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Jordana VIOTTO DA CRUZ

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« The Economics of Crowdfunding: Entrepreneurs' and Platforms' Strategies »

Directeurs de thèse
Marc BOURREAU, Télécom ParisTech
François MOREAU, Université Paris 13

Jury

Thierry PÉNARD, Professeur, Université Rennes 1	Président
Paul BELLEFLAMME, Professeur, Aix-Marseille Université	Rapporteur
Jörg CLAUSSEN, Professeur, Ludwig-Maximilians-Universität München	Rapporteur
Françoise BENHAMOU, Professeur, Université Paris 13	Examinateur
Marc BOURREAU, Professeur, Télécom ParisTech	Directeur de thèse
François MOREAU, Professeur, Université Paris 13	Directeur de thèse

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THESIS

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Jordana VIOTTO DA CRUZ

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"The Economics of Crowdfunding: Entrepreneurs' and Platforms' Strategies"

Under the supervision of
Marc BOURREAU, Télécom ParisTech
François MOREAU, Université Paris 13

Thesis committee

Thierry PÉNARD, Professor, Université Rennes 1	President
Paul BELLEFLAMME, Professor, Aix-Marseille Université	Referee
Jörg CLAUSSEN, Professor, Ludwig-Maximilians-Universität München	Referee
Françoise BENHAMOU, Professor, Université Paris 13	Examiner
Marc BOURREAU, Professor, Télécom ParisTech	Doctoral advisor
François MOREAU, Professor, Université Paris 13	Doctoral advisor

Titre : « The Economics of Crowdfunding: Entrepreneurs' and Platforms' Strategies »

Résumé : Les plateformes de financement participatif (« crowdfunding ») permettent aux entrepreneurs de faire financer leurs idées en contactant directement de petits investisseurs et des consommateurs potentiels. Cette thèse porte sur le fonctionnement de ces plateformes d'un point de vue économique, en particulier, sur les stratégies mises en place par les plateformes et les entrepreneurs dans ce marché. Cette thèse est organisée en deux parties. La première partie se focalise sur le marché du financement participatif et les stratégies de compétition des plateformes. La deuxième partie se consacre aux incitations des entrepreneurs et les potentielles barrières à son entrée – et donc au développement de ce marché. Tout d'abord, nous discutons la caractéristique des plateformes de financement participatif d'après la théorie des marchés « bifaces ». Nous soulignons le rôle de coordination de ces plateformes à partir de différentes structures de prix et de règles spécifiques qui régulent la participation d'entrepreneurs et d'investisseurs. Nous soulignons l'état de l'art de la littérature existante pour comprendre les incitations des entrepreneurs et des investisseurs de participer à ces plateformes, les outils mis en place pour réduire les asymétries d'information, et les biais des investisseurs par rapport aux caractéristiques physiques des entrepreneurs. Le deuxième article étudie le défi des plateformes bifaces d'équilibrer « quantité » et « qualité » des agents des deux côtés et en même temps tenir en compte la compétition. Nous étudions en particulier comment une stratégie d'attirer davantage d'entrepreneurs d'un côté peut réduire la qualité de l'expérience des utilisateurs. Le troisième article est consacré à démontrer empiriquement la valeur informationnelle du financement participatif pour les entrepreneurs. Avant le lancement d'un nouveau produit sur un marché, les entrepreneurs font face à des fortes incertitudes qui peuvent être paillées avec le « feedback » reçu des campagnes du financement participatif, ce qui constitue une incitation de plus pour participer à ces marchés. Le quatrième et dernier article présente un contrepoint de ces incitations, et interroge les barrières à l'entrée sur ces marchés. En particulier, nous étudions les barrières en matière de temps qui doit être consacré à une campagne de financement participatif et qui peut décourager une partie des entrepreneurs de chercher cette alternative. Pour conclure, nous discutons de l'implication de nos résultats.

Mots-clés : économie des plateformes, économie du numérique, financement participatif, entrepreneuriat, marchés bifaces, compétition, stratégies

Title: "The Economics of Crowdfunding: Entrepreneurs' and Platforms' Strategies"

Abstract: Crowdfunding platforms allow entrepreneurs to directly contact small investors and potential consumers to help them finance their ideas. This thesis dedicates to understanding the dynamics of these platforms from an economic perspective. We are particularly interested in comprehending the entrepreneurs' and platforms' strategies in this market. This thesis is composed of four scientific articles organized into two parts. The first part focuses on analyzing the crowdfunding market dynamics and the design and strategies of crowdfunding platforms. In the first article (Chapter 1), we discuss the characteristic of crowdfunding platforms based on the theory of two-sided markets. We underline the strategies platforms use to perform their coordinating role of the market. Based on the current literature, we analyze the incentives and disincentives of entrepreneurs and investors to participate in these platforms as well as the instruments to reduce information asymmetries and the potential biases on the investors' screening process in relationship to entrepreneurs' physical characteristics. The second article (Chapter 2) examines the challenge of crowdfunding platforms to balance "quantity" and "quality" on both sides of the market, and at the same time accounting for competition. In particular, we examine how a strategy to attract more entrepreneurs to one side can reduce platforms' the competitive advantage and potentially deteriorate users' experience. The second part of the thesis is devoted to the incentives and disincentives for entrepreneurs to join crowdfunding platforms. In the first article of the second part (Chapter 3 of this thesis), we empirically demonstrate the informational value of crowdfunding for entrepreneurs. Before launching a new product in a market, entrepreneurs face high uncertainties that can be reduced with the "feedback" received from crowdfunding campaigns. Therefore, the informational value of crowdfunding serves as an additional incentive to entrepreneurs besides obtaining financial support for their ideas. The fourth and last article aims at pointing out disincentives to join platforms, in particular how the need of allocating scarce time and attention to campaigns may discourage some entrepreneurs from seeking this alternative. To conclude, we summarize the implications of the main findings and suggest avenues for future research.

Keywords: digital economics, economics of digital platforms, crowdfunding, entrepreneurship, two-sided markets, competition, strategies

AVERTISSEMENT

L'Université Paris 13 n'entend donner aucune approbation ni improbation aux opinions émises dans cette thèse : ces opinions doivent être considérées comme propres à leur auteur.

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General Introduction

In the 12th century, the French county of Champagne organized trade fairs attracting merchants and financiers from all over Europe who had the opportunity to settle businesses (Fisman and Sullivan, 2016).

The organizers' role was to court potential buyers and sellers as to "bring them on board" in the sense of Rochet and Tirole (2003): they invited participants, set rules, and cared for the safety and reliability of transactions, aiming at creating an environment that would be valuable for all the members. In exchange for the matching service, they charged transaction fees.

Intermediaries like the fair organizers can be found throughout History: newspapers and radio stations connect advertisers to their audience, shopping malls bring shops and customers together, credit cards enable transactions between consumers and merchants, real estate agencies match homeowners and buyers or renters.

One distinct feature of intermediaries is that they do not have control over the assets that are transacted in their markets: they merely coordinate the interactions and transactions between individuals and firms who possess these assets and individuals and firms who demand them.

In other words, the role of intermediaries (known today as platforms or two-sided markets)[1] is to reduce search, transaction, and information costs related to interactions and transactions between two (or more) types of agents (Rochet and Tirole, 2003). In order to play this "private regulator" role (Boudreau and Hagiu, 2009), platforms use two main instruments: prices and design.

The last decades, a plethora of platform-based services emerged, boosted by the development of Information and Telecommunication Technologies (ICT)[2] alongside with the increase of Internet and broadband coverage (Figure I.1 in Appendix I) that diminished communication and information processing costs (Goldfarb and Tucker, 2017).

[1] We acknowledge the existence of multi-sided platforms, but in our setting we will refer to two-sided markets.

[2] The capacity of Secure Digital (SD) memory card storage increased from 64MB in 1999 to 128GB in 2013. Information available at http://www.oracle.com/technetwork/issue-archive/2014/14-jul/o44timecapsule-2219543.html. Last consulted on August 30th, 2017.

Platforms have become pervasive: we communicate, exchange, search, commute, travel, shop, develop hobbies, make payments, find jobs, houses, and partners using digital platforms. Table 1 shows the description and examples of platform-based business models according to the categorization in Belleflamme and Toulemonde (2016a).

Table 1: Platform models*.

Category	**Description**	**Example**
Peer-to-peer marketplaces	Facilitate the exchange of goods and services between "peers".	Airbnb, Uber, TaskRabbit
Exchanges	Help buyers and sellers search for feasible contracts for the best prices.	eBay, Booking.com
Hardware and software systems	Allow applications developers and end users to interact.	Operating systems, videogame consoles
Matchmakers	Help members of one group to search and find the right "match" within another group.	Monster, Meetic
Crowdfunding platforms	Allow entrepreneurs to raise funds from a "crowd" of investors.	Kickstarter, Crowdcube, Prosper
Transaction systems	Transaction systems provide a method of payment to buyers and sellers that are willing to use it.	Mastercard, Transferwise

* Categorization and definitions according to Belleflamme and Toulemonde (2016a).

An examination of the list of firms with greatest market valuation offers a prospect about the current relevance of two-sided markets: the top firms operate platform-based businesses (see Figure B.2 in Appendix B, Chapter 2). Apple, Google, and Microsoft facilitate the interaction between developers and app users through their respective operating systems. Facebook connects advertisers and potential consumers. Amazon enables easier search and matching between buyers and sellers. A similar distribution is found among the top "unicorns": 60% of the most valuable firms like Uber and Airbnb are platforms-based business models (see Figure B.1 in Appendix B, Chapter 2).

The growth of two-sided markets business models coupled with unique features in comparison to other industries has motivated scholars in economics and management to understand their functioning, their boundaries, and their competitive strategies.

The seminal works on two-sided market focus on platforms' pricing decisions in relationship to the incentives of players on both sides to single-home or multi-home. Caillaud and Jullien (2003) investigate competition between two intermediaries that can use registration fees and transaction fees and show that competition is more intense with multi-homing[3] players.

Rochet and Tirole (2003) study platform pricing under several situations (for-profit vs. non-for-profit, agents' incentives to multi-home, platform differentiation, platforms' ability to use volume-based pricing, the presence of same-side network effect, and platform compatibility) and find that sellers benefit an increase in multi-homing on the buyers' side and captive buyers while buyers benefit from the presence of "marquee" buyers (i.e., buyers generating high surplus on the sellers' side).

Armstrong (2006) find that the determinants of prices are the magnitude of cross-group network effects, whether agents are charged lump-sum prices or transaction fees, and the agents' preferences regarding how many platforms to join (i.e., whether they single-home or multi-home).

Empirical work evidence the asymmetric pricing structure and homing choices of agents on both sides. Kaiser and Wright (2006) use data from the German magazine industry to provide empirical evidence of the pricing structures and find that the advertisers' side subsidizes the readers' side. In other words, the more price-sensitive side and the side exerting greater cross-group network effects on the other is subsidized. They also find that 8% of the readers and 17% of advertisers multi-home.

In two-sided markets, direct network effects perform a role as important as the cross-group effects, once the incentives to join one platform depends not only on the number of members of the other side but also on the number of members on the same side.

Direct network-effects had been studied since the seminal work of Rohlfs (1974) on communication systems. However, the new strand of articles considers the interplay between direct and indirect network effects. For example, Belleflamme and Toulemonde (2016b) include within-group network effects in the two-sided single-homing model of

[3] The two-sided market theory categorizes platform users as "single-homers" if they connect to one only platform and "multi-homers" if they join multiple platforms.

Armstrong (2006) and find that sellers may benefit from a platform with more sellers, as their fees might be lower.

The analysis of direct and indirect network effects together offer new insights about agents' incentives and disincentives to participate in a given market. In marketplaces, for instance, sellers might enjoy the participation of a greater number of buyers but dislike the presence of a greater number of sellers. In apps markets with positive direct network effects (i.e., apps where the users' utility increases with the presence of other users on the same app), it might be rational for the platform to limit the number of applications as to increase the platform value for the users (Casadesus-Masanell and Halaburda, 2014).

Limiting entry on two-sided markets can also increase platforms' value by discouraging low-quality players to join and consequently increasing the average quality of the pool of agents. Although much of the seminal work on two-sided platforms focused on the size and strength of network effects, as previously highlighted, very often agents also care about the type of other players.

Claussen, Kretschmer and Mayrhofer (2013) analyze quality issues in two-sided markets using data from the Facebook app store. Launched in 2007, the platform imposed very low costs as it provided tools to facilitate integration and imposed very few restrictions regarding quality.

The market was flooded with low-quality applications, and the platform changed its policy in 2008, allocating the possibility of apps promotion through notifications and invites according to the users' feedback (rating) on each app. As a result, there was an increase in the usage intensity of the app store, indicating that quality matters more than quantity.

The previous cases highlight the relevance of platforms' non-price instruments, namely design, to reduce search and transaction costs and better coordinate both sides of the market. Non-price instruments can also help platforms to gain markets over incumbents. Fradkin (2017) notes that Craigslist had entered the market of home sharing listings before Airbnb, but the latter introduced features that facilitated a sheer reduction of search costs such as the availability calendar, the maps of properties, and recommendation systems.

The author points out, however, that even with the availability calendar, there are still

frictions due to the limited search effort potential guests engage in, and to the fact that hosts can reject guests – which they do in 49% of the time. As a result, many listings remain vacant for 40% of the time. The author suggests that, should the frictions be removed, there would be an increase in 102% of the matches.

Frictions due to the limited search effort can be mitigated with more personalized recommendation systems – one of the results of the paper. Frictions resulting from guests' rejection seem to be trickier.

In a report from September 2016, Airbnb presented an objective to reach one million listings under "instant bookings". The (so far) optional feature enables guests to make reservations without the host's approval.[4] The measure aimed at avoiding racial bias found in empirical research (Edelman and Luca, 2014), but it can also be an instrument to reduce overall search frictions pointed out by Fradkin (2017).

The drawback is that the efforts to increase "instant booking" listings generated an outrage among groups of homeowners,[5] as it was the very possibility of rejecting guests that drove many homeowners to the platform.

This overview of the platform dynamics aims at illustrating the complex dynamics of platform internal regulation and the tensions existing between attracting a great number of players versus agents of high quality. The present thesis contributes to this debate focusing on the crowdfunding market.

Crowdfunding platforms

Crowdfunding platforms allow entrepreneurs lacking access to traditional sources of capital to "tap" potential customers and small investors that can support their idea with small amounts of money (Belleflamme, Lambert and Schwienbacher, 2014). It is a relatively new industry: although the first platforms that are categorized under the term "crowdfunding"

[4] "Airbnb Works to Fight Discrimination and Build Inclusion", by Laura Murphy. September 8th, 2016. Available at http://blog.atAirbnb.com/wp-content/uploads/2016/09/REPORT_Airbnbs-Work-to-Fight-Discrimination-and-Build-Inclusion.pdf. Last consulted on August 31st, 2017.
[5] "Airbnb instant book mandatory for new hosts". Available at https://guesthoo.com/2016/08/06/Airbnb-instant-book-mandatory-new-hosts/. Last consulted on August 13th, 2017.

were launched between 2000 and 2007 (see Table I.1 for a description), the market took off between 2009 and 2013. In this period, the number of dedicated platforms increased fivefold, from 200 to 1,013 (see Figure 1.2 in Chapter 1).

This was also the period concerning one of the milestones of crowdfunding: the creation and approval of the JOBS Act (Jumpstart Our Business Startup Act). The set of measures signed by the former president Barack Obama aimed at stimulating entrepreneurship. The Title III of the JOBS Act specified rules regarding equity-based crowdfunding, including the relaxation of rules for equity-based crowdfunding.

It allowed, for instance, small investors to legally buy shares of startups through equity-based crowdfunding platforms, an activity that was previously exclusive to accredited investors.[6] The objective of the Title III of the JOBS Act, referring to equity-based crowdfunding, was to mitigate barriers to crowdfunding and generate incentives for entrepreneurs to overcome difficulty in obtaining financial support from traditional sources

Although the Title III of the JOBS Act specified rules for equity-based crowdfunding, it garnered attention to the activity as a whole. Figure I.2 (Appendix I) shows the development of the searches for "crowdfunding" on Google worldwide, suggesting an important increase of public attention towards crowdfunding between March and April 2012.

The JOBS Act was a signal to governments and institutions in several countries to turn their attention to this new mode of finance. On the one side, there was the promise to bridge the gap between entrepreneurship and finance, as already mentioned. On the other side, there was the concern about the participation of small and unsophisticated investors on financial markets.

At the center of these questions, there were the crowdfunding platforms, responsible for regulating interactions and transactions between entrepreneurs and investors by setting prices, design, and rules, much like the French county of Champagne and the other examples previously mentioned.

[6] "S.E.C. Gives Small Investors Access to Equity Crowdfunding", by Stacy Cowley, October 30th, 2015. Available at https://www.nytimes.com/2015/10/31/business/dealbook/sec-gives-small-investors-access-to-equity-crowdfunding.html. Last accessed on August 16th, 2017.

As it is going to be clear in Chapter 1, the design of crowdfunding platforms is particularly important to mitigate information asymmetries. First, platforms offer structures for entrepreneurs to include texts, documents, videos and images as to convince investors to pledge. But more importantly, much of the information on crowdfunding platforms is visible to users. For example, it is often possible to know the identity and the amount each person pledged on a given project as well as the time and date of the pledge. This type of information enables the emergence of processes like observational learning and "rational herding".

Chapter 1 also highlights the central role of minimum quality standards for crowdfunding platforms performance and for the type of entrepreneurs participating in the market. Platforms requiring higher minimum quality standards attract fewer entrepreneurs, but projects are of higher quality and more likely to achieve the pre-established threshold (Cumming and Zhang, 2016; Gaessler and Pu, 2017; Geva, Barzilay and Oestreicher-Singer, 2017; Wessel, Thies and Benlian, 2015). Therefore, these rules play a prominent role in platform competition, the theme of Chapter 2.

At the core of platform-based businesses is the incentive of two distinct types of agents to interact and complete transactions. In crowdfunding, the main incentive for entrepreneurs to join platforms is supposedly the access to capital, particularly for individuals lacking access via other sources. However, crowdfunding can also serve as a mechanism to reduce the typical uncertainty that involves the release of new products in the market (see, for example, Asplund and Sandin, 1999), as we investigate in Chapter 3.

If crowdfunding campaigns enable the access to capital for entrepreneurs lacking other sources and can serve as an informational mechanism, it also requires specific competencies and the allocation of scarce resources of time and attention. The tradeoff between benefits and barriers to crowdfunding are the subject of Chapter 4.

Presentation of this thesis

The objective of this thesis is to analyze two-sided markets using the example of crowdfunding platforms. We are particularly interested in the platforms' strategies as

well as the incentives and disincentives of entrepreneurs to join these markets.

Four scholar articles compose this thesis, and they are organized in two parts. In the first part, we study the crowdfunding market and the platforms' strategies. In the second part, we dedicate to investigating the entrepreneurs' strategies, with a focus on the incentives and disincentives to join the market. Each one of these chapters is detailed below.

Part 1: Platform strategies in crowdfunding

Chapter 1: Competition and regulation in crowdfunding: A literature review

The first article (Chapter 1) is an in-depth literature review about crowdfunding. The objective is to offer a panorama of this sector. We start by describing the four main crowdfunding models (donation, reward, lending, and equity), providing some examples, and explaining how each one works.

We follow to linking the crowdfunding business model to the two-sided market literature. In particular, we underline the tension between the need to generate critical mass on the entrepreneurs' and the supporters' side and the competitive pressure for quality agents.

We proceed to present the empirical findings in the literature regarding how investors solve information asymmetries problems, which helps to answer – at least partially – some of the questions presented above.

We also describe the empirical results in the literature related to the motivation of contributors to participate in crowdfunding as well as the incentives and disincentives of entrepreneurs.

The next step is to provide an overview of regulatory matters, with two canonical examples of countries that adapted to crowdfunding – the US (where the rules for equity-based crowdfunding were more strict) and the UK (where these rules were more flexible). Finally, we describe studies that use observational data and experimental design on

crowdfunding in order to improve the understanding about screening decisions to supply capital to entrepreneurs in the "offline" world.

Chapter 2: Quality versus quantity in two-sided markets: Empirical evidence from crowdfunding websites

The discussion regarding the tension between "quantity" (critical mass) and quality of players on both sides started in Chapter 1 opened up the opportunity to empirically investigate this issue.

We use data from two reward-based crowdfunding platforms competing in the Brazilian market. At the period of our study, two platforms responding for 93% of the market presented similar offers to entrepreneurs. More specifically, they accepted fixed or flexible funding projects in art, culture, social, and entrepreneurial-related categories. (Figures B.2a and B.2b in Appendix B show entries of both platforms on both sides of the market for the year 2015, illustrating the fierce competition for entrepreneurs and investors.)

The difference between both platforms lied on the minimum quality standards. One platform (the "incumbent") imposed more strict rules than its rival ("entrant"). The incumbent attracted fewer entrepreneurs than the entrant but displays greater average quality. In order to increase the entries on the entrepreneurs' side, the incumbent opened up the platform lowering the minimum standard quality, matching its rival.

The objective of the policy change was to attract more entrepreneurs and more supporters by the cross-group network externalities, obtaining a competitive advantage over the rival. However, at reducing the minimum standard quality, the increase in the number of entrepreneurs was offset by ad decline in the average quality. These countervailing forces did not yield a significant increase in entries on the supporters' side, suggesting that the change did not bring overall benefits to the platform. When we control for quality, however, we see that there was a relative increase in the number of supporters. After detailing our results, we present some potential alternative suggestions based on empirical evidence from the equity-based crowdfunding model.

Part 2: Entrepreneurs' strategies in crowdfunding

Chapter 3: Beyond financing: crowdfunding as an informational mechanism

The first paper in the second part of the thesis (Chapter 3) investigates whether crowdfunding can serve as an informational mechanism, reducing the uncertainty about new goods before sunk costs (Belleflamme et al., 2014; Agrawal et al., 2015; Ellman and Hurkens, 2016; Strausz, 2017; Chemla and Tinn, 2017).

The release of new goods in the market implies a great deal of uncertainty. For example, Asplund and Sandin (1999) present empirical evidence from the Swedish beer market where half of the newly launched products were withdrawn 48 months after arriving at the market, suggesting the difficulty of predicting the success of new products.

We posit that entrepreneurs can use information coming from their crowdfunding campaigns to infer potential demand and make better-informed decisions about production. The intuition behind this idea is the following: when deciding to contribute to a crowdfunding campaign, investors forego the amount allocated in relationship to outside options.

In other words, the expected payoffs are linked to the pledge amount, similarly to incentive-aligned mechanisms (Agrawal et al., 2014; Ellman and Hurkens, 2016) used in marketing (see, for example, Ding, Grewal and Liechty, 2005) and in experimental economics to test individual preferences. In this case, entrepreneurs could use information coming from their campaigns such as the total amount pledged or the number of contributors to infer potential demand, reducing uncertainty about the new good.

In order to test this hypothesis, we use data collected from Kickstarter, one of the leading crowdfunding platforms, coupled with other sources of data (Amazon, iTunes, Facebook etc.). Kickstarter relies on the "all or nothing" rule, conditioning access to capital to achieving a financial threshold previously determined during the campaign. In other words, even if an entrepreneur received financial support, she remains unfinanced if the amount raised is below the previously established threshold.

We focus on the sample of unfinanced entrepreneurs who have received (some) support

and calculate the probability of these entrepreneurs to launch the crowdfunded product in a marketplace after the campaign. We show that the likelihood of releasing a product after a failed campaign increases with the support received during the campaign, suggesting the informational mechanism we hypothesize. In order to rule out alternative explanations for the decision to release the product, we perform several robustness tests that are detailed in the paper.

Chapter 4: To crowdfund or not to crowdfund? Empirical evidence from professional musicians in France

The second paper of the second part (Chapter 4) investigates the tradeoffs between incentives to join crowdfunding platforms (access to capital) and disincentives (barriers related to the allocation of scarce time and attention to develop a campaign; Ellman and Hurkens, 2016). "Tapping the crowd" (Belleflamme et al., 2014) requires convincing many small investors of the value of a given project, and therefore signaling one's quality and trustworthiness.

The probability of joining a crowdfunding platform is a function of the entry barriers related to the allocation of this limited attention. We posit that the barriers are lower when the entrepreneur counts with managerial support. A manager can either assume the campaign activities directly or take responsibility for other administrative tasks in the firm, while the entrepreneur dedicates to the crowdfunding campaign. Using data coming from a survey with a representative sample of professional musicians in France, we show that the probability of running a crowdfunding campaign increases with managerial support, in line with our hypotheses.

As a conclusion, we provide a summary of the analyses and research questions addressed in this thesis and propose some directions for future research.

Appendix I

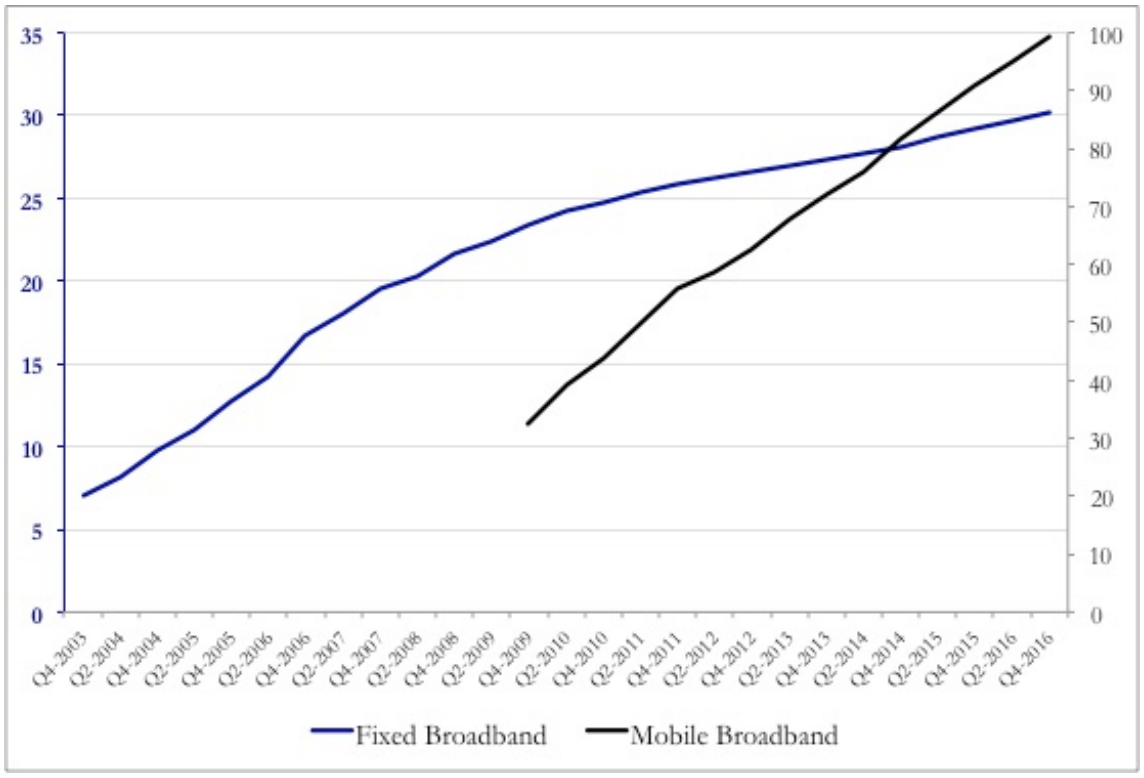

Figure I.1: Average fixed (left) and wireless (right) broadband penetration in the fourth quarter of each year for the OECD countries.[7]

[7] Source: OECD, Broadband Portal, www.oecd.org/sti/broadband/oecdbroadbandportal.htm. Last consulted on August 16th, 2017.

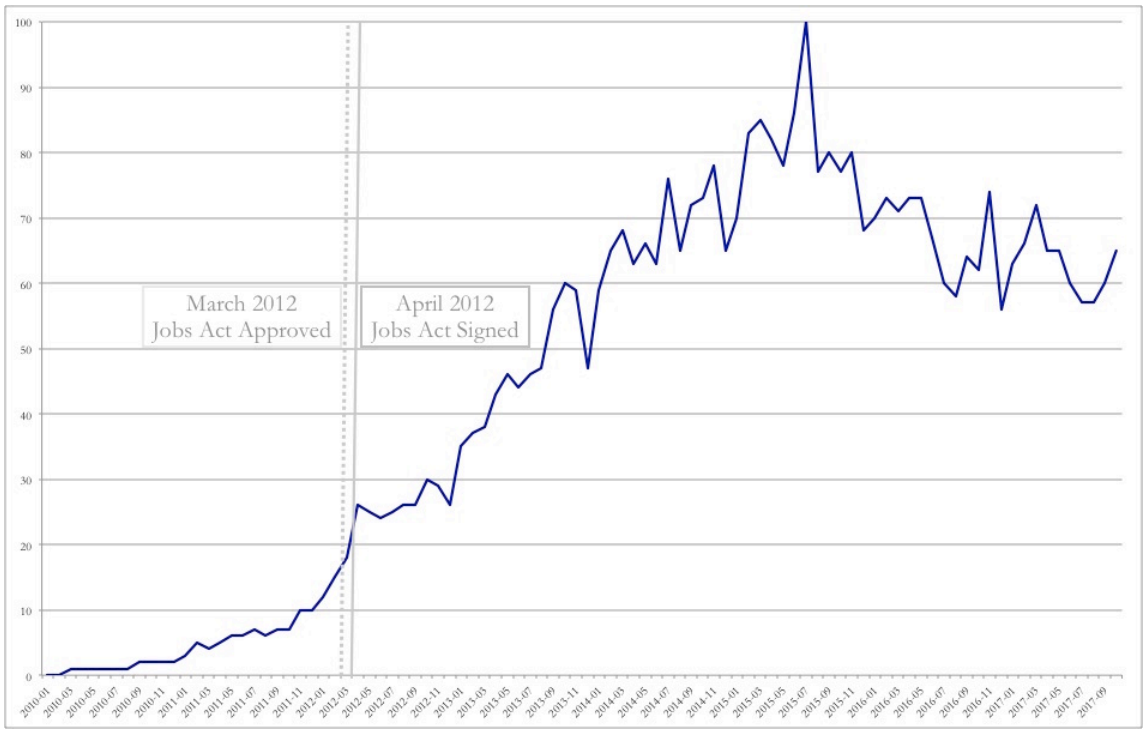

Figure I.2: Relative search volume for "crowdfunding" on Google from January 2010 to September 2017.

Table I.1: Pioneer platforms in the four crowdfunding models.

Model	Platform	Year	Founder(s)	Initial objective
Donation-based crowdfunding	Donors Choose	2000[8]	Charles Best, a teacher in a public school in New York.	To provide resources to students in several public schools in the area.
Reward-based crowdfunding	Artist Share	2003	Musician Brian Camelio	To enabled fans to fund musicians' recordings in exchange of special editions, backstage passes, and other perks.
Lending-based crowdfunding	Zopa	2005[9]	A group of finance professionals including former executives of the UK-based Internet bank Egg Plc.	To enable individuals to obtain loans outside banks.
Equity-based crowdfunding	EquityNet	2007	Professionals from venture capital and finance	To match entrepreneurs and venture capitalists[10]

[8] Information obtained from DonorsChoose homepage as in April 21st, 2001, captured using the Internet Archive Wayback Machine (web.archive.org). Last consulted on August 25th, 2017.

[9] Information obtained from the firm's website as of March 11th, 2005, collected with the help of the Internet Archive Wayback Machine (web.archive.org), and from the websites www.prudential.co.uk/~/media/Files/P/Prudential-V2/presentations/2002/egg_fr.pdf and www.bizjournals.com/sanfrancisco/stories/2006/04/10/newscolumn1.html. Last consulted on August 25th, 2017.

[10] Information obtained from the firm's website as of March 25th, 2007, collected with the help of the Internet Archive Wayback Machine (https://web.archive.org).

Part 1: Platform strategies in crowdfunding

Platforms coordinate the interactions and transactions of two (or more) types of distinct agents: buyers and sellers, travelers and homeowners, employers and employees, drivers and passengers. The efficiency of interactions and transactions depend on three instruments defined by platforms: prices, design, and rules. Hence, the strategies of the platforms are crucial for the development of two-sided markets. The first part of this thesis is dedicated to present the platforms' strategies in crowdfunding and its outcomes in transaction efficiency and in competition.

