally U-shaped for reward-based crowdfunding. For equity crowdfunding, the dynamics are L-shaped for shares allocated on a first-come, first-served basis and U-shaped when allocated by an auction mechanism.

An important economic and public policy question that has been the subject of little research so far is the link between crowdfunding and innovation, with a few exceptions that we discuss below. Our objective is to discuss possible links between crowdfunding and innovation based on the existing literature. More specifically, we raise the questions as to whether and how crowdfunding can spur innovation. We focus on two distinct channels whereby this can occur.

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The first and more immediate one is that crowdfunding can provide a new source of financing to innovation-driven projects. If crowdfunding provides money to projects that would not be funded otherwise or in a more efficient way than traditional sources of finance, then it may contribute to innovation activities. The second channel is that crowdfunding may enable the participation of the crowd in the innovation process itself. Indeed, crowdfunding is sometimes associated with crowdsourcing (Harrison, 2013; Estellés-Arolas and González-Ladrón-de-Guevara, 2012; Schwienbacher and Larralde, 2012). This aspect makes crowdfunding distinct from traditional sources of finance such as banks and professional equity investors (business angels and venture capital funds). Moreover, as shown by Mollick and Nanda (2015) for artistic projects, the crowd possesses a capacity to evaluate projects that is similar to experts. Whether these findings can be extrapolated to innovation-driven projects remains to be shown, but the fact that the crowd offers funding, ideas, and feedback leaves this question open, especially given that the crowd is often the final consumer of the product that is being put on the market later on. While professional investors can provide guidance on how to develop the business, the crowd can offer direct feedback on the product. This view is consistent with the theoretical principal-agent model developed by Strausz (2017) that underlines that while crowdfunding is not an effective way to mitigate entrepreneurial moral hazard problems (a task well handled by banks or venture capitalists), the success of reward-based crowdfunding comes from its capacity to reduce the uncertainty about aggregate demand. This argument however is specific to reward-based crowdfunding and does not directly extend to other forms.

The remainder of this article is structured as follows. The next section offers a general discussion on how crowdfunding works, which in recent years has been based on platforms that have emerged on the Internet. Section 3 discusses whether and how crowdfunding can help finance innovative projects and thereby foster innovation. Therein, we also provide a discussion on possible links between crowdfunding and other, more traditional forms of finance. Section 4 presents ways for crowdfunding to foster innovation beyond the pure provision of financial resources. Section 5 concludes with suggestions of avenues for future research.

2. The functioning of crowdfunding platforms

While the vast majority of crowdfunding campaigns takes place on dedicated platforms, the first campaigns occurred without them. Before the arrival of Kickstarter in 2009 and Indiegogo in 2008, a few entrepreneurs launched a crowdfunding campaign by setting up their own website (Belleflamme, Lambert, and Schwienbacher, 2013). An interesting example is the

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British software company Trampoline Systems, which aimed at raising £1 million to fund its development without using any platform. Eventually, they only sold securities to accredited investors. The development of platforms has facilitated the launch of campaigns by standardizing the processes and creating greater visibility to projects. This, in turn, has accelerated the development of crowdfunding internationally. Today, there are a large number of platforms operating in various forms. While some are generalists, others are specialized in specific project categories. Some operate under the all-or-nothing funding model, whereby a funding threshold must first be met, while others under the keep-it-all funding model allowing all funding to be kept; others again give entrepreneurs the possibility to choose between the two (Cumming, Leboeuf, and Schwienbacher, 2016). More recently, some platforms now offer the possibility to choose among different crowdfunding types. For instance, in addition to a reward-based crowdfunding campaign, Indiegogo now offers the possibility to run an equity crowdfunding campaign (https://equity.indiegogo.com/; see also Hornuf and Schwienbacher, 2017b).

The development of social media on the Internet has enabled the emergence of platforms that bring together businesses and potential investors, especially individual investors with little knowledge of finance but each willing to provide a relatively small amount of money (Harrison, 2013). Taken together, these small amounts of money can become large. This development could arise because the Internet has significantly reduced the costs of intermediation so that even small entrepreneurs can rely on the crowd (Belleflamme *et al.*, 2014; Leboeuf and Schwienbacher, 2018; Mollick, 2014).

