Comparing Crowdfunding Theory and Practice: The Case of Technology Firms in England

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ABSTRACT

This article analyzes crowdfunding campaigns of technology firms in England. We compare the predictions of crowdfunding theories with empirical evidence. We are particularly focused on factors of campaign success related to indirect signalling (such as the choice of campaign target) by founders that have mixed evidence in existing research as opposed to direct signalling (eg. the number of updates by founders). We have found that the campaign target has U-shape effect on success of campaign. For example, the probability of success increases if the threshold value is neither very small or significantly large. This is consistent with the spirit of some theoretical research on crowdfunding. We also provide an overview of literature related to informational problems in crowdfunding, highlight gaps and controversial areas and provide some suggestions for future research.

Keywords: crowdfunding, reward-based crowdfunding, crowdfunding in technology sector, digital entrepreneurship, information asymmetry, signalling, factors of crowdfunding success, campaign target

JEL Classification: G32; L11; L13; L15; L21; L31

1. Introduction

In recent years crowdfunding has become a popular way of raising funds among innovative, entrepreneurial and start-up firms. Small businesses do not have a strong background or sufficient experience in their development, therefore, crowdfunding offers an alternative

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financing scheme that would let these businesses improve their activity and also finance new jobs without traditional financial sector (Katona (2019)). The global crowdfunding market size has been sharply growing in last 10-15 years. It was about $84 billion in 2018 and is expected to reach $114 billion in 2021.[2]

In this article we analyse the factors of success of crowdfunding among technology firms in England. Our research is motivated by the following factors: 1) we primarily focus on factors related to information problems in crowdfunding and separate direct and indirect signalling that was not done previously; 2) many technology firms are growing firms and therefore face a large degree of market uncertainty and in many cases they are also subject to a large degree of asymmetric information between firm founders and potential investors; 3) factors of crowdfunding success have not been analysed for UK technology firms (including England) even though UK is known as one of the most successful countries in crowdfunding and the number of technology firms conducting crowdfunding is growing; 4) a gap exists between theoretical predictions and empirical literature especially literature dealing with information problems and moral hazard problems; 5) a mixed evidence exists with regard to indirect signalling eg such factors as the choice of campaign target; 6) some evidence exists that technology firms show some special features with regard to crowdfunding campaigns compared to other firms for example that they have higher target levels on average.

Theoretical literature on crowdfunding is fastly growing. Informational problems have been recognized as important for crowdfunding however the views are still different. There are two types of signalling available for entrepreneurs. One is direct signalling when entrepreneurs try directly eliminate the fact of poor information. It can be done by providing potential backers with updates, video, pictures etc. Indirect signalling is based on the idea "actions speak louder than words". It may include such actions as for example selecting the campaign threshold. Note that this is one of the reasons we chose Kickstarter where firms use AON so we can test this line.

Also with regard to indirect signals researchers have different views. On one hand some papers suggest that reward-based crowdfunding should be chosen by small campaigns that

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[2] https://www.smallbizgenius.net/by-the-numbers/crowdfunding-stats/#gref

suggest that the size should have rather negative effect (Belleflamme et al (2014), Miglo and Miglo (2019)). On the other hand some papers suggest that firms should use the campaign threshold as a signal of quality (Chakraborty and Swinney (2020), Miglo (2020a, 2021)) so a higher threshold should be associated with higher quality firms. Also Miglo and Miglo (2019) suggest that high-quality firms should neither select a very high threshold or very low threshold. They argue that in this case a separating equilibrium may exists where high quality firms can signal their quality. Chemla and Tinn (2019) suggest that target should be higher and that crowdfunding is more efficient when information problems are relatively large. Strausz (2017) on the other hand suggest that crowdfunding is most efficient when the campaign size is either is small or very large.

We analyse 2388 campaigns by technology firms from England on Kickstarter between 2011-2020. We collect information about the number of backers, target, threshold, percentage of funds raised etc. We find that direct signalling in crowdfunding is more efficient than indirect signalling. It is interesting because if look at traditional equity issues usually we find that indirect signalling by risk-bearing etc. are more important. With regard to indirect signalling we find that the effect of the target is U-shape, i.e the target should not be too small or too large in order to maximize its effect on campaign outcome. This contrasts most existing literature that usually finds a negative correlation between campaign success probability and its size but this is consistent with some theoretical ideas discussed above. Also in contrast to existing literature we study the effect of both monetary campaign target and so called "real" target on firm success and find similar results for both of them. Real target better reflects the level of aggressiveness of entrepreneurs when they select their campaign target. The reason is that different firms produce different products and the cost and the price of these products may be very different. The real target reflects this difference. It is calculated as hypothetical number of items the firm is looking funding for. It is calculated as the monetary target divided by the estimated product price and reflects the magnitude of the production scale decision by entrepreneurs.

