



## Crowdfunding as Donations to Entrepreneurial Firms

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### ARTICLE INFO

#### JEL codes:

G2

G02

H41

#### Keywords:

crowdfunding  
entrepreneurship  
public goods  
motivations

### ABSTRACT

The bulk of today's ("preorder-," "reward-," "gift-," and "donation-based") crowdfunding raises funds for small, private entrepreneurial ventures without granting funders private claims to the projects' income or the ability to guarantee the realization and delivery of project outcomes. We theorize and show empirically – via a mixed-method approach applied to a representative and remarkably informative case – that the payoff structure for crowdfunders, akin to a public good contribution problem, leads to the tangible value of main project outputs exerting little influence on contributions to crowdfunding. This then raises the question of which funder motivations fund seekers may have to address to crowdfund their projects. We demonstrate the especially large role of non-pecuniary motivations and pinpoint three particular motivations that profit-seeking entrepreneurs may stimulate to be financed through crowdfunding. The findings hold important implications for entrepreneurs' crowdfunding strategies, platform design, and our understanding of how this funding institution works in general. The study also adds to emerging research on the implications of the public good nature of crowdfunding.

### 1. Introduction

Crowdfunding has attracted interest from entrepreneurs and policymakers intrigued by the prospect of expanding entrepreneurial funding opportunities (Agrawal et al., 2014, 2016; Alberg et al., 2013; Burtch et al., 2013; Belleflamme et al., 2014; Mollick, 2014; Varian, 2013), thereby removing, at least partially, one of the major barriers to early-stage entrepreneurial experimentation and innovation (Yu et al., 2017; Sorenson et al., 2016; Mollick and Robb, 2016; Parker, 2014; Mollick and Nanda, 2014). In this paper, we study what determines entrepreneurial crowdfunding. More specifically, we seek to add to the growing body of research on crowdfunding that addresses the question of what triggers contributions to crowdfunding projects – that is, what is behind crowdfunding campaign success (e.g., Davis et al., 2017; Anglin et al., 2018; Allison, 2015; Colombo et al., 2015) and, in turn, which funder motivations fund seekers should attempt to address to crowdfund their projects. We note that this question remains a puzzle, especially for cases in which profit-seeking entrepreneurs receive money from funders without granting any claims to project income or control rights in crowdfunding schemes, known as "preorder-," "reward-," "gift-," and

"donation-based" crowdfunding for private entrepreneurial projects (Strausz, 2017; Cason and Zubrickas, 2019).<sup>1</sup> In other words, unlike sales of existing products, crowdfunding-based entrepreneurs ask funding upfront to cover the development costs of a product that they may or (often) may not be able to realize and deliver to funders at the end. In this paper, we contribute to growing extant literature on crowdfunding that, in various ways, has sought to explain the determinants of funding success (Belleflamme et al., 2014; Agrawal et al., 2014; Burtch et al., 2013) by considering what we think is an often overlooked, yet fundamental, feature – namely that the nature of crowdfunding is akin to voluntary contributions to a public good.

Much of this sort of crowdfunding is intermediated on large platforms, such as Indiegogo and Kickstarter, with especially high numbers of ventures in film, music, publishing, games, software, and technology (e.g., Mollick, 2014; Kuppuswamy and Bayus, 2017; Krishnamurthy and Tripathi, 2009; Roma et al., 2017; Stanko and Henard, 2017). Niche crowdfunding platforms that focus on other more specific categories, such as PledgeMusic, Appbackr, and Crowdrise, also exist. Various forms of crowdfunding without private claims are also run by lone organizations such as Wikipedia by appealing directly to their own followers

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<sup>1</sup> Clearly, these models' dynamics differ from debt- or equity-based crowdfunding, in which funders are investors (e.g., Ahlers et al., 2015; Hu et al., 2015; Vulkan et al., 2016; Geiger and Oranburg, 2018; Signori and Vismara, 2018; Cholokova and Clarysse, 2015).

<https://doi.org/10.1016/j.resp.2021.104264>

Received 9 October 2019; Received in revised form 1 March 2021; Accepted 4 April 2021

Available online 29 April 2021

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without using a platform intermediary.

An entrepreneur's crowdfunding success, and indeed the success of such crowdfunding as an institution, turns on the question of funder motivations. This should shape the crowdfunding campaign and perhaps even how the project itself should be defined, presented, and communicated to the funding public (Crosetto and Regner, 2018). This also should determine which projects select into crowdfunding in the first place, as well as the role that it should play within the wider set of sources of venture funding.

Pioneering studies have found evidence that suggests crowdfunders are willing to contribute funds when their funding can be observed by others, thereby creating "signals" (Hildebrand et al., 2016; Krishnamurthy and Tripathi, 2009), or when funders experience some form of psychic motivation (Burtch et al., 2013; Lin et al., 2014). Research has also pointed to the possibility that funders wish to use the good being developed (Belleflame et al., 2014; Agrawal et al., 2015).

This paper draws on such insights to consider these and other points in an integrated framework to clarify the structure of payoffs to funders and then to use the framework as a foundation to theorize and investigate the strategies profit-seeking entrepreneurs can use to get their projects funded. The analysis allows us to contribute to assertions in literature that crowdfunding is akin to voluntary contributions to public goods (e.g., Belleflame et al., 2014; Agrawal et al., 2015; Varian, 2013; Cason and Zubrickas, 2019), leading us to an often-overlooked argument that funding is unlikely to happen in response to a campaign's main product but rather as a consequence of non-pecuniary motivations. Building on this insight leads us to draw on the vast extant literature on public goods contributions (e.g., Andreoni, 1990; Glazer and Konrad, 1996; Fehr and Gächter, 2000). While many of the precise forms of non-pecuniary motivations for charitable and philanthropic giving (e.g., the warm glow from giving, status, and generalized reciprocity) might not necessarily apply to giving to entrepreneurs, we focus on the broader motivational categories identified in that literature: (1) psychic motivations, (2) signaling motivations, and (3) reciprocity, and investigate whether other forms of these broad categories of non-pecuniary motivations exist and play a role.<sup>2</sup>

The empirical research design anticipates the inherent difficulty of observing motivations in the field and the typical difficulties of empirically studying crowdfunding: (very) large numbers of small and mostly anonymous funders (who typically are not observed unless they choose to fund). Our research approach involves turning to an early historical example – a case – in which it is possible to observe the evolution of a project's followers and to source especially fine-grained data in a somewhat controlled context in which important sources of motivational shocks (namely project leader communications to followers) are observed in their entirety. This early example of crowdfunding centers around Natural Selection, which has become a leading online game. Natural Selection's early funding provides a canonical example of crowdfunding for typical product categories (computer games) in early-stage development that used a now-typical institutional approach entailing online platform interactions and communications. Our data trace this project from its earliest beginnings in the early 2000s until crowdfunding ceased and the project transitioned to more traditional funding forms. While this clearly is a representative case, our analysis will focus on underlying mechanisms to advance generalizable theory. To put it more clearly: drawing on a single crowdfunding campaign may limit the study's generalizability to other campaigns, but it brings strengths to the investigation that cross-campaign studies cannot. For example, as will become apparent, this study's empirical setup is rather novel for crowdfunding study, with an analytical reliability that is

uncommon among such studies. A virtue of our empirical setting is the way in which it differs from mainstream crowdfunding settings, such as Indiegogo and Kickstarter, when it comes to the development status of the main project output at the time of the funders' contributions. Whereas modern crowdfunding most often sells the promise of a product in pre-launch campaigns, in our setting, funders have access to a prior version of the main product on which to base their funding decision (much like in the context of Wikipedia or projects on Patreon.com), thus reducing the conflating factor of uncertainty related to the delivery of the main product. In this way, our case has characteristics that allow novel insights that go beyond the case's boundaries to produce a wider set of implications (Sigelkow, 2007).

Consistent with literature on public goods and incentives to free ride explained herein, we find no evidence of a systematic link between main project outputs (i.e., products themselves) and crowdfunding. However, the private gift of incrementally earlier "beta" access to funders, but not non-funders, was associated with systematically greater crowdfunding (Krishnan et al., 2017). These and all other findings related to our case are entirely consistent and offer the same interpretation across separately collected observational and survey data collected precisely to stress and test the case from different perspectives.

Again, consistent with research on public goods, the non-pecuniary motivations observed in present data can be accounted for *entirely* by the broad categories of non-pecuniary motivations associated with charitable and philanthropic giving. That said, the precise nature of these motivations differed in this case, where giving is to profit-seeking entrepreneurs.

Rather than a warm glow or altruism, direct psychic rewards relate, in the present study, to a sense of empathy and "common cause" with the project and its founders. Signaling motivations are related here to raising awareness and encouraging others to give rather than to signaling status or wealth. Finally, reciprocity here is restricted to "paying back" for one's own accumulated consumption after a period of time – not generalized reciprocity or paying-it-forward. The findings offer new insights into how entrepreneurs seeking crowdfunding can mobilize public funders.

## 2. Background and Hypotheses

To develop hypotheses on leverages entrepreneurs can use, we need to ground our discussion on the structure of payoffs to funders. An entrepreneur seeks crowdfunding for a project, and project development will proceed only if the project is fully funded to pay the fixed development costs,  $\bar{F}$ , required to bring the project to life.

Each crowdfunder considers whether to contribute funds,  $f$ , to the project. Those who do will receive a "private gift" (e.g., a coffee mug, poster, discount on preordered product) of value,  $r$  (Varian, 2013; Thüridl and Kamleitner, 2016). The gift's value must not exceed the value of the funding:

$$f > r.$$

If the project is fully funded and proceeds successfully, a crowdfunder can expect the consumer surplus,  $R$ , from later purchasing and enjoying the project's main output: the product. Crowdfunders also might experience various intangible, non-pecuniary rewards (Agrawal et al., 2015; Belleflame, et al. 2014; Burtch et al., 2013). The sum of the value from these rewards is  $B$ .

If the project is fully funded, crowdfunders expect total payoffs,  $V$ , which are the total value from direct outputs, private gifts, and non-pecuniary rewards less the value of funds given:

$$V = R + r + B - f.$$

The simple expression above summarizes and organizes important ideas raised in existing crowdfunding research. This payoff structure corresponds, in the broadest brushstrokes, to payoffs from voluntary

<sup>2</sup> Separate research efforts have carried out analogous exercises in rather different areas of Internet-supported contributions to public goods, such as open source software (e.g., Lakhani and Wolf, 2005; von Hippel and von Krogh, 2003).

contributions to charitable and philanthropic giving in literature on public goods (e.g., Andreoni, 1990; Harbaugh, 1998; Sugden, 1984).

To move from payoffs toward a more detailed understanding of motivations, we consider two other issues. First, how do funders make decisions in response to these payoffs? The second issue entails moving beyond mere broad categories of payoffs toward a more precise characterization of non-pecuniary motivations.

**Limits of “Coordinating” Funders’ Decisions.** Standard models presume that decision-making occurs in a strategic equilibrium, or in a “coordinated” pattern of funding decisions (e.g., Andreoni, 1990; Harbaugh, 1998; Sugden, 1984; Varian, 1994, 2013). The intuition is that fully rational and informed funders will contribute the bare minimum amount of funds required to ensure that full funding is achieved so that a consumer surplus can be realized. This presumption of “coordinated” decision-making in a strategic equilibrium is critical, as it implies that all funders have an important impact on whether the project and consumer surplus are realized (as failure by any one person to pledge the bare minimum means the project will not be fully funded). However, if crowdfunders cannot coordinate their decisions effectively in response to one another (or cannot have decisions coordinated on their behalf), as we argue here, the implications for motivations profoundly differ. Uncoordinated contributors may view themselves as exerting virtually zero impact on aggregate funding and the project’s success, in which case expected consumer surplus from main outputs may not depend on funding decisions – meaning no net added payoff from giving funds exists and, therefore, nor does the motivation for doing so.