As mentioned in the Introduction, today the different forms of crowdfunding (donation, reward, loan, equity) coexist in a global ecosystem (Harrison, 2013). At the same time, the fact that crowdfunding takes so many forms makes it appealing to different types of entrepreneurial and innovative projects. When an entrepreneur is not able to obtain the needed funds from traditional sources, he or she can choose the type of crowdfunding that is most suitable to his or her project. Similar to two-sided markets, the platform's role is to match entrepreneurs (or projects) with backers (or contributors) in a way that makes it less costly than without the platform as intermediary (Evans, 2011). These costs may take different forms, such as search costs, costs associated with collecting information on the project and its owner, and costs borne to negotiate a contract between the different parties involved. Although the platform is an intermediary, its role as such is different from traditional intermediaries like banks (Allen and Santomero, 2001; Boot and Thakor, 2000). While the latter select projects themselves, a

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crowdfunding platform leaves this decision to the crowd. The platform's intermediation role is restricted to bringing together the two sides of the market. Moreover, in contrast to banks, a platform generally plays no role in the collection of information; it is merely a place where the information provided by the parties is collected so that costs are reduced for everyone (Hornuf and Schwienbacher, 2016).

Given the different forms of crowdfunding available, it is not surprising that they also attract different types of crowdfunders and not just different types of entrepreneurs (Leboeuf and Schwienbacher, 2018; Vismara, 2016). In reward-based crowdfunding, backers generally are compensated by receiving the project's product before everyone else. Thus, backers (at least many of them) make consumption decisions when deciding to contribute. At the other end of the spectrum, equity crowdfunding involves the purchase of financial securities, so that investors become shareholders in the startup. There, backers mainly make investment decisions with the goal of achieving a financial return. Similar objectives are generally targeted for those using loan-based crowdfunding platforms. Backers therefore have different motivations depending on the types of platforms. As we will see below, other motivations may be at play and complement the ones mentioned here.

A characteristic of crowdfunding is that the entrepreneur needs to put a large amount of information in the public domain (the Internet) to convince backers to contribute. While this can generate problems for the entrepreneur if others aim at replicating the same idea (something we discuss below), the disclosure of relevant information is important to reduce information asymmetry or fraud, and thus risk for the crowd. An accumulation of fraud cases could jeopardize a platform's future or even the entire crowdfunding industry overall. Thus, it is important that platforms are managed to minimize the crowd's risk. Equity crowdfunding has especially attracted much attention by regulators during the last several years, mainly because it involves the public offering of financial securities, which are already heavily regulated. The development of crowdfunding depends on the existence of a supportive legal environment (Dushnitsky *et al.*, 2016). As a way to promote equity crowdfunding while mitigating to some extent the risks for the crowd, different countries have put in place regulations specific to it (Hornuf and Schwienbacher, 2017a). A few countries, such as France and the United Kingdom, have even drafted regulation for loan-based crowdfunding.

The United States was the first country to propose regulations for equity crowdfunding as part of the Jumpstart Our Business Startups (JOBS) Act of 2012, although it was only implemented by the US Securities and Exchange Commission in 2016 (Catalini, Fazio, and

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Murray, 2016). Other countries followed their steps, including Italy, France, Germany, Belgium, the United Kingdom, and Austria (Hornuf and Schwienbacher, 2017a). These regulations are often quite different in their approach but also share many similarities. To minimize the crowd's risk in equity crowdfunding (either because of fraud risk or risk specific to this type of investment, especially for innovative startups), regulations generally require a minimum level of information disclosure about the issuer and the company's activities. In addition, there are limits placed both on the amount that each crowd investor can invest, which may depend on the crowd investor's investable wealth, and the maximum amount that any issuer can raise within a period of (typically) 12 months.

3. Crowdfunding and the financing of innovation

3.1. Crowdfunding: a solution to the funding gap?

Startups often experience difficulties in raising capital, especially if it is meant to finance innovation, a phenomenon generally denoted by "funding gap" (also called equity gap; Cressy, 2002) and which results from important information asymmetry and moral hazard problems investors may face when investing in such firms. But, other sources of difficulty have been identified, such as the lack of sufficient collateral. For instance, firms naturally tend to seek banks to obtain funding, but these require collateral or other guarantees, which innovative startups do not have. Empirical evidence (Cosh *et al.*, 2009) therefore shows that startups do not receive enough external funding and that received funding is often not in the form they would prefer.

Within the financial growth cycle paradigm of Berger and Udell (1998) that considers a linear relationship between investor type and stage of development, crowdfunding would be situated at the beginning of the cycle, coming from friends, family, and professional investors (business angels and venture capital funds). Crowdfunding is generally used by smaller, younger firms with significant problems of information asymmetry. Since this type of firm is often funded by professional investors (Maxwell *et al.*, 2011), crowdfunding can potentially complement or substitute this form of finance.