The rest of the paper is organized as follows. The next section presents the analysis of existing literature review. Section 3 describes the methodology. In Section 4 presented data analysis presented in graphs and tables for better demonstration and regression results. The last

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section consists of discussion conclusion and recommendations that arise from the finding in this research.

2. RELATED LITERATURE

Early empirical papers on crowdfunding discovered that crowdfunding is subject to imperfect information and that mitigating this problem contributes to the success of projects. In Mollick (2014) crowdfunding success appears to be linked to project quality, in that projects that signal a higher quality level are more likely to be funded, while a large numbers of friends on online social networks are similarly associated with success. Ahlers et al (2015) similar in equity-based crowdfunding.

Financing is one of the most important challenges for entrepreneurial firms.[3] Entrepreneurial firms, innovative firms as well small- and medium size firms and their projects are characterized by a high degree of uncertainty. Firms do as much as they can to mitigate problems related to the lack of information by potential investors directly by communicating to the public the description of their activities and new projects etc. Most empirical research confirms this idea. However the power of such direct actions has its limits (Grinblatt and Titman (2001)). The public trusts actions more than words ("actions speak louder than words"[4]). So some theoretical articles on crowdfunding analyse indirect "signalling" in their models. Signalling means that there exists asymmetric information between a firm founders and funders and the firm/entrepreneur signals its private information indirectly by designing and selecting an appropriate financing strategy. Early empirical papers on crowdfunding discovered that crowdfunding is subject to imperfect information and that mitigating this problem contributes to the success of projects (eg. Mollick (2014)). Crowdfunding success appears to be linked to project quality, in that projects that signal a higher quality level are more likely to be funded, while a large numbers of friends on online social networks are similarly associated with success. Ahlers et al (2015) similar in equity-based crowdfunding. Other papers include Hildebrand, Puri, and Rocholl (2014), Block et al., (2018), Piva and Rossi-Lamastra (2017), Vismara (2016).

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[3] See, eg. Hall (2009), Mach (2014), Wilson (2015), Miglo (2020b).
[4] Lincoln (1856). https://www.bookbrowse.com/expressions/detail/index.cfm/expression_number/151/actions-speak-louder-than-words

Then theoretical literature (Belleflamme et al (2014), Miglo and Miglo (2019), Sayedi and Baghaie (2017), Chakraborty and Swinney (2019)), started to analyze and create models where firm founder have more information than backers and analyzes situations when a perfect direct signaling through eg. videos, pictures, websites updates etc. documents is not perfect. So this literature analyzes the implications of asymmetric information between founders and funders and /or it suggests that the founders can also use indirect methods of signaling their qualities. Examples include the choice between reward-based and equity-based crowdfunding, choice between AON or KIA, the choice of threshold size, the pre-sale price etc.

Empirical literature that directly test the above papers is limited however they are consistent with the spirit of some results.eg. the results found in Ahlers et al (2015), Mollick (2014), Cumming, Leboeuf and Schwienbacher (2019) etc. The latter finds for example that KIA campaigns are less successful in meeting their fundraising goals. For example, the rate of success of campaigns on Kickstarter, which only uses AON, is higher than on Indiegogo.[5]

Sofar we analyzed papers that were focused on asymmetric information between founders and backers. Another line of literature assumes that some investors are better informed than others. This literature usually argues the importance of third party signals n crowdfunding and also such phenomena as backers herding behavior. See eg. Cong and Xiao (2018) , Kleinert, Volkmann and Grünhagen (2020), Asterbo, Lovo and Vulkan (2019), Chan, Parhankangas, Sahaym, and Oo, (2020), Courtney, Dutta and Li (2017), Kim and Viswanathan, (2018), Van de Rijt, Kang, Restivo and Patil (2014), Zhang and Liu (2012). Kim, Newberry and Qiu (2018).

