NIPE Núcleo de Investigação em Políticas Económicas e Empresariais

#02
2022

WORKING PAPER

Wesley Mendes-da-Silva

Israel José dos Santos Felipe

Cristiana Cerqueira Leal

Marcelo Otone Aguiar

"Tone of Mass Media News Affect Pledge Amounts in Reward Crowdfunding Campaign"

https://nipe.eeg.uminho.pt/

FCT Fundação para a Ciência e a Tecnologia

«This paper is financed by National Funds of the FCT – Portuguese Foundation for Science and Technology within the project «UIDB/03182/2020»

Universidade do Minho
Escola de Economia e Gestão

Tone of Mass Media News Affect Pledge Amounts in Reward Crowdfunding Campaign

Wesley MENDES-DA-SILVA*
Corresponding Author
São School of Business Administration of the Fundação Getulio Vargas
Rua Itapeva #474 Sao Paulo, Brazil, 01332-000
mr.mendesdasilva@gmail.com

Israel José dos Santos FELIPE
Federal University of Ouro Preto/Brazil and NIPE/Portugal
R. do Seminário, s/n, Mariana - MG, Brazil, 35420-000.
israeljfelipe@gmail.com

Cristiana Cerqueira LEAL
School of Economics and Management & NIPE – Center for Research in Economics and Management, University of Minho
Campus de Gualtar, Braga, 4710-057, Portugal
ccerqueiraleal@gmail.com

Marcelo Otone AGUIAR
Federal University of Espirito Santo
Av. Governador Lindemberg, Jerônimo Monteiro-ES, Brazil, 29550-000
marcelo.aguiar@ufes.br

Abstract
We study whether the tone of the daily news in mass media, used as a proxy for market sentiment, affects the typical daily pledge amount in reward crowdfunding campaigns. Based on unique data from over 350,000 pledges in reward crowdfunding campaigns in over 2,600 cities in Brazil, we find that market sentiment affects the willingness of backers to make larger pledges. Our unprecedented results reveal that good news induces pledges of larger amounts. The effect of tone over pledge amounts is inhibited by the geographic distance backer-entrepreneur, and it is reinforced by the income inequality in the pledger's city.

Keywords: Natural Language Processing, Crowdfunding, Media, Investor sentiment.

JEL: L26, G32, G41, O31, C41, I31

Tone of Mass Media News Affect Pledge Amounts in Reward Crowdfunding Campaign

Abstract

We study whether the tone of the daily news in mass media, used as a proxy for market sentiment, affects the typical daily pledge amount in reward crowdfunding campaigns. Based on unique data from over 350,000 pledges in reward crowdfunding campaigns in over 2,600 cities in Brazil, we find that market sentiment affects the willingness of backers to make larger pledges. Our unprecedented results reveal that good news induces pledges of larger amounts. The effect of tone over pledge amounts is inhibited by the geographic distance backer-entrepreneur, and it is reinforced by the income inequality in the pledger's city.

Keywords: Natural Language Processing, Crowdfunding, Media, Investor sentiment.

JEL codes: L26, G32, G41, O31, C41, I31

1. INTRODUCTION

News provides information and influences the values and behavior of individuals. Mass media affects individuals and society in positive and negative ways (McQuail, 1979, Milgrom, 1981, Macnamara, 2006, Solomon, 2012, Florescu, 2014). News characterized by a negative tone causes uncertainty in society, affecting the individuals' sentiment and inhibiting investments of various types (Tetlock, 2007, Yang et al., 2017, Raimondo, 2019). In turn, industrial activity depends on access to capital as well as an abundance of ideas. In this sense, crowdfunding campaigns have the potential to make new businesses viable in the most rapid and flexible manner (Kuppuswamy & Bayus, 2015). However, no empirical evidence has been presented that the tone of the news disseminated in society during a crowdfunding campaign can affect one of the main drivers of campaign success, the average pledge amount of its backers (Mendes-Da-Silva et al., 2016, Cumming et al., 2020, Kuo et al., 2020, Nielsen & Binder, 2020, Zhang et al., 2021).

The business finance literature has documented that daily news can influence investor decisions (Tetlock, 2007, Fang & Peress, 2009, Chen et al., 2011, Jegadeesh & Wu, 2013, Dang et al., 2019). The dominant argument is that the news can contain semantic content capable of establishing sentiments in people relating to a broad array of aspects, including their willingness to invest. Within this reasonably developed business literature regarding market sentiment, crowdfunding is rarely found and may even be considered an unknown field.

In this paper, we examine whether market sentiment affects the willingness of backers to make larger pledges. Specifically, we examine four questions. First, we analyze the impact of the daily market sentiment in the mainstream media on the average pledges in reward crowdfunding campaigns made on the same day. Second, we examine the effect of social media, as an alternative proxy for daily market sentiment, on the average value of pledges made in campaigns on the same respective days. Third, we analyze the distance entrepreneur-backer and its impact on the pledge value. Finally, we analyze the influence of the level of income

inequality in the pledger city. The role played by market sentiment, reflected in the media, is of interest not only to researchers, but also to regulators, and investors (Boudoukh et al., 2019). Current researchers in the area of crowdfunding may be interested in empirical evidence concerning the role played by market sentiment, given that few articles have been written in this field (Bi et al., 2017, Courtney et al., 2017, Kaminski & Hopp, 2020). Regulators may be interested in understanding how the media can influence crowdfunding pledges, in terms of constructing instruments to mitigate campaign risk. Platform owners, backers and entrepreneurs are interested in the success of campaigns, and as a result, the average pledges made by backers. This paper is important especially to backers and platform managers because one of the main drivers of crowdfunding campaign success is the value of the pledges received on the initial days of the campaign fundraising period (Kuppuswamy & Bayus, 2015). Therefore, our results can help better schedule the moment to begin a campaign in terms of market sentiment and help to improve campaigns success.

Our data is unique and covers more than 350,000 pledges made for over 3,600 reward crowdfunding campaigns hosted on the largest platform operating in Brazil, and also includes daily news collected from the largest paper published in the country and the social media. We use Natural Language Processing (NLP) to construct our proxy for market sentiment based on the tone of the daily news. Then, we use OLS models to estimate the influence of the market sentiment in the value of reward crowdfunding pledges and control for geographic variables, such as the distance between the backer and the entrepreneur, income concentration, population density and the participation of elderly residents in the city (Miller & Shanthikumar, 2010, Mollick, 2014, Lin & Viswanathan, 2016).

We offer three main results which are robust for mainstream and social media. First, for mainstream as well as social media, the tone of the news or posts influences the average pledge made by backers: news with a positive tone induces larger pledges for reward crowdfunding

campaigns. In contrast, news with a negative tone inhibits larger pledges. Second, we find that a greater entrepreneur-backer distance inhibits the pledge value, and we find that it can attenuate the effect of positive news in terms of the pledge amount. Third, our results show that income inequality in the pledger's city induce larger campaign pledges. In addition, the impact of the tone of a news article or post can depend on the income inequality in the pledger's city, with greater income concentration leading to larger pledges within a context of good news.

We make several contributions to the literature, but we highlight two of them. First of all, this paper stands out from the current reward crowdfunding empirical and theoretical literature, especially due to it being the first to address the role of pledger sentiment on behavior in terms of pledging financial resources to a campaign (Wang et al., 2017, Kaminski & Hopp, 2020, Jiang et al., 2020). While some crowdfunding literature deals with the textual analysis of information on the campaign or project finance level (Lu et al., 2014, Bi et al., 2017), we are focused on the overall market sentiment, something which the crowdfunding literature has still not documented. Second, in considering geographical aspects, we offer evidence from a country of continental dimensions, characterized by great diversity in several dimensions under analysis. In addition, it is an emerging economy, a context in which crowdfunding may be the key to overcoming problems that have not been addressed by policy makers.

2. RELATED LITERATURE

According to the theoretical fundamentals of crowdfunding campaigns, there is heterogeneity in the backers' pledging behavior, and this heterogeneity is reflected in the pledge amount that the backer proposes in a campaign (Strausz, 2017, Chang, 2020, Zhang et al., 2021). These fundamentals are supported in various fields of knowledge including economics, psychology, and geography (Agrawal et al., 2014, Belleflamme et al., 2015, Strausz, 2017, Anglin et al., 2018). The literature is predominantly characterized by studies that concentrate on the asymmetry of information and signaling mechanisms in terms of campaign quality (Chang,

2020, Swinney, 2021, Babich et al., 2020), which especially address reward crowdfunding, in which the creators promise to reward the backers with the product/project they plan to develop, instead of monetary returns for investment.

In contrast to this, our paper studies a subject that has received little discussion in the crowdfunding literature: the role of mass media in terms of the willingness of backers to make larger pledges. That is, instead of concentrating on asymmetries of information or campaign signaling per se (Courtney et al., 2017, Bi et al., 2017, Chakraborty & Swinney, 2021), we are interested in the market sentiment reflected in the widely available media. The finance literature, specifically the capital markets, has already investigated the role of mass media in influencing investor behavior, but no evidence has been presented concerning reward crowdfunding (Felipe et al., 2019).

2.1 News tone and market sentiment

Various kinds of news, such as those dealing with presidential elections and international conflicts, can influence future expectations. Therefore, the market sentiment reflected in the media is a driver of investment decisions (Cutler et al., 1989, Neiderhoffer, 1971, Pearce and Roley, 1985, Engelberg & Parsons, 2011). Boudoukh et al. (2019) use textual analysis to identify fundamental information about firms contained in news, and their influence on volatility in the stock market. Dickinson and Hu (2015) study investor sentiment using Twitter as a data source, which was also examined by Bollen and Mao (2011) to study the predictability of the stock market.

Yang et al. (2017) argue that the impact of news disseminated by mass media on the behavior of individual investors can be asymmetric and depends on a series of conditioning aspects. At the same time, according to Belleflamme et al. (2014) and Mollick (2014), the

increase in the use of the internet, social media, and crowdfunding platforms offers new opportunities for entrepreneurs to raise capital to develop their companies or specific projects.