If one wants to position the different types of crowdfunding within Berger and Udell's (1998) paradigm, one would probably put reward-based crowdfunding first, since it mostly involves small amounts of money (most less than $10,000) for very small firms, and the motivation of backers for pledging is mainly non-financial (Cholakova and Clarysse, 2015). The next type would be loan-based crowdfunding, since there too the amounts are often small,

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while the motivation of backers is now financial (Paravisini *et al.*, 2016; Block *et al.*, 2018a). For instance, Prosper.com, a well-known loan-based crowdfunding platform, offers three-year loans for a maximum amount of $25,000 (Leung and Skarkey, 2014). Hildebrand *et al.* (2016) reported that the average amount requested is approximately $8,000. Equity crowdfunding comes last, given that the amount requested is rarely below $50,000.[2] Also, the decision by investors to participate in an equity crowdfunding campaign is mostly driven by financial motivations (Cholakova and Clarysse, 2015; Vismara, 2016). For instance, the average amount raised is £205,000 on the UK platform Crowdcube (Vismara, 2016), €151,000 on the French platform WiSEED (Hervé *et al.*, 2017), and AUD 318,500 on the Australian platform ASSOB (Ahlers *et al.*, 2015). As a result, any type of crowdfunding enables small and medium-sized enterprises (SME) to overcome problems of accessing financing, including for innovation projects. This observation is promising since access to external finance is crucial for young firms to survive and develop (Carpenter and Petersen, 2002; Gilbert *et al.*, 2006).

3.2. Links between crowdfunding and other forms of entrepreneurial finance

An important question relates to how crowdfunding interacts with other forms of entrepreneurial finance and, in particular, angel finance and venture capital. Although these two other forms appear to be close to crowdfunding in terms of amount provided and stage of development, crowdfunding turns out to be different in many ways. An important difference lies in the contractual arrangements offered by crowdfunding platforms. Professional investors more often make use of contractual covenants that are intended to protect their investment, such as liquidation preferences, preemption rights, veto rights on major corporate decisions, and, in addition to stage financing, milestone financing (Da Rin *et al.*, 2011; Dahiya and Ray, 2012; Hornuf and Schwienbacher, 2016, 2018; Wong *et al.*, 2009). Since crowdfunding involves many small investments from a large number of individuals, the platforms cannot offer tailored contracts to the same extent as professional investors. Moreover, crowd investors on equity crowdfunding platforms do not purchase equity per se, but often receive other types of securities such as participating notes (Hornuf and Schwienbacher, 2016). In contrast, angel investors and venture capital funds typically purchase common shares and convertible preferred shares. These represent important differences between crowdfunding and professional investors.

[2] Hornuf and Schwienbacher (2016) pointed out that some startups have been able to raise several million euros on equity crowdfunding platforms in Germany. The amounts can therefore be at times comparable with those provided by venture capital funds.

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Along the same lines, Brown *et al.* (2018) argued that equity crowdfunding will generally be preferred over other forms of equity financing because of weaker control rights required by equity crowdfunders. Thus, equity crowdfunding can be viewed as a diluted form of equity funding due to its weaker capacity to restrain the entrepreneur's autonomy.

Crowdfunding and financing by professional investors generally both occur in the early stage of development, which raises the question whether they are complements or substitutes. Drover *et al.* (2017) showed that startups having completed a successful (reward-based) crowdfunding campaign on a well-established platform were more likely to have venture capitalists perform due diligence on them for follow-up financing. This finding is consistent with the view that a startup that has successfully raised crowdfunding enjoys some form of certification from the crowd, which in turn positively affects the perception of the startup by professional investors.

Colombo and Shafi (2016) examined the links between venture capital financing and crowdfunding in more detail. An interesting point of their focus is the distinction made between firms that have already received venture capital and those which have not. For the latter, they argued that two opposing forces are at play, inducing a tradeoff in the choice of financing. On the one hand, a large amount raised by crowdfunding increases the autonomy of the entrepreneur and gives him/her some indication on the success of the project, even though it is more the venture capitalists who provide indication of success, though in a different way. As a result of the successful crowdfunding campaign, the entrepreneur no longer needs the help of venture capitalists to the same extent as before. This may induce the entrepreneur to rely on other forms of financing in the future, including bootstrap financing. In this case, crowdfunding and venture capital financing are substitutes. On the other hand, a successful crowdfunding campaign reduces the information asymmetry that the firm is generally subject to, since (reward-based) crowdfunding can be viewed as a pre-test for commercialization of the ultimate product. This indicates to the venture capital funds that the project may be promising, which in turn induces them to fund the firms themselves. These two opposing forces affect the likelihood of obtaining venture capital financing.