On one hand, it is remarkable that a project’s funding should be untied to the main creation of value. On the other, this is the long-understood standard result of a structure of incentives that produces free-riding. Free-riding incentives in crowdfunding without private claims need not require that crowdfunders act with guile or undue self-interest; crowdfunders simply need to believe that they exert virtually zero impact on aggregate funding success and on the likelihood of bringing the project to life. This idea finds support in extant studies that suggest a strong correlation exists between contributing to a campaign and the “making-it-happen” feeling (Cryder et al., 2013, and more recently Zvilichovsky et al., 2018).

A lack of coordination follows the institutional characteristics of present crowdfunding (Fleming and Sorenson, 2016; Mollick, 2014; Agrawal et al., 2015; Belleflame et al., 2014). Crowdfunders typically contribute less than \$100, and sometimes hundreds of dollars, to an entrepreneurial endeavor. They may number in the hundreds or thousands. They are geographically distributed (Agrawal et al., 2015; Guenther et al., 2017) and often anonymous, at least until they contribute (Burtch et al., 2015, 2016). Apart from the inherent difficulty of achieving coordination, the small size and lack of private claims mean little incentive exists to attempt to do so.

An entrepreneur or crowdfunding platform owner seeking to trigger crowdfunder funding may thus try to reduce incentives to free-ride acting as central actors. However, the real impact of such an option is far from clear. For example, explicit attempts to coordinate, as with assurance contracts whereby pledged funds are returned if some funding target is not met, do nothing to remove incentives to free ride in these instances without private claims. One recent suggestion is to go as far as to offer refund bonuses to funders as a compensation in case the project is not funded (Cason and Zubrickas, 2019). Likewise, any attempt to increase observability and facilitate communications among would-be funders does not resolve fundamental coordination challenges. Consistent with public goods literature and incentives to free-ride, thus, there should be no systematic link between main project outputs (i.e., products themselves) and crowdfunding, making any related levers useless to profit-seeking entrepreneurs. Thus:

**HYPOTHESIS 1.** (“Main Project Outputs”): Crowdfunders’ motivations to contribute are unaffected by the tangible value of main project outputs (such as products that will be available to project funders and

non-funders alike).

**HYPOTHESIS 2.** (“Private Gifts”): Even though the tangible value of private gifts available to funders only may be small relative to main project outputs, private gifts will motivate increased crowdfunding.

**Non-Pecuniary Motivations for Giving Money to Entrepreneurs.** As noted above, some role for non-pecuniary motivations,  $B$ , is not surprising, given past findings in pioneering studies on crowdfunding motivations (Josefy et al., 2017; Burtch et al., 2013; Agrawal et al., 2015; but see Cholakova and Clarysse, 2015, for an exception). However, the above arguments go further than merely claiming the *existence* of non-pecuniary motivations in crowdfunding. The limits of tangible rewards (H1 and H2) in explaining crowdfunding without private claims instead imply the *necessity* for non-pecuniary motivations to play a large and central role: to leave funders with greater payoffs from choosing to fund. In sum:

**HYPOTHESIS 3.** (“Non-Pecuniary Motivations”): Non-pecuniary motivations play a large role in motivating crowdfunding (relative to tangible payoffs).

To organize our hypothesis development around the precise *nature* of non-pecuniary motivations in entrepreneurial crowdfunding, we build on existing research on voluntary contributions to public goods (e.g., Cornes and Sandler, 1984; Andreoni, 1990; Fehr and Gächter, 2000; Glazer and Konrad, 1996; Harbaugh, 1998). Crowdfunding in the form that we study here fits the public good problem that has been central throughout decades of research on this tradition. Non-pecuniary motivations in this literature can be organized into three (very) broad categories: psychic rewards, signaling-based rewards, or reciprocity. Below, we review these categories and consider how they might apply to motivations entrepreneurs can leverage to stimulate financial contributions.

**A. Psychic Rewards.** Numerous sources of non-pecuniary benefits to making voluntary contributions to public goods in the case of charitable giving and philanthropy have the common thread of essentially triggering a direct psychic or psychological reward or feeling. This includes altruism, “warm glow,” “selfless giving,” and “other-regarding” motives (e.g., Andreoni, 1990; Cornes and Sandler, 1984; Croson and Marks, 1998; Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000).

Because the aforementioned descriptions of these benefits suggest a context of selflessness, whether they should apply to giving to private enterprises intended to enrich their owners is not immediately clear (Belleflamme et al., 2015; Schwienbacher and Larralde, 2010). We might nonetheless expect that other psychic rewards may relate to entrepreneurial crowdfunding. For example, a project’s enthusiasts frequently exhibit signs of goodwill toward the project and its founders (Fosfuri et al., 2011; Fosfuri et al., 2015). Crowdfunders also appear to be vested emotionally in projects attaining their goals and sustaining their activities and missions (Davis et al., 2017; Li et al., 2017; Meer, 2014). Funders shy away from projects that they cannot easily relate to (Leung and Sharkey, 2013) and instead exhibit affinity, identification with, and even empathy toward projects and founders closer to their interests and views (Kuppuswamy and Bayus, 2014; Greenberg and Mollick, 2016; Mollick, 2014; Burtch et al., 2013; Lin et al., 2014; Bitterl and Schreier, 2018). Crowdfunding campaigns themselves frequently appeal to a sense of mission or cause (Allison et al., 2015), if only to solve important problems, sometimes for specific communities of interest, or appeal to other values – even if only aesthetic values or product-development approaches. Findings of homophily in crowdfunding are also consistent, regardless of whether the potential exists for funders to derive some kind of psychic benefit or feel some sort of empathy toward or common cause with a project and its leaders (Lin and Viswanathan, 2016; Greenberg and Mollick, 2016). Thus:

**HYPOTHESIS 4.** (“Empathy and Common Cause”): Crowdfunders can be motivated to increase their provision of funds by stimulating their

psychic benefits such as empathy or a sense of “common cause.”

**B. “Signaling” Motivations.** A second broad category of non-pecuniary motivations in public goods literature relates to benefits from signaling and social interactions (e.g., Glazer and Konrad, 1996; Harbaugh, 1998; DellaVigna et al., 2012; Kumru and Vesterlund, 2010; Vesterlund, 2006; Bénabou and Tirole, 2006). For example, research has demonstrated that donations can signal a funder’s wealth, good character, and philanthropic interest. This can promote the funder’s status and become a “ticket of admission” to social groups (Glazer and Konrad, 1996; Harbaugh, 1998; Ellingsen and Johannesson, 2008; Andreoni and Bernheim, 2009; Ariely et al., 2009).

Again, signaling wealth and good character would hardly seem relevant in the case of entrepreneurial crowdfunding (Moss et al., 2015; Ordanini et al., 2011). We might nonetheless expect that, among crowdfunders, signaling with social capital (Courtney et al., 2017; Polzin et al., 2018), networks (Lin et al., 2013), and being an early “pre-mainstream” supporter (before the bandwagon) could play some sort of role (Hildebrand et al., 2016; Belleflamme et al., 2015; Kuppuswamy and Bayus, 2014). Findings have provided suggestive indications that for example observing funding can stimulate and encourage others to contribute (Zhang and Liu, 2012), at least by raising awareness and leading by example, if not merely raising expectations that funding goals might be reached (Vesterlund, 2003; Potters et al., 2007; Kuppuswamy and Bayus, 2017). Signaling one’s funding may lead to others forming expectations that it is a “high quality” project worth funding (Naroditskiy et al., 2014). Empirical research (Koning and Model, 2014; Kuppuswamy and Bayus, 2017) and theoretical conjectures (e.g., Agrawal et al., 2015; Zhang and Liu, 2012; Parker, 2014) have indicated that signaling one’s funding could somehow influence follow-on investments. Thus:

**HYPOTHESIS 5.** (“Encouraging Other Funders”): Crowdfunders can be motivated to increase their provision of funds by stimulating their interest in signaling their giving when it encourages others’ contributions.

**C. Reciprocity.** A third broad category of non-pecuniary rewards emphasized in charitable giving to public goods relates to reciprocity. Universities, charities, and other organizations benefitting society engender a sense of giving back (Sugden, 1984; Stanca, 2009; Frey and Meier, 2004; Falk and Fischbacher, 2006; Dufwenberg and Kirchsteiger, 2004). This also might be understood as a sense of obligation or a desire to avoid guilt, possibly providing psychic rewards (Simpson and Willer, 2008; Nowak and Sigmund, 2005). This is often not an instrumental or strategic form of reciprocity wherein individuals expect a repeated game of giving and taking. Apart from paying back, the literature also points to *paying forward* in anticipation of project outputs or “generalized” reciprocity through paying for others’ consumption, as in if “I help you, you help someone else” (Baker and Bulkeley, 2014; Gouldner, 1960; Goranson and Berkowitz, 1966). This is in line with recent crowdfunding research (André et al., 2017) suggesting that reciprocity in crowdfunding can be likened to gift exchange with expectation of returns to gift giving in the future. However, research is scarce, and crowdfunding research is unclear on how reciprocity operates. We treat this largely as an empirical question. Thus:

**HYPOTHESIS 6.** (Reciprocity): Crowdfunders might be motivated to increase their provision of funds by leveraging of their reciprocity.

### 3. Empirical Approach and Research Context

**Empirical research strategy and objectives.** The remainder of this paper empirically assesses the hypotheses, with the analysis organized by two main goals:

**Objective 1.** To distinguish the payoff categories –  $R$ ,  $r$ , and  $B$  – serving as motivations and their relative importance (H1, H2, and H3)

**Objective 2.** To explore and precisely characterize the nature of non-pecuniary motivations,  $B$  (H4, H5, and H6).

Sorting out how real crowdfunders behave and their motivations in response to typical institutional conditions naturally invites a field study able to assure control and homogeneity of the effects of contextual factors. This is, however, a challenging setting to identify with simultaneously inherent difficulties in estimating relationships and observing motivations in the field. This is particularly so, for example, when observing large numbers of different projects on a platform. An alternative to pursuing a field-based experiment tends to favor the “sharpshooting” of *a priori* formulated, precise hypotheses (e.g., Koning and Model, 2014; Meer, 2014; Greenberg and Mollick, 2016) rather than broad calibration, exploration, and characterization – as with the two objectives above. A study of a single crowdfunding campaign, as opposed to a cross-project study on a given platform, simultaneously cleanses results of any bias that can be attributed to unobserved project/campaign/entrepreneur heterogeneity – a challenge that most prior crowdfunding studies struggled with. Granted, this may limit the result’s generalizability, but in the spirit of Siggelkow (2007) invitation to search for remarkable cases that may inform us in unprecedented ways, we believe our insights are nevertheless worth careful consideration.

To move along this line, and to exploit the richness of data we gathered on the case, we use a mixed-methods approach, relying on multiple sources of data and several analytical techniques. First, our approach involves studying observational data in a regression framework to meet Objective 1. This relies on data scraped/acquired from various sources integrated into a novel dataset, allowing us to understand funders’ behavior across time coupled with a game developer’s actions. We then validate these results in separately collected survey data that provide a means of meeting Objective 2. This empirical strategy was available to us only due to our direct connection to Charlie Cleveland, founder of Unknown Worlds Entertainment, whom we met several times to discuss the case at length. This last more qualitative approach was fundamental to properly interpreting and integrating the collected data.

**Empirical Context.** Our representative empirical context is crowdfunding for the now popular online game Natural Selection, created by Cleveland and his company. In the game, two teams of players, the Kharaa (an alien species) and Frontiersmen (human space marines), engage in combat. The project’s goals reflected commercial interests, along with Cleveland’s unique product vision to develop an online, team-based, massively multiplayer game distinguished by alien vs. soldier play. This type of play ran counter to the then-prevalent human-human conflict trend in gaming (e.g., soldiers vs. terrorists). The game was originally released by the company on October 31, 2002, for free. Cleveland hoped the project would ultimately yield financial returns once a commercial version was developed. Today, the company is well-known in the industry as a successful 20-person developer firm, with many millions of game units sold.

The game quickly became popular with enthusiasts and began to earn recognition through industry and media coverage. Hailed by online game magazine *GameSpy* (February 7, 2003, Gamespy.com) as “possibly the most ambitious user-made (game) ever brought to fruition,” Natural Selection was soon registering tens of thousands of unique downloads and several thousand active players per week. The game would go through several more versions over the years.

