The Economics of Crowdfunding Platforms

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Abstract

This paper provides a description of the crowdfunding sector, considering investment-based crowdfunding platforms as well as platforms in which funders do not obtain monetary payments. It lays out key features of this quickly developing sector and explores the economic forces at play that can explain the design of these platforms. In particular, it elaborates on cross-group and within-group external effects and asymmetric information on crowdfunding platforms.

Keywords: Crowdfunding, Platform markets, Network effects, Asymmetric information, P2P lending

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1 Introduction

Crowdfunding has attracted a lot of coverage in the popular press. While in terms of overall funding volume, crowdfunding should still be considered currently as a niche phenomenon, it is rapidly expanding in many countries and it is seen by many as a hope to fund innovative projects that would not be carried out otherwise. Total funding volumes in 2014 were around 16.2 billion US$ worldwide; they were 0.8 billion US$ in 2010, 1.4 billion US$ in 2011, 2.5 billion US$ in 2012, and 6.1 billion US$ in 2013 (see Massolution, 2013 and 2015). While these numbers appear negligible in light of the trillions of investments which are made, they nevertheless demonstrate that this is currently a rapidly growing market. Crowdfunding platforms have appeared across the globe with many platforms being created in Europe and the U.S. According to a survey by Iizuka (2014), conducted in December 2014, 60 percent of the CFPs have been created in Europe, and around 20 percent in North America. In Europe, UK is leading with 2.3 billion euros collected in 2014, which represent 79% of the total amount collected in Europe; France, Germany and Sweden come next with, respectively 154, 140 and 107 million euros collected (see Wardrop et al., 2015).[1]

Crowdfunding can be seen as an open call to provide financial resources. Crowdfunding mostly takes place on crowdfunding platforms (CFPs), i.e., internet-based platforms that link fundraisers to funders with the aim of funding a particular campaign by typically many funders.[2] This paper aims

[1] In the remainder of this survey, not only well-known U.S.-based CFPs but also several French CFPs will be used as examples. According to Iizuka (2014), in France, CFPs first appeared in 2008 (two had started in 2008), the number of CFPs reached 26 in 2012. In April 2014, we identified 77 French CFPs based on data collected through CFPs websites (sources: alloprod.com; tousnosprojets.fr; crowdfundingmonamour.wordpress.com). According to the data that we collected, around two fifth of the French CFPs are reward-based and donation-based (or a mix of both of them), 30 percent are equity-based, 19 percent are lending-based or royalty-based and 12 percent are a mix of the different platforms. Iizuka (2014) provides similar numbers. According to this survey, French CFPs are distributed as follows: 36% are reward-based, 25% are peer-to-peer CFPs, 20% are equity-based platforms, 9% are donation-based platforms, and the remaining ones are classified differently.

[2] Lambert and Schwienbacher (2010) provide a more specific definition of crowdfunding as "an open call [...] for the provision of financial resources either in form of donation or in exchange for some form of reward and/or voting rights in order to support initiatives for specific purposes." See also Schwienbacher and Larralde (2012). For a different view and some discussion on how to define crowdfunding, see Mollick (2014). Further below we note that many crowdfunding projects contain a combination of donation-based and reward-based elements, which suggests to remove the word "either" from the definition by Lambert and Schwienbacher (2010).

at providing insights into the functioning of crowdfunding platforms. As it uncovers the functioning of and business models in these markets it may provide a better understanding as to the prospects of this market.

Crowdfunding comes in a variety of fundraising activities and what is offered in return for the funds. This attracts different types of participants. It is useful to distinguish between investment-based, reward-based, and donation-based CFPs. We note that many real-world investment- or reward-based CFPs include some donation-based elements of warm glow.[3] Depending on the individual campaign, part of the motivation to participate may come from non-monetary considerations to support a particular idea.[4]

A common feature of all CFPs is that, on the fundraiser's side, participants come with the hope to obtain access to additional funding. Projects have different features and funders have heterogeneous preferences over these projects. Thus CFPs belong to the class of two-sided platforms, which provide a matching service between two sides of a market. Arguably, in many cases CFPs create markets that did not exist before – the extent to which this has happened is an empirical question. Different from, e.g., dating and real-estate platforms, CFPs do not provide one-to-one matching but one-to-many matching since a project requires more than one funder to be successful, i.e., to reach the funding target. While this feature is shared by most CFPs, the incentives of funders are rather different across the different types of CFPs, as are the incentives of the fundraisers who propose a certain project.

Investment-based CFPs can be seen as alternative financial investment instruments, in particular, to finance start-ups and SMEs.[5] We distinguish

[3]Based on micro-lending data from Kiva, there is some evidence that funders find a project more attractive when it is described as a project to help others rather than as a business opportunity (see Allison et al., 2014). For an additional investigation of the warm-glow effect, see Allison, McKenny, and Short (2013).

[4]An interesting issue in this context is whether and to which extent monetary incentives crowd out non-monetary incentives, a topic which has received some attention by economists and psychologists, in particular, in the context of labor markets (see, e.g., the survey by Frey and Jegen, 2001). Several recent papers have shown that monetary incentives do not necessarily crowd out intrinsic motivations of an agent within a principal-agent relationship (e.g., Thompson et al., 2010). However, based on survey evidence to fund film and video projects, Cecere, Le Guel and Rochelandet (2015) conclude that, in their sample, monetary incentives partially crowd out the positive effect to contribute to a project that is based on intrinsic motivation and warm glow. By contrast, considering equity-backed projects, Cholakova and Clarysse (2015) did not find evidence that non-monetary motives played a significant role.

[5]As such, they may be subject to financial regulation. For instance, the Financial

between equity-based, royalty-based and lending-based CFPs. Fundraisers on equity-based CFPs offer equity to funders, while fundraisers on royalty-based CFPs offer a royalty for the funds they obtain. In both cases, remuneration depends on the performance of the project when it is successful at the funding stage. Fundraisers on lending-based CFPs offer interest payments in return for a loan. An apparent hope of firms using investment-based CFPs is that they obtain access to a larger set of funders than if they used classical funding instruments such as the backing of an individual investor or loans from a bank. There may be other advantages (and possibly disadvantages) from CFPs, as we will explore in this paper.

Perhaps more novel are reward-based and donation-based CFPs. Fundraisers on reward-based CFPs do not offer a stake in the project or a monetary payment, but offer other rewards to funders. The funder may then be partly driven by her motivation to support a cause or particular project, but also by the personal benefits offered. It is up to the fundraiser to define those benefits. For example, in case of video games, depending on the contribution this may simply be a free copy of the game or even a personalized version of the game. Donation-based CFPs do not include personal benefits, even though it is sometimes difficult to draw an exact dividing line between the two because, e.g., the mentioning of the funder can already be seen as a reward.

In Section 2 of this article we classify and exemplify existing business models in crowdfunding. In Section 3 we survey the existing literature on crowdfunding (with a particular focus on platform activities)[6] and we mobilize, more broadly, the literature on the industrial organization of the digital economy to understand better the functioning of crowdfunding platforms. Section 4 concludes.

2 Business models in crowdfunding

In this section, we present different business models and some descriptive statistics on the crowdfunding platform market. It is useful to distinguish between two broad classes of CFPs, (i) investment-based CFPs and (ii)

Conduct Authority in the UK is in the process of establishing a regulation. See Financial Conduct Authority (2013).

[6]We do not claim to be the first to survey the emerging literature. For an excellent, complementary article, see Agrawal, Catalini, and Goldfarb (2013a). Morse (2015) provides a survey that focuses on P2P lending.

reward- and donation-based CFPs. The first class includes equity-based, royalty-based, and lending-based CFPs, where funders are investors in a campaign and may obtain monetary benefits. In the second class, funders cannot expect a monetary compensation; they fund a campaign because they obtain a product or because they support its cause (or a combination of the two).

Initially, the vast majority of CFPs were donation-based, followed by lending-based and reward-based platforms. Since then the number of reward-based CFPs has grown strongly. As of 2014, the share of newly created platforms that are reward-based is 40 percent, followed by donation-based platforms and lending-based platforms (each around 20 percent in 2014). As regards funding volumes of different types of CFPs, lending-based crowdfunding dominates the industry, with 11.08 billion US$ collected in 2014 (i.e., 68.4% of the total amount collected worldwide); the other forms of crowdfunding follow at some distance (donation and reward-based with 3.26 billion US$, equity-based with 1.1 billion US$, hybrid forms with 487 million US$, and royalty-based with 273 million US$; see Massolution, 2015). It is important to note that the ranking of the the number of successful campaigns across crowdfunding models is quite different: the majority of campaigns are donation-based (about 60%), while investment-based campaigns represent a tiny minority (about a few percent of the total). For these two rankings to be compatible, we must have very different campaign volumes depending on the chosen crowdfunding model. Indeed, as reported by Massolution (2013), the average campaign size with equity-based crowdfunding (190,000 US$ in 2012) is more than 100 times larger than the average campaign size with donation-based crowdfunding (1,400 US$). This suggests that investment-based crowdfunding features very different kinds of campaigns than all the other crowdfunding models. A possible explanation is that fixed transaction costs which come with equity-based crowdfunding are relatively large.

Depending on the CFP and the particular proposal, on many platforms a campaign has a fixed volume or a range in which the campaign is successful. If the lower bound is not reached, the campaign is not successful and no money flows from funders to the fundraiser. In such a case, a CFP is said to follow a threshold-pledge system. According to Massolution (2013) more than 50 percent of CFPs have implemented such a system. Once the upper bound is reached, for some proposals no further funders can join, for others

additional funding can be provided until the deadline is reached. Other CFPs allow fundraisers to keep any funds raised even when the target is not reached.[7]

In this section we also provide various examples for the different crowdfunding models. In particular, we report on platform pricing, ancillary services, and other features of particular crowdfunding platforms.

2.1 Equity-based and royalty-based CFPs

On equity-, royalty, and lending-based CFPs, funders act as investors or lenders. They have to assess the risk of the investment; i.e., the expected performance of a successful campaign. The uncertainty from the viewpoint of the funder is whether the project will lead to a product that caters to the tastes of a sufficiently large number of potential customers (and that the fundraiser is able to get into contact with these potential customers).