For firms that have already benefited from venture capital, a successful crowdfunding campaign confirms the investment choices made by the venture capital funds and thus further increases the chances of obtaining follow-up venture capital funding. In this case, the outcome is similar to staged financing since the crowdfunding campaign represents a distinct round of financing due to the reduced information asymmetry regarding the quality of the entrepreneurial

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project. This shows that crowdfunding and venture capital can be complements. Examples of complementarity between the two forms of financing exist. One illustrative example is Oculus Rift, which raised $2.4 million on Kickstarter in 2012, ten times more than the funding goal. This phenomenal success then attracted the interest of venture capitalists, who provided a further $75 million in 2013, and eventually led to the acquisition of Oculus Rift by Facebook for $2 billion in 2014.

In this vein, Mollick and Kuppuswamy (2016) provided survey evidence indicating that crowdfunding can function as a prelude to traditional funding (venture capital and angel investment). Yu *et al.* (2017) found a correlation between crowdfunded projects and angel funding rounds at the regional level in the United States. Sorenson *et al.* (2016) identified a similar relationship between crowdfunding and venture capital. They suggested that the development of crowdfunding could be at the origin of the development of traditional forms of entrepreneurial finance (venture capital or angel finance) in regions that are traditionally excluded from these forms of financing. These different pieces of evidence are consistent with complementarities between these different sources of financing.

3.3. Summary: crowdfunding can help finance innovation

The relationship between crowdfunding and other sources of finance appears to be complex and needs to be studied in more detail, in particular from an empirical perspective. Research up till now has been theoretical work that has generated different predictions which now need to be tested empirically. What can we conclude so far? On the question as to whether crowdfunding can help alleviate the funding gap of SMEs, the answer is clearly "yes", as evidenced by increased synergies with other sources of entrepreneurial finance. The extent to which this will be the case needs to be seen, since the proportion of crowdfunding going to innovative entrepreneurs (as opposed to artistic and social projects) still remains small. It is however growing fast. Moreover, the way crowdfunding is structured makes it suitable for many startups, also at times as a complement to financing from institutional investors.

As for the question about which type of crowdfunding is most suitable to finance innovation, there is not yet a definitive answer. Reward-based and loan-based crowdfunding for startups mostly involves small amounts, while equity crowdfunding is able to attract larger ones. However, the financial motivations present in loan-based and equity crowdfunding limit the possibility to reduce information asymmetry, while reward-based crowdfunding can serve as a *proof of concept* or at least as a pre-test for assessing market demand. This provides valuable information to the entrepreneur and other investors involved that cannot be obtained

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from other forms of financing. Although loan-based crowdfunding is by far the most important form of crowdfunding worldwide (Rau, 2017), it seems to offer few opportunities for innovative startups, since the amounts involved are too small and the financial motivations are based on expectations of returns that are too short-term for supporting innovation. In contrast, equity crowdfunding represents more long-term investments and thus is more likely to support innovative projects that require time, while at the same time providing the amounts needed to undertake larger innovation projects.

In this section, we conclude that crowdfunding can constitute a valid form of financing for innovative firms. One related dimension still needs to be explored. Due to its participative nature, crowdfunding involves the participation of a large number of individuals and the disclosure of more information in the public domain than for professional investors. As a result, Harrison (2013) and McKenny *et al.* (2017) highlighted the fact that crowdfunding shares commonalities with crowdsourcing. Therefore, crowdfunding may also help entrepreneurs in carrying out their innovative project by providing other forms of feedback not raised so far. This is what we discuss next.

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4. Does crowdfunding spur innovation?

4.1. Innovation: A problem of trust?

An informational problem may arise when an entrepreneur seeks external finance, a problem called the "Double Trust Dilemma" (Cooter and Edlin, 2013; Hornuf and Schwienbacher, 2016) or the "Paradox of Arrow" (Arrow, 1962). The idea is very simple. When an entrepreneur seeks funding for an idea, he or she needs to engage with an investor. This creates a problem of trust. In order to convince the investor to provide the needed funds, the entrepreneur needs to disclose valuable information about the idea. However, once the idea is revealed, there is a risk that the investor will develop the idea himself/herself causing the idea to be lost for the entrepreneur. In the context of crowdfunding, this problem or paradox is likely to arise since the entrepreneur raises the funds over the Internet where anyone can access the information disclosed. Therefore, there is a risk of the idea being stolen in that someone else replicates it and becomes a direct competitor of the entrepreneur. This, in turn, limits the development of crowdfunding, since entrepreneurs with projects, which are valuable and can be easily replicated, may refrain from using crowdfunding as a source of funding. Projects with innovative ideas are most likely to suffer from this problem since much of their value is based