The game’s crowdfunding campaign was launched to support the game’s ongoing development and improvement. The campaign platform resided on the game’s own website, with platform features that are typical in most of today’s crowdfunding campaigns, whether on third-party platforms (such as Kickstarter and Indiegogo) or in native campaigns (e.g., Wikipedia crowdfunding). For example, the campaign featured brief explanations of the project, its background and goals, and what the funds were to be used for, as well as a bio of Cleveland. Therefore, we should interpret results in this context as reflecting

**Table 1**  
Variable Definitions.

Variable	Definition
<i>Crowdfunding</i>	Logarithm of number of crowdfunding contributions within a given week
<i>Message to Followers</i>	Indicator switched on if project makes a public communication within a given week
<i>Number of Product Users</i>	Total number of active players within a given week, in thousands
<i>Product_Release_Message</i>	Indicator switched on for those weeks in which a communications includes one of the following words: "announce" "release" "update" "introduce" "patch" "fixes" "change" "optimization" "tweak"
<i>Major_Release_Date</i>	Indicator switched on for each week in which a important new version of the game was released
<i>Beta_Release_Message</i>	Indicator switched on for those weeks in which a communications includes the word "beta"
<i>Badge_Program</i>	Indicator switched on once the constellation program, where a badge indicating a user had funded the project within the game, first appeared
<i>Community_Message</i>	Indicator switched on for those weeks in which a communications includes one of the following words: "we" "us" "community" "members"

crowdfunding for a project that is available contemporaneously for use and for which a population of users already exists. This is analogous to many cases of direct crowdfunding by projects such as Wikipedia, GitHub apps, and creative works such as podcasts that use for example Patreon.com to collect financial contributions.

An important feature of our empirical setting is the way in which it differs from well-known crowdfunding settings, such as Indiegogo and Kickstarter, regarding the development status of the main project output at the time funders make their contributions. In our setting, funders base their funding decision on a prior version of the main product, whereas in many other crowdfunding platforms the decision is based on pre-launch campaigns. The conflating factor of uncertainty related to the delivery of the main product is thus seriously reduced in our case, which is another feature that makes it remarkable and worth considering.

Also typical of crowdfunding campaigns, Cleveland, as the project's founder, maintained regular communication with the game's players through a text-based blog associated with the game. Payments were received electronically via a web-based escrow-service PayPal account that Cleveland set up himself. This feature of the campaign also removes any issues in results that may be attributed to platform policies in the form of promoting certain projects more actively than others, which is a common practice among established crowdfunding platforms. Again, this is a feature that makes the case remarkable à la Siggelkow (2007) and thus worth being considered as such.

The basic game and funding framework remained stable over the project's lifetime, save for an exceptional discontinuity in February 2003, when Cleveland announced a change in the crowdfunding

campaign, referred to as "Constellation." The program would install an icon of any funder who contributed at least \$20 into the game. The icon could be attached to the avatar of any player who funded the game and be directly visible to other gamers during gameplay.

In 2009, Natural Selection 2, a commercial version of the game, was released, and crowdfunding ceased. We analyze only data through the end of 2008 to avoid this development having any bearing on the results.

**4. Analysis of Observational Data**

**Observational Data.** We analyze data between 2002 and 2008, covering the launch of crowdfunding and the period during which crowdfunding was the sole source of. Data available for the analysis are as follows:

- (i) funding data drawn from the project's PayPal account
- (ii) all communications and announcements to followers
- (iii) the precise schedule of new version releases, and
- (iv) a record of game-playing activity from the project's server.

The data sources are matched and structured into weekly observations from October 31, 2002 to December 31, 2008.

Definitions and descriptive statistics of all variables are summarized in Tables 1 and 2. Only Crowdfunders and Number\_of\_Products\_Users are not dummy variables. Message based variables refers to weeks in which such a message was sent out. Release based variables are dummies for those weeks in which the specific type of release was sent out. And the dummy for the Badge\_program captures the weeks in which the badge program was installed and functioning. When considering mean values of Message\_to\_Followers for instance, we can deduct that 27% of the considered weeks contained some news sent from Unknown Worlds Entertainment to their followers while Community\_Message only happened in 21% of the weeks. The main variables are now discussed.

**Measuring Crowdfunding.** Given the focus on motivating the generation of contributions by large numbers of small funders, the dependent variable *Crowdfunders* is a count of numbers of funders in an observation period. The value is log-transformed. Results are not sensitive to the transformation but are more statistically significant. (Using dollar values of funding provides similar results.)

**Measuring Variation in Main Project Outputs (R).** Measures of variation in main project outputs to both funders and non-funders (R) include measures of the precise timing of major releases. In addition, in line with Block et al. (2018), we measure the timing of announcements of major releases according to the content of all project communications. An attractive feature of these communications is that the text-based posts represented all public communications. No unobserved alternative media (e.g., streamed videos, tweets, etc.) were used.

To construct a measure of occurrence and amplitude of these

**Table 2**  
Variable Means, Standard Deviations, and Correlation Matrix.

Variable	Mean	Std.Dev	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Crowdfunders	1.66	1.09	0	4.96							
(2) Message_to_Followers	0.27	0.44	0	1	0.13						
(3) Product_Release_Message	0.05	0.22	0	1	0.04	0.39					
(4) Major_Release_Date	0.02	0.14	0	1	0.03	0.09	0.05				
(5) Beta_Release_Message	0.03	0.18	0	1	0.20	0.31	0.39	0.03			
(6) Badge_Program	0.90	0.09	0	1	0.06	-0.11	-0.11	-0.20	-0.07		
(7) Community_Message	0.21	0.41	0	1	0.15	0.86	0.35	0.04	0.34	-0.03	
(8) Number_of_Product_Users	0.82	0.39	0.40	1.80	0.43	-0.06	0.06	0.28	0.15	-0.17	-0.03

		Crowdfunding Motivations?				
		Tangible Payoffs		Non-Pecuniary Payoffs		
		(R)	(r)	(B)		
Data Used		Main Outputs, Product	"Private" Gifts to Funders-Only	Psychic Rewards	Signaling Rewards	Reciprocity
Research Objective 1 (H1, H2, H3)	Test with Observational Data	Zero, H1	Positive, H2	Positive (high importance), H3		
	Validate with Survey Data					
Research Objective 2 (H4, H5, H6)	Investigate with Survey Data	N/A		"Kinship, Empathy & Common Cause," H4	"Leading-By-Example, Initiating Others," H5	Reciprocity in some form, H6

Figure 1. Empirical Research Approach: Objectives, Hypotheses, and Analyses of Multiple Datasets.

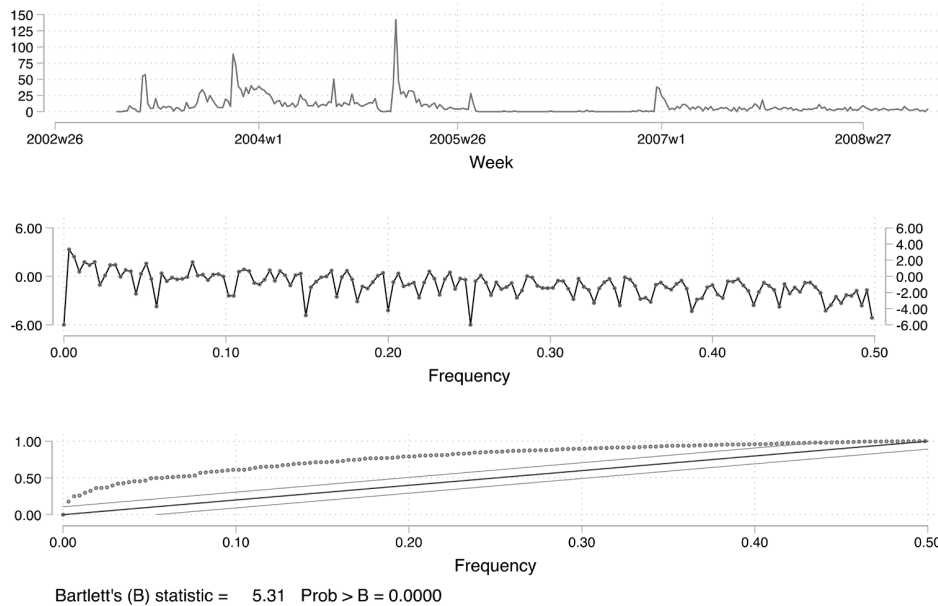


Figure 2. Funders Time-Series Plot (top), Periodogram (middle), and Bartlett's Periodogram-Based White Noise Test (bottom).

announcements, we used a lexicon of keywords by visually inspecting the entire history of the news releases and noting certain words used repeatedly to announce new releases of project outputs. The keywords are as follows: "announce," "release," "update," "introduce," "patch," "fixes," "change," "optimization," and "tweak."

*Measuring "Private Gifts" to Funders (r).* To capture variation in private gifts, we track announcements of the "beta" pre-release. This measure is especially attractive as a basis of comparison because the beta releases are essentially the same as main-product outputs except that they are released incrementally earlier and only to funders.

*Measuring Variation in Non-Pecuniary Motivations (B).* Within the observational data, the goal is simply to detect the existence and importance of the various sources of motivation. (More discerning observation and analysis occur with an investigation into accompanying survey data.)

To capture variation in empathy and a sense of common cause, we use project communications. Entrepreneur attitudes evidenced through project communications have been considered crucial stimuli for funder engagement (Allison et al., 2015; Anglin et al., 2018; Davis et al., 2017; Crosetto and Regner, 2018). In interviews with the authors, Cleveland repeatedly stressed the importance of building a "community" around

the project rather than just "customers," a documented success strategy (Butticè, 2017; Stanko and Henard, 2017; Bitterl and Schreier, 2018; see e.g. Parhankangas and Renko, 2017, for the limits of this approach). For example, Cleveland referred to game users as "members" of the game's community. In communicating with this community, Cleveland felt it important to address the game's public as "we" and "us." Rather than draw a clear distinction between sellers and buyers, this emphasized the common goals of all involved in seeing the project advance. This is consistent with research noting that first-person plural pronouns are used to create a sense of group identity and positive affectation (e.g., Tausczik and Pennebaker, 2010). In this context, general reciprocity clearly can play a role as the funding trigger (Colombo et al., 2015) when an effort to improve the product distinctly emerges in the communication. Although this is only a rough measure of the concepts discussed in the earlier hypothesis development, it serves the purpose of allowing us to test its existence and importance.

Variation in perceived signaling motivations is measured with the implementation of the "Constellation" program, in which funders received publicly observable electronic badges to attach to their game avatars. Thus, being identified as a funder may be part of the incentive (Colombo et al., 2015). We have termed this the Badge Program.

