

# **Pure donation or hybrid donation crowdfunding: which model is more conducive to prosocial campaign success?**

**Zhao, Liang**

**Sun, Zhe**

## **Abstract**

### *Purpose*

Despite the growing research exploring the possibility and feasibility of financing socially oriented projects through crowdfunding, relatively little research examines which crowdfunding model is better to serve such purpose. This paper attempts to offer novel insights to mitigate this research gap.

### *Design/methodology/approach*

A unique dataset collected from the largest Chinese crowdfunding platform is used to test the hypotheses. To solve the perceived self-selection problem, the Propensity Score Matching (PSM) method is adopted in this paper. Based on this approach, the results of similar prosocial campaigns in two different models (pure donation and hybrid donation) are compared.

### *Findings*

The empirical results show that the hybrid donation model is negatively associated with the status of success and the extent of success of prosocial campaigns. Specifically, compared to the pure donation model, hybrid donation model leads to a lower probability of success, fewer contributors, a lower funding amount and a lower completion ratio.

### *Originality/value*

The paper contributes to a relatively understudied theme in crowdfunding, namely – donations. It does so by introducing the concepts of pure versus hybrid donation models and investigates the model selection problem in financing social projects through crowdfunding based on cognitive evaluation theory.

**Key words:** prosocial crowdfunding campaign, cognitive evaluation theory, crowdfunding model selection

## **Introduction**

Crowdfunding is an innovative way to obtain entrepreneurial fundraising through hybrid logic. The hybrid logic includes the combination of social exchange and financial sustainability (Battilana and Lee, 2014). In crowdfunding, fundraisers collect small individual contributions to fund different types of projects via online crowdfunding platforms. Because of the use of information technology in the crowdfunding process, the costs of coordination and transaction in crowdfunding are much lower than those in traditional fundraising channels (Choy and Schlagwein, 2015).

The possibilities of financing commercial campaigns via crowdfunding have been explored by numerous scholars (e.g., Short et al., 2017; Moritz and Block, 2016; Macht and Weatherston, 2015). In addition to commercial campaigns, crowdfunding is also applicable for funding prosocial purposes. Specifically, prosocial crowdfunding campaign can be defined as a crowdfunding campaign with both prosocial value proposition (delivery of a social benefit for a public) and certain characteristics of public goods (benefit is shared by members of the public). In particular, the donation-based crowdfunding has been considered as a proper model to support prosocial activities (Gerber and Hui, 2013). For instance, previous literature indicates the legitimacy and feasibility for financing social entrepreneurship (Lehner, 2013), health services (Berliner and Kenworthy, 2017), educational services (Meer, 2014), and charity (Liu et al., 2018) via donation-based crowdfunding.

Although donation-based crowdfunding can be used to support prosocial campaigns, the reason why it is a proper model for financing prosocial purposes remains theoretically ambiguous and empirically unsettled. Furthermore, this question becomes more interesting by considering the perceived “free-rider” problem (Samuelson, 1954) lurking in donation-based crowdfunding. The “free-rider” problem can be explained as a market failure which occurs when individuals benefit from public goods and do not pay for it (Samuelson, 1954). Previous literature on charitable giving mentions that the “free-rider” problem can be solved by offering extrinsic motivations to donors (e.g., Friedman and McAdam, 1992). In terms of crowdfunding, tangible rewards are a common way to extrinsically motivate contributors (Gerber and Hui, 2013). Therefore, it is meaningful to determine whether tangible rewards can be used to alleviate the “free-rider” problem by exploring the relationship between tangible rewards and prosocial campaign outcomes.

More generally, this paper answers the question: which model, the hybrid donation model (donation model with tangible rewards option) or the pure donation model (donation without tangible rewards), is a better crowdfunding model for financing prosocial campaigns. Because previous crowdfunding research has paid little attention to this question, this study aims to fill this research gap. Such investigation is likely to be of great

importance for both prosocial campaign fundraisers and platforms in order to increase fundraising efficiency by tapping the right audiences, as well as accommodating their needs.

Cognitive evaluation theory is a theory designed to explain the effects of extrinsic motivations on intrinsic motivations. Specifically, it focuses on examining how intrinsic motivation is affected by external motivations in a process called motivational "crowd-out" (Deci and Ryan, 1985). Based on the cognitive evaluation theory (Deci and Ryan, 1985), the perceived "free-rider" problem should be solved automatically by satisfying donors' senses of enjoyment, competence and autonomy (Deci and Ryan, 1985). In addition, in the prosocial context, extrinsic motivations weaken the positive signal value of performing prosocial activities (Benabou and Tirole, 2003; Titmuss, 1971). Therefore, extrinsic motivations may backfire instead of adding up to intrinsic motivations via a "crowding-out" mechanism (Deci and Ryan, 1985; Frey, 1997; Lepper and Greene, 1978). Similarly, in the prosocial crowdfunding context, it might be the case that offering tangible rewards in prosocial campaigns may crowd out donors' intrinsic motivations to contribute. The "over-justification effect" and "need for autonomy effect" are two possible explanations to clarify the mechanism behind the "crowd-out" phenomenon. As a result, tangible rewards tend to be negatively associated with prosocial crowdfunding outcomes. In other words, a hybrid donation model may not be suitable for financing prosocial campaigns when compared to the pure donation model.

To test this, an empirical study is conducted using the Chinese crowdfunding platform Zhongchou, ([www.zhongchou.com](http://www.zhongchou.com)), which is the largest reward-based crowdfunding platform in China (Zhao and Vinig, 2017). In our case we include campaigns that fell under the platform categories of supporting education, environmental protection, childcare, social enterprise, animal protection, and helping the elderly. By campaigning on this platform project owners can offer tangible rewards in their prosocial campaigns in addition to the common intangible rewards (e.g. satisfaction of contributing to a cause one is passionate about). Specifically, on this platform, it is possible to divide the campaigns into two categories: pure donation campaigns and hybrid donation campaigns. Because of this special feature, this platform offers an ideal ground to test our hypotheses.

Noting the perceived endogeneity bias due to the self-selecting process of offering tangible rewards in prosocial campaigns, a propensity score matching (PSM) method is used to "refine" the data. Based on the "refined" sample, the influence of tangible rewards on the outcomes of prosocial campaigns are examined by including the presence of tangible rewards and the number of tangible rewards as independent variables.

After further robustness checks, significant evidence shows that tangible rewards crowd out intrinsic motivations in the prosocial crowdfunding context. In particular, the presence of tangible rewards is negatively associated with the success status of prosocial crowdfunding campaigns. Besides, tangible rewards also decrease the extent of success of prosocial campaigns by reducing campaigns' total number of backers, total pledge amount

and completion ratio. In addition, the negative impacts become stronger if more tangible rewards are offered in such campaigns. These findings empirically confirm that the hybrid donation model is less preferable in fundraising for prosocial purposes.

This paper offers four main contributions to the literature. First, this paper is the first to investigate model suitability for financing prosocial purposes through crowdfunding both empirically and theoretically. Based on cognitive evaluation theory (Deci and Ryan, 1985), we demonstrate that the hybrid donation model is less effective in financing prosocial campaigns compared to the pure donation model. Second, it enriches the emerging literature stream on financing non-profit prosocial projects and ventures through crowdfunding by confirming the feasibility of donation-based crowdfunding as a fundraising channel. Third, this paper introduces and argues for conceptual separation between hybrid and pure donation campaigns, enriching the relatively limited research on donation crowdfunding. Finally, this paper extends the application of cognitive evaluation theory by presenting the existence of a motivational “crowd-out” effect in the donation-based crowdfunding context, and whether such effect will be altered if non-monetary incentives are adopted.

The paper is structured as follows. Based on the literature review and theoretical analysis, the research hypotheses are presented in the next section. The research data and methodology are then explained in detail. Next, the empirical results are discussed. Key findings, implications and future research directions are presented in the final section.