In general imperfect and asymmetric information based literature on crowdfunding discovered numerous ideas about the importance of it in crowdfunding. It also suggested some ways to deal with these problems although it is clear that no ideal and/or simple solution exists for these problems. Also as was mentioned previously a gap exists between theoretical and empirical papers. Note also that many research find that because of imperfect information it is very typical in crowdfunding for projects to attract very low or negligibly small amounts of funds (see, for example, Mollick (2014), Cordova, Dolci and Gianfrate (2015) and Desjardins (2016)).

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[5] See, for example:
http://crowdfunding.cmf-fmc.ca/facts_and_stats/how-likely-is-your-crowdfunding-campaign-to-succeed

We focus on the following hypothesis.

H1: The number of backers is positively correlated with project's success.

H2: The presence of spotlight section is positively correlated with project's success.

H3: The staffpick is positively correlated with project's success.

H4: The project goal has a non-linear effect on the project's success.

3. Methodology

We use data Kickstarter that is the most popular crowdfunding platform in the world. Over 18 million people from all the world belongs to this community. Kickstarter was launched in 2009 and there is 184 271 projects which have been funded successfully. There are also 18 454 313 people that have backed a Kickstarter project and 6 161 344 repeat backers. This platform has also created more than 300 000 part-time and full-time jobs by created projects on the Kickstarter platform. (Kickstarter, 2020). The Kickstarter works on basis "all or nothing" (AON) where collected funds will be returned to investors and the project will not go ahead when the amount of collected funds does not reach the established target. In this way crowdfunding platform ensure the security of the supporters.

Our sample consists of 2388 successful and unsuccessful projects from platform mentioned before, which has been analysed to reach stated aim and objectives. For research analysis was collected following information such as spotlight information about the project, staffpick, number of backers, goal (target).

For our analysis we will be using OLS and also non-linear regression analysis. From the results of regression analysis it is possible to see the positive and negative correlation coefficient of factors that was analysed and it shows relationships between depended variable and independent variable in order to find out that hypothesis should be accepted or rejected.

For example, to test H3, the formula for regression is:

$$SR = \alpha + \beta_1 X_1 + \beta_2 C_1 + \beta_3 C_2 + \varepsilon$$

where the dependent variable is the percentage of funds raised. The independent variable is the dummy variable that equals 1 if the campaign had a support from a Kickstarter employee, and control variables (C) include different variables such as the number of backers and the dummy variable that indicates if the firm has a spotlight section on their crowdfunding website page.

We also use a non-linear regression to test H4:

$$SR = \alpha + \beta_1 X_1 + \beta_2 X_1^2 + \beta_3 C_1 + \beta_4 C_1 + \varepsilon$$

where the dependent variable is the percentage of reached goal). The independent variable is the firm fundraising goal, and control variables (C) include different variables such as the number of backers.

We also use Logit analysis when as dependent variable we use a dummy variable that equals 1 if the campaign was successful and 0 otherwise.

4. Data analysis

Table 1 provides a descriptive statistics of our sample. It shows the number of campaigns, their average ($32266) and median ($10000) goal, the number of successful campaigns, the percentage of raised money etc.. As it can be seen, only 29.3% of campaigns were successful that confirms that crowdfunding is a challenging way of raising funds.

Total number of campaigns	2388
Average goal	$32266
Median goal	$10000
Average number of backers	178.74
Median number of backers	13
Average funds pledged	16787.222
Median funds pledged	650.5
Average percent_funded	122.626 %
Median percent funded	7.58
Number of successful campaigns	696

Successful campaigns	29.3%
Average pledged amount per backer	$84.50
Median pledged	$36.68
Max pledged amount	$3068.88

Table 1. Descriptive statistics.

The table 2 below represents the Correlation Matrix. As can be seen, the higher correlation is between funding level and the presence of spotlight section and the number of supporting bac kers. They are 0.410 and 0.444 respectively. The lowest correlation noticeable between staffp ick and target and equals -0.033 and also the lowest positive correlation has staffpick and fund ing level 0.005.

Table 2. Correlation Matrix

	Spotlight	Staffpick	Backers	Goal	Real goal	Percent of funds raised
Spotlight	x					
Staffpick	-0.033	x				
Backers	0.355	0.258	x			
Goal	-0.120	0.037	0.063	x		
Real goal	0.021	0.035	0.049	0.464	x	
Percent of funds raised	0.410	0.168	0.444	-0.066		x

Table 3 presents the regression results.