on ideas. Entrepreneurs relying on crowdfunding also generally lack the means to protect their ideas through patents or defend themselves in court in case of patent infringements. Schwienbacher (2017) showed that this affects the types of entrepreneurial projects posted on crowdfunding platforms. Indeed, entrepreneurs may seek to raise more money during the crowdfunding campaign than initially planned as a way to capture part of the aftermarket where the innovative product was intended to be sold (for instance, on Amazon or other online shops, or even in real shops) so as to compete in the aftermarket in the wake of replication. In the extreme case, entrepreneurs may even simply develop a project that is limited to the crowdfunding campaign as opposed to developing a business because of the reduced benefits in the aftermarket. Overall, the Double Trust Dilemma reduces the gains from using crowdfunding so that we expect fewer projects on crowdfunding platforms. However, those using crowdfunding may take whatever they can get during the campaign (even at the cost of not being able to deliver on time) as a way to capture part of the demand that would otherwise have come in the aftermarket. Thus, we would expect fewer but larger projects on these platforms to account for the risk of idea-stealing.

To sum up, the trust problem may limit the types of innovative projects that may use crowdfunding. Projects that are hard to replicate or projects that are only marginally innovative may be more likely to seek crowdfunding. The next subsection will aim at answering two follow-up questions to offer further insights into the type of innovation likely to be fostered by crowdfunding: can crowdfunding contribute to the innovation process? If yes, what type of innovation is likely to benefit most?

4.2. Crowdfunding and crowdsourcing

Crowdsourcing involves turning to a group (the "crowd"), especially online, to obtain needed ideas, goods, or services. McKenny *et al.* (2017) pointed out the similarity between the concepts of crowdfunding and crowdsourcing. On a scale of 1 (very similar) to 5 (very different), the participants of their study (the editorial board members of the academic journal Entrepreneurship Theory and Practice) attributed an average value of 2.23, implying they believe both concepts are strongly linked. Harrison (2013) mentioned that crowdfunding can be seen as a mixture of microfinance and crowdsourcing. Schwienbacher and Larralde (2012) even defined crowdfunding as a specific form of crowdsourcing. Estellés-Arolas and González-Ladrón-de-Guevara (2012) undertook a survey of definitions of crowdsourcing provided in academic research. As a conclusion of their work, they provided a definition of crowdsourcing that shares strong similarities with crowdfunding. An important element of their definition is

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the dimension of partnering with the aim of achieving some mutual benefit. Of course, this may include the provision of financial help, which is close to crowdfunding. However, here we want to go beyond the common financial aspects between the two practices and focus on sharing non-monetary elements such as ideas and providing advice. This will shed light on other ways in which crowdfunding can contribute to the innovation process. We discuss this in the next subsection.

4.3. The contribution of crowdfunding to the innovation process

The fact that crowdfunding involves an *open call* affects the relationship between investors and entrepreneurs. First of all, in the case of reward-based crowdfunding, this open call yields an imprecise assessment of the future demand since the interest for the reward (which is generally the final product) during the campaign can provide a hint on the success of the product in the aftermarket. Thus, pledges by the crowd lead to an aggregation of individual preferences. A high demand during the campaign may indicate the entrepreneur's project is promising beyond the crowdfunding campaign. Drover *et al.* (2017) cited a venture capitalist offering a similar view: "*If crowdfunding is coming from potential customers it can be a reasonable signal of demand*." This is particularly true for reward-based crowdfunding where funding may resemble pre-ordering of the product (Mollick, 2014), but not for loan-based and equity crowdfunding (Schwienbacher, 2014). Indeed, in these latter forms of crowdfunding, backers do not make consumption decisions but rather investment decisions based on their expectations about the startup's profitability, i.e. the same criteria as professional investors (Cholakova and Clarysse, 2015; Vismara, 2016; Davis *et al.*, 2017). Thus, the assessment of future demand is likely to be more precise under reward-based crowdfunding. This feedback can be useful to the entrepreneur to decide whether to pursue the project or to adapt his or her strategy, including innovation strategy. The quality of the feedback is even greater if the entrepreneur offers a menu of reward choices in which crowdfunders can choose what they prefer best (this product differentiation can be vertical – in terms of different qualities – or horizontal – in terms of differences in properties such as colors and forms).