## **Literature Review and Hypotheses**

### **Supporting Non-profit Social Projects Through Crowdfunding**

An important portion of social projects are manifested in social entrepreneurship (SE), which is defined as prosocial entrepreneurial activities conducted by start-ups or entrepreneurs to develop, fund and offer solutions to social, cultural or environmental issues such as poverty alleviation, health care and community development (Dees, 1998). Based on its definition, non-profit SE aims to create public goods instead of commercial products or services. Fundraising is a vital step in entrepreneurial activities (Florin et al., 2003). However, because of the “liability of newness” (Stinchcombe, 1965), new ventures have more difficulty attracting financial resources from external suppliers than established companies do. For non-profit social entrepreneurship, the initial financing problem is even more challenging (Lehner, 2013). Compared to commercial ventures, non-profit SE lacks a clear financial target (Sirisena and Shneor, 2018; Dacin et al., 2010; Moss et al., 2011). In addition, non-profit SE is rooted in the social sphere, which often associates it with more limited managerial abilities (Lehner, 2013). These conditions suggest that non-profit SE may not easily cover its financial needs through traditional fundraising means (Fedele and Miniaci, 2010). Therefore, it is necessary for non-profit SE to find alternative fundraising channels.

As an innovative way to approach fundraising, in crowdfunding small individual contributions are collected to support campaigns via online platforms. Thus, crowdfunding is also a suitable channel for financing non-profit SE. It is the social features that make crowdfunding different than other traditional financing channels (Wash and Solomon, 2014). Crowdfunding as a social fundraising tool matches the mission of non-profit SEs well (Lehner, 2013). In addition, information technology has largely decreased the costs of coordination and transaction, which facilitates the funding of prosocial campaigns via online crowdfunding platforms (Choy and Schlagwein, 2015). Among different crowdfunding models, donation-based crowdfunding is the most suitable and common model for financing non-profit prosocial campaigns (Lehner, 2013). In addition to general crowdfunding features, donation-based crowdfunding provides extra legitimacy to prosocial campaigns through the “*per se* democratic” selecting process, which increases the likelihood that the crowd will choose to support highly needed prosocial causes (Drury and Stott, 2011). Donation-based crowdfunding enables individuals to produce public goods collectively by donating to prosocial campaigns. For illustration, DonorsChoose.org, a donation-based crowdfunding platform, has successfully supported public school teachers by effectively raising funds for education campaigns (Meer, 2014).

### **Perceived Free-rider Problem in the Prosocial Context**

A public good is a good that everyone has equal access to and that no one can prevent others from consuming. An individual’s consumption of a public good will not decrease others’ enjoyment of it. These two features of public goods can be summarized as non-rivalrous and non-excludable (Samuelson, 1954). Based on the definition of public goods, the products of prosocial crowdfunding campaigns can be treated as public goods because the products are goods with broad public benefits (Carr, 2013). Based on Olson’s (2009) collective-action model, in terms of donation-based crowdfunding, the fundraising process can be interpreted as contributors collectively establishing a “common pool” through donations for the provision of public goods without concrete tangible compensation.

However, as a practice involving the private provision of public goods, donation-based crowdfunding may suffer from the “free-rider” problem (Samuelson, 1954). It describes the situation in which individuals may not want to contribute to public goods because they believe that others will contribute and they can consume public goods for free (Samuelson, 1954). If being a “free-rider” becomes the common strategy when individuals face situations of private contribution to public goods, no public goods will be produced (Kim and Walker, 1984). For example, a campaign for environmental improvement from a donation-based crowdfunding platform aims to create better environmental conditions for all human beings. As the campaign’s product, the improved environmental condition can be consumed by everyone, even those that do not donate to this campaign. As a result, the campaign may fail, and no public goods will be produced. The “free-rider” problem tends

to be negatively associated with the outcomes of prosocial campaign fundraising. Therefore, it is crucial to solve the “free-rider” problem for successful fundraising.

Previous collective action literature suggests that the “free-rider” problem can be alleviated if individuals’ utility is not only derived from the public goods but also from individuals’ own contributions (Friedman and McAdam 1992; Harbaugh, 1998; Oliver, 1980). Similarly, offering tangible rewards based on individuals’ contributions may act as a possible solution to solve the “free-rider” problem in donation-based crowdfunding. Therefore, it is meaningful to test whether indeed tangible rewards can be used to solve the “free-rider” problem and enhance success in prosocial crowdfunding. Further, this question can be conceptualized as “whether hybrid donation crowdfunding is a more suitable model than the pure donation crowdfunding model when financing prosocial projects”. To answer this question, it is crucial to understand what impacts contribution behavior in prosocial crowdfunding campaigns. In this context, motivation theory (Murray, 1964) offers a useful perspective to review and answer this question.

### **Contributors’ Motivations in Supporting Prosocial Crowdfunding Campaigns**

Motivation is the inner state that directs and stimulates human behavior (Murray, 1964). Vallerand (1997) describes motivation as the engine for individuals’ satisfaction of physiological needs. Deci and Ryan (2000) categorize individuals’ motivations into intrinsic and extrinsic motivations in their cognitive evaluation theory (Deci and Ryan, 1985). According to Deci and Ryan (2000), an activity is intrinsically motivated if it reveals the reward itself or meets an individual’s primary psychological needs. Conversely, an activity is extrinsically motivated if it focuses more on external rewards or results.

In general, contributors support crowdfunding campaigns for both intrinsic and extrinsic motivations. Contributors were found to be primarily motivated by collecting rewards, helping others, supporting causes or being part of a community (Gerber and Hui, 2013). Specifically, contributors are extrinsically motivated if they contribute in order to collect rewards. For example, contributors to commercial crowdfunding campaigns are motivated by collecting future products (Allison et al., 2015). Conversely, contributors are also considered to be intrinsically motivated if they contribute to help others, support causes or be part of a community. For instance, contributors to prosocial crowdfunding campaigns tend to be intrinsically motivated because they are willing to contribute even without external incentives.

Compared to commercial campaign contributors, prosocial campaign contributors are more likely to be intrinsically motivated. They are willing to contribute to prosocial campaigns to alleviate social problems or help non-profit organizations based on *pure altruism* (Gerber and Hui, 2013; Ordanini et al., 2011). They may also enjoy the “*warm glow*” (Harbaugh, 1998) from contributing based on a philanthropic cause. The “*warm glow*” refers to the sense of joy and satisfaction derived from doing good (Andreoni, 1990). In addition, an individual’s *sense of guilt* plays a significant role in contributing to prosocial

campaigns (Hibbert et al., 2007). Sitting on the sidelines will evoke the moral pressure of not helping, which will cause this sense of guilt. Guilt has negative effects on the satisfaction of personal utility (Elster, 1998). Moreover, an individual's *empathy* also matters (Colombo et al., 2015; Gerber and Hui, 2013; Ordanini et al., 2011). For example, contributors may be motivated by a sense of personal familiarity with the situation of fundraisers, or by fairness concerns toward the individuals in need of help. These concerns tend to generate empathy based on contributors' inequity aversion. Indeed, earlier studies suggest that empathy intrinsically motivates contributing behavior (Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999).

### **The Effects of Extrinsic Motivations on Support for Prosocial Activities**

Based on the discussion above, it is assumed that individuals' contribution behavior in prosocial campaigns stems from intrinsic rather than extrinsic motivations. Contributors participate to help others, support a cause or be part of a community (Gerber and Hui, 2013). In addition, they award themselves with a sense of enjoyment, competence and autonomy by performing the donation behavior (Deci and Ryan, 1985). Enjoyment, competence and autonomy are intangible rewards that act as selective incentives (Oliver, 1980) for contributing to prosocial campaigns. They explain why contributors are willing to contribute even without any material compensation. For instance, contributors feel happy if the campaigns they support are working well because they have contributed to alleviating the problems. These benefits are exclusive to contributors but not to "free-riders".