2.2 Market sentiment and pledges in reward crowdfunding

The relationship between the media and backer behavior has been documented in the crowdfunding literature, but predominantly in terms of content regarding the idiosyncratic aspects of a campaign dedicated to a project (Wang et al., 2017, Courtney et al., 2017, Jiang et al., 2020, Kaminski & Hopp, 2020, Chakraborty & Swinney, 2021). In this sense, Lu et al. (2014) discuss the impact of social media on crowdfunding, and Bi et al. (2017) study the influence of online information regarding backer decisions in reward crowdfunding.

Courtney et al., (2017) find that usage of media and positive investor comments are strong determinants of crowdfunding success and that they reinforce each other's influence on success. In contrast, instead of specific information on campaigns or the projects they are dedicated to, our study offers new results to the crowdfunding literature, because we are interested in the effects of mass media news on backer behavior.

2.3 Geography and market sentiment

The relationship between geographic location, media coverage and the reaction of individual investors has been covered by the literature (Miller & Shanthikumar, 2010). In terms of interactions between geographic aspects and market sentiment, the work of Petrova (2008) was one of the first to discuss and theorize about the relationship between media and inequality. According to this author, greater income inequality tends to be associated with less freedom of the press within a country. Our study offers empirical evidence of the interaction between income inequality and the media, and its effect on the willingness of a backer to make larger pledges.

Di Gioacchino and Verashchagina (2017) provide a framework to think about how mass media might shape people's attitudes towards inequality. According to these authors, mass media can be effective in reducing inequality in less developed countries through pluralist forms of media (the internet in particular), whereas it may be hard to redirect the influence of mass media to support inequality aversion in most developed European countries. Furthermore, individuals have a taste for quality and ceteris paribus prefer a pluralist media. However, they hold beliefs that they like to be confirmed and therefore tend to consume media with ideological positions similar to their own, which reinforce their ex-ante opinions (Corneo & Gruner, 2002, Chan & Suen, 2008).

Greenwood and Gopal (2017) argue that despite the spread of the internet and the resulting reduction in transaction costs, there is still a strong preference for being geographically close to an investment, especially riskier ones with little relevant information for the investor, which is frequently the case in crowdfunding campaigns. This vision contrasts with the arguments of Agrawal et al. (2015), to whom crowdfunding can provide a dispersed access to capital, making it possible for entrepreneurs to find financing to make their activities viable even though they are located far from financial centers. These arguments appear to be relevant when we discuss what conditions information consumption through mass media, specifically geographic aspects such as distance and income inequality.

3. METHOD

3.1 Data

We have collected three types of data: i) reward crowdfunding campaign profiles; ii) news headlines in the traditional media and social media posts; and iii) the geographic attributes of the pledger's city. The reward crowdfunding data was obtained from the Catarse platform, the largest Brazilian reward crowdfunding platform in terms of the number of campaigns hosted and total funds raised. We found 350,012 pledges directed to 3,633 reward crowdfunding

campaigns between 2011 and 2016, which represented more than R$ 55 million (Catarse, 2016), equivalent to approximately US$ 18 million.

The 1,266 news articles published daily in traditional media used to analyze investor sentiment, in accordance with Loughran and McDonald (2011), were obtained from a manual collection of the front pages of the largest Brazilian newspaper *O Estado de São Paulo* (ANJ, 2015). Founded in 1870, this newspaper has a daily circulation of 300 thousand papers (Estadão, 2020), is available in an electronic format (estadao.com), and is located in the financial center of Latin America. The newspaper is part of a private news agency (Grupo Estado), with ample capacity to reproduce economic, political, social, and cultural information throughout the country.

Brazil has led the world rankings in terms of time using the internet, smartphone, and social media usage. According to the OECD (2020), Brazilian spend 9.3h/day on the internet, 3.3h/day on mobile phones, and 4.5h/day on social media. This is why to contemplate alternative channels of information acquisition used by individual backers (Dickinson & Hu, 2015, Kennedy & Prat, 2019), we also performed regressions using an alternative proxy for investor sentiment measured via social media content on Twitter.

The geographical aspects are relative to 390 campaign host cities, and 2,631 pledge cities during the period 2011-2016. To obtain the geographic distance between the entrepreneur and the backer, we consider the centers or centroids of the cities in which both are located. Using the Google Maps APIs <`http://code.google.com/apis/maps/`>, the coordinates of the centroids were identified and then we calculated the distance in accordance with the procedure adopted by Nichols (2007). We noted some spatial dispersion in crowdfunding campaigns. However, we observed a relative concentration of campaigns and pledges in urban centers, especially in the state of São Paulo, which represents roughly 30% of Brazil's GDP, and a large portion of the Brazilian population.

3.2 Variables

The independent variables used in this study are organized into three groups. The first represents the variables that represent campaign attributes. The second represents pledger sentiment reflected in the mass media. And the third is composed of control variables such as geographic location and the socioeconomic profile of the contribution locations.

3.2.1 Campaign attributes

$\ln Goal_i$ = ln of the goal amount in R$ for the campaign of the i^{th} pledge, realized on a given day. The campaign goal is an important attribute because it can express the appropriate quantity of financial resources needed to develop a venture and may also reflect the quality of the business (Josefy et al., 2017).

$\ln DayfterB_{id}$ = ln of the average number of days between the campaign's beginning and day d when the i^{th} pledge occurred in a given campaign. This variable should be important in determining the amount raised by projects because it provides observable attributes for the campaign investment decision (Cordova et al., 2015). In addition, a good portion of the campaigns manage to attain success by raising funds with the greatest concentration of pledges being in the first few days of a campaign (Colombo et al., 2015).

D_{Art_i} = dummy variable which receives a value of 1 if the campaign is classified as an artistic project (Mollick, 2014). We followed the campaign classification system adopted by the studied platform. Thus we consider artistic campaigns as those which raise funds in the following areas: music, cinema and video, theater, literature, comic books, the community, art, photography, games, dance, and the circus. The categories excluded from this list are architecture and urbanism, Carnival, science and technology, design, education, sports, events, gastronomy, journalism, the environment, mobility and transport, fashion and social businesses.

3.2.2 Pledger sentiment

We use pledger sentiment on the day of the contribution, measured via textual analysis of daily traditional media and social media news content. This proxy captures sentiment and trust on a national level based on news with a positive or negative tone. In this sense, we have constructed two classes of metrics: an indicator of pledger sentiment via widely published traditional media news from the newspaper with the largest circulation in Brazil, and a metric based on social media (Twitter).

$Badnews_d$ = negative textual investor sentiment in the face of news on day d when the i^{th} pledge was received for the reward crowdfunding campaign.

$Goodnews_d$ = positive textual investor sentiment in the face of news on day d when the i^{th} pledge was received for the reward crowdfunding campaign.

To obtain $Badnews_d$ and $Goodnews_d$ we employed Loughran and McDonald's procedure (2011), for mainstream as well as social media, through the use of Natural Language Processing (NLP) to extract linguistic content from the news. The purpose of this procedure is to extract the sentiment, humor or opinion of people based on a text, its content and structure (Li et al, 2014).

Loughran and McDonald's method (2011) consists of five steps: i) news collection for which we collected 1,266 news articles published on the first page of the analyzed newspaper on the day of the pledge to create our Linguistic Corpus; ii) tokenization, in which non-textual elements or stop words such as pronouns, conjunctions and prepositions are removed from the Linguistic Corpus to generate a general word list (11 thousand terms were found); iii) classification of the words as negative or positive based on the general list obtained in the second step. After these three rounds of manual word classification (with more frequency for the final decision), we obtained 1,292 negative words and 525 positive words in accordance with Loughran and McDonald (2011)]; iv) the measurement of total negative and positive

textual sentiment in the news, considering the weight of the term in relation to an article and the weight of the term within the context of all of the news articles in which it was found and the normalization factor for a news article (as presented in Equation 1), whose purpose is to compensate for the differences in the size of the examined articles. To provide an example, we found the headline of the *Estado de São Paulo* for July 11, 2012 which we found to be 7.92 in terms of positive textual sentiment ($Good\ News$), and 21.00 in terms of negative textual sentiment ($Bad\ News$), in accordance with Loughran and McDonald's procedure (2011).

The Ministries of the Treasury and Planning are lowering their forecast for Gross Domestic Product (GDP) growth this year. According to their calculations for the revenue forecast and the rate of federal spending, they consider the current forecast of 4.5% too optimistic and will reduce it to somewhere between 2.7% and 3%. Even so, this will be higher than the Central Bank's forecast of 2.5%, and the financial market's forecast of 2.01% with a tendency to decrease. The numbers used by the Treasury and Planning are usually higher than those used by the Central Bank because they serve to signal the intentions of the government. The adjustment in the growth estimate, considered inevitable technically, should become official on the 20th, during the release of the Revenue Evaluation and Primary Expenses Report for the Third Quarter of 2012. It is based on these calculations that the government decides to release more money, cut more expenses, or leave its planning unchanged.

Source: *O Estado do São Paulo* newspaper with all rights reserved. Note: News article from July 11, 2012.

This suggests that the tone of the main news article in the newspaper on July 11, 2012 represented market sentiment that was more pessimistic than optimistic; v) the measurement of the occurrence of an isolated term in each news article, attributing a weight to it in terms of importance. For example, in Panel of Table 2, we verified that the word "growth", classified as positive, appeared 81 times in 63 news articles and had a weight of importance of 198.09. Loughran and McDonald's method (2011) is widely used in the financial literature (Kearney & Liu, 2014) to perform textual analyses of news content, and along with considering word frequency, it attributes a weight for the terms found in these articles. We used the weighting term used in Loughran and McDonald's technique (2011), as presented in (1):

$$W_{p,q} = \begin{cases} \dfrac{[1+\ln(tf_{p,q})]}{[1+\ln(a_q)]} ln \dfrac{N}{df_p} & \text{if} \quad tf_{p,q} \geq 1 \\ 0 = otherwise \end{cases} \tag{1}$$

where: $W_{p,q}$ = Weighting term for word p in document q; $tf_{p,q}$ = Total of occurrences of word p in document q; a_q = Proportion of words counted in document q; N = Total documents in the sample; df_p = Total documents with at least one occurrence of word p.