On equity-based CFPs, fundraisers offer equity stakes for the funding of a campaign, while, on royalty-based CFPs, a fraction of revenues or profits is offered. Fundraisers typically specify a target that has to be reached. This "All-or-nothing" approach means that if a project does not reach its target then it does not receive any of the money that has been pledged. This is seen as a way of protecting funders and encourages projects to set realistic funding targets that match the amount of money they need in order to realize their project's aim. Equity crowdfunding (also known as 'crowdinvesting') is a form of financing in which entrepreneurs ask for funding on the Internet with the aim to attract several investors (see, e.g., Ahlers et al., 2012). Thus it may serve as a substitute for early day funding through other channels. It may be a stepping-stone in a funding strategy that involves other funding at a later stage.

An example for an equity-based CFP is UK-based Crowdcube. It claims to have funded more than 200 campaigns with a total volume of 35 million pounds and to have attracted more than 146,000 investors (as of March 7, 2015). Like most CFPs it does not charge for membership and listings, but only when a campaign is successful. If this is the case, it charges 5 percent plus VAT on the total funds that are raised.[8] Thus, like most CFPs it

[7] One example is the 'flexible funding' scheme of Indiegogo that we discuss below.

[8] Information on the pricing has been obtained from `www.crowdcube.com`, last accessed April 10, 2014.

simply taxes transactions on the platform. The level of 5 percent appears to be the typical number, not only in case of investment-based CFPs. On top, Crowdcube charges a payment processing fee of 0.5 percent and a legal and administrative fee of 1750 pounds plus VAT. The latter implies that due to the required change of ownership rights, fundraising through equity needs to be of a rather large size to be attractive.

Another example is Smart Angels, a French equity-based CFP created in 2009. More than 4 millions euros were collected and more than 500 funders contributed to the 6 successful projects of Smart angels (as of May 22, 2014). Sliding scale commissions from 5 percent to 0,5 percent depending on the amount invested are collected when the campaign is successful. For instance, 550,000€ were collected to the project "Fast lease" in 2012 and 300 000€ to the project "Sejouring" in 2013.[9]

In addition to investing in single projects, Crowdcube also offers what it calls a venture fund. Here, a professional fund manager selects a number of projects, which are then collected in a fund.[10] By investing in the fund, a funder obtains equity in the portfolio. Here, the fund manager tries to play a similar function as the manager of a venture capital fund.

2.2 Lending-based CFPs

On lending-based CFPs funders are offered a certain interest rate on successful projects if the project pays out. Here lending bypasses traditional banks. Different from a traditional bank, the CFP does not screen between different projects. Rather it lets funders decide for themselves if a particular project should be funded.[11]

An example for a lending-based CFP is the US-based Prosper.com. Prosper hosts campaigns that, for instance, "help hardworking families escape the credit card trap, fund an entrepreneur's dream, or finance a dream wedding," as they advertise on their platform.[12] This lending-based CFP assigns a credit grade for each campaign based on the fundraiser's characteristics

[9] See `www.smartangels.fr`, last accessed May 22, 2014.

[10] See `https://www.crowdcube.com/pg/investing-your-money-1513`, last accessed November 15, 2014.

[11] This is also known as 'peer-to-peer (P2P) lending'.

[12] See `www.prosper.com/invest/peer-to-peer-lending/`, last accessed November 22, 2013. From 2006 to 2009, Prosper used an eBay-style auction process to determine loan rates (for an theoretical analysis of this mechanism, see Chen, Ghosh and Lambert, 2014). In 2010, Prosper moved to a set rate per loan.

and the performance of all successful campaigns. Thus, it can be seen as a credit-rating agency for the borrowers active on Prosper. Its pricing structure has the feature that fundraisers, depending on their credit grade that is assigned to them by Prosper, are taxed upfront 1.95 percent to 4.95 percent of the volume raised through the campaign. Lenders have to pay 1 percent of the outstanding loan.

An interesting feature of Prosper is that it allows funders to organize themselves in groups. For this purpose each funder can set up a group and act as group leader. As the leader, this funder can recommend and comment on particular campaigns; also, investments can be made public within the group. The group leader is allowed to charge for his or her services. We discuss the implications of these features further below.

Two examples from France are Spear and Babyloan. Spear is a French lending-based CFP launched in 2011. In 2012 seven projects were funded and a total volume of 470,000€ was reached until 2012. Other services are covered by this platform. On top of the general fee of 3 percent, 1 percent of the amount lent goes into providing support for the project, and 1 percent for bank services.[13] Babyloan, created in 2008, has covered more than 20,000 projects with close to 10 million euros of funds and close to 35,000 funders (as of March 7, 2015).[14]

2.3 Reward-based CFPs

In contrast to the CFPs belonging to the previous two categories, on reward-based CFPs funders mainly play the role of "prosumers." Here, small-scale funders are not primarily interested in financial return; this applies especially for artistic ventures. The crowdfunding platform allows fundraisers to attract a group of funders who essentially pre-purchase the product. This reduces the risk of losses from the viewpoint of the fundraiser. The uncertainty from the viewpoint of the funder is whether the output will satisfy his or her tastes. Thus, funding is a predictor of future demand and may serve as a signal for future funding rounds, possibly through more traditional funding channels (e.g., venture capital or bank loans). One can also think of turning funders into ambassadors of the product. They promote the product, e.g., by posting to Facebook friends and, as ambassadors, may

[13] See `www.spear.fr`, last accessed May 22, 2014.
[14] See `www.babyloan.org/fr`, last accessed March 7, 2015.

receive additional rewards.

Funders in investment-based and lending-based CFPs may mostly be concerned about the probability that a funded project will provide positive returns; reward-based CFPs cannot be measured in these monetary terms. As Kuppuswany and Bayus (2013) put it, on reward-based CFPs funders receive tangible, but non-financial benefits for their contributions. Gerber, Hui, and Kuo (2012) provide examples illustrating that funders indeed see receiving rewards as an important motivation for participating in crowdfunding communities.

A particular creative project may appear to be of high importance for some funders while completely irrelevant for others. This suggests that taste heterogeneity among funders plays a more prominent role for projects launched on reward-based than on investment-based CFPs.

The most successful project (or, more precisely, series of projects on the same product) in terms of total funds attracted is the video game "Star Citizen", which between 2012 and the beginning of 2015 has attracted 72 million US$. As the Economist puts it, "every cent has come from roughly 750,000 ordinary fans. In return for pledges – ranging from $36 to $18,000 – they get virtual spacecraft to use in the game, early access to unfinished versions, T-shirts and so on." (The Economist, "The Stars Are the Limit," February 14, 2015.)

As of 2015, the most prominent reward-based CFP is Kickstarter. According to their own website, since its launch in 2009 until March 2015 more than 75,000 projects have been funded through Kickstarter (and more than 1.5 billion US dollars have been pledged). Projects fall into the categories art, comics, dance, design, fashion, film & video, food, games, music, photography, publishing, technology, and theatre. Fundraisers typically offer a variety of rewards, which allow for small contributions (e.g. 5 US$) to large contributions which can go into the thousands of dollars. The reward often contains the final product (e.g. mp3-files, a photo print, or a book), which may be personalized (signed, a thank you note, etc.) and a publicly available mention.

A popular French reward-based platform is Ulule, with 630,000 members in March 2015. This platform raised 27 million euros of funds with more than 12,000 projects including around 7,500 successful projects (the success rate is about 65 percent, as of March 7, 2015). The CFP charges commissions

to funders. The commissions' amount depends on the volume of the funds collected and the average payment; no commission is paid if the project fails.[15]

Another French example is Kisskissbankbank with more than 47,000 followers on Facebook and more than 15,000 on Twitter, and which also covers all genres of projects. This platform is at the same time reward- and donation-based; more than 28 million euros were collected to fund more than 45,000 projects by close to 525,000 funders (as of March 7, 2015). The commission rate is 5 percent and bank fees are 3 percent. Other services offered by this platform include expert support, dashboard to control collections in real-time, personalized advice, and pop-up notifications.[16]

2.4 Donation-based CFPs

The role of donation-based CFPs is to support humanitarian and artistic projects. Funders on donation-based CFPs can be seen as philanthropists. Similar to reward-based CFPs, the success of a donation-based CFP depends on the quality of the matching between the "tastes" of the funders and the characteristics of the campaign. A donation-based campaign relies on voluntary contributions to a public good. Fundraisers do not offer monetary returns or in-kind payments apart from recognition within a community. This is similar to traditional campaigns by charities and NGOs, which also ask for contribution to a cause.[17]

An example for a donation-based CFP is goFundme, which according to its own statement has raised more than 1.2 billion US$ by July 2015 (see http://www.gofundme.com/). Funds can be raised for a particular project or to help in times of difficulty. The latter may be initiated by a friend of the person or family in question. goFundme charges a 5 percent fee and, in addition, a 2.9 percent processing fee plus 30 cents per donation. Thus an individual donation of, e.g., 10 US$ is subject to a 10.9 percent fee. In addition, goFundme makes it possible to raise money for charities (a different pricing rule applies in this case). It also has a category of reward-based

[15] See `http://fr.ulule.com/` and `http://fr.ulule.com/stats/`, last accessed March 7, 2015.

[16] See `www.kisskissbankbank.com`, last accessed March 7, 2015.

[17] For an assessment of the determinants of private donations to provide public goods, see Weisbrod and Dominguez (1986). In an online context, Saxton and Wang (2014) show which factors are associated with higher demand for donations on Facebook Causes.

crowdfunding. goFundme makes suggestions based on category, geographic proximity and funding by Facebook friends of the potential funder.

Examples of particular campaigns on other donation-based CFPs include buying equipment for underfunded public schools in the U.S. (on DonorsChoose.org, which is a charity). Also, goals by advocacy groups can be funded such as the March 2014 placement of a full-page ad remembering the death of a 15 years old boy who died from the injuries allegedly inflicted by the police during the 2013 Gezi protests in Istanbul, Turkey (launched on Indiegogo). This suggests that CFPs may play an important role for the funding of campaigns by grassroots movements.[18] Fundraisers are groups or individuals in search of funding. Also, charities and NGOs may be active on donation-based CFPs. In the latter case, donation-based CFPs become intermediaries for charities and NGOs, who traditionally attempt to raise funds through mailings to previous donors, and advertising.

We note that most donation-based CFPs are for profit and take a cut if a campaign is successful (often 5 percent of the total sum raised). This adds to the "administrative" cost of a campaign. If funders switch from supporting a particular NGO to funding a portfolio of projects launched by NGOs on CFPs, this must mean that the personal value derived from a better match between the funder's taste and the campaigns' characteristics must be larger than the payment to the CFP. The social value may well be lower, if a worse match at the individual does not imply a worse match at the aggregate level. Alternatively, a campaign may also attract new funding. Here, CFPs may be a more cost-effective mean than an advertising campaign, which appears to be more difficult to target to specific audiences.