Another type of feedback provided by crowdfunders to entrepreneurs takes the form of ideas. Stanko and Henard (2017) and Di Pietro *et al.* (2018) pointed out that the interaction with investors can contribute to the generation and development of new ideas and thus the innovation process. A larger number of backers brings more information, resources, and ideas to mobilize for the development of innovation. Backers can thereby bring *inputs* to entrepreneurs. In this context, Agrawal *et al.* (2014) mentioned the example of the Pebble watch, where crowdfunders

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have proposed the development of software that can be used with the watch. This software enhances the product and its value to consumers, leading to a true collaboration in the development of the product. This holds for reward-based and equity crowdfunding and perhaps also loan-based crowdfunding since contributors to these crowdfunding forms have an incentive to see the project succeed and are therefore more likely to suggest improvements. Crowdfunders can provide such feedback at any stage of development, although it is perhaps more valuable at a more advanced stage of development when the level of abstraction is reduced (Huizing, 2011). At the time of the campaign, the degree of interaction is however largely determined by the way the crowdfunding platform enables such interactions, irrespective of the type of crowdfunding. While some platforms restrict the posting of comments at the time a pledge is made, others allow anyone (even those not contributing financially to the project) to post comments. Crowdfunding platforms typically offer ways for entrepreneurs and crowdfunders to interact during the campaign so that this exchange of ideas is possible. However, this may continue beyond the campaign if the entrepreneurs set up own ways to maintain such interactions.

Feedback can also flow the other way from entrepreneurs to investors. Colombo and Shafi (2016) stressed the importance of managerial competencies in innovative firms. These abilities play a major role in the relationship between the startup and investors. As argued by these authors, an open call to the crowd and the dissemination of information on the project can help to better assess the managerial competencies of the entrepreneur, for instance, by observing whether the entrepreneur meets the deadline for delivering the product promised during the reward-based crowdfunding campaign. It also provides information on the capacity of the entrepreneur to convince consumers to purchase the product in the future. Some managerial capacity can also be inferred from equity crowdfunding, since achieving a successful campaign means the entrepreneur has developed a business that is more developed than running a simple project (as is often the case under reward-based crowdfunding). Moreover, many equity crowdfunding platforms offer other expertise, since they carefully select the best projects while at the same time help entrepreneurs structure their firm and prepare it for the campaign. All these managerial competencies are useful and affect how the innovative projects will be managed and developed.

Additional benefits of crowdfunding can come from the ability to develop relationships with other stakeholders. Mollick and Kuppuswamy (2016) reported survey evidence that reward-based crowdfunding helps to find business partners in the industry, recruit talented

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employees, and enhance the attention of the media/press to the firm. Di Pietro *et al.* (2018) obtained similar survey-based results for equity crowdfunding. They argued that the development of partnerships with industry players, the increased awareness of the venture, and the capacity to attract new employees are all improved thanks to the crowd investors' network. They found that firms exploiting their crowd for such network aspects realized better performance than other firms. This, in turn, suggests that crowdfunding, by way of network development, can play a major role in fostering innovation.

A last characteristic of crowdfunding that can affect the innovation process is based on the way crowdfunders themselves diffuse the information on the project. Crowdfunders may act as ambassadors for promoting the product (Schwienbacher and Larralde, 2012). Such diffusion of information represents a form of "word-of-mouth", which has been shown to be a useful tool in marketing (Kozinets *et al.*, 2010) and in finance (Hong *et al.*, 2005). Several studies have further shown the usefulness of using social networks by entrepreneurs for their crowdfunding campaigns (Ahlers *et al.*, 2015; Buttice *et al.*, 2017). Crowdfunders are then helpful in diffusing the information and letting others know about the product, notably by using their own social networks during and after the campaign. This could facilitate the creation of knowledge and the adoption of new products and services, thereby promoting innovation. Here again, the type of crowdfunding probably does not matter so much since all types induce crowdfunders to use word-of-mouth. The extent to which these arguments are true in practice, however, still needs to be researched.

Despite all these potential benefits, crowdfunding can also hinder the development of innovative projects. One obstacle is that the information and feedback obtained by the entrepreneur from the crowd may become excessive, requiring too much involvement of the entrepreneur into time-consuming activities associated with interacting with the crowd (Agrawal *et al.*, 2014; Brown *et al.*, 2018). This may eventually slow down the entrepreneur. Indeed, the entrepreneur cannot always ignore feedback from the crowd since otherwise, the crowd's view about the project may turn against the entrepreneur and then lead to negative postings on the Internet. Wortham (2012) cited an entrepreneur, who said: "*We wanted to make it because it was something we believed in, but we got roped into maintaining a relationship with a lot of people. We weren't prepared to have to deal with that*." A second possible obstacle could be the crowd itself, especially if highly diverse (Agrawal *et al.*, 2014; Brown *et al.*, 2018). Entrepreneurs are not always good at coordinating a large number of individuals and thus can

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end up with contradictory feedback, which can then lead to more uncertainty and again slow down the project's innovation progress.