We used the same procedure as Loughran and McDonald (2011) to analyze pledger sentiment via social media. To accomplish this, we collected via access activity and directory filing in the Twitter Streaming API service, 122,336 tweets published on the dates in which there was at least one pledge in the crowdfunding campaigns. We accessed the official Twitter site of the *O Estado de São Paulo* newspaper (`@Estadao`), which publishes news, texts and opinions about economics, politics, culture, and society, to create our database derived from social media.

Twitter enables its users to send, receive and read short messages of up to 280 characters, known as "tweets". According to Yang et al. (2015), Twitter has evolved and now has 517 million users (counted beginning in 2012), which generate more than 340 million tweets a day. This fact has made Twitter one of the 15 main channels in terms of its volume of information (Yang et al., 2015).

3.2.3 Geographic location and the socioeconomic profile of the contribution location

$Distance_i$ = ln of the geographic distance in km between the entrepreneur and the backer. Previous studies have indicated that crowdfunding can reduce the inhibiting effects imposed by geographic distance on the interaction between entrepreneurs and financers (Agrawal et al., 2011, Guenther et al., 2018). However, recent studies, such as Mendes-Da-Silva et al. (2016) and Nunzia (2020), suggest that crowdfunding can act in a way similar to traditional financing, in which the costs of information and distance can affect a venture's access to capital. Following this line of thought, Lin and Viswanathan (2016) offer evidence of home bias in crowdfunding. According to these authors, home bias exists in the virtual market of financial products. They

also argue that explanations based on rationality cannot totally explain this behavior, and behavioral reasons are at least partially responsible for this notable phenomenon (Cumming & Dai, 2010).

$Income\ inequality_i$ = income inequality index of the pledger making the i^{th} pledge in a given campaign, measured by the Gini index. According to Zhang et al. (2021), the economic concentration of a region is one of the elements that can influence the success of ventures because it directly affects development in that location. However, Greenberg and Mollick (2015) argue that the concentration of capital can reduce democratic access to economic and financial activities in a given region. Petrova (2008) and Di Gioacchino and Verashchagina (2017) emphasize that income inequality conditions individual behavior in terms of consumption and investment in relation to mass media.

$Denspop_i$ = population density, residents (in ln)/area in square kilometers, in the city of the pledger making the i^{th} pledge (Giudici et al., 2018).

$Popold_i$ = percentage of elderly residents in the city of the pledger making the i^{th} pledge. Elderly individuals tend to make less intensive use of internet tools and procedures, which may end up inhibiting the realization of campaign crowdfunding pledges in a city (Agrawal et al., 2011, Gamble et al., 2017).

3.3 Empirical strategy

The variables of interest and the control variables investigated in this study were selected from the current crowdfunding literature and financial markets in a way that does not compromise the validity of the regression results (Atanasov & Black, 2016). The tested empirical model is represented in Equation (2). We are interested in verifying the relationships between tone in the mass media and the pledge amount that the backer decides to make in a reward crowdfunding campaign (Yang et al., 2017).

$$
\begin{aligned}
Pledge\ amount_{id} & \\
&= \beta_0 + \beta_1 Good\ news_d + \beta_2 Bad\ news_d \\
&+ \beta_3 Good\ news_d . Distance_i \\
&+ \beta_4 Good\ news_d . Income\ inequality_i \\
&+ \beta_5 Bad\ news_d . Distance_i \\
&+ \beta_6 Bad\ news_d . Income\ inequality_i + \delta Controls_i + \varepsilon_i
\end{aligned} \tag{2}
$$

While Wang et al. (2017), Kaminski and Hopp (2020), and Jiang et al., (2020) employ textual analysis to access particular attributes of crowdfunding campaigns such as success drivers, we use textual analysis of the mainstream and social media to verify the relationships between market sentiment and the pledge amounts made daily in reward crowdfunding campaigns.

Ever since the work of Milgrom (1981), the literature has documented the idea that news characterized by a negative tone can increase a feeling of personal economic uncertainty, making people realize that they could lose their jobs, making them tighten their belts and avoid unnecessary spending. For crowdfunding financing, this translates into a more weighted approach to campaign support. This does not necessarily imply that people are not willing to donate money to campaigns – but they may end up deciding to make pledges of smaller amounts.

To verify the impact of market sentiment on the pledge amount typically allocated in reward crowdfunding campaigns, we use models based on the ordinary least squares method (OLS). To ensure the validity and robustness of the results, we first check whether the dependent variable has a roughly normal distribution. In addition, we adopt robust standard errors for the estimated coefficients (Preacher & Hayes 2008). Second, we evaluate the most appropriate functional form for the regressions, and in all of the cases, the linear form proved to be the most appropriate, given that the other forms did not present a significantly better fit. Third, via White's test, we evaluate whether the errors contain heteroscedasticity. Four, we

assess whether the simulated models exhibit problems with multicollinearity using tolerance metrics and the variance inflation factor if the criteria of the reported models do not present problems. Five, we avoid influential observations and atypical cases that generate an overestimation of the model. Six, we simulate models substituting continuous independent variables with their natural logarithms, and the results were close to the results obtained with the original versions of these variables.

Seven, keeping in mind that a portion of the pledges is dedicated to campaigns in the same city, there is the possibility of having a selection bias. Therefore, we also used Heckman's Two-Step Selection Method (Heckman, 1979). For the first step we specified the backer-entrepreneur distance with a probit model in which the value 1 was attributed to all pledges that came from distant cities (214,443 observations), and 0 was attributed to pledges that came from the same city as the campaign (135,569 observations). In this step, we considered the control variables as predictors. In the second step, we included the inverse Mills ratio variable in the OLS model to control for the potential effect of selection bias, together with independent and control variables.

4. RESULTS

4.1 Descriptive variables

4.1.1 Profile of the pledges

Table 1 presents the general characteristics of the pledges made for reward crowdfunding campaigns considered in this study. The average pledge amount was R$95.88, with the largest amount being R$55 thousand, and the smallest being around R$ 2. The campaign goals, on average, were around R$ 28.5 thousand, with the maximum goal being more than R$ 235 thousand and the minimum being R$ 35. The contributions occurred, on average, 23.29 days after the beginning of the campaign.

Table 1. Profile Characteristics of Reward Crowdfunding Campaign Pledges.

	Average	Std. Dev.	Min.	Max.
Pledge amount (R$)	95.88	368.29	2.00	55,555.00
Goal (R$)	28,515.58	29,490.95	35.00	235,549.00
DafterB	23.29	19.22	0.00	69.00
D_Art	0.81	0.39	0.00	1.00
Income inequality	0.59	0.06	0.28	0.80
Denspop (inhab./km^2)	4,200.10	3,232.06	0.09	13,456.05
Popold	8.01	1.83	1.50	18.50

Source: Calculations by the authors. Note: This table presents the characteristics of contributions to projects considered in this study before a winsorization process at 5% ($Pledge\ amount$, $Income\ inequality$ and $Popold$) and the logarithmic transformation ($Goal$, $DafterB$ and $Denspop$). A contribution was registered on the 69th day of fundraising for a campaign. This may have occurred because the platform adopted a "second chance" policy for campaigns which were relatively close to their financial goal.

In terms of the purpose of the campaigns, we observe that 81% were dedicated to artistic initiatives, without the relatively high participation of campaigns classified as artistic influencing the estimates obtained in the regressions which are reported and discussed below. The average value of $Income\ inequality$ (measured by the Gini index) is 0.59. In turn, the average demographic density of the city of the pledger was 4,200 inhabitants/km^2. However, we also identified pledges that originated in regions with more than 13,000 inhabitants/km^2, and in areas with demographic densities below 1 inhabitant/km^2. The average percentage of the elderly in the regions that produce contributions for crowdfunding projects was 8.0%, with a maximum of 18.0%, and a minimum of 1.5%. Figure 1 presents the average value of pledges by the pledger's city with the respective intervals for the value of the pledges (in R$).

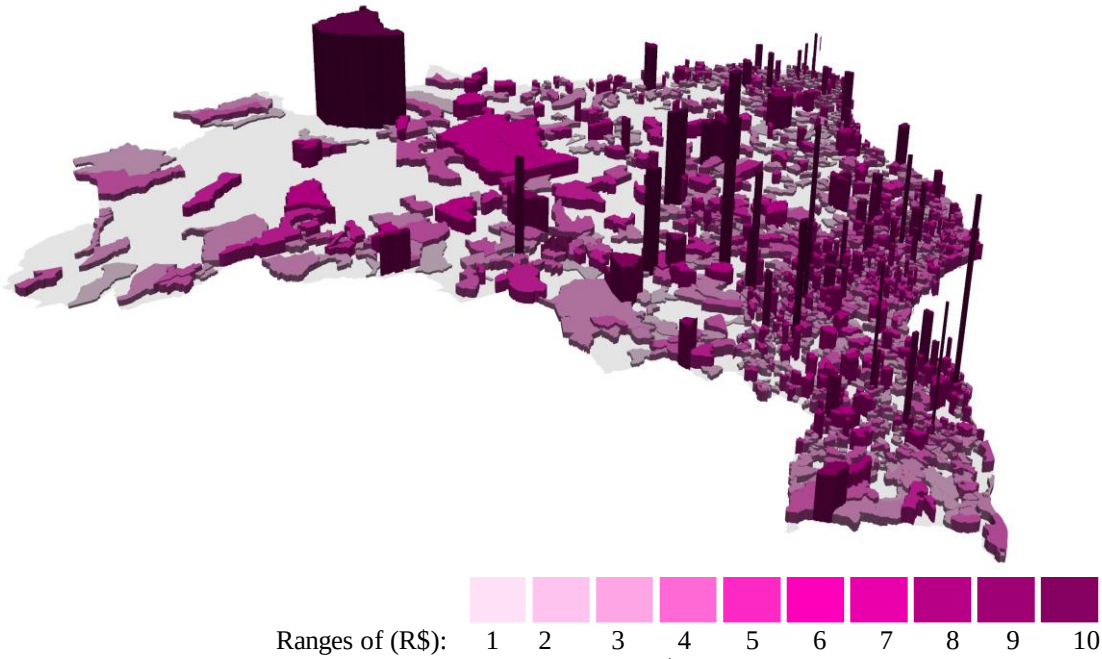


Figure 1. Distribution of the Average Value of Contributions (R$) Allocated in Reward Crowdfunding Campaigns in Brazil.

