Crowdfunding and Innovation

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1. Introduction

After raising $375k in seed funding from several high-profile Silicon Valley angel investors for an innovative e-paper display watch that enables users to interact with their Android or iOS device through a wrist interface, inventor-entrepreneur Eric Migicovsky required an additional $100k for tooling equipment to move from his prototype to a small production run. Despite having production experience with a previous watch he created for the Blackberry, experience raising seed capital, pedigree through his affiliation with a high-profile incubator (Y-Combinator), and being located in a region with a high concentration of angel investors, he could not find a willing investor. On April 11, 2012, he turned to crowdfunding – raising capital in small amounts from many people through an online platform - and launched a campaign to raise $100k. In return for funding commitments, he promised contributors a watch for every (approximately) $120 they pledged. To his surprise, he raised the capital in two hours. After 37 days, he closed his campaign, having raised more than $10m from 68,929 people and committed to producing 85,000 watches by September that year.

Around the same time, on April 5, 2012, President Obama signed into law the Jumpstart Our Business Startups ("JOBS") Act, which, among other things, effectively legalized crowdfunding for equity by relaxing various restrictions concerning the sale of securities (e.g., relax restrictions on general solicitation of securities, relax SEC reporting requirements, raise from 500 to 2000 the number of shareholders a company may have and still remain private). However, the primary purpose of the Securities Act of 1933, which is the basis for most of the regulations in question, was to protect investors. Thus, relaxing these restrictions raised concern that crowdfunding would expose investors to risk from fraud or incompetence (Hazen, 2012; Griffin, 2012). Recognizing this potential problem, the JOBS Act stipulated that equity crowdfunding required rules to be set by the SEC, which were anticipated for January 2013 but are still in progress as of this writing.

Policy maker support for crowdfunding exemptions in the JOBS Act is predicated on the assumption that equity crowdfunding will enhance innovation.[1] Will it? If so, then how? The prospect of equity crowdfunding raises two central policy-related questions. First, will equity crowdfunding influence the rate and direction of innovation? In other words, to what extent will equity crowdfunding increase the total amount of capital allocated to innovation and furthermore

[1] http://www.whitehouse.gov/the-press-office/2012/04/05/president-obama-sign-jumpstart-our-business-startups-jobs-act

[1] http://majorityleader.gov/newsroom/2012/02/house-republicans-unveil-the-jobs-act-to-spur-small-businesses-and-startups.html

to what extent will that capital be applied to different innovations than what would otherwise be funded? Second, if crowdfunding results in some social loss by relaxing traditional regulations associated with the sale of securities (e.g., enabling inexperienced individuals to make poor investment decisions, creator incompetence, fraud), then to what extent will these costs be outweighed by the benefits of enhanced innovation? In other words, will crowdfunding have a net positive effect on social welfare?

The objective of this chapter is to lay out a framework for considering these two questions. Of course it will be many years before we have the data required to attempt to answer these questions empirically. In the meantime, however, we can assemble clues from economic theory and prior research on traditional forms of financing innovation, online markets, and non-equity based crowdfunding to present a picture that offers insights into the factors that will likely determine the answer to these questions.

To this end, we begin by providing intuition concerning the rate and direction and social welfare questions. Then, we summarize the spectrum of views on the prospect of equity crowdfunding, both positive and negative, expressed by experts in the popular press. Next, we describe the incentives for creators, funders, and platform providers in crowdfunding markets. We then examine their disincentives to use crowdfunding. Next, we examine the tools most likely to be deployed to reduce the disincentives to use crowdfunding. Finally, we speculate on how equity crowdfunding may evolve.

2. Intuition

We begin by offering intuition on how crowdfunding could influence the rate and direction of innovation. Crowdfunding may influence the rate of innovation by increasing the total amount of funding available to innovative projects. At the same time, it may influence the direction of innovation by changing the way in which capital is allocated to innovative projects. This could result from, for example, the crowd having access to different information than traditional sources of capital (e.g., relationships with the entrepreneur, a wider base of experience and industry insight than the local angel and VC communities), having a different objective (e.g., the crowd values the creation of a new product or service in addition to maximizing their financial return on investment), or having different opportunities to mitigate risk (e.g., since transaction costs are lower the crowd is able to make smaller investments and thus is able to spread their risk over a greater number of projects than, say, a traditional friends-and-family seed or angel investment, enabling them to invest in more ventures with a higher risk/return profile). To the extent that crowdfunding allocates capital not to marginal projects but rather to different projects, it will influence the direction of innovation.

It is also possible that crowdfunding only changes the rate, but not the direction, of innovation by increasing the total amount of funding without influencing the allocation algorithm. For example, without crowdfunding, the top 100 projects are financed, and with crowdfunding, the top 100 plus the next 10 are funded. In other words, the additional capital from crowdfunding is allocated

at the margin, towards the projects that were next in line to be financed in the no-equity-crowdfunding regime. Finally, crowdfunding may not increase the rate or direction of innovation. For example, if the cost to funders is too high (due to risk of fraud, for example), then funders will not use crowdfunding and the process will never reach a great enough scale to have any meaningful impact on innovation. Alternatively, even if crowdfunding does appeal to a large number of funders, it may simply substitute for other forms of funding, crowding out the use of other forms of early-stage finance such that neither the amount nor allocation of funding for innovation is affected.

Next, we offer intuition on the social welfare question. This question is predicated on comparing the social benefits with the social costs that arise from crowdfunding. The benefits arise from the social gains associated with innovation caused by crowdfunding, as well as from consumption value to creators and funders from the crowdfunding process itself. Social costs arise from the opportunity cost of capital due to misallocation by inexperienced investors, incompetent creators, and fraud, as well as from the opportunity cost of human capital due to creators who successfully attract capital but would be better off from a social perspective doing something else.

Experts have primarily focused on social benefits (e.g., job creation) due to more capital allocated to innovation based on somewhat different information and objectives as well as social costs resulting from fraud. We summarize these views next.

3. Opinions and Evidence

3.1 The Popular Press

Public interest in crowdfunding grew exponentially over the past four years, especially since the early announcements that the US government was considering exemptions that would legalize equity crowdfunding (Figure 1). This interest was matched by action. The volume of transactions in non-equity crowdfunding also grew exponentially, as illustrated by data from Kickstarter, the largest innovation-oriented crowdfunding platform in the world (Figure 2). Although to our knowledge there are as of yet no peer-reviewed publications on crowdfunding in economics, many business experts have weighed in on the potential benefits of crowdfunding in the popular press. For example, they have described it's potential to increase the total capital allocated to innovation, fund good ideas that might otherwise be undercapitalized, generate jobs, and evolve through experimentation:

> *"Fred Wilson, a prominent venture capitalist, calculates that if Americans used just 1% of their investable assets to crowdfund business they would release a $300 billion surge of capital." - The Economist*[2]

[2] http://www.economist.com/node/21556973, Accessed February 17, 2013.