Here, some may suggest that by offering extra extrinsic motivations in terms of tangible rewards, campaigners may alleviate the "free-rider" problem. However, offering tangible rewards in prosocial crowdfunding campaigns can also be harmful. Extrinsic motivations and intrinsic motivations are sometimes incompatible. Specific to the prosocial contribution behavior context, the introduction of extrinsic motivation may decrease an individual's intrinsic motivation level. This is called the "crowding-out" effect of extrinsic motivations on intrinsic motivations (De Charms, 2013; Deci et al., 1999; Deci, 1976; Frey, 1993; Frey and Jegen, 2001; Greene and Lepper, 1974; Gneezy and Rustichini, 2000). The "crowding-out" effect can be relatively strong because participants in prosocial activities are intrinsically motivated (Bacchiega and Borzaga, 2003; Leete, 2000). For instance, individuals tend to behave less rather than more generously in charitable giving if material or monetary rewards are offered as extrinsic motivations (Newman and Shen, 2012). Similar results can be found in blood donations (Mellström and Johannesson, 2008; Titmuss, 1971), charitable donations (Newman and Shen, 2012), volunteering work (Carpenter and Myers, 2010) and collective prosocial activities (Frey and Oberholzer-Gee, 1997).

Similarly, in terms of prosocial crowdfunding, which is one manifestation of prosocial activity, contributors are intrinsically motivated. Therefore, offering tangible rewards as extrinsic motivations may crowd out intrinsically motivated contributors' willingness to

contribute. As a result, offering tangible rewards as extrinsic motivations can be negatively associated with the outcomes of prosocial crowdfunding campaigns. The mechanism behind such outcome can be explained further by two effects: the “over-justification” effect and the “need for autonomy” effect.

The over-justification effect (Lepper et al., 1973) is derived from attribution theory (Kelly, 1967) and self-perception theory (Bem, 1972). According to the over-justification effect, if an activity is intrinsically motivated, introducing extrinsic motivations may cause a decrease in intrinsic motivations, because extrinsic motivations bring too many choices (justifications) for performing the activity (Collins, 2015). In terms of contributing to prosocial crowdfunding campaigns, offering tangible rewards may shift the meaning of contributing from caring about social welfare into collecting rewards. Contributors may feel that they are influenced by an economic mindset instead of a prosocial altruistic mindset if tangible rewards are offered as extrinsic motivations in prosocial crowdfunding campaigns (Gneezy and Rustichini, 2000; Heyman and Ariely, 2004). This shift may taint contributors’ prosocial behavior (Heyman and Ariely, 2004). In addition, it is reasonable to assume that more tangible reward options will strengthen the “over-justification” effect.

In addition, one can may claim that the addition of extrinsic motivations, via the offering of tangible rewards, may be viewed as a ‘waste of money’ that could have been better used in fulfilling the prosocial mission of the campaign. Here, contributors that are primarily intrinsically motivated may lose interest in supporting the campaign, as they would view the use of funding to cover costs of tangible rewards as an unnecessary and costly deviation from the primary social cause at the heart of the campaign.

Accordingly, we propose the following hypotheses:

*H<sub>1</sub>: The presence of a tangible reward is negatively associated with the likelihood of success of a prosocial crowdfunding campaign.*

*H<sub>2</sub>: The presence of a tangible reward is negatively associated with the extent of success of a prosocial crowdfunding campaign.*

According to cognitive evaluation theory, Deci and Ryan (1985) propose that individuals have intrinsic needs for autonomy. Autonomy describes whether an individual’s behavior is self-determined (De Charms, 2013). Individuals’ intrinsic motivations tend to be influenced by the satisfaction of innate needs. If this is the case, the introduction of extrinsic motivations will diminish individuals’ intrinsic motivations to perform tasks (Deci et al., 1999). In terms of prosocial crowdfunding, it is reasonable to propose that potential contributors to prosocial campaigns will feel less likely to donate if they notice that tangible awards have been offered as the perceived rewards for contributing. These tangible rewards diminish the satisfaction of autonomy by adding extra control (Deci and Ryan, 1985). Contributors’ intrinsically motivated contributing behavior will be disrupted by the



controlling effect caused by offering extrinsic rewards. The degree of controlling effect is positively associated with the number of tangible rewards.

Based on the previous discussion, we hypothesize the following:

*H<sub>3</sub>: The total number of tangible rewards in a prosocial crowdfunding campaign is negatively associated with the extent of success of a prosocial crowdfunding campaign.*

## **Data and Variables**

### **Data**

China is considered as the global leader in alternative finance and crowdfunding (Ziegler et al., 2019), where volumes of donation and reward crowdfunding have reached more than USD 5 billion in 2017 (Ziegler et al. 2018). The data used in the current study were collected from Zhongchou ([www.zhongchou.com](http://www.zhongchou.com)), the largest reward-based crowdfunding platform in mainland China. This platform has served as an accepted context of study in earlier research (Bi et al. 2017; Yuan et al. 2016; Zhao and Vinig, 2017; Zhao and Vinig, 2019). Like other reward-based crowdfunding platforms, Zhongchou follows an “all-or-nothing” strategy for campaign management. This strategy means that fundraisers can only receive the funds raised if the campaigns successfully reach their funding goals. Furthermore, Zhongchou has unique features. In addition to commercial campaigns, non-profit prosocial campaigns are also accepted. These prosocial campaigns are listed under the category “prosocial crowdfunding” and are separated from the commercially oriented reward campaigns. More specifically, the prosocial campaigns fell into six sub-categories: supporting education, environmental protection, childcare, social enterprise, animal protection, and helping the elderly.

On this platform, every prosocial campaign must offer at least one reward option for backers to choose. To promote backers’ engagement and attract more backers to contribute, the form of reward is not limited to tangible rewards. Specifically, the rewards can be intangible, tangible or both. An intangible reward is a common approach for prosocial campaigns because the campaigns aim to produce public goods for the greater society rather than goods for individual private consumption. Intangible rewards usually take the forms of virtual hugs or thank-you e-mails. In principal, prosocial campaigns offer intangible rewards and donors are given no tangible compensation. In this case, it works similar to the classic donation-based crowdfunding model. However, it is also possible to offer tangible rewards in prosocial campaigns. Specifically, tangible rewards usually take the forms of campaign-related personal recognition souvenirs (Kuppuswamy and Bayus, 2017) such as t-shirts or mugs with campaign logos as in classic reward-based crowdfunding model. In addition, it is also possible to arrange a prosocial campaign in a hybrid way by offering both tangible and intangible rewards. Hence, by accommodating reward, pure donation, and hybrid donation models the setting of Zhongchou offers an ideal ground to test our hypotheses.

The final dataset contains 2,167 campaigns posted on Zhongchou in a one-year period from January 2016 to December 2016 in the category of prosocial crowdfunding. Campaigns that started in 2016 but finished after 2016 are excluded, along with the campaigns with missing information and cancelled campaigns. Before collecting campaign-based information, the introductions of the campaigns are checked to ensure that all the campaigns in the initial sample aim to create public goods. For each campaign in the dataset, the following information is collected by a self-designed web-crawler program: funding target; sub-category; post time; location; description length; duration; reward levels; reward description; introduction video or not; picture number; total pledge; final backer number; final status and final completion ratio.

—Insert Table 1 about here—

## Variables

The dependent variables, independent variables and control variables are coded based on the collected information.

In terms of dependent variables, Ahlers et al. (2015) suggest that the outcome of a crowdfunding campaign is a multifaceted concept and should be evaluated by multiple standards. Based on the suggestions from previous literature (e.g., Cumming et al., 2015), four dependent variables from two perspectives are used to measure the outcomes of prosocial crowdfunding campaigns. *Status* is a binary dummy variable that describes the final status of a prosocial crowdfunding campaign. It takes a value of 1 if a campaign reaches its funding target successfully and a value of 0 if fundraising falls short. In addition, three measures have been used to capture extent of success. Here, *backer\_num* is used to represent the total number of contributors in a prosocial campaign. In addition, *total\_pledge* represents a campaign's total amount of money collected at the end of its fundraising period. *Completion\_ratio* measures the ratio of *total\_pledge sum* out of the *target sum*.