**Table 3**  
Baseline Model Assessment and Evaluation.

Dep. Var.:	Crowdfunders		Players	B. Robustness – First-Diffs			C. Amplitude of Messages	
	A. Robustness - Alternative Controls Simple Corr'n	Year Dummies (preferred)		Standard	Individual Quarter FE	Individual Month FE	Number of Messages	Word Count
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>MESSAGING &amp; COMMUNICATIONS BY PROJECT LEADERS</b>								
<i>Message_to_Followers</i>	0.296** (0.133)	0.297*** (0.099)	0.295*** (0.099)	0.222** (0.103)	0.229** (0.117)	0.192* (0.113)	0.249* (0.146)	0.269** (0.122)
lag 1	0.211 (0.132)	0.202** (0.102)	0.203** (0.099)	0.240* (0.133)	0.260* (0.154)	0.210 (0.149)	0.217 (0.145)	0.230* (0.123)
lag 2	0.005 (0.133)	-0.003 (0.105)	-0.008 (0.102)	-0.022 (0.139)	-0.025 (0.155)	-0.038 (0.151)	-0.021 (0.163)	0.07 (0.123)
lag 3	0.129 (0.132)	0.121 (0.110)	0.113 (0.107)	-0.091 (0.120)	-0.099 (0.137)	-0.119 (0.138)	0.173 (0.168)	0.186 (0.136)
lag 4	0.106 (132)	0.097 (0.111)	0.072 (0.108)	-0.041 (0.093)	-0.068 (0.111)	-0.038 (0.114)	0.062 (0.157)	0.081 (0.134)
<i>Message Amplitude</i>							0.030 (0.080)	0.000 (0.000)
lag 1							-0.007 (0.080)	-0.000 (0.000)
lag 2							0.006 (0.095)	-0.000 (0.000)
lag 3							-0.039 (0.093)	-0.000 (0.000)
lag 4							0.008 (0.086)	-0.000 (0.000)
<b>CONTROLS</b>								
<i>Number of Product Users</i>			1.917*** (0.383)	-0.016 (0.388)	-0.060 (0.240)	-0.25 (62%)	1.910*** (0.386)	1.904*** (0.381)
Dep. Var., lagged				-0.880*** (0.238)	-0.942*** (0.240)	-1.073*** (0.255)		
Constant	1.333*** (0.143)	1.329*** (0.162)	0.309 (0.200)	-0.017 (0.184)				
Year FE		Y	Y	Y	Y	Y	Y	Y
Individual Quarter FE					Y	Y		
Individual Month FE						Y		
Adj-R <sup>2</sup>	.02	.41	.45	n/a	n/a	n/a	.44	.44

Notes: The dependent variable is the log number of crowdfunders. Standard errors of coefficients are reported in brackets based on correlation-robust standard-error estimates; \* = p-value < 0.1, \*\* = p-value < 0.05, \*\*\* = p-value < 0.01; N = 314. Models (4), (5), and (6) report coefficients estimated with the dynamic Arellano-Bond estimator on the basis of period-to-period first differences while controlling for individual years, quarters, or months. The lagged, differenced dependent variable in these models is instrumented with the second lag of the dependent variable's level (Arellano and Bond, 1991).

Figure A1-A2 in the Appendix exhibit plots of the main variables of interest.<sup>3</sup>

**Regression Model.** The analysis proceeds by modeling the relationship between *Crowdfunders* and the key explanatory variables described earlier in a simple linear framework as follows:

$$Crowdfunders_t = \alpha_t + \beta \cdot R_t + \gamma \cdot r_t + \delta \cdot B_t + \varepsilon_t \tag{5}$$

where  $\alpha$ ,  $\beta$ ,  $\gamma$ , and  $\delta$  are coefficients, and  $\varepsilon$  is a zero-mean error term.  $R$  relates to main project output,  $r$  is gifts, and  $B$  is the vector of non-pecuniary motivations.

<sup>3</sup> The plots are based on weekly registration and may provide readers a sense of the validity of the data employed and hence the robustness of the analysis. The plots indicate the week in which we had a given event taking place. We split the time series into two periods (week 44 in 2002 to week 50 in 2005 (Figures A1 and A2) and week 50 in 2005 to week 1 in 2009 (figures A3 and A4)) simply to ease the reading of the graphs. All plots also included the number of funders in each week as a timeseries plot so that the registered events can be compared visually with the dependent variable directly. Notice that there is a shock to the number of funders in the period from mid 2005 to late 2006. The reason for this shock is multiple hacking attacks to the funding server. While this is an exogenous shock to the time series, we nevertheless explored the degree to which this contributes to our findings. We did so by including a dummy for this period. We found no significant change in our results nor conclusions. These results are available upon request.

H1 predicts coefficient  $\beta$  should be zero; H2 predicts  $\gamma$  should be positive although perhaps small; H3 predicts  $\delta$  will be large and positive. Other factors influencing crowdfunding are summarized by  $\alpha$ ;  $t$  indexes time.

**Model estimation.** The econometric analysis exploits variation in  $R$ ,  $r$ , and  $B$  related to Cleveland's somewhat erratic schedule for communicating with followers. Members of the project described considerable haphazardness regarding whether and when communications were made and in choices of content. The econometric strategy is an attempt to introduce stringent controls, leaving residual variation as the basis for estimating coefficients.

A concern is controlling for time-period-specific variation,  $\alpha_t$ , that might somehow be at once correlated with *crowdfunding* and measures of  $R$ ,  $r$ , and  $B$ . We cannot simply introduce time-fixed effects. However, we can introduce dummies for each year, each quarter (not just four but rather each individual quarter), or each month (not just 12 but each individual month).

The possibility of simultaneous trending, co-movements, or cyclicity in observed and unobserved determinants of funding are also a concern. To better understand possible challenges here, we first examine the dependent variable's time-series properties. To begin, the high regular peaks in the periodograms (Figure 2) suggest a possible periodicity rather than just an episodic structural change and influences (e.g., Chatfield, 2004). Bartlett's periodogram-based white noise is used to assess whether the data resemble noise without structure or systematic patterns. The test statistic is statistically significant, indicating that the

**Table 4**  
Crowdfunding and Tangible Payoffs Available to Everyone Vs. Those for Crowdfunders Only.

Dep. Var.:	Crowdfunders				
	Main Project Output Model: (1)	Private Gifts (2)	Main Project Outputs + Private Gifts (3)	Private Gifts (4)	Main Project Outputs + Private Gifts (5)
TANGIBLE PAYOFFS TO FUNDERS					
Product Releases to Funders & Non-Funders					
<i>Product_Release_Message</i>	-0.015 (0.215)		-0.098 (0.218)		
<i>Major_Release_Date</i>				0.171 (0.299)	0.173 (0.288)
Product "Beta" Releases to Funders Only					
<i>Beta_Release_Followers</i>		0.380* (0.228)	0.406* (0.231)		0.380* (0.229)
BASELINE MODEL CONTROLS					
<i>Message_to_Followers</i>	0.286*** (0.110)	0.213** (0.108)	0.234** (0.114)	0.284*** (0.101)	0.215** (0.108)
<i>Lag(Message_to_Followers)</i>	0.215** (0.104)	0.204** (0.104)	0.205** (0.104)	0.219** (0.105)	0.209** (0.105)
Year FE	Y	Y	Y	Y	Y
Adj-R <sup>2</sup>	0.41	0.41	0.41	0.41	0.41

Notes: The dependent variable is the log number of crowdfunders. Standard errors of coefficients are reported in brackets based on correlation-robust standard-error estimates; \* = p-value < 0.1, \*\* = p-value < 0.05, \*\*\* = p-value < 0.01; N = 314.

time series has non-random properties. Furthermore, the result of the Dickey-Fuller test indicates that we cannot rule out a unit root, suggesting the time series is statistically stationary. The results underline the importance of assessing result robustness with regard to time-series models and indicate the use of autocorrelation-robust estimates of standard errors is a proper regression-specification choice.<sup>4</sup>

**Baseline Results and Model Robustness.** Before proceeding to test the hypotheses, we assess the baseline model's meaningfulness and robustness. The model here is found to be highly robust to alternative specifications, estimation approaches, and stringent controls. Patterns here are consistent with communications by project leaders being linked to short-run boosts in crowdfunding. This is important because later hypothesis testing will depend on the content of these communications.

Table 3 reports baseline OLS model estimates. Statistical significance is noted with stars indicating p-values below a certain level as is customary. These are based on autocorrelation-robust standard errors. Model (1) begins by estimating the relationship between the crowdfunding level (*Crowdfunders*) and an indicator variable switched on for periods in which a message was sent to the project's followers, and a constant. Four lags of the message indicator were included to investigate a wide range of imaginable lag structures.

Point estimates for the indicator messaging and its lags are each positive, as communications are associated with greater funding. More stringent controls, such as adding year dummies as in model (2), do not alter results. We also attempt to control for variation in the number of project followers and the overall "risk set" of possible crowdfunders by introducing a measure of the number of product users, as in model (3). The changing size of the risk set of funders is highly correlated with crowdfunding but exerts no effect on other coefficient estimates, among which we are most interested in the coefficient for messaging to followers and lags. (The interaction between numbers of players and messaging, not reported, is statistically insignificant.)

We further assess robustness by taking quite a different approach to estimating coefficients, using a dynamic framework. We take first-

differences (i.e., period-to-period changes) of main variables, while simultaneously including a lag of the (first-differenced) dependent variable to serve as an added control that will be instrumented. The instrument is the absolute level (rather than the difference) of the dependent variable's second lag (Arellano and Bond, 1991). This different estimator, reported in model (4), leads to statistically identical estimates of those of earlier models. However, it is worth noting that the coefficient on *Number of Product Users* becomes statistically indistinguishable from zero in the first-differenced dynamic specification. This is consistent with the stringency of control and limited source of variation exploited in these estimates. Also, the estimated coefficient on the lag of the (differenced) dependent variable is negative. Keeping in mind that the estate is insignificant, a negative would suggest high levels of contribution growth in one week tend to be followed by slower growth the following week. This is consistent with funding activities fading out unless some form of shock occurs in the process. Results generally are unchanged when either adding especially fine-grained time controls, as in individual quarter fixed effects in model (5), or individual month-fixed effects in model (6). These are not simply seasonal controls but controls for each individual time period.

As a preferred specification to be used as a control in the analysis to follow, we choose the simple and easy-to-interpret analysis of levels—i.e., models (1), (2), and (3)—considering that all preceding analyses delivered similar results. Among these models, we choose model (2), as it does not include any endogenous regressors (i.e., *Number of Product Users*). The following analyses are not sensitive to this choice: any of the preceding models can be used as a basic set of controls without statistically or substantially altering the results.

The preceding models focused on the *incidence* of project team communications to followers. Before proceeding to study whether message content plays a role, models (7) and (8) first check whether message amplitude—that is, the number of messages and numbers of words—is related to crowdfunding. Although these variables are significant if added on their own, they are nonsignificant when added in addition to our indicator variables capturing the simple incidence of messages.

**Crowdfunding, Tangible Payoffs, and Free-Riding.** This subsection examines the relationship between *Crowdfunding* and variation in tangible payoffs, distinguishing between correlations with tangible payoffs available only to funders ("private gifts" in the earlier development) and those available to both funders and non-funders (the

<sup>4</sup> Another concern might be that results could be driven by repeat contributors. However, the Paypal data suggest that very few of the contributions are provided by the same individual. Removing repeat contributions randomly does not alter the results significantly. One reason for this may be that the investigation is not on the funder level but is a time series analysis wherein contributions of funds are aggregated in time periods.

**Table 5**  
Crowdfunding and Non-Pecuniary Motivations.

Dep. Var.:	Model:	Crowdfunders (1)	(2)	(3)	(4)	(5)	(6)
NON-PECUNIARY PAYOFFS TO FUNDERS							
Psychic Rewards		0.412**					0.336**
<i>Community_Message</i>		(0.184)					(0.171)
Signaling Motivations							
<i>Badge_Program</i>			1.548***				1.425***
			(0.394)				(0.396)
Reciprocity							
<i>Major_Release_Date</i>				-0.021			0.085
				(0.218)			(0.188)
<i>Lag(Major_Release_Date)</i>				0.184			0.225
				(0.221)			(0.227)
<i>Lead(Major_Release_Date)</i>				0.013			0.061
				(0.213)			(0.205)
<i>Effort_Message</i>					0.017		0.136
					(0.318)		(0.326)
<i>Need_Message</i>						-0.235	-0.326
						(0.188)	(0.205)
BASELINE MODEL CONTROLS							
<i>Message_to_Followers</i>		-0.047	0.317***	0.292***	0.280***	0.348***	0.109
		(0.175)	(0.099)	(0.112)	(0.102)	(0.107)	(0.167)
<i>Lag(Message_to_Followers)</i>		0.202*	0.226**	0.167	0.215**	0.198*	0.140
		(0.104)	(0.101)	(0.112)	(0.103)	(0.103)	(0.109)
Year FE		Y	Y	Y	Y	Y	Y
Adj-R <sup>2</sup>		0.42	0.44	0.41	0.41	0.41	0.45

Notes: The dependent variable is the log number of crowdfunders. Standard errors of coefficients are reported in brackets based on correlation-robust standard-error estimates; \*=*p*-value<0.1, \*\*=*p*-value<0.05, \*\*\*=*p*-value<0.01; N = 314. Table 2 revealed that there is a significant correlation between *Community\_Message* and *Message\_to\_Followers*. We explored this by also excluding *Message\_to\_Followers* in model (1) finding no reasons for concern. Estimate on *Community\_Message* remains virtually unaltered.

project’s “main outputs”).