CFPs may allow for more flexible funding and funders can more easily scrutinize the merit of a particular campaign. However, the CFP does not take over all the tasks a charity or NGO typically performs. In particular, CFPs lack the monitoring and auditing done by NGOs and charities; they also tend not to have close relationships to institutional partners, in contrast to NGOs and charities that, for instance, have long-term relationships with a particular school or hospital.

For instance, the French CFP MyLocalProject created in 2013 is a donation-based platform and covers projects on education, environment and

[18] It also suggests that some governments may intervene if they "dislike" certain activities on a CFP.

health mostly in developing countries. The amount of above 14,000€ were collected and 12 projects financed (as of March 7, 2015). Commissions are fixed to 9 percent of the amount collected; these fees cover MyLocalProject fees (mission cost, bank fees, communication fees, etc.).[19] Another example is United Donations, also a French donation-based CFP. As of May 2014, it also collects a commission of 9 percent.[20]

3 Understanding the functioning of crowdfunding platforms

In this section we aim at developing a better understanding of the functioning of crowdfunding platforms. We first analyze the various cross-group and within-group external effects present on CFPs and shortly discuss the merits of different pricing models. This is followed by an analysis of asymmetric information problems on CFPs, of dynamic behavior among funders and of the role of social networks on CFPs. Finally, in the last subsection, we analyze the role of a marketing and sales platform that CFPs play (in particular, reward-based CFPs).

3.1 CFPs and external effects

We distinguish between two sides on crowdfunding platforms, funders and fundraisers. A funder establishes a relationship with a fundraiser by pledging a certain amount of money to a particular project (or, equivalently, campaign). Crowdfunding platforms exhibit positive cross-group external effects between funders and fundraisers. If the two groups exert cross-group external effects on each other and these external effects are managed by a platform, the market can be called a two-sided platform market.[21] External effects may also be present within a particular group. We examine the two types of external effects in turn.

[19] See `www.mylocalproject.org`, last accessed March 7, 2015.

[20] This platform was created in 2012 and 11.16 million euros were collected to cover eight social and environmental projects. See `www.uniteddonations.eu`, last accessed May 26, 2014.

[21] The seminal paper on network effects is Katz and Shapiro (1985). For seminal contributions on two-sided markets, see Rochet and Tirole (2003) and Armstrong (2006), and for a textbook treatment, see Belleflamme and Peitz (2010).

3.1.1 Cross-group external effects on CFPs

Funders tend to prefer platforms with a larger number of campaigns and, thus, with a larger number of fundraisers as this increases their choice about which project to fund. In particular, on reward-based and donation-based CFPs, a larger number of campaigns tends to increase the probability of encountering a project that better fits a funder's tastes (provided that the CFP is well developed so as to facilitate finding the best match between funder's tastes and campaign characteristics). However, there may be instances where a funder is more attracted by a platform with a smaller number of campaigns as this increases the chance that any given campaign will achieve the required threshold, everything else given. Thus, it depends on the balance between variety and co-funding opportunity whether cross-group external effects from fundraisers on funders are positive. We presume that the former tends to dominate the latter, which holds if funders are able to coordinate on projects that are likely to be successful.

To illustrate that absent coordination the cross-group effect can be negative, consider the following stylized example of a CFP that hosts either one or two campaigns and is joined by two funders on the other side. For a campaign to be successful funding by both funders is required. Each funder pledges money to up to one campaign. Funder A's net value of contributing to a successful campaign is denoted by $v^A \in \{v_L, v_H\}$ with $v_H > v_L > 0$. Correspondingly, for funder B. The net value is drawn with equal probability and is independent across funders and perfectly negatively correlated across campaigns. Thus, with probability 1/2 the two funders have opposing views about which campaign they prefer. Suppose that both campaigns have been proposed. If funders cannot coordinate their actions, e.g., because they have to choose simultaneously, each funder will pledge money to her preferred campaign. Hence, with probability 1/2 no campaign will be successful. The joint expected funders' value is thus v_H. If only one of the two campaigns was available, this campaign would always be successful and the joint expected funders value would be $v_H + v_L$. Hence, absent coordination, increasing the number of campaigns affects funders negatively.

By contrast, if funders could coordinate their actions, one campaign would always be successful, also when two campaigns are proposed. Coordination is achieved by allowing one of the funders to be the first mover, e.g., funder A. In this case, funder B will optimally choose the same

campaign as funder A. Then, the joint expected funders' value would be $(3/2)v_H + (1/2)v_L$, which is greater than the corresponding value when only one of the two campaigns is available. This illustrates that under coordination, funders benefit from a larger number of proposed campaigns. In reality, CFPs can take actions to facilitate coordination. In particular, they can (and do) guide interested funders to campaigns that are close to the threshold to become a success. By promoting such campaigns they make it more likely that coordination failures are avoided.

In the opposite direction, from funders to fundraisers, the external effect is unambiguous: Fundraisers prefer platforms with a larger number of funders, as this increases their chances and expected conditions of their campaign. Hence, in this market positive cross-group external effects from funders to fundraisers are present. Often, they are positive in both directions. Another positive indirect effect is that fundraiser are also interested in showcasing their products, in 'testing the waters', or in attracting producers of complementary goods (e.g., application developers for some new hardware); the larger the crowd of investors/potential consumers, the larger this effect. By jointly locating on one platform, fundraisers and funders can jointly enjoy the resulting utility gains. Figure 6 illustrates the link between the two groups.

Funders and fundraisers may not only be interested in the number of participants on the other side, but also in the composition. This opens the door for segmentation. From a fundraiser's perspective it may not be obvious why the identity of the funder should matter; however, the informational requirements of different types of funders may be different, certain CFPs may therefore specialize and cater to the needs of particular types of funders. Thus, there appears to be room for differentiation even within each category of CFPs. On the fundraiser side, apart from horizontal differentiation, the pricing (and possibly different services provided to fundraisers by CFPs) may induce self-selection among fundraisers according to the quality of the project. Thus, high-quality projects may be attracted to a CFP which charges a higher price, since those CFPs attract a more predictable stream of funding. In a stylized setting, Damiano and Li (2008) show how a platform can use prices to induce segmentation. Such a mechanism may also play out on CFPs.

The link of two distinct groups of users through external effects is a

distinguishing feature of platform markets, if these markets are actively managed. The platform can then use price and non-price instruments to manage participation and usage on both sides of the market. Of particular interest is the question whether the price structure is neutral.[22] We address pricing issues further below.

3.1.2 Within-group external effects on CFPs

Often, also within-group external effects are present on CFPs. They are negative among fundraisers: A fundraiser, for any given number of funders, is likely to find it more difficult to obtain the required funds for his project if there are more competing campaigns. By contrast, on the side of the funders, a funder prefers to be together with a larger number of fellow funders if a project is carried out whenever a threshold is crossed and the project is scaled up if the total investment is above the threshold. In this case, funders are not competing but simply benefit from a higher probability that the project will be realized. Based on this argument we would expect the within-group external effect to be positive. If a project has a fixed size, a funder may perceive fellow funders as competitors, as she may miss out on an interesting project when being too late. In this case, it is less clear whether the within-group external effect is necessarily positive on the funder side. Other effects may also come into play – these may be positive or negative. First, on CFPs peer-effects may be present. This applies if more funders backing a particular campaign can be seen as a signal of this campaign's probability of success. Here, the quality of the signal – and so the sign of the externality – depends on the information that the first funders have (we discuss this issue further in Section 3.4). Second, there may also exist free-riding among funders, for instance in terms of due diligence.

It is useful to exemplify that in the context of CFP there tend to be positive within-group externalities on the funder side and positive cross-group externalities from funders to fundraisers. Suppose that each funder expects to like any given project with probability α and thus wants to contribute; she does not like it with the remaining probability. For simplicity, con-

[22] Rochet and Tirole (2006) speak of a two-sided market only if the price structure is not neutral. As discussed for instance in Belleflamme and Peitz (2010), it depends in general on the chosen business model and on regulation whether neutrality holds. Here, we do not use the narrow definition proposed by Rochet and Tirole (2006). See also Evans and Schmalensee (2007) for a broad definition of two-sided markets.

sider a fixed level of each individual contribution. Then, a project needs at least a certain number of funders, say k, to realize the project. If the random variables of funders to like the project are independent of each other, then the probability that at least k out of n funders like the project is $1 - B(k-1, n, \alpha)$ where B is the cumulative distribution function of the binomial distribution. We note that the probability that at least k funders like the product increases in the total number of potential funders n. This implies that fundraisers prefer a platform with more funders and there are positive cross-group external effects from funders to fundraisers. We also note that any funder prefers to be on a platform with more fellow funders everything else given. Again, this is so as $1 - B(k-2, n, \alpha)$ is increasing in n. Hence, a funder with a positive realization prefers a larger platform on his or her own side as this increases the chance that at least $k-1$ fellow funders also like the project, and there are positive within-group external effects.

3.2 Price structure of CFPs

In general, CFPs currently have up to three revenue sources. First, they earn interest on the money which is dedicated to a given campaign because funders transfer money at the moment they contribute and this money is passed on to the fundraisers in case the campaign is successful or returned to the funders in case the campaign is not successful. In the meantime, the CFP can earn interest on the funds. Thus, funders incur a foregone interest when investing (early) in a project. They implicitly pay a fee proportional to their committed funds, which is independent of the success of the project.

Second, some CFPs offer additional services for which they charge. In particular, many charge for handling payments. They may also offer third-party services and obtain revenues from third-party providers. For instance, the revenue of the French CFP Spear is based on additional services such as project support (1 percent of the amount lent), on top of 3 percent of subscription fees (see Section 2.1.2 for more details). Other possible services as costly add-ons are the release of information on previous projects; some diagnostics may be valuable for funders, others for fundraisers.

Third, many CFP charge a transaction fee. This fee can be conditioned on whether a campaign is successful. As documented in Massolution (2013, p. 68) most CFPs charge a transaction fee to fundraisers as a percent basis

for all successful campaigns; they do not charge for unsuccessful campaigns. Thus, the full contribution is returned when the project is not successful. For instance, Octopousse, which is a reward-based French CFP created in 2011, charges 7 percent of the funding volume if the project is financed.[23] In addition, or as an alternative, CFP could also charge fees to become a member or to subscribe for a certain period. As of 2014, CFPs typically do not use this possibility, but it is to be seen whether subscription-based business models will be adopted in the future.