"Crowdfunding has the potential to revolutionize the financing of small business, transforming millions of users of social media such as Facebook into overnight venture capitalists, and giving life to valuable business ideas that might otherwise go unfunded." – The Wall Street Journal[3]

"Besides, isn't this the type of innovation we should be encouraging? Unlike exotic derivatives and super-fast trading algorithms, crowdfunding generates capital for job-creating small businesses." – The New York Times[4]

"Robert Litan of the Kauffman Foundation, a think-tank, believes…venture-capital firms… would boost crowdfunding if, say, they lent their reputations to young firms and promised to invest later if they met certain targets. With so much promising experimentation in the works, Mr Litan says, 'let's just hope the SEC doesn't kill it off before it gets started.'" - The Economist[5]

At the same time, other business experts have taken positions at the opposite end of the spectrum, focusing on legitimate concerns such as the potential for fraud, unrealistic investor expectations, the loss of expert advice, and inexperienced creators:

"...crowdfunding could become an efficient, online means for defrauding the investing public" – Wired

"'The honeymoon period that we are experiencing around crowdfunding is beginning to come to a close,' said Wil Schroter, co-founder and chief executive of Fundable, a company that is applying crowdfunding to the venture capital process. 'People realize there is real risk involved in investing in anything early-stage, whether it's an idea, a charity or a product, and they're starting to understand they aren't buying off of Amazon.'" – The New York Times

"While founders raising cash from a big pool of small amounts of money are benefiting from quick access and the boost of popular interest, they are also forgoing some of the advice and experience of more traditional angel or venture-capital investors." – The Financial Times

"Anecdotal reports abound of flawed products (try Googling 'jellyfish death trap'), overambitious creators who can't pull off what they promised, and epic delays. A CNNMoney investigation found that 84% of Kickstarter's 50 top-funded projects missed their estimated delivery dates." – CNNMoney

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[3] http://online.wsj.com/article/SB10001424127887323468604578251913868617572.html, Accessed February 17, 2013.

[4] http://www.nytimes.com/2011/09/26/opinion/a-proposal-to-allow-small-private-companies-to-get-investors-online.html, Accessed February 17, 2013.

5 5 http://www.economist.com/node/21556973, Accessed February 17, 2013.

Given the polarized debate on the benefits of crowdfunding, it is perhaps surprising that the JOBS Act passed with unusually broad bipartisan support. Nevertheless, we must consider these issues in context and evaluate how they may affect the overall potential for crowdfunding to influence innovation and social welfare. We turn to that in Section 4. Next, we examine preliminary evidence.

3.2 Preliminary Evidence – The Geographic Distribution of Crowdfunding Capital

One dimension that we may expect crowdfunding to deviate from traditional funding is on is the spatial allocation of capital. Since transactions occur online rather than in person, the traditional link between the geographic distribution of financial capital and human capital seems as though it may be less salient. Therefore, it is plausible that crowdfunding may be particularly important as a mechanism to finance projects in regions that have disproportionately less access to financial capital relative to their stock of human capital. In other words, it seems likely that the spatial distribution of crowdfunding capital may look quite different from that of traditional capital.

We use data from Kickstarter to provide some preliminary insight into this question. We find that crowdfunding capital follows a surprisingly similar geographic pattern to traditional funding. Our data contain every funded project between founding (June 2009) and October 2012. The data spans 27,403 projects totaling $293 million in 13 categories. We have information on the timing of financing and the location of the project.

Figure 3 shows the relationship between the states in which Kickstarter-financed projects are based and other sources of funding. Figure 3a shows a strong correlation between state-level funding from the National Endowment for the Arts and funding for arts-related projects on Kickstarter. Figure 3b shows a strong correlation between state-level venture capital financing (source: MoneyTree Report 2009-2012[6]) and funding for technology projects on Kickstarter (though this correlation is less strong than for the arts). If expressed in per capita terms, the general patterns in the scatter plots do not change. We interpret Figure 3 to suggest that overall, crowdfunding does not appear to deviate from the traditional geographic distribution of capital allocation. However, that may reflect the distribution of human capital and thus does not imply that crowdfunding is not financing different types of innovation.

Figure 4 maps the location of Kickstarter funding, with the darker coloring suggesting more funding for the state. We also list the top three states for each category. The overall pattern seems to be very much the same as the scatter plots in Figure 3: New York and California dominate, and large, technology-intense states are darker in color. After New York and California, Tennessee is important for music and Illinois for publishing and theater.

Further evidence that crowdfunded projects are similar in terms of their spatial distribution to other forms of funded projects comes from an examination of substitution in financing.

[6] The MoneyTree Report is published by PricewaterhouseCoopers and the National Venture Capital Association, and is based on data from Thomson Reuters (https://www.pwcmoneytree.com/)

Specifically, in Agrawal, Catalini, and Goldfarb (2013), we examine how changes in local (city-level) house prices correlate with changes in crowdfunding. Robinson (2012) shows that home equity financing is an important source of funds for entrepreneurs. We show that the relative price and availability of these funds affects crowdfunding. Specifically, when house prices are higher (and home equity financing is therefore more readily available), crowdfunding falls. While this analysis is preliminary and does not completely control for the unobservable aspects of the strength of the local economy, it does suggest that crowdfunding replaces other financing, and it is not consistent with crowdfunding facilitating a substantially different kind of project than regular sources of financing.

While generally crowdfunding does not appear to generate primarily different projects, there are a handful of exceptions. In particular, a careful look at the map (Figure 4) shows some perhaps surprising locations for crowdfunding: Minnesota is third in technology, North Carolina is third in food, and Massachusetts is third in fashion (Arizona is fourth). Crowdfunding might facilitate the funding of projects that transcend the specialization of a region and are therefore more difficult to fund.

Overall, this preliminary evidence suggests that the geographic distribution of projects financed on Kickstarter is not substantially different than the projects financed through other means. While there are some exceptions (such as Massachusetts in fashion), crowdfunding might provide funding for more projects but perhaps not facilitate funding for fundamentally different projects at least not in different locations. In the next two sections, we describe the incentives and features of crowdfunding to further examine how it may influence the rate and direction of innovation.

4 Incentives to Participate in Crowdfunding

In this section, we describe the incentives facing creators, funders, and platforms in crowdfunding markets. For simplicity, we group entrepreneurs, artists, and others who propose projects under the label “creators.” We group investors, pre-buyers, and donors under the label “funders.”