The first article (Chapter 1) is an in-depth literature review describing the crowdfunding models, the incentives for entrepreneurs and investors (or contributors) to join, and the design features aimed at reducing information asymmetries. We also present issues related to regulation, particularly in the equity-based crowdfunding, and describe empirical evidence on the screening process of investors on crowdfunding and what one can learn about screening in the financial markets in the "offline" world from online data.

The second article (Chapter 2) studies the strategies of crowdfunding platforms. More specifically, it investigates a duopoly where one of the platforms reduces the minimum quality requirements in an attempt to face competition. We show that although the platform changing its policy attracts more entrepreneurs, it does not have a significant effect on the supporters' side. The managerial implication is that strategies aiming at increasing the sheer number of players may reduce the strength of network effects with the decrease in quality. Therefore, strategies need to focus on attracting more high-quality players to the platform as to benefit from network effects and increase participation on both sides.

Chapter 1. Competition and regulation on crowdfunding platforms: a literature review*

Abstract

Crowdfunding platforms play a central role in regulating the interaction between entrepreneurs and investors. This paper describes the two-sidedness of crowdfunding platforms and reviews the literature highlighting the mechanisms that allow the mitigation of potential market failures. It also reports the findings about entrepreneurs' incentives and disincentives to join crowdfunding platforms as well as investors' motivations, particularly in the non-monetary rewards model. Finally, it presents the findings about screening process of capital seekers that can be insightful for the "offline" market.

*This is an updated version of "Competition and regulation on crowdfunding platforms: a two-sided market approach" (2015), *Communication & Strategies*, 99, 33-50.

1 Introduction

The startup Pebble had failed to attract venture capitalists in 2012 to invest in a smartwatch that can be connected to iOS and Android phones. Its inventor decided then to "tap the crowd" with an online fundraising on the platform Kickstarter. In 37 days, it raised $10,2 million from 68,929 enthusiasts (Figure A.1 in Appendix A).

The last couple of years, crowdfunding – or the practice to raise funds for specific projects from groups of investors over the Internet – raised billion of dollars worldwide via specialized platforms that coordinate entrepreneurs on the one side and investors or contributors[12] on the other side using prices, rules, and regulation (see Figures 1.1 and 1.2 for the evolution of transactions on crowdfunding websites and the number of platforms, and Figure A.2 in the Appendix for the distribution of platforms by country in 2017).

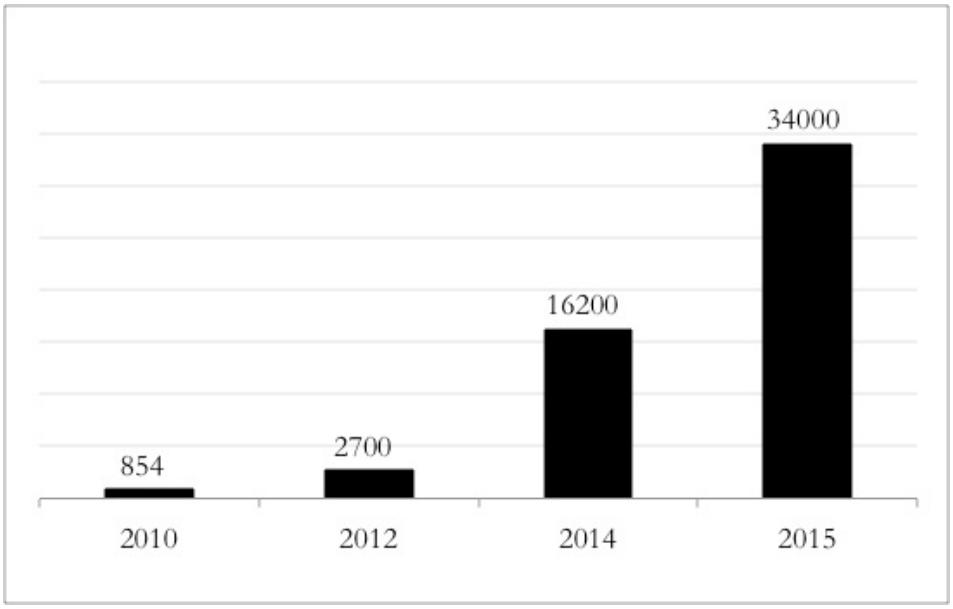

Figure 1.1: Volume of transactions on crowdfunding platforms (in million dollars).[13]

[12] In this paper, we will refer to "investors" when referring to crowdfunding in general and to models offering pecuniary returns (lending and equity-based crowdfunding). "Contributors" will be used to refer to participants on the supply side of non-monetary rewards models (reward and donation-based crowdfunding).
[13] Source: Massolution Crowdfunding Industry Reports available at www.crowdsourcing.org/research.

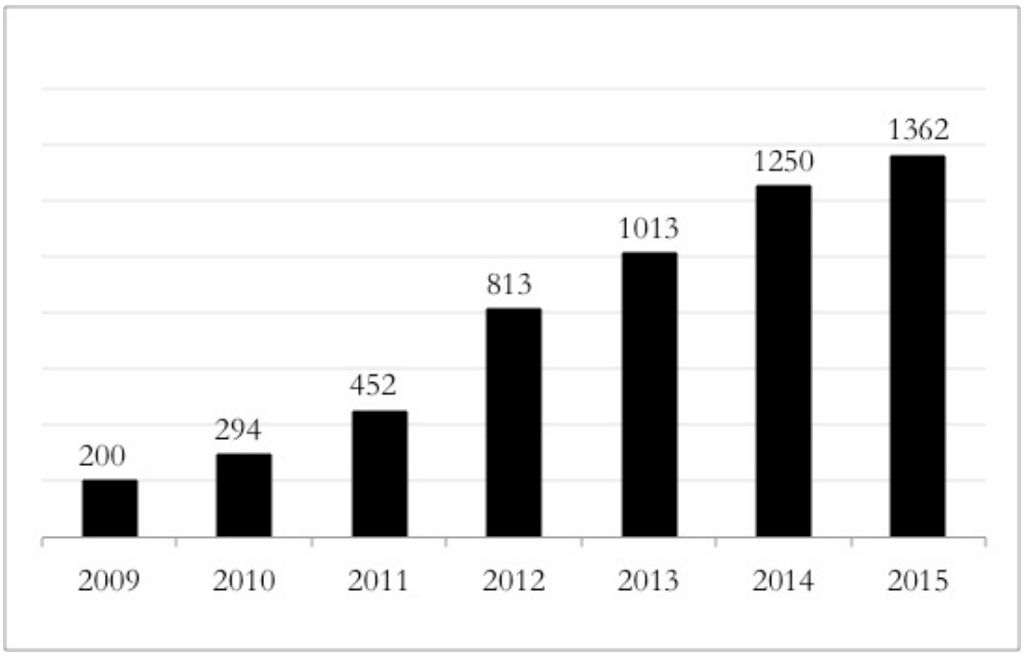

Figure 1.2: Number of crowdfunding platforms worldwide.[14]

The rise of crowdfunding and dedicated platforms alongside with successes stories like the one of the Pebble watch attracted the attention of governments, regulators, and the media the last few years. On the one hand, the fundraising model is seen as a promising way to boost the economy through entrepreneurship by providing capital to individuals and firms lacking access to traditional sources. On the other hand, policymakers have reported their concerns regarding the combination of information asymmetries and unsophisticated investors.[15]

The last couple of years, research has emerged to explore questions related to the economics of crowdfunding platforms, how investors solve information asymmetry problems, the motivations behind contributors in non-monetary models such as donation and reward-based crowdfunding, the incentives and disincentives for entrepreneurs to join crowdfunding platforms, the impact of institutional and

[14] Source: Massolution (2015), Crowdfunding Industry Report, available at www.crowdsourcing.org/research.

[15] See, for example, "The FCA's regulatory approach to crowdfunding over the internet, and the promotion of non readily realisable securities by other media – Feedback to CP13/13 and final rules", last consulted on August 2015, at http://tinyurl.com/pcr8rn2.

sophisticated investors on the decision of the unsophisticated ones, and the effect of the entry of projects attracting disproportional volume of capital. Studies also took advantage of the architecture of platforms and the generation of a massive volume of data to refine the understanding of issues such as how investors screen entrepreneurial ventures, and whether financial decisions are based on physical attributes and biased against minority groups.

In this paper, we provide a literature review of the crowdfunding market.[16] We first describe the crowdfunding models and how they work, providing examples of platforms operating under each one. Section 2, presents crowdfunding under the two-sided market theory. Section 3 describes the findings in the literature about the incentives agents have to join crowdfunding platforms on both sides (entrepreneurs and investors). Section 4 describes issues related to information asymmetries and how regulation authorities approach this new mode of finance in selected countries. Section 5 focuses on lessons learned from crowdfunding platforms that can be applied to the offline world, in particular those concerning screening of capital seekers. We conclude on Section 6 with suggestions for future research.

1.1 Crowdfunding models

Crowdfunding is the practice to pitch ideas over the Internet with the aim of receiving financial support from a pool of investors in exchange of rewards and/or voting rights (Belleflamme, Lambert and Schwienbacher, 2014). This description of ranges a quite wide set of activities on the Internet that are generally categorized under four main models. Two of them propose non-monetary rewards while the other two imply monetary incentives to investors.

In the first group, there are the reward-based and the donation-based crowdfunding. In reward-based crowdfunding, contributors can obtain special perks, early editions of new products, appreciation tokens or "community benefits" (Belleflamme et al., 2014) in exchange for their financial participation. In the aforementioned case of the Pebble watch, 40,799 individuals pledged at least US$115 to have early access to the product

[16] Belleflamme, Omrani and Peitz (2015) provide a thorough literature review highlighting the two-sidedness of crowdfunding platforms and issues related to information asymmetries, linking the dynamics of this type of platforms with the economic theory.

while 100 individuals chose to pledge at least US$235 to have access to one watch, one prototype and the SDK (software development kit aimed at developers who desire to create applications). Kickstarter is one of the main reward-based platforms worldwide, having allowed 131,391 projects to raise US$3,2 billion raised to 131,391 projects from 13 million supporters since its inception in 2009.[17]

Donation-based crowdfunding facilitates private contributions to public goods ranging from the renovation of a public square in a neighborhood to the maintenance of schools. DonorsChoose is a platform that operates under the donation-based crowdfunding, and it aims at funding projects related to schools. It has received a total amount of US$282 million from 1.5 million donors to 638 thousand projects from 2000 to 2014 (Althoff and Leskovec, 2015).

The two models under the monetary payoffs are the lending-based crowdfunding and the equity-based crowdfunding. In lending-based crowdfunding (also referred to as peer-to-peer lending or social lending), investors supply funds to individuals, groups or small companies, expecting to be reimbursed after a given period, generally with interest rates. Lending-based model is the model that expands the most worldwide – half of the platforms operate under this model (Rau, 2017). Prosper and LendingClub are two of the most known peer-to-peer lending platforms worldwide, with a joint volume of transactions of around US$12 billion in 2015 –US$4 billion for Prosper and US$12 billion for LendingClub (Havrylchyck, Mariotto, Rahim and Verdier, 2016). In the equity-based crowdfunding, investors become startups' shareholders. AngelList is one of the equity-based crowdfunding having attracted US$ 250 million in 1,300 investments from investors like Reid Hoffmann (co-founder of LinkedIn) and Marissa Mayer (president and CEO of Yahoo!) (Bernstein, Korteweg and Laws, 2017). In many countries, both models are submitted to regulations from the financial system – or some adaptation of that. We will come back to this issue in Section 4.

Platforms can also be hybrid. For example, Sellaband, a platform that operated from 2006 to 2014, allowed musicians to raise money in exchange of special perks like in the reward-based crowdfunding, and participation in the royalties, similarly to the equity-based crowdfunding. Social lending platforms, like Kiva in the US and Babyloan in

[17] Information from the statistics page on the platform. Last consulted on September 16th, 2017.

France, mix peer-to-peer lending and donation-based crowdfunding. Borrowers are typically in very small producers in developing countries, and lenders expect to be repaid but without receiving interest rates. These investors are motivated by "warm glow" (the act of "altruism" aiming at feeling better about oneself as proposed in Andreoni, 1990), rather than profit maximization (Allison, McKenny and Short, 2013; Chemin and De Laat, 2013), in contrast to for-profit lending-based investors who are driven by the expected returns (Pierrakis and Collins, 2013; Baeck, Collins and Zhang, 2014). Another difference in relationship to the for-profit peer-to-peer lending is that the small borrowers are twice intermediated, once by the platform, and once by a Microfinance Institutions (MFIs). The role of the MFIs is to select project owners, to subscribe them to the platforms, and to intermediate the transactions. Project owners receive loans from MFIs and pay them interest rates, which can be much higher than those of loans in developed countries. These lending-based platforms are not submitted to regulatory framework scrutiny. Table 1.1 summarizes the description of the four main models with examples.

Table 1.1: The four models of crowdfunding with respective descriptions and examples.

Type		Brief description	Example
Non-monetary returns	Reward-based	Project owners pitch for financial support as a donation in exchange for some special perks and prizes.	Kickstarter
	Donation-based	Project owners request financial support as a donation.	DonorsChoose
Monetary returns	Lending-based	Borrowers (individuals and/or firms) request financial support in exchange for financial returns (interest rates for lenders).	LendingClub
	Equity-based	Startups pitch for financial support in exchange for a participation in the firm's capital.	AngelList

2 The two-sidedness of crowdfunding platforms

2.1 Pricing

These platforms can be considered as two-sided markets for they facilitate the interaction and transaction between two types of economic agents – entrepreneurs who demand capital and investors who supply it. Figure 1.3 illustrates how crowdfunding platforms work.

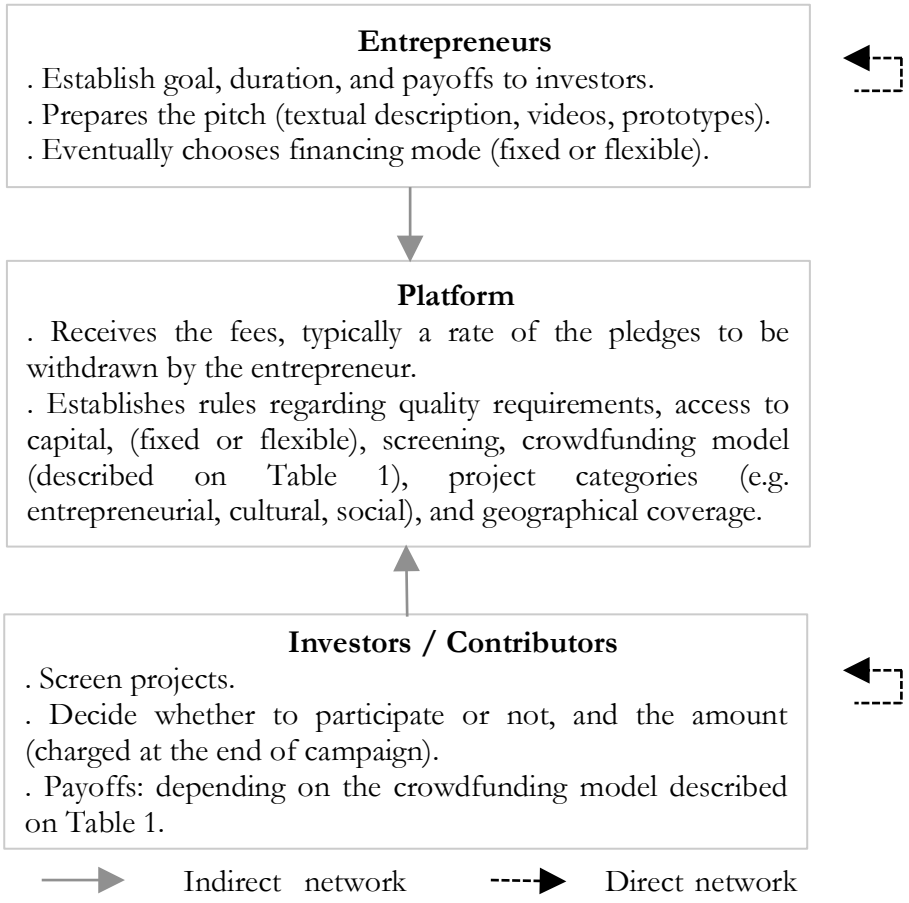

Figure 1.3: Illustration of the two-sidedness of crowdfunding platforms.

The core of two-sided markets is the externalities generated by the possibility of two groups to be matched and transact. In other words, the number of players on the one side affects the incentives for the other side to join the platforms. On crowdfunding,

entrepreneurs tend to enjoy platforms where the number of supporters is more important, as it increases their chances of successfully raising capital. Supporters might prefer platforms where the number of entrepreneurs is larger, particularly in lending and equity-based crowdfunding, where a greater number of propositions might translate into a greater possibility to diversify the portfolio. Supporters also care about the type of projects they find on the platform, a question we will discuss on Section 2.3.

Intragroup network externalities also matter in a number of models of two-sided markets, and also in crowdfunding platforms. On the supporters' side, within-side network effects tend to be positive, as a larger number of supporters might increase the chance of successful coordination to finance one specific project. On the entrepreneurs' side, within-group externalities are ambiguous. On the one hand, more entrepreneurs mean greater competition for the supporters' pocket. On the other hand, more entrepreneurs bring more supporters (Rochet and Tirole, 2003), indirectly increasing the incentives to join.

This interdependent demand on both sides is the reason why observed prices are asymmetric on two-sided markets. Often the side generating greater externalities or the one more price-sensitive is partially or fully subsidized. On crowdfunding platforms, contributors generally do not pay for participation: the fees are charged from the project owners. In the special case of equity-based platforms, they tend to include a lump-sum fee for due diligence and a percentage of the amount successfully raised by the project owner.

In many models of two-sided markets, a successful transaction or interaction implies matching one participant from each side – marketplace, dating website, ride-sharing services. Crowdfunding platforms present distinguished features in this sense once each transaction requires one entrepreneur and many investors. It might explain why crowdfunding platforms not only fully subsidize investors' participation but also engage efforts to reduce the transaction costs related to the process of subscribing and investing. This intuition, however, needs a formal assessment.

2.2 Homing

According to the two-sided market theory, competition between platforms depends on whether agents on both sides have incentives to join one platform (single-homing) or multiple (multi-home). The most frequent setting in the two-sided market literature is the "competitive bottleneck", when one side single-homes and the other one multi-homes (see, for example, Armstrong, 2006). The canonical example is the video-game market. Gamers typically choose the console that better fit their preferences. In order to have access to the pool of gamers of all the consoles, developers need to produce for all the platforms. When both sides single-home or both-sides multi-home, the coexistence of two or more platforms requires horizontal differentiation on at least one side of the market (Armstrong, 2006; Bohme and Muller, 2012).

In crowdfunding platforms, project owners tend to single home – they choose a platform that better suits a project, and once it ends, project owners may restart a different project in a new platform or come back to the same website. Single homing enables the project to profit from online social interaction: as cumulative investments tend to attract more investors in several models (see, for example, Agrawal, Catalini and Goldfarb, 2015), project owners have incitation in concentrating all the potential demand in one only platform to stimulate mechanisms like observational learning (see, for example, Burtch, Ghose and Wattal, 2014a). Furthermore, multi-homing would not come without costs of learning and adapting to the alternative platform (Roson, 2005). Project owners will only multi home if she infers there are different groups of potential investors connected to distinct platforms (for example, in different countries).

On the investors' side, incentives are mixed. In lending and equity-based crowdfunding, the coexistence of two similar platforms attracting distinct types of propositions might lead to multi-homing in the sense of portfolio diversification. In reward and donation-based crowdfunding, investors tend to care about specific projects, case in which they would join the platform having been able to attract the project that matches their taste. They can also have strong preferences for one given platform due to its reputation, its capacity to attract high-quality entrepreneurs, or the category covered (for example, the platform PledgeMusic only receives projects from musicians and bands, therefore investors are expected to be music fans.)

The two-sided market literature predicts that coexistence of multiple platforms in a given market depends on the homing behavior of agents. If there is "competitive bottleneck", platforms are more aggressive on the single-homing side as to "steer" agents to the focal platform (Rochet and Tirole, 2003; Armstrong, 2006). Assuming that there is competitive bottleneck on crowdfunding, it becomes easy to understand why platforms engage great effort to attract certain types of project owners. These efforts range from special services such as consulting to partnerships with large firms and institutions. For example, Kickstarter has partnerships with the Sundance Festival, and filmmakers participating in the festival are incentivized to raise money through the platform. In France, the platform KissKissBankBank holds a partnership with the public bank La Banque Postale where the bank invested an amount corresponding to half of the objective of selected projects. Entrepreneurs would then have the incentive to join if they expected to be chosen.

These strategies can also be explained if both sides single-home. In this case, coexistence can only take place if platforms are horizontally differentiated. Considering that projects tend to be unique and match the taste of a certain part potential investors, they would value the platform that better corresponds to their preferences in terms of the pool of projects they attract. This can explain, for example, the head to head competition of two very similar platforms – KissKissBankBank and Ulule – in the reward-based crowdfunding in France. Each one attracts certain projects and, as a consequence, certain supporters.

In some contexts, differentiation is not apparent, but the coexistence of platforms suggest that agents do not value all of them equally. Mariotto (2016) highlights the fact that Prosper and LendingClub offer similar products, attract a very similar pool of borrowers in terms of credit rating, and yield comparable returns. From this perspective, both platforms seem undifferentiated at the eyes of investors, which is inconsistent with coexistence. The author asks why, in this case, platforms coexist. One potential answer might be in the characteristics other than the aggregate feature of the pool of borrowers coupled with lenders' heterogeneity in taste for investment and on their behavior regarding how many platforms they join.

In order to better understand the behavior of players on both sides and how platforms compete, the literature would benefit from theoretical and empirical work explicitly

exploring these issues.

2.3 Quality versus quantity

In Section 2.1, we highlighted the two-sidedness in relationship to quantity of players on both sides and explained that in some settings, agents are also – or especially – interested in the quality of the other agents. Actually, the two-sided market literature shows that quality of players can enhance the network effects (Li and Pénard, 2014).

Platforms dispose of some strategies to sort agents according to their quality. The first one is pricing. Bloch and Ryder (2000) analyze the outcomes regarding the quality of agents participating in the market according to the pricing decisions (lump-sum or transaction fee) in the matching service provision. Damiano and Li (2008) develop a model of competing platforms with heterogeneous agents in the markets, and where the coordination of participants' decisions on which platform to join is governed by prices. The authors underline that gains from market expansion, which typically leads to attracting low-quality types, must be weighted against less efficient sorting. Dating websites charge higher prices to dissuade non-serious bachelors from joining and increase the value of the platform for the other agents.

The second strategy to define quality is using exclusive contracts: videogame console producers and paid-TV providers establish exclusive contracts with developers and content producers to ensure quality. The third strategy, used in a number of digital platforms like marketplaces, user-generated content websites, and crowdfunding platforms, it's mainly the imposition of entry costs through minimum quality standards and other rules that define the incitation mechanisms.

Minimum quality standards and due diligence

In the specific case of crowdfunding platforms, minimum quality standards can be coupled with due diligence such as manual review of projects to ensure compliance. The level of minimum requirements varies across and within models. Equity-based crowdfunding

imposes very strict rules aiming not only to dissuade low-quality entrepreneurs to join but also to avoid moral hazard and comply with regulation imposed by financial authorities. In these platforms, higher levels of due diligence are positively correlated with project outcomes in terms of success and total pledged amount (Cumming and Zhang, 2016). Lending-based crowdfunding follows similar dynamics. For example, in France, the business-oriented lending-based crowdfunding platform Unilend requires credit reports as well as documents regarding the firm's performance proving that the fundraising aims at expansion or working capital (as opposed to debt consolidation). In consumer-oriented peer-to-peer lending platforms such as Prosper and LendingClub, entry requires credit score verification (Mariotto, 2016).

Platforms that are not subject to regulation scrutiny also have incentives to control entry as it improves the platforms' performance avoiding "lemons" and increases the likelihood of participation on the supporters' side. Three contemporaneous papers investigate the effect of Kickstarter to abolish its manual verification in 2014 (Gaessler and Pu, 2017; Geva, Barzilay and Oestreicher-Singer, 2017; Wessel, Thies and Benlian, 2015). Using observational data from the platform and employing distinct empirical approaches, the three arrive at similar conclusions: while the number of entrepreneurs entries increased, the average quality of projects significantly decreased. The success rate also diminished, which can be a result of greater competition for the contributors' pockets, of the poorer average quality of projects or of both.

These results highlight not only the challenge of balancing quality and quantity on two-sided markets but also the difficulty of keeping control as platforms grow and need to scale their operations (Gaessler and Pu, 2017). This explains why some platforms that used to submit project owners to more strict conditions are relaxing their rules. For example, Kickstarter submitted all project owners requesting entry to manual revision from their inception in 2009 to 2014, when they abolished this process.

Minimum quality standard on the contributors' side is less strict, particularly in the reward and donation-based crowdfunding. As previously mentioned, the need to attract as many participants as possible on the contributors' side drive platforms to reduce as much as possible the transaction costs for this side. On lending-based and equity-based crowdfunding, however, greater risks and regulatory requirements oblige investors to

provide personal information and personal documents for credit identity check. For example, Prosper and LendingClub only accept members from the US while many European lending and equity-based platforms restrict the access to citizens from the members States.

Market mechanisms: the terms of the transactions

a. Fixed funding vs. flexible funding

Two important issues in crowdfunding markets are the conditions under which the transactions will occur. The type of mechanisms that concerns platforms depends on the crowdfunding model. In reward-based crowdfunding, although many platforms use the fixed funding model, the different potential outcomes between this model and the flexible funding are of interest to platform managers and policymakers – as the flexible funding model may present greater risk once the entrepreneur can reach a certain amount of money that will not allow her to pursue her idea.

Most crowdfunding platforms operate under the fixed funding ("all or nothing") mode of access to capital, conditioning withdrawing the amount pledged to the achievement of a pre-established goal. Fixed funding has the property of a commitment device (Ellman and Hurkens, 2016), signals project and entrepreneur's quality ((Cumming, Leboeuf and Schwienbacher, 2014), and avoids moral hazard (Strausz, 2017; Chemla and Tinn 2017).

Some reward-based and many donation-based crowdfunding platforms, however, offer the flexible funding ("keep it all") where project owners can withdraw any positive amount of pledge. Flexible funding seems to be an effort to encourage more entrepreneurs to join, particularly those in categories where projects can be produced at any level of contribution (Chang, 2016). In contrast, theory and empirical evidence suggest that fixed funding projects receive greater support, and are more likely to reach the funding goal (Cumming et al., 2014; Chang, 2016).

Platforms might offer flexible funding with two main objectives. The first one is to increase participation on the project owner's side. The second one is to position itself in a different competitive "location" in relationship to similar fixed funding platforms. For example,

Kickstarter and Indiegogo are frontal competitors in reward-based crowdfunding in several categories and countries. Kickstarter only operates under the fixed funding mode whereas Indiegogo accepts both. Nevertheless, 95% of pitches on Indiegogo are flexible funding projects. This suggests that the funding mode Indiegogo might be seen as the flexible funding alternative to Kickstarter.

As platform revenues come from a percentage of the amount collected by each project owner having access to capital, fixed funding platforms only generate revenues with the amount raised by projects that reach, at least, their threshold while flexible funding platforms receive a part of every positive amount raised by all the projects. In contrast, fixed funding projects are more likely to reach their goal, and attract a greater amount of capital. One open question in the literature is whether is in what circumstances fixed funding is more profitable than flexible funding.

b. Pricing and participation in platforms with monetary returns

In platforms based on monetary returns (lending and equity-based crowdfunding), to the best of our knowledge, all the platforms use the fixed funding model. In the lending-based crowdfunding, platforms generally opt between auction prices (the "crowd" establishes the interest rates of each loan) and listed prices (interest rates are determined by the platform). Wei and Lin (2016) report that posted prices increase the speed at which loans are originated as well as the probability of loans to be funded. The downside is that loans are granted at higher rates than under auctions, and the default rate is also more important.

In equity-based crowdfunding, two mechanisms define the participation of investors: a "first-come, first-serve" mode where securities are sold up to a pre-established limit, and a second-price auction. Hornuf and Schwienbacher (2017a) find that under the "first-come, first-serve" mechanism induces early investments than in auction mechanisms, with implications for the timing of information disclosure during the campaign.

3 Incentives to join

3.1 Incentives for entrepreneurs

There are three main reasons for the growth of crowdfunding in the last years, as mentioned in the Introduction. First, greater access to broadband Internet allowing the development of relatively sophisticated web-based business models. Second, the improvement of payment services over the Internet. Third, the historical barrier entrepreneurs face when searching for capital. Startups and small businesses often lack collateral and information about the potential of their businesses (Cassar, 2004). In times of crisis, when banks become relatively more risk-averse, entrepreneurs find it even more difficult to obtain support from traditional sources (Lerner, 2010).

Empirical evidence suggests that financial constraints are important drivers to entrepreneurs to decide to set a crowdfunding campaign. Kim and Hann (2014) collect data from Kickstarter projects and couple it with house prices and bank branches in the same Metropolitan Statistical Area (MSA) of the project as measures of access to capital. They show that regions with higher house prices and lower bank branches density are the ones where entrepreneurs are relatively more likely to set a crowdfunding campaign.

Consistent with these results, surveys with borrowers from UK-based peer-to-peer lending platforms show that 80% of users had sought to lend from banks, but only 22% actually received an offer. One-third of participants say they would be unlikely or very unlikely to raise money elsewhere (Pierrakis and Collins, 2013; Baeck, Collins and Zhang, 2014).

However, other reasons for not attempting to secure loans from banks emerge. For 40% of respondents in another survey with users of UK-based platform Funding Club, the length and difficulty of the process led them to online fundraising.

Crowdfunding also has informational value for the entrepreneur and future investors. On the entrepreneurs' side, the release of new products implies great uncertainty (see, for example, Asplund and Sandin, 1999) that can be reduced with the association of an investment opportunity with a consumption experience (Schwienbacher, 2015) in a sort of incentive-aligned mechanism (Agrawal, Catalini and Goldfarb, 2014) where individuals reveal their valuation about the idea by choosing the amount they desire to contribute with.

Emerging theory highlights the informational aspect of crowdfunding. The results in Strausz (2017) point out to the informational value of crowdfunding to screen projects, complementing the traditional entrepreneurial financing that mitigates the risk of moral hazard. Ellman and Hurkens (2016) underlines the advantage for entrepreneurs to adapt production according to the feedback received from the crowd. Chemla and Tinn (2017) suggests that crowdfunding enables entrepreneurs to credibly learn about consumers' preferences, benefiting project owners regardless of their success in achieving their goal. Viotto da Cruz (2016) and Xu (2017) show that when entrepreneurs fail to reach their target but receive positive signal from the "crowd" about their idea, their likelihood to commercialize the product in a marketplace increases.

On the investors' side, information asymmetries coupled with uncertainty about the venture potential may refrain the provision of financial support for entrepreneurs. Successful crowdfunding campaigns might offer a signal about potential market demand. The Pebble watch mentioned in the Introduction is an anecdotal example. The entrepreneur, Eric Migicovski, failed to raise funds from venture capitalists and decided for crowdfunding. With the positive signal from the campaign, the venture could obtain financial support in new rounds from sophisticated investors.[18]

In order to formally investigate if crowdfunding helps entrepreneurs to raise funds in subsequent rounds from venture capitalists, Ryu and Kim (2016) use data from crowdfunded projects and matching firms having received funds from angel investors. The results show that although there is not statistically significant difference in the chances of obtaining a follow-up finance from VCs, startups raising large amounts of money on crowdfunding are more likely to attract the attention of VCs than their angel investors' counterparts.