To illustrate the combination of different revenue sources, consider the price structure of Particeep, an equity-based French CFP created in 2013. Payments include: (i) a 3 percent fee of the amount invested; (ii) 1 percent for handling payment when investing in a private group via Particeep; (iii) a transaction fee of 299€ (duty free) for the entrepreneur when validating the investment. Another example is Kisskissbankbank (for more details, see Section 2.1.3). The revenue of this platform is based on a transaction fee (5 percent of the funds if the campaign was successful) and a fee for handling payment (3 percent of the funds if the campaign was successful).

On most CFPs, fundraisers cannot choose between different types of price menus. One exception is Indiegogo, which offers fundraisers (since 2011) the option of choosing between an 'all-or-nothing (AON)' or a 'keep-it-all (KIA)' model. In the AON model (also called 'fixed funding'), the fundraiser gets the total money pledged by the funders only if the specified goal has been reached at the end of the campaign period; the KIA model (or 'flexible funding') differs by allowing the fundraiser to keep the money raised even if it falls short of the goal. The latter option comes with a price: Indiegogo charges a 9 percent fee on the money that the fundraiser keeps in an unsuccessful campaign (whereas the rate for successful campaigns is 4 percent).[24] Cumming, Leboeuf and Schwienbacher (2014) examine the potential signaling value of the choice between these two models by the fundraisers (we come back to this issue in Section 3.3).

Another exception is the third-degree price discrimination scheme that is proposed by Fondatio, a French equity and donation-based CFP created in 2012: for equity-based projects the commission is 2.5 percent, while the commission for collaborative and humanitarian projects is 5.5 percent (in-

[23] See `http://octopousse.com`, last accessed in May 2014.

[24] Bulb in town, a donation and reward-based French CFP created in 2012 with 30 successful projects (as of May 22, 2014), proposes the exact same pricing structure.

cluding a bank and administrative fee of 3 percent).

On most CFPs, fundraisers cannot choose between different modes of payments. An exception is Ulule, where commissions differ with respect to the chosen payment mode (we refer back to Section 2.1.3 for details).

Typically fundraisers have to pay commissions to the CFP; an exception is HelloAsso, a non-profit CFP. On this CFP no commission is paid even if the project succeeds. In fact, revenue sources of this CFP are voluntary contributions and advertising revenues: (i) fundraisers may give part of the obtained funds to the CFP, (ii) funders may make voluntary payments; (iii) for the feature "dons-minute" HelloAsso gives 70 percent of the revenue generated by advertising videos to the fundraising associations and retains the remaining 30 percent for website maintenance.[25]

From a theory perspective it may seem surprising that most CFPs do not charge participation or membership fees (either to join, or on a regular basis, or per campaign). This applies in particular to the fundraiser side. Since campaigns are of different quality (in terms of their likelihood of being successful), a fee per campaign may serve as a screening device, to limit "bad" campaigns on the platform. This may reduce the required search effort by funders and thus make the platform more attractive. Why do we currently not observe such fees? Possibly, since most CFPs are new, they are currently most concerned with offering a large variety of campaigns and, therefore, do not want to discourage the launch of campaigns. This may be particularly relevant in an environment in which many, rather new, CFPs try their luck. Therefore, in the future, once the market has consolidated, CFPs may change their pricing strategies.

To which extent participation fees may become relevant phenomena also depends on the presence and nature of private information of funders and fundraisers about the value of a project being successful. Funders may have private information about how much they like a project of any given quality and fundraisers may have private information of the quality of the project. If fundraisers learn about the quality of their project only after joining the platform (and funders only observe how much they like a project of given quality once they have joined the platform), a CFP with market power may want to charge for participation on both sides while setting a negative transaction fee for successful projects. As Rochet and Tirole (2006) show

[25] See `http://tinyurl.com/phd3ae4`.

in a two-sided matching market with a monopoly platform and private information on both sides after participation decisions have been made, the platform optimally charges positive participation fees and a negative transaction fee. While a CFP relies on multiple funders to fund a project, private information is likely to be present on the funder and the fundraiser side.

Transaction and participation fees serve different purposes. Under competition between differentiated platforms, both funders and fundraisers are likely to be uncertain about the transaction benefit at the time they decide whether to join a platform. Then, even if the two market sides contain ex ante homogeneous funders and fundraisers, respectively, after their participation decision, this uncertainty may be at least partly resolved. This applies if after registration more information is released by the platform and subscribers react differently to this information. Then, funders and fundraisers become heterogeneous ex post.

Reisinger (2014) formally investigates platform competition in a setting with ex post heterogeneity. He uses the standard Hotelling setting and adds that there are two types on each side of the market, who differ in their desired intensity of interaction on the other platform. Two part tariffs, namely a participation fee and a transaction fee on each side, affect the participation decision and the transaction decision (conditional on the decision to participate). In this setting, the problem of multiplicity of equilibria, which arises in simpler settings when allowing for two-part tariffs, is avoided.[26] Under competition, platforms set low prices to the side that strongly affects the other side, and high prices to the side that benefits a lot from interacting. We note that the price structure with respect to transaction fees does not play out on CFPs. Here, CFPs impose a tax (as a per cent of the funding volume), and the market allocation is neutral with respect to which market side pays the tax. This is so since fundraisers can internalize which side pays for the transaction and adjust the funding volume accordingly.

While we have identified reasons to set participation fees (at least on the fundraiser side), even in the long run, CFPs may refrain from using campaign fees as a screening device. If campaigns mostly differ by horizontal characteristics and not by qualities, variety may be a desirable feature, as

[26] See also Bedre-Defolie and Calvano (2013), who provide an extension of their monopoly model to platform competition. White and Weyl (2015) propose a different pricing game (where platforms offer insulating tariffs), which also generates unique equilibrium predictions.

argued above. Then, a CFP does not want to discourage participation of fundraisers. Quality differences may not be pronounced because fundraisers may have very noisy or essentially no information on the success probability of their campaigns.

3.3 CFPs and asymmetric information

As explained by Agrawal, Catalini and Goldfarb (2013a), funders on CFPs face a number of asymmetric information problems. There are hidden information problems insofar as funders may lack the necessary information to estimate the chances of success of the proposed campaigns. Hidden action problems may also arise, as funders may not be able to control how fundraisers use the funds that they have collected. In this subsection, we examine the different means by which funders can use their own information, as well as information provided by fundraisers and CFPs, to try to alleviate these problems, while in Subsection 3.4 we focus on the interaction *among* funders in response to asymmetric information and the role of the CFP in managing the interaction among funders.

3.3.1 Hidden information problems

A – and sometimes the – central function of a crowdfunding platform is to provide the needed financial resources, at least initially substituting traditional financial institutions (e.g., venture capital funds). In particular, lending-based CFPs facilitate peer-to-peer loans, meaning that individuals receive loans directly from other individuals (see, e.g., Ahlers et al., 2015). In case of investment-based CFPs, crowdfunding has the potential for funders with limited available funds to launch a successful campaign, which would not receive funding from traditional financial institutions (or at less attractive terms). As mentioned above, it may thus provide a stepping-stone for further funding, possibly through other channels. In particular, entrepreneurs often use success on a CFP to signal their creditworthiness and, thereby, facilitate their access to bank loans or attract venture capitalists.

However, as inexperienced funders enter into a market with sometimes very high default risks, the strategy of (at least initially) relying on CFPs poses dangers to funders and fundraisers alike: if funders are too wary, fundraisers will not be successful through crowdfunding, and the above-mentioned signaling role will be ineffective. This vicious circle may challenge

the whole business model of CFPs (and also alert regulators). It is thus of crucial importance for all parties that hidden information (adverse selection) problems be carefully addressed. We examine here a number of potential remedies.

Screening. A first instrument in mitigating hidden information problems is screening by the CFP itself. Prosper.com, a lending-based CFP, appears to screen potential borrowers quite efficiently, as evidenced by Weiss, Pelger and Horsch (2014). The authors show that the only personal characteristics of potential borrowers that have a significant influence on the probability to be successfully funded are precisely those characteristics that have been analyzed and verified by the CFP.

Complementary sources of information. Funders on Prosper.com may lack access to the full fundraiser's credit history, but they can view other type of information that may prove useful, such as the maximum interest rate the fundraiser is willing to pay, a textual description of his or her reasons for the loan application and even his or her picture. Moreover, when the interest rate for a funded loan is determined through sequential bidding, it reflects the lenders' collective perception of the fundraiser's creditworthiness. Online peer-to-peer lending platforms provide thus lenders with a market-based screening mechanism, which can be compared with traditional screening methods based on credit score. Iyer et al. (2013) are able to make such a comparison because, in their dataset, they have access to the fundraisers' exact credit score (which is unobserved by lenders). The main result of their study is that lenders are able to predict defaults substantially better with the help of nonstandard or "soft" information than by using the credit score. Berkovich (2011) suggests that those lenders who can use the soft information are at an advantage over those who base their decisions purely on credit score. Herzenstein, Sonenshein and Dholakia (2011) share this view; they demonstrate the importance of soft information (in particular, identity claims constructed in narratives by borrowers) and claim that lenders can gain a competitive advantage by analyzing these narratives.

On a slightly different note, Greiner and Wang (2010) suggest that hard information (which they call 'economic status') is the major driver of lenders' bidding behavior, while soft information acts more as a trust-building mechanism between lenders and borrowers. Taking the borrowers' point of view,

Michels (2012) provides evidence that including more unverifiable disclosures in a loan listing (e.g., intended use of proceeds, interest rates on other debts, explanations for poor credit ratings, or a picture) allows borrowers to obtain a lower interest rate on a loan, and to increase the bidding activity.

Another strategy for CFPs consists in bringing sophisticated investors (such as venture capitalists, business angels, and institutional investors) on board of the platform.[27] Sophisticated investors have much larger capacities and experience to investigate the reliability and success probability of proposed campaigns than standard investors. Kircher and Postlewaite (2008) analyze a particular mechanism through which the actions of sophisticated investors can serve as a signal. Individual funders are thus likely to infer useful information from the choices made by sophisticated investors. It may also be the case that the latter use the "wisdom of the crowd" as an indicator of the potential success of a new product (something that they may have a hard time to evaluate otherwise). If these two effects are present, the two groups of investors will complement each other and the CFP will benefit from this strategy. Yet, there may also exist conflicts of interest between the two groups, as examined by Hornuf and Schwienbacher (2014) in the case of equity crowdfunding and angel finance.