The comparison here is especially useful given that both types of payoffs are essentially the same: both provide access to the product. The only difference is that private gifts entail incrementally earlier access through the beta program. We will see that only the incremental value of the private gift (only available to funders) is anywhere near being correlated with crowdfunding (significant at a 10% level). Seeing that there is only a weak correlation with private gift at best, we can hardly say we have provided support to H2. The main outputs available to funders and non-funders alike are unrelated to crowdfunding (far from significant), which is consistent with earlier hypothesized incentives to free-ride (H1). Model estimates are reported in Table 4.

Model (1) first introduces an indicator variable to capture the incidence of messages about a general product release. Along with the other models, it also includes control variables from the earlier preferred specification: time dummies, number of product users, and controls for incidence of communications. The estimated relationship with crowdfunding levels is insignificant, and the same insignificant result is found when replacing this explanatory variable with alternative measures that reflect (i) numbers of such messages, (ii) numbers of words in such messages, or (iii) numbers of specific mentions of general product releases within each message. As this measure is based on the appearance of specific keywords (e.g., “Data and Variables” section), we also re-estimated the relationships using all possible variable definitions based on all possible alternative combinations of keywords. Again, results are insignificant, with no evidence found of any relationship between announcements of product releases and higher crowdfunding levels.

In contrast to this finding, introducing any such sort of measure that reflects a beta release, as in model (2), yields a positive correlation with higher crowdfunding levels which is weak given that it is only significant at a 10% level in a two-sided test. Despite the beta release being just an incremental benefit beyond releasing the product, the correlation’s point estimate in model (2) is an order of magnitude larger than that of model (1) in relation to the product’s release. Furthermore, introducing both measures in the same model (3), again, yields no evidence of a relationship with main product output (this time, a negative point

estimate), with a virtually identical estimate on the indicator related to the beta program available only to funders.

To further validate the weak but noticeable contrast between the importance of private gifts (to funders only) and the project’s main outputs (to funders and non-funders alike), we next introduce an alternative measure of project’s main output: the actual release date of new outputs—*Major\_Release\_Date*—an indicator switched on precisely during those weeks of a major new release. This also is insignificantly correlated with higher crowdfunding levels, as seen in model (4). Adding this measure, along with the indicator variable for the beta program, again finds the coefficient on the latter unchanged, as seen in model (5).

Keeping in mind the weak significance of the private gift estimate (although strong if a one-sided test applies), the evidence suggests that crowdfunders largely respond to tangible payoffs in the form of “private gifts” to funders only. This is consistent with earlier predictions of H1 and weakly supports H2.

**Crowdfunding and Non-Pecuniary Motivations.** In what follows, we investigate whether the evidence is consistent with the claim that non-pecuniary motivations play a relatively important role in motivating crowdfunding (H3) in light of limits in motivations based in tangible payoffs, as in H1, H2, and the preceding results. Whereas the survey-data analysis we will discuss later in this section will provide a more nuanced exploration of non-pecuniary motivations, the basic goal here is to detect whether the evidence is consistent with H3—that non-pecuniary motivations play a large role in stimulating funding. Results are presented in Table 5.

The analysis proceeds in a similar fashion as the earlier analysis of tangible payoffs, but this time introduces measures for the three broad categories of non-pecuniary motivations discussed in hypothesis development (and associated with H4, H5, and H6). These measures should not be interpreted as being ideal for exploring motivations’ precise nature, but merely meaningful for detecting correlations with crowdfunding levels in relation to H3.

For example, model (1) introduces an indicator—*Community\_Message*—that captures instances when communications content relates to a sense of community, kinship, and common cause. Among the words used to capture this are “contribution”, “community”, and “members”. The

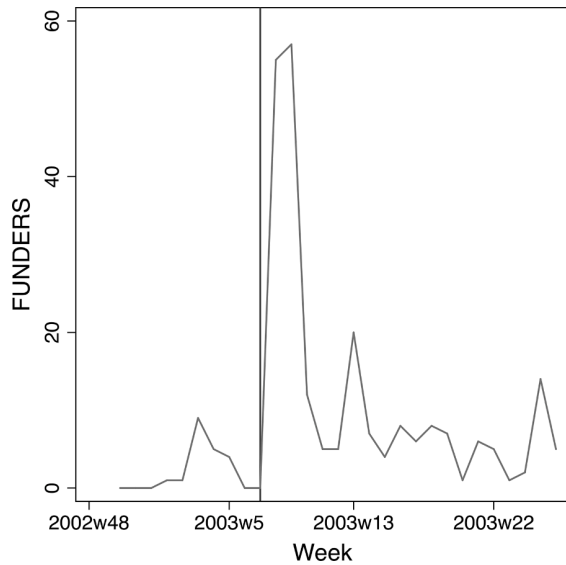


Figure 3. Spike in Crowdfunders after Initiation of the “Constellation Icon” Badging Program.

point-estimate coefficient on this variable on its own is larger than coefficients reported above in relation to tangible payoffs.

Model (2) next introduces an indicator variable for periods during which the Constellation Badge program (in which an icon appears on avatars within games for those who had contributed funds) was operational. Again, the point estimate is positive and considerably larger than in cases of tangible payoffs above. Figure 3 presents the raw data around the time of the institution of this program to highlight the unmistakable discontinuity around the introduction of this means of signaling one’s crowdfunding to other players. The results thus far are consistent with these forms of motivations playing a role, with this role at least as important as that of tangible private gifts, whereas improvements in main project outputs do not relate to higher crowdfunding levels.

Models (3) through (6) attempt to find evidence of reciprocity. Here, we study multiple models to reveal that somewhat exhaustive alternative efforts fail to find evidence of a correlation with higher crowdfunding levels. Indeed, the later analysis of survey evidence will confirm a type of reciprocity that should be difficult to find in aggregate crowdfunding data like these.

Model (3) adds an indicator for a major release, as was studied in relation to the project’s main inputs. However, to better attempt to capture any sense of reciprocity, we also add lags and leads from this variable in case reciprocity emerges in anticipation of the response to receipt of the product. No such measures (including alternative lags and leads) are found to be significantly correlated with crowdfunding. We then explore alternative plausible measures that arguably might provoke a sense of giving-back or giving-forward, focusing again on the content of messages to followers. Model (4) introduces an indicator for weeks in which messages contain a mention of “effort” in the sense of work and activity to create the product. Model (5) introduces an indicator for weeks in which messages contain mentions of specific needs for added resources. Neither is found to be significant on its own. Model (6) then introduces all measures at once, along with the earlier measures related to psychic rewards and signaling, finding no changes to any of the earlier results. Neither does adding each of these measures while also introducing the measures of tangible payoffs change any of the earlier results, although statistical significance dips.

5. Analysis of Survey Data

Separately studying survey data allows us, first, to test and validate the findings from the preceding analysis of observational data, that is,

Table 6 Survey-Structured Response Questions.

Interpretation	Response
Psychic Rewards	It makes me feel good. It shows that I am part of the community.
Signaling Motivations	It shows to other players that I have contributed to encouraging others to contribute. It gives me respect among other users. I wanted the badge. It is important that others can see that I have contributed. It shows that I can afford to make a contribution.
Reciprocity	I feel that the developers have given me something valuable. The developers deserve it. When I contribute, I expect developers to produce product.

that non-pecuniary motivations play a larger role than tangible private gifts play, and that the main project does itself not play much of a role (H1, H2, and H3). Triangulation is key in case studies if they are to adhere to the “corroboratory mode” and ensure that different lines of inquiry converge. Second, and more important, we can characterize more discerningly the non-pecuniary nature of motivations (H4, H5, and H6). In this we follow established case-study research that proposes triangulation as a method to unveil possible sources of variance that may be overlooked when only one methodology is relied on (Jick, 1979).

The usual reservations about self-reported survey data are worth repeating, particularly in relation to self-reported motivations, which are subject to post-hoc justification. To help limit misinterpretation, we (1) organize the analysis into two types of tangible payoffs and three broad categories of non-pecuniary motivations to systematically discern the coarsest distinctions; (2) interpret responses in light of earlier theory and literature and the findings from the observational data; (3) consider both structured and unstructured responses jointly; and (4) attempt to avoid drawing conclusions from only subtle distinctions – we focus here on the starkest points that arise from the data.

**Data on Self-Reported Motivations.** A survey was sent to all funders in the spring of 2004, 19 months after crowdfunding on the game project began. Responses were collected from a (remarkably high) 66% of all funders to that point, 762 responses in all. The structured questions asked respondents to indicate, on a 7-point Likert scale, “What motivated you to contribute funding?” in relation to a list of possible reasons, as presented in Table 6.

The surveys also captured open-ended text comments, allowing respondents to describe further their motivations for contributing. We employed a team of undergraduate research assistants to code these responses (1-0) according to whether they contained sentiments related to the main project outputs (R), private gifts (r), or one of the three broad categories of non-pecuniary factors (B) discussed throughout this paper (i.e., psychic rewards, signaling motivations, or reciprocity). We also allowed for a choice of “other,” but all reasons fell within these categories.

**Integration of Structured and Unstructured Data.** Drawing the responses together into a single summary of statistics, Table 7 presents the strongest motivations of the respondents. This was accomplished by coding responses 1-0 according to whether either the structured response indicated the motivation at the highest level (a score of 7) or the motivation was stated in the unstructured response.

A total of 88% of respondents indicated that a non-pecuniary motivation had the highest possible importance, consistent with H3. (If we reduce the threshold to less than a score of 7, virtually all respondents indicate such motivation.) Each of the three broad categories is also important individually (H4, H5, and H6), whereas the beta release is less important (H2), and main product releases are the least important of all (H1). These points also are wholly consistent with the analysis of observational data.

**Nature of Psychic Rewards:** Regarding psychic rewards, we find a large number and wide array of response types, including abundant examples of descriptions of simple enthusiasm, moral support, and

**Table 7**  
Proportion of Survey Responses Indicating either 7-out-of-7 Importance or Explicit Description in the Open-Ended Unstructured Response.

Category	Variable	Mean	s.e.
R	Main Outputs	.02	.15
r	Private Gifts	.07	.25
B	Non-Pecuniary (All)	.88	.33
	Psychic Rewards	.74	.44
	Signaling Motivations	.54	.50
	Reciprocity	.79	.41

Notes: Mean values reflect the proportion of survey responses in which either the respondent indicated a 7-out-of-7 highest importance or otherwise explicitly mentioned the source of motivation in the open-ended unstructured response.

empathy for particular project goals, missions, and causes, for example, “[I contribute] because the development team members are doing a bloody good job.” A few broader, more generalized expressions, such as “all things fun should be supported,” were also encountered.

Adding to this general enthusiasm and fanatical support, 17% of all open-ended responses expressed statements that could be interpreted as a concern for and desire to help the project or its team members, with highly personal connotations. Examples include: “This is a huge project, and the team needs as much support as possible. I intend to contribute more in the future”; “I know that [Cleveland] has made large personal financial sacrifices, and he needs my support”; and “[I contribute] so that Charlie can eat.” Other examples include: “I’m particularly keen on the idea of patronage. I work in the theater, where donations are vital for keeping some companies going” and “I’m a member of a gaming community, and I feel that by helping [the project], I’m helping to sustain a future for our communities Natural Selection future.” These responses are broadly consistent with the prediction of a sense of empathy and common cause being held by funders (H4), although we note that considerable heterogeneity exists in the details of any one response.

**Nature of Signaling Motivations.** Regarding signaling-based motivations, contributing to crowdfunding has little to do with signaling wealth or prestige. For example, the two least-chosen structured responses are “It is important that others can see I have contributed” and “It shows that I can afford to make a contribution.”

The use of a personal badge on one’s game-playing avatar, in the case of the Constellation program, showed the most important reason for signaling comprised an attempt to create follow-on funding among would-be funders. Responses include: “I wanted the [Constellation badge] so it might encourage other people to donate”; “I felt that I needed to spread the word, and telling people that I donated to a free online game does just that”; “I hope that seeing I have donated will encourage others to do the same”; and “I wanted to inspire others to donate.” One response mentioned the following set of interactions: “The icon shows that a person donated. If someone new joins a server and sees this icon, they’ll ask what it is. Once people know what it is and start to see a bunch of them, they might think, ‘Wow, this is a great [game], and it’s cool that all these people are supporting it. Maybe I should too!’” Therefore, signaling here appears to be consistent with an interest in urging others to contribute (H5).

**Nature of Reciprocity Motivations.** Regarding reciprocity-related motivations, typical open-ended responses included: “I contributed because the Natural Selection developers deserve a reward for their work” and “It was a way of thanking him for keeping the server running and being involved in the community of the game he developed.” Note, also, that these responses indicate a sense of gratitude or a psychic desire to pay back rather than an acknowledgment of receipt of the game.

In no case is there an indication of “paying forward” or generalized reciprocity in the sense of contributing motivated by benefits received

by others. Roughly a third of the responses related to reciprocity (36 percent), even going so far as to explicitly mention their consumption. For example, “I play the game more hours per day for longer than most games” and “I felt that the amount of enjoyment I received from Natural Selection was at least worth my \$20.” Therefore, reciprocity is particularly salient in this case, in which funders are drawn from users of an existing product (as opposed to a yet-to-be-launched product), and the sense of reciprocity is related to a psychological sense of obligation in which contributing confers psychic benefits or at least avoids psychic costs. This particular source of motivation is not linked to any particular product output or event. These sentiments accrue from a mounting sense of obligation to pay back accumulated after some period consumption.

This sort of paying-back based on personal consumption is likely to gradually accrue over time with the accrual of product users. Therefore, it is not surprising that we failed to find evidence of any distinct response to communications or actions by the project that provoked an episodic sense of reciprocity at any one time.

As a result, entrepreneurs wanting to leverage reciprocity feelings to attract crowdfunders must consider that though reciprocity appears to play a role which appears to be limited to a psychological sense of obligation to pay back for one’s own personal accumulated consumption of the product.

As an aside, our choice of methodology applying triangulation to expose all the multifaceted features of a case without risking that a single source of insight (in our case, regressions) would neglect mechanisms that could be detected only by other sources (e.g., survey data) (Jick, 1979) has been confirmed. Data richness of this kind can only be obtained from case studies, confirming that our methodological choice may be worth the cost of reduced generalizability.

## 6. Summary and Conclusions

This paper contributes to pioneering research that seeks to explain the triggers of crowdfunding campaign success through theoretical argument about the nature of crowdfunding as a good in itself and through a related analysis of funder responses to various entrepreneur provisions and stimuli.

We studied the motivations for funding entrepreneurial crowdfunding without private claims, encompassing approaches referred to as “preorder-,” “reward-,” “gift-based-,” and “donation-based” crowdfunding. We reviewed the payoff structure and features of the institutional context and presented evidence that main project outputs generally play a limited direct role in motivating contributions and thus provide negligible leverage for stimulating funding. More specifically, products offered through a platform, such as the game Natural Selection, do self-select interested participants in the first place. Indeed, a certain level of interest in the product or community surrounding it is a *conditio sine qua non* for any participant to be on the platform and thus be included in our sample. However, we were interested in capturing what leverages the entrepreneur can use to nudge participants to contribute funds to such a project. We discovered, first, that major improvements of the product are unlikely to produce this effect. Of course, the product might play a role in the non-pecuniary motivations that funders experience, but tangible value and consumer surplus on their own do not shape funding directly because small, isolated, and uncoordinated funders without private claims will have virtually no influence on funding levels or project success, so these simply will not play into motivations. Strictly speaking, this is a form of free-riding common to public good problems, as elucidated herein.

Although the tangible value of main outputs cannot be used to influence funding directly, we provide some relatively weak evidence indicating that private gifts given only to funders may influence funding,

at least to some degree. The limits of tangible payoffs for stimulating funding imply that funding must primarily be motivated by non-pecuniary motivations. We found each of these patterns were represented in multiple datasets related to a representative project, the crowdfunding of the Unknown Worlds Entertainment in the early 2000s. Notably, the data also exhibited a tendency among funding levels to fade out unless an orchestrated shock is introduced. This finding highlights that entrepreneur action is crucial to generate funding.

We argued that, consistent with voluntary contributions to charitable and philanthropic organizations and given the limits of offering tangible rewards as incentives, entrepreneurs pursuing funding through crowdfunding without private claims must somehow evoke non-pecuniary motivations. The long history of analogous funding in charitable and philanthropic giving suggests three broad categories of relevant non-pecuniary motivations: psychic rewards, signaling incentives, and reciprocity.

We explored the nature of non-pecuniary motivations and found abundant evidence for these motivations. Whereas charitable giving might involve enjoying, for example, the “warm glow” of giving or a sense of altruism, we found evidence of a sense of empathy and “common cause” between funder and entrepreneur. Whereas charitable giving might involve signaling one’s contribution to, for example, gain status or signal virtue, we found that the first-order importance of signaling as a motivation was to enlist others to support the entrepreneurial project. We also found that numerous crowdfunders were motivated by reciprocity in the sense of “paying back” entrepreneurs for their accumulated consumption of project outputs. This also has been documented in charitable giving. However, in the present study, we found no evidence of “paying forward” or “generalized reciprocity,” in which funders might be motivated by the entrepreneur’s impact on others. We found these results to be consistent with our hypotheses. Therefore, despite the limitations of any single empirical or theoretical analysis, the arguments and evidence are consistent.

The choice of an empirical design that investigated only one crowdfunding campaign may cause concerns with generalizability, but it also offers strength in that we can rule out that the results are byproducts of unobserved heterogeneity across entrepreneurial endeavors. Furthermore, investigating a single crowdfunding campaign allowed us to investigate the dynamic features of such campaigns in greater detail by assessing the serial correlations and autoregressive processes of the main variables of interest. Our design and choices also provided strength, as we did not investigate a campaign on an established crowdfunding platform. Platforms have policies and tools in place that may impact observed crowdfunder behavior and may distort the associations we investigated in the present work. This study relied on a simple independent campaign set up outside such an environment, and thus it was not subject to such adverse conditions. This speaks to the reliability of our findings. Perhaps the most important feature of our choice of empirical setting was the product availability at the time of funding. Funders were able to observe, through the availability of products already provided by the entrepreneur, that experiencing a product in the future was a likely outcome, thereby possibly reducing funder uncertainty regarding the main tangible product. This feature made our test conservative when compared with the high uncertainty in mainstream platforms. However, in even this unique instance with low uncertainty regarding the main product, funder responses indicated that the main product had no influence in motivating their funding decisions.

The choice of setting might arouse concern regarding generalizability. First, the existence of a product ex-ante could attract somewhat different funders, as compared with mainstream campaigns for a product does not exist at the outset. Second, the presence of a product ex-ante offers potential funders information and knowledge about the qualities of the product and offered value, lowering the risk or uncertainty generally associated with crowdfunding. However, Unknown Worlds Entertainment could have at any time chosen to end its operations, as funders and users did not have claims to the offered product. This itself

represents risk and uncertainty.

The theory we eventually developed from this remarkable case was crafted by considering what we believe to be an overlooked, yet fundamental, feature: crowdfunding’s nature as a good in itself. We thus place our contribution within the extant literature that, in various ways, has sought to explain the levers used to reach funding campaign success (e.g., Agrawal et al., 2014, 2016; Burtch et al., 2013; Mollick, 2014; Davis et al., 2017; Anglin et al., 2018; Allison, 2015; (Cason and Zubrickas, 2019)). We did so by treating the case from the perspective of public good provision. In doing so, we developed a novel perspective. As Siggelkow, (2007) argues, a case with a remarkable feature that allows an advance of our understanding should not be considered a limitation but rather an addition to our understanding of a larger class of phenomena. We therefore believe that this case has more commonalities with the broader set of crowdfunding campaign literature than differences.

In this vein, we see our research as applicable more broadly to the emerging research stream focusing on pre-order-, reward-, gift-, and donation-based types of crowdfunding that is attracting interest from a growing number of researchers (Roma et al., 2017; Agrawal et al., 2015; Alberg, 2013; Burtch et al., 2013; Belleflamme et al., 2014; Mollick, 2014; Varian, 2013; Sorenson et al., 2016; Parker, 2014; Mollick and Nanda, 2014; Kuppaswamy and Bayus, 2017). We proffered theory to relevant literature by providing an integrated account of the structure of funder payoffs and how funder decisions may be explained. We used this framework to link crowdfunding to vast and extant public good literature (e.g., Andreoni, 1990; Fehr and Gächter, 2000; Glazer and Konrad, 1996) and to identify similarities and differences, in particular, in non-pecuniary motivations. This paper’s theoretical contribution to crowdfunding literature is its integration and application of well-established literature on voluntary public good provision to central open questions in literature on crowdfunding. Its empirical contribution – in line with its theoretical arguments and hypotheses – is the result indicating a lack of the impact of tangible main project outcomes on funding and a clear impact of non-pecuniary motivation in crowdfunding.

These findings lead to a set of implications for management and policy. Given that the public model of fundraising through crowdfunding promotes new priorities while diminishing others, we should expect to see entrepreneurs choosing particular routes to pursue in their fundraising strategies and communications. Following our findings, an entrepreneur should (a) find ways to improve relationships that strengthen common cause with funders, for example through strategic and “inclusive” communications; (b) appeal to funder reciprocity motivations by, for instance, emphasizing the value (to be) delivered to funders; and (c) ensure that funders have the means to signal involvement, for example through a badge attached to user profiles. Given the public funding model and the minimal impact the main project has on funders, the entrepreneur should expend little effort committing to priorities such as positive future returns, monitoring, and controls. Overall, these features of crowdfunding without private claims suggest that we should observe selection-in for certain types of projects and perhaps expand the range of entrepreneurial projects that can be funded. These latter points are questions that warrant closer study.

#### Credit Author Statement

All authors contributed equally to this manuscript.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

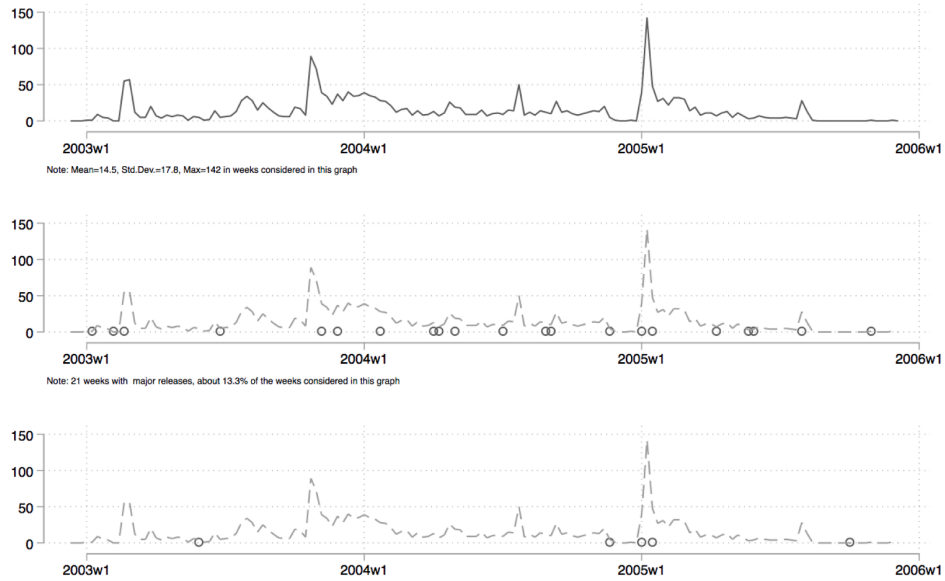
**Acknowledgements**

We are grateful to Charlie Cleveland for spending time and resources supporting the early stages of data collection in this research. We acknowledge the contributions of data and perspectives from the crowdfunding contributors to Natural Selection, without which this study would not have been possible. This paper also benefitted from inputs, ideas and reactions from Rodrigo Canales, Christian Catalini, Gary Dushnitsky, Christine Exley, Luis Garicano, Liz Keenan, Nicola Lacetera, Karim Lakhani, Rafel Lucea, Jesper Sorensen, and seminar

