The role of location in the emergence of crowdfunding

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ABSTRACT

Crowdfunding is an innovative and fastly growing way of financing for entrepreneurial firms. England is the leading country in crowdfunding. Yet no research exists that compare different cities of UK with regard to the conditions of crowdfunding emergence. In this article we shed some light on this question. We have found 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. Further we find that entrepreneurs in these cities select lower crowdfunding targets and are more likely to publish a spotlight about their ideas suggesting that entrepreneurs in these cities understand the importance of imperfect information and signalling (direct and indirect) in crowdfunding. We also discuss these findings in light of crowdfunding theories.

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 financing scheme that would let these businesses improve their activity and also finance new

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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]

England is recognised is a leading country in developing crowdfunding (Dushnitsky, Guerini, Piva and Rossi-Lamastra (2016), Kukk and Laidroo (2020), Rau (2020)). The size of crowdfunding in England in 2018 was USD 10.4 bln. (Wenzlaff, Odorović, Ziegler and Shneor (2020)) while the total volume of crowdfunding in Europe was about USD 18 bln and in a comparable European country such as Germany, for example, this number is significantly smaller (USD 1.4 bln). Further some cities in England are sometimes branded as hubs of fintech development (eg. Manchester[3]) so it's important and interesting to compare different cities of UK with regard to the conditions of crowdfunding emergence.

We analyse 2408 campaigns by technology firms from England on Kickstarter between 2011-2020. We collect information about the location (city), number of backers, target, threshold, percentage of funds raised etc. We then calculate the average features of campaigns in each city. We also collect information about different cities in the UK (such as median population age, education level, city population, age, GDP per capita, education etc etc.) from the Office of National Statistics.[4] Regression and correlation analyses were used to analyze the connections between different factors for each city and the campaign outcomes.

Our research is related to two areas of research. One is an emerging area related to geographical aspects of fintech development. For example Laidroo and Avarmaa (2020) find that the success of fintech development is related positively to level of education and internet availability. They also find that the fact of the country was affected by global financial crisis 2007-2009 also positively contributes to FinTech development. Although crowdfunding is usually performed on-line (see eg. Belleflamme, Lambert and Schwienbacher (2014)) and theoretically has no boundaries, the issue of location has been studied in literature. For example it was found that investors have psychological biases towards local campaigns. Aggarwal, Catalini and Goldfarb (2011) find that a geography effect can take place in crowdfunding and is driven by investors who likely have a personal connection with the artist-entrepreneur.

[2] https://www.smallbizgenius.net/by-the-numbers/crowdfunding-stats/#gref
[3] https://www.investinmanchester.com/sectors/financial-professional-and-business-services/fintech
[4] https://www.ons.gov.uk/peoplepopulationandcommunity/housing/datasets/townsandcitiesanalysis/current

Dushnitsky et al (2016) find that country-level factors such as the size of the national population, the presence of platforms operated by incumbent financial organizations and the level of entrepreneurial activity influence crowdfunding platform creation in European countries. Our contribution to this literature is two-fold. First it is the first study that focuses on city differences and secondly we also find differences between locations and some aspects of entrepreneurs' choice of their crowdfunding strategies.

Secondly our paper is related to crowdfunding theories. 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 (see eg. Mollick (2014)). 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). The ability of entrepreneurs communicate information about the quality of their projects maybe related to education level (knowledge of fintech and crowdfunding and understanding of information problems in crowdfunding; internet development availability etc.). Secondly note that the power of such direct signals (actions) has its limits (Grinblatt and Titman (2001)). The public often trusts actions more than words ("actions speak louder than words"[5]). So some theoretical articles on crowdfunding analyse other factors (besides direct information communication) that can contribute to campaign success. Some theoretical literature (eg. Belleflamme et al (2014), Sayedi and Baghaie (2017), Miglo and Miglo (2019)) suggests that crowdfunding campaign (especially reward-based crowdfunding) should have smaller size. We analyze if entrepreneurs in cities with best results in crowdfunding really follow this strategy that may suggest that entrepreneurs in these cities have better overall knowledge about crowdfunding and better understand its important features.

Our results show that for example that ultrafast broadband availability and the level of education strongly affect the likelihood of crowdfunding campaigns success. We also find that the average target of campaigns is smaller in more successful cities. The result about campaign size is related to the ideas about signalling discussed above. Since we observe the negative correlation between campaign size and success across all campaigns but most importantly we

[5] Lincoln (1856). https://www.bookbrowse.com/expressions/detail/index.cfm/expression_number/151/actions-speak-louder-than-words

observe these number as taken averages by cities and since there is no indication that campaign in these cities have smaller size by the nature of their projects (all projects belong to the same industry) it suggest that entrepreneurs in these cities either use campaign size as a signal or know that smaller campaigns have more chances for success that suggest a better level of crowdfunding understanding.