Signaling. Fundraisers may provide valuable information themselves. Provided that information that is revealed cannot be distorted and that the cost of such revelation is negligible, economic theory suggests that full unravelling will take place and thus all private information is revealed (see, e.g., Grossman, 1981, Milgrom, 1981, and Okuno-Fujiwara, Postlewaite, and Suzumura, 1990). However, this presupposes that either funders can easily verify the statements made by the fundraiser or that at least the CFP is able and willing to do so; regarding the latter, the CFP may not be willing to do so even if it is able (see the discussion below).

Funders may make inferences from certain actions of the fundraisers. For instance, as explained in Section 3.2, some reward-based CFPs offer fundraisers the choice between fixed funding (so-called 'All-or-Nothing', AON, model) or flexible funding (so-called 'Keep-it-all', KIA, model). Cum-

[27] For instance, MyMicroInvest (a Belgian investment-based CFP) allows projects to be funded by the crowd together with a professional venture capitalist; Angel.me (another Belgian CFP) has established a partnership with the bank Belfius (see Belleflamme and Lambert, 2014).

ming, Leboeuf and Schwienbacher (2014) provide large sample evidence consistent with the view that fundraisers' choice of AON acts as a credible signal to the crowd of their commitment not to undertake their project if insufficient funds are raised. Therefore, the crowd sees the investment in AON projects as less risky, which allows fundraisers to be more successful (they are, on average, more likely to state – and reach – higher goals).

Portfolio effects. In many cases, fundraisers can only have one ongoing campaign on a CFP. In that case, there is no or hardly any information available on past performance. For instance, funders on prosper.com, a lending-based CFP, do not have the full fundraiser's credit history. Funders may, nevertheless, learn about market risk as they observe outcomes of successful campaigns. Here, the funder may learn from her own experiences, if she has assembled a portfolio of loans. Freedman and Jin (2011) show that a lender on prosper.com is more likely not to fund another loan as a larger fraction of loans in her portfolio are late. In principle, as lenders are organized by social group, they may as well learn from the performance of other lenders' loans. However, Freedman and Jin provide evidence that lenders put more emphasis on their personal experience.[28] They also observe a lot of heterogeneity with respect to the performance of portfolios among lenders. However, lenders learn over time, and the initially worse performing lenders learn faster than the initially better performing lenders.[29] Thus, heterogeneity declines over time.

Learning from others. Different from reputation on Ebay where, for instant purchases, buyers tend to update their beliefs after a transaction, on crowdfunding platforms funders can possibly learn prior to the end of a campaign. This is the case, since typically several funders are needed and funders sequentially make publicly observable decisions. In Section 3.4, we take a look at dynamics of funder actions, either because the funders observe actions of fellow funders or because their own previous behavior is relevant

[28] Possible explanations include that lenders may have assembled their portfolio to correlate risks of the funded campaigns (e.g., a particular type of music, projects in a particular geographic reasons) so that there is more informational content in their own experience than in the experience from fellow lenders. Also, various behavioral explanations can be given.

[29] Freedman and Jin (2011) rule out reversion to the mean as the main explanation of these differences.

to understand consecutive actions.

Trust. Finally, funders may condition their actions on how much they "trust" a fundraiser. Note that this applies both to hidden information and hidden action problems (which we consider next). Chen, Lai and Lin (2014) examined lenders' trust in P2P online lending in China. Their dataset includes 785 lenders. Incorporating lenders and borrowers antecedents, they find (perhaps unsurprisingly) in their empirical analysis that trusting a borrower plays an essential role in a lender's willingness to lend.

Duarte, Siegel and Young (2012) in their study about borrowers' trustworthiness collected transaction-level data from Prosper.com. The authors show that borrowers who appear more trustworthy have higher probabilities of obtaining a loan and pay lower interest rates than do borrowers who appear less trustworthy. Borrowers who appear more trustworthy have better credit grades and a lower probabilities of default. While the interest rate paid by borrowers who appear more trustworthy is lower than the interest rate of the less trustworthy-looking borrowers, it would need to be even lower to fully account for trustworthy borrowers' default rates.

3.3.2 Hidden actions, certification, and insurance

Hidden actions. To limit hidden action (moral hazard) problems, CFPs may devote resources to carefully screen the projects that they propose to funders, so as to maximize the chances that successful campaigns will deliver on their promises. They can also take active steps through their own monitoring decisions. In addition, CFPs can install a reputation system to harness the "wisdom of the crowd" and combine it to their own expertise. Such reputation systems may, however, prove difficult to design.

A risk for CFPs and funders is that fundraisers use the arriving funds before the success of a campaign is assured. To avoid this problem, CFPs take control of making the financial transaction. As discussed above, this provides the CFP with an additional revenue source, as it earns interest on these funds until it either pays out to the fundraiser or returns the money to the funders.

Another key issue to be addressed by CFPs is the opportunism problem by fundraisers with respect to truthful reporting. To avoid or at least limit severe cases such as outright fraud, the CFP must have an adequate mon-

itoring system. Public policy may consider holding the platform liable for fraud being carried out at the platform. Such a liability rule appears justified if funders, prior to becoming active on a platform, are in a bad position to make an informed judgment about the risk of fraud on the platform.

Certification and information disclosure. Even if CFPs have superior information compared to funders, CFPs may not necessarily provide this information. Thus, even though CFPs may operate as certifiers, they may not fully disclose the information available to them.

First, as stressed by Bouvard and Levy (2013), there exists a tension between funder and fundraisers incentives arising from reputation concerns, which limits the accuracy of certification. We can consider a CFP as a certification platform. The CFP as a monopoly certifier faces the tradeoff that a higher accuracy attracts high-quality funders, but that it may repel funders of low-quality. As it is concerned about its reputation vis-à-vis funders and fundraisers, on the fundraiser side, it wants to enjoy the reputation of being lenient in order to attract many fundraisers, while, on the funder side, it wants to enjoy the reputation of accuracy. Balancing these opposite incentives the CFP may therefore sacrifice some the accuracy it could provide.

Second, abstracting from reputation concerns of the CFP, the CFP may not be willing to disclose all information it has available about the fundraiser. Biglaiser (1993) demonstrates how intermediaries may become certifiers of the fundraiser's quality. However, as shown by Lizzeri (1999), it cannot be taken for granted that the intermediary reveals fully the information it has.[30] Indeed, it may be possible for the intermediary to extract rents without providing any information.

Reputation systems. To the extent that fundraisers repeatedly use a given CFP, this CFP could provide useful information on the track record of the fundraiser in question similar to the rating sellers receive on Amazon and eBay.[31] This is useful if there are some persistent abilities of the fundraiser or

[30] For a textbook treatment, see Belleflamme and Peitz (2010). For a setting with moral hazard, see Albano and Lizzeri (2001).

[31] For evidence on seller reputation on eBay, see, Cabral and Hortacsu (2010) and Klein, Lambertz, and Stahl (2013). However, on many CFPs such repeated interaction is rare. For instance, on the lending-based CFP Prosper.com, fundraisers can have only one ongoing project; and the associated loan has a fixed length of three years.

if linking experiences with a fundraiser contribute to solving a moral hazard problem. Here, a one-sided reputation system would report on the previous activities of a fundraiser. The CFP may provide this information using some benchmarking, for example by reporting the average performance of a particular set of projects based on observable characteristics (such as size or category).

Designing a reputation system on the Internet may also allow the CFP to tap into wealth of information available on social networks (we return to social networks in Section 3.5). In particular, features of the fundraiser may be used to design a reputation system which links expected performance to observables. As has been documented in the literature (see, e.g., Lin, Prabhala, and Viswanathan, 2013), the position of the borrower/investor in the friendship network matters for the success.

Insurance. CFPs may also provide insurance to funders for certain risks. For instance, Röthler and Wenzlaff (2011) give examples of lending-based CFPs that partner with banks to avoid market risks. CFPs may also have to manage funders' risks if they want to be recognized by professional bodies. For instance, the British Peer-to-peer Finance Association conditions membership to platforms that meet a number of criteria, among them "Demonstrate high standards of loan underwriting and credit and operational risk management", or "Demonstrate high standards of transparency and provide clear, balanced and fair information to all customers".[32]

3.4 Dynamic behavior among funders

On CFPs, funding follows a sequential process, which may prove a useful source of information for all parties involved. In particular, fundraisers may want to manage their campaign in response to the dynamic behavior among funders. Also, CFPs may want to anticipate such behavior when designing the platform. We examine here various facets of this issue.

3.4.1 Decisions of early funders: inference vs. free-riding

When funders have little information about fundraisers' quality, they may try to infer information from the behavior of fellow funders (even if they

[32] See `http://p2pfa.info/rules`.

are not better informed). CFPs that want to capitalize on this tendency are likely to face the following dilemma: on the one hand, using existing project support to gauge future support may help to address the asymmetric information problems exposed in the previous section; on the other hand, prospective funders may not contribute to a project that already received a lot of support because they assume that someone else will provide the remaining financing. In other words, while information on funding early in a campaign may reduce information asymmetries by providing information to funders who are still hesitant whether to fund a project, in some context it may also lead to a free-riding behavior. The relative importance of these conflicting forces requires empirical assessment.

The study by Kuppuswamy and Bayus (2013) suggests that free-riding may dominate. The authors analyze two years of publicly available panel data on successfully and unsuccessfully funded projects listed on Kickstarter. The authors find that additional funder support for a project is negatively related to its initial support.[33] This is consistent with a simple free-rider story, which is also present in the context of donations more generally. It says that a funder's support could decrease with the perceived presence of other supporters, as the funder's contribution is unlikely to be needed. In other words, the more the number of participants increases, the more the individuals will rely on other participants to do the job.[34]

Li and Duan (2014) give evidence of the presence of the two opposing forces. Using a dataset covering 577 projects launched between November 2013 and March 2014 on one of the leading reward-based CFP in the U.S., they estimate a model that captures how funders infer information about the success chances of a project from its current funding and time progress. The model estimation shows both inference ("investors are more likely to back a project that has already attracted a critical mass of funding") and free-riding ("[f]or the same amount of achieved funding, the backing propensity declines over time"). The practical implication of these findings for fundraisers and CFPs is that successful funding depends on the ability to reach a critical

[33] They relate this finding to the social psychology theory of diffusion of responsibility effects; see also Garcia et al. (2002). Burtch, Ghose and Wattal. (2013) observe a similar pattern in donation-based CFPs.

