New Economic Windows

Paolo Tasca
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Nicolas Perony *Editors*

Banking Beyond Banks and Money

A Guide to Banking Services in the Twenty-First Century

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Introduction

Paolo Tasca, Tomaso Aste, Loriana Pelizzon and Nicolas Perony

Abstract New technologies are dramatically transforming our economic systems, and our society in general. The introduction of decentralised peer-to-peer technologies makes possible to initiate a new economy that is blurring the lines between consumers and producers, this technology shift is enabling a rapid transition towards what is known as the economy of collaborative commons: a digital space where providers and users share goods and services at a marginal cost rapidly approaching nil. In this book leading scholars, entrepreneurs, policy makers and practitioners are reporting from their different perspectives the unfolding technological revolution in banking and finance.

Keywords Crowdfunding · Distributed Ledger Technologies · Blockchain · P2P finance - Peer to Peer finance · e-finance · Fintech

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This book collects the voices of leading scholars, entrepreneurs, policy makers and consultants who, through their expertise and keen analytical skills, are best positioned to picture from various angles the unfolding technological revolution in banking and finance.

We stand on the brink of a fourth industrial revolution, which will fundamentally alter the way we live, work, and relate to one another. New technologies are dramatically transforming our economic systems, and our society in general, into something very different from what we were used to think about over the last few decades. The possibilities unlocked by billions of people collectively connected by mobile devices, with unprecedented processing power, storage capacity, and access to knowledge, are vast. The introduction of distributed ledger technologies makes possible to initiate a new economy that is blurring the lines between consumers and producers, this technology shift is enabling a rapid transition towards what is known as the economy of collaborative commons: a digital space where providers and users share goods and services at a marginal cost rapidly approaching nil (Rifkin 2014). These innovations will be further multiplied by emerging technological breakthroughs in fields such as machine learning, robotics, the Internet of Things, nanotechnology, biotechnology, materials science, energy storage and quantum computing.

In this context, traditional financial instruments, institutions and markets are rapidly becoming obsolete and inadequate to serve an increasingly globally interconnected online marketplace with an accelerating number of high-frequency transactions.

As technology progressed, the advent of the Internet era at the end of the last century opened the road to new financial services and markets. In Allen et. al 2002, the word e-finance was coined by Allen et al (2002). to include mobile and digital financial services such as online banking, Internet transactions and online trading. If, during that phase, the traditional brick-and-mortar banking model was somehow still able to keep its dominant role within the financial systems, now this position is challenged by new technology advances. The evolution, and combined use of, information communication technologies, cryptography, open source computing methods, time-stamped ledgers, and peer-to-peer distributed networks now afford end users direct, anonymous, disintermediated and secure access to assets, payments and financial services without the need to rely upon banks.

In recent years, we have started to move from e-finance to peer-to-peer (P2P) finance, defined by Tasca (2015) as: “the provision of financial services and markets directly by end users to end users using technology-enabled platforms supported by computer-based and network-based information and communication technologies”. The term P2P finance encompasses cryptocurrencies and blockchain-based financial applications, decentralised markets for lending, crowdfunding and other financial services, digital assets and wallets.

These technologies are fragmenting and dismantling some of the major banking services: Lending, deposits, security, advisory services, investments, payments and

currencies. These financial services, that were traditionally procured under one roof with a single point of control, can now be offered by decentralised platforms with limited or absent human interaction—one of the prerequisites and founding pillars of the brick-and-mortar banking model.

P2P finance is a new form of banking beyond banks and money, emerging as a consequence of the ongoing FinTech revolution characterized by a finance-focused trend of technology start-ups and corporations primarily focused on peripheral industries but increasingly interested in finance. A legion of technology companies in San Francisco, New York City, London, and elsewhere seized the opportunity offered by the dissatisfaction of banking customers and are now creating financial products and services that are beyond the capacity of banks to replicate. This new contingent of FinTech companies are not only capturing revenues that were traditionally banking profits (e.g., in payments or lending), but also experimenting with new data-led revenue streams for banking.

At the same time, although banks find it difficult to innovate mostly due of the burden of their legacy infrastructures, the traditional banking industry benefits from many years of experience with a large number of detailed regulations and operational procedures, providing the means to operate safely. No such framework currently exists for P2P finance which is a bottom-up phenomenon, based on fast-evolving technological advances. P2P finance is shifting the power from the traditional stakeholders to the end users, and the citizens in general, and creating new opportunities for entrepreneurs; in doing so it also introduces new risks and challenges for legal systems and risk management practices.

Similarly, in the twenty-first century we need the same banking services of the twentieth century, but the way we expect them to be delivered to us has dramatically changed, as we now leave in the digital age global communication and information sharing. In the first decade of the twenty-first century only, people connected to the Internet worldwide increased from 350 million to over 2.5 billion. The use of mobile phones increased from 750 million to over 6 billion. By 2025, if the current pace of technological innovation is maintained, most of the projected 8 billion people on Earth will be online (Schmidt and Cohen 2013). As long as the connectivity will continue to increase and become more affordable, by extending the online experience to places where people today don't even have landline phones, we envision a landscape where P2P finance will continue to invade and disrupt the financial mainstream. New forms of financial (dis)intermediations, new ubiquitous accesses to services and decentralised markets will emerge, which will fill gaps, create value and progressively substitute the traditional banking system.

This book constitutes a unique perspective on this technological and social revolution, as it is written by the people who are driving it. By presenting an overview of the new banking and money transfer models and, at the same time, addressing their challenges and threats, this collection of essays is meant to offer a guideline for the providers and the consumers of banking services in the twenty-first century.

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Classification of Crowdfunding in the Financial System

Loriana Pelizzon, Max Riedel and Paolo Tasca

Abstract The emergence of crowdfunding has attracted attention from borrowers, investors, banks and regulators alike. This chapter reviews its historical development, distinguishes between different business models, and discusses its disruptive potential and future growth prospects. Focusing mainly on lending- and equity-based crowdfunding, it further presents insights related to participants' behavior on crowdfunding platforms and regulatory advancements in different countries.

Keywords Crowdfunding regulation · Equity-based crowdfunding · Peer-to-peer lending

1 Emergence of Social Financing in the Digital Age

Digital technology has become a prerequisite for, and a constant companion of, new developments in our daily life and business activity. Internet, information communications technologies, data-driven technologies, modern analytical methods and virtual infrastructures penetrate into the daily life of every single household by changing consumer and investment behavior worldwide. Nowadays, anyone with access to the Internet can participate interactively in digital spaces. Flexible and varied relationships are formed between people and their diverse identities, both in the online and offline worlds. We are already living in the so-called economy of Collaborative Commons characterized by the prevalence of sharing over ownership. This major structural

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change mainly applies to products and services that can be easily standardized and automated, similar to the broad spectrum of services offered by traditional banks.

The rapid development from the early days of the Internet in the 90s to its current advancement towards the Internet of Things[1] is partly attributable to the emergence of the so-called Web 2.0. The term Web 2.0 was coined soon after the launch of the worldwide first crowdfunding platform ArtistShare in the US in 2003 and about one year before the pioneering peer-to-peer (P2P) lending platform Zopa was founded in the United Kingdom in 2005. The year 2004 became a turning point for Internet users. Being largely consumers of content in the 'old Web', users transformed into content creators. User interactivity, collaboration and the resulting content creation were the main characteristics of Web 2.0. As documented by Schwienbacher and Larralde (2010), Web 2.0 especially broadened the capabilities of small firms by allowing users' content to inflow and create value for the company. This technological advancement enabled the first P2P platforms to utilize the emerging momentum and popularity of various online social networks, while especially lending platforms took the simplicity and efficiency of credit scores to their advantage and managed to deal with loan applications at a speed that is close to real time.

The novel financing segment for consumers and small businesses grew from a niche to a sizeable market not until the 2008 Financial crisis. Many households, hit by huge financial pain, lost trust and confidence in the traditional banking sector (Gritten 2011) and withdrew from financial markets while looking for alternative sources to obtaining funds. Banks reduced their lending activity and capital stopped flowing from those who had it to those who were able to use it to grow businesses and create jobs, thus, prolonging the Great Recession. At the dawn of the emergency program loans and public bail outs, the reputation of the bankers was already significantly undermined in most of the western countries and their traditional role as credit providers has been criticized and put under spotlight of the public opinion, (Rose 2010; Stiglitz 2010). The post-crisis period was characterized by a low-yield environment such that investors became creative in identifying alternative investments and allocating their funds in new financial products.

Under this general context, the focus of both capital holders and capital seekers turned to alternative market infrastructures that were able to provide direct, disintermediated credit-lending relationships for households and businesses without the need of a single point of control (or failure).

2 The Many Facets of Crowdfunding

Crowdfunding refers to the process of acquiring capital for a project by collecting relatively small amounts from many investors or backers. It represents a more specific form of the more general term crowdsourcing, which is the acquisition of

[1]The Internet of Things describes the a concept where physical devices are connected to the Internet and are able to identify themselves and exchange data.

any resource (services, creative content, funds, etc.) from a large group that is typically online. The term crowdfunding was first coined in 2006 by Michael Sullivan on Fundavlog, his video blogging project.

The actors associated with crowdfunding fall into three main roles: (i) the borrower or project initiator who presents her credit request or idea/project to be funded; (ii) individuals or groups (i.e., the crowd) who support the funding request; and (iii) a moderating organization (i.e., the platform) that brings the parties together to launch the idea or support the borrowing request.

The literature distinguishes between (i) lending-based crowdfunding, which consists of loans which are repaid with interest, (ii) equity-based crowdfunding in which investors receive shares of the startup company, (iii) reward-based crowdfunding that involves rewarding funders with a product that has actual monetary value, often an early version of the product or service being funded, and (iv) donation-based crowdfunding in which backers donate funds because they believe in the cause (Cholakova and Clarysse 2015).

As pointed out by Everett (2008), lending-based crowdfunding is a technology-enabled form of social lending. Indeed, the advent of modern social lending is attributed to the English Friendly Societies of the 18th and 19th century that arose spontaneously during the Industrial Revolution as clubs that helped their members pool resources and risk. The Friendly Societies allowed members to make deposits and receive loans, and also assisted family members in the case of negative shocks such as illness. What was a locally bounded phenomenon in the past has become nowadays a spatially unbounded opportunity to connect with socially inclined or profit oriented, mostly anonymous, individuals. Besides, one of the biggest challenges, accurate risk assessment, was facilitated with technological advances. Friendly Societies had little experience in risk management and about one third of them had failed in the 19th century (Covello and Mumpower 1986). An online platform, on the other hand, is not exposed to idiosyncratic risk of its borrowers per se but it provides the necessary tools to investors for controlling their risk exposure by (a) collecting, scoring, and disseminating credit qualifications for a pool of prospective borrowers, (b) the real-time reporting supply of lending bids, allowing investors to diversify across loans and spreading borrower risk across investors, and (c) the online servicing, monitoring, and credit history reporting of loan performance.

The equity-based model is a valuable alternative source of funding for entrepreneurs as the crowd takes the role of traditional investors in startups, such as business angels and venture capitalists. The project initiatives involve equity shares, revenue, or profit sharing with the funders.

In contrast to lending- and equity-based crowdfunding, the donation- and reward-based models do not guarantee a payoff to funders. Projects of this kind tend to raise smaller amounts of capital than those with equity participation. Still, both models experienced high popularity among backers. This might seem unreasonable since financial reward is practically non-existent and one might assume that project initiators depend solely on the goodwill of potential backers. This is not necessarily true as pointed out by Schwartz (2015). Funders can be incentivised to donate by

experiencing a non-financial value while doing so. Their intrinsic motivation might be driven by factors such as personal entertainment, political expression, arts patronage, altruism, being part of a community, or having a feeling of being a creator.

Despite the growing popularity of the latter two models, it is mostly P2P lending and equity-based crowdfunding that pose a potential threat to the business models of traditional financial institutions. Consequently, the focus of this survey lies especially on these two models.

3 Evidence of Positive Disruption to Traditional Financing

How does crowdfunding relate to the financial system? Is it complementary or disruptive? In order to answer these questions it is advisable to consider first the size of this market.

In 2015, more than 400 crowdfunding platforms were operating in more than 35 countries and more than 100 social lending platforms were running business in 25 countries. To give a dimension of the market, one should know that in 2009 the crowdfunding volume was about USD 530 million worldwide. Almost doubling every year, it reached USD 16.2 billion by the end of 2014,[2] while growth projections for the year 2020 suggest an increase to USD 150–490 billion worldwide.[3]

In the United States, the top five P2P lending platforms originated USD 3.5 billion in loans in 2013, up from USD 1.2 billion in 2012.[4] As a comparison, households in the United States had around USD 858 billion in credit card debt outstanding as of December 2013, reflecting net new borrowing of USD 12.3 billion over the prior 12 months. Under the assumption that the USD 12.3 billion figure is a rough estimate of the growth in securitized consumer lending, this suggests that a relevant share of consumer lending net growth could be captured by P2P lending.

The effects of the growing alternative financing markets on the traditional financial system were not investigated yet. Classical economic literature, though, suggests that an increase in competition, in general, improves consumers' welfare because it minimizes deadweight loss. In fact, Fraiberger and Sundararajan (2015) show that sharing economies improve overall welfare benefits. A more crowdfunding-related study was done by Agrawal et al. (2011). They observe that online platforms eliminate economic frictions related to spacial distance, enhancing credit supply to artists.

[2]Source: Crowdsourcing.org; Massolution.

[3]Source: Morgan Stanley Research.

[4]Source: Fitch Ratings. https://www.fitchratings.com/gws/en/fitchwire/fitchwirearticle/P2P-Lending's-Success?pr_id=851174.

Theoretical and empirical results show that traditional banks have little incentive for screening small borrowers and practically they invest little effort in doing this. Iyer et al. (2010) find that the screening process in P2P markets incorporates 'soft', i.e. non-standard, information. They point out that lenders are able to infer one-third of the information regarding borrowers' credit score by utilizing such information benefiting in particular small borrowers. Since traditional lenders use only 'hard', standard information on estimating creditworthiness, they argue that Prosper, a lending platform in the US, acts like a complementary lending institution that improves small borrowers' overall credit access. On the negative side, not all lenders have financial and screening expertise giving a comparative advantage to institutional investors over individual investors in selecting profitable loans. Butler et al. (2010) reports that borrowers with relatively better access to traditional bank financing are willing to borrow at a lower rate at Prosper. This suggests that P2P markets add to overall credit supply efficiency.

Morse (2015) points out that the main driver of the crowdfunding disrupting force is the increasing role of big data. Data analysis has become a crucial part in business relations and an integral component of social network businesses. Despite the fact that big data brings forth also all sorts of uncertainties such as privacy, monopoly power, or discrimination, P2P platforms might be able to offer pricing and access benefits to potential borrowers if they manage to unearth soft information not accessed or used by intermediated finance.

By considering all the above elements, if asked whether crowdfunding has the possibility to positively disrupt consumer finance, it seems that this is potentially the case. Due to the complexity of some businesses (e.g., collateralized loans requiring repossessions and foreclosures, and long maturity lending without forcing mechanisms), this will probably be not the case across all markets.

4 Insights on Social Behavior in P2P Lending Markets

P2P markets provide an academically interesting setting where social interaction, investment and borrowing decisions can be studied simultaneously. The following survey will provide an overview of recent behavioral and financial insights.

One string of literature focuses on identifying statistical as opposed to taste-based discrimination in P2P markets. The former occurs when distinctions between demographic groups are made on the grounds of real or imagined statistical distinctions between the groups. The latter takes place when agents' personal prejudices or tastes against associating with members of a particular group affect their treatment of those individuals (Becker 1971). Pope and Sydnor (2011) observe racial discrimination through borrower pictures on Prosper. In particular, pictures of the black, the elderly and people with an unhappy facial expression are significantly discriminated against in terms of loan funding and high interest rates. Ravina (2008) observes that personal characteristics significantly affect the probability of having a loan funded. Beautiful borrowers are favored while black borrowers are relatively

less likely to get a loan as opposed to white. They conclude that the way borrowers present themselves affects the likelihood of getting a loan and more favorable loan terms. Overall, beauty seems to be related to taste-based discrimination while blacks are subjected to statistical discrimination.

Successful loan funding also appears to be related to various signals of trustworthiness. Duarte et al. (2012) finds that borrowers who appear to be more trustworthy have a higher likelihood of getting loan and being charged a relatively lower interest rate. However, trustworthy-looking borrowers, in fact, default at a lower rate and have a relatively better credit rating. Freedman and Jin (2014) observe that also having a social network is beneficial for borrowers as it increases the probability of being funded and lowers the interest rate on the loan. According to Hildebrand et al. (2010), group leaders, who are rewarded for successful loan listings, have an incentive to signal borrower quality to lenders. This alleviates information asymmetries that can be mitigated if group leaders invest a substantial amount in the loans themselves.

Studies show that some investors do not process all available information optimally. Gelman (2013) finds that small investors, in particular, ignore valuable borrower information that is conveyed in a borrower's loan verification status on Lending Club. Thus, such investors show risk seeking behavior while professional investors act more rationally and in a more risk averse manner. Furthermore, Freedman and Jin (2014) find that lenders on Prosper do not understand the relation between social ties and unobserved borrower quality. Some borrowers use their social network to their advantage of getting the best deal. Lenders learn about such gaming behavior from their investment mistakes only gradually over time and adjust slowly. Contrary to this finding, Lin et al. (2009) observes that friendships of borrowers signal credit quality to lenders.

Mach et al. (2014) show that small business applications are more than twice as likely to be funded than other loans. Berger and Gleisner (2014) observe that market participants who were paid to act as intermediaries on Prosper and screen loan listings had a positive impact on lowering borrowers' credit spreads by reducing information asymmetries.

There is also presence of herding behavior among lenders. Zhang and Liu (2012), Herzenstein et al. (2011) and Ceyhan et al. (2011) observe that bids for a single loan do not occur uniformly over time. In particular, bids are concentrated at the end of a listing's lifetime and tend to be more concentrated for listings that are close to being fully funded.

From a more theoretical perspective, Paravisini et al. (2009) estimate investors' risk preference parameters and their elasticity to wealth. They find that wealthier investors exhibit lower absolute risk aversion and higher relative risk aversion and that for a given investor, the relative risk aversion increases after experiencing a negative wealth shock.

To sum up, despite some inefficiencies observed by researchers, P2P lending markets overall positively affect credit supply to individuals.

5 Recent Developments in Equity-Based Crowdfunding

Equity crowdfunding is a mechanism that enables individuals to collectively invest in startup companies and small businesses in return for equity.[5] In terms of funding volume, equity crowdfunding is a relatively small category. During the last years it counted only for about the 5 % of the total funds channeled via crowdfunding platforms (Wilson and Testoni 2014). The reason behind this low level lies in the fact that equity crowdfunding is heavily penalized by different legislative approaches that in general tend to protect investors from its high risk profile. Some significant evidence is that, although the US lead the overall crowdfunding, when it comes to the equity-based market, it is Europe who holds the leading position thanks to its accommodating policy environment. But the situation in US might improve because of the recent approval of Title III of the JOBS Act in 2015. In practice, this law will unlock the possibility for every US citizen to invest in equity crowdfunding. This could indeed represent a sizable positive shock for the US market.

Difference Compared with other types of crowdfunding, equity crowdfunding exhibits some unique characteristics along with peculiar investment attitudes. Ahlers et al. (2015) compare four types of crowdfunding (donation-based, reward-based, lending-based and equity-based) by positioning them in a two dimensional map where, on one side is the level of complexity (legislation and information asymmetries) and on the other side is the level of uncertainty. With no doubt, equity crowdfunding reaches the highest level along both dimensions. Accordingly, investors of equity crowdfunding are the least risk averse. From an incentive point of view, the investors in equity crowdfunding tend to pursue a long-term monetary return. In terms of funding scale, equity crowdfunding is in general smaller than private equity, venture capital and even angel investments. This characteristic makes equity crowdfunding a proper instrument that is able to fill the 'equity gap' for early stage projects. Traditionally, small businesses in seed funding raise funds from the three 'f' (friends, family and fools). However, friends and family financing is often an insufficient source of funds and in order to achieve scale, larger sources of risk capital are often required. During the recent years, business angels and venture capitalists—the traditional sources of risk capital after the three 'f', have increasingly been moving their investment activity upstream, making larger investments into more developed companies (Collins and Pierrakis 2012). To have a sense of the dimension, according to Wilson and Testoni (2014), most of the equity-based projects raise an amount of funds ranging between USD 50,000 and USD 100,000. Instead, many angels tend to consider only businesses that are looking to raise amounts larger than USD 100,000.

[5]Financial Conduct Authority (2016, April 6). The FCA's regulatory approach to crowdfunding over the internet, and the promotion of non-readily realisable securities by other media. Retrieved from http://www.fca.org.uk/static/documents/policy-statements/ps14-04.pdf.

Funding From the funding side there are many factors that could influence the performance of equity crowdfunding. Compared to venture capital funding, which is lead by professional experts, the influential factors of equity crowdfunding could be detrimental when funding decisions are taken by small investors without a strong financial background. An empirical examination in this field is applied by Ahlers et al. (2015). After having investigated 104 equity crowdfunding offerings published on ASSOB (one of the largest equity-based crowdfunding platform), the authors present several key factors that could lead to an investment bias. Namely, factors that are not necessarily linked to performance but that are instead perceived as such by the investors: the quantity of the board members, the levels of members, education, their professional network, the clarification for the exit scenario (IPO, or trade sale) and the time that the firm has been in the business (experience).

Investment As for as investment is concerned, the valuation of a startup is the great challenge, especially when it comes to small investors. In donation-based crowdfunding, the pricing problem does not exist at all, as the motivation for donation is not based on financial return. For lending-based crowdfunding, investors could receive their interest periodically, thus the pricing model could at least refer to Discounted Cash Flow techniques. But when it comes to equity crowdfunding, there does not exist an unassailable text-book model. Usually, the valuation could be either based on the asset value, on the expected cash flow (or return) or a mix of both. In terms of asset valuation, for startups in early-stage, the most important asset is probably the intellectual property, which is intangible and therefore subjected to an arbitrary valuation. On the other hand, the forthcoming expected return could also be of great uncertainty. Indeed, it is very common to happen that no cash flow is generated in the first 5–7 years for a seed or early-stage company. If any, it would anyway be reinvested into the business again. So, investors generally do not have a sufficient set of track-records to use in order to extrapolate future cash flows or returns on investment (Wilson and Testoni 2014). And due to information asymmetries, entrepreneurs and investors probably have a different view on equity pricing because they have a different information set. In fact, the information asymmetry problem is hardly avoided especially for startups still in their seed stage. There exists a tension in equity crowdfunding (but not only) as entrepreneurs have to bear the risk to disclose more business details to the crowd but at the same time they need to protect their ideas and business strategies that could be copied easily by other companies. In this field Innovestment, a German crowdfunding platform, provides an innovative solution. In Innovestment, pricing of equity is based on auction. Investors bid for the equity of a startup according to their own internal valuation and entrepreneurs can at the end decide whether to accept or refuse the funding amount.

Regulations Investment in seed-stage companies is essentially a high-risk activity because, as presented above, it deserves some level of competence. Indeed, according to Zhang et al. (2014), the majority of investors are professionals or high-net-worth individuals. Thus, governments tend to be very cautious with regard to regulation of retail equity crowdfunding. Although still in evolution, in the

following, we briefly present the status of the legislation for some of the biggest crowdfunding markets. In the US, for a long time equity-based crowdfunding has only been opened to accredited investors. According to the Security and Exchange Commission an accredited investor, in the context of a natural person, includes anyone who earned income in excess of USD 200,000 in each of the prior two years, or has a net worth over USD 1 million. This restriction is expected to be lifted up soon. However, in October 2015, the SEC approved the Title III of the JOBS Act, which will allow non-accredited investors to invest in equity-based crowdfunding. When the rules will come into effect, the US equity crowdfunding market will be open to all citizens. Also in UK, equity crowdfunding is considered a risky investment. It is fully monitored and regulated by the Financial Conduct Authority which considers any share in equity-based crowdfunding as a non-readily realizable security. In general, the market is only open to some qualified investors whose wealth or income has surpassed a certain pre-defined standard. According to a rule approved in 2014, retail investors and normal citizens must explicitly confirm that they will not invest more than 10 % of their net investable assets in equity crowdfunding products. In other EU countries, the investment environment is relatively loose. In July 2013, Italy, became the first country in Europe to implement a complete retail equity crowdfunding regulation. After few months, in reviewing existing rules, Italy enlarged the category of suitable crowdfunding target companies. Now, it is no longer limited only to startups but it is extended and applied to a broader definition, provided that crowdfunding companies are innovating and launching new products. In Germany equity crowdfunding has been legal for years but only limited to silent partnership, which means investors could only share the profit but have no voting rights. In France, equity crowdfunding is also allowed but the regulation places some constraints. For example, crowdfunding platforms need to maintain a minimum capital requirement of EUR 730,000.

Looking at the past, it becomes clear that regulators are willing to facilitate the flow of capital between market participants. However, most countries are still in the ongoing process of defining an appropriate legal framework for the crowdfunding segment.

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Crowdfunding and Bank Stress

Daniel Blaseg and Michael Koetter

Abstract Bank instability may induce borrowers to use crowdfunding as a source of external finance. A range of stress indicators help identify banks with potential credit supply constraints, which then can be linked to a unique, manually constructed sample of 157 new ventures seeking equity crowdfunding, for comparison with 200 ventures that do not use crowdfunding. The sample comprises projects from all major German equity crowdfunding platforms since 2011, augmented with controls for venture, manager, and bank characteristics. Crowdfunding is significantly more likely for new ventures that interact with stressed banks. Innovative funding sources are thus particularly relevant in times of stress among conventional financiers. But crowdfunded ventures are generally also more opaque and risky than new ventures that do not use crowdfunding.

Keywords Crowdfunding · Bank stress · Funding alternative · New ventures · Credit crunch

1 Introduction

Akerlof's (1970) seminal lemons problem epitomizes the key challenge faced by any investor: how to select projects from a pool of opaque applicants. Traditionally, banks help resolve the information asymmetry between savers and investors by developing screening competences and acting as delegated monitors (Diamond 1984). But dramatically reduced transaction and information acquisition costs, together with historically low interest rates, impede banks' incentives to engage in

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costly information generation, which can lead to the contraction of credit (Puri et al. 2011; Jiménez et al. 2012) or misallocated funding to too risky projects (Dell'Ariccia and Marquez 2004; Jiménez et al. 2014). Against this backdrop, recent studies by Belleflamme et al. (2013) and Mollick (2014) hypothesize that crowdfunding may rival bank finance and connect even small savers with risky new ventures that face traditionally tighter financing constraints (e.g., Cassar 2004; Robb and Robinson 2014).

We test whether the wisdom-of-the-(investor)crowd becomes a more likely substitute for bank credit as a major source of funding for new ventures if young ventures' banks are shocked. We construct a novel, hand-collected data set of ventures' uses of equity crowdfunding in Germany, their relationships with banks, and various venture traits since 2011. By observing venture-bank relationships, we can identify if ventures connected to shocked banks are more likely to use crowdfunding in an attempt to substitute for contracting bank credit supply. In so doing, we move beyond the important descriptive evidence in this nascent strand of literature, which does not permit inferences about the causal effects of the determinants of crowdfunding.[1]

We also control for observable management and venture traits to determine if more opaque ventures with greater information asymmetries are more likely to use crowdfunding as an alternative source of financing. Greater information asymmetries increase capital costs, which implies a well-known pecking order of capital structure: Internal funds are preferred over debt, and equity is a last resort of funding (Jensen and Meckling 1976; Myers and Majluf 1984). To mitigate information asymmetries and facilitate the efficient allocation of financial resources, from savers to productive investors, financial intermediaries can generate private information by establishing close and long-term relationships (Rajan 1992; Uchida et al. 2012). But relationship lending is costly, so banks may turn down funding requests by promising, yet hard-to-assess projects such as new ventures if they cannot confidently cover the costs associated with producing necessary private information (Rajan 1992; Petersen and Rajan 1994, 2002). In this setting, we investigate if ventures tied to banks that struggle to cover the costs of private information generation are more likely to tap a potentially less-than-wise crowd as a funding source.

The financial crisis of 2008 amplified the generally prevalent challenges that young and small ventures confront when trying to raise external finance. In the aftermath of the great financial crisis, the number and volume of equity financing rounds from venture capital sources declined significantly (Block et al. 2010), credit supply tightened in the Eurozone (Hempell and Kok 2010), and in Germany, even local lenders reduced their loans (Puri et al. 2011). Gorman and Sahlman (1989) and Cassar (2004) caution that credit supply shocks are especially important for new ventures. However, most existing empirical evidence is geared toward venture capitalist

[1]Recent policy (e.g., De Buysere et al. 2014), and academic (e.g., Mollick 2014; Schwienbacher 2013; Hornuf and Schwienbacher 2014), light on the potential role of crowdfunding and vividly illustrate the broadening interest in this new form of financing ventures. We instead seek to provide empirical evidence about the causal effects of bank credit crunches.

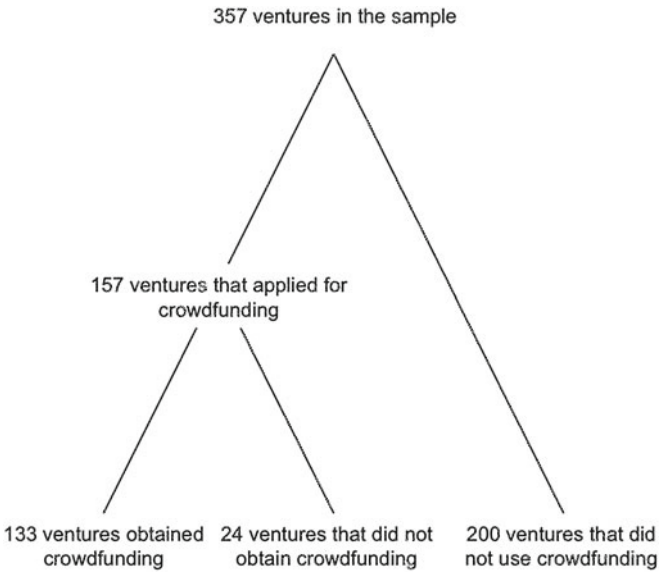

Fig. 1 Sample of new ventures that apply for crowdfunding or not. *Notes* This figure shows the sample of ventures that applied successfully to one of the six largest equity crowdfunding platforms in Germany for funds between 2011 and 2014. Out of 157 applicants, 133 ventures successfully completed their funding request by obtaining the requested minimum amount, 24 applying ventures were not successfully in terms of raising the the requested minimum amount, and 200 ventures did not apply at all. Some ventures applied multiple times for funding. The data on non-applicants is obtained from the German Federal Association of Startups. The data about crowdfunding applicants were collected from observing applicant data directly in the online platforms maintained by Bankless24, Berfuerst, Companisto, Fundsters, Innovestment, Mashup Finance, Seedmatch, and others

funding (for an overview, see Gompers and Lerner 2001). The ability of crowdfunding to substitute for bank credit or other sources of external finance, due to its significantly lower transaction costs in the Internet age, in particular remains unclear.

This research gap exists primarily because of the absence of data. We hand-collected a sample of all the ventures that applied for funds on major German equity crowdfunding platforms since 2011. That is, among 357 new ventures for which we have data, 157 applied for equity crowdfunding at one of the six major German online platforms between November 2011 and June 2014, which cover 95 % of the total market in terms of offerings and 99 % in terms of volume. Figure 1 illustrates the structure of the sample and the main specifications that explain the odds that a venture apply for external funding on a crowdfunding platform conditional on its bank relationship and venture and management traits.

We manually gathered the data for the crowdfunding ventures from each platform webpage and database. For the 200 ventures that did not use crowdfunding, we obtained the venture and management variables from the membership database of the Federal Association of Startups. Thus, in contrast with previous research into

crowdfunding (e.g., Belleflamme et al. 2013; Mollick 2014), we can estimate the probability of tapping the "wisdom of the crowd''Trust and Reputation, conditional on venture and managerial traits, relative to a relevant comparison group of comparable young ventures that face similar financing constraints.

Another challenge that plagues empirical literature pertaining to the role of crowdfunding is the notorious unobservability of the arguably most important competing source of external finance: bank credit. Because we collect information about each ventures' bank relationship, we can exploit the heterogeneity in bank distress in the aftermath of the financial crisis and identify credit supply shocks to ventures, according to the health of their main external financier. To our knowledge, this article is the first to seek to identify the effect of bank stress on alternative forms of external finance directly.

In total, we identify 82 banks connected to the new ventures in our sample and specify five alternative indicators of stressed relationship lenders. The main indicator is whether a bank received capital support from the German Special Fund for Financial Market Stabilization ("SoFFin"), which came into effect as of 2008. With an alternative approach, we also classify banks as stressed if they report an existing restructuring plan, according to the comprehensive assessment conducted by the European Banking Authority (EBA) in November 2014, and whether a regional savings bank belongs to a stressed Landesbank in 2008 (see Puri et al. 2011).

The main results show that ties to a bank bailed out by the SoFFin increase the probability that the venture taps a crowdfunding platforms by 18 %. The probability of successfully completing a crowdfunding request increases by 22 % tough, so the successful completion of a crowdfunding request (the left branch in Fig. 1) does not appear to depend on the indicators of bank distress. That is, credit supply shocks determine the choice to seek alternative funding forms, but they do not necessarily discriminate between projects that can or cannot convince the crowd. The positive effect of crunched banks the use of crowdfunding remains statistically and economically significant, even when we control directly for bank financial profiles. Alternative indicators of bank distress, and especially the existence of restructuring plans shared with the EBA, yield qualitatively similar results, though with weaker statistical significance. Regarding other venture and management traits, we find that the likelihood of using crowdfunding is significantly larger for ventures that exhibit lower ratings, are smaller, and have fewer tangible assets. This result may indicate that ventures with greater information asymmetry suffer the most from a credit supply shock, and therefore seek crowdfunding as an alternative. Whether these projects are more likely to be lemons or gems that have been neglected by banks is an important question for further research.

The remainder of this article is organized as follows: Sect. 2 relates our study to prior literature and provides an institutional background of equity crowdfunding in Germany. In Sect. 3, we present and discuss crowdfunding data, as well as our identification strategy for bank-venture relationships. We discuss the empirical findings in Sect. 4 and conclude in Sect. 5.

2 Literature and Background

2.1 Bank Funding and Crowdfunding

Banks are vital to resolve information asymmetries, especially those that plague small and medium enterprises (e.g., Petersen and Rajan 1994, 2002; Berger and Udell 1998). The quality of opaque new ventures is difficult for investors to evaluate and information asymmetries always exist during external, early stage financing (see Jensen and Meckling 1976; Stiglitz and Weiss 1981; de Meza and Webb 1987). Information asymmetries between ventures and possible investors result in the well-known pecking order of capital (Myers and Majluf 1984), such that ventures prefer to finance new projects with retained earnings or other internal cash flows, because external funds are more expensive. External debt financing is favored over equity, because the latter dilutes the ownership of the entrepreneur. Robb and Robinson (2014) use the Kauffman Firm Surveys to document the important role of debt at the beginning of a venture's life and suggest that the largest part of total capital comes from outside debt, followed by owners' equity, then insider debt, outside equity, and finally owner debt. Brown et al. (2012) also note the important role for bank debt as a source of funding for new ventures in Germany.

The financial crisis aggravated the financing challenges faced by young ventures during and after 2008 (e.g., Popov and Udell 2012; Jiménez et al. 2012). Puri et al. (2011) document a credit supply crunch among German local lenders and Hempell and Kok (2010) identify a significant bank lending contraction in Germany from the ECB lending survey. Considering the important role of debt use in entrepreneurial financing, we conjecture that banks transmitting a credit shock may cause the young ventures connected to them to grow more inclined to find new sources of funding, especially if small financing volumes imply high relative transaction costs that are unattractive to large-scale investors (Titman and Wessels 1988; Robb and Robinson 2014).

A novel way to reduce transaction costs in entrepreneurial financing is crowdfunding. Schwienbacher and Larralde (2010) provide an overview of nascent equity crowdfunding literature in relation to entrepreneurial finance, in which they discuss why founders choose this source of funding. Hornuf and Schwienbacher (2014) and Mollick (2013) compare crowdfunding to different entrepreneurial financing options. Hemer (2011) emphasizes that the funding process itself is the decisive difference, because "entrepreneurs make an open call for funding on a crowdfunding platform, and investors make their decisions based on the information provided therein. Moreover, the crowdfunding platform facilitates the transaction by providing a standardized investment contract and settling the payments." Bradford (2012) defines equity crowdfunding as a scenario in which supporters or investors receive a stake in the ventures they fund, in the form of profit participation or straight equity. We similarly define equity crowdfunding as a source of funds, obtained when an entrepreneur sells equity shares of a company to a group of (small) investors through an open call for funding on Internet-based platforms.

2.2 Institutional Background

Equity crowdfunding platforms are non-bank financial institutions that provide intermediation services for the offering and sale of stocks and similar securities to the general public. These services include the provision of standardized contracts, technology infrastructure for the transactions, and investor relations. To reduce investors' transaction costs, they also provide standardized information, such as pitch decks, financials, and valuations sourced from the venture, without guaranteeing their correctness though. Most equity crowdfunding platforms do not act as open marketplaces but instead serve as network orchestrators, curating the offerings placed on the platform after a cross-check of formal criteria, such as limited liability and available documentation.

Where as some platforms allow the direct acquisition of securities in the venture, others act as nominated agents and pool funds. Because they facilitate the sale of equity-like instruments without voting rights, the platforms fall outside legal brokerage framework, though rapidly growing crowdfunding markets worldwide have prompted some countries (e.g., Italy, the United Kingdom, France, Germany, Spain) to develop specific crowdfunding regulations, with the goal of protecting unprofessional investors and increasing the transparency of offers in the shadow banking market.

German crowdfunding platforms use financial instruments and equity-like mezzanine capital, such as silent partnerships (*Stille Beteiligungen*) and participation rights (*Genussrechte*). More common debt-like mezzanine instruments take the form of subordinated loans (*Partiarische Nachrangdarlehen*), which are less regulated. The offerings of a venture based on equity-like securities in Germany are limited to EUR 100,000 per year without an official prospectus, which is accepted by the *Bundesanstalt fuer Finanzdienstleistungsaufsicht* (BaFin) as long as there are more than 20 investors or the offering is aimed at unprofessional investors with a share price of less than EUR 50,000. Subordinated loans skirt this problem and allow offerings with higher volumes.

As an intermediary between investors and the ventures looking for funding, the platforms are not directly involved in the financial activity and take on very limited responsibility. Revenue is mostly generated from the success fees for offerings that exceed their minimum requested amount, which range between 5 and 10 % of the amount raised. Few platforms operate as full banks, which means they cannot handle the payments on their own and instead must engage an authorized payment service provider or bank, which incurs additional costs of 1–3 % for the funded venture. Expenses to produce a video, often a core element in an offering, together with the costs of preparing and running the campaign and maintaining the investor relations afterwards, also must have to be taken into account by the venture.

Table 1 provides an overview of the German crowdfunding market. The first six projects were funded at the end of November 2011 on the Innovestment and Seedmatch platforms. As of December 2014, 14 active crowdfunding platforms were facilitating equity crowdfunding or revenue-sharing models in Germany. Nine more platforms started operations but closed before their first offering. The total

Table 1 German crowdfunding market overview

Year / Platform	2011	2012	2013	2014	Total
Bankless24	–	–	0.18 (2)	0.37 (4)	0.55 (6)
Bergfuerst	–	–	3.0 (1)	1.1 (1)	4.1 (2)
Companisto	–	0.55 (6)	2.65 (15)	3.9 (9)	7.1 (30)
Fundsters	–	–	0.56 (5)	0.48 (6)	1.04 (11)
Innovestment	0.1 (2)	1.0 (13/8)	0.85 (11/4)	0.3 (7)	2.25 (33/12)
Mashup finance	–	0.1 (1)	0.11 (1)	–	0.21 (2)
Seedmatch	0.35 (4)	2.2 (22)	7.32 (22/1)	9.17 (20)	19.04 (68/1)
Others	–	0.0 (1)	0.55 (11)	0.45 (7)	1.0 (19)
Total	0.45 (6)	3.85 (43/8)	15.22 (68/5)	15.77 (54)	35.29 (171/13)

Notes This table presents the volume raised in the German equity crowdfunding market with successful campaigns, in millions of EUR, during the period 2011–2014. The number of (successful/unsuccessful) offerings appear in brackets. *Source* Own elicitation

funding volume of equity crowdfunding platforms in Germany in 2011 was around EUR 0.45 million, but it rose to EUR 35.3 million by the end of 2014. Seven of the 14 active platforms had one or no offerings during this period, and 95 % of the total volume was raised on five platforms: Seedmatch (approximately EUR 19 million), Innovestment (EUR 2.3 million), Bergfuerst (EUR 4.1 million), Fundsters (EUR 1 million), and Companisto (EUR 7.1 million). In total, 171 offerings by the end of 2014 came from 165 different ventures. Thirteen offerings were unsuccessful in that the minimum amount the venture requested by the company was not raised during the funding process.

3 Sampling and Identification

3.1 Sampling

To identify the differential effect of a credit supply shock on the inclination of ventures to seek crowdfunding, we sample new ventures that use or that do not use crowdfunding, as shown in Fig. 1. We begin with the members of the Federal Association of Startups in Germany (*Bundesverband Deutsche Startups*). It had 264 members by the end of 2014, of which 64 used crowdfunding. The formal pre-requisites to be listed on a German crowdfunding platform are very similar to those required for a membership in the association. We thus identified 93 crowdfunding offerings with available information that applied for funding through the German