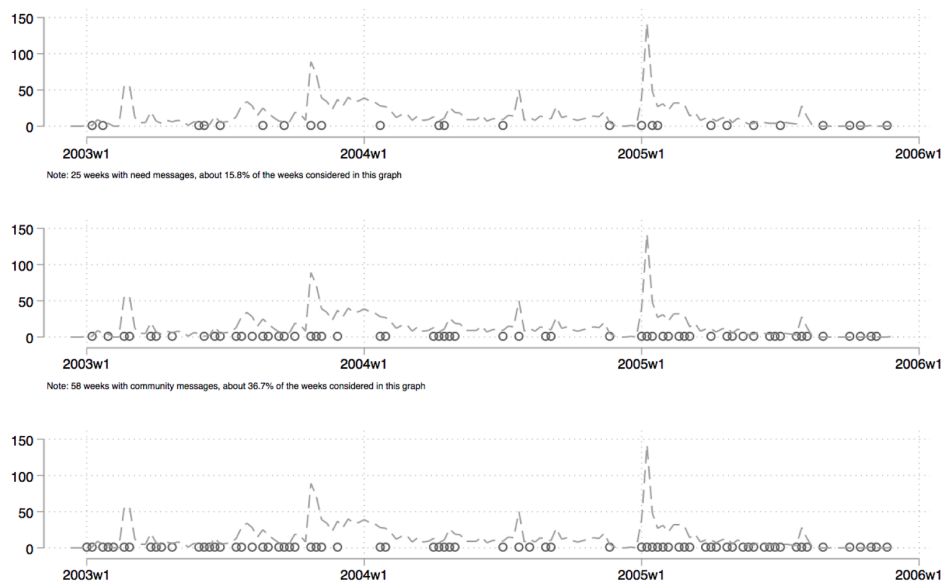
participants at the Sloan School at the Massachusetts Institute of Technology, Bocconi University, and the Danish Centre for Entrepreneurship Research. We acknowledge financial support from the Tuborg Foundation and a Research and Materials Development grant from London Business School. All errors are our own. We dedicate this paper to Rafel Lucea.

**Appendix**

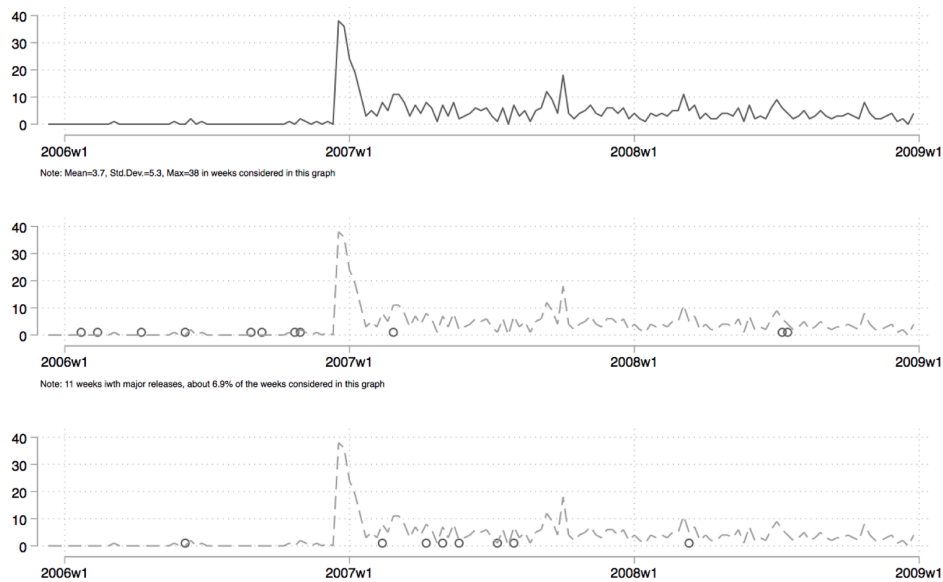
Figures A1–A3



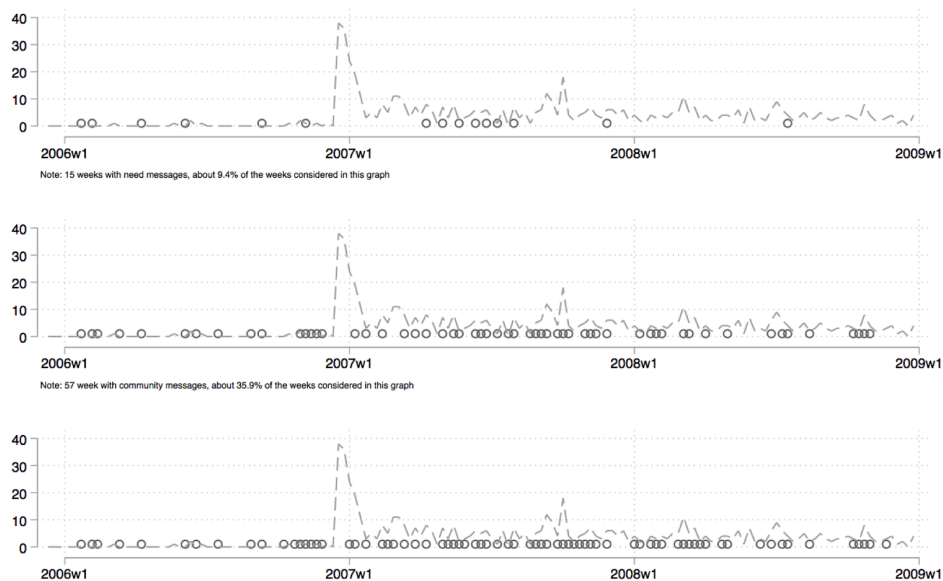
**Figure A1.** Graphical displaying number of funders (top), weeks with major releases (middle) and weeks with effort messages (bottom) based on raw data from week 44 in 2002 to week 50 in 2005.



**Figure A2.** Graphical displaying weeks with needs messages (top), weeks with community messages (middle) and weeks with messages to followers (bottom) based on raw data from week 44 in 2002 to week 50 in 2005.



**Figure A3.** Graphical displaying number of funders (top), weeks with major releases (middle) and weeks with effort messages (bottom) based on raw data from week 50 in 2005 to week 1 in 2009.



**Figure A4.** Graphical displaying weeks with signals of needs messages (top), weeks with community messages (middle) and weeks with messages to followers (bottom) based on raw data from week 50 in 2005 to week 1 in 2009

## References

- Agrawal, A., Catalini, C., Goldfarb, A., 2014. Some simple economics of crowdfunding. *Innovation Policy and the Economy* 14 (1), 63–97.
- Agrawal, A., Catalini, C., Goldfarb, A., 2015. Crowdfunding: Geography, social networks, and the timing of investment decisions. *Journal of Economics & Management Strategy* 24 (2), 253–274.
- Agrawal, A., Catalini, C., Goldfarb, C., 2016. Are syndicates the killer app of equity crowdfunding? *California Management Review* 58 (2), 111–124.
- Ahlers, G.K., Cumming, D., Günther, C., Schweizer, D., 2015. Signaling in equity crowdfunding. *Entrepreneurship Theory Practice* 39 (4), 955–980.
- Alberg, T., Bogan, A.A., Bradley, H.S., Cooter, R.D., Cheney, M.G., Goodenough, O.R., ..., Vosmek, S., 2013. 2013 State of entrepreneurship address: Entrepreneurial growth. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2212743](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2212743).
- Allison, T.H., Davis, B.C., Short, J.C., Webb, J.W., 2015. Crowdfunding in a prosocial microlending environment: Examining the role of intrinsic versus extrinsic cues. *Entrepreneurship Theory and Practice* 39 (1), 53–73.
- André, K., Bureau, S., Gautier, A., Rubel, O., 2017. Beyond the opposition between altruism and self-interest: Reciprocal giving in reward-based crowdfunding. *Journal of Business Ethics* 146 (2), 313–332.
- Andreoni, J., 1990. Impure altruism and donations to public goods: A theory of warm glow giving. *Economic Journal* 100 (401), 464–477.
- Andreoni, J., Bernheim, B.D., 2009. Social image and the 50–50 norm: A theoretical and experimental analysis of audience effects. *Econometrica* 77 (5), 1607–1636.
- Anglin, A.H., Short, J.C., Drover, W., Stevenson, R.M., McKenny, A.F., Allison, T.H., 2018. The power of positivity? The influence of positive psychological capital language on crowdfunding performance. *Journal of Business Venturing* 33 (4), 470–492.
- Arellano, M., Bond, S., 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58 (2), 277–297.
- Ariely, D., Bracha, A., Meier, S., 2009. Doing Good or Doing Well? Image Motivation and Monetary Incentives in Behaving Prosocially. *American Economic Review* 99 (1), 544–555.
- Baker, W.E., Bulkley, N., 2014. Paying It Forward vs. Rewarding Reputation: Mechanisms of Generalized Reciprocity. *Organization Science* 25 (5), 1493–1510.

- Belleflamme, P., Lambert, T., Schwienbacher, A., 2014. Crowdfunding: Tapping the right crowd. *Journal of Business Venturing* 29 (5), 585–609.
- Belleflamme, P., Omrani, N., Peitz, M., 2015. The economics of crowdfunding platforms. *Information Economics and Policy* 33, 11–28.
- Bénabou, R., Tirole, J., 2006. Incentives and Pro-Social Behavior. *American Economic Review* 96 (5), 1652–1678.
- Bolton, G.E., Ockenfels, A., 2000. ERC: A theory of equity, reciprocity, and competition. *American economic review* 90 (1), 166–193.
- Bitterl, S., Schreier, M., 2018. When consumers become project backers: The psychological consequences of participation in crowdfunding. *International Journal of Research in Marketing* 35 (4), 673–685.
- Block, J., Hornuf, L., Moritz, A., 2018. Which updates during an equity crowdfunding campaign increase crowd participation? *Small Business Economics* 50 (1), 3–27.
- Burtch, G., Ghose, A., Wattal, S., 2013. An Empirical Examination of the Antecedents and Consequences of Contribution Patterns in Crowd-Funded Markets. *Information Systems Research* 24 (3), 499–519.
- Burtch, G., Ghose, A., Wattal, S., 2015. The hidden cost of accommodating crowdfunder privacy preferences: A randomized field experiment. *Management Science* 61 (5), 949–962.
- Burtch, G., Ghose, A., Wattal, S., 2016. Secret admirers: An empirical examination of information hiding and contribution dynamics in online crowdfunding. *Information Systems Research* 27 (3), 478–496.
- Butticè, V., Colombo, M.G., Wright, M., 2017. Serial Crowdfunding, Social Capital, and Project Success. *Entrepreneurship Theory and Practice* 41 (2), 183–207.
- Cason, T., Zubrickas, R., 2019. Donation-based crowdfunding with refund bonuses. *European Economic Review* 119, 452–471.
- Chatfield, C., 2004. *The Analysis of time series: An introduction*. Chapman & Hall/CRC, Boca Raton, FL.
- Cholakova, M., Clarysse, B., 2015. Does the possibility to make equity investments in crowdfunding projects crowd out reward-based investments? *Entrepreneurship Theory and Practice* 39 (1), 145–172.
- Colombo, M.G., Franzoni, C., Rossi-Lamastra, C., 2015. Internal social capital and the attraction of early contributions in crowdfunding. *Entrepreneurship Theory and Practice* 39 (1), 75–100.
- Cornes, R., Sandler, T., 1984. easy riders, joint production, and public goods. *Economic Journal* 94 (375), 580–59.
- Courtney, C., Dutta, S., Li, Y., 2017. Resolving information asymmetry: Signaling, endorsement, and crowdfunding success. *Entrepreneurship Theory and Practice* 41 (2), 265–290.
- Crossetto, P., Regner, T., 2018. It's never too late: Funding dynamics and self pledges in reward-based crowdfunding. *Research Policy* 47 (8), 1463–1477.
- Crosron, R., Marks, M., 1998. Identifiability of individual contributions in a threshold public goods experiment. *Journal of Mathematical Psychology* 42 (2-3), 167–190.
- Cryder, C.E., Loewenstein, G., Selman, H., 2013. Goal gradient in helping behavior. *Journal of Experimental Social Psychology* 49 (6), 1078–1083.
- Davis, B.C., Hmieleski, K.M., Webb, J.W., Coombs, J.E., 2017. Funders' positive affective reactions to entrepreneurs' crowdfunding pitches: The influence of perceived product creativity and entrepreneurial passion. *Journal of Business Venturing* 32 (1), 90–106.
- DellaVigna, S., List, J.A., Malmendier, U., 2012. Testing for altruism and social pressure in charitable giving. *Quarterly Journal of Economics* 127 (1), 1–56.
- Dufwenberg, M., Kirchsteiger, G., 2004. A theory of sequential reciprocity. *Games and Economic Behavior* 47 (2), 268–298.
- Ellingsen, T., Johannesson, M., 2008. Pride and prejudice: The human side of incentive theory. *American Economic Review* 98 (3), 990–1008.
- Falk, A., Fischbacher, U., 2006. A theory of reciprocity. *Games and Economic Behavior* 54 (2), 293–315.
- Fehr, E., Gächter, S., 2000. Fairness and retaliation: The economics of reciprocity. *Journal of Economic Perspectives* 14 (3), 159–181.
- Fehr, E., Schmidt, K., 1999. A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics* 114 (3), 817–868.
- Fleming, L., Sorenson, O., 2016. Financing by and for the masses. *California Management Review* 58 (2), 5–19.
- Fosfuri, A., Giarratana, M.S., Roca, E., 2011. Community-focused strategies. *Strategic Organization* 9 (3), 222–239.
- Fosfuri, A., Giarratana, M.S., Roca, E., 2015. Walking a slippery line: Investments in social values and product longevity. *Strategic Management Journal* 36 (11), 1750–1760.
- Frey, B.S., Meier, S., 2004. Social comparisons and pro-social behavior: Testing “conditional cooperation” in a field experiment. *American Economic Review* 94 (5), 1717–1722.
- Geiger, M., Oranburg, S.C., 2018. Female entrepreneurs and equity crowdfunding in the US: Receiving less when asking for more. *Journal of Business Venturing Insights*, 10.
- Glazer, A., Konrad, K., 1996. A signaling explanation for charity. *American Economic Review* 86 (4), 1019–1028.
- Goranson, R.E., Berkowitz, L., 1966. Reciprocity and responsibility reactions to prior help. *Journal of Personality and Social Psychology* 3 (2), 227–232.
- Gouldner, A., 1960. The norm of reciprocity: A preliminary statement. *American Sociological Review* 25 (2), 161–178.
- Greenberg, J., Mollick, E., 2016. Activist choice homophily and the crowdfunding of female founders. *Administrative Science Quarterly* 62 (2), 341–374.
- Guenther, C., Johander, S., Schweizer, D., 2017. Is the crowd sensitive to distance? How investment decisions differ by investor type. *Small Business Economics* 50 (1), 1–17.
- Harbaugh, W.T., 1998. The prestige motive for making charitable transfers. *American Economic Review* 88 (2), 277–282.
- Hildebrand, T., Puri, M., Rocholl, J., 2016. Adverse incentives in crowdfunding. *Management Science* 63 (3), 587–608.
- Hu, M., Xu, L., Shi, M., 2015. Product and pricing decisions in crowdfunding. *Marketing Science* 34 (3), 331–345.
- Jick, T.D., 1979. Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly* 24 (4), 602–611.
- Josefy, M., Dean, T.J., Albert, L.S., Fitza, M.A., 2017. The role of community in crowdfunding success: Evidence on cultural attributes in funding campaigns to “save the local theater. *Entrepreneurship Theory and Practice* 41 (2), 161–182.
- Koning, R.M., Model, J., 2014. Experimental study of crowdfunding cascades: When nothing is better than something. *Academy of Management Proceedings* 2014 (1).
- Krishnamurthy, S., Tripathi, A.K., 2009. Monetary donations to an open source software platform. *Research Policy* 38 (2), 404–414.
- Krishnan, K., Lohmer, L., Wang, P., 2017. What Do Crowds Really Want? Crowdfunding and Early Product Access. Northeastern University's D'Amore-McKim School of Business (research paper) 2684223.
- Kumru, C.S., Vesterlund, L., 2010. The Effect of Status on Charitable Giving. *Journal of Public Economic Theory* 12 (4), 709–735.
- Kuppuswamy, V. & Bayus, B. L. (2014) Crowdfunding creative ideas: The dynamics of project backers in Kickstarter. SSRN Working Paper. Available at <https://dx.doi.org/10.2139/ssrn.2234765>.
- Kuppuswamy, V., Bayus, B.L., 2017. Does my contribution to your crowdfunding project matter? *Journal of Business Venturing* 32 (1), 72–89.
- edited by Lakhani, K., Wolf, R.G., 2005. In: Feller, J., Fitzgerald, B., Hissam, S., Lakhani, K.R. (Eds.), *Why Hackers Do What They Do: Understanding Motivation and Effort in Free/Open Source Software Projects, Perspectives on Free and Open Source Software* (2005). MIT Press. edited by.
- Leung, M.D., Sharkey, A.J., 2013. Out of sight, out of mind? Evidence of perceptual factors in the multiple-category discount. *Organization Science* 25 (1), 171–184.
- Li, J.J., Chen, X.P., Kotha, S., Fisher, G., 2017. Catching Fire and Spreading It: A Glimpse Into Displayed Entrepreneurial Passion in Crowdfunding Campaigns. *Journal of Applied Psychology* 102 (7), 1075–1090.
- Lin, Y., Boh, W.F., Goh, K.H., 2014. How Different are Crowdfunders? Examining Archetypes of Crowdfunders and Their Choice of Projects. *Academy of Management Proceedings* 2014 (1).
- Lin, M., Viswanathan, S., 2016. Home bias in online investments: An empirical study of an online crowdfunding market. *Management Science* 62 (5), 1393–1414.
- Lin, M., Prabhala, N.R., Viswanathan, S., 2013. Judging borrowers by the company they keep: Friendship networks and information asymmetry in online peer-to-peer lending. *Management Science* 59 (1), 17–35.
- Meer, J., 2014. Effects of the price of charitable giving: Evidence from an online crowdfunding platform. *Journal of Economic Behavior & Organization* 103, 113–124.
- Mollick, E., 2014. The dynamics of crowdfunding: An exploratory study. *Journal of Business Venturing* 29 (1), 1–16.
- Mollick, E., Nanda, R., 2014. Wisdom or Madness? Comparing Crowds With Expert Evaluation in Funding the Arts. *Management Science* 62 (6), 1533–1553.
- Mollick, E., Robb, A., 2016. Democratizing innovation and capital access. *California Management Review* 58 (2), 72–87.
- Moss, T.W., Neubaum, D.O., Meyskens, M., 2015. The effect of virtuous and entrepreneurial orientations on microfinance lending and repayment: A signaling theory perspective. *Entrepreneurship Theory and Practice* 39 (1), 27–52.
- Naroditskiy, V., Stein, S., Tonin, M., Tran-Thanh, L., Vlassopoulos, M., Jennings, N.R., 2014. Referral Incentives in Crowdfunding. IZA Discussion Paper No. 7995. Available at. <http://hdl.handle.net/10419/93295>.
- Nowak, M.A., Sigmund, K., 2005. Evolution of indirect reciprocity. *Nature* 437, 1291–1298.
- Ordanini, A., Miceli, L., Pizzetti, M., Parasuraman, A., 2011. Crowd-funding: transforming customers into investors through innovative service platforms. *Journal of Service Management* 22 (4), 443–470.
- Parhankangas, A., Renko, M., 2017. Linguistic style and crowdfunding success among social and commercial entrepreneurs. *Journal of Business Venturing* 32 (2), 215–236.
- Parker, S.C., 2014. Crowdfunding, cascades, and informed investors. *Economics Letters* 125 (3), 432–443.
- Polzin, F., Toxopeus, H., Stam, E., 2018. The wisdom of the crowd in funding: Information heterogeneity and social networks of crowdfunders. *Small Business Economics* 50 (2), 251–273.
- Potters, J.J.M., Sefton, M., Vesterlund, L., 2007. Leading-by-example and signaling in voluntary contribution games: An experimental study. *Economic Theory* 33 (1), 169–182.
- Roma, P., Petruzzelli, A.M., Perrone, G., 2017. From the crowd to the market: The role of reward-based crowdfunding performance in attracting professional investors. *Research Policy* 46 (9), 1606–1628.
- Schwiebacher, A., Larralde, B., 2010. *Crowdfunding of Small Entrepreneurial Ventures: Handbook of Entrepreneurial Finance*. Oxford University Press, New York, NY.
- Siggelkow, N., 2007. Persuasion with case studies. *Academy of Management Journal* 50 (1), 20–24.
- Signori, A., Vismara, S., 2018. Does success bring success? The post-offering lives of equity-crowdfunded firms. *Journal of Corporate Finance* 50, 575–591.
- Simpson, B., Willer, R., 2008. Altruism and indirect reciprocity: The interaction of person and situation in prosocial behavior. *Social Psychology Quarterly* 71 (1), 37–52.
- Sorenson, O., Assenova, V., Li, G.C., Boada, J., Fleming, L., 2016. Expand innovation finance via crowdfunding: Crowdfunding attracts venture capital to new regions. *Science* 354 (6319), 1526–1528.

- Stanca, L., 2009. Measuring indirect reciprocity: Whose back do we scratch? *Journal of Economic Psychology* 30 (2), 190–202.
- Stanko, M.A., Henard, D.H., 2017. Toward a better understanding of crowdfunding, openness, and the consequences for innovation. *Research Policy* 46 (4), 784–798.
- Strausz, R., 2017. A theory of crowdfunding: A mechanism design approach with demand uncertainty and moral hazard. *American Economic Review* 107 (6), 1430–1476.
- Sugden, R., 1984. Reciprocity: The supply of public goods through voluntary contributions. *The Economic Journal* 94 (376), 772–787.
- Tausczik, R., Pennebaker, J.W., 2010. The psychological meaning of words: LIWC and computerized text analysis methods. *Journal of Language and Social Psychology* 29 (1), 24–54.
- Thürriid, C., Kamleitner, B., 2016. What goes around comes around? *California Management Review* 58 (2), 88–110.
- Varian, H.R., 1994. Sequential contributions to public goods. *Journal of Public Economics* 53 (2), 165–186.
- Varian, H., 2013. Public goods and private gifts [unpublished manuscript].. Available at: <http://people.ischool.berkeley.edu/~hal/Papers/2013/kick.pdf>.
- Vesterlund, L., 2003. The informational value of sequential fundraising. *Journal of Public Economics* 87 (3-4), 627–658.
- Vesterlund, L., 2006. Why do people give? In: Steinberg, R., Powell, W.W. (Eds.), *The Nonprofit Sector*, 2nd ed. Yale University Press, New Haven, CT & London, UK.
- von Hippel, E., von Krogh, G., 2003. Open source software and the “private-collective” innovation model: Issues for organization science. *Organization Science* 2 (14), 209–223.
- Vulkan, N., Åstebro, T., Sierra, M.F., 2016. Equity crowdfunding: A new phenomena. *Journal of Business Venturing Insights* 5, 37–49.
- Yu, S., Johnson, S., Lai, C., Cricelli, A., Fleming, L., 2017. Crowdfunding and regional entrepreneurial investment: An application of the CrowdBerkeley database. *Research Policy* 46 (10), 1723–1737.
- Zhang, J., Liu, P., 2012. Rational herding in microloan markets. *Management Science* 58 (5), 892–912.
- Zvilichovsky, D., Danziger, S., Steinhart, Y., 2018. Making-the-Product-Happen: A driver of crowdfunding participation. *Journal of Interactive Marketing* 41, 81–93.