For independent variables, each campaign was assigned a unique type. Here, based on the reward descriptions of the campaigns, a campaign was coded as “pure donation” if only intangible rewards can be found in its reward descriptions. Similarly, a campaign was coded as “hybrid donation” if both tangible and intangible rewards are described. A campaign was coded as “pure reward” if only tangible rewards can be found in its reward descriptions. As a result, 202 “hybrid donation” campaigns, 1,965 “pure donation” campaigns and 0 “pure reward” campaigns were included. It should be confusing to see that no “pure reward” campaign data was presented in our dataset. We have generated some possible explanations to rationalize it. Normally, prosocial crowdfunding, a special type of charitable giving, no materialized rewards should be offered according to the essence of charitable giving. In addition, charitable contributions are usually in smaller amounts when compared to the commercial contributions. Therefore, it was difficult for project creators to cover their costs (e.g., produce the rewards, shipments etc.) if they choose to offer the

contributors materialized rewards. Therefore, in our case, no pure reward campaigns are listed in the prosocial setting can be explained to some extent. The campaigns with tangible rewards account for 9.32% of the entire sample. A binary dummy variable *tangible\_reward\_dummy* is used to represent whether a prosocial campaign has adopted tangible rewards. A “hybrid donation” campaign is coded 1, and 0 otherwise. In addition, we use *tangible\_reward\_num* as the other independent variable to indicate the number of tangible rewards of a “hybrid donation” campaign.

Regarding control variables, prior literature indicates that campaign quality is positively related to crowdfunding outcomes (Mollick, 2014). A campaign has a higher probability of success if it offers more campaign-related information as quality signals. Detailed campaign descriptions, more pictures and video pitches are three common quality signals in crowdfunding campaigns (Mollick, 2014; Ahlers et al., 2015; Colombo et al., 2015), and are assumed to alleviate information asymmetry by the supply of extra information. Therefore, *video*, *pic\_num* and *wordcount* are used as control variables in this paper. *Video* is a binary dummy variable. If there is a descriptive video on a campaign webpage, it is coded 1, and 0 otherwise. *pic\_num* describes the total number of pictures posted on a campaign’s webpage. *Wordcount* represents the length of a campaign’s descriptive content in Chinese characters. In addition, based on previous crowdfunding literature (e.g., Mollick, 2014), other factors that tend to influence the outcomes of crowdfunding campaigns are also controlled for, including *location*, *sub\_category*, *target*, *duration*, *month* and *intangible\_reward\_num*.

Due to the high skewness of real crowdfunding data, some of the non-dummy variables are not normally distributed with long tails. To satisfy asymptotic normality and increase prediction accuracy, the natural log transformations of all the skewed variables are conducted before the regression analyses. The definitions of variables are summarized in Table 1. Table 2 reports the descriptive statistics for all variables.

—Insert Table 2 about here—

## Models and Methodology

### Models

The hypotheses are tested by three models respectively:

Whether the presence of tangible rewards (*tangible\_reward\_dummy*) is negatively associated with the status of success (*status*) of a prosocial crowdfunding campaign is tested in Model 1.

$$status_i = \beta_0 + \beta_1 tangible\_reward\_dummy_i + \beta_2 control\_variables_i + \varepsilon_i \quad (1)$$

In Model 2, the way in which a tangible reward (*tangible\_reward\_dummy*) influences the extent of success (*backer\_num*, *total\_pledge* and *completion\_ratio*) of a prosocial crowdfunding campaign is examined.

$$Y_i = \beta_0 + \beta_1 \text{tangible\_reward\_dummy}_i + \beta_2 \text{control\_variables}_i + \varepsilon_i \quad (2)$$

Model 3 tests how the number of tangible rewards (*tangible\_reward\_num*) affects the extent of success (*backer\_num*, *total\_pledge* and *completion\_ratio*) of a prosocial crowdfunding campaign.

$$Y_i = \beta_0 + \beta_1 \text{tangible\_reward\_num}_i + \beta_2 \text{control\_variables}_i + \varepsilon_i \quad (3)$$

In all the three models, *i* indicates the prosocial crowdfunding campaign<sub>*i*</sub>. *Status<sub>i</sub>* is a binary dummy variable representing whether campaign<sub>*i*</sub> reached its funding target (Yes=1, No=0). *Y<sub>i</sub>* is a series of dependent variables indicating the campaign<sub>*i*</sub>'s extent of success, including *backer\_num*, *total\_pledge* and *completion\_ratio*. *Tangible\_reward\_dummy<sub>i</sub>* is a binary dummy variable indicating whether the campaign<sub>*i*</sub> offers a tangible reward (Yes=1, No=0). *Tangible\_reward\_num<sub>i</sub>* is a continuous variable indicating the number of tangible rewards of the campaign<sub>*i*</sub>. *Control\_variables<sub>i</sub>* is a list of variables that may be associated with the campaign<sub>*i*</sub>'s status of success and extent of success, including *video*, *pic\_num*, *wordcount*, *location*, *sub\_category*, *target*, *duration*, *month* and *intangible\_reward\_num*.

## Methodology

To test the hypotheses, the outcomes of campaigns in the “hybrid donation” group and the “pure donation” group should be compared. Specifically, prosocial campaign initiators have the freedom to choose to offer tangible rewards or not according to their wishes. Therefore, the adoption of tangible rewards seems to be a self-selection process, which may cause endogenous problems. If the endogenous problems exist, the results may be seriously biased. Particularly, offering of rewards may be a facet of campaign quality. Therefore, the pure effect of offering tangible rewards on campaign outcomes may be confounded by campaign quality, or more generally, by campaigns' inborn features. To solve the endogeneity bias due to self-selection, a Propensity Score Matching (PSM) method (Dehejia and Wahba, 2002) is conducted in this paper. The function of PSM is to match campaigns with tangible rewards (treatment group) to campaigns without tangible rewards (comparison group) to create counterfactuals for campaigns in the treatment group.

Specifically, the PSM method uses a campaign's inborn features to estimate the campaign's probability of adopting tangible rewards. The probability is defined as the campaign's *propensity score*. Campaigns' propensity scores offer effective ways to balance the different campaign features in the treatment and comparison groups. Based on campaigns' propensity scores, every campaign in a treatment group can find one (or more) matched campaign(s) with similar propensity score(s) in a comparison group. After this matching process, the results will no longer be biased because all the confounded variables are controlled for by the propensity scores. Accordingly, it is then possible to estimate the pure effect of the treatment (offering tangible rewards) on campaign outcomes.

Campaigns' propensity scores can be calculated using a logit regression. In this regression, the dependent variable is whether a campaign offers tangible rewards

(*tangible\_reward\_dummy*) and the independent variables are the campaign's inborn features (*video*, *pic\_num*, *wordcount*, *location*, *sub\_category*, *target*, *duration* and *month*). Inborn features are ideal covariates because the features relate not only to the treatment but also to campaign outcomes. In addition, they are fixed over time and remain unchanged after introducing treatment (Caliendo and Kopeinig, 2008). The regression results are presented in Table 3. As expected, campaigns with short introductions, fewer pictures and no videos are significantly associated with the adoption of tangible rewards, meaning that campaigns of lower quality are more likely to offer tangible rewards as a strategy to promote fundraising. Campaign duration and campaign target are also positively and significantly associated with the probability of adopting tangible rewards. Based on this logit regression, all campaigns' propensity scores are calculated. As a result of the balance check, the propensity scores and the covariates are balanced in both treatment groups and comparison groups.