Source: The authors' calculations. Note: Ranges 1 = 10.00-27.00; 2 = 27.00-44.82; 3 = 44.82-64.71; 4 = 64.71-88.85; 5 = 88.85-125.42; 6 = 125.42-182.50; 7 = 182.50-275.00; 8 = 275.00-400.00; 9 = 400.00-739.53; 10 = 739.53-1691.67. (1US$ ≈ 5.30R$ in July 2020).

4.1.2 Market sentiment

The analysis of textual sentiment can be a useful tool to measure the impact of the content of a given news article or tweet on the perception of an individual in terms of his or her investments, and above all the crowdfunding market. Negative words that occur more often and have greater weights tend to make the crowdfunding market investor cancel future capital investments or even inhibit greater investments in campaigns. On the other hand, it is hoped that a greater influence from positive words in the same news article (or tweet) can awaken a greater response in terms of investor participation.

In Panel A of Table 2, we present the estimates for the five words which have the greatest weight in the textual sentiment of the news in the mainstream media. We observed that the word "informs" presented the greatest weight in the positive word category, with a value of 277.22. This word was found 120 times and was distributed in 120 distinct news articles. The word "support" proved to be the second word with the most weight in the observed news

articles, with a value of 275.78. This word was found 132 times in 106 different news articles. Next "growth", "investments" and "give" were the positive words which presented the greatest relevance in the list as the five words with the greatest effect in the news articles. On the other hand, the words "development", "improvement", "optimism", "pacify" and "satisfied", were the positive words which presented the least effect in the news content.

Table 2. Estimated Weights for Words with the Most/Least Effect on the News's Positive or Negative Tone.

Panel A: Mainstream media							
	Words with greatest effects				Words with least effects		
	Freq.	# News	Weight		Freq.	# News	Weight
Panel A1: Positive words							
Informs	120	120	277.22	Development	9	8	40.98
Support	132	106	275.78	Improvement	6	6	29.59
Growth	81	63	198.09	Optimism	4	4	21.74
Investments	58	52	164.29	Pacify	3	3	17.03
Give	53	49	156.43	Satisfied	3	2	12.9
Panel A2: Negative words							
Crisis	08	101	247.78	Contingency	9	9	40.78
Increase	106	85	235.85	Fragility	6	6	31.13
Fall	96	79	227.01	Harm	4	4	23.03
Laundering	72	63	191.78	Stagnant	4	4	21.98
Costs	71	62	189.98	Penalties	4	3	18.94
Panel B: Social media							
	Words with greatest effects				Words with least effects		
	Freq.	# Tweets	Weight		Freq.	# Tweets	Weight
Panel B1: Positive words							
Support	558	419	530.78	Calm	9	8	41.13
Security	402	313	493.83	Innovative	8	7	37.45
Success	341	282	463.26	Valued	4	4	22.13
Rights	203	182	355.68	Reinvigorate	1	1	4.27
Freedom	141	128	283.79	Worthy	1	1	2.84
Panel B2: Negative words							
Death	926	610	578.96	Sins	10	10	43.71
Protests	616	344	557.55	Humiliation	8	7	35.65
Arrested	494	383	512.58	Disastrous	5	5	25.43
Convicted	409	314	481.86	Disrespectful	2	2	10.89
Wounded	371	299	465.92	Massacre	2	1	7.48

Source: Calculations by the authors based on Loughran and McDonald's procedures (2011). Note: Panel A of this table presents the five words which occurred most often in the headlines of the newspaper *O Estado de São Paulo* on the 1,266 dates on which the pledges occurred. Panel B presents the five words which occurred most often in the over 122,000 tweets published on the Official Twitter site of the newspaper *O Estado de São Paulo* on the dates in which there were investments in crowdfunding campaigns.

In relation to negative words, in Panel A2, "crisis" was the word which appeared with the greatest term weight of 247.78. This word was found 108 times in 101 news articles. Next the word "increase" had a weight of 235.85, being found 106 times in 85 different texts. Finally, the words "fall", "laundering" and "costs", were the negative words with the greatest impact and frequency in the news. On the other hand, the word "contingency", "fragility", "harm", "stagnant" and "penalties", were the words with the least effect in the observed news content.

Panel B of Table 2 provides the estimates of the five positive and negative words with the greatest and least textual weight in the textual analysis of the social media content (via Twitter) of the newspaper considered in this study. Based on Panel B1, we can observe that the words "support", "security", "success", "rights" and "freedom" are found more frequently, appearing in a larger number of tweets and having greater weights. Among these five words, "support" was found 558 times in 419 tweets and had a term weight of 530.78. On the other hand, the five words with the least positive effect in the tweets were: "calm", "innovative", "valued", "reinvigorate" and "worthy".

We also found that the words with a negative meaning with the greatest effect were: "death", "protests", "arrested", "convicted" and "wounded". In this word list, "death" was found 926 times in 610 tweets and generated a term weight in the observed data of 578.96. The words with the least negative effect identified in this collection of tweets were: "sins", "humiliation", "disastrous", "disrespectful" and "massacre".

Table 3 presents the typical behavior of the pledge amount in relation to market sentiment, when news with a positive or negative tone predominates in the mainstream media. On November 6, 2013, the newspaper's headline was "Shooting Police vs. Bandits", which implied a predominantly negative sentiment. On this day 464 pledges were identified with an average amount of R$68.02. On August 14, 2013, the newspaper's headline was

"United States says data collection only serves to protect Brazilian citizens", with there being a predominantly positive textual sentiment in the news content. On this day, 353 pledges were identified with an average amount of R$70.42, and a maximum of R$6,700 that day.

To illustrate this, in Figure 2 we present the behavior of pledges over the studied period. We present the tone of the daily news and the respective average pledge amount that day. To do this, we selected the day of the month with the most positive tone (the left side of Figure 2) and the most negative (the right part of Figure 2). The shaded area of this figure represents the average pledge amount realized in the reward crowdfunding campaigns hosts on the studied platform. The blue line refers to a positive tone identified in the news of that day, and a red line characterizes a negative tone, in accordance with the procedure described in Equation (1), used by Loughran and McDonald (2011).

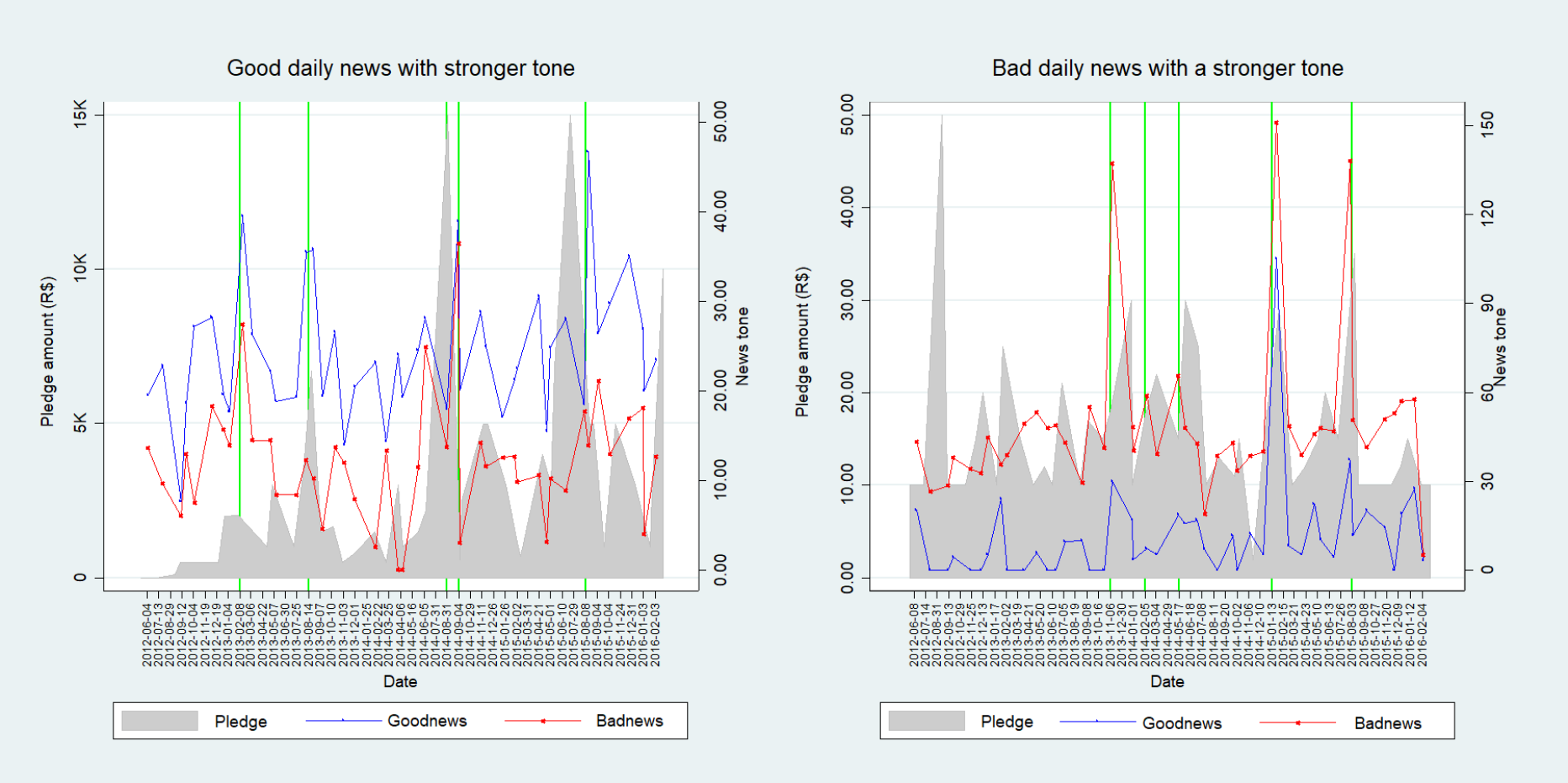
It is possible to note that the scale of values (the vertical axis on the left) in the two parts of Figure 2 suggests pledges are typically greater on days in which the mainstream media is predominantly positive. That is, when the news articles are positive, the pledges have an average value that even surpasses R$15,000, and on the days with a predominantly negative tone, the average amount is less than R$60.00.

Table 3. The Tone of Daily News in the Mainstream Media and the Average Amount of Pledges (in R$)

Headline (day)	Tone	# of Pledges	Pledge amount (in R$)			
			Avg.	Min.	Max.	Std. Dev.
Bad news						
(6/11/2013) Shooting Police vs. Bandits	137.00	464	68.02	10	2,000	299.36
(2/5/2014) 11 States in the South, Southeast, Midwest. and North are without electricity	58.70	214	75.92	10	2,500	351.10
(5/17/2014) President of the Superior Electoral Court defends the confidentiality of lawsuits to revoke the mandates of politicians	48.00	112	68.66	10	500	355.93
(1/13/2015) Government suffers severe criticism	151.00	259	93.00	10	2,030	411.85
(8/3/2015) President will cut ministries	50.50	279	83.88	10	3,000	400.72
Good news						
(2/8/2013) The Government will use the exchange rate against inflation	39.50	145	70.42	10	2,025	240.68
(8/14/2013) United States says data collection only serves to protect Brazilian citizens	35.80	353	113.81	10	6,700	288.00
(8/31/2014) Presidential candidate claims support for civil rights for homosexuals	38.90	139	80.94	10	600	347.38
(9/4/2014) Presidential candidates rise in voter intentions	20.10	507	110.61	10	2,500	365.98
(8/8/2015) President demands democracy from Congress	46.10	434	118.99	10	5,000	400.67

Note: This table presents the behavior of pledges within a context of a negative tone (upper part of the table) and a positive tone in the news (lower part). In relation to a negative tone, we can see that on days with a negative tone, the number of contributions and the average value of pledges tend to be smaller. We can observe that the average value of a pledge on more negative news days is R$ 77.90 and the average of total pledges is 266. When we look at days with news that is more optimistic, the average pledge amount was R$ 93.95 (20% greater than the average pledge on days with negative news). This evidence is in line with our argument that within an environment dominated by more optimistic news, the average pledge is greater. In addition to the volume of pledges being greater on more optimistic days, the average value of pledges is also greater with a lower standard deviation. 1US$ ≈ 5.30R$ in July 2020.

Figure 2. Market Sentiment and the Average Amount of Pledges in Reward Crowdfunding Campaigns (2011-2016)



Note: This Figure presents the tone of the daily news when there were pledges in reward crowdfunding campaigns. We have selected a day for each month from our data and captured the positive and negative tones for this day and the respective values for pledges. The shaded area of the figure represents the pledge value deposited in the campaigns. The blue line indicates the positive tone in the news on days when there was a pledge, and the red line indicates the negative tone. We have marked the left half of the figure with solid green lines for the five days with more optimistic news [(2/8/2013) The government will use the exchange rate against inflation; (8/14/2013) United States says data collection only serves to protect Brazilian citizens; (8/31/2014) Presidential candidate claims support for civil rights for homosexuals; (9/4/2014) Presidential candidates rise in voter intentions and (8/8/2015) President demands democracy from Congress] and on the right side, we highlight the five days with more pessimistic news [(11/6/2013) Shooting police vs. bandits; (2/5/2014) 11 States in the South, Southeast, Midwest and North regions are without electricity; (5/17/2014) President of the Superior Electoral Court defended the confidentiality of lawsuits to revoke the mandate of politicians; (1/13/2015) Government suffers severe criticism and (8/3/2015) President will cut ministries].

4.1.3 Geographic distance and pledges

Table 4 presents the profile of pledges according to the geographic distance between the entrepreneur and the backer. Based on this table, we can verify indications of home bias in the pledges realized to the extent that when the distance increases, the average contributions decrease, in accordance with the arguments of Agrawal et al. (2015), Lin and Viswanathan (2016), and the evidence already documented in Brazil by Mendes-Da-Silva et al. (2016). More than 53% of the pledges were dedicated to campaigns with geographic distances of less than 50 km.

Table 4. Pattern of Contributions by Geographic Distance between the Entrepreneur and the Pledger.

Range of distances	# of Pledges (i)	Average amount of pledges (ii)	Total amount of pledges (iii)	% of pledges (iv)
0-5 km	135,823	116.92	15,880,388.26	47.32
5-50 km	24,127	87.52	2,111,562.31	6.29
50-500 km	88,729	86.58	7,682,022.59	22.98
500-1.500 km	62,689	78.89	4,945,643.95	14.74
1.500-2.500 km	31,611	77.79	2,459,144.19	7.33
2.500-3.500 km	6,974	68.64	478,729.43	1.43
>3.500 km	59	61.58	3,633.00	0.01
Total	350,012	577.92	33,561,123.73	100.00

Source: Calculations by the authors. Note: (i) the number of contributions to reward crowdfunding projects; (ii) average value of contributions (in R$); (iii) sum of contributions (in R$); (iv) percentage of contributions made for projects. As we have mentioned in this work, we used the winsorization technique (p = 0.05) to treat outliers, in accordance with Barnett and Lewis's procedure (1994). 1US$ ≈ 5.30R$ in July 2020.

Just 0.01% of the pledges were allocated in projects with a distance of over 3,500 km. The average distance between investors and the entrepreneurs was approximately 480 km. The greatest distance between an entrepreneur and an investor was registered for a music project based in Fortaleza, Ceará (the Northeastern region of Brazil), whose founder received a contribution of R$ 70.00 from an investor in Cruzeiro do Sul, Acre (the Northern region of Brazil), 3,929 km away.

4.2 Regressions

We conducted regressions with the unit of analysis being the pledge amount allocated to a given reward crowdfunding campaign. We tested the link between market sentiment and pledge amount, and to accomplish this we used two different proxies for market sentiment: the tone of the daily news in traditional media (Tables 5 and 6) and the tone in social media posts on the days in which the pledges occurred (Tables 7 and 8). The dependent variable is the pledge amount that the reward crowdfunding campaign receives. Specifically, we were interested in the amount in Reais (R$), that a backer pledges to a given campaign on a given day, as a function of market sentiment, geographic aspects of the pledger's city of origin, and a group of control variables.

4.2.1 Mainstream media as sentiment

We began with the estimation of Equation (2), using the mainstream media as a proxy of market sentiment (Tetlock, 2007, Yang et al., 2017). Table 5 presents the estimated coefficients for pledge amount as a dependent variable in function of the tone of the daily news found in the mainstream media. The positive tone in the daily news appears to induce backers to realize pledges of a larger amount, in contrast a negative tone seems to inhibit the willingness of backers to make more generous pledges. In addition, we verified that the distance between the entrepreneur and the backer seems to inhibit the pledge amount, in accordance with the arguments in favor of home bias in the crowdfunding industry (Lin & Viswanathan, 2016). However, income inequality in the pledger's city induces pledges of greater amounts, supporting the argument that income inequality can be a motive for supporting crowdfunding campaigns, keeping in mind the power of collaborating to reduce inequality by using this method of financing (Gerber & Hui, 2013). The inclusion of geographic aspects did not

occasion alterations in the signaling of market sentiment proxies, and the economic and statistical effects remained essentially stable.

We argue that in a situation in which the entrepreneur and the back are separated by smaller geographic distances there may be a greater disposition for larger pledges, in line with Mendes-Da-Silva et al. (2016), which implies a selection bias in our estimations. Thus, to diminish the chances of selection bias, we estimate Model V (Table 6) to analyze *pledge amounts* in accordance with the city of origin of the campaigns. To accomplish this, we used Heckman's (1979) two stage selection procedure to increase the comparability between the cities.

Table 5. Baseline Regressions for the Pledge Amount of Reward Crowdfunding Campaigns with Mainstream Media as a Proxy for Market Sentiment.

	I	II	III	IV
Goodnews	0.208***	0.207***	0.208***	0.207***
	(0.026)	(0.026)	(0.026)	(0.026)
Badnews	-0.055***	-0.055***	-0.056***	-0.056***
	(0.010)	(0.010)	(0.010)	(0.010)
Geographic Distance	-1.317***	-1.395***	-1.312***	-1.387***
	(0.035)	(0.036)	(0.035)	(0.036)
Income inequality	36.29***	49.73***	36.01***	49.55***
	(1.806)	(2.253)	(1.822)	(2.258)
Goal	Yes	Yes	Yes	Yes
DafterB	Yes	Yes	Yes	Yes
Denspop	No	Yes	No	Yes
Popold	No	No	Yes	Yes
Goodnews*D_Art	Yes	Yes	Yes	Yes
Fixed effects (time)	Yes	Yes	Yes	Yes
Constant	-8.089***	-9.879***	-8.604***	-10.81***
	(1.504)	(1.513)	(1.552)	(1.562)
AIC	387258	387249	387258	387249
Adj. R^2	0.02	0.02	0.02	0.02
N	350.012	350.012	350.012	350.012

Source: Calculated by the authors. Note: This table presents the parameters estimated via OLS with the dependent variable being the *Pledge amount*. The regressions were estimated using a robust standard error, which is presented in parentheses. We used fixed time effects for the observed variables (2011-2016). The variables *Pledge amount*, *Income inequality*, *Badnews*, *Goodnews* and *Popold* were winsorized (p = 0.05) to reduce the influence of outliers, with 5% in the lower portion and 5% in the upper portion, in accordance with Barnett and Lewis's procedure (1994). ***p < 0.01; **p < 0.05; *p < 0.1

The first stage was realized based on the classification of the geographic distance between the entrepreneur and the backer via the probit model, in which pledges that originate in the same city as the campaign receive a value of 0, and pledges from distinct cities receive a value of 1. Thus, we censored 135,569 (~39%) of the observations that presented a null geographic distance between the entrepreneur and the backer.

Even when adopting the procedure of censoring observations with a null geographic distance, the estimated signs for the market sentiment proxies, $Good\ news$ ($\hat{\beta} = 0.204, p < 0.01$) and $Bad\ news$ ($\hat{\beta} = -0.073, p < 0.01$), remained unaltered. Or in other words, news with a positive tone stimulates more generous pledges, while negative news inhibits backers from providing greater support to reward crowdfunding campaigns.

The other models presented in Table 6 are estimated using the addition of each proxy for market sentiment separately, or the interaction term of these proxies with the geographic distance between the entrepreneur and the backer, or the $Income\ inequality$ of the pledger's city. According to Model VI, the positive news do not end up exercising a positive effect on the pledge amount (Courtney et al., 2017), bearing in mind the distance between the entrepreneur and the backer ($\hat{\beta} = -0.105, p < 0.01$), even when we control for geographic aspects and the campaign's fundraising goal. This result supports the argument of the existence of home bias, even in contexts characterized by positive news, which a priori would induce larger pledges.

Table 6. Estimated Regressions for Reward Crowdfunding Campaign Pledge Amounts, with Mainstream Media as a Proxy for Market Sentiment.

	V†	VI	VII	VIII	IX	X
Good news	0.204***					
	(0.034)					
Good news*Distance		-0.105***				
		(0.003)				
Goodnews*Income inequality			3.284*			
			(0.182)			
Badnews	-0.073***					
	(0.012)					
Badnews*Distance				-0.046***		
				(0.001)		
Badnews* Income inequality					-0.036**	
					(0.016)	
Geographic distance	-1.916***					
	(0.095)					
Income inequality	46.13***					
	(2.748)					
Distance*Income inequality						-2.263***
						(0.059)
Inverse Mills Ratio λ	14.20***					
	(1.989)					
Goal	Yes	Yes	Yes	Yes	Yes	Yes
DafterB	Yes	Yes	Yes	Yes	Yes	Yes
Denspop	Yes	Yes	Yes	Yes	Yes	Yes
Popold	Yes	Yes	Yes	Yes	Yes	Yes
Goodnews*D_Art	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects (time)	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.024	9.597***	6.541***	2.276	1.816	10.528***
	(2.484)	(1.221)	(1.212)	(1.211)	(1.203)	(1.221)
AIC		3873165	3873627	3874300	3874305	3872934
Adj. R^2		0.02	0.02	0.02	0.02	0.02
Wald Chi^2	4072.15***					
N	214,443	350,012	350,012	350,012	350,012	350,012

Source: The authors' calculations. Note: This table presents the parameters estimated using OLS, with the dependent variable being $Pledge\ amount$. The regressions were estimated using a robust standard error, which is presented in parentheses. We used fixed time effects for the observed variables (2011-2016). †The Inverse Mills Ratio represents the utilization of the regressor to correct for Heckman's (1979) sample bias. The variable $\lambda = f(x)/F(x)$, in which $f(x)$ is a function of the probability density and $F(x)$ is a function of the additional cumulative distribution. The Heckman selection model consists of two steps: 135,569 censored observations (39%) = where there is no distance between the entrepreneur and the investor. Models VI to X represent estimations for the tested interactions with the variables of interest in this study. The variables $Pledge\ amount$, $Income\ inequality$, $Badnews$, $Goodnews$ and $Popold$ were winsorized (p = 0.05) to reduce the influence of outliers with 5% in the lower part and 5% in the upper part, in accordance with Barnett and Lewis's procedure (1994). ***p < 0.01; **p < 0.05; *p < 0.1.

In contrast, Model VII suggests that the role played by positive news is reinforced by income inequality ($Good\ news * Income\ inequality$) in the pledge city ($\hat{\beta} = 3.284, p < 0.1$), which is in line with the argument that environments characterized by greater inequality may provide additional motivation for supporting crowdfunding campaigns, bearing in mind the potential reduction in inequalities through stimulating ventures which may encounter difficulties in being financed through the conventional market (Gerber & Hui, 2013).

In an alternative manner, according to Kennedy and Prat (2019), in areas with greater income inequality, access to mass media may be more restricted. In addition, according to Petrova (2008), inequality can compromise how the population perceives news in the mass media, or even limit the freedom and neutrality of the press as well as the access of poorer citizens to news in the media.

If on one hand, positive news stimulates larger pledges, except when the geographic distance between the entrepreneur and the backer is greater, negative news can play an inhibiting role on more generous pledges when the distances are greater, as can be seen in Model VIII ($\hat{\beta} = -0.046, p < 0.01$), or even when the income inequality in the pledger's city is greater, as can be seen in Model IX ($\hat{\beta} = -0.036, p < 0.05$).

4.2.2 Social media as sentiment

Given that there may be distinct characteristics between mainstream and social media (Bollen et al., 2011, Lu et al., 2014), we estimate models that use an alternative proxy for market sentiment as the dependent variable, measured by posts in social media (Tables 7 and 8), keeping in mind the arguments of Kaur and Gera (2017) in respect to the relevance of social media to the performance of crowdfunding campaigns. Just as we found positive signs for news with a positive tone, and negative signs for news with a negative tone, when we employed the

mainstream media as a proxy for market sentiment (as in Tables 5 and 6), we noted in Table 7 that the results remain similar and are robust for the same controls.

Table 7. Baseline Regressions for the Pledge Amount in Reward Crowdfunding Campaigns, with Social Media as a Proxy for Market Sentiment.

	XI	XII	XIII	XIV
Goodnews	0.021***	0.021***	0.021***	0.021***
	(0.002)	(0.002)	(0.002)	(0.002)
Badnews	-0.015***	-0.015***	-0.015***	-0.015***
	(0.003)	(0.003)	(0.003)	(0.003)
Geographic distance	-1.296***	-1.372***	-1.292***	-1.366***
	(0.035)	(0.036)	(0.035)	(0.036)
Income inequality	35.73***	48.99***	35.52***	48.83***
	(1.805)	(2.253)	(1.821)	(2.258)
Goal	Yes	Yes	Yes	Yes
DafterB	Yes	Yes	Yes	Yes
Denspop	No	Yes	No	Yes
Popold	No	No	Yes	Yes
Goodnews*D_Art	Yes	Yes	Yes	Yes
Fixed effects (time)	Yes	Yes	Yes	Yes
Constant	-7.649***	-9.418***	-8.097***	-10.28***
	(1.553)	(1.562)	(1.600)	(1.562)
AIC	3872333	3872247	3872333	3872245
Adj. R^2	0.02	0.02	0.02	0.02
N	350,012	350,012	350,012	350,012

Source: Calculated by the authors. Note: This table presents the parameters estimated via OLS using the variable *Pledge amount*. The regressions were estimated via the robust standard error, which is presented in the parentheses. We utilized fixed time effects for the observed variables (2011-2016). The variables *Pledge amount*, *Income inequality*, *Bad news*, *Good news*, and *Popold* were winsorized (p = 0.05) to reduce the influence of outliers with 5% in the lower part and 5% in the upper part, in accordance with Barnett and Lewis's procedure (1994). ***p < 0.01; **p < 0.05; *p < 0.1.

Table 8 presents the estimated coefficients for the control model for selection bias via the Heckman procedure (1979), as well as the models that contemplate each variable of interest one at a time and their terms of interaction with geographic aspects, specifically the distance between the entrepreneur and the backer, and the income inequality in the pledger's city.

Table 8. Estimated Regressions for the Pledge Amount in Reward Crowdfunding Campaigns, using the Social Media as a Proxy for Market Sentiment.

	XV †	XVI	XVII	XVIII	XIX	XX
Goodnews	0.004***					
	(0.003)					
Goodnews*Geographic distance		-0.006***				
		(0.0001)				
Goodnews*Income inequality			0.244***			
			(0.010)			
Badnews	-0.026***					
	(0.004)					
Badnews*Geographic distance				-0.011***		
				(0.0002)		
Badnews* Income inequality					-0.016***	
					(0.006)	
Geographic distance	-1.870***					
	(0.095)					
Income inequality	49.56***					
	(2.747)					
Distance*Income inequality						-2.227***
						(0.059)
Inverse Mills Ratio λ	2.287***					
	(2.062)					
Goal	Yes	Yes	Yes	Yes	Yes	Yes
DafterB	Yes	Yes	Yes	Yes	Yes	Yes
Denspop	Yes	Yes	Yes	Yes	Yes	Yes
Popold	Yes	Yes	Yes	Yes	Yes	Yes
Goodnews*D_Art	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects (time)	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.960***	11.33***	11.35***	1.426*	0.116	10.528***
	(0.017)	(1.227)	(1.230)	(1.227)	(1.236)	(1.221)
AIC		3872900	3872991	3874302	3874270	3872934
Adj. R^2		0.02	0.02	0.02	0.02	0.02
Wald Chi^2	4387.19 ***					
N	214,443	350,012	350,012	350,012	350,012	350,012

Source: The authors' calculations. Note: This table presents the parameters estimated via OLS, using the dependent variable $Pledge\ amount$. The regressions were estimated via robust standard errors, which are presented in the parentheses. We used fixed time effects for the observed variables (2011-2016). †The Inverse Mills Ratio represents the utilization of the regressor to correct for Heckman's sample bias (1979). The lambda variable is $\lambda = f(x)/F(x)$, in which $f(x)$ is a function of the probability density and $F(x)$ is a function of the cumulative additional distribution. The model for Heckman's selection has two steps: 135,569 censored observations (39%) where the distance between the entrepreneur and the investor is zero. Models XVI to XX represent the estimates for the interactions tested with the variables of interest in this study. The variables $Pledge\ amount$, $Income\ inequality$, $Bad\ news$, $Good\ news$, and $Popold$ were winsorized (p = 0.05) to reduce the influence of outliers with 5% in the lower part and 5% in the upper part, in accordance with Barnett and Lewis's procedure (1994). ***p < 0.01; **p < 0.05; *p < 0.1.

To support the results obtained with the proxy for market sentiment based on the daily news in the mainstream media, in Table 8 we verified whether the tone of the posts in social media on the day of the pledge influences the pledge amount. Also, similar to the results obtained in the mainstream media, we examine whether the positive effect of good news can be influenced by the distance between the entrepreneur and the backer, according to the coefficients estimated for Model XVI ($\hat{\beta} = -0.006, p < 0.01$), and the income inequality among the inhabitants of the pledger's city ($\hat{\beta} = 0.244, p < 0.01$).

5. CONCLUDING REMARKS

Some scholars believe that the dissemination of information about the particular characteristics of crowdfunding campaigns is a driver of the pledge amounts that the backers choose to make and the success of the campaign. However, as in other markets, reward crowdfunding is sensitive to content disseminated by the mass media, which influences the sentiments of individual investors. This paper examines the crowdfunding literature in a pioneering manner to determine whether market sentiment influences the pledge amounts made in reward crowdfunding campaigns. To accomplish this, we use a unique data set obtained from the largest crowdfunding platform in one of the world's ten most productive economies, which allows us to observe detailed interactions between entrepreneurs and investors for a large sample of pledges in a country of continental dimensions characterized by geographic and cultural diversity.

Based on our results, supported by data for more than 350,000 pledges made in 2,600 different cities in Brazil, crowdfunding entrepreneurs, backers, and platform managers can learn more about the role that mass media plays in influencing backer behavior in the allocation of financial resources in reward crowdfunding campaigns. As a consequence, one of the main factors in campaign success, the number of resources raised during a campaign, can be better managed in light of a knowledge of market sentiment.

We find that positive news increases the pledge amounts made in campaigns in contrast to negative news which reduces the pledge amount. The results are not only driven by news tone, but also geographic aspects that can influence the reaction of individuals to news content. Overall, our results are consistent for mainstream and social media. In general, we find that mass media influences the typical pledge amount received by a crowdfunding campaign, with this effect being influenced by the geographic distance between the entrepreneur and the backer, and the income inequality of the pledger's city.

Therefore, even in contexts characterized by content with a positive tone in the media, geographic distance can make things more difficult for the campaign, in keeping with arguments in favor of the existence of home bias in the crowdfunding industry (Lin & Viswanathan, 2016), which is an alternative to the arguments that this mode of financing may be insensitive to the consequences of geographic distance (Agrawal et al., 2014, 2015).

This study contributes to the crowdfunding literature by documenting for the first time the influence of mass media on pledge amounts. To the extent that pledges during the first days of a campaign can be decisive to its fundraising success, the empirical evidence that we offer constitutes relevant information for estimating the appropriate timing for launching a campaign, given the news being disseminated at the time. Our results, together with issues that remain open in the literature, point to a fertile field of research related to market sentiment and campaigns that goes beyond their idiosyncratic aspects.

Acknowledgements: The authors wish to thank the comments and suggestions made by Roberto Borges Kerr, Gregory Pogue, Bruce Kellison, Cristiane C. Gattaz, Guilherme Tavares, Gabriel Souza, and Elin Merethe Oftedal. Also, we acknowledge Eduardo Rezende Francisco who provided support by making figures we used in this paper. The authors would also like to acknowledge the suggestions received from the participants in the Research Seminar at the IC^2 Institute at the University of Texas at Austin in November 2017. The authors would especially like to thank the Brazil reward crowdfunding platform Catarse, which provided part of its operational campaign data.

Funding: This work was supported by the National Council for Scientific and Technological DevelopmentCNPq [grant number 47089420148]; the São Paulo Research Foundation-FAPESP [grant number 17/09306-6].

References

Agrawal, A., Catalini, C., Goldfarb, A. (2015). Crowdfunding: Geography, social networks, and the timing of investment decisions. *Journal of Economics & Management Strategy*, 24(2), 253-274. https://doi.org/10.1111/jems.12093

Agrawal, A.K., Catalini, C., Goldfarb, A. (2014). Some simple economics of crowdfunding. *Innovation Policy and the Economy*, 14(1), 63–97. https://doi.org/10.1086/674021

Anglin, A.H., Wolfe, M.Y., Short, J.C., McKenny, A.F., Pidduck, R.J. (2018). Narcissistic rhetoric and crowfunding performance: A social role theory perspective. *Journal of Business Venturing*, 33(6), 780-812. https://doi.org/10.1016/j.jbusvent.2018.04.004

Atanasov, V., Blabk, B. (2016). Shock-Based Causal Inference in Corporate Finance and Accounting Research. *Critical Finance Review*, 5, 207-304.

Babich, V., Tsoukalas, G., Marinesi, S. (2020). Does crowdfunding benefit entrepreneurs and venture capital investors?. *Manufacturing & Service Operations Management*, Forthcoming. https://doi.org/10.1287/msom.2019.0835

Barnett, V., Lewis, T. (1994). *Outliers in statistical data*. 3. ed. Chichester: Wiley, 1994.

Belleflamme, P., Omrani, N., Peitz, M. (2015). The economics of crowdfunding platforms. *Information Economics and Policy*, 33, 11–28. https://doi.org/10.1016/j.infoecopol.2015.08.003

Bi, S., Liu, Z., Usman, K. (2017). The influence of online information on investing decisions of reward-based crowdfunding. *Journal of Business Research*, 71, 10-18. https://doi.org/10.1016/j.jbusres.2016.10.001

Bollen, J., Mao, H. (2011). Twitter mood as a stock market predictor. *Computer*, (10), 91-94. https://arxiv.org/pdf/1010.3003.pdf

Boudoukh, J., Feldman, R., Kogan, S., Richardson, M. (2019). Information, Trading, and Volatility: Evidence from Firm-Specific News. *Review of Financial Studies*, 32(3), 992-1033. https://doi.org/10.1093/rfs/hhy083

Chakraborty, S., Swinney, R. (2021). Signaling to the crowd: Private quality information and rewards-based crowdfunding. *Manufacturing & Service Operations Management*, Forthcoming. https://doi.org/10.1287/msom.2019.0833

Chan, J., Suen, W. (2008). 'A Spatial Theory of News Consumption and Electoral Competition', The Review of Economic Studies, 75(3): pp. 699-728. Clark, A.E. and D'Ambrosio, C. (2015) 'Attitudes to income inequality: experimental and survey evidence', in F. Bourguignon and A. Atkinson, Handbook of Income Distribution, 2A, Elsevier: pp. 1148-1208.

Chang, J.W. (2020). The Economics of Crowdfunding. *American Economic Journal: Microeconomics*, 12(2), 257-80. https://doi.org/10.1257 / mic.20170183

Corneo, G., Gruner, H.P. (2002). Individual preferences for political redistribution, *Journal of Public Economics*, 83(1), 83-107. https://doi.org/10.1016/S0047-2727(00)00172-9

Courtney, C., Dutta, S., Li, Y. (2017). Resolving Information Asymmetries: Influence of Media and Crowd Sentiment on Crowdfunding Success. *Entrepreneurship Theory and Practice*, 265-290. https://doi.org/10.1111/etap.12267

Crosetto, P., Regner, T. (2018). It's never too late: funding dynamics and self pledges in reward-based crowdfunding. *Research Policy*, 47(8), 1463-1477. https://doi.org/10.1016/j.respol.2018.04.020

Cumming, D., Dai, N. (2010). Local bias in venture capital investments. *Journal of Empirical Finance*, 17(3), 362-380.

Cumming, D.J., Leboeuf, G., Schwienbacher, A. (2020). Crowdfunding models: Keep-It-All vs. All-Or-Nothing. *Financial Management*, 49(2), 331-360. https://doi.org/10.1111/fima.12262

Cutler, D.M., Poterba, J.M., Summers, L.H. (1989). What moves stock prices?. *Journal of Portfolio Management*, 15(3), 4-12. https://doi.org/10.3905/jpm.1989.409212

Di Gioacchino, D., Verashchagina, A. (2017). *Mass media and attitudes to inequality*, Working Papers 178, University of Rome La Sapienza, Department of Public Economics. Available at: https://ideas.repec.org/p/sap/wpaper/wp178.html

Dickinson, B., Hu, W. (2015). Sentiment analysis of investor opinions on twitter. *Social Networking*, 4(03), 62. https://doi.org/10.4236/sn.2015.43008

Engelberg, J.E., Parsons, C. A. (2011). The causal impact of media in financial markets. *The Journal of Finance*, 66(1), 67-97. https://doi.org/10.1111/j.1540-6261.2010.01626.x

Fang, L., Peress, J. (2009). Media Coverage and the Cross-Section of Stock Returns. *Journal of Finance*, 64(5), 2023-2052. https://doi.org/10.1111/j.1540-6261.2009.01493.x

Felipe, I.J.S. Mendes-Da-Silva, W., Gattaz, C.C. (2019). Crowdfunding Research Agenda: Semantic Analysis of the Media and Geography of investments. *Encyclopedia with Semantic Computing and Robotic Intelligence*, 2, 1930001-1-1930001-10. https://doi.org/10.1142/S2529737619300018

Florescu, O. (2014). Positive and Negative Influences of the Mass Media upon Education. *Procedia-Social and Behavioral Sciences*, 149, 349-353. https://doi.org/10.1016/j.sbspro.2014.08.271

Gerber, E. M., Hui, J. (2013). Crowdfunding: Motivations and deterrents for participation. *ACM Transactions on Computer-Human Interaction*, 20(6), 34. https://dl.acm.org/doi/10.1145/2530540

Greenwood, B.N., Gopal, A. (2017). Ending the Mending Wall: Herding, Media Coverage, and Co-Location in IT Entrepreneurship. Media Coverage, and Co-Location in IT Entrepreneurship. *MIS Quarterly*, 41(3), 989-1007. https://dx.doi.org/10.25300/MISQ/2017/41.3.15

Guenther, C., Johan, S., Schweizer, D. (2018). Is the crowd sensitive to distance? –how investment decisions differ by investor type. *Small Business Economics*, 50(2), 289-305.

Heckman, J. (1979). Sample selection as a specification error. *Econometrica*, 47(1), 153–161

Hu, M., Li, X., Shi, M. (2015). Product and pricing decisions in crowdfunding. *Marketing Science* 34(3), 331–345. http://dx.doi.org/10.1287/mksc.2014.0900

Jiang, C., Han, R., Xu, Q., Liu, Y. (2020). The impact of soft information extracted from descriptive text on crowdfunding performance. *Electronic Commerce Research and Applications*, 43, 101002.

Kaminski, J.C., Hopp, C. (2020). Predicting outcomes in crowdfunding campaigns with textual, visual, and linguistic signals. *Small Business Economics*, 55, 627-649. http://dx.doi.org/10.1007/s11187-019-00218-w

Kaur, H., Gera, J. (2017). Effect of Social Media Connectivity on Success of Crowdfunding Campaigns. *Procedia Computer Science*, 122, 767-774. https://doi.org/10.1016/j.procs.2017.11.435

Kennedy, P.J., Prat, A. (2019). Where do people get their news?. *Economic Policy*, 34(97), 5-47. https://doi.org/10.1093/epolic/eiy016

Kothari, S.P., Li, X., Short, J.E. (2009). The effect of disclosures by management, analysts, and business press on cost of capital, return volatility, and analyst forecasts: A study using content analysis. *The Accounting Review*, 84(5), 1639–1670.

Kumar, P., Langberg, N., Zvilichovsky, D. (2016). (Crowd) funding innovation: Financing constraints, price discrimination and welfare. SSRN Working Paper (2600923).

Kuo, Y.F., Lin, C.H., Hou, J.R. (2020). The effects of anchoring on backers' pledge in reward-based crowdfunding: evidence from Taiwanese Market. *Internet Research*, 1066-2243.

Kuppuswamy, V., Bayus, B.L. (2015). *Crowdfunding creative ideas: The dynamics of project backers in kickstarter*. UNC Kenan-Flagler Research Paper (2013-15).

Lin, M., Viswanathan, S. (2016). Home Bias in Online Investments: An Empirical Study of an Online Crowdfunding Market. *Management Science*, 62(5). https://doi.org/10.1287/mnsc.2015.2206

Loughran, T., McDonald, B. (2011). When is a liability not a liability? Textual analysis, dictionaries, and 10-Ks. *The Journal of Finance*, 66(1), 35-65. https://doi.org/10.1111/j.1540-6261.2010.01625.x

Lu, C.T., Xie, S., Kong, X., Yu, P.S. (2014). Inferring the impacts of social media on crowdfunding. *In Proceedings of the 7th ACM international conference on Web search and data mining* (p. 573-582). ACM

Macnamara J.R. (2006). The Role and Effects of Mass Media in Modern Societies. In: Media and Male Identity. Palgrave Macmillan, London. https://doi.org/10.1057/9780230625679_5

McQuail, D. (1979). The Influence and Effects of Mass Media. In Mass Communication and Society. Sage Publications. Available at: https://www.csub.edu/~mault/the%20influence%20and%20effects%20o.pdf

Milgrom, P.R. (1981). Good News and Bad News: Representation Theorems and Applications. *The Bell Journal of Economics*, 12, 380–391.

Miller, G.S., Shanthikumar, D.M. (2010). Geographic location, media coverage and investor reactions. *Media Coverage and Investor Reactions*. https://dx.doi.org/10.2139/ssrn.1266792

Mollick, E. (2014). The dynamics of crowdfunding: An exploratory study. *Journal of Business Venturing*, 29(1), 1-16.

Neiderhoffer, V. (1971). The Analysis of World Events and Stock Prices: Evidences. *Journal of Business*, 44, 193-219.

Nielsen, K.R., Binder, J.K. (2020). I Am What I Pledge: The Importance of Value Alignment for Mobilizing Backers in Reward-Based Crowdfunding. *Entrepreneurship Theory and Practice*, 1-31. https://doi.org/10.1177/1042258720929888

OECD (2020). *OECD Digital Economy Outlook 2020*, OECD Publishing, Paris. https://doi.org/10.1787/bb167041-en

Pearce, D.K., Roley, V.V. (1985). Stock Prices and Economic News. *Journal of Business*, 58(1), 49-67.

Petrova, M. (2008). Inequality and media capture. *Journal of Public Economics*, 92, 183-212.

Raimondo, C. (2019). The Media and the Financial Markets: A Review. *Asia-Pacific Journal of Financial Studies*, 48(2), 155-184. https://doi.org/10.1111/ajfs.12250

Solomon, D.H. (2012). Selective publicity and stock prices. *Journal of Finance*, 67(2), 599-638. https://doi.org/10.1111/j.1540-6261.2012.01726.x

Strausz, R. (2017). A theory of crowdfunding: A mechanism design approach with demand uncertainty and moral hazard. *American Economic Review*, 107(6), 1430–76.

Tetlock, P.C. (2007). Giving content to investor sentiment: The role of media in the stock market. *The Journal of Finance*, *62*(3), 1139-1168. https://doi.org/10.1111/j.1540-6261.2007.01232.x

Wang, W., Zhu, K., Wang, H., Wu, Y.C.J. (2017). The impact of sentiment orientations on successful crowdfunding campaigns through text analytics. *IET Software*, 11(5), 229-238. https://doi.org/10.1049/iet-sen.2016.0295

Yang, W., Lin, D., Yi, Z. (2017). Impacts of the mass media effect on investor sentiment. *Finance Research Letters*, 22, 1-4. https://doi.org/10.1016/j.frl.2017.05.001

Zhang, J., Savin, S., Veeraraghavan, S. (2021). Revenue Management in Crowdfunding. *Manufacturing & Service Operations Management*, Forthcoming.

Most Recent Working Paper

NIPE WP 02/2022	Wesley Mendes-da-Silva, Israel José dos Santos Felipe, **Cristiana Cerqueira Leal**, Marcelo Otone Aguiar, Tone of Mass Media News Affect Pledge Amounts in Reward Crowdfunding Campaign, 2022
NIPE WP 01/2022	**Rosa-Branca Esteves** and Jie Shuai, Personalized prices in a delivered pricing model with a price sensitive demand, 2022
NIPE WP 16/2021	**Rosa-Branca Esteves** and **Francisco Carballo Cruz**, Can data openness unlock competition when the incumbent has exclusive data access for personalized pricing?, 2021
NIPE WP 15/2021	J. Jerónimo, Assis de Azevedo, P. Neves, **M. Thompson**, Interactions between Financial Constraints and Economic Growth, 2021
NIPE WP 14/2021	**Pinter,J.**, Monetarist arithmetic at Covid-19 time: a take on how not to misapply the quantity theory of money, 2021
NIPE WP 13/2021	Bastos, P., **Monteiro, N. P.**, and **Straume, O. R.**, The Division of Unexpected Revenue Shocks, 2021
NIPE WP 12/2021	**Campos-Martins, S.**, and **Amado, C.**, Modelling Time-Varying Volatility Interactions, 2021
NIPE WP 11/2021	Brekke, K. R., Siciliani, L. and **Straume, O. R.**, Competition, quality and integrated health care, 2021
NIPE WP 10/2021	Felipe, I. J. S., Mendes-Da-Silva, W., **Leal, C. C.**, and Santos, D. B., Reward Crowdfunding Campaigns: Time-To-Success Analysis, 2021
NIPE WP 9/2021	**Fernando Alexandre,** Avaliação dos incentivos financeiros às empresas em Portugal: QREN (2007-2013) e PT2020 (2014-2018), 2021
NIPE WP 8/2021	**Rosa-Branca Esteves**, Can personalized pricing be a winning strategy in oligopolistic markets with heterogeneous demand customers? Yes, it can, 2021
NIPE WP 7/2021	**Loureiro, G.,** and **Silva, S.**, The Impact of Securities Regulation on the Information Environment around Stock-Financed Acquisitions, 2021
NIPE WP 6/2021	**Aguiar-Conraria, L.**, Conceição, G., and **Soares, M. J.**, How far is gas from becoming a global commodity?, 2021
NIPE WP 5/2021	**Rosa-Branca Esteves** and **Francisco Carballo Cruz**, Access to Data for Personalized Pricing: Can it raise entry barriers and abuse of dominance concerns?, 2021
NIPE WP 4/2021	**Rosa-Branca Esteves**, Liu, Q. and Shuai, J. Behavior-Based Price Discrimination with Non-Uniform Distribution of Consumer Preferences, 2021
NIPE WP 3/2021	**Ghandour, Z.,** Siciliani, L. and **Odd Rune Straume**, Investment and Quality Competition in Healthcare Markets, 2021
NIPE WP 2/2021	**Martins, João**, **Linda Veiga and** Bruno **Fernandes**, Does electronic government deter corruption? Evidence from across the world, 2021
NIPE WP 1/2021	Kurt R. Brekke, Dag Morten Dalen and **Odd Rune Straume**, Paying for pharmaceuticals: uniform pricing versus two-part tariffs, 2021
NIPE WP 10/2020	**Ghandour, Z.** and **Odd Rune Straume**, Quality competition in mixed oligopoly, 2020
NIPE WP 09/2020	Gabrielsen, T. S., Johansen, B. O., and **Odd Rune Straume**, National pricing with local quality competition, 2020
NIPE WP 08/2020	Engle, R. F., and **Campos-Martins, S.**, Measuring and Hedging Geopolitical Risk, 2020
NIPE WP 07/2020	Boukari, M., and **Veiga, F. J.**, Fiscal Forecast Manipulations and Electoral Results: Evidence from Portuguese Municipalities, 2020
NIPE WP 06/2020	**Alexandre, F., Cruz, S**. and **Portela, M.**, Financial distress and the role of management in micro and small-sized firms, 2020
NIPE WP 05/2020	Cooke, D., Ana P. Fernandes and **Priscila Ferreira**, Entry Deregulation, Firm Organization and Wage Inequality, 2020
NIPE WP 04/2020	**Fernando Alexandre**, Pedro Bação, **João Cerejeira**, **Hélder Costa** and **Miguel Portela**, Minimum wage and financially distressed firms: another one bites the dust, 2020
NIPE WP 03/2020	**Luís Sá** and **Odd Rune Straume**, Quality provision in hospital markets with demand inertia: The role of patient expectations, 2020