4.4. Types of crowdfunding and innovation

We have argued in the previous subsection that crowdfunding has the capacity to help entrepreneurs to innovate by means of both financial and non-financial contributions. This however raises the question as to which type of innovation is most likely to benefit from crowdfunding. A commonly used classification of innovation consists in distinguishing between two broad types: incremental and radical innovation (Dewar and Dutton, 1986). Incremental innovation involves improvement or simple adjustment of an existing product or service, while radical innovation represents a fundamental transformation of a product or service so that existing products become obsolete.

Two, distinct perspectives support the idea that crowdfunding can help these two types of innovation in entrepreneurial firms in distinct ways. First, from the point of view of the consumer, Chan and Parhankangas (2017) considered incremental innovation and presented the following arguments. For the consumer, incremental innovation is more familiar and easier to adopt than radical innovation, which then reduces the consumer's fear for the product's success since less effort to adopt and use it is required. Moreover, a project with incremental innovation may appear easier to implement and thus less risky for the consumer to fund through crowdfunding. Finally, the consumer can more easily provide valuable feedback to the entrepreneur if the innovation is incremental, since assessment requires less knowledge than for radical innovation. All these elements lead to the view that crowdfunders, when being put in the context of consumption, are more likely to fund projects with incremental innovation. Furthermore, an analysis of radical innovation leads to a similar conclusion. Radical innovation is more difficult to understand as it requires specific knowledge, and thus consumers find it more difficult to assess the benefits. Also, given the knowledge needed to appreciate the true value of this type of innovation, it involves more risk and makes interactions with consumers more difficult. This in turn leads to the view that radical innovations are more difficult to crowdfund. Following this consumer perspective (Priem, 2007), it therefore seems that while crowdfunders can provide financial and non-financial help, their support is more likely for projects with incremental innovation.

This conclusion may be changed or even reversed if one takes the point of view of the entrepreneur, which represents the second perspective. Davis *et al.* (2017) argued that the level of creativity of the proposed product plays a key role in the competitive advantage of the

entrepreneur. These authors developed a measure of creativity which is close to a measure of product innovativeness since it was evaluated with questionnaires asking consumers about the product's degree of originality and "newness". The degree of creativity was seen by consumers as a predictor of the performance of the product on the market. The authors empirically found a positive link between campaign success and product creativity. In this case, crowdfunding favors the highest possible level of innovation, which is the radical one. Stanko and Henard (2017) considered openness in the innovation process and argued that if crowdfunders provided a greater amount of information and ideas and given more sources of external knowledge, then the level of innovation would be increased. This aspect largely compensates for the complexity mentioned above of aggregating the information obtained. Stanko and Henard (2017) validated the positive effect of the number of external sources on radical innovation through an empirical study on reward-based crowdfunding. The authors did not exclude however that equity crowdfunding may show different effects, since projects funded in this way are quite different.

Finally, the type of innovation featured on the different types of crowdfunding platforms largely results from the fact that equity crowdfunding tends to represent a longer-term investment than reward-based crowdfunding, which assumes that the entrepreneur is able to ship the promised reward within the next few months. Therefore, the entrepreneur needs to be sure to have the product soon ready under reward-based crowdfunding; otherwise, reputational costs may arise for the entrepreneur and hurt him/her in the aftermarket. This may, in turn, reduce the entrepreneur's capacity to pursue radical innovation, since it requires more time. In contrast, investors participating in an equity crowdfunding campaign need to understand that the funds are allocated on a project that will not yield any return in the short run. Thus, an entrepreneur interested in undertaking radical innovation will favor equity crowdfunding.

4.5. Necessary conditions for the development of innovation

For crowdfunding to contribute to innovation, it is important to ensure that the campaigns allocate funds in an efficient way and, in particular, to the most promising projects. To ensure this is the case, platforms may need to take an active role by selecting those projects that are most likely to be funded, filtering out the "lemons", and making sure that projects are properly presented. While reward-based crowdfunding platforms typically filter very little, equity crowdfunding platforms are highly selective. For example, Hornuf and Schwienbacher (2017b) indicated that German equity crowdfunding platforms have an acceptance rate below 5%. Similar rates are reported for France (Hervé *et al.*, 2017). Some equity crowdfunding platforms give the crowd further roles beyond financing projects. These platforms let their

registered members vote on projects, and only those with sufficient positive votes and pre-commitments to invest may launch a campaign (Cumming *et al.*, 2017). One such example is the French equity crowdfunding platform WiSEED. Cumming *et al.* (2017) however documented that voters are subject to a strong hypothetical bias, since they actually invest only 18% of what they said they would during the voting period.