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

2. Methodology

We focus on the following hypothesis.

H1: The likelihood of using crowdfunding is positively correlated with city's population
H2: The likelihood of using crowdfunding is positively correlated with ultrafast broadband access.
H3: The likelihood of using crowdfunding is positively correlated with highly educated population.
H4: The likelihood of campaign success is positively correlated with city's population
H5: The likelihood of campaign success is positively correlated with ultrafast broadband access.
H6: The likelihood of campaign success is positively correlated with highly educated population.
H7: Average campaign target is negatively correlated with city's population
H8: Average campaign target is negatively correlated with ultrafast broadband access.
H9: Average campaign target is negatively correlated with highly educated population.

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. 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 H1-H3, the formula for regression is:

$$D = \alpha + \beta_1 X + \beta_2 C + \varepsilon$$

where the dependent variable is the number of campaigns a city (we use both the absolute number of campaigns and the number of campaigns per capita). The independent variables (X) are population, the number of households with ultrafast broadband at home (UB), fraction of population with higher education (Edu), and the average target in cities, and control variables (C) include different variables such as GDP per capita, the average target etc.. We normalize data using an approach similar to Beck et al (2008).

To test H4-H6, the dependent variable is the fraction of successful campaigns a city (or the average percentage of funds raised).

To test H7-H9, the dependent variable is the average campaign target in a city. The independent variables are population the number of households with ultrafast broadband at home, fraction of population with higher education, and control variables include different variables such as GDP per capita etc..

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.

3. 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	2408
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.

Table 2 below represents the Correlation Matrix. As can be seen, the higher correlation is bet ween funding level and the presence of spotlight section and the number of supporting backer

s. They are 0.410 and 0.444 respectively. The lowest correlation noticeable between staffpick and target and equals -0.033 and also the lowest positive correlation has staffpick and funding 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 statistics of crowdfunding data for England by major cities.

Table 3. Crowdfunding statistics for the major cities in the UK.

City	Percentage of successful campaigns	Number of campaigns	Average target	Median target	Number of campaigns with spotlight	Percentage of campaigns with spotlight	Population	Population Aged 18-29 2019, % total	GDP per capita	Business Start-ups 2019 (per 10,000 population)	Ultrafast Broadband 2018 (%)	Working Age Population with a Qualification at NVQ4 or Above 2019 (%)	Patent Applications 2018 (per 100,000 of population)
London	0.28	1035.00	42770.00	150000.00	303	0.18	10151260.00	16.43	53126.00	107.33	81.46	53.30	13.64
Manchester	0.28	72.00	26424.00	120000.00	21	0.31	2486481.00	17.33	29358.00	65.37	70.98	38.00	6.01
Birmingham	0.14	58.00	32257.00	200000.00	9	0.2	2549673.00	17.28	26278.00	56.82	87.49	30.20	5.46
Nottingham	0.47	34.01	24197.00	150000.00	17	0.55	677617.00	21.50	26711.00	40.20	89.67	36.30	9.89
Bristol	0.29	49.00	44458.00	200000.00	14	0.30	746049.00	21.12	38603.00	55.91	87.25	46.70	20.06
Oxford	0.41	41.00	16677.00	8192.00	17	0.40	154327.00	32.04	41470.00	42.30	87.87	57.90	64.51

Cambridge	0.54	52.00	15718.00	8150.00	30	0.59	125758.00	30.42	51686.00	54.88	93.61	69.60	148.12
Leeds	0.16	31.00	18044.00	15000.00	5	0.16	789194.00	21.40	36492.00	52.63	78.48	40.10	6.46
Southampton	0.36	28.00	18410.25	7250.00	10	0.42	386100.00	21.55	34320.03	78.61	82.47	39.40	10.35
Liverpool	0.31	26.00	13125.00	7750.00	8	0.33	648900.00	21.35	29640.66	58.87	83.76	36.30	5.37
Coventry	0.14	14.00	29200.00	6000.00	2	0.14	371520.00	24.70	28354.48	43.60	82.64	36.40	95.53
Sheffield	0.39	23.00	23236.35	15000.00	9	0.41	850260.00	19.83	23489.77	41.16	53.32	41.30	5.96

Sources:
https://www.kickstarter.com/discover/advanced?category_id=16&woe_id=23424975&sort=magic&seed=2693861&page={0}
https://www.centreforcities.org/data-tool/su/6d5b08f4
https://www.ons.gov.uk/peoplepopulationandcommunity/housing/datasets/townsandcitiesanalysis/current