Table 3. Regression analysis results. *Regression Results. The dependent variable is the total debt provided/total liabilities (2011) ratio. *** indicates significance at 1% level, ** indicates significance at 5% level, and * indicates significance at 10% level.*

	(1)	(2)	(3)	(4)	(5)
Intercept	17.0728	30.3808	32.1292	8.2390	7.6549
Number of backers	0.2194	0.2235	0.2250	0.2158	0.2158
Goal	-0.0003	-0.0008	-0.0009		
Goal squared		0.0006	0.0006		
Spotlight	133.5007	256.8778	127.7564	137.2108	137.4777
Staffpick	-12.0639	-15.6017	-6.4136	-14.5718	-14.5095
Real goal			0.0007	-0.0001	-3.302e-05
Real goal squared			-0.0005	0.0001	
Adj. R²	0.272	0.275	0.272	0.265	0.265
F-value	224.2	182.1	120.6	162.9	203.7

From the results, it can be seen that spotlight information availability has positive impact on the success of a project. It lets backers feel safer about the campaign they want to support. This is consistent with existent literature that usually finds that for successful crowdfunding campaign creation platforms there is a need to tell about an idea (direct signalling). Similarly most existing papers usually find a positive impact of the number of updates on the probability of project success.

Also one can see that the campaign goal has a negative impact on project's success, which is consistent with most existing literature. However we also used a so called real target. The real target is calculated as the monetary target divided by the estimated average price of the product. So the real target reflects a real ambition of the firm in terms of potential scale of production. Traditional monetary target used in the literature do not take into account the differences in costs and prices among the firms. In our view the real target is more consistent with the spirit of some signalling literature on crowdfunding (eg Miglo and Miglo (2019)). The results

regarding real targets are less conclusive as one can see from Table 3. We will further analyse this issue when comparing different cities of England.

The number of backers is positively correlated with the campaign success which is consistent with existing literature. As it was mentioned by authors Petruzzellia, Natalicchioa, Pannielloa, Umberto, Roma (2018) the backers that are interesting in supporting the crowdfunding project obviously are crucial in achieving the goals of the campaign. These supporters participate and fund a crowdfunding project in order to receive either material or financial benefits an also they believe that their contributions will have a real impact on the project to be successful.

The results of logit analysis can be seen in Appendix. Qualitatively their results are very similar to our previous analysis conclusions.

The second hypothesis says that the staffpick has a positive impact on projects' success. As one can see we have not found a confirmation of this hypothesis.

The limitations of our analysis are mostly related to data availability. It would be good to have more precise estimation of firms' product prices and costs in order to further analyze the real differences in campaigns targets.

5. Conclusions

This article analyzes crowdfunding campaigns of technology firms in England. We compare the predictions of crowdfunding theories with empirical evidence. We are particularly focused on factors of campaign success related to indirect signalling (such as the choice of campaign target) by founders that have mixed evidence in existing research as opposed to direct signalling (eg. the number of updates by founders). We are also focused on comparing different cities of UK with regard to crowdfunding. Regression and correlation analyses were used to analyze the connections between different factors and the campaign outcomes. We have found that the campaign target has U-shape effect on success of campaign. For example, the probability of success increases if the threshold value is neither very small or significantly large. This is consistent with the spirit of some theoretical research on crowdfunding. We also find that cities with better access to ultrafast broadband among households and cities with greater number of people with higher education have significantly better results in crowdfunding. We also provide an overview of literature related to informational problems in

crowdfunding, highlight gaps and controversial areas and provide some suggestions for future research.

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APPENDIX

Logit analysis

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Results: Logit
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Model:              Logit            Pseudo R-squared: inf
Dependent Variable: state_successful AIC:              inf
Date:               2021-03-28 14:31 BIC:              inf
No. Observations:   1601             Log-Likelihood:   -inf
Df Model:           1                LL-Null:          0.0000
Df Residuals:       1599             LLR p-value:      1.0000
Converged:          1.0000           Scale:            1.0000
No. Iterations:     10.0000
---------------------------------------------------------------
                Coef.  Std.Err.    z     P>|z|   [0.025  0.975]
---------------------------------------------------------------
goal           -0.0001   0.0000 -14.8767 0.0000 -0.0001 -0.0001
backers_count   0.0256   0.0017  14.8552 0.0000  0.0222  0.0290
===============================================================
```