4.1 Creators

There are three primary incentives for creators to raise capital through crowdfunding: 1) a lower the cost of capital; 2) the ability to receive an early market signal regarding the viability of a new product or service; and 3) access to input on product and business model design. We describe each one below.

Independent creators typically access capital from sources such as personal savings, home equity loans, personal credit cards, friends and family, angel investors, and venture capitalists. To the extent that crowdfunding increases the supply of capital available to creators it may increase competition and thus lower the cost of capital to creators. Furthermore, crowdfunding enables funder-creator matching over a global market, vastly increasing the pool of potential

matches. This may further lower the cost of capital for creators relative to the cost associated with less optimal matches from their traditionally smaller consideration set of local investors. Moreover, since individual investors may invest for reasons other than only financial return (e.g., they derive utility from being part of the creator's community), then crowdfunding may provide capital at a further discounted rate.

Crowdfunding provides creators an early market signal of the value of their idea, before they invest capital to actually produce it. For example, despite the negative reaction Eric Migicovsky received from traditional early-stage investors, the information conveyed via the crowdfunding community's strong response to the Pebble watch validated his hypothesis that a wearable device with that particular design and set of features would have had broad appeal. This early market feedback, prior to the production of a new device, is valuable not only to the creator but also to future (traditional) investors. Of course, crowdfunding may also provide information about a new product's lack of potential, which is also valuable information to the creator prior to making further investments or time commitments.

To the extent that the pre-buying on crowdfunding is sufficiently large to make a project feasible (or even profitable), then crowdfunding is a near-perfect signal of whether demand is above the breakeven point at least for early-adopters. In this way, crowdfunding serves as perhaps the most informative type of marketing research available for new products. Marketing research is often modeled as reducing the variance of post-launch demand (Lauga and Ofek, 2009); like marketing research, crowdfunding that allows pre-buying provides an informative signal of post-launch demand. Unlike most marketing research, crowdfunding really can be advanced selling, which provides incentive-compatible demand signals, thereby substantially increasing the quality of the signal (Ding, 2007). Thus, entrepreneurs can see crowdfunding as reducing the noise associated with assessing demand prior to launch of a fundamentally new product. This can lead to an increase in the number of products launched and to a higher rate of success among launched products (Lauga and Ofek, 2009). In other words, we might see both more innovation and different (riskier) innovation.

In addition to a market signal concerning the demand for a product (either real demand as reflected through pre-sales or predicted demand as reflected through equity sales), crowdfunding provides creators a mechanism through which they may receive input on their product or business plan from users and investors. In the case of the Pebble watch, for example, users proposed software applications that they or others could write to take advantage of the unique features of the device, expanding the possibilities for it and increasing its value for certain potential users. For instance, one person suggests:

> *"Pebble would be a perfect device for coxes and coaches in rowing. I've seen many a cox risk his iPhone by taking it out to time races and such, and sooner or later there's a water issue. It's a rough and wet environment out there. Very hard on phones, but perfect for Pebble! Pebble would be able to connect to a hidden and protected iPhone, relaying stroke rate, timings, and even (if the messaging limitations could be circumvented somehow) delivering instructions from a coach on shore."*

Similarly, the community of potential users also weighed in on product features, such as the need to include support for Bluetooth 4.0. The creator responded:

> *"Dear Kickstarter backers... Today, we'd like to announce that your enthusiasm has helped convince us to move the entire Pebble roadmap forward and bring you a brand new feature. Bluetooth 4.0 - inside every Pebble! All Pebble watches will support Bluetooth 2.1 (as before) as well as Bluetooth 4.0 (Low Energy)."*

Although the benefits of user-driven innovation are well documented (von Hippel, 1998; Baldwin, Hienerth, and von Hippel, 2006; Chatterji and Fabrizio, 2011), crowdfunding platforms enable *potential* users to provide input early in the process, during creation and before the initial product has been actually produced. Although information from potential users seems as though it will benefit creators, similar to user information, this phenomenon has yet to be carefully studied.

4.2 Funders

Funders are heterogeneous in their motivations for crowdfunding. Some do it for altruism, some for early access to a product or service, some for supporting the creator who may be a friend or family member, some for consumption (e.g., the pleasure they receive from being part of a creator's online community), and, in the case of equity crowdfunding, some for a financial return on their investment. Funders receive no financial return on their investments on non-equity crowdfunding platforms; their motives are generally multifaceted.

Early investors are often family and friends who invest to support the entrepreneur (Agrawal et al, 2010): Crowdfunding platforms, which act as an intermediary and formalize what would otherwise be informal finance, improve on the financial contracts between family and friends by balancing the benefits and costs of social relationships (Lee and Persson, 2012).[7] For many funders, investing on a crowdfunding platform is an inherently social activity, and they partly commit capital to obtain preferential access to the entrepreneur (e.g., updates, direct communication). They also derive consumption value from a generalized feeling of being part[8] of the entrepreneurial initiative and among a select group of early adopters. Entrepreneurs use extensively limited-edition products and offer special access to further attract funders who care about exclusivity and recognition. For projects that involve the delivery of an actual product and not the support of a cause, a key motivation is the ability to pre-buy (sometimes at a price discount). Equity-based crowdfunding also has the potential to democratize the investment

[7] Whereas family and friends can use social pressure to incentivize the entrepreneur, their presence also discourages ex-ante risk taking in the absence of a formal contract, as failure could also negatively impact the social relationship.

[8] *"If I like the personality of the team, I may donate even if I don't intend to use the product myself. By donating to Fara I was able to live vicariously through the dev team."* Source: http://www.wired.com/gamelife/2012/02/kickstarter-blindside/

process, “giving ordinary investors the opportunity to get in on the ground floor of the next big idea” (Gubler 2013).

4.3 Platforms

The incentive for platforms is to maximize the aggregate value of crowdfunding transactions that result in funded projects. Most platforms employ a revenue model based on a transaction fee for successful projects. The fee is typically 4-5% of the total funding amount and may be higher in cases where the target is not reached but the platform still allows the entrepreneur to collect what has been raised (e.g., Indiegogo currently takes a 9% fee for projects that fall in this category). The objective of the platform is therefore to have as many successful projects as possible. This requires attracting a large community of funders and creators as well as designing the market in a way to select high-quality projects, reduce fraud, and allow for efficient matching between ideas and capital (e.g., by increasing the degree of disclosure by the entrepreneurs and allowing for effective search on the side of the funders). Crowdfunding platforms also have an incentive to attract projects that can generate a disproportionate share of media attention, as they not only expand the existing community of funders (further increasing network effects) but also allow the platform to expand into new categories (Kain, 2012).

5. Disincentives to Participate in Crowdfunding

We summarize the main disincentives for creators and funders to participate in crowdfunding, relative to their other options for raising capital for or investing capital in innovative activies. The two main disincentives for creators concern disclosure and investor management. The main disincentives for funders include fraud and creator incompetence.

5.1 Creators

Although the incentives to use crowdfunding are compelling for some creators, crowdfunding also presents certain disincentives. Perhaps the greatest of these is the disclosure requirement. Other sources of funding, like home equity loans, friends and family, and angel investors allow the creator to keep their innovation secret from the general public prior to selling their product or service. However, crowdfunding requires the creator to disclose their innovation in a public forum. This poses a disincentive of varying degrees to creators. The disincentive will be strongest for those creators who are most worried about imitation, especially during the period between raising capital and launching their product, when the difference between crowdfunding and other sources of capital in terms of exposure to risk due to disclosure is most severe.

Investor management presents another disincentive. First, because crowdfunders generally fund in smaller amounts than, say, angel investors, more investors are required to raise a given amount of capital. Investor management may be significantly more costly in crowdfunding simply due to the sheer number of funders who need to be managed. Second, creators usually have no control over who funds their projects. As such, creators have no way to prevent “overly

vocal" funders from joining and adversely affecting the community's dialogue. Third, professional investors, for instance angels and VCs, often bring additional value such as industry knowledge, relationships, and status. Not only are non-professional crowdfunders less likely to bring these benefits, they are also less likely to make the effort to confer these benefits to the creator (if they could) because the returns for doing so are much lower given their typically much smaller investment.

Receiving investments from a large number of small investors can be time-consuming: Whereas most individuals invest and then wait for the deliverable, some invest with the intention of actively engaging on a regular basis with the entrepreneur. This engagement may not even be for the constructive purpose of improving the project but instead for the consumption value the funder receives for interacting with the creator (particularly for artistic projects)[9]. The process can be particularly daunting as the number of investors rises. Moreover, whenever a project fails to meet a deadline or expectations, even less active investors will typically start demanding increasing levels of attention. Although such interaction allows entrepreneurs to collect user feedback, it also can divert resources and time from executing on the idea. Max Salzberg, who unexpectedly raised $200K on Kickstarter (from a $10K initial target) to develop an open source alternative to Facebook, described his team's experience as *"they had become so consumed with things like answering e-mails and making T-shirts for their contributors that they had little time to build the software"* (Wortham, 2012).

In the case of the Pebble watch, as of February 2013, the team had delivered 32 detailed updates about the software and manufacturing of the product and received about 12,000 comments from the Kickstarter community.[10] Projects that are able to disclose more information, such as those that do not face a direct risk of imitation, are generally able to manage expectations more efficiently both during the fundraising phase as well as after. This reduces the level of interaction required with any single investor and allows the community to adjust expectations as the project advances.

In summary, creators who incur greater than average costs from disclosure and/or derive greater than average benefit from professional investors above and beyond access to their capital will be less likely to seek capital through crowdfunding. The variation in incentives across projects suggest those that rely on crowdfunding may be systematically different from projects that rely on other sources of financing.

5.2 Funders

[9] *"'Aside from raising the money, it really is an exercise in engaging with your fans and having a conversation with them and getting them involved.'"* Source: http://www.npr.org/blogs/therecord/2012/11/23/165658174/how-much-does-crowdfunding-cost-musicians (accessed 02-15-13)

[10] See http://www.kickstarter.com/projects/597507018/pebble-e-paper-watch-for-iphone-and-android/posts (accessed 02-10-13)

Funders face three primary disincentives: creator incompetence, project risk (above and beyond the risk of creator incompetence), and fraud.

To date funders on crowdfunding platforms have been relatively optimistic about the ability of creators to deliver on their promises. As more projects successfully raise money, but then fail to meet milestones, platforms have tried to manage better the expectations of the community[11] and have asked entrepreneurs to disclose more information. Even with these adjustments, transparent disclosure is a major problem, and funders still have a difficult time assessing the execution risk. Whereas pre-buying behavior is often a key reason for investment, entrepreneurs can rarely ensure on-time delivery (or any delivery at all), and have little experience in building a product, dealing with logistics and suppliers.[12]

Projects that exceed the funding goal by large amounts often deliver late (if at all), as they are unable to adjust to demand (Pepitone, 2012). The issue is so prevalent that Kickstarter has started to tightened its requirements and reject an increasing number of projects, in particular if they involve a hardware component (Hurst, 2012). This change has prompted an increasing degree of platform shopping, with some of the more uncertain projects landing on other platforms.

Inexperienced or overly optimistic investors may not only channel capital towards bad projects, but also leave room for outright fraud. It is relatively easy to craft project pages that look like authentic fundraising campaigns and use false credentials or claim endorsements and false affiliations (e.g., with a charity). Whereas platforms try to filter the most salient cases of manipulation, as the number of project and transactions raises, they also become an appealing target for professional scammers and cybercrime organizations. Moreover, in the absence of regulation or external certification, even legitimate entrepreneurs have little incentive to fully disclose their execution risks.

Because investments are small, the risk is exacerbated by weak, individual funder incentives to perform due diligence on crowdfunded projects. Whenever the cost of performing due diligence is high but the individual benefit is low, the crowdfunding community will systematically underinvest in it because of free-riding behavior. Relative to platforms such as Ebay or Airbnb, where sellers have an incentive to build a reputation, the lack of repeated interaction over a short period of time makes the potential for fraud substantially higher. At the same time, when due diligence takes place, it can be timely and thorough because of its crowdsourced nature.

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[11] See http://www.kickstarter.com/blog/is-lateness-failure and http://www.kickstarter.com/blog/kickstarter-is-not-a-store (accessed 10-02-13)

[12] *"Quest did not have contracts already in place before he went on Kickstarter - a novice mistake. Once the Hanfree was funded, Quest says, he began contracting with accessories manufacturers in China, Singapore, and Los Angeles. But because those manufacturers were able to see precisely how much money Quest had raised on Kickstarter, Quest says they gained too much leverage in negotiations, chipping away at the product's margins. It soon became too expensive to create the product with the funds raised"* (Markowitz, 2013)

Existing research suggests that funders heavily rely on accumulated capital as a signal of quality, i.e., they delegate due diligence to early investors (Agrawal, Catalini, and Goldfarb, 2011; Zhang and Liu, 2012; Burtch, Ghose, and Wattal, 2011; Freedman and Jin, 2011). This means that the propensity to invest rises as capital accumulates. Thus, the sequential nature of investment has the potential of triggering an information cascade. In Agrawal, Catalini, and Goldfarb (2011), we examine investment patterns on the music platform Sellaband, an early crowdfunding innovator. We show that the first few thousand dollars usually required weeks to raise, while accumulating the last few thousand often took just a few hours.

This path dependence and accelerating rate of funding suggests that project success will only reflect underlying project quality if early funders do a careful job screening projects. Given that early funds disproportionately come from family and friends of the creators and that late funders do not discount the information when the early funds come from family and friends of the creator, early funds may be a better signal of the wealth of creators' social networks than of underlying project quality. Thus, the information cascade may be gamed when late funders find it difficult to determine whether early funders are acting upon private information related to the underlying quality of the project or whether early funders are directly receiving private value from funding a friend. In addition, creators could more exactly exploit the path-dependent nature of investment by injecting capital in the early stages, thereby inducing an information cascade, but then withdrawing their money before the fundraising is closed.

These risks may reduce the trust funders place in crowdfunding, thus reducing the amount of funds available and the ability of crowdfunding platforms to generate more innovation by providing lower cost and abundant capital. To overcome these risks, crowdfunding platforms have developed mechanisms to reduce these disincentives for funders, which we discuss in the next section.

6. Tools to Reduce Disincentives for Crowdfunding

Crowdfunding platforms are evolving rapidly. One of the most dynamic dimensions of these platforms is the tools they are developing in order to reduce the disincentives for creators and, in particular, funders. We describe four of the major tools here: provision point mechanism, platform regulation and monitoring, crowd due diligence, and reputation.

6.1 The Provision Point Mechanism

A common feature across crowdfunding platforms is the use of a provision point mechanism (Bagnoli and Lipman, 1989): Specifically, the creator only receives the funds if the funding goal is reached (or surpassed) within a certain period of time. This particular type of contract is a solution to a classic coordination and free-riding problem that arises in the provision of public goods: Whereas a group of individuals may be better off by a project being funded, if ex-post it is impossible to exclude non-funders from benefiting from it, ex-ante individuals would rationally decide to freeride and wait, making the fundraising impossible. By relying on the provision point

mechanism, crowdfunding platforms eliminate the first-round funding risk and induce individuals to invest whenever they would ultimately benefit from the product (assuming they are willing to wait and sustain the execution risk).

Two types of funding motivations are particularly affected by this: 1) pre-buy funders who only pay if the creator has sufficient funds to undertake the project, and 2) friends and family who only give money if the project crosses some threshold of general interest. Pre-buy investors benefit directly from the usefulness of the provision point mechanism in a public good provision. Friends and family benefit from a similar mechanism but perhaps in a more subtle way because their motivations are likely to be a mix of pure public goods investment and some social benefit. The provision point mechanism provides friends and family with a way to support the creator but use other funders to hedge somewhat against the risk that there will never be an attempt to deliver on the project. Broadly, the provision point mechanism encourages the funding of projects with a clear pre-buy element and/or a large set of family and friends willing to support the project with some assurance of a good faith effort by the creator. To the extent that the provision point mechanism facilitates financing by mature projects with established friends and family, it may increase the degree to which crowdfunded projects look like the types of projects funded by other sources.

6.2 Platform regulation and monitoring

Crowdfunding platforms are adapting their rules and regulations to user behavior in an ongoing effort to reduce disincentives for funders. For example, Kickstarter recently allocated additional resources to detect fraud, but make clear that they leave it up to funders to evaluate creator competency: "We've also allocated more staff to trust and safety. We look into projects reported by our community for guidelines violations and suspicious activity, and we take action when necessary. These efforts are focused on fraud and acceptable uses of Kickstarter, not a creator's ability to complete a project and fulfill. On Kickstarter, backers ultimately decide the validity and worthiness of a project by whether they decide to fund it."[13] They also took steps to better set expectations for both creators and funders: "As Kickstarter has grown, we've made changes to improve accountability and fulfillment. In August 2011 we began requiring creators to list an 'Estimated Delivery Date' for all rewards. This was done to make creators think hard about when they could deliver, and to underline that Kickstarter is not a traditional shopping experience." Finally, recognizing that some types of projects were more prone to disappointment than others, the platform increased the burden of disclosure on creators of product design and technology: "In May 2012 we added additional guidelines and requirements for Product Design and Technology projects. These include requiring creators to provide information about their background and experience, a manufacturing plan (for hardware projects), and a functional prototype. We made this change to ensure that creators have done their research before launching and backers have sufficient information when deciding whether to back these projects." Given platforms' incentives to maximize successful funding campaigns, we anticipate continuous modifications to platform regulation and monitoring, reacting to user

[13] http://www.kickstarter.com/help/faq/kickstarter%20basics

behavior in search of striking the appropriate balance between minimizing burden on creators while maximizing safety for investors.

6.3 Crowd Due Diligence

On one hand, the crowd is disadvantaged relative to traditional investors in terms of due diligence since crowdfunders typically have a much smaller stake and therefore less incentive to invest effort into conducting due diligence on creators. The free rider problem is severe. On the other hand, there are many more crowdfunders reviewing any given crowdfunded project, so there is more chance that someone will notice something amiss. For example, only two days and approximately $4K in on a $80K fundraising campaign for an action video game on Kickstarter, two potential investors flagged the project as a scam and notified others:

> *"The concept art at http://www.mythicthegame.com/concept-art.html was blatantly stolen from two different people in the competition at http://conceptart.org/forums/showpost.php and the character art was stolen from this guy http://genzoman.deviantart.com/ [...] and the facebook page which recently went down had pictures of offices like this: http://i.imgur.com/uTCBT.png which were blatantly stolen from Burton Design group: http://www.burtondesigngroup.com/studio/ In summary, this is a blatant scam."*[14]

In other settings, the crowd has produced mixed results in terms of monitoring and due diligence. For example, Wikipedia relies on its most active community members to protect entries from vandalism.[15] Volunteers and software bots track new pages for copyright violations, spam and vandalism as well as recent changes to entries of particular interest. Pages can also be placed under different levels of protection (entries under full protection can only be edited by administrators).[16] At the same time, the bottom-up process of revisions by the community is far from perfect: over time, it has become increasingly difficult for new editors to have their contributions accepted (Halfaker et al., 2012). Moreover, most of the process of convergence towards a neutral point of view seems to be driven more by the introduction of new articles with a different slant than by the reduction of slant in the original pages (Greenstein and Zhu, 2012).