This further raises questions about the determinants of campaign success. While we still know very little about the ultimate outcome of crowdfunded projects and the businesses themselves, there exists a significant strand of literature on success drivers of campaigns. Ahlers *et al.* (2015) and Mollick (2014) identified a number of factors that contribute to the success of a campaign, including the entrepreneur's human capital (education level), social capital (size of social network on Facebook and LinkedIn), and intellectual capital (patents). Other relevant factors that are more exogenous to the project itself include the way projects are presented by the entrepreneur and how the platform manages these interactions (Hornuf and Schwienbacher, 2018). Mollick (2014) showed that including a video that presents the project and the quality of the pitch increase the chances of success. Hornuf and Schwienbacher (2017b) and Block *et al.* (2018b) found that the updates posted by the entrepreneurs and comments posted by the crowd on the platform play a significant role in explaining the success of a campaign. Allison *et al.* (2013) empirically validated these results regarding the rhetoric of the project presentation. Moreover, the platform's marketing effort matters; specific projects highlighted and presented first by the platform on their website ultimately perform better. While the selection of these projects is not random, it nevertheless gives a role to the platform in promoting individual projects and thereby the innovation outcome of the selected projects.

As mentioned above, a question much less studied deals with the outcome of projects beyond the campaign. One reason is the lack of data, while another is the fact that most campaigns are very recent, which makes it often too early to make a judgment about outcomes. This latter reason is particularly true for equity crowdfunding. One of the few exceptions is the study by Signori and Vismara (2016), who examined this question with data from the equity crowdfunding platform Crowdcube. Their results rely however on some strong assumptions. Difficulties in performing such an analysis today include the lack of a secondary market (while a value may be attached to shares of crowdfunded businesses, it remains difficult to sell at any price currently) and the fact that most equity crowdfunded business have not experienced any exit in the form of an initial public offering or being bought by another firm, so that it is still challenging to assess true market values. In any case, studying the question of long-term

performance is crucial, not just for the viability of the crowdfunding market itself but also for assessing the impact of crowdfunding on innovation.

5. Conclusions

Crowdfunding appears to offer new financing opportunities to certain types of small, innovative firms. As such, crowdfunding plays a role in filling the funding gap traditionally identified for small businesses. Therefore, it may contribute to the development of innovation in small firms. However, the contribution of crowdfunding to innovation may not be limited to the provision of financial resources. It can also let backers participate in the development of the innovation process by providing feedback and ideas to the entrepreneur. While research has started to investigate these interactions, whether they ultimately affect the innovation process remains to be studied in more detail.

Agrawal *et al.* (2014) raised the question as to whether crowdfunding will eventually increase the number and types of innovation. The answer to this important question is complex and is inevitably related to the question if crowdfunding is complementary to other sources of finance and not simply a substitute for them. Research on this question remains inconclusive, but, as discussed in this article, initial evidence suggests complementarities exist. In terms of types of innovation, the answer is even more difficult, since it is impossible to know the strategies that entrepreneurs would have taken under each of the financing sources. However, since the crowd is likely to make different choices than professional investors, one might expect different types of innovation projects to be funded by the two groups. Also, it remains unclear whether the crowd is better at selecting the most promising projects than professional investors, in particular when it comes to innovation-driven projects. This, in turn, will affect the type of innovation financed by crowdfunding as compared to what professional investors are likely to finance. Further research is needed to offer more reliable answers to these questions. In parallel, crowdfunding will continue to evolve and adapt to improve its operation, including regarding the way projects are selected.

Another open question is which forms of crowdfunding are more likely to spur innovation. Our discussion does not offer a final answer, since it largely depends also on the perspective taken (consumer or entrepreneur). This provides great opportunities for future research in that area. For instance, while the interaction between entrepreneur and crowdfunders has been partially studied (e.g., its impact on campaign outcomes and funding dynamics within

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campaigns; Hornuf and Schwienbacher, 2017b; Block *et al.*, 2018b), the analysis of the interactions that occur between the two parties during the campaign clearly merits further research, especially concerning the impact on innovation. Content analysis may provide rich insights into how the interactions take place and the value of the discussions, as well as their impact on the innovation process and dynamics.

Finally, an interesting avenue for future research is the role of regulation. As mentioned in this article, many countries have implemented specific regulations on equity crowdfunding, and we observe a large disparity in approaches to the regulation of equity crowdfunding. Part of this disparity is probably due to different political-economic approaches (some countries consider that the state has an important role to play, while others favor some form of laissez-faire). Other reasons for this disparity may be due to different economic structures, which make some countries more prone to promote entrepreneurial activities than others. This may explain why platforms may be more popular in some countries than others. What remains to be seen is which regulatory approaches are more conducive to promote innovation through the different channels studied in this article.

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