—Insert Table 3 about here—

In terms of the matching algorithm, the nearest neighbor algorithm without replacement is used in this paper. It is one of the most straightforward and common matching algorithms (Caliendo and Kopeinig, 2008). By applying one-to-one exact matching, each campaign in the treatment group is matched to exactly one campaign in the comparison group with the closest propensity score. In addition, the tolerance level on the maximum propensity score distance between two campaigns (caliper) is set as 0.05 for precise matching. As a result, 404 matched campaigns are collected as the final sample. Half of the sample comes from the treatment group and half comes from the comparison group. The descriptive statistics and the correlation matrix of the matched sample are reported in Table 4 and Table 5.

—Insert Table 4 about here—

—Insert Table 5 about here—

To evaluate the quality of matching, several tests have been conducted. First, the percentage of standard error biases before and after matching are calculated to determine whether campaigns with treatment and campaigns without treatment have no significant differences in their observable features after matching. The results are presented in Table 6. The results indicate that before matching, the standard error bias ranges from 18.1% to 129.8%. However, after matching, it ranges from 2.5% to 8.4%, a sharp decrease in standard error. In addition, a *t*-test is also conducted on the mean value of each campaign's observable features before and after matching. According to Table 6, there are no significant differences in each observable feature's mean value between campaigns in the treatment group and campaigns in the comparison group after matching, indicating that campaign differences are no longer significant.

—Insert Table 6 about here—

Regarding the model's goodness of fit, a logit regression is conducted two times using the unmatched data set and the matched data set. The dependent variable in this regression is whether a campaign offers tangible rewards, and the independent variables are campaigns' inborn features. The results of the regressions, depicted in Table 7, indicate that the Pseudo  $R^2$  of the unmatched model is 0.384, which presents a good goodness of fit of the model (Claeskens and Hjort, 2008). Based on the results of the likelihood ratio (LR) test, the unmatched model is significant as a whole and a campaign's inborn features can be used to determine which campaign is more likely to offer tangible rewards. Conversely, the Pseudo  $R^2$  decreased to 0.016, and the results of the LR test were no longer significant in the matched model. Therefore, it is no longer possible to identify which campaign is more likely to offer tangible rewards based on its inborn features. To sum up, in terms of inborn features, the campaigns in the treatment group and the ones in the comparison group are very similar after matching. Thus, the endogeneity problem caused by self-selection has been resolved by the PSM method. Next, the hypotheses are tested based on this matched sample.

*—Insert Table 7 about here—*

## **Results**

To rule out multicollinearity, the variance inflation factors (VIFs) of all variables are calculated. The mean VIF value is 2.08, and all other single VIF values range from 1.05 to 3.79, below the threshold of 5 (Neter et al., 1996). Furthermore, all intercorrelations are well within accepted ranges and below the 0.6 level. The only exception is the single high intercorrelation between number of intangible rewards and number of pictures (0.84). Here, since intangible rewards (e.g. satisfaction, autonomy, welfare) are more difficult to capture through imagery (as compared to images of products in the case of tangible rewards), it is assumed that, despite being highly correlated, the two present distinct concepts measured by distinct measures. Therefore, the models have no multicollinearity problem.

A binary logistic regression is conducted to test whether offering tangible rewards is negatively associated with the final status of a prosocial crowdfunding campaign ( $H_1$ ). As the results show in Model 1 from Table 8, the presence of tangible rewards has a significant negative effect on the success status of a prosocial crowdfunding campaign (-0.74,  $p < 0.01$ ). Next, a series of OLS regressions are estimated to test whether this negative effect is still valid in terms of a prosocial campaign's extent of success ( $H_2$ ). The results are presented separately in Models 2, 3 and 4 of Table 8. Specifically, campaigns with tangible rewards tend to a lower total number of backers (-0.24,  $p < 0.05$ ) and a lower total pledge amount (-0.70,  $p < 0.01$ ) than campaigns without rewards. In addition, offering tangible rewards causes a reduction in the completion ratio of a campaign (-0.37,  $p < 0.01$ ). These results support hypothesis  $H_2$ . Next, the influence of the number of tangible rewards on a campaign's extent of success is tested ( $H_3$ ). The results are reported in Table 9. In line with previous predictions, the number of tangible rewards in a campaign is negatively associated

with the campaign's extent of success. With all else being equal, one standard deviation increase in a prosocial campaign's tangible reward number will cause a 7% decrease in its total backer number (-0.07,  $p < 0.001$ ), a 22% decrease in its total pledge amount (-0.22,  $p < 0.001$ ) and a 0.07 deduction in its completion ratio (-0.07,  $p < 0.001$ ).

—Insert Table 8 about here—

—Insert Table 9 about here—

### **Robustness checks**

To test the robustness of the results, four additional OLS regressions are conducted to determine whether the negative effects of tangible rewards remain significant when using alternative variables to measure campaign outcomes. Entrepreneurs use crowdfunding not only for fundraising but also for expanding the awareness of their work. This expanded awareness helps them to extend resources beyond close social networks and offers opportunities to market their campaigns to the general public (Gerber and Hui, 2013). Therefore, a campaign still has satisfactory outcomes if it expands its public awareness. On Zhongchou.com, backers can choose to be fans of crowdfunding campaigns by clicking the “like” button or can share campaigns via their social media by clicking the “share” button. Thus, the number of fans and the number of shares (both are natural log-transformed) are introduced as two new dependent variables for robustness checks. The results are reported in Table 10. According to Models 8 and 9, the presence of tangible rewards has negative effects on a campaign's total fans number (-0.16,  $p < 0.01$ ) and number of shares (-0.22,  $p < 0.01$ ). The number of tangible rewards is also negatively associated with a campaign's total fans number (-0.05,  $p < 0.001$ ) and a campaign's number of shares (-0.07,  $p < 0.001$ ). In summary, the results are found to be robust and consistent across two different measures of campaign outcomes.

—Insert Table 10 about here—

### **Discussion**

Generally, our empirical results show support of the cognitive evaluation theory in the context of donation-based crowdfunding by exploring the effects of intrinsic motivation and extrinsic motivation on prosocial crowdfunding campaign outcomes. This paper offers new insights into differentiating hybrid donation model and pure donation model and their feasibilities of financing prosocial purposes through crowdfunding, which haven't been studied previously.

Specifically, this paper contributes to the emerging literature of donation-based crowdfunding. Our findings show that that campaign's quality signals such as video, picture and description are positively associated with prosocial campaign success, which echoes previous studies in the context of reward-based crowdfunding (e.g., Mollick, 2014; Agrawal et al., 2015). However, the tangible rewards, which are used to predict crowdfunding campaign success (e.g., Burtch et al., 2011; Cholakova and Clarysse, 2015;

Frydrych et al., 2014), are proved to be negatively associated with campaign success in the donation-based crowdfunding context. A potential explanation for this finding may be the “crowding-out” effect of extrinsic motivations on intrinsic motivations (De Charms, 2013).

Furthermore, because of its social feature (Lehner, 2013) and “*per se* democratic” process (Drury and Stott, 2011), our findings confirm the feasibility of financing non-profit prosocial projects through crowdfunding, which replicates similar findings in previous studies ( e.g., Berliner and Kenworthy, 2017; Lehner, 2013; Allision et al.,2015; Meer, 2014). In addition, we define and analyze two donation-based crowdfunding models (hybrid donation model and pure donation model) and their feasibilities for supporting prosocial projects for the first time. By highlighting the differences and between the two models, this paper is the first to explore model suitability in the context of supporting prosocial purposes through crowdfunding. Based on cognitive evaluation theory (Deci and Ryan, 1985), we offer concrete responding to the question why pure donation model is better than hybrid donation model in financing prosocial purposes theoretically.