If there are many incentives to join crowdfunding platforms, there are of course disincentives. Online fundraising campaigns are time-consuming ventures that represent a "full-time job", according to entrepreneurs who run a crowdfunding campaign (Viotto da Cruz, 2016). Agrawal, Catalini, Goldfarb and Luo (2016b) provide empirical evidence for

[18] "Who Needs Venture Capital? Pebble Smart Watch Raises Over $5 Million on Kickstarter", by Anthony Wing Kosner, April 19, 2012. Available at www.forbes.com/sites/anthonykosner/2012/04/19/who-needs-venture-capital-pebble-smart-watch-raises-over-5-million-on-kickstarter. Last consulted on August 15th, 2017.

the importance of available time for online fundraising, showing that during university school breaks, the number of projects related to the local universities' specializations increases on Kickstarter. In line with this finding, Viotto da Cruz, Bourreau and Moreau (2017) show that professional musicians who count on managerial support are more likely to run a crowdfunding campaign than those who do not. In their interpretation, the presence of a manager alleviates administrative burdens from the project owners, which in turn decreases barriers to entry these platforms.

3.2 Incentives to investors and contributors

The motivation to participate in a crowdfunding campaign on the investors' side varies across the four crowdfunding models presented in Section 1.1. In donation-based crowdfunding, empirical evidence suggests that contributions are driven by altruism. Burtch, Ghose and Wattal (2013) study altruism and reciprocity using observational data. The reasoning is that altruism is associated with crowding out of donations, and the amount of previous donations would reduce the likelihood of new donations. In contrast, reciprocity implies that newcomers will try to match the efforts of past donors. They find evidence for altruism, but not reciprocity. More specifically, their results show that a 1% increase in prior contribution frequency is associated with a 0.32% decrease in follow-up contribution.

A similar motivation, "warm glow" seems to guide the supply of resources in social peer-to-peer lending. In a mix between donation-based and lending-based crowdfunding, lenders only receive the amount lent with no interest rate and borrowers tend to be small entrepreneurs in developing countries. Allison, McKenny and Short (2013) and Chemin and DeLaat (2013) show that contributors' behavior does not reflect profit-maximizing decisions, implying the presence of pro-social motivations.

In reward-based crowdfunding, motivation tends to be mixed between the desire for perks and special gifts and the perception of usefulness for someone's idea. Josefy, Dean, Albert and Fitza (2017) investigate local theater projects on Kickstarter in order to understand whether the role of the community appeals to the project outcomes. Their results suggest

that contributors are moved by their perception of benefit the project can bring to their community (Josefy et al., 2017). Kuppuswamy and Bayus (2017) study sequential donations on Kickstarter and suggest that participation on the contributors' side increase with the perception that the financial support will "make a difference" for the project owner. Gerber, Hui and Kuo (2012) use a qualitative approach to grasp the contributors' motivations and find that "being part" of the project is one of the most mentioned reasons by interviewees. In line with academic studies, a survey performed among users of a Brazilian crowdfunding platform corroborates these findings, placing the first motivation to contribute as "identifying with the project", followed by "trusting the project owner's potential" and "the project's quality". [19]

These findings suggest that pro-social motivations such as altruism, "warm glow" or reciprocity, might play an important role in the decision to participate in a crowdfunding campaign. In order to gain further insights in this matter, Bernard and Gazel (2017) perform an online experiment connecting contributions in a Brazilian platform with canonical games in experimental economics to elicit the revelation of social preferences. Games are proposed in an "online lab" and the results suggest that contributors exhibiting higher levels of altruism and reciprocity tend to support more projects. In a similar vein, Cecere, Le Guel and Rochelandet (2017) perform a survey with supporters of a French reward-based crowdfunding platform and also find that pro-social motivations explain the participation projects.

Boudreau, Jeppessen, Reichstein and Rullani (2017) present a diverging view of the hybrid nature of crowdfunding claimed in other studies. They posit that rewards provide weak incentives for contributions, and therefore the motivation for participating in a project comes mostly from pro-social motivation. They test the idea with time series observational data of contributions to a representative project in the games category and obtain results in line with their hypothesis.

Less empirical academic research exists about the lending and equity-based crowdfunding. Two surveys aiming at the lending-based crowdfunding the UK show, unsurprisingly, that "making financial returns" and "diversifying the portfolio" are the main reasons to

[19] Survey "Portrait of crowdfunding in Brasil" ("Retrato do financiamento coletivo no Brasil"), by the Brazilian crowdfunding platform Catarse at http://pesquisa.catarse.me last consulted on August 13th, 2015.

participate in peer-to-peer lending in general. The reasons to lend to a particular company include "financial track record", "customer and market potential", and "personal expertise in the industry that the company operates". Table 1.2 sums up the findings regarding investors' and contributors' motivation.

Table 1.2: Investors' or contributors' motivation across the four models of crowdfunding and the respective empirical evidence.

Type	**Motivation**	**Author(s)**	**Data**
Reward	"Warm glow" (cf. Andreoni, 1990)	Bernard and Gazel (2017) Cecere et al. (2017) Boudreau et al. (2017)	Online lab Survey Observational data
	Participation	Gerber et al. (2012)	Interviews
Donation	Altruism	Burtch et al. (2013)	Observational data
Lending	Financial returns Control over investments	Pierrakis and Collins (2013) Baeck, Collins and Zhang (2014)	Surveys in the UK

4 Information asymmetries and regulation

4.1 Mechanisms to mitigate information asymmetries

Signals sent by other participants

The extent of crowdfunding platforms' efficiency in matching pools of investors to trustworthy entrepreneurs depends on their capacity to correctly regulate the market and mitigate information asymmetries. In other Internet-based business models like marketplaces, platforms employ reputation and recommendation systems that account for much of their efficiency (Cabral and Hortaçsu, 2004; Cabral, 2012). However, such

systems can only work in contexts of repeated interactions. In crowdfunding, many, if not most, project owners do not have a track record. In rare cases of "serial entrepreneurs" in crowdfunding, projects can be of distinct nature from one another, making it difficult to design a recommendation system in the model of marketplaces.

Crowdfunding platforms rely on other types of signals. First, they keep publicly available data about past investments. Project pages show the projects' financial goal, the duration, the number of contributors having already participated, the number of interactions between participants (updates, comments, sharing on social network etc.) among other elements. Empirical research shows that publicly available information accounts for much of the efficiency of crowdfunding platforms. For example, in reward-based crowdfunding, friends and family tend to be the first to pitch, revealing private information they possess about the project owner's quality (Agrawal et al., 2015). In lending-based crowdfunding, investors who identify themselves as friends with the borrower and who pitch on their friends' proposition increase the likelihood of new investments and of success, suggesting that it also reveals private information (Lin, Prabhala and Viswanathan, 2013). In equity-based crowdfunding, information cascades play an important role for pitches outcomes as measured by the number of late investors, the total amount of funding, and the success of the project (Vismara, 2016b). Investors also value comments made by other investors (Hornuf and Schwienbacher, 2017a).

The presence of reputable or institutional investors early in a proposition consists of a strong positive signal to contributors about the project's quality (Kim and Viswanathan, 2016; Lin, Sias and Wei, 2015; Hornuf and Schwienbacher, 2017a). This fact suggests that platforms should consider the balance of retail, unsophisticated investors with experienced, sophisticated ones. Besides providing quality signals to pitches they select, in some settings they can perform due diligence and monitoring, reducing the risks of moral hazard (Agrawal et al., 2015).

Signals sent by the entrepreneur

The consideration of other investors' behavior could lead to herd behavior and

investment bubbles. But empirical work shows that investors and contributors also consider signals sent by the entrepreneur.

In reward-based crowdfunding, for example, the efforts to make a pitch with a video, no grammar errors, and more words to explain the project is associated with higher probability of success (see, for example, Mollick, 2014). Parhankangas and Renko (2017) show that the linguistic style predicts success for some types of entrepreneurs ("social" entrepreneurs) but not for others ("commercial" entrepreneurs).

In lending-based crowdfunding, the inclusion of pictures and long descriptions also lead to greater chances of success (Iyer, Khwaja, Luttmer and Shue, 2015), but investors also consider how capital seekers structure their pitch (Herzenstein, Sonenshein, and Dholakia, 2011). Gao and Lin (2016) contribute to the literature by showing that linguistic cues related to creditworthiness predict loan repayment. However, lenders do not seem to account for some of these cues. Investors in peer-to-peer lending also take into account observable listing characteristics conveying information about trustworthiness such as the amount requested, the borrower's credit rating, the debt-to-income ratio, and whether the borrower is a homeowner (Zhang and Liu, 2012).

In equity-based crowdfunding, the amount of equity and the disclosure of information are associated with greater probability of success (Ahlers, Cumming, Günther and Schweizer, 2015). Investors also seem to value entrepreneurs' updates (Hornuf and Schwienbacher, 2017a).

Finally, platforms create labeling to increase investors' and entrepreneurs' trust. One example is the association of lending-based crowdfunding in the UK, which provides a label to members. The platforms membership to this association is conditional on complying with complying with minimum standards in terms of risk assessment, operational risk management, and transparency regarding customer information. Therefore, the label also serves as a signal mechanism of the platform, helping market participants to mitigate risks.

4.2 Regulation of the crowdfunding market

The network effects at the core of two-sided markets tend to create a positive feedback leading platforms to concentration, raising concerns about abuse of market power. Recently, Google received a €2,4 billion fine Google from the European Commission for anticompetitive behavior in its shopping website. [20] Media markets such as newspapers and TV channels can abuse their market power with serious consequences for public and private decisions (Anderson and McLaren, 2012).

Crowdfunding is still on the verge of consolidation, and for the moment, neither lack of plurality nor abuse of dominant position seem to be an issue for regulators. The central question relates to funding part, or whether the market can be efficient with unsophisticated investors in "the crowd" and without a centralized authority performing monitoring and due diligence.

Platforms' rules and regulations combined with publicly available data and eventually sophisticated and lead investors appear to reduce risks of adverse selection and moral hazard. When mechanisms lead to inefficient matches (e.g., adverse selection), platforms seem to correct their route (Hildebrand, Puri and Rocholl, 2016). Although there were cases of moral hazard on the project owners' side,[21] fraud is reported to be rare (Mollick, 2014). At the center of platforms' efficiency in matching supply and demand are the mechanisms that allow reducing information asymmetries, addressing most of the aforementioned policymakers' concerns. Besides risks regarding transactions within platforms, risks of "hit and run" where platforms come to the market, raise money, and close unexpectedly, have been subjects of authority discussion. [22]

Regulators in several countries appear to be converging to the adjustment of requirements that reduce the risks for entrepreneurs and investors at the same time the crowdfunding business model remains viable. In the UK, for instance, the Financial

[20] Commissioner Margrethe Vestager stated "Google's strategy for its comparison shopping service wasn't just about attracting customers by making its product better than those of its rivals. Instead, Google abused its market dominance as a search engine by promoting its own comparison shopping service in its search results, and demoting those of competitors." Information available at http://europa.eu/rapid/press-release_IP-17-1784_en.htm. Last consulted on August 15th, 2017.

[21] See "How the 'Biggest Scam in Kickstarter History' Almost Worked", by Eric Larson, June 21st, 2013. http://mashable.com/2013/06/21/kickstarter-scam/#jSx_q.UPc8qp

[22] In 2011, lending-based crowdfunding Quakle closed overnight, leaving borrowers and lenders with £20,000 in losses from 30 loans.

Conduct Authority (FCA) requires that platforms assess the investors' knowledge about the investment market and crowdfunding.[23] Only participants demonstrating a minimum understanding of the underlying mechanisms are able to invest. The regulator also demands that, in their promotional material, platforms stress risk exposure as much as they underline the benefits of crowdfunding activities. They must also obtain a license through the submission of a detailed business plan as well as to secure financial resources to operations as to avoid this behavior. In the US, the Security and Exchange Commission (SEC) used to consider equity-based crowdfunding platforms as brokers and they needed to register and operate as such, a requirement that may impose high entry barriers and refrain the market to develop. Likewise, investors and project owners needed to register with the authority and comply with rules that may be burdensome to "retail" investors and start-ups. The JOBS Act approved by the US Congress in 2012 proposed the relaxation of some rules for equity-based crowdfunding, like the exemption of complying with administrative requirements.[24]

A recent analysis in Hornuf and Schwienbacher (2017b) use a theoretical framework, an in-depth discussion about reforms in different countries, and exploratory empirical evidence to understand whether securities regulation should promote crowdfunding. Their results suggest that too strong investor protection may harm entrepreneurial initiatives and that optimal regulation depends on the availability of alternative early-stage finance such as business angels and venture capital – benefits of weaker investor protection are greater when other options are scarce.

5 Learning from crowdfunding platforms

A lot of the information generated in crowdfunding platforms is publicly available, enabling researchers to understand preferences and behavior of supply and demand of capital with observational data and experimental design – potentially yielding more reliable results than one would have from self-reported surveys (Bertrand and Mullainathan, 2000).

[23]See, for example, ""The FCA's regulatory approach to crowdfunding over the internet, and the promotion of non readily realisable securities by other media – Feedback to CP13/13 and final rules" on March 2014 at http://tinyurl.com/pcr8rn2.

[24] Information obtained at https://www.sec.gov/spotlight/jobs-act.shtml, last consulted on August 15th, 2017.

One subject that has been a central issue in the entrepreneurial literature is how investors screen entrepreneurs, whether they value more the "horse" (the business idea) or the "jockey" (the entrepreneur or entrepreneurial team). In order to respond to this question, Bernstein et al., (2017) performed a field experiment in partnership AngelList, one of the main equity-based crowdfunding worldwide. They used the platforms' newsletter (which is used to present new businesses to potential investors), making some manipulations as to vary the treatment groups and understand what was the feature leading to more clicks and contacts. Their results show a significantly larger number of clicks when the newsletter highlighted the founding team as opposed to the firm traction or lead investors. The authors interpret the results as signal of the importance investors give to the operational capacity of the founding team and to the fact that founders have strong outside options.

In a study with observational data focusing on a similar question, Marom and Sade (2013) study the presentation of projects and project owners on crowdfunding platforms as to understand whether greater success rate is related to projects highlighting the entrepreneur or the product. Controlling for other variables, they find similar results as Bernstein et al. (2017).

As mentioned in Section 3, entrepreneurs find difficulty in obtaining funding support through traditional channels. On the top of that, the literature in economics and in management suggests that there is bias against certain minority groups or individuals in economic transactions and in firm investments (Lee and James, 2007; Doleac and Stein, 2013). With observational data from crowdfunding and proper empirical approaches, it is possible to obtain better understanding of discrimination.

A recent study mixing the econometric analysis of observational data and experimental design provides evidence about bias against African American men (Younkin and Kuppuswamy, 2017). The results support the idea that investors prefer to back white men, and that African American men need to provide more quality signals than, their white counterparts. Additional experimental tests suggest that "whitewashing" the picture raised the perceived quality of the project. Although the authors claim the evidence is limited to the crowdfunding setting investigated rather than to venture capital, it raises more concerns that similar preferences might be present in other contexts.

Aiming at investigating whether crowdfunding websites lower entry barriers for female entrepreneurs to raise capital, Marom, Robb and Sade (2016) employ an econometric analysis of a sample of Kickstarter projects and find that 23% of projects men invest in have women as project owners and that 40% of projects women invest in have similar characteristics. In a follow-up survey, authors discover that some lower investment in female-led projects by man can be attributed to taste-based discrimination.

Gender bias seems to be present in other contexts as well. Radford (2016) uses a sample from DonorsChoose and discovers that projects led by men and women had similar probability of being funded until 2008, when the platform did not display the project owners' identity, and that the distinction became pronounced afterward.

One question about crowdfunding is whether the "crowd" is more efficient than specialists and traditional institutions. Theoretical work argues that crowdfunding lacks due diligence, expertise, and monitoring (Strausz, 2017). In some settings, however, it can be as efficient as traditional channels – or more.

Iyer et al. (2015) study how lenders screen borrowers based on standard financial information as well as soft information (whether the borrower posts a picture or the number of words used in the listing text descriptions), and find that lenders in peer-to-peer lending are capable of predict default with 45% greater accuracy than if one would be based on credit score, the traditional measure used by banks. In a similar vein, Michels (2012) find that this type of unverifiable content is associated with a 1.27 percentage point reduction in interest rate and an 8 percent increase in bidding activity. When it comes to institutional investors versus retail investors, however, the former perform better, particularly in relationship to low-credit rating borrowers (Lin, Sias and Wei, 2015). However, the improved performance comes from the size and diversification of their portfolio.

In reward-based crowdfunding, the opinion of art experts and the crowd does not show significant differences, as shown in Mollick and Nanda (2016). The authors rely on observational data combined with an experimental design focused on theater projects and discover that when it is the case of disagreement between the experts and the crowd, the former would not fund a project that the crowd would.

6 Conclusion and discussion

The present paper provided an updated review of the literature on crowdfunding. We first described this financing model at the light of the two-sided markets. In particular, we underlined the rules regulating crowdfunding several models of platforms and the tension between the need to generate critical mass on both sides of the market and the competitive pressure for quality agents. The main issue regarding the maintenance of a certain quality level is the potential lack of scalability as the platforms grow. Platforms are confronted with the need to find solutions to balance critical mass and quality without prohibitively increasing the internal monitoring costs.

One possible alternative is to focus on the attraction of reputable and experienced investors - as a number of papers presented in this literature review suggest, in some contexts, the presence of reputable and experienced investors may not only guide inexperienced and unsophisticated investors but also provide monitoring and due diligence. Further insights of whether this alternative is able to solve the quantity-quality tension can be provided by future research.

The two-sided market theory predicts that competition highly depends on whether agents multi-home or single-home. In particular, it states that dominant platforms are not necessarily anticompetitive. From empirical evidence, we infer that project owners have strong incentives to single-home while the incentives for investors and contributors are ambiguous. Researchers and practitioners would benefit from studies exploring the homing behavior of investors and contributors. With further information regarding the investors' behavior, it would be possible to better assess the competitive pressures for crowdfunding platforms and understand whether more efficiency is reached with one dominant platform in a market or with competition.

Empirical research widely explores motivation of contributors in models with non-monetary return, but the literature would benefit from further investigation on the motivation of investors in lending and equity-based crowdfunding. While monetary returns is a clear driver, it can be interesting to understand to which extent investors have preferences for certain areas they are more familiar with.

Additionally, we presented the main findings regarding how investors solve

information asymmetries and provided some evidence about regulatory framework in selected countries. A more thorough study comparing the different regulatory frameworks and their outcomes could benefit researchers and policymakers in the field.

Empirical evidence with observational data and experimental design improves the understanding of decision-making processes that are hard to grasp with surveys, in particular, the screening decisions to supply capital to entrepreneurs. Studies suggest that investors rely on the team and their inferred capacity to lead the project more than on the idea itself. Studies also show that decision seems to be biased against minorities.

The present paper highlighted many studies using a myriad of empirical techniques and approaches. New studies can rely on similar techniques, or improve them with sophisticated methods involving artificial intelligence and machine learning.

Appendix A

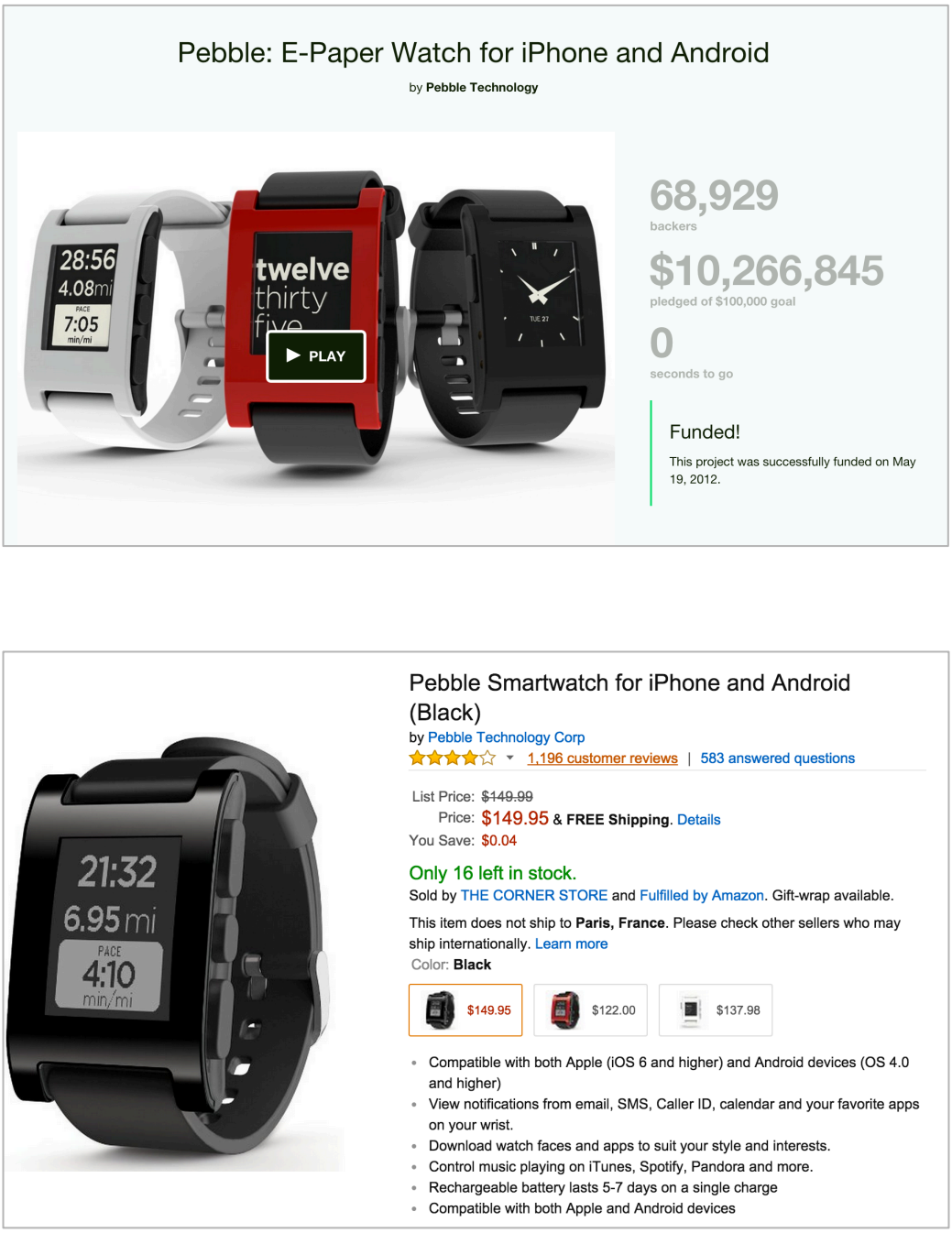

Figure A.1: The Pebble watch campaign (top) and the Pebble watch on Amazon website (bottom).

Figure A.2: Number of crowdfunding platforms by country (15 biggest countries, in number of platforms). Source: Rau (2017).

Chapter 2. Quality versus quantity in two-sided markets competition: Evidence from crowdfunding websites

Abstract

In this paper, we study how mechanisms like minimum quality standards shape competition in two-sided markets in terms of quantity and quality of members. We investigate the reward-based crowdfunding industry, a growing and (yet) weakly regulated model, where entrepreneurs pitch to receive financial support from investors and receive pledges in exchange for special prizes. In our setting, two platforms compete head-to-head, and one of them softens its minimum quality standards. By potentially opening up its system to lower quality entrepreneurs, the platform sharply increases entry in comparison to its rival while the relative average quality decreases. Our results highlight the complex competitive dynamics in two-sided markets, as changes on the one side also impact the other. In particular, we feature the challenging task of balancing quantity and quality in platform competition, as well as the potential usefulness of the findings for platform operators to set their strategies.

1 Introduction

Platforms are ubiquitous nowadays: we communicate, exchange, commute, purchase, compare prices, travel, study, find jobs, houses, and partners using them. Rankings of the most valuable firms reflect the prominent role of platforms and their importance in the market. Half of the top "unicorns"[25] are platform-based companies. (Figure B.1 in Appendix B).[26] The top five most valuable companies are at the core of the platform ecosystems: Apple, Google, Facebook, Amazon, and Microsoft (Figure B.2 in Appendix B). These facts show how platforms are increasingly changing the way we make several choices. As a consequence, competition between platforms becomes a central subject in the economic debate.

The core feature of platforms is indirect network effects, implying interdependent demand between two or more distinct groups of agents (buyers and sellers, travelers and hotels, entrepreneurs and investors, etc.). The two-sidedness requires that platforms create mechanisms to coordinate the diffusion process within the distinct groups as to create a critical mass on both sides, as the utility of members of one group increases with the number of members in the other group. Very often, platform users also care about the quality, which means that attracting a large number of members on the one side can be detrimental to the utility of on the other side if the former are of "low quality". In other words, platforms often find themselves in an attempt to find the balance between quantity and quality of players on both sides.

The analysis in Claussen, Kretschmer and Mayrhofer (2013) about how Facebook set incentives to attract high-quality apps after a period of "free entry" illustrates the challenge. The authors report that the social media website's app store was launched in 2007 with very low entry costs for developers, as the platform provided tools to facilitate integration and imposed very few restrictions regarding quality. As the market was flooded with low-quality applications, the platform changed its rules in 2008 in an attempt to increase quality – the possibility of promoting through notifications and invites would be allocated based

[25] Startups with post money value greater than US$1 billion.
[26] Crunchbase rank uses, among other variables, the total funding amount and the popularity of its record in terms of recent visualizations.

on the users' feedback (ratings). As a result, the authors find that quality matters more than quantity for usage intensity of applications.

As the example of Facebook, several types of platforms use rules to regulate entry – either creating incentives for high-quality players or imposing entry costs to low-quality agents. In this paper, we study the challenge of balancing quantity versus quality in platform competition. The context of the study is the reward-based crowdfunding,[27] a growing and (yet) weakly regulated model where entrepreneurs (or project owners) can receive financial support for their ideas from investors (or contributors).[28] In order to balance quantity and quality, crowdfunding platforms use a variety of control levels, from very strict quality standards to cases where entrepreneurs publish their ideas directly on the websites.

Our data comes from the Brazilian reward-based crowdfunding market, where two platforms compete head-to-head for 93% of the market. Catarse (the "incumbent"), launched in 2011, was the first crowdfunding platform in the country, setting entry costs to entrepreneurs as its staff manually approved every project before allowing it to join the platform in order to verify its adherence to its minimum quality standards. Kickante (the "entrant") entered the market in 2013 with much more flexible rules, including the possibility for entrepreneurs to publish their projects directly on the website. On May 3rd, 2016, Catarse opened its system, allowing entrepreneurs to publish their projects directly on the website.

The reduction of entry costs in the incumbent led to an increase in the entries on the entrepreneurs' side and a decrease in the average quality level in comparison to its rival. We aim at investigating if we confirm these hypotheses empirically and also understanding what happens on the supporters' side, as the results are not easily predictable, as we explain later.

[27] Four crowdfunding models distinguish platforms: in the reward-based model, contributors can receive non- monetary compensations for their financial support. The donation-based crowdfunding facilitates private contributions to public goods. In the lending-based crowdfunding, investors supply funds to individuals, groups or companies, expecting to be reimbursed after a given period, with or without interest rates. Finally, in equity-based crowdfunding, investors become startup shareholders.

[28] In reward-based crowdfunding, investors receive non-monetary payoffs from their monetary participation, and it might be more accurate to refer to them as "contributors". This paper will use both terms indiscriminately as the individual(s) who provide monetary support to entrepreneurs through a crowdfunding platform.

We use publicly available data collected from both platforms since their respective inception until December 2016. In order to focus on potential changes in the competitive position between the platforms, we limit our sample to projects launched within the period of 20 weeks prior to the policy change and 20 after.[29]

Our results show that, in line with our hypotheses, the incumbent enjoys an increase in the number of projects in comparison to the competitor with a consequent decrease in quality. However, the number of supporters remains unchanged in comparison to the rival and to the period prior to the change. As this result can be driven by the increase in competition for the supporters' pockets and a decrease in quality, we perform an alternative analysis and find that, when controlling for quality, the number of supporters increase, suggesting that the degradation in the average quality penalized the platform.

The paper is organized as follows. Section 2 presents the literature review, positioning our contribution in relationship to the existing research. Section 3 sets the theoretical framework and presents the hypotheses. Section 4 presents the data and the empirical strategy. Section 5 presents the results, and Section 6 concludes.

2 Literature review

Crowdfunding platforms can be considered as two-sided markets for they connect two distinct types of economic agents (project owners and investors) and facilitate transactions that would otherwise imply high transaction costs (Belleflamme, Omrani and Peitz, 2015; Viotto da Cruz, 2015). [30] The main characteristic of two-sided markets is the interdependence of different groups of users due to cross-group network effects (see, for example, Caillaud and Julien, 2003), although intragroup network effects may also exist and affect platforms' membership (see, for example, Belleflamme and Toulemonde, 2016b). Crowdfunding platforms exhibit positive cross-group network effects as the number of new entries on one side increases entry (and contributions) on the other side (Belleflamme,

[29] The restriction of 20 weeks before and 20 weeks after allows us to concentrate on a period where both platforms had similar offers. Catarse opened its flexible funding 32 weeks before the policy change we are interested in.

[30] Even though there are documented individual initiatives of crowdfunding (Belleflamme, Lambert and Schwienbacher, 2013).

Lambert and Schwienbacher, 2017). Intragroup externalities on the supporters' side are also positive expected to be positive as the number of new members on one side increases with past participation (Belleflamme et al., 2017).

In two-sided markets, the users' decision of joining any given platform generally depends not only on the relative size of the market on each side but also on the quality pool each platform attracts, and it might enhance positive network effects (Tellis, Yin and Niraj, 2009; Li and Pénard, 2014), which explains why a monopolist incumbent might be outsold by a higher quality entrant (Evans, 2003).

As platforms do not have control over how much the complementors will supply, or at what quality, they rely on some mechanisms to govern both features. One of the mechanisms used by Internet-based two-sided markets is rules and regulation that aim at encouraging certain types of members to join the platform and sorting out the "lemons" (Damiano and Li, 2008; Viecens, 2006).

Two main forms of regulation are used by crowdfunding platforms. The first one concerns the mode of access to capital – fixed funding ("all or nothing") or flexible funding ("keep it all"). The former conditions access to capital to a financial threshold established at the beginning of the campaign, while the latter allows project owners to withdraw any positive amount pledged during the campaign. The fixed funding mechanism has the property of a commitment device (Ellman and Hurkens, 2016) and signals project and entrepreneur's quality (Cumming et al., 2014). Projects using this type of mechanism receive greater support[31] and are more likely to reach the funding goal (Cumming et al., 2014; Chang, 2016).

Fixed funding is also seen as a reinforcement mechanism to avoid moral hazard problems (Strausz, 2017; Chemla and Tinn 2017). Flexible funding can be efficient for projects that can be produced at any level of financial support such as charities (Chang, 2016). Platforms allowing both modes attract predominantly "flexible funding" projects (Cumming et al., 2014). The two types of financing modes also determine the platform compensation: in the

[31] As platform revenues come from a percentage of the amount collected by each project owner having access to capital, fixed funding offers revenues per project for successful projects while flexible funding provides lower revenues per project over all the projects. Depending on the magnitude of potential entries in each model and the amount collected, one model may be more profitable than the other – but which one is that is not an easy question.

fixed funding model, platforms retain a fraction of what successful entrepreneurs receive while in the flexible funding model, any project having received positive support generates revenues (also a fraction of the total amount raised).[32]

The second form of regulation used by crowdfunding platforms relates to minimum quality standards. Many platforms establish due diligence rules as manual review of projects in order to ensure the compliance with minimum quality standards. The level of minimum requirements varies widely, from very strict rules where platforms interfere with content and requests entrepreneurs' documents, to cases where entrepreneurs publish their ideas directly on the websites.

Empirical evidence suggests that the overall project performance improves with platform control. When platforms perform due diligence, average project quality is higher than when platforms are more open. As a consequence, projects are more likely to reach their financial objective (Cumming and Zhang, 2016; Gaessler and Pu, 2017; Geva, Barzilay and Oestreicher-Singer, 2017; Wessel, Thies and Benlian, 2015). However, many platforms – in particular those operating in models not subject to policy scrutiny, like reward-based crowdfunding – might lack means to scale the process as the platform grows without incurring costs. Furthermore, open platforms have shown the ability to attract projects that raise a disproportional amount of pledges (Gaessler and Pu, 2017).

We directly relate to three contemporaneous papers exploring the abolishment of manual review process on Kickstarter, in 2014. They find that a reduction in platform control led to an increase in the number of projects entering the platform and a decrease in the average quality of outcomes (Gaessler and Pu, 2017; Wessel, Thies and Benlian, 2015), and of success rate (Geva, Barzilay and Oestreicher-Singer, 2017). Additionally, opening a platform increases project diversity quality and higher level of competition and decreased campaign quality. Our empirical strategy borrows from Doshi (2015), who studies the impact of the arrival of "high performance" projects (i.e., projects raising a disproportional amount of pledges) on subsequent entries and contributions. Finally, we contribute to the two-sided market literature exploring competition between platforms (Rysman, 2004;

[32] Catarse fees: 13% over the collected amount for the successful projects in fixed funding and 13% for all projects having raised any amount of money. Kickante fees: 12% for successful projects under both models, 17,5% for projects under flexible funding not having reached their objective. Because most flexible funding projects do not reach their goal, overall fees are 17,5%.

George and Waldfogel, 2006; Zhu and Iansiti, 2012; Cennamo and Santaló, 2013; Kim and Lee, 2017; Seamans and Zhu, 2014, 2017) and the role of agents' quality (Viecens, 2006; Hagiu, 2009a; Tellis et al., 2009; Bohme and Muller, 2012; Claussen et al., 2013; Gabszewicz and Wauthy, 2014; Kim, Prince and Qiu, 2014; Li and Pénard, 2014; Duch-Brown, 2017).

3 Theoretical framework and hypotheses

Crowdfunding platforms coordinate interactions between entrepreneurs searching for capital and investors. On the reward-based form, entrepreneurs set their financing objective, the duration, and pitch using videos and texts – features that signal the project's quality. Contributors observe the presentation of the project, the rewards offered, and decide whether to participate and at what price.

Contributors tend to be attracted by particular projects or pool of projects, deciding to pitch if the project conveys enough information about the entrepreneurs' trustfulness and the project quality (see, for example, Mollick, 2014). Therefore, when deciding to join a reward-based crowdfunding platform, contributors consider not only the number of entrepreneurs but also (and perhaps mainly) their quality.[33] Regarding within-side network effects, contributors tend to prefer platforms where there are more contributors, as it increases the probability of a given project to reach enough capital.

On the entrepreneurs' side, we expect the cross-group network effect to be positive for the same reason: a greater number of supporters increases the likelihood of projects to be financed. The within-side effect is ambiguous. Entrepreneurs might prefer platforms with lower number of other projects as to face less competition. In contrast, more entrepreneurs might bring more supporters.

Besides the network effects and quality of other players, the decision to join a crowdfunding platform is governed by the costs incurred on both sides. Reward-based crowdfunding platforms typically do not charge membership fees, only transaction fees.

[33] Incentives might be different in lending and equity-based crowdfunding, where investors might be also interested in the quantity of entrepreneurs on the other side of the platform as it potentially allows them to diversify their portfolio.

Supporters are not charged for their participation and do not incur the platform fee.[34] The platform fee is incurred by entrepreneurs and represents a fraction of the amount successfully raised – i.e., a percentage of any amount raised under the flexible funding mode or the total money pledged to projects that reach their goal under the fixed funding model.

Entrepreneurs also incur entry costs related to the production of the pitch – preparing videos, writing and revising texts, defining rewards etc. These costs vary with entry requirements defined by the platform – higher standards translate into higher entry costs, implying greater entrepreneurs' effort to prepare their campaigns. In order to guarantee the compliance with minimum quality standards, platforms can manually control the projects before putting them online.

In this paper, we consider a duopoly competition between platform *I*, initially displaying higher minimum quality standards and manually controlling the compliance with these standards, and platform *E*, initially displaying lower quality standards and allowing project owners to publish directly on their website. An entrepreneur that has already decided to join one of the platforms will prefer platform *I* if the expected utility (in the form of greater benefit from participation added to greater potential of transaction volume) is larger than in platform *E*.

When platform *I* reduces the entry costs by abolishing the manual control, it will attract entrepreneurs who would not pass the minimum quality standards. We expect that the number of entrepreneurs increases in comparison to its rival. Formally, we write our first hypothesis:

H1. The reduction of entry costs for entrepreneurs on the incumbent increases the advantage of the incumbent in weekly entries on the entrepreneurs' side.

As evidenced in the two-sided platform literature, lower entry costs entail consequences on the overall platform quality due to the fact that agents who would not have been able to pass the minimum quality standards will now have access to the platform. An alternative

[34] They pay a fee related to the transaction platforms (credit card, PayPal etc.).

possibility is that entrepreneurs who would be willing to engage greater effort to pass the review process will lower their own efforts. In both cases, these entrepreneurs can either be in a pool that would have chosen the rival platform (substitution effect) or new entrepreneurs that profit the new rules to potentially enjoy greater reputation of the incumbent (market expansion). In either case, we expect that the relative quality might suffer decay. We posit that:

H2. The reduction of entry costs for entrepreneurs on the incumbent decreases the advantage of the incumbent in average quality on the entrepreneurs' side.

Should the number of entrepreneurs increase without a decrease in the average quality, the expected result on the supporters' side would be an increase in the number of contributors joining the platform. However, with the expected decrease in the quality, the consequences on the supporters' side are unclear and depend on the strength of both forces. We then write two hypotheses to account for the supporters' side.

H3a. The reduction of entry costs for entrepreneurs on the incumbent increases the advantage of the incumbent in weekly entries on the supporters' side.

H3b. The reduction of entry costs for entrepreneurs on the incumbent decreases the advantage of the incumbent in weekly entries on the supporters' side.

4 Data and empirical strategy

4.1 Context

There exist today 1,362 crowdfunding platforms worldwide (Rau, 2017), most of them competing within their headquarters' country borders. Fourteen of these platforms are in Brazil, a country occupying the twelfth position in number of platforms (Rau, 2017). Forty percent of the active Brazilian population owns a business, but according to the Global Entrepreneurship Monitor (GEM)[35], Brazilian entrepreneurs struggle to find financial

[35] Results on the Global Entrepreneurship Monitor 2016 are available at www.gemconsortium.org. Last

resources – the 2016 edition of the GEM shows that in 2016 it rated 2.65, below other emerging countries like India (3.43) and China (3.32). It is also the worse rate regarding governmental programs aiming at entrepreneurship.

Crowdfunding platforms can alleviate the burden by connecting small investors and entrepreneurs. This possibility, however, depends on the development of the crowdfunding market, which in turn relies on how the platforms evolve themselves.

Two platforms dispute 93% of the reward-based crowdfunding market. The first platform to enter the market was Catarse, launched in 2011 as a fixed funding platform only. Mirroring reward-based crowdfunding platforms in other countries, particularly Kickstarter, it implemented a strict policy regarding minimum quality standards. Catarse's staff manually reviewed every project to ensure it complied with its policy.

Kickante was launched in 2013, offering both fixed and flexible funding, and allowing project owners to publish their ideas directly on their website. Although the average support was historically lower than on its rival (see Table 2.A in the Appendix for the numbers regarding the years 2014 and 2015), the platform managed to attract "high performance" projects (Doshi, 2015), i.e., projects that attract a disproportional amount of support and potentially help the platform development. Figure 2.1 shows the twenty most successful projects on both websites during all the period.

Both platforms compete in art and creative-related categories (cinema, music, literature), social-related categories (charity-based projects), and entrepreneurial and technological categories. The two platforms accept projects from all over Brazil, and focus on the national market (neither has an English version of their website, for example). In 2015, both platforms had a similar size in terms of number of entries on the entrepreneurs' and the supporters' side (see Figures A.2a and A.2b in the Appendix).

consulted on September 15th, 2017.

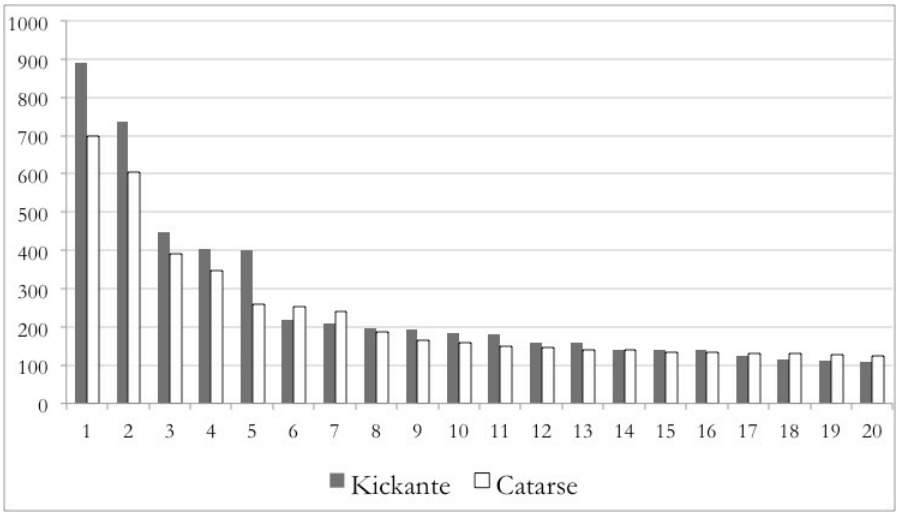

Figure 2.1: Distribution of the twenty most successful projects on the two Brazilian reward-based crowdfunding platforms in terms of amount raised (in thousand Brazilian Reais).

In November 2015, Catarse started a series of changes on the platform to encourage more entrepreneurs to join it. The first one was the launch of "flexible funding". On the firm's blog,[36] they wrote: "Overall, this new model will reach a wider range of projects than Catarse had up to today. The idea is to simplify the crowdfunding process." The minimum standard quality requirements were maintained until May 31st, 2016, when Catarse unexpectedly announced it was abolishing the review procedure, allowing project owners to publish directly on the platform.[37]

According to their blog, the idea was to transfer the screening process to the supporters: "We have chosen to withdraw the analysis process because, in addition to simplifying the creation of a campaign, we believe that the evaluation of the community itself is very effective. Nothing better than the very people who use Catarse every day to validate if an idea is good enough to go ahead and succeed in raising funds. With this, we can dedicate ourselves to creating more and more educational materials, and to making projects leave the paper with more and more autonomy!"

[36] "Catarse flex: flexible crowdfunding on Catarse" ("Catarse flex: crowdfunding flexível no Catarse"), available at http://blog.catarse.me/catarse-flex-crowdfunding-flexivel-no-catarse/. Last consulted on August 15th 2017.
[37] "Your crowdfunding project one button away" ("Seu projeto de financiamento coletivo a um botao de distância"), available at http://blog.catarse.me/sem-analise/#more-23554582760. Last consulted on August 15th 2017.

The blog post suggests that the decision was based on the idea of scalability mentioned in the literature review (Gaessler and Pu, 2017). The choice of the reward-based crowdfunding in Brazil enables us to compare two similar platforms competing head-to-head in several features and holding important distinctions about the entry costs. This setting allows us to isolate the result of the policy change in the competitive dynamics, teasing out other potential distinctions between both platforms. Figures 2a and 2b display the distribution of entrepreneurs and contributors on both platforms 20 weeks period and after the policy change on Catarse (vertical line).

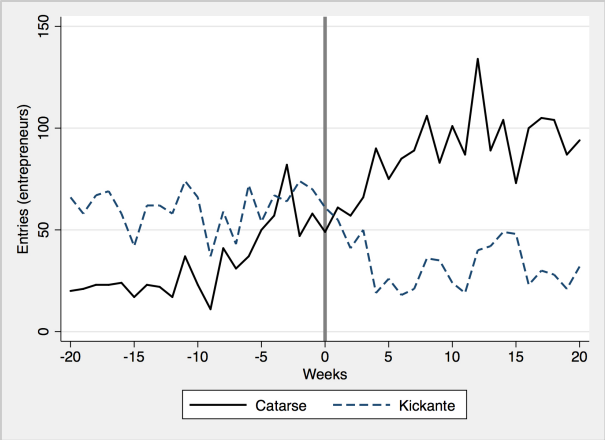

Figure 2.2a: Number of entries on the entrepreneurs' side on both platforms 20 weeks before and 20 weeks after the change.

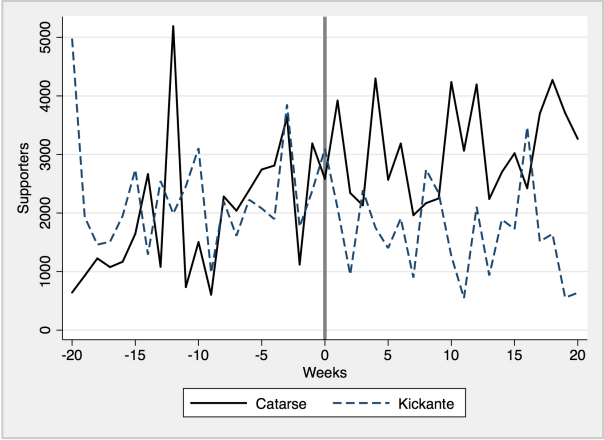

Figure 2.2b: Number of entries on the supporters' side on both platforms 20 weeks before and 20 weeks after the change.

4.2 Data

As many reward-based crowdfunding websites, Catarse and Kickante keep the finished projects online with all the public information available as in the last day of campaign. This enables the collection of publicly available data using web-scrapping techniques.

We collected information from each platform's inception to December 2016, yielding a dataset of 12,338 projects. For each project, we have the following information: the financing mode (fixed funding or flexible funding), the financing goal, the total amount collected, the total number of supporters, the category, the location (city and state), and the first and last day of each project. We also collected information about the elements used in

the description of each project (videos, images, texts), as they traditionally serve as proxy for quality in the crowdfunding literature (see, for example, Mollick, 2014).

We dropped projects that were "tests" or "drafts" as well as those under R$2,000 of goal, in line with the literature on crowdfunding (see, for example, Mollick, 2014). We further limit the sample to projects whose first day is within the 20 weeks prior the policy change and 20 weeks after.[38] The final sample contains 2,012 projects, aiming at goals from R$2,000 to R$490,000, and effectively raising from R$10 to R$448,893 from up to 1,913 supporters (considering only projects having had access to capital, please note that flexible funding projects can withdraw any positive amount raised, even not reaching the goal).

4.3 Empirical strategy

Crowdfunding platforms use categories to facilitate search and matching, and each entrepreneur chooses one category for her project. We expect that projects in the same categories hold certain similarities, and supporters of one category have interest in projects of similar categories (Doshi, 2015). For this reason, our empirical analysis relies on a panel of weekly categories within each platform. Only categories that are common to both platforms are used (categories that do not fall into this description represent a very small sample of projects and supporters).

Our dependent variables are the number of projects, the number of supporters, and the average number of videos. Videos are traditionally a proxy for quality on the crowdfunding literature as it implies an effort of the entrepreneur to pitch besides the textual description. As an alternative, we use the average number of words as a proxy for the efforts entrepreneurs engaged to pitch. We assume that higher quality project owners engage greater efforts to pitch. Due to data constraints, one substantial assumption is that all supporters arrive at the last day of the campaign. Another assumption is that both platforms account for the whole market, disregarding fringe platforms.

[38] The restriction of 20 weeks before and 20 weeks after allows us to concentrate on a period where both platforms had similar offers. Catarse opened its flexible funding 32 weeks before the policy change we are interested in.

Our main independent variables are *after*, a dummy taking the value 1 if the week occurs after the change and 0 otherwise, and *incumbent*, a dummy takes the value 1 if the observation is on Catarse, and 0 otherwise.

The identification strategy relies on the fact that the minimum standard with manual control policy was not announced until it was operational on the platform. In other words, project owners were unlikely to have anticipated the changes and strategically planned the campaign launch to the posterior period.

One potential concern relates to changes in the crowdfunding environment, for example, with growth in the overall adhesion that would increase the participation on both platforms. We include variables to control for time-varying events. The variable *category age*, the period in weeks from the first project on the focal category up to the focal week, aims at accounting for distinct trends in different categories depending on how long they are present on the platform (and consequently how many projects were presented under the focal platform over time, as in Doshi, 2015).

In order to deal with potential confounding factors arising from eventual shifts in the popularity of crowdfunding that would impact the number of entries on both sides, we follow previous work (Choi and Varian, 2012; Wu and Brynjolfsson, 2015; Doshi, 2015) and use the Google Trends index to control for crowdfunding popularity. We use the words "crowdfunding" and its Portuguese counterpart ("financiamento coletivo") as well as the name of both platforms (Catarse and Kickante). As the word "catarse" relates to other contexts, we multiply the word by "crowdfunding" and "financiamento coletivo" to moderate the search frequency (see Figure A.2 in the Appendix for the relative search frequencies as measured by Google Trends).

Finally, we account for network effects by using one-period lag of the number of entrepreneurs and number of supporters. Our assumption is that each agent observers the market at time t and makes the decision of which platform to join at time $t+1$. Contemporaneous agents do not observe each other's decisions before entering the platform. For example, consider an entrepreneur that decides to set a crowdfunding campaign. She will be more likely to consider the state of the market as it is prior to her decision to effectively enter the market. Likewise, on the supporters' side, the consideration will be more likely to take advantage of the information regarding past performance, and

not contemporaneous. Although these assumptions are needed due to data limitations, they capture behavior observed in the market.

On the entrepreneurs' side, the situation tends to be more ambiguous. The number of entrepreneurs does not necessarily influence the supporters – as supporters are assumed to prefer quality to quantity. As for the direct network effect, it can go both ways. Entrepreneurs might prefer platforms with higher number of other similar entrepreneurs as it signals the presence of supporters who enjoy projects in a particular category. They might also dislike more entrepreneurs as it represents greater competition for the supporters' pockets.

Table 2.1 presents the main variables and Table 2.2 gives summary statistics at the category-platform-week level.

Table 2.1: Main Variables.

Entries	Total number of entries on the entrepreneurs' side by category-platform each month.
Supporters	Total number of entries on the supporters' side by category-platform each month.
After	=1 if the month is after the policy change, and 0 otherwise.
Incumbent	=1 if the category-platform pair refers to the incumbent, and 0 otherwise.
Category age	The time to date of the first project on the focal category and platform, in months.
Google Trends	A relative measure captured from Google Trends website using search words relative to crowdfunding and to the websites' names.

Table 2.2: Summary statistics at the category-platform-week level.

	Catarse				Kickante			
	Before		After		Before		After	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Entries - Projects	3.35	2.80	6.18	4.95	4.99	4.89	4.61	5.66
Total Pledged ($1,000)	19.67	42.92	22.08	45.39	17.10	29.92	20.07	38.59
Supporters	182.13	356.50	216.33	324.02	187.30	377.78	181.20	257.74
Projects w/ Access to Capital	1.76	1.93	3.96	3.15	4.59	4.72	3.14	2.92
Average # Videos	0.78	0.48	0.57	0.58	0.72	1.08	0.73	0.86
Average Words in Pitch	507.39	337.21	439.15	275.73	396.23	249.99	463.82	332.93

4.4 Hypotheses testing

To assess whether the policy change in the incumbent increased or decreased its competitive advantage in comparison to its rival on both sides of the market, we estimate the following model:

$$Y_{ct} = \beta_1 * after + \beta_2 * after * incumbent + \sigma_{ct} + \lambda_t + \varepsilon_{ct}, \qquad (1)$$

where *c* indexes each category-platform pair and *t* indexes time in months. In Equation 1, Y_{ct} represents entrepreneurs' entries, number of supporters, and the average of videos on platform-category *c* at time *t*. *Incumbent* and *after* are dummies as described in the previous subsection. The term σ_{ct} represents controls at the category-platform-week levels: the *category age* at the focal platform as measured by the number of months from the first project in a given category, and lagged variables to account for network effects.

When the dependent variable is the number of entrepreneurs, we use the lag of entrepreneurs and the lag of supporters (because both variables are highly correlated, we introduce them one at a time). When the dependent variable is the number of supporters, we only use the lag of supporters, as previously explained. The term λ_t represents the Google Trends index (as previously explained). Finally, ε_{ct} represents the idiosyncratic error term.

Please note that while the empirical specification has a design of a difference-in-difference model, both platforms operate in a competitive environment, and the change on a platform is likely to impact the performance on the other – actually, this is part of our hypothesis and the reason of this study. Therefore, the coefficient of interest β_2 must be interpreted as the differential impact of the policy change on the incumbent in comparison to the entrant – and not the "classical" difference-in-difference (Doshi, 2015).

When the dependent variable is the number of entries, the expected result for β_2 is positive, as the platforms changing its entries might attract project owners that would otherwise not have joined.

When the dependent variable is the average quality as measured by the number of videos, the expected result for β_2 is negative, as the decrease in the entry costs might attract more low-quality project owners than the rival does.

As for the number of supporters, there are three possible results for β_2. The first one is $\beta_2 > 0$ implying that even if more low-quality project owners entered the platform, the net result of more entrepreneurs benefits the platform changing its policy also on the supporters' side (perhaps not proportionally). The second one is $\beta_2 < 0$ if the entrepreneurs' side is flooded with bad quality projects, crowding out the platform on the supporters' side.

5 Results

5.1 Weekly entries and average quality

As our variables of interest are non-negative and highly-skewed, we estimate Equation 1 using the Poisson model with standard errors clustered at the category-platform level (Santos Silva and Tenreyro, 2006). Table 2.3 display the results of the estimation of Equation 1 using the number of entrepreneurs as the dependent variable. The main results with the time-varying variables and the week fixed effects are displayed in Columns 1 and 2. Column 1 accounts for direct network effects using one lag for the number of entrepreneurs and Column 2 controls for indirect network effects using the lag for the number of supporters. Columns 3-6 display alternative specifications without week fixed effects and Google Trends, for comparison.

Table 2.3: Incumbent's advantage concerning entrepreneurs' entry.

	(1)	(2)	(3)	(4)	(5)	(6)
After*Incumbent	0.721***	0.861***	0.687***	0.833***	0.720***	0.862***
	(0.225)	(0.311)	(0.228)	(0.316)	(0.224)	(0.311)
After	0.381*	0.453	0.202	0.240	0.355*	0.399
	(0.205)	(0.278)	(0.193)	(0.297)	(0.190)	(0.280)
$\Delta(\text{Projects})_{t-1}$	0.0302***		0.0307***		0.0303***	
	(0.00755)		(0.00713)		(0.00738)	
$\Delta(\text{Supporters})_{t-1}$		3.66e06		4.10e06		3.31e06
		(4.80e05)		(4.35e05)		(4.58e05)
Trends	Yes	Yes	No	No	Yes	Yes
Week FE	Yes	Yes	No	No	No	No
Observations	822	822	823	823	822	822
Number of groups	33	33	33	33	33	33
Wald chi2	(8)170.70	(8)55.09	(3)77.99	(3)30.50	(7)173.21	(7)55.43
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Dependent variable: number of entries on the entrepreneurs' side at the category-platform-week level. Coefficients calculated using the Poisson model with standard errors clustered at the category-platform level (in parenthesis), ***p>0.01, **p>0.05, *p>0.1.

The coefficient for *After*Incumbent* is β_2, our estimator of interest. The coefficient is positive and statistically significant at the 1% level for all the specifications, suggesting that after the change, the incumbent benefits of a steep increase in the number of new entries at the category-platform level in comparison to the entrant, providing support to H1.

We now turn to the analysis of H2, using the average videos as a proxy for quality. The main results are in Columns 1 and 2 of Table 2.4, similar to the previous presentation. The coefficient of interest is negative and statistically significant at the 1% level for all specifications, suggesting that, following the policy change, the incumbent saw a sharp decrease in average quality as measured by the average number of videos in comparison to the average performance of its rival. In other words, the incumbent loses competitive advantage in comparison to average quality of projects of the rival, in line with H2.

Table 2.4: Incumbent's advantage concerning average quality.

	(1)	(2)	(3)	(4)	(5)	(6)
After*Incumbent	-0.543***	-0.548***	-0.491***	-0.498***	-0.543***	-0.547***
	(0.125)	(0.128)	(0.114)	(0.117)	(0.126)	(0.129)
After	0.325**	0.328**	0.170*	0.169*	0.385***	0.387***
	(0.129)	(0.130)	(0.0904)	(0.0862)	(0.127)	(0.128)
Δ(Average Videos)$_{t-1}$	0.0211		0.0376		0.0207	
	(0.0672)		(0.0638)		(0.0675)	
Δ(Supporters)$_{t-1}$		2.51e-05		3.79e-05		2.78e-05
		(4.09e-05)		(4.41e-05)		(4.30e-05)
Trends	Yes	Yes	No	No	Yes	Yes
Week FE	Yes	Yes	No	No	No	No
Observations	822	822	823	823	822	822
Number of groups	33	33	33	33	33	33
Wald chi2	(8)25.74	(8)32.59	(3)21.95	(3)21.85	(7)25.34	(7)30.86
Prob > chi2	0.0012	0.0001	0.0001	0.0001	0.0007	0.0001

Dependent variable: average videos at the category-platform-week level. Coefficients calculated using the Poisson model with standard errors clustered at the category-platform level (in parenthesis), ***p>0.01, **p>0.05, *p>0.1.

Table 2.5 displays the results for the estimation of Equation 1 with the number of supporters as dependent variable. Column 1 displays the main results, and the main coefficient is not significantly different from zero, suggesting that the difference between both platforms remained the same after the policy change. On Column 2, we include controls for quality, namely the average videos per week and the average size of texts per week. The main coefficient is then statistically significant at the 1% level, suggesting that the decrease in the average quality did not allow the number of supporters to increase with the number of entrepreneurs. Columns 3-6 are displayed for comparison, with and without the time-varying variables as in the previous cases.

Table 2.5: Incumbent's advantage concerning entrepreneurs' entry.

	(1)	(2)	(4)	(3)	(5)	(6)
After*Incumbent	0.328	0.440**	0.176	0.425**	0.231	0.444**
	(0.189)	(0.215)	(0.160)	(0.190)	(0.131)	(0.210)
After	0.309	-0.347**	0.306	-0.228	0.313	-0.310**
	(0.215)	(0.176)	(0.199)	(0.156)	(0.214)	(0.134)
$\Delta(\text{Supporters})_{t-1}$	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Control for quality	No	Yes	Yes	No	No	Yes
Trends	Yes	Yes	No	No	No	No
Week FE	Yes	Yes	No	Yes	No	Yes
Observations	822	822	823	823	822	822
Number of groups	33	33	33	33	33	33
Wald chi2	(8)16.00	(10)53.41	(3)2.54	(5)46.05	(7)15.88	(9)53.41
Prob > chi2	0.0423	0.0000	0.4689	0.0000	0.0262	0.0000

Dependent variable: number of entries on the supporters' side at the category-platform-week level. Coefficients calculated using the Poisson model with standard errors clustered at the category-platform level (in parenthesis), ***p>0.01, **p>0.05, *p>0.1.

5.2 Market share

One question that emerges from our results, in line with the platform competition questions investigated in the present paper, is whether the policy change benefited the incumbent in terms of market share on both sides of the market. We are particularly interested in the platform revenues, which we calculate multiplying the total amount collected for each successful project under the fixed model and for all the projects under the flexible model by their respective platform fee.[39]

[39] Catarse fees: 13% over the collected amount for the successful projects in fixed funding and 13% for all projects having raised any amount of money. Kickante fees: 12% for successful projects under both models, 17,5% for projects under flexible funding not having reached their objective. Because most flexible funding

Revenues are aggregated per project at the category-week level, and generate the variable "market share", which is the revenues of the incumbent divided by the revenues of both platforms. We estimate the following model:

$$Y_{ct} = \beta_1 * after + \lambda_t + \sigma_{ct} + \varepsilon_{ct}, \qquad (2)$$

where Y_{ct} is the incumbent's market share in revenues at the category-week level, and the coefficient of interest is β_1, the variation of market share after the policy change, controlling for other factors that might change the participation of market share. As the dependent variable is bounded between zero and one, we run a Linear Probability Model.[40] Table 2.6 displays the results for Equation 2.

Table 2.6: Incumbent's advantage concerning market share (revenues).

	(1)	(2)	(3)
After	0.0562	0.168***	0.169***
	(0.0651)	(0.0324)	(0.0393)
Constant	-1.193	0.486***	0.460***
	(0.769)	(0.0231)	(0.0761)
Observations	495	495	495
R-squared	0.063	0.053	0.053
N. of groups	17	17	17
Category Age	Yes	Yes	Yes
Trends	Yes	No	Yes
Week FE	Yes	No	No
R2	0.0680	0.0545	0.0550
F	(4,474)=7.91	(1,477)=26.71	(3,475)=8.93
Prob > F	0.0000	0.0000	0.0000

Dependent variable: revenue share for the incumbent at the category-platform-week level. Coefficients calculated using the Linear Probability Model. Standard errors in parenthesis, ***p>0.01, **p>0.05, *p>0.1.

projects do not reach their goal, overall fees are 17,5%.

[40] Qualitatively similar results are obtained using robust standard errors.

Column 1 shows that the coefficient of interest is positive, but not statistically significant, suggesting that the incumbent did not gain market share in revenues with the policy change.

6 Conclusion

Our paper emphasizes the complex competitive dynamics in two-sided markets, particularly when platforms need to balance the generation of critical mass and the attraction of high-quality members. Platforms typically use minimum quality standards to avoid attracting "lemons" at the price of creating entry costs that might be detrimental to the generation of critical mass over time.

The context of our study is the reward-based crowdfunding, a financing model where entrepreneurs pitch on digital platforms for monetary support of investors offering special prizes in exchange. We focus on two platforms competing head-to-head in the Brazilian market. While one platform ("incumbent") has strict regulations, with *ex-ante* review of projects, the other ("entrant") allows project owners to publish directly on their web page. On May 2016, the first platform abolishes its rules and completely opens the access to project owners. The aim of this study was to understand how the reduction in entry costs in one platform shapes competition in the market.

Our results show that the reduction in entry costs benefits the incumbent in comparison to the entrant in the number of entrepreneurs' joining the platform. However, the relative average quality of projects suffers a sharp reduction. The countervailing forces between the increase in the number of entries and the decrease in the average quality yield a "null effect" on the supporters' side. When we moderate the entry on the supporters' side by the average quality of projects, we observe an increase in the number of supporters for the changing platform. The results evoke questions regarding the effects of the change in terms of market share. We show that the incumbent sharply increases the market share on the entrepreneurs' side while it remains steady on the supporters' side.

Overall, the paper suggests that attracting more entrepreneurs did not offer

competitive advantage in terms of potential transactions to the incumbent reducing the entry costs.

While our study provides insights about competition on two-sided markets, it raises new questions that can be the theme of future research. For example, if keeping the manual review process might be not scalable over time, the focus on attracting high-quality entrepreneurs could have led to more advantageous outcomes. In order to confirm this intuition, new research could explore alternative responses to competition in two-sided platforms.

Our results also raise questions regarding alternative scenarios: what would have happened in the competition landscape hadn't the incumbent changed? And what would be the outcome had the incumbent changed on another period of time? An assessment using exercises with counterfactual simulations would enable a thorough understanding of these alternative scenarios regarding distinct possible decisions from the platform management.

New research could also explore questions regarding the social welfare. On the one hand, one might question whether reducing entry costs in crowdfunding platforms enables the entry and financing of projects that would otherwise remain unfinanced. On the other hand, whether this change will create a market of "lemons" in the long run.

Appendix B

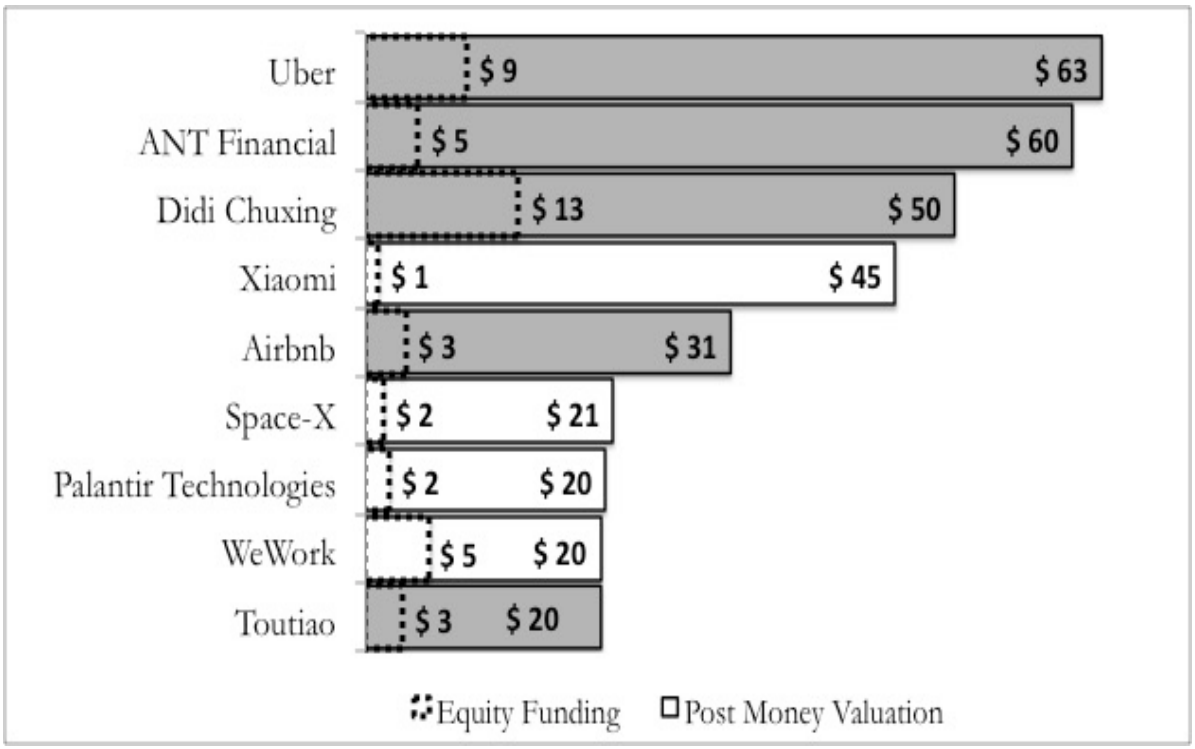

Figure B.1: Top ten "unicorns" by post money valuation.[41]

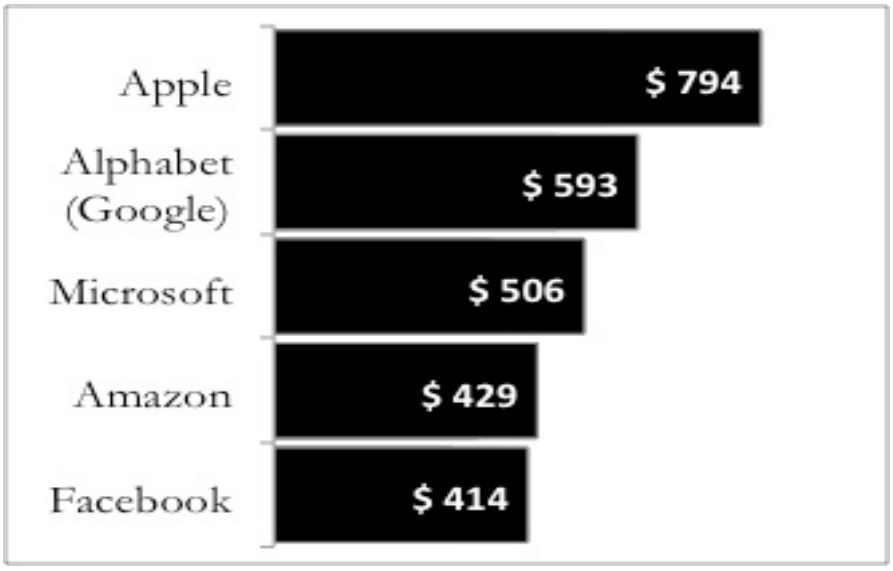

Figure B.2: The five greatest US-based firms by market capitalization as of April 20th, 2017.[42]

[41] *As on October 15, 2017; In grey: two-sided/multi-sided business model firms

[42] Information available at https://www.nytimes.com/2017/04/22/opinion/sunday/is-it-time-to-break-up-google.html. Last consulted on September 10th, 2017.

Table B.1: Top countries in number of crowdfunding platforms (Rau, 2017).

Position	Country	# Platforms
1	China	402
2	UK	143
3	USA	123
4	France	70
5	Germany	58
6	Netherlands	51
6	Spain	51
7	Australia	29
8	Italy	28
9	Canada	23
10	Poland	19
11	India	15
11	South Africa	15
11	South Korea	15
11	Switzerland	15
12	Brazil	14
12	Mexico	14
12	Singapore	14

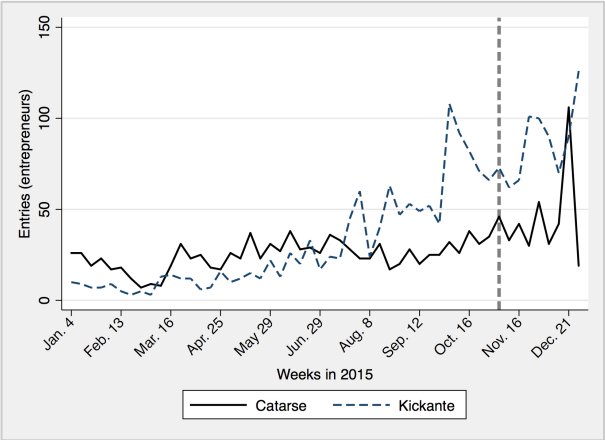

Figure B.3a: Number of weekly entries on the entrepreneurs' side on both platforms in 2015. The dashed vertical line represents the moment where Catarse includes the flexible funding in its menu.

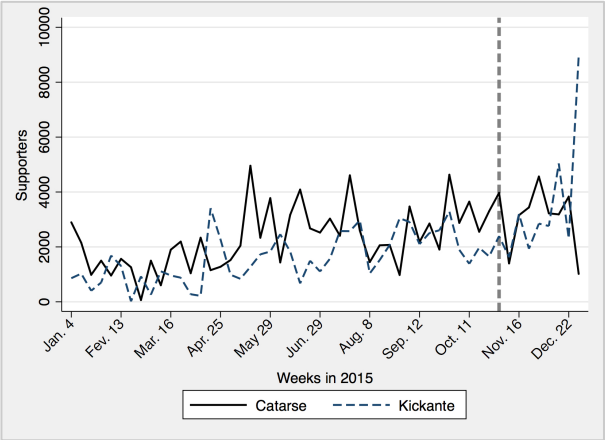

Figure B.3b: Number of weekly entries on the entrepreneurs' side on both platforms in 2015. The dashed vertical line represents the moment where Catarse includes the flexible funding in its menu.

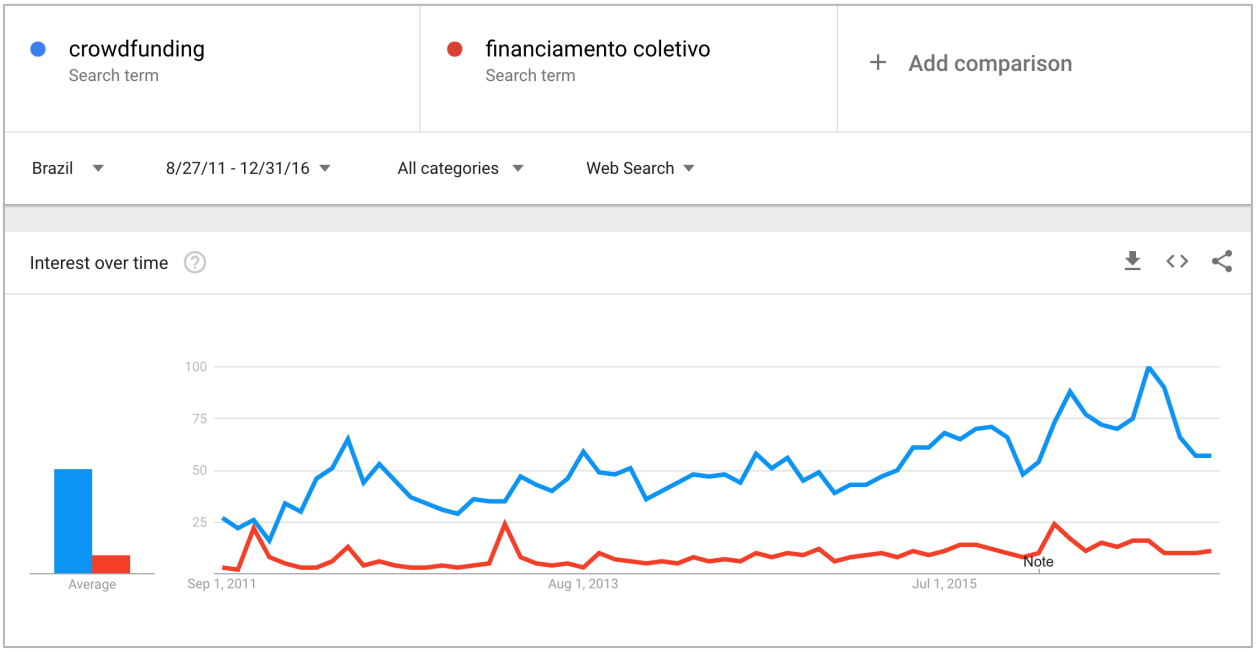

Figure B.4: Google Trends results for "Crowdfunding" and "Financiamento Coletivo" in Brazil, from 2011 to 2016.

Part 2: Entrepreneurs' strategies in crowdfunding

The second part of this thesis is dedicated to the entrepreneurs' strategies in crowdfunding platforms. In particular, we are interested in their incentives and disincentives to participate in this type of two-sided market.

The main incentive for entrepreneurs to join crowdfunding platforms is obtaining financial support for new ventures. An alternative driver is obtaining information about the "crowd's" valuation on the idea, reducing the uncertainty prior to incurring fixed costs. In its reward-based form, crowdfunding associates investment with a consumption experience (Schwienbacher, 2015) in a sort of incentive-aligned mechanism (Agrawal et al., 2014) where individuals reveal their valuation about the idea by choosing the amount they desire to contribute with. The first paper of this second part (Chapter 3) empirically investigates the use of crowdfunding as an informational mechanism.

If crowdfunding provides an alternative for financing new projects as well as obtaining feedback about new ideas, it requires the allocation of entrepreneurs' limited time and attention on the campaign elaboration and promotional efforts. In the second article of this second part (Chapter 4), we empirically investigate the tradeoffs between benefits and barriers to crowdfunding using survey data from a representative sample of professional musicians in France.

Chapter 3. Beyond financing: crowdfunding as an informational mechanism

Abstract

Besides providing financial support for new ventures, crowdfunding can bring additional advantages for entrepreneurs. In this paper, we test the hypothesis that crowdfunding also serves as an informational mechanism. Using a unique dataset built with publicly available data from Internet-based sources, and after controlling for alternative explanations, we empirically show that when not successful on crowdfunding, thus not accessing capital, project owners may decide to release the product in the market if contributions suggest positive valuation from the "crowd".

1 Introduction

Crowdfunding is an alternative mode of financing that has provided monetary support for projects whose high-quality was later endorsed by institutions such as the TIME 25 Best Inventions of the Year,[43] the Oscars,[44] the Grammy Awards,[45] and the Museum of Modern Arts in New York (MoMA).[46] Besides monetary resources, entrepreneurs presenting their ideas on crowdfunding platforms may obtain additional benefits from their campaigns. For example, they can collect information about the public's valuation of their projects.

Producers face great uncertainty preceding the release of new goods in the market (see, for example, Asplund and Sandin, 1999). Crowdfunding offers an investment opportunity associated with a consumption experience (Schwienbacher, 2015) where contributors choose the amount they give to a project, as in an incentive-aligned mechanism (Agrawal, Catalini and Goldfarb, 2014) that allows individuals to reveal their valuation about a certain idea. From this perspective, the contributions can offer information about the potential of the product in the market, which in turn may help to reduce the entrepreneurs' uncertainty prior to release.

Such hypothesis was evoked on past research (Agrawal et al., 2014; Belleflamme, Lambert and Schwienbacher, 2014; Belleflamme et al., 2015) and has recently motivated theoretical papers (Ellman and Hurkens, 2016; Strausz, 2017; Chemla and Tinn, 2017), but to the best of our knowledge not yet empirically tested in the context of new product release on retail channels, which is the objective of the present paper. We frame our research question as: *how do project owners respond to information from their crowdfunding campaigns?* As "response", we consider the decision to release the corresponding good in the market after a crowdfunding

[43] Information from the pages dedicated to "The 15 Best Inventions" in 2013 (ti.me/17TRn1m), 2014 (time.com/3594971/the-25-best-inventions-of-2014), and 2015 (time.com/4115398/best-inventions- 2015/). Last consulted on January 6, 2016.
[44] Samantha Murphy. "Oscar Win Is a First for Kickstarter-Funded Film". Mashable, February 25, 2013. Available at mashable.com/2013/02/24/inocente-oscar-kickstarter. Last consulted on December 5, 2015.
[45] Jazz musician Maria Schneider was nominated to four Grammy Awards and won in one category with her album "Concert in the Garden" (2004), financed through ArtistShare. Information from the artist's website (mariaschneider.com) and the Grammy Awards (grammy.com). Last consulted on December 5, 2015.
[46] Margaret Rhodes. "A CFL Bulb That Is As Practical As It Is Sculptural". FastCoDesign, January 13, 2014. Available at www.fastcodesign.com/3024738/wanted/a-cfl-bulb-that-is-as-practical-as-it-is-sculptural. Last consulted on December 5, 2015.

campaign, and we posit that the probability of release increases with the crowd's valuation.

Our strategy to test this hypothesis relies on the "all or nothing" rule used by most crowdfunding platforms. Such rule conditions access to capital on the achievement of a certain financial threshold during the campaign.[47] In other words, even project owners who receive monetary support remain unfinanced if their initial target is not reached. In this case, their respective contributors are reimbursed at the end of the period.

The "all or nothing" rule creates two subsamples of project owners – those who receive financial support and obtain access to the capital raised through their campaign, and those who receive financial support but remain unfinanced. We expect that if information is important enough to reduce the entrepreneurs' uncertainty, the probability of releasing the new product among the unsuccessful entrepreneurs increases with the crowd's valuation.

In order to test our hypothesis, we focus on projects aiming at producing music albums. Music is one of the main categories in crowdfunding (the second on the platform we study in terms of number of projects), and about 40% of music projects aim at creating an album. More importantly, the music industry confronts the same information asymmetries issues as other markets, particularly concerning uncertainty prior to the release of a new product. Finally, as in Bacache-Beauvallet, Moreau and Bourreau (2014) and Agrawal, Catalini and Goldfarb (2015), we consider musicians to be artists-entrepreneurs who need access to capital in order to release a new product in the market. Therefore we expect to provide insights into other project categories.

Our analysis uses a unique dataset built with information collected from different Internet-based sources. The main one is Kickstarter, considered one of the prominent crowdfunding platforms worldwide. Kickstarter allows project owners to offer early access to the good or service being developed as well as prizes and "community benefits" (Belleflamme et al., 2014) in exchange for financial support. Other data sources include Facebook, Amazon, and iTunes.

The final sample contains 707 observations, with both successful and unsuccessful projects, and we remark that 25% of unsuccessful projects release the respective product in

[47] The financial goal and the duration of the campaign are two characteristics determined at the beginning of the campaign and that cannot be changed once the project is online.

the market after the crowdfunding campaign. We calculate the probability of releasing the corresponding product in the market for successful and unsuccessful projects given the crowd's valuation. We consider four variables as proxies of the crowd's valuation: the total number of supporters, the average collected, the total amount collected during the campaign, and the amount collected in relationship to the original goal (which we call *percentage obtained*). Our choice of testing the four variables is based on the assumption that once entrepreneurs observe contributors' decisions, they can take advantage of these pieces of information differently. The number of individuals having decided to participate can be interpreted as "the size of the crowd" that appreciates the project. The amount each supporter allocates can be interpreted as how much each participant values the project (as we do not have this information, we use the average collected as a proxy). The aggregate amount collected would be how much this "crowd" appreciates the project. And finally, the *percentage obtained* can be seen as the project's potential *vis-à-vis* the original idea.

Our results suggest that, in general, crowdfunding campaigns yield information to project owners: the probability of releasing an album increases with the information proxies. This result is confirmed by a qualitative investigation that allows us to assess project owners' objectives and motivations as well as explore an area with little preexisting data (Helper, 2000). The interviews go in the same direction as our main results with the advantage of providing nuance on other aspects of the campaign that would not be assessed otherwise.

We repeat the same analysis on a sample with projects from the Design category, which aim at financing high tech products, sports materials (e.g., electric bicycles), toys, and home appliances among other goods. The objective is to provide external validity in terms of costs structure (projects the in Design category present, on average, higher fixed costs than in Music, and non-negligible marginal costs). Our results allow us to infer that the informational aspects of crowdfunding are at play also for this category, but in a different manner, as we discuss later.

We expect our paper contributes to the growing literature on crowdfunding, particularly to the stream dedicated to studying the informational mechanisms arising on these platforms. This stream has mostly dedicated to understanding the impact of information on the demand side (contributors), and only recently started investigating the supply side (entrepreneurs), with a focus on theoretical models. Our work is also connected with

papers about subsequent outcomes of the crowdfunding activity such as the access to venture capital. Besides the academic contribution, we expect to provide insights to entrepreneurs about crowdfunding as an informational mechanism.

The paper is organized as follows. Section 2 reviews the relevant literature. Section 3 describes the theoretical framework and the hypothesis. Section 4 details the dataset and the variables used. Section 5 presents the results, and Section 6 brings the concluding remarks and the discussion.

2 Literature review

Crowdfunding has motivated a growing body of academic literature over the past few years. Our study relates closely to a quite recent research stream investigating the informational side of crowdfunding campaigns on the supply side (entrepreneurs). Strausz (2017) develops a theoretical model to study the trade-off between the threat of moral hazard on crowdfunding platforms and their potential role to address or mitigate demand uncertainty for entrepreneurs. Focusing on a mechanism design framework, the author highlights the informational value of crowdfunding to screen projects, complementing the traditional entrepreneurial financing, which focuses on mitigating the risk of moral hazard. On a similar vein, Ellman and Hurkens (2016) study how the interplay of project owners and contributors determine consumer, producer, and total welfare. The authors point out that the main social advantage of this model is the possibility it provides to project owners to adapt production according to the crowd's information.

Chemla and Tinn (2017) highlight the importance of learning, rather than financial constraints, to engage in crowdfunding. The authors develop a theoretical model where contributions enable firms to credibly learn about consumers' preferences, benefiting project owners regardless of their success in achieving their goal.

Focusing on the entrepreneur's decision between "fixed funding" and "flexible funding", Chang (2016) models the decision of the contributors to participate in a campaign as a signal about the common value of the project.

We contribute to these theoretical papers by empirically testing the informational value of crowdfunding to entrepreneurs. We show the correlation between the campaign result and the subsequent decision of project owners to engage in production when they do not benefit from access to capital. In our view, this is evidence of the use of information provided by crowdfunding campaigns, consistent with predictions by theory.

We complement empirical work focusing on subsequent outcomes of crowdfunding. Signori and Vismara (2016) quantify the return on investments in equity crowdfunding, highlighting the determinants of post-campaign outcomes (e.g., exits, new funding rounds). Ryu and Kim (2016) analyze how success on equity-based crowdfunding impacts subsequent financing rounds and exit outcomes. We also complement the literature on the entrepreneurial learning process on crowdfunding (Xu, 2017; Leboeuf, 2017).

Additionally, our paper relates to works exploring informational mechanisms on the demand side, particularly studies examining how past contributions influence future participation and projects' outcomes (Zhang and Liu, 2012; Burtch et al., 2013; Lin et al., 2013; Parker, 2014; Agrawal et al., 2015). One of the central findings in these articles is the importance of one's social network as a signal of quality, and consequently as a driver for success. For example, Agrawal et al. (2015) finds that friends and family tend to be the first to contribute to a project, thereby revealing private information about the project owner to "distant" investors[48]. Other signals of quality analyzed in these papers are the choice of the mode of access to capital (i.e., "all or nothing" vs. "keep it all", Cumming et al., 2014), and communication elements such as videos and texts (Mollick, 2014; Gao and Lin, 2016).

An important point for our research is that if success is associated with proxies of quality, failure does not necessarily imply lack of quality. First, success is correlated with lower financial goals (e.g., Mollick, 2014). Second, in an uncertain environment such as crowdfunding, even high-quality projects may fail, particularly if the project owner cannot inform a relatively high number of potential contributors at a very early stage of the campaign (Li and Duan, 2016). In other words, the unsuccessful projects that are at the core of the present paper do not necessarily differ in quality in relationship to those that are successful but may fail due to the lack of skill to build "momentum", for example.

[48] The paper analyzes a hybrid form of crowdfunding in the music industry, where investors could receive royalties and rewards. We consider that the paper provides valuable insights to non-hybrid models such as "pure" reward-based crowdfunding, as Kickstarter.

Nevertheless, our empirical setting controls for heterogeneity in quality borrowing from the crowdfunding literature, particularly from Mollick (2014) and Gao and Lin (2016). We provide further details in Section 4.

3 Theoretical framework and hypothesis

Reward-based crowdfunding[49] consists of a financing mode where entrepreneurs pitch for monetary contributions to an idea in exchange for special prizes, appreciation tokens or early editions of products. Figure 3.1 illustrates a timeline of five main stages of reward-based crowdfunding, from the campaign setting to the product release in the market.

While this financing model represents a valuable alternative for entrepreneurs lacking other forms of access to capital (Kim and Hann, 2017), it can also serve as a way to test the market as hypothesized in theoretical papers (Belleflamme et al., 2014; Agrawal et al., 2014; Ellman and Hurkens, 2016; Strausz, 2017; Chemla and Tinn, 2017), reducing the uncertainty entrepreneurs face prior to releasing a new product in the market (Asplund and Sandin, 1999). Actually, theoretical papers suggest that the main value of reward-based crowdfunding lies in the informational aspect it provides, complementing traditional sources of finance (Ellman and Hurkens, 2016; Strausz, 2017; Chemla and Tinn, 2017).

[49] Alternatively, crowdfunding can be categorized into donation-based (which facilitates private contributions to public goods), lending-based, (peer-to-peer lending), and equity-based (investors become shareholders). See, for example, Belleflamme et al., (2015) and Viotto (2015) for a thorough description of these models.

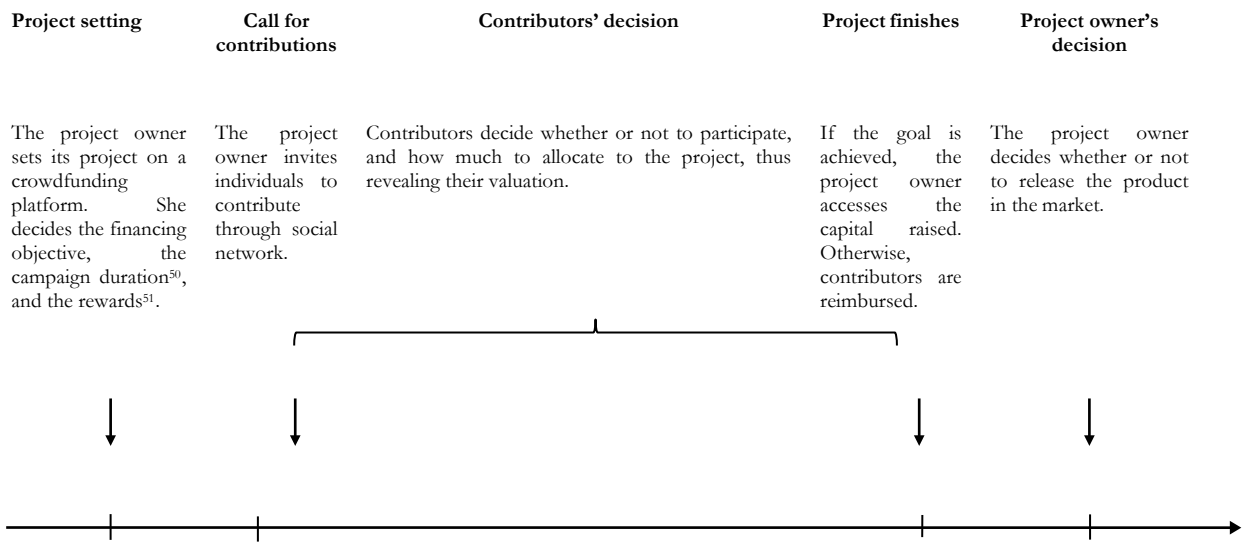

Figure 3.1: Illustration of the timeline of reward-based crowdfunding projects under the "all or nothing" model.

The informational value of crowdfunding can be understood as follows: when deciding to contribute to a crowdfunding campaign, investors commit to future consumption (Schwienbacher, 2015), foregoing the amount allocated in relationship to outside options. As their payoffs are conditioned to their decision of how much to allocate, crowdfunding can be compared to incentive-aligned mechanisms (Agrawal et al., 2014; Ellman and Hurkens, 2016) used in marketing (see, for example, Ding et al., 2005) and in experimental economics to test preferences and motivations by connecting individuals' payoffs to their responses. Incentive-aligned mechanisms consist of alternatives to research techniques where agents face hypothetical situations and their payoffs are not altered by their responses – which would be subject to bias (Diamond and Hausman, 1994). Based on these observations, we suggest that crowdfunding can provide valuable feedback in terms of potential consumer preferences and valuation considering their decision of money allocation (Agrawal et al., 2014).

[50] Platforms typically set the maximal duration to 60 days, with 30 days being the most common duration for reward-based crowdfunding.

[51] Typically, contributors can have access to distinct rewards depending on the amount they contribute with. See Figure C.1 in Appendix C for a concrete example of a crowdfunding campaign with some of its respective rewards.

Entrepreneurs observe investors or contributors' decisions and can take advantage of several pieces of information coming from the crowdfunding campaign. First, the number of individuals having decided to participate – or "the size of the crowd" that appreciates the project. Second, how much each participant values the project (as we do not have this information, we use the average collected as a proxy). Third, the aggregate valuation of the "crowd", or how much this "crowd" appreciates the project. And finally, how far the project reached in contributions in relationship to the primary goal (what we call *percentage obtained*), which can be seen as the potential *vis-à-vis* the original project[52].

If crowdfunding serves as both an alternative source of financial support and as a method to test the market, we need to disentangle these two mechanisms. We benefit from the "all or nothing" rule on crowdfunding platforms, which conditions access to capital to the achievement of a certain financial threshold during the period of the campaign. It implies that even if the project owner has received support, she remains unfinanced if failing to reach the target, and their respective contributors are then reimbursed. The condition creates a subsample of project owners who do not have access to capital, but who can still use information on the crowd's valuation to reduce their uncertainty regarding the potential public's interest in the project. The decision of this group of project owners about the release of the relative product in the market will enable our understanding of the potential role of information to reduce uncertainty. Formally, we write our hypothesis as:

H1: The probability of releasing a product after an unsuccessful campaign increases with contribution.

In order to test it, we use a Probit model where the dependent variable is the decision to release the product. The econometric model is written as follows:

$$Pr(release = 1 \mid fail, information, previous\ products, production\ phase) =$$

$$\Phi(\beta_1 fail_l + \beta_2\ information_l + \beta_3 fail_l * information_l + \beta_4 previous\_products_l +$$

$$\beta_5 fail * previous\_products_l + \beta_6 production\_phase_l + \beta_7 fail * production\_phase_l + \psi_l).$$

[52] We acknowledge that other forms of feedback may also have place in crowdfunding, but analyzing them would require another empirical approach. We discuss this in Section 6.

The dependent variable is a dummy taking the value 1 if the product corresponding to the crowdfunding project is identified on online retail channels after the campaign, and 0 otherwise; Φ is the cumulative distribution function of the standard normal distribution; the variable *fail* equals 1 if the project was not successful on crowdfunding, and 0 otherwise; *information* represents the variables used as information proxies.

As mentioned above, there are mainly four types of information that entrepreneurs can use to measure the public's valuation: the *total collected*, the *number of supporters*, the *average collected*, and the *percentage obtained*. Each variable may convey distinct information to the entrepreneur, therefore it is possible that they are not always significant at the same level.

The variables *previous products* and *production phase* aim at controlling for alternative explanations for the release of an album after failing on crowdfunding. The first alternative explanation is the use of bootstrap finance, or finance coming from internal sources (see, for example, Van Auken and Neeley, 1996; Ebben and Johnson, 2006). Entrepreneurs who fail on crowdfunding but have previous products in the market may use revenues coming from the sales of these goods to finance the new ones. The variable *previous products* is the number of products the project owner had in the market prior to the crowdfunding campaign. In the case of entrants, *previous products* takes the value zero. (Appendix A provides an explanation about the choice of this variable as a proxy for revenues coming from other products in the music industry.)

We test a second explanation related to the number of previous products in the market. Albums represent not only a source of revenues but also signal to the industry (labels, concert producers, marketing managers) the artistic and managerial skills of artists. Releasing an album requires knowledge of how to manage its conception and production, even if there is the support of a professional producer. Therefore, an artist with no previous albums might have more incentive to release a product after an unsuccessful campaign in relationship to an artist with track record. We then replace *previous albums* for *first album* in some specifications.

The stage of production of the good may as well play a role in the decision to release a product. It is generally assumed that crowdfunding and production happen sequentially, but these processes can also occur simultaneously. In this case, project owners incur fixed costs of production *ex-ante* and cover these costs with capital coming from the

crowdfunding campaign. If they fail the campaign and do not access capital from crowdfunding, they may release the product expecting to recover some of the fixed costs incurred with sales. We control this possibility with the variable *production phase*. This variable is built as follows: each project page on Kickstarter provides the estimated delivery of rewards expressed in months and years. Considering that rewards include the main crowdfunded good, we expect the entrepreneurs to account for the end of production when setting an estimated delivery, therefore the period between the end of the crowdfunding campaign and the estimated delivery is an approximation of the time needed by the project owner to access capital, launch and finish the production, and deliver the good. The variable is expressed in months – a project with a *production phase* of one month is closer to completion than another one with a *production phase* of six months.

The term ψ_i is a vector of variables controlling for characteristics that may be also related to the decision of releasing a product in the market. In this vector, we include the number of Facebook fans, which we use as a proxy for social network and potential public (similarly to previous works, e.g., Mollick, 2014). We also control for music genres, a crucial aspect as it accounts for horizontal differentiation in the Music industry. More specifically, it considers the difference in the commercial appeal across genres, and therefore the distinct incentives to release. Albums in rock or country, for instance, tend to have more commercial appeal than albums in genres considered "niche" such as jazz or world music. Consequently, a project owner in rock or country may have more incentives to release after a failed crowdfunding campaign than a project owner in jazz or world music. (Our data confirms this reasoning; see Figure C.3 in Appendix C for a graphic of projects by genre according to the campaign outcome and the release decision).

Finally, we control for project quality. It is possible that entrepreneurs who make more effort *ex-ante* towards better quality projects could potentially be more inclined to release the product regardless of the information stemming from crowdfunding. Measures of quality follow the literature on crowdfunding (Mollick, 2014; Gao and Lin, 2016) and on entrepreneurship (Chen, Yao and Kotha, 2009; Ghose, Ipeirotis and Li, 2012), and include the presence of video and text quality. Appendix B describes these measures in details.

The strategy to test our hypothesis relies on the use of the interaction term between *fail* and *information*, allowing us to condition the variables of interest (the four proxies of

information, one at a time) to failure, and calculate the probability of release for this group. We also use interaction terms for the variables representing alternative explanations with the aim of controlling for systematic differences between successful and unsuccessful project owners on two central aspects. First, entrepreneurs having had more albums also have more experience, and may be more inclined to release a product conditional on having failed. Second, conditional on having failed, an entrepreneur who is closer to the end of the production could be more likely to release the product than another one that did not start the production yet.

Adding these two variables without the interaction terms would allow us to control for these aspects with respect to the entire sample – i.e., to understand whether overall artists would be more prone to release when they are experienced than when they are entrants. The use of interaction terms allows conditioning these variables to the fact that the entrepreneur has failed in the crowdfunding, and controlling for fundamental distinctions regarding these characteristics for successful and unsuccessful projects, if they exist.

The drawback of the use of interaction terms with variables that are correlated such as *fail* and the information proxies is the potential bias due to collinearity. We perform robustness tests by splitting the sample into unsuccessful and successful projects to check if the results hold. Robustness tests are reported in Section 5.1.

4 Data

Our primary source of data for the empirical analysis is Kickstarter, considered one of the main reward-based crowdfunding platforms worldwide, having attracted more than $2,7 billion in transactions coming from 12 million contributors up to November 2016. The funding is based on the "all or nothing" principle, and the platform transfers the funds to the project owners at the end of the funding period if the project collects at least the pre-established financial goal. A project that cannot achieve its goal is considered unsuccessful and the contributors are reimbursed.

All project pages on Kickstarter publicly display information on the characteristics and the performance of each project: financial target, amount collected, location (city, state and

country), number of contributors, category (e.g., film, music, theater), subcategory (e.g., genre, in the case of music), number of updates on the campaign (by the project owner), comments (by the project owner and contributors), the period of each campaign (initial and final dates of the project), the description of each reward and the minimum amount to access it, number of contributors choosing each type of reward, and the estimated delivery of rewards (see Figure C.1 in the Appendix C for an example of a crowdfunding campaign on Kickstarter with some of its rewards). Once the project ends, the pages of successful and unsuccessful projects stay online with all information as on the last day of the campaign.

Reward-based crowdfunding is largely used for projects with creative, innovative, and/or technological appeal. For example, Kickstarter presents ideas related to games, design, films, and music, among others. In order to be able to compare projects, we chose to focus on one category offering outcomes with some level of similarity in terms of product characteristics. We find that the Music category, more precisely projects aiming at producing a music album, to be suitable for our purpose. Music is one of the main categories in reward-based crowdfunding, and the second category on Kickstarter in terms of number of projects (see Figure 3.2). Furthermore, about 40% of music projects are dedicated to creating a music album.[53]

As in Bacache-Beauvallet et al. (2014) and Agrawal et al. (2015), we consider musicians to be artists-entrepreneurs who need to access to capital to release a new product (album) in the market. After the crowdfunding campaign, these artists-entrepreneurs can release their products on traditional channels such as Amazon and iTunes (see Figures C.1 and C.2 in Appendix C for an example of a crowdfunding campaign and the related product released on Amazon afterward).

[53] The word "album" appears in 19,597 of the 48,794 projects on the Music category on Kickstarter (as in May, 2016).

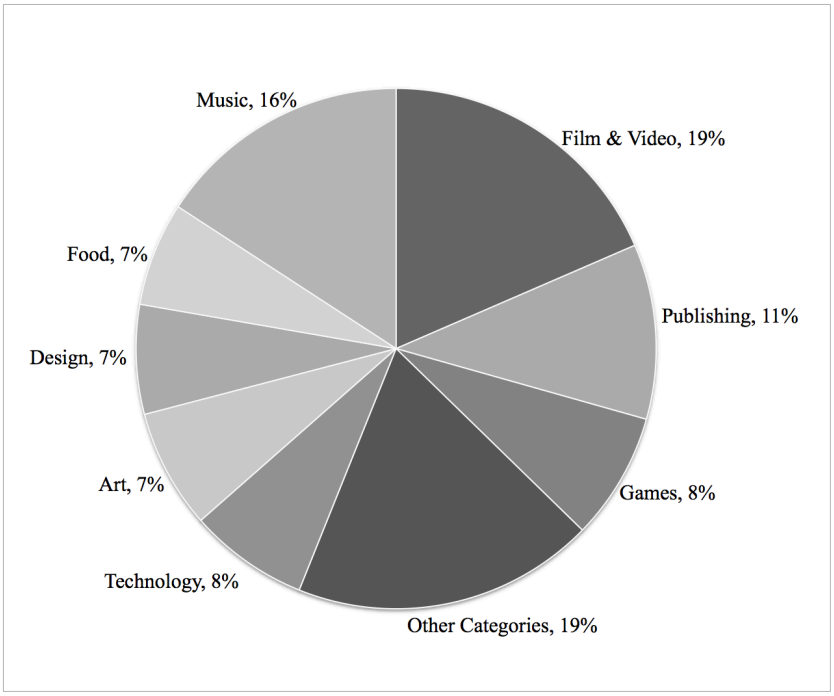

Figure 3.2: Distribution of categories on Kickstarter according to the number of projects.

These two channels led the distribution of recording music the last years at the same time they impose some barriers to non-professional artists. The distribution is done either by vertically integrating with an incumbent (a label) or independently, through specialized distributors. In our sample, all artists adopt the latter option, approaching an entrepreneurial attitude. Although independent distribution imposes low barriers to artists, distributors require fixed fees to place albums on online retail channels, thus we consider that only artists-entrepreneurs expecting to sell will have incentives to release through these channels.

In order to build our sample, we first collect information about 1,505 US-based projects aiming at producing a music album with estimated delivery of rewards between August 2014 and May 2015. Similarly to previous work (Mollick, 2014; Cumming et al., 2017), we eliminate very low or very high financial goals. To decide on the lower and upper bounds, we consider the specificities of the music industry – project owners setting goals of less than $3,000 would be more likely to expect contributions from friends and family, and those determining goals above $200,000 seem to be unrealistic about the market.

Table 3.1: Main variables.

Released	= 1 if project releases on retail channels (Amazon and iTunes), 0 otherwise.
Fail	= 1 if project does not reach the financing objective, 0 otherwise.
Information	Total collected (log), number of supporters (log), average collected (log), and percentage obtained.
Previous products	Number of previous albums (zero if this is the first album of the artist), first album (= 1 if this is the first album of the artist, zero otherwise).
Production phase	Period between the end of a campaign and the estimated delivery of main rewards informed on the projects' pages.

We complement the data from Kickstarter with information from other sources. First, we visit the artists' websites to collect the number of previous albums, which is a proxy for alternative financial resources (as explained in Section 3). Then, we obtain the number of Facebook fans, assuming that social media is the main promotional channel for independent artists (Bourreau, Maillard and Moreau, 2014), and that information from social media provides a proxy for the social network of the project owner (Mollick, 2014) as well as her potential public. Project owners not having Facebook pages are dismissed. Finally, we follow these projects on online retail outlets (Amazon and iTunes) until November 2015, leaving room for an average of six months for possible delays, which is the average reported in the literature (Mollick, 2014).

The final sample contains 707 observations from unique project owners. Table 3.1 shows the description of the main variables, and Table 3.2 presents the summary statistics. The variable *production phase*, which controls for the stage of production, as explained in Section 3, is expressed in months – a project with a production phase of one month is closer to completion than another one with a production phase of six months. Figure 3.3 displays the distribution of production phase, showing that most crowdfunding campaigns set the estimated delivery in the same month or one month after the end of the campaign. Our measure is similar to what Agrawal, Catalini, Goldfarb and Luo (2016b) call *time for (first / last) reward*, which they use as an approximation of time for the development of the project from the time it is posted on the website.

Table 3.2: Summary statistics.

All Sample	Obs	Mean	Std. Dev.	Min	Max
Released	707	0.61	0.49	0	1
Fail	707	0.26	0.44	0	1
Supporters	707	127.55	258.87	0	3305
Collected	707	9958.02	18571.26	0	278486
Average Collected	707	85.88	69.45	0	956.25
Percentage Obtained	707	0.94	0.598	0	6.08
Goal	707	10247.20	11915.44	3100	175000
Previous Albums	707	1.26	2.51	0	34
Production Phase	707	2.79	3.00	0	21
Facebook Fans	707	4738.29	22510.51	2	444214
Successful Projects	Obs	Mean	Std. Dev.	Min	Max
Released	522	0.74	0.44	0	1
Supporters	522	166.08	291.35	10	3305
Collected	522	12960.06	20734.42	530	278486
Average Collected	522	93.79	53.04	28.15	467.73
Percentage Obtained	522	1.222	0.410	1	6.088
Goal	522	10159.66	12789.06	3100	175000
Previous Albums	522	1.45	2.65	0	34
Production Phase	522	2.65	2.83	0	21
Facebook Fans	522	5724.72	25658.51	14	444214
Unsuccessful Projects	Obs	Mean	Std. Dev.	Min	Max
Released	185	0.25	0.43	0	1
Supporters	185	18.83	25.99	0	193
Collected	185	1487.42	2882.52	0	23815
Average Collected	185	63.57	99.31	0	956.25
Percentage Obtained	185	0.144	0.182	0	0.90
Goal	185	10494.21	9030.81	3150	60000
Previous Albums	185	0.72	1.98	0	17
Production Phase	185	3.20	3.43	0	18
Facebook Fans	185	1954.96	8340.71	2	108278

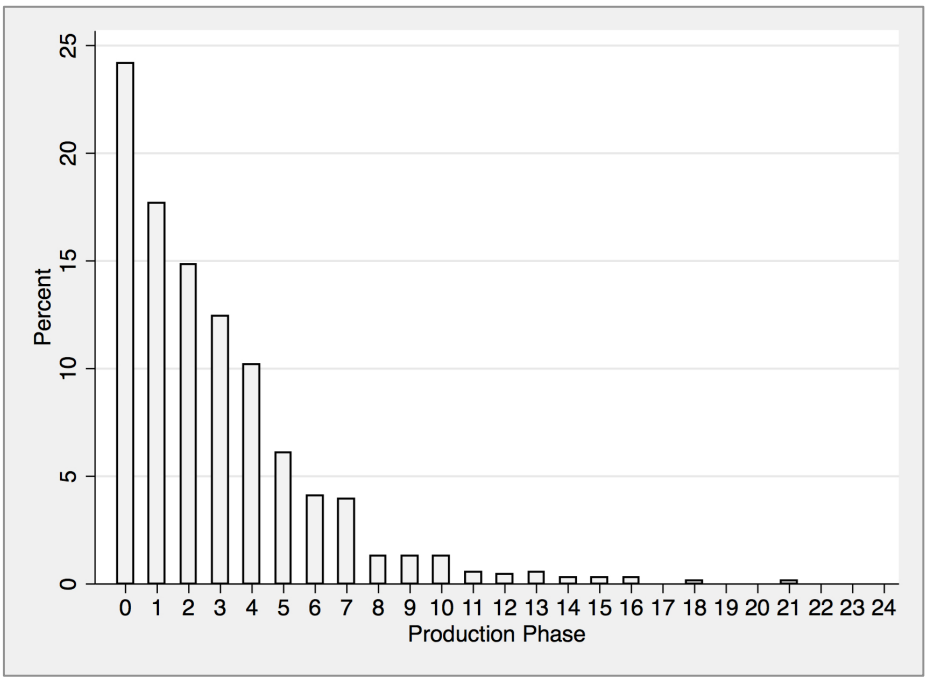

Figure 3.3: Distribution of projects according to the production phase.

One potential concern in our setting is that project owners may have raised the money outside the crowdfunding platform, but the literature suggests that it would be less likely as the entrepreneurs come to crowdfunding when lacking access to traditional sources (Kim and Hann, 2017). One might also argue that entrepreneurs used multiple platforms simultaneously, but this is also unlikely – while it is not a forbidden practice, it implies costs due to the amount of work required to run a campaign (Hui, Gerber and Greenberg, 2012), and it can also hurt the potential of success as publicly available information about previous support influences future contributions (Burtch et al., 2013; Agrawal et al., 2015; Kuppuswamy and Bayus, 2017).

5 Results

The first part of the results relies on the analysis of the main effects of the model presented in Section 3, in particular, the signal and significance of the interaction between *fail* and the information proxies. We exclude projects that do not receive contributions as these

entrepreneurs did not obtain information. [54]

Table 3.3 displays the coefficients and standard errors for *amount collected* (Columns 1 and 2) and *number of supporters* (Columns 3 and 4) as proxies while Table 3.4 displays results for *average collected* and *percentage obtained*. On both tables, Columns 1 and 3 display the results for the main model while in Columns 2 and 4 the variable *previous albums* is replaced by *first album*.

The coefficients of the interaction terms of interest are all positive and statistically significant, suggesting the informational mechanism we hypothesize. However, they are not always statistically significant at the same levels – for example, while the estimations for *percentage obtained* yield coefficients statistically significant at the 1% level, the estimations for *average collected* yields coefficients statistically significant at the 5% level. This result suggests that each variable conveys distinct types of information to project owners, as we hypothesized in the theoretical framework.

The other interaction terms are not statistically significant, suggesting that the fact of eventually search for track record or have an advanced production is not particularly important for entrepreneurs who failed to reach the goal in their campaign to decide on the release.

At the same time the results point out in the direction of the informational aspect of crowdfunding, the main effects also show that *fail* is negative and statistically significant at the 1% level, which means that its inverse, success, is positive and statistically significant at the same level. Such result corroborates the idea that primary goal of crowdfunding is to provide financial alternatives to entrepreneurs. We call the attention to this fact because the main terms of the information proxies are not statistically significant, which may raise questions of whether the informational mechanisms are at work solely for unsuccessful entrepreneurs. We discuss this issue in Section 6.

[54] Results with the projects having had no contributions are reported in the Appendix, Tables C.1 and C.2.

Table 3.3: Probit[55]. Dependent variable: Released.

	(1)	(2)	(3)	(4)
Fail	-4.050***	-3.406***	-2.219***	-2.029***
	(1.079)	(1.056)	(0.595)	(0.651)
Fail*Log(Collected+1)	0.391***	0.324***		
	(0.126)	(0.121)		
Log(Collected+1)	-0.174	-0.115		
	(0.110)	(0.104)		
Fail*Log(Supporters+1)			0.385***	0.343**
			(0.141)	(0.138)
Log(Supporters+1)			-0.0343	0.00107
			(0.099)	(0.095)
Fail*Previous Albums	0.0328		0.0414	
	(0.0731)		(0.0730)	
Previous Albums	0.0813**		0.0661*	
	(0.0392)		(0.0383)	
Fail*First Album		-0.039		0.005
		(0.265)		(0.264)
First Album		0.280**		0.265**
		(0.134)		(0.133)
Fail*Prod. Phase	0.00739	0.0122	0.00965	0.0133
	(0.041)	(0.041)	(0.041)	(0.041)
Production Phase	-0.059***	-0.059***	-0.061***	-0.061***
	(0.022)	(0.022)	(0.022)	(0.0214)
Log(FB Fans)	0.0600	0.0624	0.0477	0.0467
	(0.042)	(0.041)	(0.041)	(0.041)
Video	0.325	0.299	0.286	0.263
	(0.307)	(0.307)	(0.306)	(0.306)
Spelling	0.0291	0.0401	0.0199	0.0319
	(0.0824)	(0.0822)	(0.0828)	(0.0829)
Sentiment	0.104	0.0562	0.0606	0.0258
	(0.152)	(0.151)	(0.152)	(0.152)
Genre	Yes	Yes	Yes	Yes
Constant	1.512	0.698	0.243	-0.173
	(0.972)	(0.902)	(0.550)	(0.530)
Observations	689	689	689	689
LR chi2	(19)198.25	(19)194.42	(19)195.31	(19)193.41
Prob > chi2	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.2249	0.2205	0.2215	0.2194

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

[55] Qualitatively similar estimation results are obtained with a Logit model or a Linear Probability Model.

Table 3.4: Probit. Dependent variable: Released.

	(1)	(2)	(3)	(4)
Fail	-3.170***	-3.064***	-1.344***	-1.298**
	(0.862)	(0.910)	(0.416)	(0.530)
Fail*Log(Av.Col+1)	0.478**	0.438**		
	(0.187)	(0.186)		
Log(Av.Collected+1)	-0.217	-0.212		
	(0.139)	(0.139)		
Fail*PercentageObtained			1.761***	1.724***
			(0.619)	(0.615)
Percentage Obtained			0.130	0.144
			(0.200)	(0.198)
Fail*PreviousAlbums	0.0625		0.0450	
	(0.0702)		(0.0734)	
Previous Albums	0.0606*		0.0590	
	(0.0365)		(0.0367)	
Fail*First Album		0.0747		0.00525
		(0.261)		(0.264)
First Album		0.258*		0.258*
		(0.133)		(0.133)
Fail*ProductionPhase	0.0100	0.0140	0.0120	0.0145
	(0.0399)	(0.0397)	(0.0398)	(0.0397)
Production Phase	-0.060***	-0.060***	-0.061***	-0.060***
	(0.0216)	(0.0214)	(0.0215)	(0.0214)
Log(FB Fans)	0.0441	0.0477	0.0427	0.0443
	(0.0395)	(0.0381)	(0.0397)	(0.0385)
Video	0.254	0.246	0.261	0.250
	(0.303)	(0.303)	(0.305)	(0.305)
Spelling	0.0262	0.0389	0.0258	0.0369
	(0.0820)	(0.0820)	(0.0838)	(0.0838)
Sentiment	0.135	0.0905	0.0971	0.0647
	(0.152)	(0.151)	(0.152)	(0.151)
Genre	Yes	Yes	Yes	Yes
Constant	1.077	0.772	-0.0380	-0.332
	(0.758)	(0.768)	(0.471)	(0.475)
Observations	689	689	689	689
LR chi2	(19)190.14	(19)187.42	(19)193.90	(19)192.53
Prob > chi2	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.2157	0.2126	0.2199	0.2184

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

Another concern our model may raise regards the strong correlations between *fail* and information proxies, which could lead to bias due to potential collinearity. The most

straightforward manner to test for this issue is to split the sample between successful and unsuccessful projects and recalculate the estimators using a model without interaction terms. The results presented in the Appendix (Tables C.5 and C.6) do not suggest that collinearity changes qualitatively the results. The coefficients for the information proxies for the unsuccessful projects (Table C.5) are positive and statistically significant at the 1% (*amount collected*, *number of supporters* and *percentage obtained*) and the 5% levels (*average collected*).

We now turn to the calculation and interpretation of the average marginal effect for each variable of interest for the unsuccessful sample in order to provide more meaningful economic results. Average marginal effects[56] on Table 3.5 are obtained by estimating the marginal effects for each individual with their observed levels of covariates and averaged across all individuals.

Table 3.5: Average marginal effects – unsuccessful projects.

	Unsuccessful
Log(Collected+1)	0.065***
	(0.018)
Log(Supporters+1)	0.108***
	(0.028)
Log(Av Col +1)	0.070***
	(0.037)
Percentage	0.557***
Obtained	(0.169)

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

The average marginal effects represent the average change in the probability when the variable of interest increases by one unit. In the case of the log-transformed variables, we multiply the average marginal effects by 0.1 to obtain the average change in the probability when the variable of interest increases by 10%. For example, when the amount collected

[56] Calculating the average marginal effect directly from the main model would require that we would hold the variable *fail* fixed at zero and at one. This option, however, could raise concerns, particularly to the variable "percentage obtained", where some values only happen when fail equals to zero and others when fail equals to one: it makes little sense to use the option of holding the variable fixed at zero or one in this specific variable. We overcome this issue by calculating the marginal effects using the split sample, as the results between the main model and the split samples do not qualitatively change, as previously discussed.

increases by 10%, the average change in the probability is of 0.006, or 0.06 percentage points. The result is the same as the average collected. As for the number of supporters, the change in 10% this variable increases by 0.01 the probability of release, or 1 percentage point, on average.

For the "percentage obtained" variable, we multiply the average marginal effects by 0.10 to obtain how much the probability to release changes when there is an increase by 0.10. The result is 0.05, or 5 percentage points.

5.1 Robustness

A. Control variables

One question regarding the choice of variables may be the absence of the funding goal as a control. This is explained by the strong correlation between the funding goal and the total amount collected for successful projects (one of the main characteristics of crowdfunding is that success happens by small margins, Mollick, 2014). Facing the tradeoff between severe collinearity and omitted variable bias, we performed a likelihood ratio test to compare specifications with and without the funding goal and to verify if this is a relevant variable to consider. We are not able to reject the hypothesis that there is no difference between both models. As an additional robustness test, we split the sample into successful and unsuccessful projects allowing all the coefficients to vary between both groups. We then performed the baseline regression with and without the funding goal. We confirm the main results in the paper as well as the result of the likelihood ratio test. (These tests are not reported due to space, but they are available upon request.)

B. Interviews with project owners from the Music category

Our analysis gives support to our claim about the informational mechanisms on crowdfunding, but one might question whether the results are due to a mere correlation or if there is a causal link between the campaign and the entrepreneurial decision of pursuing with the product release. In order to provide this causal link, we rely on a qualitative work

where entrepreneurs are asked directly about their decision-making process, an approach that allows us to assess project owners' objectives and motivations as well as explore an area with little preexisting data (Helper, 2000).

Participants were chosen according to the purposive sampling, which prescribes a selection according to criteria relevant to the research question(s). In the present case, mandatory characteristics were having run a crowdfunding campaign to produce a music album, having received support without having reached the goal.

We selected 142 individuals within this profile to receive a personal invitation either through email or through their Facebook account.[57] Seventeen participants were interviewed; a sample size consistent with past research investigating a theme that is close to ours: entrepreneurial failure (notably Singh, Corner and Pavlovich, 2015, N=12; Mantere, Aula, Schildt and Vaara, 2013, N=18). On average, the participants have collected 18% of their objective, with 17% being the minimum and 59% being the maximum. The average goal was $44,000 (minimum $3,500, maximum $200,000; see Table C.7 in Appendix C for the summary statistics of the interview sample).

An interview guide (Table C.8 in Appendix C) served as reference to cover similar aspects of interactions, enabling case comparison. However, we followed a more conversational mode (Patton, 1987) with the aim of leaving the participants at ease and gaining their trust (Beaud and Weber, 2011). Furthermore, *ad hoc* questions were asked when relevant (Mantere et al., 2013). Interviews were interpreted using content analysis, a technique that encourages the identification of themes and patterns arising from data collected during the interactions (Patton, 1987).

Table C.9 (Appendix C) brings results of the interviews allowing us to capture the informational aspects of crowdfunding. Three main aspects emerge in support to our claim about the informational aspects of crowdfunding. First, entrepreneurs interpret the support received from crowdfunding as a "validation" of their idea. For example, Interviewee #4 affirmed that the decision to set a crowdfunding campaign was a promotional effort – besides an attempt to raise money for a project for which there was no viable alternative at

[57] Note that failing a crowdfunding campaign can be frustrating (as our interviews confirm), and talking about this can be challenging. This situation leads to difficulty to reach individuals willing to discuss this experience, consistent with issues of accessibility in past research about entrepreneurial failure (Shepherd, Wiklund and Haynie, 2009; Singh et al., 2015).

the time. *"Kickstarter is like a stage, and it just lets everyone come and perform at this stage to what millions of people are looking at. (…) So there is this thing where either people think it is very good and then they support it or they think it is a waste of time. (…) Even though it did not give us a lot of idea of what I should be doing, it helped us seeing that we had a good project, but that maybe we took the wrong approach. (…) Clearly people like this format, it was not 100% wrong."*

Second, entrepreneurs can adapt production to match the market potential prior to commiting with fixed costs (consistent with Ellman and Hurkens, 2016). For instance, Interviewee #13 plans to scale down the production in this sense (see Appendix C, C.7 for further details).

Third, information is also used to decide not to release the product when the support in the crowdfunding was interpreted as a signal of not enough appeal, as in the case of Interviewee #1. "*You said 'here's my idea' and you shared with them and not enough people backed it and if that's the case then I think to do that same project again is real to not listen to the feedback you're getting from people who are essentially saying you know 'we don't think this is worth backing'; 'we are not as excited about it as you are'".*

Importantly enough, entrepreneurs manifested that they interpret each piece of information differently, as we claim in our theoretical framework. In general, the amount collected is associated with the project having a substantial value to the audience while the number of contributors indicates the size of the public interested in the idea.

The interviews also allow us to understand that, for some entrepreneurs, the informational aspects are present since the beginning of the campaign. In particular, four entrepreneurs affirmed that the decided to run a crowdfunding campaign (as opposed to choosing other methods of raising funds) to test the concept they had created.

As anticipated in our econometric model, alternative motivations to release an album after failing crowdfunding emerge from the interviews. In particular, entrepreneurs mentioned the willingness to show a track record in the market and production phase (the product was ready). These aspects, though, do not seem to account for the most part of the decision-making process, consistent with the quantitative results.

Another aspect entrepreneurs bring up is the possibility of directly contacting investors. This possibility, however, does not fully explain our results, and we provide evidence for this claim. Entrepreneurs who solicited direct donations collected 10% to 70% of the amount received during the campaign (which was already lower than the goal). This can be explained by the coordination problem they face: private donations do not allow investors to observe other individuals' decisions, and if they believe other contributors will not show up to secure enough investment for production, there may be crowding out from the campaign. Coordinating distinct types of agents is at the core of the existence of digital platforms (including the crowdfunding ones): they set price and regulation strategies as to "bring both sides on board" (Rochet and Tirole, 2003). In the case of crowdfunding platforms, regulation strategies include mechanisms to elicit investors to participate such as public information about past contributions (reducing uncertainty and information asymmetries) and the "all or nothing" rule (serving as a commitment device that the investor will not be charged unless enough capital is secured). These mechanisms are absent if the entrepreneur sets a private account to receive money.

Data from our samples provide further support for this claim. When failing the campaign, entrepreneurs do not receive a list with contacts of contributors (this was confirmed by one of the participants in the interviews in the qualitative section), and they rely on updates on their campaign page to contact these potential investors. Most of entrepreneurs in the sample (54%) never updated their respective pages, and most of those who wrote updates did it in the beginning or in the middle (88%) of the campaign whereas updates that refer to direct contact would happen at the end. Entrepreneurs who update at the end or after represent 12% the total observations who update, and 5% of the sample. This analysis suggests that even if some entrepreneurs directly contact investors, this does not seem to account for the major part of the release decisions.

C. Sample from the Design category

In order to test for external validity in terms of project category, we built a new sample with successful and unsuccessful projects from the Design category, which displays, for example, high-tech products, sports equipment, home appliances, toys, and personal

accessories. The Design category is responsible for some of Kickstarter's most popular items such as the Pebble watch (a smartwatch having collected US$20,338,986 from 78,471 contributors) and the Coolest Cooler (a portable cooler with built-in blender having collected US$13,285,226 from 62,642 supporters).

The average goal of the Design category is three times higher than the one for the Music category (US$17,698 and US$5,537, respectively, according to Mollick, 2014). We collected information for 509 projects, 215 successful and 356 unsuccessful, with estimated delivery from September 2014 to December 2015 (the summary statistics for the Design category are presented in Table C.10 in Appendix C).

We adapt the empirical model to account for specificities of this category. For example, we include location as a control – due to the nature of the products; the incentives to release after failing to reach the crowdfunding target might be more dependent of being collocated with manufacturers, distribution channels, and potential consumers. The variable we use is the Metropolitan Statistical Area (MSA) corresponding to the city reported on the Kickstarter project (or the closest MSA, if the location does not belong an MSA). We use a similar econometric model as the one presented in Section 3, with the adaptations mentioned. Table 3.6 shows the results without the projects that did not collect anything (like in the Music sample).

The coefficient of *fail*percentage obtained* is positive and statistically significant at the 1% level while the coefficients for the interaction terms containing the other information proxies are not significant. This suggests that the informational aspect is present in the Design category, but in a distinct manner as compared to the Music category: in the former, fixed costs are less flexible and entrepreneurs face non-negligible marginal costs. These characteristics can explain the greater importance of being closer to the original goal – therefore the significance of the interaction term of *fail* with percentage obtained. The results also highlight the importance of considering the specificities of each category not only in the econometric model (as we did by introducing the MSA for Design projects) but also to interpret the results.

Table 3.6: Probit for the Design category sample. Dependent variable: released.

	(1)	(2)	(3)	(4)
Fail	0.519	-1.128	-2.417***	-1.265***
	(1.874)	(0.723)	(0.880)	(0.247)
Fail*Log(Collected+1)	-0.130			
	(0.177)			
Log(Collected+1)	0.357**			
	(0.165)			
Fail*Log(Supporters+1)		0.0192		
		(0.128)		
Log(Supporters+1)		0.144		
		(0.109)		
Fail*Log(Av.Col+1)			0.226	
			(0.178)	
Log(Av.Collected+1)			0.0534	
			(0.148)	
Fail*PercentageObtained				1.040***
				(0.385)
Percentage Obtained				0.175*
				(0.090)
Fail*Prod. Phase	0.0155	-5.54e-05	0.0165	-0.015
	(0.072)	(0.070)	(0.070)	(0.071)
Production Phase	-0.0474	-0.045	-0.044	-0.036
	(0.0591)	(0.058)	(0.057)	(0.059)
Log(FB Friends)	-0.0935	-0.0706	-0.067	-0.061
	(0.058)	(0.056)	(0.055)	(0.055)
Sentiment	Yes	Yes	Yes	Yes
Word count	Yes	Yes	Yes	Yes
Number videos	Yes	Yes	Yes	Yes
Spelling	Yes	Yes	Yes	Yes
MSA	Yes	Yes	Yes	Yes
Category	Yes	Yes	Yes	Yes
Constant	-2.314	0.447	1.007	0.920**
	(1.834)	(0.772)	(0.848)	(0.464)
Observations	487	487	487	487
LR chi2	(11)137.83	(11)125.08	(11)126.31	(11)134.19
Prob > chi2	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.2042	0.1853	0.1871	0.1988

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

6 Conclusion and Discussion

Entrepreneurs and creators have been turning more and more towards crowdfunding as an alternative to finance their innovative projects. In this paper, we showed evidence that crowdfunding is also an informational mechanism, providing feedback about the presented ideas in a sort of incentive-aligned mechanism.

We departed from the hypothesis that crowdfunding contributors reveal their valuation of projects when deciding whether or not to contribute to the campaign, and at which amount. In this context, allocations provide information about the how the "crowd" values the project, and entrepreneurs can use this information to decide on the product release. One issue is that such decision can also come from the mere access to capital. In order to disentangle it from information, we benefited from the "all or nothing" rule on crowdfunding platforms. This rule conditions access to capital to reaching a given financial threshold. We then focused on entrepreneurs who received support during their campaign, but who did not reach their goal, remaining unfinanced. We showed that the likelihood of releasing the product in the market increases with the contributions to unfinanced entrepreneurs, which we interpreted as evidence of the informational mechanism we hypothesized.

We run two robustness tests for our results. The first one aimed at providing a causal link between the informational aspect and the decision to release. We interviewed entrepreneurs who did not succeed on crowdfunding in order to understand whether and to which extent the informational aspect played a role in their decision (of releasing or not) after the campaign. This strategy allowed to assess project owners' objectives and motivations as well as explore an area with little preexisting data (Helper 2000).

With this approach, we were able to identify the informational aspect in three main ways. First, crowdfunding contributions encouraged entrepreneurs to pursue the project if they consider there is enough market potential for the product. Second, the campaign informed entrepreneurs about the need to adapt the projects according to the response from campaign, a behavior consistent with predictions in Ellman and Hursken (2016). Third, crowdfunding warranted entrepreneurs of not enough interest for the project, in which case they abandoned it prior to incurring fixed costs. During the interviews, a part of

entrepreneurs also highlighted that their choice to go crowdfunding was, in the first place, linked to the idea of testing the market besides obtaining capital. Although this is an informational aspect we do not explore in our setting, we consider it can inform future studies.

The second robustness test aimed at providing external validity in relationship to categories. Our objective was to understand whether our results could be extended beyond the Music category used in our main study. We then performed the same econometric test on a sample of projects in Design (high-tech gadgets, home appliances etc.). The results suggest that the informational aspect is also present, but in a distinct manner: for these entrepreneurs, being able to get closer to the goal seems to be the most important element to consider. This is consistent with the fact that entrepreneurs in high-technology face higher fixed costs and non-negligible marginal costs.

We consider that our study provides contributions to the understanding of the uses of crowdfunding other than its primary objective of funding new projects, with empirical evidence to entrepreneurs that this mechanism can be used to test and validate their ideas on the Internet.

Limitations

Our study investigates the informational mechanism using a sample of unsuccessful project owners. While we infer that the results hold for successful project owners, we cannot conclude it from our study. Success is the most statistically significant variable in all the specifications and samples, suggesting that the primary goal of crowdfunding is to provide financial alternatives to entrepreneurs. The information proxies for successful entrepreneurs, however, are not statistically significant, a fact that can raise concerns about to which extent the informational aspect is present for these project owners or whether information is only important for unsuccessful entrepreneurs.

It is important to highlight that once the entrepreneurs have access to capital, other mechanisms that we are unable to control might be at work. First, there can be a reputational concern and once the project owner reaches the goal, the likelihood of

releasing is the same regardless of the level of support. Second, successful entrepreneurs with distinct levels of support may interpret the results differently. While reward-based crowdfunding campaign followed by a release on traditional channels can expand the market (Belleflamme et al., 2014), it is possible that very successful entrepreneurs, particularly those in categories like music or films, could see a substitution effect and adapt the strategy accordingly.[58] It is also possible that very successful project owners incur very long delay (of more than six months in relationship to the estimated delivery), which we noted as "not released".[59] We leave such issues for future research.[60]

Another limitation in our research refers to the method chosen to investigate the research question. Our approach aimed at understanding the entrepreneurial decision-making process by observing attitudes in the "real world" instead of using surveys asking the entrepreneurs about outcomes. While this procedure avoids self-selection and self-declared responses (and therefore *idealized persona bias* – where the respondent answers according to actions she would like to have taken, see, for example, Carpenter and Myers, 2010) – it also imposes limitations regarding causality. A complementary study was warranted to provide the causal link between our evidence and the real motivations of entrepreneurs. We decided to run a detailed qualitative survey as it could add substantial nuance to the quantitative analysis while accounting for unobserved explanations and motivations. At the same time we are convinced that qualitative study complemented nicely the quantitative approach – particularly in entrepreneurship field where qualitative approaches have been encouraged (Suddaby, Bruton, and Si, 2015), we are aware that this choice might suffer criticism (Helper, 2000).

[58] For example, Grammy award winner Kenny Loggins raised US$121,797 to record an album of his band Blue Sky Riders, which was distributed to contributors in September 2015, according to updates on the crowdfunding campaign page (and not contested on the comments by contributors). Remaining physical copies of album were available on the band's website, but the product was not made available on Amazon or iTunes, even if the previous albums were. The reasons for that go beyond the scope of this paper.

[59] For example, musician Paula Fuga (who has worked with names like Jack Johnson, and thus has a reputation) raised $27,797 in June 2014, and posted an updated in November 2015 with the title "Hang in there guys!! I haven't forgotten and No, I didn't rip you off!!" (update only available to supporters). Information from the artist's crowdfunding campaign available at kck.st/1jAq2UX. Last consulted on March 27, 2016.

[60] We must highlight that the project owners only commit to deliver rewards, not to release the product in the market – and we observe the release in the market, not the delivery of rewards. The literature suggests that fraud is rare but delays are common (see, for example, Mollick, 2014; Hauge and Chimahusky, 2016).

Avenues for future research

In this study, we aimed at the type of feedback coming directly from contributions. However, there are other types of feedback on crowdfunding platforms that may benefit entrepreneurs – in particular, feedback coming from comments and suggestions from potential consumers and community members. In the present paper, we did not explore this kind of feedback, leaving avenue for future research. Scholars interested in this aspect, however, should consider that contributors can comment after the project ends, and caution is warranted if one merely considers the number of comments as signal of feedback – a high number of comments can represent a high number of complaints once the product is received (instead of feedback in the project phase). This difficulty can be overcome by obtaining the timing of comments as well as their content. Text analysis approaches (as in Ghose et al., 2012, for hotel reviews) can be useful to sort contributors' inputs from other interactions.

In our setting, due diligence is minimal and barriers to entry are low compared to other crowdfunding models. It is possible that this platform design attracts entrepreneurs with more innovative – and riskier – projects, therefore benefiting more of feedback than entrepreneurs with less risky projects that go into platforms with higher barriers to entry and harder rules regarding due diligence. Whether and how the response from the "crowd" plays a role in these settings is an open question that can be explored in future research.

Our work relies on the investigation of entrepreneurs who failed on crowdfunding. Although we do not focus on the reasons of failure, we highlight that they can be diverse: optimism (consistent with the literature on entrepreneurship, see, for example, De Meza and Southey, 1996), lack of managerial or marketing skills, lack of potential public, to mention a few. Some of them are implicitly accounted for in our controls (for example, the potential public), but we cannot observe all the potential reasons for failure. We note that the literature on crowdfunding has enormously focused on success, and new research could explore not only distinct reasons for failure but also the learning process during the campaign, in line with the literature of entrepreneurial learning from failure (see, for example, Shepherd, 2003).

The present paper highlights one of the benefits of crowdfunding, which is the informational aspect. It adds to the literature on other benefits, particularly the availability

of alternative sources of capital (Kim and Hann, 2017).

One area that remains understudied is the other side of these benefits or the costs of crowdfunding. To the best of our knowledge, only Hui et al., (2012) and Agrawal, Catalini, Goldfarb, and Luo (2016b) explore this issue. During our qualitative assessment, all the entrepreneurs mentioned crowdfunding as a "full-time job", which seems to be one crucial drawback of this model of financing. New research could add to this work from a strategic perspective, as platforms eager to attract more entrepreneurs in order to generate network effects, and from a policy perspective, as policymakers seem interested in understanding the potential of crowdfunding to supply funds to entrepreneurial and artistic ventures.[61]

[61] For example, the European Commission launched a call for tender Pilot project on "Crowdfunding for the cultural and creative sectors: kick-starting the cultural economy". Available at ec.europa.eu/culture/calls/2015-eac-03_en. In a similar vein, the French Ministry of Culture launched the call for research propositions "Crowdfunding in the arts, culture and medias", to finance research projects that would help with the understanding of this new financial mode in the corresponding areas. Available at tinyurl.com/ministereculture. Last consulted on November 18, 2016.

Appendix C

Table C.1: Albums as sources of finance in the music industry.

In the music industry, revenue can come from many sources: music sales, concerts, advertisement agreements, and other ancillary goods (e.g., T-shirts, mugs etc.). Obtaining data from all these sources, however, is (nearly) impossible, and the data would remain largely imprecise. For example, if one considers adding the number of concerts, the revenue varies immensely according to the contracts model and venue size and type (e.g., theaters deal with musicians differently in comparison to cafés or bars). The control for concerts would soon become overwhelming and still largely imprecise, which also happens to advertisement placements or ancillary goods.

One way to circumvent this issue is to consider one activity that captures all the others and that would be comparable across genres and observations. In the music industry, the production of an album is central to a musician's or a band's career. First, it generates revenues, either directly (from downloads, streaming, or sales of physical copies) or indirectly, through informational spillovers (Hendricks and Sorensen, 2009, show that the release of new albums stimulates sales of old albums) or promotion for ancillary revenue-generating activities such as TV appearances, radio plays, and tours (Moreau and Curien, 2006; Byrne, 2012).

Furthermore, independent artists have more incentives to release new albums if the previous albums generated revenues of any sort, either directly or indirectly. I then consider that the number of albums captures, even if imperfectly, these revenue-generating activities.

The use of revenue generated from albums depends on the musicians' upstream contracts. When the musicians are under a major label, they typically received an advance (similar to a bank loan) from the label and this advance is recouped with album sales (Byrne, 2012). In the case of independent artists, there is no such constraint, so revenue generated from other activities and from past albums can be used to finance new albums. This assumption is confirmed with three interviews with two musicians and one executive of a major label (performed prior to the realization of this work for validation of the proxy).

Table C.2: Quality measures for crowdfunding projects.

Controlling for *ex-ante* quality is crucial in our setting: an entrepreneur who made more effort towards higher quality goods may have more incentives to release a product after a failed campaign, regardless of the informational aspect of crowdfunding.

The literature on crowdfunding considers the presence of a video as one of the measures of quality (see, for example, Mollick, 2014). We, therefore, include the variable "video" taking the value one if the project displays a video, and zero otherwise.

We also include variables to account for the text quality, following the literature on crowdfunding (Mollick, 2014; Gao and Lin, 2016), and on entrepreneurship (Chen et al., 2009; Ghose et al., 2012). In particular, the latter suggests that text conveys information on the entrepreneur's trustworthiness and the project's quality.

Pitches on Kickstarter are less standardized than in the lending-based crowdfunding analyzed in Gao and Lin (2016), and many projects only provide texts within pictures, schemes, prototype drawings, posters etc. However, every project displays text in the title, in the short description, and in a mandatory section called "risks and challenges". We, therefore, use the texts in these three sections to measure text quality. In particular, we consider that describing risks and challenges in a pitch requires planning ahead, anticipating potential problems and suggesting the respective solutions. Assuming that higher quality projects are also more carefully planned, the description of risks and challenges provides a proxy for the quality of the pitch.

We use three measures of text quality. The first one is spelling errors (as in Mollick, 2014; Gao and Lin, 2016). The second one is the number of words in the "risks and challenges" section. The third one is the objectivity in the "risks and challenges" section. Information objectivity in texts is used in a wide range of situations as a measure of trustworthiness and quality – from venture capitalists assessing entrepreneurs' quality via business plans (Chen et al., 2009) to hotel review readers making travel plans (Ghose et al., 2012). Furthermore, more objective texts are more likely to be based on facts (Metzger, 2007).

In order to measure objectivity, we adopt the MPQA Subjectivity Lexicon (Hoffmann, Wilson and Wiebe, 2005), which categorizes texts into negative, neutral, and positive, and attributes to each one an index according to the degree of polarity. The index ranges from 0 to 1, with 0.5 corresponding to a perfectly neutral text. The closer to zero, the more negative the text; and the closer to one, the more positive it is. Neutral texts are considered objective while negative or positive texts are considered subjective. This approach is similar to Gao and Lin (2016).

For example, the sentence "*To ensure the final product is convincing, we have hired a professional audio engineer to 'place' the players in the same sonic space as our virtual orchestra and master the tracks to the highest quality attainable."* takes the value 0.59 and is considered neutral (therefore objective) whereas the sentence *"we are very good at doing this"* takes the value 0.79 and is considered positive (therefore subjective).

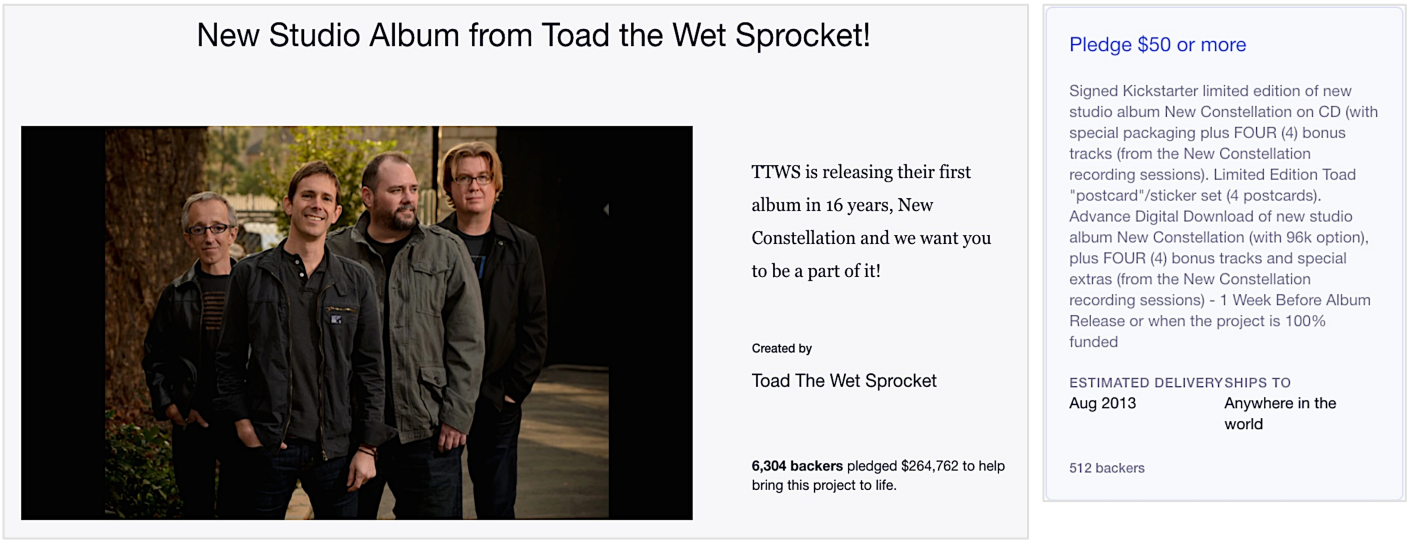

Figure C.1: Toad the Wet Sprocket's Kickstarter campaign and one example of rewards in detail.

Figure C.2: Toad the Wet Sprocket's crowdfunded album on Amazon.

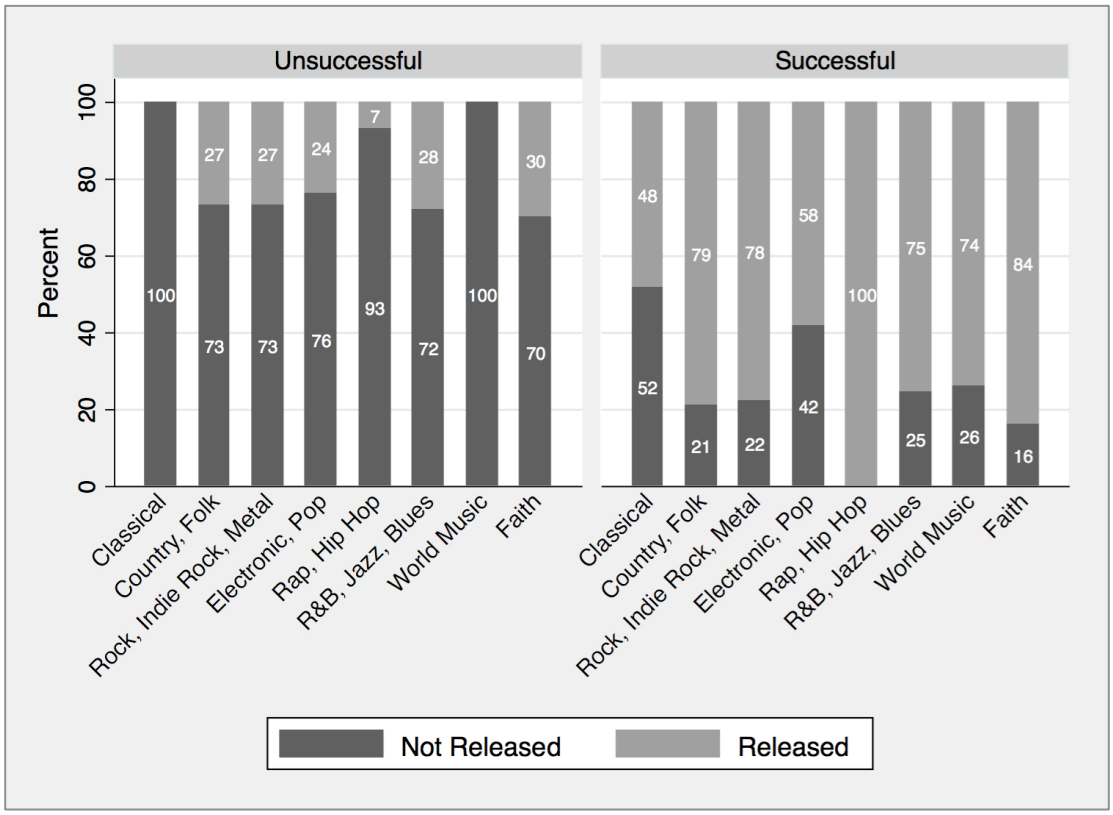

Figure C.3: Distribution of albums released by genre and crowdfunding outcome.

Table C.3: Probit[62] for the Music category including projects that did not collect anything. Dependent variable: Released.

	Log(Collected+1)		Log(Supporters+1)	
	(1)	(2)	(3)	(4)
Fail	-3.203***	-2.587***	-1.753***	-1.530**
	(1.025)	(1.001)	(0.560)	(0.613)
Fail*Log(Collected+1)	0.271**	0.209*		
	(0.116)	(0.111)		
Log(Collected+1)	-0.182*	-0.122		
	(0.110)	(0.104)		
Fail*Log(Supporters+1)			0.246*	0.212*
			(0.127)	(0.124)
Log(Supporters+1)			-0.0305	0.00421
			(0.0991)	(0.0952)
Fail*Previous Albums	0.0244		0.0335	
	(0.0707)		(0.0709)	
Previous Albums	0.0826**		0.0670*	
	(0.0392)		(0.0384)	
Fail*First Album		-0.0446		-0.0373
		(0.261)		(0.260)
First Album		0.287**		0.271**
		(0.133)		(0.133)
Fail*Prod. Phase	-0.005	-0.002	-0.005	-0.002
	(0.040)	(0.039)	(0.040)	(0.039)
Production Phase	-0.0602***	-0.0598***	-0.0624***	-0.0620***
	(0.0217)	(0.0215)	(0.0215)	(0.0214)
Log(FB Fans)	0.0623	0.0645	0.0455	0.0452
	(0.0410)	(0.0406)	(0.0407)	(0.0403)
Video	0.309	0.285	0.265	0.244
	(0.306)	(0.306)	(0.305)	(0.305)
Spelling	0.0276	0.0396	0.0235	0.0347
	(0.080)	(0.080)	(0.081)	(0.081)
Sentiment	0.105	0.0586	0.0739	0.0381
	(0.150)	(0.149)	(0.150)	(0.149)
Genre	Yes	Yes	Yes	Yes
Constant	1.605*	0.776	0.272	-0.158
	(0.970)	(0.900)	(0.548)	(0.528)
Observations	707	707	707	707
LR chi2	(19)205.26	(19)201.75	(19)204.77	(19)202.90
Prob > chi2	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.2246	0.2208	0.2241	0.2221

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

[62] Qualitatively similar estimation results are obtained with a Logit model or a Linear Probability Model.

Table C.4: Probit for the Music category including projects that did not collect anything. Dependent variable: Released.

	Log(AvCol+1)		Percentage Obtained	
	(1)	(2)	(3)	(4)
Fail	-2.411***	-2.387***	-1.228***	-1.132**
	(0.756)	(0.814)	(0.411)	(0.518)
Fail*Log(Av.Col+1)	0.302*	0.282*		
	(0.158)	(0.158)		
Log(Av.Collected+1)	-0.229*	-0.223		
	(0.139)	(0.139)		
Fail*PercentageObtained			1.588***	1.578***
			(0.601)	(0.601)
Percentage Obtained			0.141	0.154
			(0.200)	(0.198)
Fail*PreviousAlbums	0.0568		0.0391	
	(0.0693)		(0.0722)	
Previous Albums	0.0607*		0.0603	
	(0.0365)		(0.0368)	
Fail*First Album		0.0727		-0.0387
		(0.258)		(0.260)
First Album		0.262**		0.263**
		(0.133)		(0.133)
Fail*ProductionPhase	-0.0038	-0.0003	-0.0036	-0.0007
	(0.0389)	(0.0387)	(0.0391)	(0.0389)
Production Phase	-0.0617***	-0.0611***	-0.0619***	-0.0612***
	(0.0216)	(0.0214)	(0.0216)	(0.0214)
Log(FB Fans)	0.0464	0.0492	0.0400	0.0425
	(0.0390)	(0.0376)	(0.0392)	(0.0381)
Video	0.245	0.237	0.247	0.237
	(0.303)	(0.303)	(0.304)	(0.305)
Spelling	0.0255	0.0388	0.0291	0.0391
	(0.0804)	(0.0804)	(0.0819)	(0.0818)
Sentiment	0.119	0.0782	0.0959	0.0634
	(0.150)	(0.149)	(0.150)	(0.149)
Genre	Yes	Yes	Yes	Yes
Constant	1.143	0.834	-0.00430	-0.312
	(0.756)	(0.766)	(0.469)	(0.473)
Observations	707	707	707	707
LR chi2	(19)201.47	(19)199.31	(19)207.52	(19)206.09
Prob > chi2	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.2205	0.2181	0.2271	0.2256

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

Table C.5: Probit for unsuccessful projects in the Music category.
Dependent variable: Released.

	(1)	(2)	(3)	(4)
Log(Collected+1)	0.272***			
	(0.072)			
Log(Supporters+1)		0.447***		
		(0.116)		
Log(Av Col +1)			0.302**	
			(0.133)	
Percentage Obtained				2.375***
				(0.679)
Previous Albums	0.0856	0.0790	0.0983	0.0775
	(0.063)	(0.064)	(0.060)	(0.066)
Production Phase	-0.071*	-0.065*	-0.063*	-0.064*
	(0.038)	(0.037)	(0.036)	(0.036)
Log(FB Fans)	-0.009	0.006	0.0178	0.015
	(0.080)	(0.078)	(0.077)	(0.077)
Spelling	0.062	0.0365	0.0686	0.0591
	(0.130)	(0.132)	(0.125)	(0.133)
Word count risks and challenges	-0.005**	-0.005**	-0.004**	-0.006**
	(0.003)	(0.002)	(0.002)	(0.002)
Sentiment index	-0.254	-0.421	-0.108	-0.223
	(0.355)	(0.356)	(0.347)	(0.351)
Video✤	--	--	--	--
Constant	-1.545**	-1.053*	-1.281*	-0.433
	(0.677)	(0.611)	(0.705)	(0.580)
Observations	157	157	157	157
LR chi2	(12)28.99	(12)28.99	(12)18.25	(12)25.73
Prob > chi2	0.0040	0.0040	0.1082	0.0117
Pseudo R2	0.1526	0.1526	0.0961	0.1355

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. ✤Dropped due to collinearity

Table C.6: Probit for successful projects in the Music category.
Dependent variable: Released.

	(1)	(2)	(3)	(4)
Log(Collected+1)	-0.150			
	(0.103)			
Log(Supporters+1)		-0.0474		
		(0.102)		
Log(Av Col +1)			-0.177	
			(0.142)	
Percentage Obtained				0.101
				(0.204)
Previous Albums	0.0752*	0.0601	0.0558	0.0543
	(0.0396)	(0.0387)	(0.0373)	(0.0374)
Production Phase	-0.061***	-0.064***	-0.063***	-0.064***
	(0.0219)	(0.0217)	(0.0218)	(0.0217)
Log(FB Fans)	0.0943*	0.0681	0.0564	0.056
	(0.051)	(0.050)	(0.048)	(0.048)
Spelling	0.0195	0.0226	0.0220	0.0232
	(0.121)	(0.121)	(0.122)	(0.122)
Word count risks and challenges	-0.0003	-0.0004	-0.0004	-0.0004
	(0.001)	(0.001)	(0.001)	(0.001)
Sentiment index	0.216	0.194	0.220	0.194
	(0.174)	(0.173)	(0.175)	(0.173)
Video	0.596*	0.524	0.504	0.497
	(0.339)	(0.336)	(0.333)	(0.334)
Constant	1.151	-0.345	0.621	-0.581
	(0.993)	(0.595)	(0.812)	(0.537)
Observations	517	517	517	517
LR chi2	(14)41.05	(14)37.61	(14)40.42	(14)37.66
Prob > chi2	0.0002	0.0006	0.0002	0.0006
Pseudo R2	0.0760	0.0696	0.0748	0.0697

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

Table C.7: Summary statistics for the interviews.

	Observations	Mean	SD	Min	Max
Collected	18	8311.5	6264.09	1467	21441
Goal	18	44268.75	54375.99	3500	200000
Perc. obtained	18	0.18	0.17	0.08	0.59
Supporters	18	95.625	52	22	240

Table C.8: Interview guide with the overall theme to be covered and the potential questions to motivate it.

Theme	**Question**
Reasons for crowdfunding	Why did you choose to run a crowdfunding campaign?
Campaign setting	How did you decide on the goal?
Campaign management	Who managed the campaign? How was the campaign? What happened at the end of the campaign?
Product release	Did you release the album? (Why?)
Adaptation	Did you have to adapt anything regarding the material you had in mind, the size, the costs etc.?
Campaign follow-up	Did you inform backers once the album was released?
Overall experience	Would you do it again? Why or why not?
Opinion on crowdfunding	What is your opinion on the idea of crowdfunding? *(Pros and cons…)*
Information	In your opinion, what was the most important indication of your crowdfunding campaign: the amount collected, the number of supporters, the average each supporter contributed with, or the percentage you obtained from your objective? What other aspects, if any, do you consider important?

Table C.9: Elements from the interviews with individuals from the Music sample.

Interview #*	Reason for CF (other than financial) Evidence	Released?	Motivations to release (or abandon)	Interpretation of motivations to release (or abandon)	How	Evidence of motivation to release (or abandon)
1	Community engagement "I could have done a version of it without crowdfunding, but I wanted to involve more people (...) the community aspect was really big for me."	No	Not enough interest	Information ("negative")		"You said 'here's my idea' and you shared with them and not enough people backed it and if that's the case then I think to do that same project again is real to not listen to the feedback you're getting from people who are essentially saying you know 'we don't think this is worth backing'."
2	Promotion "(…) to raise money, but also as a promotional tool."	Not yet	Resizing it	Adaptation		"It was an experience that allowed me to gage the attention of people. (...) So I got a lot of listens, and that was great. That was encouraging. (...) That was what pushed me."
3		Yes	Resized it	Adaptation	Negotiation with suppliers	"I met this guy when I was doing my video for Kickstarter. He records music, and he said 'well, I can record the album, what you can do is just however many CDs sell, just give me a percentage of that'."
4	Promotion "The first reason was that we needed the money and we did not have any. But Kickstarter is also a way to show your creativity (…)."	Yes	. Got motivated by the response . Resized it	Information ("positive"); Adaptation	Personal money; resizing	"They are willing to give that amount of money before seeing anything being made. I think to me, as an artist, it fills me. (...) So clearly people like this format, it was not 100% wrong. There was something wrong, but not 100%."
5		Yes	Passion	Passion	Negotiation with suppliers; personal money	"A producer, friend of mine, he was so passionate about this project…(...). And we spent so much time arranging these songs."
6	Test "(…) it became very obvious to me that lots of people were true fans, I thought that I could sort of test to what degree they were willing to support my music. And it was the only answer I had."	No	Not ready		Obtained part of the funds, but not enough to continue	"My fans who had pledged started writing to me telling me to switch to another platform and 'ask everyone to follow you there' .I changed the goal down (...) I made the ideas I had more humble to reflect the amount I received."
7		Yes	Completed the project	Production phase	Contact with investors; personal finance	"I had done that already in advance of doing the crowdfunding. It was ready. I only needed the money for promotion and release activities."
8		No	Not enough interest	Information ("negative")		"(...) there wasn't enough interest. We decided that it just didn't make a lot of sense to do that anymore, to do it and have moved on from that project."
9		Yes	Passion	Passion	Personal finance	"It was more than an artistic project, and a dream come true than it was anything else. So it was a passion project (…)."

Table C.9 (cont.): Elements from the interviews with individuals from the Music sample.

Interview #*	Reason for CF (other than financial) Evidence	Released?	Motivations to release (or abandon)	Interpretation of motivations to release (or abandon)	How	Evidence of motivation to release (or abandon)
10	Market test "(...) one is to get the money before one commits to action, and also to test the concept that actually."	No	Not enough interest	Information ("negative")		"I think people vote with their feet (...) If no one walks towards your crowdfunding project, you learn very quickly that something is not quite right about what are you doing."
11		Not yet	Ready			"We were going to do it regardless and it was costing money so we thought we trying to reduce the costs by trying to pre-selling CDs."
12		Yes	Fans who supported. Track record	Information ("positive"), track record	Contact with investors.	"Partially I released because of the support I got, because of people wanting me to make music, and partially because I was finishing a cycle and I felt it was important. My last album was released in 2007. People have been requesting it."
13		Not yet	Resizing	Adaptation		"I'm going to scale down the production to work, speaking frankly now, the process of just recording alone and hiring the musicians, so I'll manage to do it in an awesome budget."
14		Yes	Felt people liked it. Track record.	Information ("positive"), track record		"Putting your records or your recordings on iTunes, Spotify or whatever else, is a track record (...) leading hopefully to working with like a record label or someone that sees you (...) I felt people like my work. I didn't get the money because there wasn't enough time for me to reach people".
15		Yes	Got motivated by the response resized it	Information ("positive"), direct contact with investors	Contact with investors, resizing	"At the end of the campaign, we had mixed feelings: we were disappointed in not getting what we expected at the same time we were happy that people still participated, that there were people who wanted us to release the album."
16		Yes	Contact with investors	Information ("positive"), adaptation, direct contact with investors	Contact with investors, resizing	"It gave me the idea that people were interested and it compelled me to do something outside this particular crowdfunding campaign."
17		Yes	Contact with investors	Information ("positive and negative")	Contact with investors	"(...) for me it was a great experience to understand that I did great feedback from people supported, and people who didn't. (...) And it also made me closer with my patrons. They realized what I can do. And I saw who was really interested, I gained some new fans and followers. And at the end of the day, this is all that matters."

Table C.10: Summary statistics of the Design category sample.

All Sample	Obs	Mean	Std. Dev.	Min	Max
Released	509	0.501	0.500	0	1
Fail	509	0.621	0.486	0	1
Supporters	509	509.440	2967.655	0	62642
Collected	509	75217.460	629726.000	0	13300000
Average Collected	509	161.910	159.705	0	1289.41
Goal	509	66186.040	68140.970	20000	600000
Production Phase	509	1.383	2.035	0	14
Facebook Friends	509	725.020	764.058	2	4995
Successful Projects	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Released	193	0.798	0.403	0	1
Supporters	193	1201.238	4744.332	43	62642
Collected	193	180464.500	1015325.000	20042	13300000
Average Collected	193	171.718	144.667	26.29545	1007.396
Goal	193	36375.820	18423.620	20000	100000
Production Phase	193	1.466	1.735	0	8
Facebook Friends	193	864.731	821.487	2	4995
Unsuccessful Projects	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Released	316	0.320	0.467	0	1
Supporters	316	86.918	105.320	0	742
Collected	316	10936.860	15552.260	0	134986
Average Collected	316	155.919	168.170	0	1289.41
Goal	316	84392.910	80026.000	20000	600000
Production Phase	316	1.332	2.200	0	14
Facebook Friends	316	639.690	714.754	4	4981

Chapter 4. To crowdfund or not to crowdfund: Evidence from professional musicians in France

Jordana Viotto da Cruz*° Marc Bourreau* François Moreau°

Abstract

In this paper, we shed light on the potential barriers to the adoption of crowdfunding platforms by entrepreneurs. We posit that time-consuming activities related to crowdfunding campaigns represent a burden to entrepreneurs, who might then refrain from searching for capital under this model. We investigate this question using data from a survey of a representative sample of professional musicians in France. Our results suggest that individuals with lower income are more prone to adopt crowdfunding, in line with the primary objective of these platforms, but that individuals lacking managerial support – and therefore with less availability of time – are also less likely to use crowdfunding. We interpret this result as evidence of the tradeoff entrepreneurs face when deciding whether or not to use online fundraising as means to finance a new project, between the need of access to capital and the lack of time to perform the required activities to be successful on crowdfunding.

* Télécom ParisTech
° Université Paris 13 & Labex ICCA

1 Introduction

Over the last couple of years, crowdfunding has shown its potential to mitigate frictions in access to capital, providing entrepreneurs and creators with alternatives to bypass traditional sources of finance. Online fundraising can also contribute to reducing the uncertainty linked to innovation, serving as an incentive-aligned mechanism through which entrepreneurs learn about the "crowd's" valuation of their ideas. Such benefits have driven this model to an exponential growth, which in turn captured the attention of new firms, policymakers.

Despite its expansion, crowdfunding remains a complementary source of financing to traditional channels. This raises the following question: if crowdfunding provides so many benefits, why don't entrepreneurs adopt it massively as a means to raise capital? One possible answer is the presence of barriers to entry. While crowdfunding lowers the direct costs of capital (Agrawal, Catalini and Goldfarb, 2015),[64] entrepreneurs face barriers related to time-consuming activities, as running an online fundraising campaign requires numerous tasks, ranging from studying the market and the production costs, defining a financing goal, to complying with investors' payoff delivery. Entrepreneurs who have undergone online fundraising campaigns describe crowdfunding as a "full-time job", and some of them attribute their eventual failure to not having anticipated the amount of work needed (Viotto da Cruz, 2017).

This anecdotal evidence suggests that there is a tradeoff between the benefits of crowdfunding in terms of facilitated access to capital and the aforementioned barriers. Therefore, individuals who are budget constrained but who face high barriers to enter crowdfunding might be more prone to select another source of capital, and crowdfunding would be more viable to entrepreneurs who are able to reduce such barriers.

The present paper aims at shedding light on the tradeoffs determining entrepreneurial entry into crowdfunding. More particularly, we are interested in analyzing empirically what

[64] In equity-based crowdfunding, entrepreneurs face due-diligence and legal costs. But as we focus on reward-based crowdfunding, we abstract from this characteristic.

characteristics and professional practices of entrepreneurs are correlated with the decision to set up a crowdfunding campaign.

Past studies about crowdfunding have primarily focused on the dynamics of the campaign, but not on its antecedents. To the best of our knowledge, our paper is the first to examine the decision to enter into crowdfunding, as a function of personal and professional characteristics within a representative population.

We center our attention on the music sector, one of the most important industries in crowdfunding platforms worldwide (for example, it represents 14% of propositions among 15 categories on Kickstarter). The data comes from a survey collected from a representative sample of professionals in the French music industry. France is one of the prominent countries where crowdfunding has developed – it is the second country in transaction volume in Europe, and the third in number of platforms – as detailed in Section 2.

Individuals invited to engage in the survey are associated to Adami, the main professional musicians association in France. Only musicians having participated in an album commercialized by retailers can join Adami. The association is responsible for collecting royalties for its members (from radio airplay, TV broadcasts etc.) and redistributing them accordingly. Therefore, the incentive to join Adami is associated with the interest in having an income-generating activity from music (as opposed to a hobby). This is the reason why the musicians affiliated to Adami can be considered as artists-entrepreneurs, who need access to capital in order to release a new product or service in the market (Bacache-Beauvallet, Bourreau and Moreau, 2014; Agrawal et al., 2015).

In the survey run by GfK, one of the largest market research firms in Europe, participants were asked about their professional practices and characteristics. Our dependent variable is whether or not they have run a crowdfunding campaign in the past. The main independent variables are *income*, which serves as a proxy for access to capital, as it can be used directly (savings) or indirectly (through non-collateral loans, for example), and *support of a manager*, as managers can assume part or all of the campaign activities (we assume the costs with these professionals are sunk). We use two alternative variables for benefits and barriers to search for capital using crowdfunding. First, *contractual situation*, which works as a proxy for access to capital since labels are the main source of finance in the music industry. Second,

age as a proxy for barriers: younger individuals are more at ease with new technologies, incurring thus lower learning costs, while older individuals possess more experience in the sector, being more efficient in administrative tasks.

We calculate the coefficients of a Probit model with the main variables described above. Our results confirm our hypotheses. The probability of setting up a campaign increases when entrepreneurs are more budget constrained, in line with the idea that crowdfunding can alleviate a lack of access to capital. The probability to enter crowdfunding is also higher for individuals that can count on managerial support, suggesting that in the absence of a manager, i.e., when individuals are more time-constrained, there are higher barriers to perform a crowdfunding campaign. We also find that younger and older artists are more prone to use crowdfunding, in line with the idea that the former face lower technological barriers and the latter might possess more experience with administrative tasks. To sum up, our results suggest that crowdfunding constitutes an alternative to entrepreneurs lacking other sources of capital, but that barriers can refrain a number of individuals from using it.

We expect our paper to contribute not only to the literature on crowdfunding but also to the literature on the management of platforms. Crowdfunding is also perceived by policymakers as a promising alternative source of finance for innovators, creators, and entrepreneurs. Our results suggest that policymakers should consider that the potential of crowdfunding to provide alternative means of financing innovation can be limited by the indirect costs imposed to entrepreneurs.

The rest of the paper is organized as follows. In Section 2 we highlight the context of the study and review the related literature. Section 3 presents the theoretical framework and our hypotheses. We describe the data in Section 4. Section 5 presents the results, and Section 6 discusses them and concludes.

2 Context and literature

2.1 Context of the study

Crowdfunding has been exponentially growing over the last years. In France, for example, the country where we focus our study, the volume of transactions increased by 40% from 2015 to 2016 (see Figure D.1 in Appendix D). France is also the fifth country in the world in number of dedicated platforms.

The present paper focuses on reward-based crowdfunding,[65] where contributors can obtain non-monetary perks such as early access to new goods and special prizes in exchange for their financial support. In France, reward-based crowdfunding represented 27% of the total volume transacted in 2016, a similar rate of equity-based crowdfunding (30%).[66]

Most projects in reward-based crowdfunding are in culture, in particular films and music. As previously mentioned, music is one of the most important categories in crowdfunding platforms worldwide in terms of number of projects (for example, it represents 14% of propositions among 15 categories on Kickstarter). In France, projects in the Music category received a total of €16 million in the two leading platforms (KissKissBankBank and Ulule[67]) between their inception in 2010 and November 2016. The transaction volume of music projects represents around 10% of the total on each website, placing the category in first and third places in importance in total amount collected, respectively.

[65] Four main crowdfunding models coexist: 1) in the reward-based model, contributors receive non-monetary compensations for their financial support; 2) donation-based crowdfunding facilitates private contributions to public goods; 3) in lending-based crowdfunding, investors supply funds to individuals, groups or companies, expecting to be reimbursed after a given period, with or without interest rates; 4) finally, in equity-based crowdfunding, investors become startup shareholders.

[66] According to the French Crowdfunding Association (Financement Participatif France): financeparticipative.org. Data available at financeparticipative.org/wp-content/uploads/2017/02/Barometre-CrowdFunding-2016.pdf. Last consulted on July 16, 2017.

[67] Data available on the platforms' statistics pages, respectively available at www.kisskissbankbank.com/fr/stats and fr.ulule.com/stats. Last consulted on November 14, 2016.

2.2 Related literature

Entrepreneurs searching for financial resources face barriers due to direct and indirect costs of access to capital. Direct costs are related to taxes, interest rates, or other fees, and might be present at any stage of the firm for several types of financial sources. Nanda (2008) uses a tax reform in Denmark as an exogenous variation in the cost of access to capital to study the likelihood of individuals to start a new business, and shows that these costs affect entry into entrepreneurship. Aggarwal and Rivoli (1991) show that the costs of an initial public offering (IPO) can be quite substantial, particularly for smaller firms, suggesting that premature IPOs are inefficient.

Indirect costs, which are generally transaction and opportunity costs, also affect entrepreneurial decisions in several stages of the firm. Li and Ferreira (2011) suggest that in countries where corruption is more widespread, the costs of seeking capital in formal institutions with enforceable contracts (e.g., financial service firms) are higher, which leads entrepreneurs to informal alternatives with non-enforceable contracts (e.g., family, friends). Hsu (2004) provides evidence of opportunity costs incurred when entrepreneurs pay a premium (in the form of foregone marginal valuation) for affiliating with more prominent venture capitalists.

Time-consuming activities also impact negatively entrepreneurship. Bruno and Tyebjee (1985) provide evidence of time-consuming activities, showing that, on average, entrepreneurs take 4 to 5 months to find investors, a period that can be longer for first-time entrepreneurs. In a similar vein, Denis (2004) points out that when venture capitalists are closely involved in the firm, entrepreneurs face the costs of having reduced decision and control rights as well as more time-consuming activities (such as more meetings with the investors).

Our work is closely related to this stream of literature, as crowdfunding campaigns require the allocation of limited resources of time and attention of entrepreneurs (Ellman and Hurkens, 2016). The time to perform "mundane tasks" impacts the entry of entrepreneurs in crowdfunding – for example, when there is a school break in a city with a university, the number of entries in a crowdfunding platform considerably increases, as large blocks of free time make it easier to perform these activities (Agrawal, Catalini, Goldfarb and Luo,

2016b). Entrepreneurs need to allocate greater amount of time to succeed, as the time dedicated to campaigns is their success (Hui et al., 2012).

We also relate to papers investigating the benefits of crowdfunding, as they represent the incentives against which entrepreneurs need to evaluate the aforementioned costs. One of the main advantages of crowdfunding is the mitigation of geographical frictions in comparison to access to investors through traditional channels. This enables reaching investors that live farther from the entrepreneur – for example, while the mean distance between entrepreneurs and investors in crowdfunding is of 5,000 km, it is 120 km in a traditional venture capital setting (Agrawal et al., 2015). Therefore, online financing platforms disproportionally benefit small cities in relationship to traditional capital sources (Kim and Hann, 2017), and individuals living in areas less well served by financial services.

In most platforms, access to crowdfunding is conditional on reaching the financial goal established in the beginning of the campaign, placing the "success" on attracting enough capital on a central spot in crowdfunding (see, for example, Mollick, 2014). This explains the prolific number of studies about the determinants of success, such as quality signals and network size (see Belleflamme et al., 2015; and Viotto da Cruz, 2015 for literature reviews). In this regard, a large portion of the literature is interested in the investors' decision, and only a few papers have turned to the entrepreneurs' side. In this sense, our work adds to the latter strand of studies. Signori and Vismara (2016) quantify the return on investments in equity crowdfunding, highlighting the determinants of post-campaign outcomes (e.g., exits, new funding rounds). Ellman and Hurkens (2016), Strausz (2017) and Chemla and Tinn (2017) develop theoretical models with the idea that crowdfunding complements traditional financing sources, as entrepreneurs can learn about the "crowd's" valuation about their product. Xu (2017), Leboeuf (2017), Ryu and Kim (2016) and Viotto da Cruz (2016) provide empirical evidence on the learning effect of crowdfunding.

Finally, as we explore the music industry considering musicians as artists-entrepreneurs who eventually search for capital to develop a new product or service, our paper is also related to the study by Agrawal et al. (2015), who explore a sample of crowdfunded musicians to investigate the importance of social network and geographical location in the campaign outcomes.

3 Theoretical framework and hypotheses

The objective of the present paper is to study the determinants of the decision to run a crowdfunding campaign. We begin with the main objective of these platforms, which is to provide monetary support to individuals and firms lacking other forms of access.

As highlighted in the literature review, the main benefit from crowdfunding is to provide access to capital to individuals lacking other sources of financing. The literature relates the lack of access to capital to geographical location, i.e., individuals living in areas with lower concentration of bank branches are more likely to search for crowdfunding. In our work, we relate the lack of access to capital to income. Individuals with lower income possess less available cash to use directly on a project. They are also less likely to obtain a non-collateral loan. Our first hypothesis is then:

H1a: Artists with lower income will be more likely to participate in crowdfunding.

In the context of our study, another form of loan comes from labels. They can grant an advance to musicians to be recouped from product sales (Byrne, 2012). Individuals who are not under a label contract (i.e., independent artists) may thus be more reliant on finding alternative sources of finance. From this stems our next hypothesis:

H1b: Independent artists will be more likely to participate in crowdfunding than artists under contract with a label.

Besides lack of income, professionals in entrepreneurial ventures may lack information about the potential of their project. In the context of the music industry, one way to assess the potential of an artist is through their popularity. Although we do not have direct information on the popularity of the artists, we have data about whether they have obtained a music award. As awarded artists tend to be more popular than non-awarded artists, we posit that the latter will be more likely to search for alternatives on crowdfunding. We write our next hypothesis as:

H1c: Less popular artists will be more likely to participate in crowdfunding than more popular artists.

If crowdfunding alleviates frictions in the access to capital, it also imposes barriers. Based on the existing literature, we consider that the highest barriers to crowdfunding concern the time-consuming activities associated to it, such as studying the market and the production costs so as to define the goal, creating a pitch (which often means producing multimedia material such as videos and photos), defining rewards to contributors, managing the campaign's page, mobilizing one's social network, and complying with investors' rewards delivery. We posit that the probability of entering into crowdfunding increases when potential barriers decrease.

One way to reduce these time-related barriers is by counting with a manager. The reduction of barriers in this manner can happen either directly, with third parties assuming the campaign activities, or indirectly, with these third parties taking responsibility for other administrative tasks in the firm, while the entrepreneur dedicates to the crowdfunding campaign. Therefore, we hypothesize:

H2a: Artists with managerial support will be more likely to participate in crowdfunding.

Age (and therefore experience) is also related to barriers to entry in crowdfunding. On the one hand, less experienced (younger) individuals are less risk-averse and therefore more prone to go to entrepreneurship. Furthermore, crowdfunding is an Internet-based new business model that tends to attract younger individuals. On the other hand, older individuals enjoy more solid social and professional network, which is important to the venture success. Running a crowdfunding campaign indeed relates to entrepreneurship, and an artist's experience, usually measured by her age, is known as an important determinant of entrepreneurship (see, for example, Parker, 2009). Our hypothesis is a non-linear relation between experience (as measured by age) and the participation in a crowdfunding campaign. Our last hypothesis then writes:

H2b: Both younger and older artists will be more likely to participate in crowdfunding, relative to artists in intermediate age groups.

4 Empirical model and data

We use data from a survey performed among members of Adami, the main professional musicians association in France and run by GfK, one of the largest market research firms in Europe. Only musicians having participated in an album commercialized by retailers can join Adami. The association is responsible for collecting royalties for its members (from radio airplay, TV broadcasts etc.), and redistributing them accordingly. Therefore, there are strong incentives for an artist to join Adami and we are confident that professional musicians in our sample are somehow entrepreneurs who need access to capital in order to release a new product or service in the market.

In the survey, participants were asked about their professional practices and characteristics. For example, they answer whether they have run a crowdfunding campaign in the past. The response to this question constitutes our dependent variable, a dummy taking the value 1 if they respond "yes" and 0 otherwise. The main independent variables are *LowIncome*, which serves as a proxy for access to capital, as it can be used directly (savings) or indirectly (through non-collateral loans, for example), and *Manager*, a dummy that takes the value 1 if the respondent benefits from the support of a manager and 0 otherwise. We use two alternative variables for benefits and barriers to joining crowdfunding. First, the contractual situation of the artist (*Contract*) is used as a proxy for access to capital, since labels are the main source of funding in the music industry. Second, *Age* serves as a proxy for barriers to entry into crowdfunding: younger individuals are more at ease with new technologies, incurring lower learning costs, while older individuals possess more experience in the sector, being more efficient in administrative tasks. We also use *Award* as a proxy for popularity. Table 4.1 sums up the main variables used.

Table 4.1: Main variables.

Crowdfunding	= 1 if the individual has run a crowdfunding campaign, and 0 otherwise.
LowIncome	= 1 if the individual has an annual personal income under €30k, and 0 otherwise.
Manager	= 1 if the individual has the support of a manager, and 0 otherwise.
Contract	= 1 if the individual has a contract with a record company, and 0 otherwise.
Age	Age of the respondent.
Award	= 1 if the individual has obtained a nationally recognized music award, and 0 otherwise.

We also include a set of control variables. The decision to run a crowdfunding campaign may be impacted by the location of the artist. Although crowdfunding mitigates geographical frictions, it still mimics geographical clusters. In France, cultural and economic activities are concentrated in Paris, so we posit that individuals living in Paris are more likely to run a crowdfunding campaign than those living in other areas. *Paris* is a dummy variable that takes value 1 if the artist lives in Paris or its closest suburbs, and 0 otherwise. The online presence of an artist is also supposed to have a positive impact on the decision to use crowdfunding. *Facebook* takes the value 1 if the artist owns a Facebook page specifically dedicated to her musical career. A legal training on music business can also impact the decision to crowdfund (*Legal* takes value 1 if the artist participated in a legal training, and 0 otherwise) as well as the education level (*HigherEducation* takes value 1 if she has a higher education certificate, and 0 otherwise). Finally, we also include dummy variables for gender and for musical genre (with eight genres distinguished: classical, jazz, pop-rock, French popular, world music, urban music, electro, other).

Table 4.2: Summary Statistics

Variable	Obs	Mean	SD	Min	Max
Crowdfunding	1,014	.107	.310	0	1
LowIncome	1,014	.750	.434	0	1
Contract	1,014	.232	.422	0	1
Award	1,014	.152	.359	0	1
Manager	1,014	.189	.392	0	1
Age	1,014	48.98	8.83	25	64
Paris	1,014	.401	.490	0	1
Facebook	1,014	.647	.478	0	1
HigherEducation	1,014	.350	.477	0	1
Legal training	1,014	.255	.436	0	1
Genre: classical	1,014	.145	.352	0	1
Genre: jazz/blues	1,014	.119	.324	0	1
Genre: pop/rock	1,014	.166	.372	0	1
Genre: popular music	1,014	.239	.426	0	1
Genre: world music	1,014	.130	.337	0	1
Genre: urban music (rap / hip hop)	1,014	.029	.167	0	1
Genre: electro	1,014	.036	.188	0	1
Genre: other	1,014	.136	.343	0	1
Female	1,014	.200	.400	0	1

In 2014 there were 9,000 musicians associated to Adami, and 7,500 were randomly selected to receive a form.[68] We obtained 1,239 responses, of which 1,014 were considered valid.[69] Table 4.2 displays the summary statistics of the used variable. Only 11% of the participants have already run a crowdfunding campaign, which can be explained by the fact that this is a nascent market and that not all individuals have online presence (only 65% are present on Facebook). It might also be an indication of the costs of crowdfunding, as we hypothesize.[70]

[68] 4,000 received a paper form and 3,500 received an online form.

[69] A response is considered valid when the respondent fills in all the questions. We also restrict the sample to artists who are less than 65 years old.

[70] Those who answered having participated on crowdfunding were also invited to respond questions about the campaign, including the platform they used for that. Based on their answers, we can affirm that all of the

In order to test our hypotheses, we calculate the probability of professional musicians to run a crowdfunding campaign given the access to capital and the potential barriers due to the (non) presence of a manager, controlling for individual characteristics. The decision to run a crowdfunding campaign is our dependent variable, and our main independent variables are the proxies for access to capital (income level and contractual situation) and for barriers (managerial support and age). We write our model as:

$$Pr(crowdfunding=1 \mid access\ to\ capital,\ barriers) =$$

$$= \Phi(\beta_1\ LowIncome_i + \beta_2\ Contract_i + \beta_3\ Manager_i + \beta_4\ Age_i + \beta_5\ (Age)^2_i + \beta_7\ Award_i + \psi),$$

where Φ represents the cumulative distribution function of the standard normal distribution, and the other variables are described in Table 4.1. The term ψ represents a vector of control variables including gender, location, main genre of the artist (e.g., pop, classical, jazz etc.), whether she participated in legal training, whether she has a higher education certificate, and the internet activities as measured by the presence on Facebook.

5 Results

The results of the Probit model presented in Section 4 are shown in Table 4.3. Table 4.4 displays the marginal effects for the main variables.

LowIncome is positive and statistically significant at the 1% level, suggesting that artists lacking personal finance or personal guarantees to request loans in traditional sources are more likely to select into crowdfunding. Therefore, we reject the null hypotheses for *H1a*. The probability of running a crowdfunding campaign increases by about 8 percentage points when the annual income of an artist is under €30k (Table 4.4).

artists used reward-based crowdfunding platforms, as it is usually the case for projects in the creative and cultural sectors.

The coefficient for *Contract* is negative and significant at the 5% level. This suggests that when an artist has a contract with a record company, she is less likely to run a crowdfunding campaign. We thus reject the null hypothesis for *H1b*.

Table 4.3: Probit model.

	Dependent variable: Participation on crowdfunding	
LowIncome	.465***	(.158)
Contract	-.282**	(.144)
Award	-.407**	(.201)
Manager	.329**	(.141)
Age	-.160***	(.060)
$(Age)^2$	.001**	(.001)
Paris	.210*	(.119)
Facebook	.511***	(.144)
HigherEducation	.027	(.124)
Legal training	.041	(.127)
Genre: classical	-.027	(.225)
Genre: jazz/blues	-.170	(.227)
Genre: pop/rock	-.039	(.198)
Genre: popular music	-.065	(.190)
Genre: world music	-.619**	(.251)
Genre: urban music	-.923**	(.415)
Genre: electro	-.329	(.328)
Genre: other	Ref.	
Female	-.197	(.152)
Constant	2.279	(1.406)
Observations	1014	
LR chi2	(18)79.15	
Prob > chi2	0.0000	
Pseudo R2 (McFadden)	0.1144	

Standard errors in parenthesis; ***p<0.01, **p<0.05, *p<0.1.

Table 4.4: Marginal effects.

LowIncome	.077***	(.026)
Contract	-.046**	(.024)
Award	- .067**	(.033)
Manager	.054***	(.023)
Age	-.026**	(.010)
$(Age)^2$	.0002**	(.000)

Standard errors in parenthesis; ***p<0.01, **p<0.05, *p<0.1.

The coefficient of variable *Award* is negative and statistically significant at the 5% level, suggesting that the popularity is negatively correlated with the probability of participating in crowdfunding, which can be explained by the fact that more popular artists tend to be able to count on external financing sources, and therefore rely less on crowdfunding. We thus reject the null for *H1c*.

As for the variable *Manager*, it is positive and statistically significant at the 5% level. This implies that musicians with the support of a manager may be more able to deal with the costs of a crowdfunding campaign, which would explain the greater likelihood of participating, in line with our hypothesis *H2a*. Table 4.4 shows that the probability of running a crowdfunding campaign increases by 5.4 percentage points for artists with managerial support in comparison to those without a manager.

As for *H2b*, *Age* is negatively correlated with the probability of using crowdfunding (1% significance), but this relationship is nonlinear as the quadratic term for *Age* is positive and statistically significant at the 5% level. Therefore, although the probability decreases up to a certain point, suggesting that younger artists are more prone to run a crowdfunding campaign, the probability increases from a certain age. This suggests that artists with distinct ages and experiences benefit differently from crowdfunding. This result supports *H2b*.

As far as control variables are concerned, we observe that the variable *Paris* is positive and statistically significant at the 10% level, in line with previous research connecting the probability to go crowdfunding to geography. As expected, the online presence through a

Facebook page is also highly correlated with the propensity to run a crowdfunding campaign.

6 Discussion and conclusion

The objective of this paper was to shed light on the determinants of running a crowdfunding campaign within a representative sample of artists. Understanding what practices and characteristics are associated with this decision helps us to analyze the incentives and disincentives to enter into crowdfunding.

Our results reflect the nature of crowdfunding as an alternative to individuals lacking access to other sources of capital. We find that artists with lower levels of income as well as those who are not under a contract with a record label (and therefore are not able to count on this financial support) are more prone to run a campaign.

Our main contribution to the literature concerns the barriers to crowdfunding. The main barrier refers to the time-consuming activities in a crowdfunding campaign, as it requires numerous tasks ranging from studying the market to creating the pitch and managing rewards delivery. In our study, we observe that the probability of running a crowdfunding campaign increases by more than 5 percentage points for individuals who have managerial support (and therefore can delegate these activities) in comparison to those who do not. We interpret this result as evidence of barriers to crowdfunding related to time-consuming activities. We also show that middle-age artists are the less prompt to run a crowdfunding campaign since they simultaneously face two barriers: they are more risk-averse and less at ease with digital tools than younger artists, and they do not benefit from the solid social and professional network and the experience of older artists that favor entrepreneurship.

Also in line with previous studies pointing out that crowdfunding follows traditional industry clusters, ours shows that individuals living in Paris are more likely to participate – the French capital is the cultural and economic center in the country, and it is therefore not surprising that there is a concentration of online fundraising activities.

We stress two main implications stemming from these results. The first one is managerial and concerns the platforms. As many other digital business models, crowdfunding platforms are two-sided markets coordinating transactions between two distinct types of economic agents (entrepreneurs and investors). Two-sided markets rely on indirect network effects (i.e., the demand on the one side depends on the demand on the other side) and on reaching critical mass on both sides in order to survive. Therefore, the adhesion of new entrepreneurs on one side of crowdfunding platforms is crucial to incentivize the investors' side to join, and vice-versa. If entrepreneurs perceive crowdfunding as an activity with greater costs than benefits, there might be a failure in creating this dynamic, which in turn would lead platforms to exit the market.

In recent years, platforms have adopted three main types of initiatives to reduce the barriers to run a campaign. First, they offer intensive training on how to run a campaign, aiming at reducing the entrepreneurs' learning curve. Second, they have set partnerships with service providers such as video makers and social media agencies to offer support to entrepreneurs in the administrative tasks of a crowdfunding campaign. To which extent these initiatives are efficient is an open question. However, they illustrate that time-consuming activities on the entrepreneurs' side are a burden for the development of platforms.

The second main implication concerns policymakers, who have shown interest in crowdfunding as an alternative source of finance for innovators, creators, and entrepreneurs – particularly in sectors that are historically budget constrained. Our results suggest that policymakers should consider that the potential of crowdfunding to provide an alternative to innovation seems to be limited by the barriers it imposes to entrepreneurs.

Appendix D

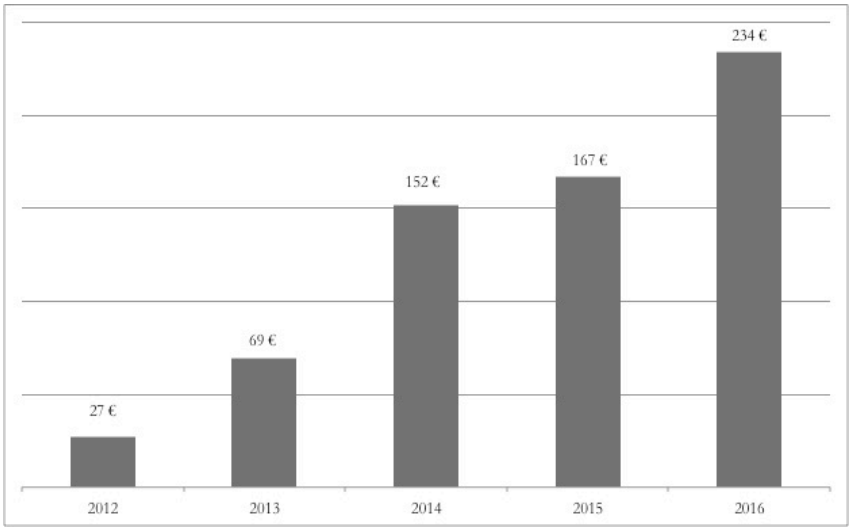

Figure D.1: Evolution of the volume of capital transacted on French crowdfunding platforms. Source: Financement Participatif France.

General Conclusion

The growth of information storage and processing capacity alongside with the widespread of Internet access and broadband enabled the emergence of a plethora of platform-based business models (or two-sided markets). The development and pervasiveness of two-sided markets attracted the attention of scholars in economics and management willing to understand their functioning, their boundaries, and their strategies.

One interesting aspect about platform-based business models is their activity as "private regulators" (Boudreau and Hagiu, 2009): instead of controlling production, interactions, or transactions, they coordinate supply and demand of these assets using price and non-price strategies.

This thesis contributes to the two-sided market literature, in particular to the empirical works focusing on non-pricing strategies using the context of crowdfunding platforms. It also adds to the crowdfunding literature, investigating incentives and disincentives for entrepreneurs to participate in crowdfunding markets.

In the present section, we summarize our results and present possible avenues for future research.

Platforms' strategies and competition

A large strand of the two-sided market literature underlines on pricing instruments and their role to "bring both sides on board". More recently, researchers have turned their attention to the role of non-pricing strategies (see, for example, Boudreau and Hagiu, 2009).

In our literature review (Chapter 1), we emphasize the empirical findings regarding the platforms' design to mitigate information asymmetries. Platforms' architecture facilitating the inclusion of promotional material such as videos and images allow entrepreneurs to send positive signals to potential investors or contributors.

More importantly, however, platforms leave information about past contributions visible to new contributors, enabling observational learning and "rational herding". These features account for low cases of fraud – particularly in the reward-based crowdfunding, where platforms exert less control and due diligence than in lending or equity-based crowdfunding models.

The analysis also highlights the challenges platforms are confronted with in relationship to the need to find solutions to balance critical mass and quality without prohibitively increasing the internal monitoring costs. The issue can be to be more pronounced when two (or more) platforms compete for single-homing agents.

The discussion led us to an empirical investigation about the question of "quantity versus quality" in platform competition, which is the theme of Chapter 2. The results of our empirical analysis show that reducing entry costs to attract more entrepreneurs not necessarily entails greater participation on the supporters' side due to the reduction of the average quality of entrepreneurs.

One potential alternative may come from the experience of platforms under other models, notably equity-crowdfunding. Although the dynamics of both types are quite distinct as well as the incentives of players on entrepreneurs' and investors' side, equity-crowdfunding platforms have benefited from the presence of reputable investors (Agrawal et al., 2016a; Kim and Viswanathan, 2016).

Empirical analysis on these platforms suggests that reputable investors guide inexperienced and unsophisticated investors but also provide monitoring and due diligence. Future work could dedicate to investigating whether reputable investors could increase high-quality entrepreneurs' participation. The intuition is that they play the role of the "marquee buyers" in Rochet and Tirole (2003), increasing the value of the platform to the other side of the market (in crowdfunding, for entrepreneurs), and generating a positive feedback loop, allowing reward-based crowdfunding platforms to develop without losing competitive advantage.

Another issue in platform competition concerns user preferences regarding their decision to join one or multiple platforms. The two-sided market theory predicts that competition and efficiency highly depend on whether agents multi-home or single-home. The results in

Caillaud and Julien (2003), for example, show that when agents single-home, efficiency is reached when all agents use the same platform.

In the case of crowdfunding, it is unclear whether the market benefits of competition or more efficiency would be reached with one dominant platform. From anecdotal evidence, we infer that project owners have incentives to single-home while the behavior of investors and contributors remain ambiguous. The comprehension of equilibrium and efficiency in crowdfunding market would then benefit from investigating the agents' preferences regarding the platforms they join, particularly on the investors' side.

Crowdfunding platforms and regulation

The donation and reward-based crowdfunding models are weakly regulated due to their non-pecuniary nature. In contrast, lending and equity-based crowdfunding might be obliged to follow regulations in the traditional financial sector. For example, in the US previously to the JOBS Act, equity-based crowdfunding was similar to traditional venture capital; only allowing accredited investors to participate.

In our Chapter 1, we offer a brief overview in the matter, as the literature is still narrow in the distinct regulatory framework, to the best of our knowledge. More thorough studies comparing the regulatory frameworks in distinct countries with their respective outcomes could benefit researchers and policymakers in the field.

Incentives and disincentives to join crowdfunding platforms

The second part of the thesis dedicated to the entrepreneurs' strategy, in particular their incentives and disincentives to join crowdfunding platforms. We were interested in the reward-based crowdfunding, a model where supporters are typically interested in specific projects, therefore the entrepreneurs' decision regarding which platform to join is crucial to the platforms' competition.

The main incentive to set a crowdfunding campaign is to obtain financing that would

otherwise be difficult (or impossible) to reach. The results from our econometric analysis of the dataset obtained from a survey with professional musicians in France, presented in Chapter 4, suggests that the lack of alternative sources of capital are the main drivers to search for crowdfunding.

Crowdfunding presents other benefits to entrepreneurs, as suggested in theoretical research: it can serve to obtain feedback about one's idea, reducing the typical uncertainty around the release of new products in the market. In our Chapter 3, we empirically test this hypothesis using data collected rom several publicly available Internet sources, and the results are in line with this hypothesis.

If crowdfunding presents a promise of alternative to being financed and to obtain feedback from the "crowd", it also poses barriers that can refrain entrepreneurs from using this funding model. Anecdotal and empirical evidence suggest that the main barrier for entrepreneurs is the allocation of scarce time and attention to campaigns (Hui et al., 2012; Ellman and Hurkins, 2016; Agrawal et al., 2016b).

One manner to reduce this barrier is by counting with managerial support. A manager can either assume the campaign activities or take responsibility for other administrative tasks in the firm, while the entrepreneur dedicates to the crowdfunding campaign. Therefore, counting with the support of a manager increases the likelihood of setting a crowdfunding campaign.

The results of the analysis in Chapter 4 support our hypotheses: the probability of running a crowdfunding campaign increases with the lack of access to other sources of capital and decreases with the lack of managerial support.

The development of crowdfunding platforms relies on the adhesion of new high-quality entrepreneurs, which in turn depends on the reduction of barriers to entry on the entrepreneurs' side. In recent years, platforms have adopted several initiatives aiming at attracting entrepreneurs and, at the same time, reducing the barriers.

The first type of initiative is the offer of intensive online and in-site training about several aspects of the campaign such as pitching and the production of promotional material. Secondly, they set partnerships with service providers such as video makers and social

media agencies to offer support to entrepreneurs in the administrative tasks of a crowdfunding campaign. New research could explore to which extent such initiatives reduce the barriers for entrepreneurs to join.

Finally, policymakers have shown interest in crowdfunding as an alternative source of finance for innovators, creators, and entrepreneurs in historically budget-constrained sectors. The results of our second part suggest that while offering an alternative to obtain financial support and information, crowdfunding imposes barriers that might refrain many entrepreneurs to use this alternative.

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