The regression results are reported in Table 5. The results show that the number of campaigns is positively associated with average level of education and access to ultrafast internet and negatively correlated with the average target of campaigns. Relationship with GDP per capita and the population is insignificant. In general the regression results are very strong. Ideally raising funds via internet should remove geographical barriers for firms (Agrawal et al (2011)) however the analysis suggests that cities' characteristics are important for crowdfunding data. It may be related to the cost and efficiency arguments. First consider them on the supply side. From providers point of view, the education level provides an indication of potential economies of scale for their business development. Note that crowdfunding regulation and infrastructure support in the UK is two-fold: there is federal level and regional layer as well. Some cities are more advanced in terms of support of crowdfunding. Cities with less educated population do not have high numbers in terms of average probability of their projects' success. Secondly on the demand side, if distance plays some role in crowdfunding (in the spirit of Aggarwal et al (2011)) and cities population is slightly more interested in local campaigns then population size can reflect the potential amount of feedback and benefits funders can receive by conducting a crowdfunding campaign (Belleflamme et al (2014)). GDP per capita does not have significant impact probably because there are pros and cons with regard to this parameter. On one hand, a higher GDP per capita may reflect a better economic wealth/power of potential entrepreneurs that can positively contribute to crowdfunding success; on the other hand, in an area with low GDP per capita one can have more incentives for people to be involved in innovative entrepreneurship. Perhaps it also reflects the idea that crowdfunding is

suitable for different types of investors including small and large ones. Entrepreneurial developments and the average number of patents does not have a strong impact on the success of crowdfunding providers. On one hand a city with strong entrepreneurial traditions should have more success in crowdfunding but on the other hand, this can be interpreted as that crowdfunding serves as substitute for traditional innovative entrepreneurial activities. The results suggest also that the cost and efficiency are important factors for crowdfunding. This also contributes to recent debates about local bias in crowdfunding (see eg. Hornuf, Schmitt and Stenzhorn (2020)).

Table 5. Regression Results. *The dependent variable is the number of campaigns (2021). *** indicates significance at 1% level, ** indicates significance at 5% level, and * indicates significance at 10% level.*

Variables	(1)	(2)	(3)
Intercept	-0.0006 [0.00018]***	-1.3833 [0.10709] *	0.090442 [0.80594]***
Population	0.00048 [0.000349]*	-1.91549599 [9.2336069]	8.46373982 [2.293972173]
Working Age Population with a Qualification at NVQ4 or Above 2019 (%)	0.001287[0.000441]***	0.0272758[0.0033118]**	0.03257[0.01344]**
Population Aged 18-29 2019,% total	0.031273[0.028317]**		-0.018589[0.020469]*
GDP/capita	-0.000035 [0.0000151]	-0.0000350 [7.981312598]	-0.000015 [0.000025]
Business Start-ups 2019 (per 10,000 population)	0.0014623[0.006550]	0.00800689[0.00106107]	-0.00379 [0.00765]
Ultrafast Broadband 2018 (%)	0.0099370[0.00468]	0.0084144 [0.0014839]	-0.00110 [0.008640]
Patent Applications 2018 (per 100,000 of population)	-0.0010902[0.001591]		
Adj. R^2	0.93023	0.9850846	0.48142
F-value	24.24162	73.6496	2.02120

The regression results regarding hypothesis H4-H6 are reported in Table 6. Similarly to previous analysis results show that the percentage of successful campaigns is positively associated with average level of education and access to ultrafast internet. Relationship with GDP per capita and the population is insignificant. In general the regression results are very strong. The target size is negatively correlated with campaign success. This is consistent with an idea that entrepreneurs in more educated cities have better dea about crowdfunding and select better strategies deliberately. Firms in all cities belong to the same industry so there are

no reasons for why companies in some cities should require higher amounts of capital on average.

Table 6. Regression Results. *The dependent variable is the percentage of successful campaigns (2021). *** indicates significance at 1% level, ** indicates significance at 5% level, and * indicates significance at 10% level.*

Variables	(1)	(2)	(3)
Intercept	-0.0581 [0.61799]***	-1.3833 [0.10709] *	0.090442 [0.80594]***
Number of campaigns	0.00093[0.00068]	-2.473407[0.00096]	-0.00108 [0.00236]
Average target	-3.78776[5.29035]		
Median target	-4.024848[0.000019]	0.00009166[0.0000134]	
Population	-9.30615 [7.0117519]	-1.91549599 [9.2336069]	8.46373982 [2.293972173]
Working Age Population with a Qualification at NVQ4 or Above 2019 (%)	0.037043[0.010803]**	0.0272758[0.0033118]**	0.03257[0.01344]**
Population Aged 18-29 2019,% total	-0.031273[0.028317]**		-0.018589[0.020469]*
GDP/capita	-0.000035 [0.0000151]	-0.0000350 [7.981312598]	-0.000015 [0.000025]
Business Start-ups 2019 (per 10,000 population)	0.0014623[0.006550]	0.00800689[0.00106107]	-0.00379 [0.00765]
Ultrafast Broadband 2018 (%)	0.0099370[0.00468]	0.0084144 [0.0014839]	-0.00110 [0.008640]
Patent Applications 2018 (per 100,000 of population)	-0.0010902[0.001591]		
Adj. R^2	0.53023	0.9850846	0.48142
F-value	2.24162	73.6496	2.02120

Finally the regression results regarding hypothesis H7-H9 are reported in Table 7. Consistent with previous analysis smaller targets are strongly associated with better education.