Our findings are also consistent with previous literature relating to donor behavior (Benabou and Tirole 2003; Deci and Ryan, 1985; Frey, 1993; Gneezy et al., 2011; Lepper and Greene, 2015). Based on cognitive evaluation theory (Deci and Ryan, 1985), we analyze the motivational “crowd-out” effect in the context of donation-based crowdfunding, which extends the boundary of donor behavior research. Previous studies (e.g., Titmuss, 1970) have proved the existence of the “crowd-out” effect in prosocial contexts by using money as the proxy of extrinsic motivation. In this paper, we extend previous research (e.g., Ariely et al., 2009) by testing the function of non-monetary rewards as the proxy of extrinsic motivation in the donation-based crowdfunding context. Our results presenting the first empirical evidence showing that the “crowd-out” effect is not altered when non-monetary incentives are adopted in the donation-based crowdfunding context.

## **Conclusion**

This paper examines the effects of offering tangible rewards on the outcomes of prosocial crowdfunding campaigns. Theoretically, this paper aims to shed light on whether extrinsic motivations will crowd out intrinsic motivations in prosocial crowdfunding contexts. To answer this question, a dataset collected from the largest reward-based crowdfunding platform in China is analyzed using the PSM method. According to the empirical results, the presence of tangible rewards is negatively associated with prosocial crowdfunding campaigns’ outcomes. In particular, the adoption of tangible reward leads to a lower probability of meeting the funding target, fewer contributors, lower pledge amounts and a lower completion ratio when compared to the campaigns without tangible rewards. These negative effects are strengthened if more tangible reward options are offered.

This paper contributes to the emerging literature on general crowdfunding and donation-based crowdfunding in particular. Specifically, this paper contributes to the previous literature about success factors of crowdfunding campaigns (e.g., Mollick, 2014; Agrawal et al., 2015) by presenting the evidence that campaign’s quality signals are also positively



associated with the success of prosocial crowdfunding campaigns. Interestingly, while prior literature suggests that rewards are positively associated with crowdfunding campaign success (e.g., Burtch et al., 2011; Cholakova and Clarysse, 2015; Frydrych et al., 2014) the current study shows that in the donation-based crowdfunding context, tangible rewards work in the opposite way.

In addition, this paper sheds light on the literature stream on financing non-profit social entrepreneurship through crowdfunding (e.g., Allison et al., 2015; Meer, 2014). Our findings confirm that donation-based crowdfunding is a feasible channel for supporting prosocial purposes because of its social feature (Lehner, 2013) and “*per se democratic*” process (Drury and Stott, 2011). However, and most importantly, the current paper distinguishes between “hybrid” and “pure” donation campaigns, highlighting the differences between these two models of donation crowdfunding campaigning, as well as their relative efficiency and fit with successful campaigns. Furthermore, this paper is the first to investigate model suitability for financing prosocial purposes through crowdfunding. Based on cognitive evaluation theory (Deci and Ryan, 1985), this paper explains why pure donation crowdfunding model is better than hybrid donation crowdfunding model in financing prosocial purposes theoretically.

Our findings also confirm and extend prior research about donor behavior based on cognitive evaluation theory (Deci and Ryan, 1985). Specifically, our findings confirm the existence of motivational “crowd-out” effect in prosocial activities (Benabou and Tirole 2003; Deci and Ryan, 1985; Frey, 1993; Gneezy et al., 2011; Lepper and Greene, 2015). Prior literature has examined the “crowd-out” effect in prosocial contexts by using money as the proxy of extrinsic motivations (Titmuss, 1970). In this paper, we extend previous research (e.g., Ariely et al., 2009) by using the non-monetary reward as the proxy of extrinsic motivation. The findings show that the “crowd-out” effect is not altered when non-monetary incentives are adopted.

This paper also offers several practical implications for both prosocial campaign initiators and crowdfunding platform administrators. First, this study empirically demonstrates that offering tangible rewards is not an effective strategy to facilitate prosocial campaign fundraising via crowdfunding. Therefore, compared to hybrid donation model, pure donation model is a more suitable model for prosocial campaign initiators using to raise funding.

Second, it is crucial for the administrators of crowdfunding platforms to apply different promotional strategies to different crowdfunding campaigns. They should be aware that the supporters who contribute to different kinds of campaigns may be driven by heterogeneous motivations. Therefore, the promotion strategies should be customized instead of generalized according to different kind of campaigns. It may cause unintended results by adopting inappropriate campaign promotion strategies. For example, compared to a prosocial campaign, contributors of commercial campaigns may not be intrinsically motivated to participate in contributing. Instead, they tend to be motivated extrinsically.

Therefore, in terms of commercial campaigns, offering extrinsic rewards should be an effective promotional strategy for generating more positive fundraising results. However, it will work in a totally reverse way if this strategy is used to promote prosocial campaigns as the extrinsic rewards may crowd out the intrinsic motivations of prosocial donors. Therefore, platform administrators should design appropriate promotional models to different campaign categories and provide guidance to fundraisers about which model functions best for which type of campaign. In addition, platform website designers should highlight the benefits of campaigns from different categories in order to make it easier for potential supporters to identify the values created by their contributions.

Apart from the theoretical and practical insights, this paper also has limitations that offer directions for future research. First, although the self-selection bias of tangible reward adoption is alleviated by balancing campaign characteristics through the propensity score matching method, entrepreneur-related features may also cause self-selection bias. For example, experienced entrepreneurs tend to have a lower propensity than novice entrepreneurs to adopt tangible rewards as external incentives in their prosocial campaigns. Because of their previous experience, they may have better knowledge than novices do about designing attractive campaigns. If this is the case, entrepreneurs' past crowdfunding experience should be an important variable associated with tangible reward adoption and should be controlled to obtain unbiased results. However, entrepreneur-related information is not accessible on this platform. Future research may generate better results by controlling the past crowdfunding experience of entrepreneurs.

In addition, individuals care about their social image when conducting prosocial activities. They want to be recognized for altruism rather than egoism in public (Benabou and Tirole, 2006). Therefore, in addition to intrinsic and extrinsic motivations, social image concerns may also be treated as necessary motivations that drive individuals to perform prosocial activities (Haley and Fessler, 2005). In this paper, social image concern is not taken into consideration for various reasons. It is impossible to find a suitable proxy to measure individuals' social image concern in the platform's public data. In addition, contributions on crowdfunding platforms are always given anonymously (Burtch et al., 2013), which may dramatically reduce contributors' concern for social image. This anonymity may also partly explain the negative effects of the "personal recognition souvenirs" on campaign outcomes. However, it does not mean that social image concern is not important in the prosocial crowdfunding context. Future studies could extend and enrich knowledge by finding ways to measure individuals' social image concern and testing the effects of it on donors' desire to contribute to prosocial campaigns.

Based on the collected data, the form of tangible rewards is limited to personal recognition souvenirs (e.g., t-shirts with a prosocial campaign logo). Therefore, the findings may not be generalized to other types of tangible rewards. To further enhance the generalizability of the current findings, future studies could explore the effect of extrinsic motivations in

the prosocial crowdfunding context by testing and comparing effects across different types of tangible rewards.

Finally, the findings are generated by analyzing the data from a Chinese crowdfunding platform. Therefore, the question of whether the results of this study can be applied universally remains uncertain. For instance, in some cultures, promoting donation is not advocated as it tends to shame the recipients of the donation and donation should not be associated with personal aggrandizement. Future studies could enrich our knowledge by reexamining the findings of the current study in different crowdfunding platforms that are established in different cultural and social environments (e.g., Indiegogo in the US). It would also be interesting to conduct comparative studies between crowdfunding platforms in different cultural settings to determine whether cultural factors moderate the effects of extrinsic motivations in prosocial contexts.