Ebay relies on both the community and data analytics to detect fraud.[17] In terms of data analytics, Ebay uses large data on prices, high-volume items and seller information (e.g., IP address, geographic origin, category spanning) to identify suspicious sellers and prevent them from building a positive reputation (e.g., by selling multiple cheap items at a loss). Ebay also

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[14] Source: http://www.kickstarter.com/projects/273246798/mythic-the-story-of-gods-and-men/comments (accessed 02-17-13)

[15] http://en.wikipedia.org/wiki/Wikipedia:Counter-Vandalism_Unit, Accessed February 18, 2013

[16] http://en.wikipedia.org/wiki/Wikipedia:FULL#Full_protection, Accessed February 18, 2013

[17] http://www.fastcompany.com/46858/how-ebay-fights-fraud, https://www.quora.com/Fraud-Detection/What-techniques-and-algorithms-does-eBay-use-to-prevent-fraud-among-its-buyers-and-sellers, Accessed February 18, 2013.

relies on reporting by the community, although timely intervention is often a challenge. Ebay also offers protection to buyers that complete the transaction using an approved electronic payment method, further leveraging its integration with subsidiary PayPal.[18] Fraud also takes place on the other side of the market, with reputable sellers being targeted by unwarranted returns and payment fraud.[19] Although fraud continues to be a serious problem on platforms such as Wikipedia and Ebay, it is not so overwhelming as to stop them from functioning.

6.4 The Role of Reputation

The provision point mechanism, platform regulation, and crowd due diligence, are all ways to reduce the level of fraud on crowdfunding platforms. Still, many of the risks persist after the funds are raised. Therefore, in crowdfunded markets, as in many other online markets, reputation and trust are particularly important. Cabral (2012, p. 344) emphasizes the risk of fraud in online transactions, suggesting that "While there are various mechanisms to deal with fraud, reputation is one of the best candidates—and arguably one of the more effective ones."

The existing literature on crowdfunding has emphasized the role of the social nature of crowdfunding platforms to provide trust and signal quality. For example, in examining the related phenomenon of online lending (at Prosper.com), Zhang and Liu (2012) argue for "rational herding" as investors use the decisions of others as an informative signal of project quality. Freedman and Jin (2008) show the usefulness of social networks in overcoming asymmetric information in online lending markets. Similarly, using data from a journalism crowdfunding platform, Burtch, Ghose, and Wattal (2013) demonstrate that the decisions of others provide an informative signal of quality (and hence provide a marketing function for the final product).

This demonstrated importance of social networks to reputation-building in existing crowdfunding platforms does not necessarily mean these networks will continue to play such as key role in building trust if crowdfunding grows beyond its "donation-based" roots. To the extent creators can manipulate the social network signal value of crowdfunding (as described above), it is possible that other reputation mechanisms will increase in importance.

In other online markets, several other reputation mechanisms have arisen to deal with the asymmetric information issues and potential for fraud online. Broadly, these mechanisms can be divided into three types of tools for building reputations online: 1) quality signals, 2) feedback systems, and 3) trustworthy intermediaries.

First, and perhaps most simply, participants in online marketplaces can provide credible signals of quality. Waldfogel and Chen (2006) demonstrate the importance of brands in signaling quality in online marketplaces. Importantly, they show that as information becomes more accessible, the importance of brands diminishes. Lewis (2011) further examines the role of information access and shows that the voluntary disclosure of private information increases the prices of

[18] http://pages.ebay.com/paypal/buyer/, Accessed February 12, 2013.
[19] http://ebay.about.com/od/resolvingdispute1/a/rd_buyerfraud.htm, Accessed February 4, 2013.

used cars on eBay. There are other ways to signal quality, even if product information cannot be credibly communicated. For example, Roberts (2011) shows that warrantees provide a credible quality signal, and Elfenbein, Fisman, and McManus (2012) show that tying charitable donations to online auctions seems to provide an informative quality signal.

Second, it is in the interest of online marketplaces to provide mechanisms for relaying information about the reputation of buyers and sellers. The most basic versions of these mechanisms simply report sales information, which Tucker and Zhang (2012) demonstrate has important effects on choices and gives a signal similar to the social network mechanism currently emphasized in crowdfunding. More sophisticated mechanisms rely on ratings systems to provide reputation information. This literature emphasizes the eBay ratings system, but the ideas are more widely applicable (Cabral, 2012). The idea behind this mechanism is to get market participants to rate their experience after a transaction. For example, eBay's current mechanism has buyers rating sellers. If sellers generally provide a high-quality experience, their ratings will be good. New buyers will see the high ratings, place further trust in the seller, and be willing to pay a higher price. A long literature demonstrates the importance of seller (and buyer) ratings to outcomes on eBay and other platforms (reviewed in Cabral, 2012 and Cabral and Hortacsu, 2010).

Third, the arrival of new online markets has led to the establishment of third-party intermediaries that provide quality signals and facilitate trust between marketplace participants. For example, Jin and Kato (2007) demonstrate the importance of third-party quality certification to the thriving online markets for collectibles. In particular, agencies that certify quality of sports cards have become important since the rise of online markets for collectibles. Rather than simply saying "high quality," a seller can post a certified and verifiable quality level, enabling buyers to have a reliable signal of the product's quality. Since the certification agencies' interests are to provide honest ratings, both buyers and sellers can trust them. This phenomenon is not unique to third-party certification. Stanton and Thomas (2012) explore the possibility that independent workers in online labor markets can form teams (that look like firms) in order to leverage the reputation of established workers to improve the job opportunities of new workers. Facebook and other large social networks such as Twitter and Linkedin are also increasingly used to validate user profiles when moral-hazard is a major concern.

In summary, as crowdfunding grows, reputation and trust are likely to grow in importance. While social networks do provide some value for reputation, other ways for marketplaces and participants to signal quality are likely to arise, including ratings systems and the establishment of third-party intermediaries. An increase in the variety of reputation mechanisms may increase funder trust in crowdfunding, thereby increasing the quantity of capital, the effective price of that capital to creators, and the number of projects that can be produced.

The prior research on other types of online reputation mechanisms, however, suggests that as online reputation mechanisms become established, there is an increase in mainstream online activity and a decrease in the size of the fringe. To the extent that reputation mechanisms might become increasingly important in building trust on crowdfunding platforms, we might see an

increase in funds toward innovation, but a decline in the extent that such funding goes to a different type of innovation than we see through other channels. More broadly, the forces that seek to increase trust and reduce risk might diminish the extent to which crowdfunding affects the direction of innovation rather than just the rate. These issues related to trust might explain why our preliminary look at funded projects on Kickstarter suggested that crowdfunded projects exhibit a similar geographic agglomeration pattern to other projects.

Conclusions

Crowdfunding is growing in importance as a source of funding for early stage ventures. The JOBS Act is likely to further increase its rate of growth. It is an open question whether crowdfunding will affect the rate and direction of innovation. To the extent that investment risk and fraud are fundamental concerns, crowdfunding may never gain sufficient traction to have a noticeable impact on the cost of capital for early stage investments and therefore may have no meaningful impact on the rate of innovation. Crowdfunding platforms are developing mechanisms to overcome some of these concerns, specifically through the use of provision point mechanisms, through the use of other reputation signals, and through the value of demand signalling in reducing other types of risk. To the extent that these mechanisms have succeeded, or can be expected to succeed in the future, we can expect crowdfunding to provide an additional source of capital for early stage projects. This is likely to increase the number of projects undertaken.

Importantly, even if crowdfunding does facilitate more innovation, it is not at all clear that it will lead to a different type of innovation, rather than simply enabling marginal projects to be funded. The mechanisms available to reduce risk, such as relying on brands and social networks, may push crowdfunded projects to look like projects funded through other means.

We opened this article with a discussion of the Pebble Watch as an example of how crowdfunding can lead to more and different innovation. While it is difficult to take too much from one example, the Pebble Watch story is consistent with crowdfunding facilitating more innovation. It is not clear that Pebble Watch is truly different, or if, ex ante, the Pebble Watch was a marginal project that only deserved funding under a lower cost of capital (and perhaps even ex post given the implementation challenges discussed in the *Financial Times* and elsewhere (Bradshaw 2012, Abbruzzese 2012, Pepitone 2012).

Of course, given the early stage of crowdfunding, it is difficult to say with much certainty what will happen. Relying on the existing data is necessarily imperfect, especially given that there can be no large scale equity-based crowdfunding platform until the SEC releases its recommendations. Our argument is therefore necessarily guided by very preliminary data and suggestive ideas from economic theory.

Given these limitations, we summarize cautiously. Broadly, if crowdfunding succeeds in mitigating the risks to investors, it could lead to an increase in the availability of early stage

investment capital but it may not lead to any systematic difference in the type of projects that get funded.

Figure 1: Google Search Volume for “crowdfunding”

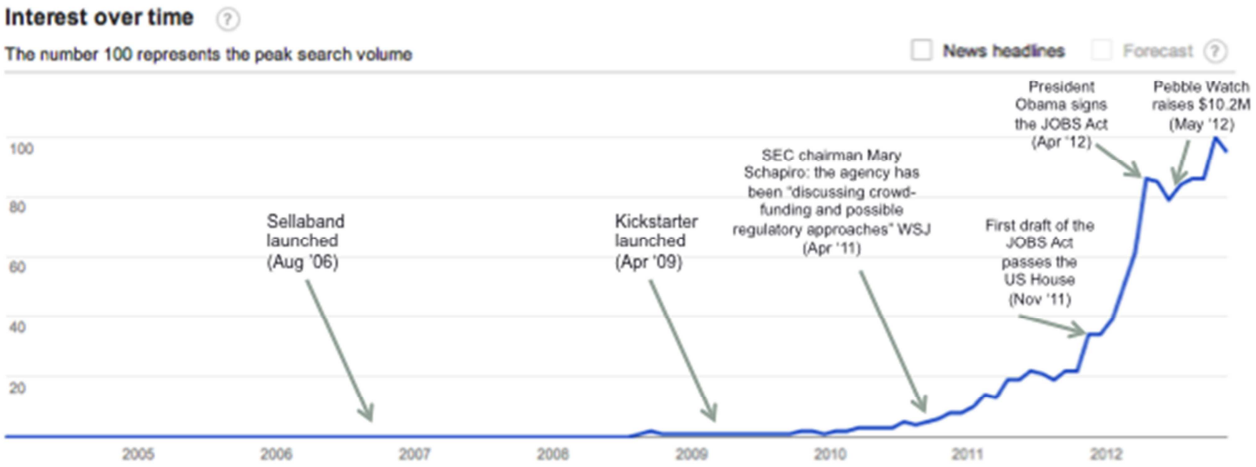


Figure 2: Total Capital Raised (thousands) on Kickstarter by successful projects between June 2009 and October 2012

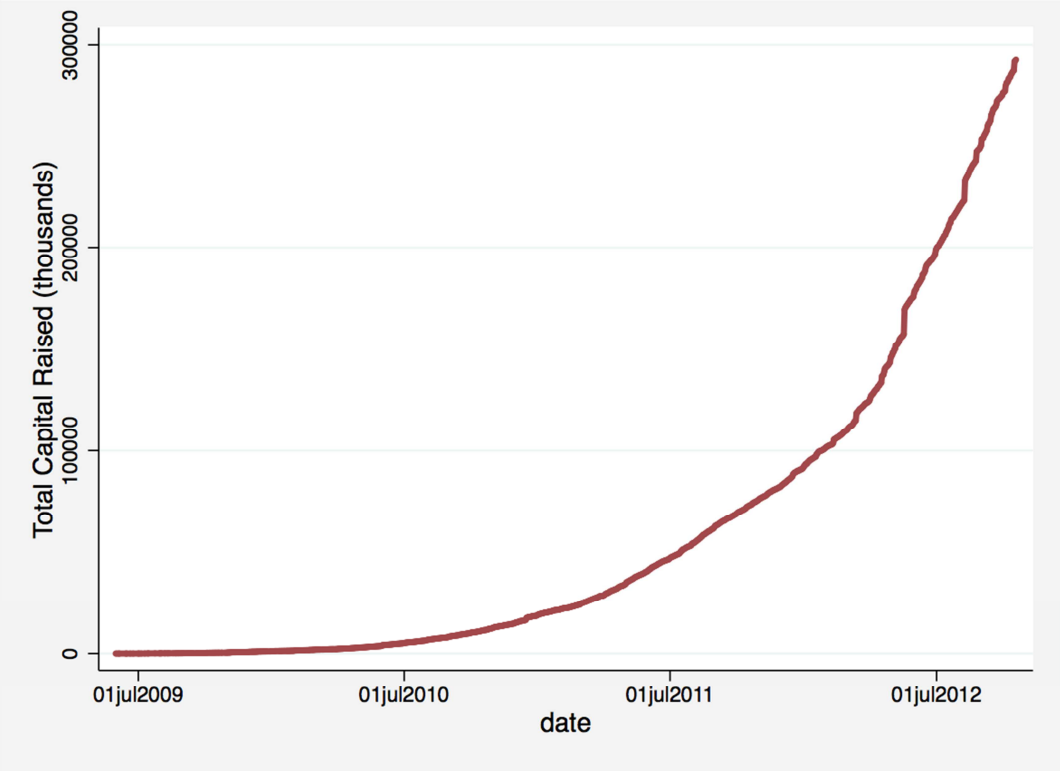


Figure 3a: Kickstarter funding in the arts by National Endowment for the Arts grants, by state

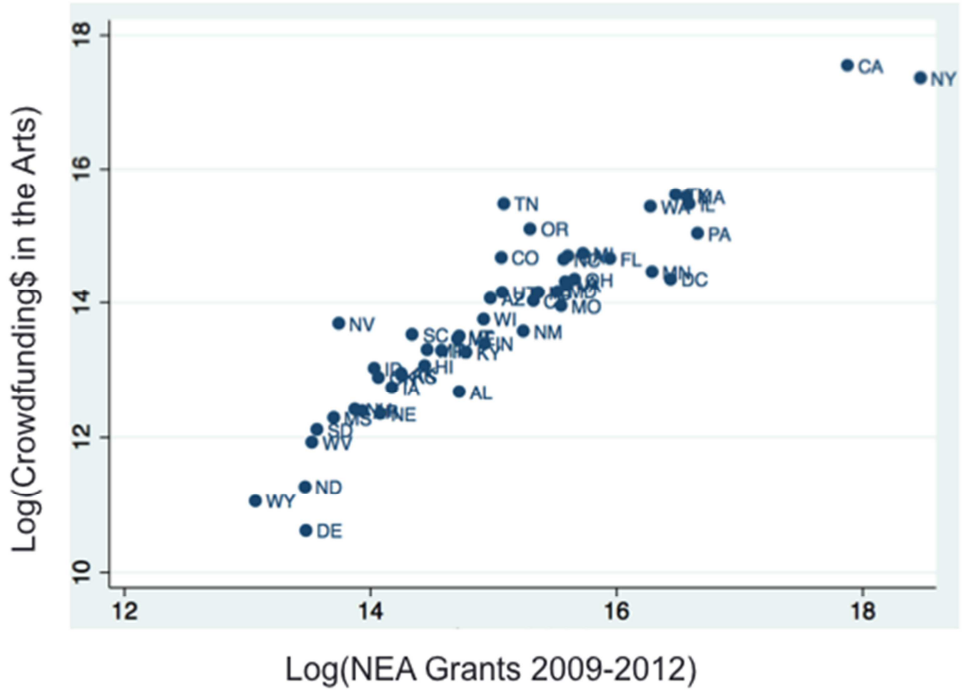


Figure 3b: Kickstarter funding in technology by venture capital investments, by state

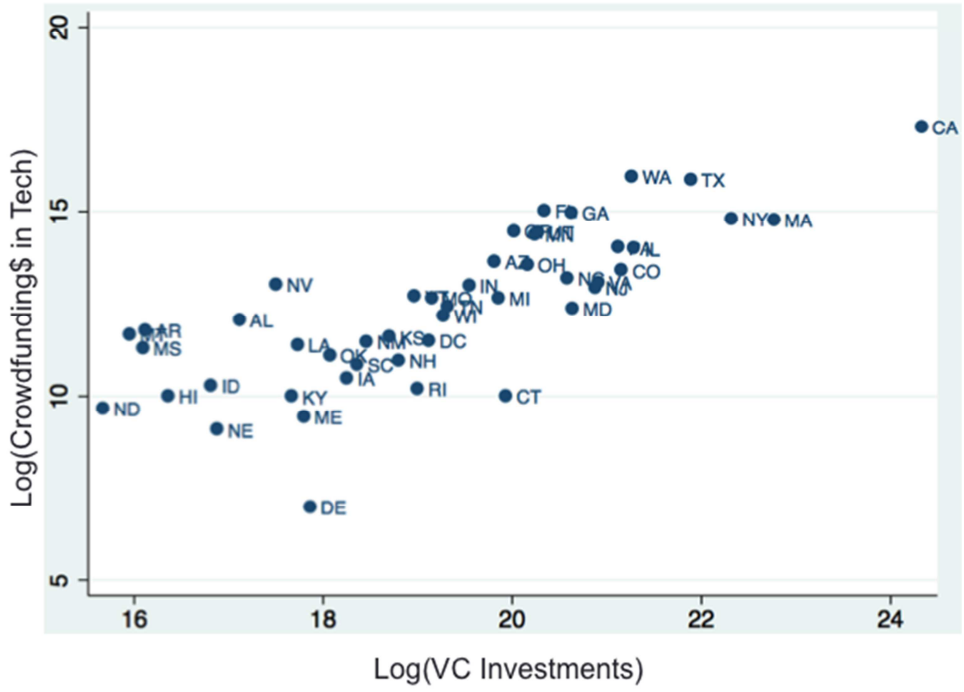
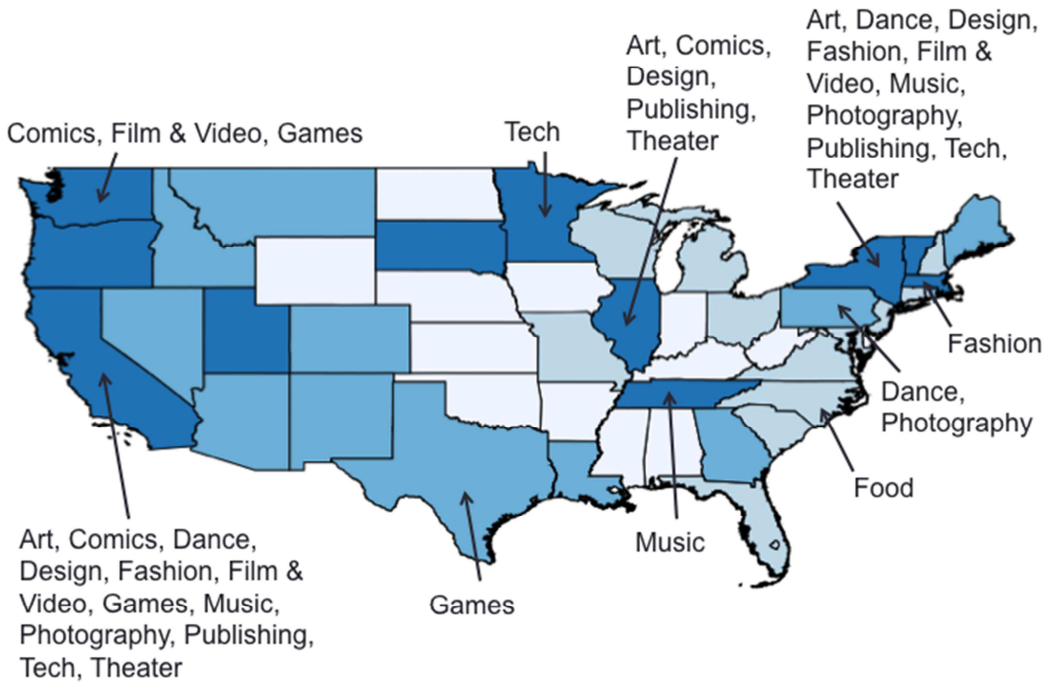


Figure 4: Kickstarter projects by state (darker colors have more financing)



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