Table 7. Regression Results. *The dependent variable is the percentage of successful campaigns (2021). *** indicates significance at 1% level, ** indicates significance at 5% level, and * indicates significance at 10% level.*

Variables	(1)	(2)	(3)
Intercept	-0.0581 [0.61799]***	-1.3833 [0.10709] *	0.090442 [0.80594]***
Number of campaigns	0.00093[0.00068]	-2.473407[0.00096]	-0.00108 [0.00236]

Population	-9.30615 [7.0117519]	-1.91549599 [9.2336069]	8.46373982 [2.293972173]
Working Age Population with a Qualification at NVQ4 or Above 2019 (%)	0.037043[0.010803]**	0.0272758[0.0033118]**	0.03257[0.01344]**
Population Aged 18-29 2019,% total	-0.031273[0.028317]**		-0.018589[0.020469]*
GDP/capita	-0.000035 [0.0000151]	-0.0000350 [7.981312598]	-0.000015 [0.000025]
Business Start-ups 2019 (per 10,000 population)	0.0014623[0.006550]	0.00800689[0.00106107]	-0.00379 [0.00765]
Ultrafast Broadband 2018 (%)	0.0099370[0.00468]	0.0084144 [0.0014839]	-0.00110 [0.008640]
Patent Applications 2018 (per 100,000 of population)	-0.0010902[0.001591]		
Adj. R^2	0.53023	0.9850846	0.48142
F-value	2.24162	73.6496	2.02120

Figure 1 illustrates the connections between city average target and the average probability of campaign success.

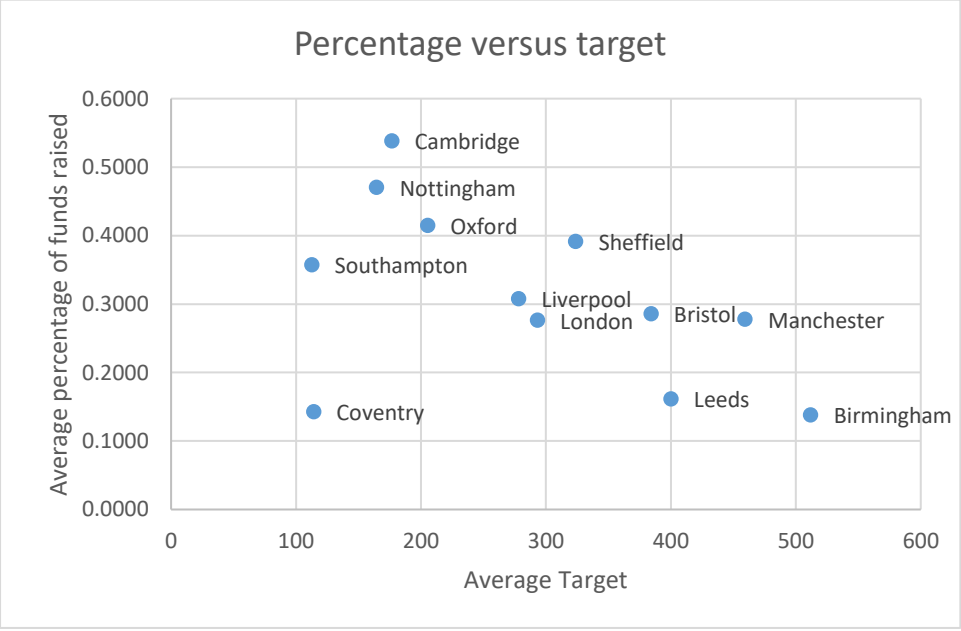

Fig. 1 City average target and the average probability of campaign success

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

In this article we compare different cities of UK with regard to the conditions of crowdfunding emergence. Our research is motivated by the following factors: 1) 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; 2) 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 fintech in general and the number of technology firms conducting crowdfunding is growing; 3) 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.

We have found that the campaign target has negative effect on success of campaign. The probability of success increases if the threshold value is not very 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.

For future research it would be interesting to incorporate some data about post-campaign firm performance and compare them with campaign features. Especially it would be interesting to continue analyzing so called indirect "signalling". 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. 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.[6]

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.

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APPENDIX

Logit analysis

```
Results: Logit
=================================================================
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
=================================================================
```