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## Tables:

**Table 1** Variable definitions

<b>Independent Variable</b>	<b>Definition</b>	<b>Variable Type</b>
Tangible_reward_dummy	1-a campaign offers tangible rewards as crowdfunding perks, 0-otherwise	Dummy
Tangible_reward_num	Total number of the tangible rewards of a campaign	Continuous
<b>Control variable</b>	<b>Definition</b>	<b>Variable Type</b>
Ln_target	Natural log-transformed fundraising goal of a campaign (in RMB)	Continuous
Ln_duration	Natural log-transformed fundraising duration (in days)	Continuous
Video	1-a campaign includes a video on its web pitch, 0-otherwise	Dummy
Pic_num	Number of pictures a campaign used to describe the project	Continuous
Intangible_reward_num	Total number of intangible rewards of a campaign	Continuous
Ln_wordcount	Natural log-transformed number of total Chinese characters in a campaign's description	Continuous
Sub_category	1-Education, 2-Environment, 3-Childcare, 4-Social enterprise, 5-Animal protection, 6-Seniorcare	Dummy
Month	A series of dummy variables to show the month in which a campaign is established	Dummy
Location	A series of dummy variables to show the region where a campaign is established(1-Northeast,2-East,3-Central,4-West)	Dummy
<b>Dependent variable</b>	<b>Definition</b>	<b>Variable Type</b>
Status	1-campaign successfully funded, 0-otherwise	Dummy
Ln_backer_num	Natural log-transformed total number of backers a campaign received	Continuous
Ln_total_pledge	Natural log-transformed total money raised for a campaign (in RMB)	Continuous
Completion_ratio	The ratio between campaign's total pledge and campaign's funding target	Continuous

**Table 2** Descriptive statistics (all sample)

Variable	Obs	Mean	Std. Dev.	Min	Max
Tangible_reward_dummy	2167	0.09	0.29	0.00	1.00
Tangible_reward_num	2167	0.70	2.33	0.00	13.00
Ln_target	2167	9.52	1.37	6.91	13.82
Ln_duration	2167	3.52	0.51	2.30	4.50
Video	2167	0.28	0.45	0.00	1.00
Pic_num	2167	6.18	6.04	1.00	50.00
Intangible_reward_num	2167	1.31	1.08	1.00	4.00
Ln_wordcount	2167	7.63	0.58	6.37	9.49
Status	2167	0.61	0.49	0.00	1.00
Ln_backer_num	2167	3.81	1.01	0.69	9.00
Ln_total_pledge	2167	8.73	1.87	2.77	14.53
Completion_ratio	2167	1.23	2.00	0.00	27.25
Region_1	2167	0.03	0.16	0.00	1.00
Region_2	2167	0.73	0.44	0.00	1.00
Region_3	2167	0.11	0.32	0.00	1.00
Region_4	2167	0.13	0.33	0.00	1.00
Category_1	2167	0.18	0.38	0.00	1.00
Category_2	2167	0.24	0.43	0.00	1.00
Category_3	2167	0.25	0.44	0.00	1.00
Category_4	2167	0.11	0.31	0.00	1.00
Category_5	2167	0.12	0.33	0.00	1.00
Category_6	2167	0.10	0.30	0.00	1.00

**Table 3** Logit regression results

	Tangible_reward_dummy (logistic regression)	
Ln_duration	2.25***	(0.23)
Ln_target	1.14***	(0.08)
Ln_wordcount	-0.63***	(0.17)
Video	-2.08***	(0.35)
Pic_num	-0.10**	(0.03)
Region_1	0.03	(0.56)
Region_2	0.07	(0.27)
Region_3	-0.14	(0.37)
Category_1	-0.12	(0.36)
Category_2	-0.01	(0.34)
Category_3	-0.01	(0.33)
Category_4	0.02	(0.38)
Category_5	-0.4	(0.43)
Constant	-16.15***	(1.57)
N	2167	
pr2	0.38	
Month FE	Yes	

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

Note: Robust standard errors in parentheses.

**Table 4** Descriptive statistics (matched sample)

Variable	Obs	Mean	S. D.	Min	Max
Tangible_reward_dummy	404	0.50	0.50	0.00	1.00
Tangible_reward_num	404	3.72	4.20	0.00	13.00
Ln_target	404	10.86	1.18	6.91	13.82
Ln_duration	404	3.89	0.42	2.30	4.50
Video	404	0.08	0.27	0.00	1.00
Pic_num	404	3.50	3.25	1.00	25.00
Intangible_reward_num	404	0.84	0.91	1.00	3.00
Ln_wordcount	404	7.61	0.60	6.41	9.15
Status	404	0.39	0.49	0.00	1.00
Ln_backer_num	404	3.99	1.06	1.39	9.00
Ln_total_pledge	404	8.88	2.33	2.83	13.91
Completion_ratio	404	0.66	1.28	0.00	20.17
Region_1	404	0.05	0.21	0.00	1.00
Region_2	404	0.72	0.45	0.00	1.00
Region_3	404	0.09	0.28	0.00	1.00
Region_4	404	0.15	0.36	0.00	1.00
Category_1	404	0.17	0.38	0.00	1.00
Category_2	404	0.18	0.39	0.00	1.00
Category_3	404	0.32	0.47	0.00	1.00
Category_4	404	0.12	0.33	0.00	1.00
Category_5	404	0.08	0.28	0.00	1.00
Category_6	404	0.12	0.33	0.00	1.00

**Table 5** Correlation matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.Tangible_reward_dummy	1																			
2.Tangible_reward_num	0.93*	1																		
3.Status	-0.19*	-0.25*	1																	
4.Ln_backer_num	0.03	-0.04	0.36*	1																
5.Ln_total_pledge	-0.02	-0.15*	0.61*	0.59*	1															
6.Completion_ratio	-0.12*	-0.11*	0.42*	0.32*	0.39*	1														
7.Ln_target	0.34*	0.30*	-0.26*	0.24*	0.34*	-0.22*	1													
8.Ln_duration	0.24*	0.22*	-0.07*	0.07*	0.02	-0.03	0.14*	1												
9.Video	-0.15*	-0.13*	0.00	0.06*	0.08*	0.01	0.07*	-0.03	1											
10.Pic_num	-0.14*	-0.12*	0.02	-0.06*	-0.01	0.09*	-0.08*	0.01	0.10*	1										
11.Intangible_reward_num	-0.14*	-0.12*	0.02	-0.05*	-0.01	0.07*	-0.07*	0.01	0.08*	0.84*	1									
12.Ln_wordcount	0.01	-0.04*	0.15*	0.14*	0.28*	0.07*	0.16*	0.10*	0.06*	0.04*	0.08*	1								
13.Region_1	0.03	0.04	-0.06*	-0.04	-0.05*	-0.03	0.02	0.04	-0.01	0.00	0.01	0.02	1							
14.Region_2	-0.01	-0.02	0.10*	0.12*	0.11*	0.05*	0.02	-0.07*	0.00	-0.03	-0.06*	0.02	-0.28*	1						
15.Region_3	-0.02	-0.02	-0.04	-0.07*	-0.06*	-0.01	-0.04*	0.03	-0.01	-0.01	0.03	0.01	-0.06*	-0.59*	1					
16.Category_1	-0.01	-0.03	0.07*	0.03	0.08*	0.05*	-0.02	0.00	0.00	-0.02	-0.01	0.14*	-0.05*	0.05*	0.00	1				
17.Category_2	-0.03	-0.05*	0.04	-0.03	0.04*	0.03	-0.02	-0.12*	0.02	0.01	0.00	0.05*	0.05*	-0.03	0.00	-0.26*	1			
18.Category_3	0.05*	0.07*	-0.12*	-0.05*	-0.12*	-0.07*	0.06*	0.02	-0.06*	0.01	0.02	-0.20*	-0.01	-0.06*	0.01	-0.27*	-0.33*	1		
19.Category_4	0.02	0.03	-0.02	0.02	0.00	-0.03	0.02	0.04	0.03	0.00	0.00	-0.01	0.05*	-0.05*	0.00	-0.16*	-0.19*	-0.20*	1	
20.Category_5	-0.04	-0.03	0.02	0.03	0.00	0.01	-0.04	0.04	0.05*	0.02	0.02	0.01	-0.02	0.05*	-0.01	-0.17*	-0.21*	-0.22*	-0.13*	1