[34] This finding is related to similar evidence in a different context: Barron and Yechiam (2002) show that the likelihood of providing an answer to an email decreases with the presence of other recipients in the email. They did so in a controlled experiment so that neither the content nor the characteristics of the recipient were endogenous.

mass of funding in a given time period; dynamic seeding strategies can be designed to meet this requirement.

In contrast, van de Rijt et al. (2014) give evidence that funders may extract information from the fact that a campaign already received some commitment by fellow funders. In a randomized field experiment, they show that an initial funding advantage on Kickstarter translates into to a higher success probability of the project. The authors randomly chose 200 new and unfunded campaigns and provided an initial contribution of either 1 percent or 10 percent of the campaigns target (assigned randomly to their treatment group). The control group did not receive any contribution from the authors. While in the control group 39 percent of the campaigns received at least one contribution, 70 percent of those in the treatment group received a further treatment. However, there was no statistical difference between receiving 1 percent or 10 percent of the target. This finding is compatible with the view that funders attach an informational value to existing funding. Such a result may simply be the outcome of simple search rules employed by a large number of funders, e.g., only to consider campaigns with an initial funder or, alternatively, the outcome of a more sophisticated information processing.

Kim and Viswanathan (2013) go a step further to investigate whether the identity of early funders influences the likelihood of further funding of a campaign. In their dataset of campaigns for the development of apps on the CFP appbackr.com, it turns out that not all early investors are equally influential. In particular, among the early investors, app developer investors and experienced investors have a significant influence on the likelihood of further funding. Since app developer investors have a better knowledge of the product, one may expect these investors to be more important for the further funding of "concept apps", which are apps in the pre-release stage. Since experienced investors are likely to have a better knowledge of market performance, one may expect that their early funding increases the probability of further funding of "live apps", which are already being sold in the market. These hypotheses are confirmed by the empirical analysis. It suggests that funders make rather sophisticated use of early funding decisions of a campaign.

3.4.2 Herding

Relying on the decisions and possibly the characteristics of early funders may affect the decision of later funders. This means that herding might occur. In the extreme, funders may even ignore their private information.[35] Lee and Lee (2012) find strong evidence of herding using data from a Korean lending-based CFP.

In the empirical studies a positive relationship between herding and performance of the funded project is seen as an indication of rational herding. In a market for microloans in the US, Zhang and Liu (2012) find evidence of such *rational* herding. By contrast, Chen and Lin (2014) interpret their findings as evidence of *irrational* herding using data from the largest online P2P lending market in China.

Zhang and Liu (2012) consider a random sample of 49,693 listings from 2006 to 2008 on Prosper.com. For each listing, their data set contains the amount requested by the borrower, the interest rate offered, the credit grade of the borrower, debt-to-income ratio, number of friend endorsements, the listing date, and some other characteristics. Furthermore, information is available about how the listing's funding status has progressed over its duration. They note that funder behavior may resemble herding simply because listing attributes affect all lenders and thus lead to positive correlation of the bidding. They also note that funder behavior may resemble herding because of payoff externalities: While a bid for a listing that does not pass the funding goal is returned, the funder incurs an opportunity cost. Hence, a funder's return from funding a listing depends on the behavior of the other funders.

First, Zhang and Liu (2012) provide evidence of herding: Controlling for unobserved listing heterogeneity and payoff externalities, the amount of funding a listing has received is a significant indicator of additional funding in the future. Second, they find evidence that herding is rational: After controlling for observable loan attributes well-funded loans are less likely to default.[36]

We are not aware whether CFPs have become concerned with the type of herding. The issue for the CFP is that funders may, on average, be more

[35] Even when such herding is individually rational, it may lead to an inefficient outcome; see Banerjee (1992) for a model that makes this point.

[36] Relatedly, Herzenstein, Dholakia and Andrews (2011), using listings on Prosper.com in June 2006, find that herding is positively associated with loan performance.

satisfied with the funded projects if (irrational) herding did not take place, as herding introduces an inefficiency as to which project gets funded or not: Those lucky to receive initial favorable attention are more likely to make it even if they are less deserving than other projects that were initially not so lucky. One attempt to deal with herding at an early stage may be that the CFP neither discloses funder's name nor total funds raised as long as a certain threshold (e.g., as a fraction of the total funds requested) is not met. However, we are not aware of actual CFPs using such a disclosure rule.[37]

More generally, the question is what is the optimal mechanism of a CFP to release information on funders to subsequent potential funders. In particular, the CFP may want to make recommendations to funders that arrive sequentially over time. Kremer, Mansour and Perry (2014) formally investigate the optimal recommendation mechanism of a platform in such an environment. At each point in time, the platform provides a recommendation to the funder who is active in this period whether or not to invest in a particular project. To directly apply their analysis to crowdfunding, one has to assume that a project does not have a threshold and that a consumer's action and realized valuation are observed by the platform. Thus, the platform may invite funders to experiment with a particular project or not to become active. Recommendations by the platform have to respect the incentive compatibility constraint by the funders to follow the recommendation. It is shown that, in the optimal mechanism, the platform always recommends the action that is better for the individual funder. Thus, the CFP does not change its recommendation in the presence of externalities. While this is an interesting benchmark, it would seem to be more realistic to assume that the CFP can only observe actions but not realized valuations. Furthermore, it may be costly for the individual funder to become informed. A recommendation by the CFP would then also include a recommendation whether to further explore a project.

[37] Behavioral "biases" may contribute to inefficient dynamic behavior of funders. For instance, if funders have reference-dependent preferences featuring loss aversion (Kahneman and Tversky, 1979), a funder having dedicated some amount to a project may be tempted to excessively dedicate further funds if he or she sees that the project is about to fail. The funder may already anticipate the project to be a success. Then, the risk that the project fails would constitute a loss that negatively affects the well-being of the funder. To reduce this risk, the funder may then excessively commit further funds. Here, our argument relies on expectation-based loss aversion, as formally developed by Köszegi and Rabin (2006).

3.4.3 Information about funders

Compared to traditional funding methods, crowdfunding makes funders and their actions more visible. Data about transactions, funders' identity and contribution history is indeed publicly accessible on most CFPs. As some funders may fear such public exposure while others may welcome it, many CFPs allow funders to control how much information they accept to reveal. They hope that this increased flexibility should please funders and, thereby, increase fundraising. Yet, these features may also prevent some users from transacting at all (e.g., if they find the features difficult to understand or to use) or raise privacy concerns for funders who would not have thought about their privacy otherwise (see Tucker, 2014). It is thus not obvious how a CFP's information control features affect funders' willingness to transact.

Burtch, Ghose and Wattal (2015) address this issue by performing a randomized control trial among visitors of a leading global CFP. By default, the CFP displays the funders' identity and contributed amount and allows funders to conceal one or the other information (but not both). This possibility was presented to a control group prior to payment and to a treatment group after payment had been completed. Comparing the behavior in the two groups, they observe that funders in the treatment (post-payment) group are more likely to complete a transaction (the probability is 4.9 percent higher) but contribute less on average (US$ 5.81 less) than funders in the control (pre-payment) group. However, the net effect is positive, meaning that the CFP should prefer the post-payment setup.

Another reason for a CFP to think about the information it wants to make publicly available is that this information may affect the funding of campaigns, as following the herd may depend on the information available about those early funders (see the discussion above). In this respect, Burtch, Ghose and Wattal (2013) show that subsequent contributors tend to follow previous contributors, unless the latter chose to conceal the amount of their contribution.

3.4.4 Information exchange among funders

Funders may be able to reduce asymmetric information themselves. In particular, they may want to reveal to a group of fellow funders why they

think that a certain campaign is particularly worthwhile.[38] They may have an incentive to do so because they have invested themselves and want the campaign to be successful. Hence, due to their own financial stake or for reasons of social interaction and, perhaps, in expectation of reciprocal behavior by other group members, they reveal private information and thus reduce asymmetric information.

In the case of Prosper.com, for privacy reasons the true identity of a fundraiser is not revealed to funders. However, a fundraiser may form friendships, in which case his identity is revealed to his friends. Thus, a friendship tie removes the anonymity of a fundraiser vis-à-vis the friend on the funder side. In case of default or delayed payment, the fundraiser may then suffer social stigma. This suggests that fundraisers who anticipate that they are likely to default should be less inclined to form friendships on Prosper.com. Furthermore, since lenders differ by their activity on the CFP, active funders are more likely to observe default and, thus, cause a larger cost due to social stigma than funders who rarely use Prosper.com. Hence, fundraisers should in particular care about friendships with very active funders, as they provide the strongest incentive to use friendship as a signal of credit quality, i.e., low default risk and low delay. This argument has been developed and empirically tested by Lin, Prabhala, and Viswanathan (2013). They find that a fundraiser's friendships on Prosper.com indeed act as a signal of credit quality: friendships are associated with a higher probability of successful funding, lower interest rates on funded loans, and lower ex-post default rates.

One may think that the incentives to reveal private information can be strengthened by offering explicit rewards to group leaders. Such a reward could consist of a cut in the transaction volume that is channeled through the group. However, this may lead to a misalignment of the investment incentives of the group leader and other group members. Since the group leader benefits from the investment of other group members, he may be willing to misrepresent risk so as to lure fellow investors into campaigns. To the extent that group members try to extract information from the investment decision by the group leader, such misalignment makes the group leader's decision less informative. Therefore, rational fellow investors should treat

[38] As Hildebrand, Puri and Rocholl (2013) explain, the CFP Prosper.com offers this possibility. Here, group leaders do not obtain a direct reward for providing services to the group.

such information with caution. This would endanger the signaling mechanism. If, however, fellow investors are less sophisticated and misread the signal, group leaders can benefit by "exploiting" their fellow group members.

3.4.5 Recommender systems

A CFP may use the information from a previous or ongoing campaign in its recommender system. The CFP may use funding decisions from previous campaigns a funder engaged in to give personalized recommendations.[39] As it knows the funding history of any given funder and the one of fellow funders it can provide recommendations similar to the ones given by Amazon ("people who bought X also bought Y"): A funder who already funded project X may then receive a recommendation to also fund project Y; e.g., the CFP may send the message: "Perhaps you would also like to fund project Y because some people who funded X also funded project Y."[40]

The fact that an ongoing campaign is relatively successful may suggest that early funders received information that the project is of high quality. Tucker and Zhang (2011) propose a simple theoretical model in which, translated into the crowdfunding environment, funders learn their (horizontal) match value and receive private signal about the quality of the project. Some of the projects are mass market projects that cater to the taste of most funders, whereas other are niche projects that cater only to the taste of a small fraction of funders. Tucker and Zhang show that under some condition the funding decision by fellow funders allows funders to update their beliefs about the quality of the project.

A recommender system informs about the decision of a previous potential funder who has had a look at the project. Such a recommender system may then increase the success rate of high-quality projects. However, the conditions under which a recommender system achieves this outcome depend on the nature of the project. As Tucker and Zhang show, the funding of a niche product is unlikely to stem from a good realization of the horizontal match value. Therefore, funders see pledges by other funders as an indication that they received a positive signal about product quality. By contrast, in case of mass market projects, pledges by other funders are attributed to high horizontal match values and, thus, pledged funds provide little information

[39] For a theoretical contribution on recommender systems, see Kennes and Schiff (2007).

[40] For an empirical analysis of recommender systems on Amazon and their impact on the sales distribution, see, for instance, Oesterreicher-Singer and Sundararajan (2012).

about signals of project quality received by other funders. As a result, fundraisers of niche projects are more likely to benefit from a good start of a campaign than fundraisers of mass-market projects.

Due to market failures, the risks mentioned in this subsection and in the previous one may justify regulation, in particular, when many lenders are inexperienced. Regulators may have to become active to address default risk and fraud. It may also want to become active with respect to the mispricing of credit and default risk. However, to do so, it must assess the economic forces at play in terms of asymmetric information, behavioral biases, and herding (which may be the outcome of the former or the latter). The regulator also has to be aware of the incentives of CFPs themselves, as it must be made sure that they do not follow a hit-and-run strategy and, thus, are able to pay out the funds under their temporary management.

3.5 CFPs, social groups, and social networks

In an efficient market a fundraiser's success depends on the quality of the campaign. With a limited supply of funds and abstracting from different horizontal characteristics of the campaigns, the fundraisers with the highest-quality projects should receive the funding. However, quality is only imperfectly observable. Funders therefore rely on quality signals. Possibly, characteristics of the funder, even though not necessarily directly related to the quality of the project may affect the decision by funders. In this respect, social networks may play an important role. We examine, in turn, how funders, fundraisers or CFPs themselves may turn to social networks to improve the functioning of crowdfunding.

3.5.1 Social networks of funders

In the previous section, we discussed how funders, lacking information about the quality of proposed projects, may base their funding decisions on previous funding behavior. Another source of quality signals could be 'social buzz' or 'eWOM (electronic word-of-mouth)' in the form of support that a particular campaign would receive on social networks (e.g., shares and likes on Facebook, or tweets on Twitter). Social buzz may supplement adequately the campaign description that a fundraiser would give on a CFP and may be critical for the campaign success if funders put more weight on recommendations they receive from friends in a social network than on general

information.

Thies, Wessel and Benlian (2014) examine the joint effects of popularity information (decisions of previous funders) and social buzz on the likelihood of success of crowdfunded campaigns. Their data set combines information about more than 6,000 projects proposed on Indiegogo, and the daily number of shares and tweets that these campaigns received, respectively on Facebook and Twitter. Their results show that social buzz (especially Facebook shares) positively influences project backing. Although the reverse influence also makes sense (previous funders may create additional eWOM to attract further funders and increase the success probability of the campaign that they back), it is not supported by the data.

3.5.2 Social networks and social groups of fundraisers

As just discussed, funders may obtain useful information from their own social network. As we see now, funders may also draw information from observing the social network of the fundraisers that they envisage to back. Mollick (2014) provides some evidence along these lines: he shows that a fundraiser's number of Facebook connections (taken as a proxy for the size of a fundraiser's social network) is a good predictor of successful fundraising. Similarly, the analysis of Agrawal, Catalini and Goldfarb (2013b) suggests that the evolution of a fundraising campaign depends on a fundraiser's social ties. Using data from Sellaband, a CFP promoting artists, they show that 'local' funders (i.e., funders who are co-located with the artist they fund) are much less responsive to the cumulative level of funding already raised than 'distant' funders are. A potential explanation for this difference is that because local funders have offline access to the artist, they can better assess the quality and potential of this artist's project and, hence, need to a lesser extent to infer information from the capital raised to date. Everett (2010) investigates default risk for online social lending markets based on group membership and finds that the geographic proximity of group members of a social lending group is negatively related to default and interest rate.

Lin and Viswanathan (2014) document a 'home bias' using data from Prosper.com: lenders tend to conduct more transactions with borrowers who are geographically closer to them (even at the price of foregoing strictly better alternatives). We note that such behavior may be due to information or preferences. Informational differences may be the reason, as lenders will

prefer borrowers that are easier for them to evaluate. Alternatively, lenders may be more likely to "trust" borrowers from a similar cultural background. Other work on trust has been mentioned in Section 3.3.1 above.

Relatedly, Burtch, Ghose and Wattal (2014) conducted an analysis using data of more than three million individual lending transactions on the lending-based CFP Kiva.org between 2005 and 2010. They consider not only the role of geographic distance, but also of cultural differences on the lenders' decisions about choosing the borrowers to support. They find that lenders prefer borrowers with similar culture and which are less distant geographically.[41] Analyzing data from kickstarter, Marom, Robb, and Sade (2015) find social proximity with respect to gender in the funding of projects: they find that the project leader receives a relatively higher percentage of funders from the same gender. Based on additional survey data, they attribute these differences partly to taste-based discrimination.[42]

As mentioned in Section 3.4.4, Lin, Prabhala, and Viswanathan (2013) investigate the role of fundraisers' friends for the lending outcome on a lending-based CFP. Using data from Prosper.com, they show that the more friends a fundraiser has the higher is the probability that his or her project receives funding. Also, a larger friendship network is associated with lower interest rates on funded loans. Since it is also associated with lower default rates, this suggests that funders are making a rational decision when they favor projects of fundraisers who have a large friendship network. A possible explanation is that a large friendship network is positively correlated with unobservable components of project quality and, therefore, serves as a signal. Liu, Brass and Chen (2014) refine the previous analysis by distinguishing among different types of friendship effects. First, they confirm that close friends of borrowers are more likely to lend them money than outsiders. On the other hand, they show that subsequent lenders tend to be positively influenced by the bids of their own friends but negatively by the bids of the

[41] In an earlier study, also using data from Kiva, Galak, Small and Steven (2011) already found evidence for lenders favoring socially proximate borrowers. Among the variables for social proximity they used gender and occupation.

[42] In the spirit of Bertrand and Mullainathan (2004), Pope and Sydnor (2011) consider racial discrimination in P2P lending markets. They find that, conditioning on the credit profile, blacks compared to whites have a 25 to 30 percent lower chance to receive funding. However, when conditioning on the credit profile, even though blacks are charged an on average higher interest rate, funders of loans to blacks perform worse than funders of loans to whites because of observed higher default rates of blacks. Thus, the result should be interpreted as a result of statistical discrimination and not of taste-based discrimination.

borrower's friends.

CFPs as social networks may strengthen community bonds and allow for pro-social behavior such as reciprocal behavior. On some CFPs individuals act both as funders and fundraisers. Thus, a person who backs some projects may at some other point apply for funding of her own project. While no explicit punishment mechanisms are available if somebody does not deliver on her project, similar forces may be at play as in microfinance, where a group of individuals contributes regularly and sometimes requires funding.

Zvilichovsky, Inbar, and Barzilay (2014) identify a set of fundraisers on Kickstarter who have been backing other projects. They find that the backing of other projects is associated with higher success rates of the project, attract more funders and raise more funds. They interpret their findings as providing some evidence of direct and indirect reciprocity.

3.5.3 Use of social networks by CFPs

Even in environments in which fundraisers are typically only once on a platform, the CFP may use social network information to allow funders to update their beliefs. For instance, if a CFP has access to social network data of LinkedIn, it may be able to report success rates of those contacts, who previously launched a project and are directly connected to the person in question (social network of fundraisers). If the average success rate in this group is larger than the population average, this may make funders anticipate that the project is more likely to succeed, i.e., achieve the requested funding. Here the CFP provides information about a particular fundraiser to all funders. Information from social networks can also be used on the funder side, an issue we turn to next.

A recommender system that makes personalized suggestions for projects may utilize the network structure and characteristics of funders. This is of particular relevance if funders are uncertain about horizontal match values and if they are correlated for adjacent nodes in the social network of funders. For its recommendation, the CFP may then have to rely on the social network structure itself.[43] It may also team up with another social network

[43] Here it is immaterial if the correlation of match value is purely driven by the fact that the two funders are close to each other in the network (e.g., because they like to imitate the behavior of direct neighbors in the network) or if the correlation is due to unobservable horizontal characteristics of funders which are correlated with their position in the network.

and rely on its information to devise personalized suggestions. For instance, if the CFP has access to Facebook information, it can suggest a project that has also been recommended by Facebook friends. This information may also be actively provided by Facebook friends if they decide to post their funding decision on Facebook. Hence, by the active decision of fellow funders or by the action of the CFP, a funder may receive personalized recommendations. As alluded to above, this may intensify information cascades, with good or bad consequences.

3.6 CFP as marketing and sales platform

CFPs provide a means for startup firms to generate publicity; a project on a CFP may thus be used as a marketing device. In addition to its financial advantages, crowdfunding can be used as a marketing tool as it allows to build a community and to develop a public image (see, e.g., Gatautis and Vitkauskaite, 2014).

3.6.1 CFP as a means of attracting other funds

A successful project can spill over into the general public if media report about a particular success story.[44] It may thus sow the seeds for additional demand outside the platform. A project may generate additional value if complementary services are developed or if additional human capital can be attracted. Here, attracting attention on the CFP helps in further improving the offering or in generating complementary offering. Furthermore, on the funding side, a successful project can be used as a device to convince funders and possibly banks to provide follow-up funding or funding for another project by the same firm.

To illustrate these potential benefits of crowdfunding, consider Optinvent, a start-up that has created ORA (brand new glasses for augmented reality and informative display). It carried out its first crowdfunding campaign through the American CFP Kickstarter.[45] The aim of this campaign was not to finance the first stage of the development of the start-up, as Opt-

[44] In principle, even an unsuccessful campaign may benefit from being on the platform. This will happen if nevertheless it receives media attention, although this appears to be less likely to happen than with success.

[45] Information in this paragraph is taken from "'Kickstarter est un passage obligé pour tout nouveau fabricant de hardware, selon le PDG d'Optinvent" by Sylvain Arnulf, September 14, 2014 on `http://tinyurl.com/nsth8hs`, last accessed November 16, 2014.

invent already obtained 1.5 million Euros from business angels. The goal was to introduce the young company and its technologies to an interested public. Kayvan Mirza, president of Optinvent explained that they consider Kickstarter as a marketing platform, as it constitutes a mean of attracting attention of relevant audiences. This includes, in line with the traditional functions associated with CFPs, potential funders of startup firms (see Section 3.3). More generally, a project on Kickstarter may help to obtain alternative funding *outside* the platform. Furthermore, a campaign on Kickstarter can generate publicity that attracts outside developers to contribute to the project.

3.6.2 Reward-based CFPs as marketing platforms

Launching a project on a CFP can be used as a low-cost strategy to introduce a product under uncertain aggregate demand and may thus increase allocative efficiency, as otherwise some markets were missing and gains from trade would not materialize. In particular, reward-based CFPs have the potential to generate demand for projects they are hosting, as they have the feature that funders by construction become consumers (or intermediaries reselling the purchased product).[46]

For instance, the CFP "I Am la Mode" is a platform for creators of fashion products. To prepare creators, it offers some training on the communication and web 2.0 tools' usage. To attract donors, the website retains only the projects that are promoted through photos and videos. Alexandre Diard, co-founder of I Am la Mode states that the user must be able to observe the quality of the product shortly after a project has secured the necessary funds.[47] Since the result of projects on music and clothing are typically available shortly after a campaign is successful, it is to be expected that such types of project are often available on CFPs.

In general, crowdfunding can be used as a marketing device that allows to sell products that do not yet exist. A CFP can create a community that

[46] The underlying argument for this observation is based on asymmetric information, as has been explored above. Creators have initially no clear idea whether their project is profitable, whereas consumers would know whether they would like to buy. If a project is not launched on a CFP it is prohibitively costly for some creators to launch a project because the sunk investment that is required to develop a product exceeds the expected profit gross of the investment and it is impossible or too costly to learn about demand absent pre-selling on CFP.

[47] See `http://blog.epjt.fr/?post/2014/02/17/crowdfunding`.

brings together funders and fundraisers in the sense that fundraisers recruit the future consumers of their products. From a practitioner's perspective, rephrasing the words of Yann Le Jeune from Afexios, in crowdfunding, the donor feels to be an active part, judge and banker at the same time, with the power to choose the project that will be sold "tomorrow." According to Yann Le Jeune, crowdfunding meets the needs of funders as they want to decide where to place their money based on their own tastes.[48]

Belleflamme, Lambert and Schwienbacher (2014) build a stylized model of reward-based crowdfunding using pre-ordering: funders are consumers who have a strong taste for the announced product and who therefore decide to pre-order it. It is assumed that the more consumers/funders value the product, the more they also value the rewards that the fundraiser offers them in return for pre-ordering the product. This allows the fundraiser to segment the demand into two groups: the early funders who reveal themselves to be high-paying consumers (and whose willingness to pay is further enhanced by the value that they attach to the rewards), and the regular consumers who may eventually decide to buy once the product is marketed. By price discriminating between the two groups, the fundraiser may increase her profits. However, the optimal price discrimination scheme may not be feasible if the initial capital requirement is too high. The obligation to finance the capital through pre-sales puts indeed a constraint on the price that can be charged to the early funders. The profitability of this form of crowdfunding decreases thus with the size of the capital requirement.

In the case of pre-ordering without additional rewards, funders may rationally foresee that the product will be available at a much lower price in a mass market once the project has received sufficient funding and, therefore, decide to wait. Thus, one may wonder whether free-riding among funders may undermine the funding of the project. However, if each funder is pivotal for the success of the project, free-riding is not an issue and funders pay a higher price than consumers in the market which opens after successful funding (for a theoretical analysis, see Kumar, Langberg, and Zvilichovsky, 2015).

Ellman and Hurkens (2014) also consider reward-based crowdfunding, where the reward consists in receiving the product. In contrast with Belleflamme, Lambert and Schwienbacher (2014), they assume that funders do

[48] ibid.

not get any additional utility from the rewards (on top of the utility stemming from the product itself). Their concern is with the optimal design of the crowdfunding mechanism when fundraisers can commit to produce only if aggregate funding exceeds a defined threshold. They show that the optimal strategy of the CFP has to balance two conflicting effects: setting a high threshold allows the entrepreneur to set higher prices for high type buyers; on the other hand, setting a low threshold raises the probability of production.

Nocke, Peitz and Rosar (2011) also link product pre-ordering to price discrimination, but they abstract from the funding issue of a project of minimum size (there is no requirement that revenues from pre-sales be above some minimum level). Their general insight about the possible use of pre-ordering relies on asymmetric information: the match value of a forthcoming product is only revealed later. Pre-ordering is thus done before the match value is known and is only appealing for the consumers with high expected valuation. In this context, advance purchase leads to price discounts.

Pre-selling also offers the chance to fundraisers to receive valuable feedback from funders about the product. This feedback may be used when launching a mass-market version of the product that was pre-sold on the CFP.[49]

So far we considered products that may be made available at a later point to a wider audience (e.g., video games). We now turn to products sold under the fundraiser's commitment to a limited production volume. Reward-based projects on CFPs offer the possibility of the production of limited editions of creative work. As the size of limited edition is determined ex ante, the fundraiser can decide on the number of copies based on expected demand. This is similar to traditional offline examples, with the important difference that on CFPs projects are only realized if full subscription to the limited edition is guaranteed, whereas offline campaigns often have to go ahead before the sales of all units are assured. Thus, launching a project with a limited edition on a CFP carries less financial risk for fundraisers than the launch of a limited edition prior to pre-selling the limited edition since he or she does

[49] Takashi Mochizuki in the Wall Street Journal ("Sony Taps Crowdfunding Wisdom on Smart Lock," December 12, 2014) provides an example that even established branded manufacturers use reward-based CFPs to test their product: Sony sold a limited number of a prototype of a smart watch on a CFP at a discount. Clearly, the funding motive is not driving Sony's decision, but rather the use of the CFP as a marketing platform.

not risk to be stranded with unsold copies. Furthermore, crowdfunding may trigger an outreach to potential funders by funders who already contributed. Thus, CFPs may be particularly successful in generating the critical mass to profitably release a niche product such as pieces of art in print.

Reward-based crowdfunding allows funders to mix donation-based incentives with direct consumption benefits. For instance, a funder who wants to support upcoming photographers may derive a particular benefit from receiving a signed copy of a book of photography. Thus, her taste which project to supports by donation is positively correlated with the benefit she derives from consumption.[50] This may make reward-based CFPs a particular success in the arts.

More generally, reward-based projects that contain an element of donation may generate the sensation of warm glow and establish a relationship between funder and fundraiser, which may serve a fundraiser well for a future project. This suggests that CFPs may be successful in establishing virtual communities.[51]

3.6.3 CFPs and brand image

Besides start-up fundraisers, other firms may use CFPs as a marketing device. Established firms may use CFPs to improve their brand image; this may occur as funder, fundraiser or as a CFP itself. On the funder side, there are documented examples of institutional funders using CFPs with the aim to improve their brand image. For instance, Le Monde and La Banque Postale formed a partnership with some CFPs as projects' mentor. La Banque Postale since 2012 has made a partnership with the CFP KissKissBankBank. The agreement is that La Banque Postale chooses one or two project(s) per month and completes the fundraising. According to Vincent Ricordeau, co-funder of KissKissBankBank, this leads to a positive image for the bank.[52] An example for an established firm being active as a CFP is the retailer Intersport. It has created its own CFP "Sponsorise.me", which is specialized in sports' projects. Projects include financial assistance

[50] As explained above, Belleflamme, Lambert and Scwhienbacher (2014) make precisely this assumption in their model of reward-based crowdfunding.

[51] According to Hemer (2011) crowdfunding allows the quick establishment of specific web communities of users through social networks and Web 2.0, which facilitates "virtual networking and marketing".

[52] See `http://tinyurl.com/njdpgyl`.

for a sport season, the purchase of equipment, the creation of a new product, the creation of or participation in a sports event. Arguably, the motivation of Intersport is to improve its brand image. On the fundraiser side, campaigns may allow for an improvement of the brand image as well as for trials and endogenous product launches, possibly suggesting that a firm wants to better know its customers and let them choose the product. The firm may thus be perceived to care for its customers.

More specifically, crowdfunding may allow for interaction between consumers and brand managers; each one of them may benefit from this interaction. The brand manager may perform a market test and create a community of ambassadors who will extend this community through their own friends networks (we refer back to the subsection on social networks). The brand owner may also stimulate pre-purchasing of the future product. Consumers have therefore the power of picking what will become available on the market and are not restricted to buy from the set of already available products.

To summarize the argument, crowdfunding allows to find new contributors and therefore future customers before the release of the product on the market. Brands under development may enjoy early funding and consumers may benefit from a lower price during the launch period of the product or brand.

Crowdfunding opens the possibility to "engage" the brands with their contributors and may stimulate the demand for the product. The success of such campaign facilitates the promotion of the product through the community already engaged during the campaign.

4 Conclusion

Crowdfunding is a recent phenomenon which has attracted the public interest. This survey does two things: It presents facts about the current business models in crowdfunding and it discusses the emerging economics and management literature. At various points, it also links to the broader research in economics that is relevant for the understanding of crowdfunding platforms.

We have argued that, to understand the business models of CFPs, a two-sided markets perspective should be adopted. The interaction among

funders and fundraisers on a platform is characterized by cross-group and within-group external effects. Information asymmetries loom large on CFPs. They pose several challenges for the design and governance of the platform. In particular, CFPs face the challenge to make relevant information easily available while at the same time to encourage information gathering, in particular on the funder side.

The literature on CFPs is growing rapidly, and we do not claim to do justice to all contributors. Our selective survey is an attempt to organize different aspects relevant for the economics of CFPs. We provide a number of references on the issue identified in this survey and several real-world examples to illustrate some of the features of current CFPs. Outside the scope of this survey is financial market regulation applied to crowdfunding, in particular, equity-based crowdfunding. While the introduction contains a few aggregate numbers of the market, this survey does not aim at providing detailed industry numbers and trends. These are available e.g. in Massolution (2015).

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