Note: \* p < 0.01

**Table 6** Results of balancing assumption

Variable	Unmatched	Mean		Bias (%)	Reduced Bias (%)	t-test	
	Matched	Treated	Control			t-value	p-value
Ln_duration	U	3.9	3.49	90.4	93.1	11.31	0
	M	3.89	3.91	-6.2		-0.65	0.519
Ln_target	U	10.99	9.37	129.8	98.1	16.98	0
	M	10.88	10.85	2.5		0.27	0.79
Ln_wordcount	U	6.94	6.55	18.1	73.4	3.58	0
	M	6.94	7.05	-4.8		-0.66	0.51
Video	U	0.07	0.3	-60.2	86.1	-6.86	0
	M	0.08	0.11	-8.4		-1.05	0.3
Pic_num	U	3.56	6.45	-59.9	87	-6.53	0
	M	3.63	3.26	7.8		1.18	0.24

**Table 7** The variance of control group and treatment group before and after matching

Sample	Pseudo-R <sup>2</sup>	Likelihood Ratio Test		Bias	
		chi2-value	p-value	Means	Median
Unmatched	0.38	515.37	0	33.5	13
Matched	0.02	8.59	0.86	5.7	5.7

**Table 8** The effects of the presence of tangible rewards on prosocial campaign results

	Model 1		Model 2		Model 3		Model 4	
	Status		Ln_backer_num		Ln_total_pledge		Completion_ratio	
Tangible_reward_dummy	-0.74**	(0.23)	-0.24*	(0.1)	-0.70**	(0.21)	-0.37**	(0.12)
Ln_duration	-0.57	(0.3)	-0.34*	(0.14)	-0.86**	(0.29)	-0.59	(0.38)
Ln_target	-0.40***	(0.11)	0.07	(0.04)	0.23*	(0.11)	-0.21**	(0.06)
Ln_wordcount	1.19***	(0.24)	0.44***	(0.1)	1.36***	(0.19)	0.47***	(0.12)
Video	-0.95	(0.49)	-0.24	(0.22)	-0.27	(0.42)	-0.25	(0.13)
Pic_num	-0.14*	(0.05)	-0.05*	(0.02)	-0.08	(0.05)	-0.05	(0.03)
Intangible_reward_num	0.3	(0.21)	0.07	(0.09)	0.07	(0.19)	0.25	(0.16)
Region_1	-0.72	(0.76)	-0.31	(0.3)	-0.27	(0.62)	-0.15	(0.18)
Region_2	0.38	(0.33)	0.28*	(0.13)	0.37	(0.3)	0.24*	(0.1)
Region_3	0.18	(0.48)	0.06	(0.21)	0.15	(0.42)	0.27	(0.2)
Category_1	-0.04	(0.43)	-0.08	(0.21)	0.35	(0.38)	-0.08	(0.17)
Category_2	-0.03	(0.42)	-0.01	(0.2)	0.2	(0.41)	-0.05	(0.17)
Category_3	-0.16	(0.41)	-0.01	(0.2)	0.02	(0.39)	0.06	(0.19)
Category_4	-0.61	(0.45)	-0.12	(0.23)	-0.09	(0.43)	-0.05	(0.21)
Category_5	0.06	(0.5)	-0.09	(0.25)	0.32	(0.45)	-0.09	(0.18)
Constant	-2.84	(2)	1.31	(0.91)	-0.46	(1.87)	1.41	(1.36)
N	404		404		404		404	
Pr2/r2	0.14		0.13		0.21		0.11	
Month FE	Yes		Yes		Yes		Yes	

Note: Robust standard errors in parentheses, \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

**Table 9** The effects of the tangible reward number on the prosocial campaign's extent of success

	Model 5		Model 6		Model 7	
	Ln_backer_num		Ln_total_pledge		Completion_ratio	
Tangible_reward_num	-0.07***	(0.01)	-0.22***	(0.03)	-0.07***	(0.01)
Ln_duration	-0.32*	(0.13)	-0.79**	(0.26)	-0.58	(0.38)
Ln_target	0.06	(0.04)	0.23*	(0.1)	-0.22**	(0.07)
Ln_wordcount	0.39***	(0.09)	1.21***	(0.19)	0.42***	(0.11)
Video	-0.24	(0.2)	-0.28	(0.39)	-0.25*	(0.12)
Pic_num	-0.05*	(0.02)	-0.07	(0.04)	-0.05	(0.03)
Intangible_reward_num	0.07	(0.09)	0.09	(0.18)	0.25	(0.16)
Region_1	-0.3	(0.29)	-0.22	(0.57)	-0.14	(0.18)
Region_2	0.27*	(0.13)	0.35	(0.29)	0.23*	(0.1)
Region_3	0.08	(0.2)	0.23	(0.38)	0.28	(0.2)
Category_1	-0.1	(0.2)	0.3	(0.32)	-0.1	(0.16)
Category_2	-0.03	(0.2)	0.16	(0.37)	-0.08	(0.16)
Category_3	0.01	(0.19)	0.08	(0.34)	0.07	(0.19)
Category_4	-0.09	(0.22)	0	(0.38)	-0.02	(0.2)
Category_5	-0.08	(0.25)	0.35	(0.4)	-0.09	(0.17)
Constant	1.72*	(0.86)	0.81	(1.63)	1.92	(1.42)
N	404		404		404	
r2	0.19		0.34		0.14	
Month FE	Yes		Yes		Yes	

Note: Robust standard errors in parentheses, \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .



**Table 10** Robustness check

	Model 8		Model 9		Model 10		Model 11	
	Ln_fans		Ln_shares		Ln_fans		Ln_shares	
Tangible_reward_dummy	-0.16**	(0.12)	-0.22**	(0.14)				
Tangible_reward_num					-0.05***	(0.01)	-0.07***	(0.01)
Ln_duration	-0.06	(0.16)	-0.26	(0.19)	-0.04	(0.16)	-0.24	(0.19)
Ln_target	0.06	(0.06)	-0.04	(0.06)	0.06	(0.06)	-0.04	(0.06)
Ln_wordcount	0.52***	(0.11)	0.31*	(0.13)	0.49***	(0.11)	0.26*	(0.13)
Video	-0.13	(0.23)	-0.03	(0.29)	-0.13	(0.22)	-0.04	(0.28)
Pic_num	0.01	(0.03)	0.01	(0.03)	0.01	(0.03)	0.01	(0.03)
Intangible_reward_num	-0.13	(0.1)	-0.09	(0.11)	-0.13	(0.11)	-0.09	(0.11)
Region_1	-0.03	(0.34)	-0.08	(0.36)	-0.02	(0.33)	-0.06	(0.35)
Region_2	0.40*	(0.19)	0.3	(0.18)	0.40*	(0.19)	0.29	(0.18)
Region_3	0.46	(0.27)	0.26	(0.27)	0.49	(0.26)	0.28	(0.27)
Category_1	0.52*	(0.21)	0.53	(0.28)	0.51*	(0.2)	0.51	(0.27)
Category_2	-0.39	(0.22)	0.63*	(0.26)	-0.4	(0.22)	0.62*	(0.26)
Category_3	-0.27	(0.19)	0.59*	(0.26)	-0.25	(0.19)	0.61*	(0.25)
Category_4	-0.18	(0.21)	0.64*	(0.3)	-0.16	(0.2)	0.67*	(0.29)
Category_5	-0.01	(0.25)	0.48	(0.33)	0	(0.25)	0.49	(0.34)
Constant	-0.12	(1.14)	1.39	(1.22)	0.19	(1.1)	1.79	(1.18)
N	404		404		404		404	
r2	0.19		0.05		0.22		0.09	
Month FE	Yes		Yes		Yes		Yes	

Note: Robust standard errors in parentheses, \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .