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Research Article

Good News from Mass Media Induces More Investments in the Equity Crowdfunding Market

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ABSTRACT

This study verifies the association between the text sentiment of news items and the value of capital investments in the equity crowdfunding market. It also analyzes the influence of geographic attributes on the investments made. Based on data for 736 investments made in different ventures in the largest equity crowdfunding platform in one of the main emerging markets, this study's results indicate that the attributes of ventures can affect the amount of capital invested in them. In addition, published mass media news items that have a greater quantity of positive words can stimulate larger investments in these ventures. On the other hand, the geographic distance between the entrepreneur and the investor can negatively affect the value of these investments. These results are relevant since they can contribute to the definition of fundraising strategies on the part of entrepreneurs and platform managers.

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equity crowdfunding; semantic analysis of the media; investment geography; financial innovation; alternative finance.

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The authors claim that they do not have authorization from the ECF platform to make the survey data available to the public. BAR – Brazilian Administration Review encourages data sharing but, in compliance with ethical principles, it does not demand the disclosure of any means of identifying research subjects.

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INTRODUCTION

Crowdfunding constitutes a way for businesses and other organizations to raise funding from multiple individuals (Mochkabadi & Volkmann, 2020; Stevenson et al., 2019). Thus, as an extension of classic funding from family and friends, crowdfunding uses communities (especially online communities) to raise money to finance projects. International organizations have seen crowdfunding as a path to world development, especially in terms of less developed markets (World Bank, 2013). One form of crowdfunding involves entrepreneurs making an open call to sell a specific quantity of equity, or convertible shares of equity for a company on the internet. This form is known as equity crowdfunding (Blaseg et al., 2021), henceforth called ECF.

Only a limited number of startups are able to obtain external capital from venture capital firms and angel investors (Clarke, 2016), especially when we are considering ventures that are led by entrepreneurs who do not have sufficient funds to develop their businesses. High growth potential ventures tend to resort to external financing for the development of their activities (Ahlers et al., 2015). External capital plays a vital role for these companies, because with the raising of funds these businesses need to meet conditions that have to be initiated or expanded (Estrin et al., 2018). To Ahlers et al. (2015), ECF is developing because it has managed to overcome legal obstacles in various countries, especially emerging countries, in which financial mechanisms tend to be less developed.

Filling the very large funding gap that exists in typical emerging markets for startups and SMEs is something that has motivated ECF platforms in these economies. Yet in a country struggling with economic, political, and social challenges, how does an ECF platform become part of the solution in filling the funding gap where regulations stifle business startups and investments? This question is related to a study of the determinants of the propensity of investors to invest in an ECF platform, with special interest in economies in which financial mechanisms are less developed and bureaucratic, e.g., emerging economies. The literature regarding the disposition of investors to place their resources in ECF is still sparse (Shafi, 2019), and apparently inexistent in terms of examining investor sentiment and geographic attributes.

The popularization of ECF has led to empirical studies of it, and initial impressions of this market are appearing more and more often. Thus, its general economic aspects (Agrawal et al., 2011), market mechanisms (Hornuf & Schwienbacher, 2018), the success of projects (Ralcheva & Roosenboom, 2020), and the social relationships of funding (Piva & Rossi-Lamastra, 2018) are all examples of areas that have been the subject of recent studies of this collective method of fundraising for small innovative companies.

According to Tetlock (2007), the narratives provided by the media can play an important function in the market because they spread information, reducing the tension due to the asymmetry of information and agency problems. In addition, the fact that this information is not directly linked to the companies gives it a certain degree of credibility to investors (Kothari et al., 2009). Thus, it is believed that the news can communicate interesting information about the decision-making process related to the allocation of investments, especially on investor behavior (Hornuf & Schwienbacher, 2018; Tiberius & Hauptmeijer, 2021).

Studies that investigate text sentiment point to indications that news in the media can provoke reactions in the market (Tetlock, 2007). Stevenson et al. (2019) reinforce our idea when they concluded that investor opinions can increase or reduce the probability of successful startup financing, serving as a kind of decoy, called by the authors 'crowd bias.' Moreover, Griffin et al. (2011) indicate that the narratives in the media can play a role of considerable importance in estimating the fundamental values of assets. That is to say, the news can be implemented to regulate the beliefs of investors regarding the value of a company or its assets. Thus, optimistic or pessimistic news should be capable of influencing the market (Liu & McConnell, 2013).

Geographic attributes, or in other words, the characteristics associated with the location of these projects (Foster et al., 2019) and the distance between the venture and the investor (Agrawal et al., 2011), may be capable of interfering in the disposition of investors to place their capital in projects that seek this alternative mode of fundraising. Breznitz and Noonan (2020) claim that in reward crowdfunding, the projects that are most likely to receive resources are those most grouped around the same physical proximity, revealing that the allocation of capital in this modality of crowdfunding may be dependent on a geographical grouping of enterprises. So far, the literature on the influence of geography on the dynamics of capital allocation in ECF is not well defined, which motivated us to research it. Hornuf and Schwienbacher (2018) support the idea that research on crowdfunding should direct attention to matters that are still little explored and capable of influencing the successes and failures of ventures, which are particularly important for the maturing of this type of credit granting for startups.

The geographic distribution of ECF projects itself may exhibit a concentration of ventures in areas that are more developed economically (Mollick & Robb, 2016),

which could be justified in part by the element of risk in the operations that take place in this market. According to Agrawal et al. (2011), financiers can evaluate a venture's fundraising capacity based on its location. The use of geography in studies of financial relationships can provide useful information on the economic and social development of certain areas, as well as reveal elements of social culture and innovation (Battaglia et al., 2022; Florida, 2002). Geography can indicate which ECF areas are capable of receiving greater investment and, as a result, have greater chances of success.

With support from these arguments, it is reasonable to assume that the text sentiment of news items, as well as geography, can influence the value of financial investments in ECF ventures. In this sense, the objective of this study is to verify the associations between the value of capital investments in the ECF market and the text sentiment of news items and the geography of the investments made, and with that in mind we decided to use data for over 700 investments in an ECF platform as well as mass media news items and the geographic characteristics of the locations where these projects are centered.

LITERATURE REVIEW

Asymmetry of information is a characteristic problem with startup ventures (Clarke, 2016; Meoli & Vismara, 2021), and most of the time entrepreneurs have greater clarity in terms of the quality of the business they are presenting than the investors do (Sood, 2003). In addition, various levels of information among those involved in the funding process can result in adverse selection, making it difficult for the entrepreneurs and the investors to evaluate the business (Amit et al., 1998).

According to the efficient markets hypothesis (EMH), new information should regulate the expectations of investors in relation to the gains to be made from future cash flow — and the behavior of investors will be based on the adjustment of prices through this new information. Thus, soon estimates of asset prices in equilibrium should be made based on expected returns (Fama, 1991). However, more recent studies, like Hong et al. (2007), have emphasized the limited rationality of individuals. According to these authors, people are averse not only to risk, but also to losses, and this notion is relevant when we are dealing with a market made up of companies that are not well known.

Hirshleifer et al. (2009) tested the capacity of investors to manage the volume of information available through the publication of news items on the financial market and concluded that news not related to the industry and surprises in terms of gains exert a more intense distracting effect, inhibiting market reactions to more relevant news. According to Solomon (2012), the control of the volume of good and bad news is conducted by the media itself, or, in other words, the premise that investors can access and process all useful information (at no cost) could be compromised. This author believes that, in disseminating information through media coverage, the press plays a fundamental role in determining investor expectations.

In this way, the content published by the media tends to affect asset prices and investor behavior and provokes a market reaction. Negative news about a company, product, or service can affect investment intentions regarding a given collective venture, just as a positive news item about a given investment opportunity can encourage investors to participate in a crowdfunding campaign (Clarke, 2016).

ECF investors seek the information that is available regarding potential investment opportunities to reduce possible problems related to the asymmetry of information (Ahlers et al., 2015; Kukk, 2022). The level of information available to investors can influence the perception of risk involved in a business (Courtney et al., 2017), and it is therefore an element that is seriously considered by venture capital and angel investors (Cumming et al., 2021a) as well as ECF investors (Block et al., 2018; Lukkarinen et al., 2022) when making the decision to allocate their financial resources.

The decision to invest in ECF involves a high degree of risk, therefore it requires investors to seek out and process information about the business from the entrepreneur as well as other sources (Amit et al., 1998; Meoli & Vismara, 2021). Given these considerations, it is possible to think that the information released by the media is essential in ECF market investment decisions, because it reduces the level of asymmetry of information in this market (Courtney et al., 2017; Kukk, 2022), in a way that is similar to what happens with other sources of investment in the traditional financial market (Solomon, 2012).

Text sentiment of news items and market reactions

One of the first studies to explore the relationship between the text sentiment of news items and stock market behavior was Tetlock's (2007) article. This author analyzes, in an automated manner, the relationship between news items from a *Wall Street Journal* (WSJ) column with the behavior of stock prices in the financial market. Tetlock's (2007) findings suggest that high levels of pessimism in media news items influence market prices, which tend to react with large losses, followed by big turnarounds.

Using a computational algorithm to create a database, Jegadeesh and Wu (2013) collected more than

45 thousand pieces of company information between 1995 and 2010. The intention of these authors was to observe the effect of the news on the market returns of these companies, and according to these authors, the content of news items, whether it is positive or negative, can provoke a considerable effect on the share returns of the companies analyzed. In addition, they declare that the appropriate selection of a term in a news item can motivate or inhibit the evaluation of financial assets.

Liu (2014), in turn, verifies the possible relationship between negative sentiments in news items, the volume of these items, and the returns offered by government bonds during the economic crisis in Europe. The author tested how text sentiment in news items can be applied to long-term market debt securities. The empirical findings indicate that in the presence of an elevated level of pessimism and a widespread release of news items, the prices of these issues decline. Moreover, the author verifies that a high level of pessimism is associated with a large concentration of press publications.

Hendershott et al. (2015) observe the volume of purchases and sales of institutional businesses in relation to news items published by the Reuters Agency. When large fluxes of information were observed, these authors state that the news items oriented the behavior of the business deals that took place. In addition, through the flux of information they were able to predict the text sentiment of the news; the reaction of the stock market on the days of these news items; and the reaction of the stock market on days with news items related to the crisis and announcements of extra earnings. These results converge with the study of Chan and Chong (2017) and reinforce the necessity of more studies in the field of knowledge (Renault, 2020). More recent studies, such as those by Shapiro et al. (2022) and Picault et al. (2022), point to similar results and further highlight the relevant role that the media has in influencing people's behavior both in an investment and in a consumption scenario, and even in inflation.

In relation to the ECF market, we can state that up until now the technique of text sentiment analysis has not been applied to investor behavior. The use of natural language processing (NLP) has grown over recent years, especially in the area of finance according to Fisher et al. (2016) and Raimondo (2019). According to these authors, NLP can be very useful in extracting information in accounting statements, media news items, and analyst predictions, among others. In addition, this technique makes it possible to get a more coherent understanding of the communication between people and systems.

The financial literature has suggested that private information causes serious problems in terms of the asymmetry of information in the financial market (Jegadeesh & Wu, 2013), but the media, through its publication of information, can diminish this problem (Solomon, 2012). In this way, this study believes that the qualitative information that originates from media news items can be useful in clarifying the practice of allocating investments in the ECF market.

Geography in the venture financing process

The influence of geography on the success of financing startups has been studied for some time for ventures that use financial resources from venture capital firms, according to the work of Chen et al. (2010), to the extent that projects developed in locations closer to the venture capital centers have a greater chance of receiving financing than those on the periphery. One of the possible reasons for this is that regional income is able to attract a greater volume of human and financial capital in certain areas (Florida, 2002).

The geography of ventures can influence decision-making in terms of capital investments, given that the relationships between business leaders and investors tend to be affected by costs related to physical distance and information (Miller & Shanthikumar, 2010; Shane & Cable, 2002). This thinking is supported by traditional economic theory in which ventures that are closer to their potential investors have greater chances of being able to raise their desired financing, especially in terms of the costs of these financial relationships (Stuart & Sorenson, 2003).

Financial relationships may be affected by the 'economic distance' effect, according to Coval and Moskowitz (1999). According to these authors, the cost of financial transactions for more distant ventures is quite high, especially if one considers the physical costs of the operation and the degree of asymmetry of information involved in the business (Jegadeesh & Wu, 2013).

However, it is hoped that crowdfunding ventures are capable of overcoming the limitations of the granting of financing for ventures located further away from investors (Agrawal et al., 2011). This occurs due to the technology that sustains the operations that support the crowdfunding market (Cumming et al., 2021a). Virtual platforms publish information that provides greater transparency during the fundraising process, thus reducing the degree of asymmetry of information (Hornuf & Schwienbacher, 2018).

In general, communication allows the financial relationships developed in crowdfunding to be considered efficient (Senney, 2016). In this sense, Agrawal

et al. (2011) believe that a good part of the success of crowdfunding ventures is due to personal relationships of a friendship level (Lin et al., 2012) and family or social ties (Kotha & George, 2012). Lin and Viswanathan (2015) state that investors who use a crowdfunding platform present a certain propensity to select those with a similar culture and a closer geographic location. These authors find evidence of a home bias in the crowdfunding market and conclude that the preference of investors for closer ventures must be due to problems related to credibility and tension regarding information. Breznitz and Noonan (2020) reinforce these arguments and defend the idea that funding via crowdfunding is not as proportional as has been said in other studies.

Development of hypotheses

Belleflamme et al. (2014) and Mollick (2014) argue that this financial model makes it possible for ventures to be financed by a large group of investors who are willing to assume this business risk. In this way, these authors believe that crowdfunding can compete with bank financing, above all during periods of economic instability and financial distress for banks (Blaseg et al., 2021).

The value defined for a project financing goal should be relevant for collective fundraising because this may stimulate or inhibit the participation of individuals (Vismara, 2016). If this value is deemed to be inconsistent with the venture's real cost and scope, this may diminish the quantity of investments (Mollick, 2014). However, Josefy et al. (2017) state that well-structured financial targets can provide a strong signal of the quality of a venture and confirm the potential of the business under consideration.

Ahlers et al. (2015) and Colombo et al. (2015) agree with these arguments and emphasize that exploring a financing target for a crowdfunding venture based on the ratio between the desired value as defined by the financing campaign and the total number of investors could be a more appropriate figure. Based on these arguments, we propose testing the relationship between the finance target and the value of investments for collective ventures as established by H_1:

> **H_1:** The value defined as the financing target for a venture can affect the value of investments made in this venture through the ECF market.

One of the relevant aspects to the success of crowdfunding campaigns found in the literature is the campaign's certification, i.e., aspects that indicate the quality of the campaign. In respect to this, the literature establishes that the participation of reliable investors or intermediaries can have a positive effect on the financing of a venture (Stuart & Sorenson, 2003). According to Moritz et al. (2015), the same signal effect could be taking place in the ECF market. These authors believe that asymmetries of information should be diminished by the participation of experienced people in the venture financing process. It is probable that the presence of more experienced investors, with their opinions and qualifications, can signal the credibility necessary for a venture's success (Ahlers et al., 2015). Considering these arguments, we think it is pertinent to test **H_2**:

> **H_2:** The participation of experienced investors influences the value of capital investments made in ECF ventures.

Barasinska and Schäfer (2014) analyze the impact of the entrepreneur's gender on a lending crowdfunding campaign. According to these authors, it is not rare for women to have a lower chance of obtaining the desired financing for their ventures. Related to this, Greenberg and Mollick (2014) point to the existence of a tendency of members of the same gender to concede more credit in terms of collective financing initiatives, and this may be a way for women to overcome difficulties in access to sources of financing (Mohammadi & Shafi, 2018).

Greenberg and Mollick (2014) believe that the internet is a technology that favors egalitarian access to financing, and its extensive use is driving the promotion of financial resources for women in terms of both crowdfunding and venture capital. In contrast, Mohammadi and Shafi (2018) conclude that women, compared to men, have greater resistance to investing in startups due to the risk involved in these businesses. In addition, these women prefer to invest resources in ventures headed by men. Thus, we propose to test the influence of the entrepreneur's gender on the value of capital investments in ECF projects, in the form of **H_3**:

> **H_3:** The gender of the entrepreneur can stimulate or inhibit the value of capital investments in ECF projects.

According to Beattie (2014), text sentiment deals with one of the linguistic attributes inherent in the communication process, and it is related to the positive or negative meaning of information. In discussions of elements that can act on market price movements, text sentiment is considered a relevant measure of information, especially since it permits the content analysis of information presented by the media (Tetlock, 2007).

In this sense, the literature that studies the relationship between the text sentiment of media news items

and market reactions finds that the textual content of new items can affect the behavior and volume of financial negotiations as well as asset prices (Liu, 2014). The empirical evidence presented in the finance literature points out that investors should use information published in the media to regulate their expectations in terms of the value of their investments, and this behavior tends to be reflected in the movement of the market based on positive or negative news. Due to these arguments, we propose testing H_4:

> **H_4:** The ECF market reacts to the text sentiment of news.

METHODOLOGY

Data collection and variables

This study uses data from the largest ECF platform (kria.vc) in Brazil, which is the 9th largest economy and one of most representative emerging economies in the world, in addition to being the largest economy in the region. The Kria platform follows an all-or-nothing business model. In this model, the financing target is defined for ventures during a certain period. The venture should at least equal the minimum fundraising target to ensure that it is not canceled with the financial investments that have been received up to that point being returned to the investors.

The Brazilian institutional environment is characterized by social, cultural, technological, and regulatory conditions that make the advance of startups and SMEs in general timid, even though this sector is responsible for half the employment in the country. Excessive and outdated regulation that promotes complicated bureaucracy and unnecessary costs inhibits commercial performance in Brazil.

The data collection was performed in two distinct phases. The first was concentrated on obtaining data provided by the ECF platform, which constitutes the structure of the information offered to the public (Figure 1): (a) the value of the investment in the ventures; (b) the number of investors; (c) the venture category (product or service); (d) the entrepreneur's gender; (e) the presence of an anchor investor (one that has previous experience), and (f) the investment stage (validation or expansion). The 736 investment operations involved 22 ventures from a variety of sectors (including ventures from the construction, digital marketing, education, food, retail, auto, consumer goods, fintech, co-working, logistics, agricultural, health, real estate, delivery service, marketplace, and mobile app sectors), with a total value of over R$ 7.2 million. The second phase of the data collection involved mass media news items.

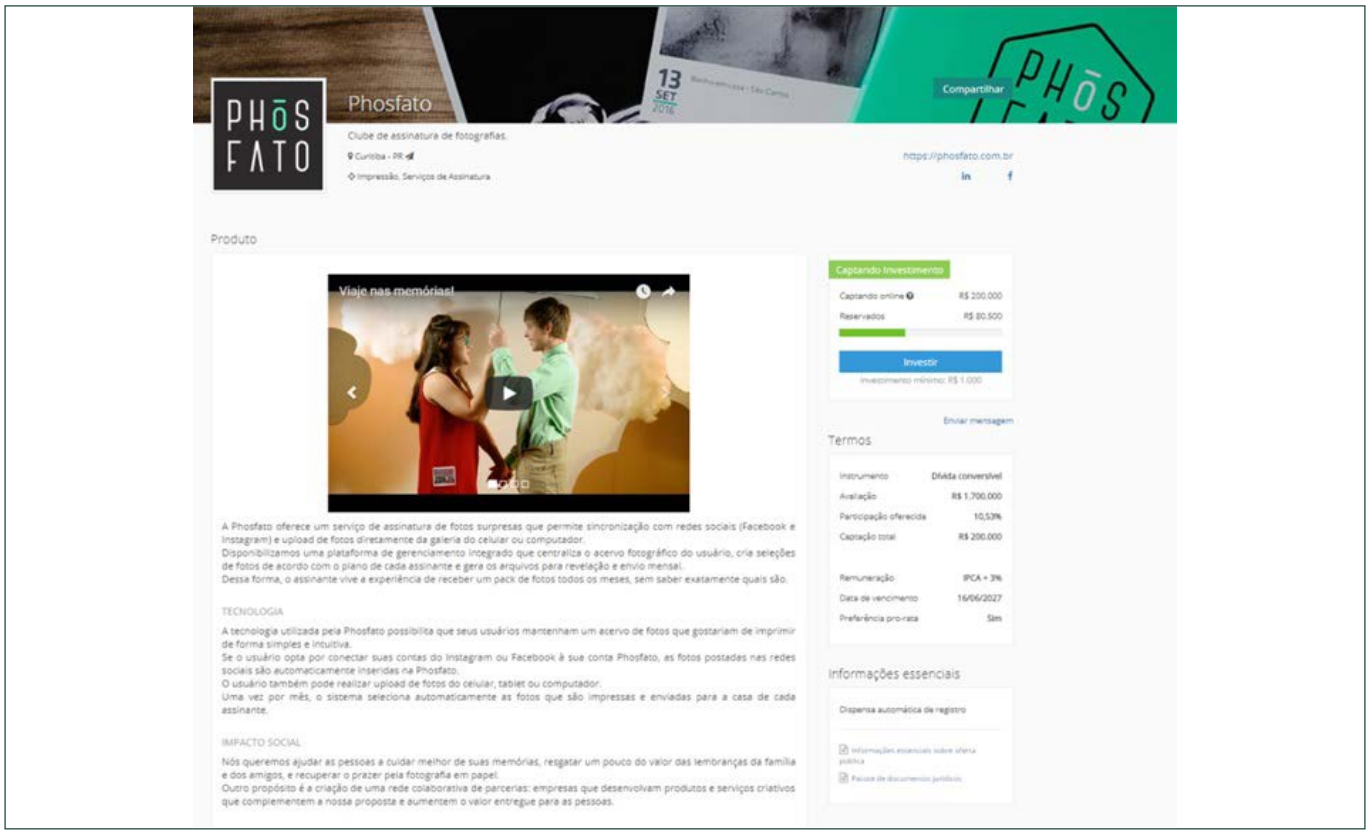

Figure 1. An example of a company raising money on the ECF platform.
Source: Kria platform. Retrieved from https://www.phosfato.com.br/

The reason that the mass media were considered in this study is the importance of these communication media to the Brazilian market. According to Brazilian media research (Portal AERP, 2015), the country's media consumption habits are concentrated on television, radio, and the internet. In addition, most of those interviewed say that they have most confidence in newspapers, which are read in their printed and digital forms. Portal AERP also reveals that 73% of those interviewed watch television every day, 30% listen to the radio daily, and practically half of all Brazilians use the internet for information on economy, politics, culture, and leisure, among other subjects.

Founded in 1870, this newspaper has a daily circulation of 200 thousand copies, is available in an electronic format (estadão.com), and is located in the financial center of Latin America, the city of São Paulo. This newspaper is the hub of a private news agency (the Estado Group), with ample capacity to distribute information all over Brazil. The news collected consisted of the 275 dates in which there were ECF investment operations during 2015 and 2016.

The variables used in this study, presented in Table 1, were selected from the current literature about the use of ECF as an alternative to financing for different categories of innovative ventures. This study uses two groups of analysis, one focused on mass media and the other on geographic attributes. The first group considers three groups of variables. The first represents the attributes of ventures that receive investments (*Capital target*, *Anchor*, and *Gender*).

Table 1. Variable definition.

Variable	Variable definition
Value	Dependent variable represented by the natural logarithm of the value of a given investment in venture *i*.
Capital target	Relationship between the financing goal of the venture and the number of investors in this business. The financing goal of these projects was considered in this model because it should indicate the quality of the venture being offered and can serve as a tool to attract investors (Josefy et al., 2017; Mollick, 2014; Zvilichovsky et al., 2015).
Anchor	Variable that indicates the presence of an anchor investor (dummy: 1 = yes; 0 = no), that is, one with more experience in investing in high-risk businesses (a proxy for project credibility). According to the literature, the presence of these individuals or other reliable intermediaries can stimulate greater investments in businesses (Alexy et al., 2012).
Gender	Dummy variable that informs the gender of the entrepreneur (dummy: 1 = male; 0 = female), or in other words, the entrepreneur who is offering the investment opportunity. This variable was incorporated in the model that investigates the value of ECF investments because it is believed that, in the same way as occurs with venture capital and traditional sources of financing, the gender of entrepreneurs can limit their access to the desired amount of capital (Barasinska & Schäfer, 2014).
Negative news	Variable that represents the negative sentiment of the investor due to news items published on the day they occurred to the i^{th} investment operation.
Positive news	Characterizes a positive text sentiment given the publishing of a news item regarding a venture on a day in which an investment was confirmed for a venture. These variables were developed through a programming language designed to extract the linguistic content of news items related to investor sentiment.
Category	Dummy variable that represents the category of the analyzed ventures, which were divided into businesses associated with goods or services. Dummy: 1 = good; 0 = service.
Stage	Dummy variable that indicates the stage of a venture that is seeking financing through ECF, namely expansion (for an existing business) or validation (for a new business). Dummy: 1 = expansion; 0 = validation.

The second group is related to variables used to express a negative text sentiment (*Negative news*) or a positive text sentiment (*Positive news*) in media news items, using a vector space model, in accordance with the instructions of Loughran and McDonald (2011). Lastly, the third group of variables consists of controls for the venture category and stage.

We used the market sentiment on the day of the investment, measured via textual analysis of daily traditional media news content. This proxy captures sentiment and trust at the national level based on positive or negative news. In this sense, we have constructed an indicator of investor sentiment via widely published traditional media news from newspapers with the largest circulation in Brazil. *Negative news* = negative textual investor sentiment in the face of news on day *d* when the i^{th} investment was received for the ECF campaign. *Positive news* = positive textual investor sentiment in the face of news on day *d* when the i^{th} investment was received for the ECF campaign.

The 275 news items published daily in the traditional media were obtained from a manual collection of the front pages of one of the largest Brazilian newspapers (*O Estado de São Paulo*). To obtain negative news and good news, we employed Loughran and McDonald's (2011) procedure for mainstream media using natural language processing (NLP) to extract linguistic content from the news. The purpose of this procedure is to extract the feeling or opinions of individuals from the content and structure of a text or document (Li et al., 2014). This method consists of five steps, the first of which is the collection of news (in our case, we collected the 275 news published on the front page of the newspaper under analysis on the day that there were contributions to ECF ventures) for the creation of the linguistic corpus; the second is known as the tokeni-

zation process, that is, the linguistic corpus generated undergoes a cleaning to exclude non-textual elements or stop words (e.g., prepositions) to generate a general list of words (five thousand terms found); the third consists of classifying words as negative or positive from the general list obtained in the second step; at the end of three rounds of word classification, we obtained 605 negative words and 315 positive words (recommendation by Loughran & McDonald, 2011); the fourth seeks to measure the negative and positive textual sentiment of the total news set considering the weight of the term in relation to a news item, the weight of the term in relation to all news items, and the normalization factor for a news item as presented in , whose purpose is to compensate for the difference in the size of the news considered.

$$w_{r,s} = \begin{cases} \frac{\left[1+\log\left(tf_{r,s}\right)\right]}{\left[1+\log\left(a_s\right)\right]} \log\frac{N}{df_r} \; if \; tf_{r,s} \geq 1 \\ 0 \; otherwise \end{cases} \quad (1)$$

where: $w_{r,s}$= term weight of a word *r* in document *s*; $tf_{r,s}$ total instances of a word *r* in document *s*; α_s proportion of words counted in a document *s*; *N* = total number of documents in the sample; df_r = total number of documents with at least one occurrence of word *r*.

The second group of analyses just considers the investment operations for which location attributes were available for the investor, which involved 393 investment operations. These investments were placed in 22 ECF projects based in nine Brazilian cities. The centers of each of the cities were used to identify the geographic distance between the entrepreneurs and the investors. Using the Google Maps API tools (http://code.google.com/apis/maps/), the coordinates of the centers of the cities were identified and then the distance between them was calculated based on the procedures recommended by Nichols (2007).

RESULTS

Profile of capital investments

Table 2 presents the overall characteristics of investments made in ECF ventures. The average capital investment was more than R$ 9 thousand, with the largest being R$ 660 thousand and the smallest being just R$ 1 thousand. The ratio between venture financing targets and the number of investors was, on average, more than R$ 9.6 thousand, with a maximum of R$ 40 thousand and a minimum of over R$ 3.7 thousand, with 68% of the ventures having an anchor investor. Men represented 81% of the business leaders leading the ECF projects in this study, and 30% of the ECF ventures were for businesses linked to products, with the rest being service-related. The proportion of ventures that were in the expansion phase was 84%, with 16% of these being new ventures whose business ideas were being evaluated.

Table 2. Variables and descriptive statistics.

Quantitative variables	Avg.	Std. Dev.	Min.	Max.
Value (R$)	9,815.90	30,115.57	1,000.00	660,000.00
Target capital (R$)	9,619.00	7,575.25	3,797.47	40,000.00
Dummy variables	**Percentage**	**Std. Dev.**		
Anchor	0.68	0.47		
Gender	0.81	0.39		
Category	0.30	0.46		
Stage	0.84	0.36		

Note. This table presents the quantitative variables (without logarithmic transformation) and the dummy variables (*Anchor, Gender, Category*, and *Stage* with percentage values) used to investigate the value of investments made in ECF projects. N = 736.

Semantic analysis of the media

In terms of the text sentiment of the news items, Table 3 indicates that the average text sentiment of the negative news items was 19.82. However, there were news items that did not have negative content, or in other words, the text sentiment was equal to zero, and others had negative items with a maximum weight of 191.00. In contrast, positive text sentiment in news items presented an average value of 10.17. It should be noted that there were news items with positive text sentiment equal to zero and other positive items with a maximum weight of 96.00.

Table 3 presents the words that have the greatest weight in the text sentiment analysis. Observe that the word 'support' had the largest weight in the positive word category, with a value of 70.72. This word was encountered 38 times in 29 distinct news items. The word 'value' was the word with the second largest weight in the observed news items with a value of 44.81. This word was found in 18 captured events in 16 different news items. The words 'growth,' 'investments,' and 'democracy' were next on the list of the five positive words with the greatest effects in media news items. On the other hand, 'guarantee', 'legitimacy', 'development', 're-

covery', and 'sharing' were the positive words that had the least effects in the news content.

In relation to the words of a negative nature, 'lawsuit' was the word that had the greatest weight, namely 106.71. This word was found in 89 events and in 53 different news items. The next word in terms of weight was 'crisis,' which had a weight of 71.17, and it was found in 45 events and in 37 different news items. The words 'spending,' 'fall,' and 'risk' were next on the list of the five negative words with the greatest effects in media news items. On the other hand, 'unemployment,' 'fraud,' 'illegal,' 'uncertain,' and 'chaos' were the negative words that had the least effects in the news content.

Table 3. Estimates of the term weights.

Words with greatest effects				Words with smallest effects			
	Occurrences	News Items	Term weight		Occurrences	News Items	Term weight
Panel A: Positive words							
Support	38	29	70.72	Guarantee	4	4	16.92
Value	18	16	44.81	Legitimacy	3	3	11.68
Growth	17	11	42.8	Development	2	2	9.85
Investments	14	12	39.55	Recovery	2	2	8.75
Democracy	13	7	31.32	Sharing	1	1	5.62
Panel B: Negative words							
Lawsuit	89	53	106.71	Unemployment	5	3	15.79
Crisis	45	37	71.17	Fraud	3	3	13.55
Spending	34	24	64.86	Illegal	3	2	12.15
Fall	25	17	51.69	Uncertain	2	1	7.21
Risk	18	14	44.32	Chaos	1	1	4.89

Note. Calculated by the authors. This table presents the five top words in terms of frequency in news items in cover stories of the newspaper *O Estado de São Paulo* on the 275 dates in which investment operations in ECF occurred.

Words of a negative nature that have larger weights and frequencies can lead market investors to reduce their investments or even suspend potential large investments. In compensation for this, it is expected that positive words with larger weights and frequencies in the same news item can encourage greater participation by investors. However, it is probable that the same news item has diverse impacts on the varied types of crowdfunding. An example of this is that a news item of a negative nature regarding the financial situation of a country can cause a negative sentiment on the part of an ECF investor. On the other hand, this may be perceived as a good moment to invest in the lending crowdfunding market. This should happen because in financial crises individuals tend to resort more to loans to meet their capital needs. Given this fact, the sentiments of crowdfunding market investors should vary depending on which type they are working with and, compared to traditional market investors, they may be excessively varied.

Analysis of ECF investments

Table 4 presents the estimated models, which have the value of the investments in the ventures as their dependent variable. To study the relationship between text sentiment and the mass media, and the value of capital investments in projects financed by the equity fundraising platform, we adopted our model using ordinary least squares (OLS) and a robust standard error with fixed effects.

In this table, model I considers all the variables, but without controls; model II was estimated with the variables of interest and a control for venture attributes (category); model III was estimated with the variables of interest and another control for the venture attributes (stage); model IV was estimated with all the variables, including the controls; and model V was estimated completely with the Heckman's (1979) correction for sample selection bias effects. This model was designed to control for potential selection bias. However, according to model V, no indications of bias were encountered in this study's selection. Thus, we were able to use the estimates obtained in the other models in this discussion.

It is possible to state, using the estimated models in Table 4, that H_1 was supported, which means that the variable of interest presented a positive and significant parameter ($\widehat{\gamma_1}$ = 0.439). Thus, it is possible to admit that the financial targets of the project should influence the disposition to make capital investments in ventures featured on this platform. This finding is in line with the works of Vismara (2016) and Ahlers et al. (2015), who argue that well-adjusted financial targets can serve as a stimulus to attract investors in the ECF market.

Table 4. Estimated regressions for the value of ECF investments.

	Model I	Model II	Model III	Model IV	Model V
Companies' attributes					
Target capital	0.420***	0.439***	0.390***	0.411***	0.439**
	(0.092)	(0.092)	(0.093)	(0.094)	(0.135)
Anchor	0.495***	0.521***	0.502***	0.527***	0.607**
	(0.084)	(0.085)	(0.084)	(0.085)	(0.203)
Gender	-0.139	-0.284**	-0.158	-0.294**	-0.238
	(0.113)	(0.120)	(0.113)	(0.120)	(0.212)
Sentiment of news					
Negative news	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)
Positive news	0.007*	0.007*	0.007*	0.008**	0.012
	(0.004)	(0.004)	(0.004)	(0.004)	(0.008)
Inverse Mills ratio					
Lambda					1.838
					(2.005)
Controls					
Category		-0.237***		-0.226**	0.502
		(0.089)		(0.089)	(0.816)
Stage			0.192**	0.177*	0.159
			(0.097)	(0.097)	(0.205)
Fixed effects (year)	Yes	Yes	Yes	Yes	Yes
Constant	4.324***	4.303***	4.426***	4.399***	3.380*
	(0.812)	(0.814)	(0.814)	(0.815)	(1.492)
R^2	0.132	0.139	0.137	0.143	
Adj. R^2	0.125	0.132	0.128	0.134	
Wald Chi^2					40.28***
AIC	2,023.7	2,019.2	2,021.9	2,018.1	
N	736	736	736	736	608

Note. This table presents the parameters estimated via OLS, using the dependent variable *value*. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. The regressions were estimated via robust standard error. The standard error of the coefficients is presented inside the parentheses. Control for the marginal time effect on the observed variables (2015-2016). Heckman selection model in two stages: 128 censured observations (18%) = investments in ventures with zero success, or in other words, unsuccessful businesses.

The target values of venture financing should have a positive impact on the value of the financing campaign (Zvilichovsky et al., 2015), given that they should reflect the quality of the business opportunity being made available to the public (Colombo et al., 2015). In addition, Hornuf and Neuenkirch (2017) note that ventures that present slightly superior financial targets are informed that they can pay higher financial premiums in exchange for the investments they raise.

In a similar manner, H_2 was supported, which means that the observed variable was positive and significant ($\widehat{\gamma_2}$ = 0.527). Thus, it appears that the presence of more experienced investors (here called anchor investors) can affect the size of capital investments made in collective ventures. It is probable that the participation of people who have practical knowledge in making high-risk investments can have a positive effect on the value raised by businesses using the ECF market. This finding supports the arguments of previous works such as Stuart and Sorenson (2003) and Alexy et al. (2012). In addition, this may indicate that in markets that present risky investment opportunities, the presence of experienced investors can signal the quality of these ventures (Moritz et al., 2015) and reduce the asymmetry of information (Courtney et al., 2017).

In relation to the gender of the entrepreneurs, it was verified that ECF venture investments are influenced by the gender of the business owner. As seen in model IV, ventures managed by men received less investment ($\widehat{\gamma_3}$ = -0.294). In other words, this conforms to H_3, which states that the entrepreneur's gender can influence the dynamic of capital investments made in the ECF market. This result suggests that ventures led by women received more generous investments compared to investments led by men. This result contrasts with the traditional financial discrimination found in the economic literature and may suggest at least two relevant explanations. The first is that women are able to achieve greater access through collective financing, at least in the context of the Brazilian market. This logic is supported by Greenberg and Mollick (2014) and Mollick and Robb (2016), to whom crowdfunding has managed to soften the inequalities of economic restrictions. The second suggests that ventures directed by women may be signaling greater credibility to investors than those administered by men.

Our finding deepens the understanding of gender differences in investor behavior, and we advanced in this field, following the recommendations of Mohammadi and Shafi (2018). These authors point out that the gender of both the investor and the entrepreneur can influence the dynamics of capital allocation in ECF campaigns. More recent studies such as Malaga et al. (2018) and Kleinert and Mochkabadi (2021) provide evidence of discriminatory behavior by ECF market investors. The first study defends the idea that crowdfunding has not been able to reduce the conventional problems of access to credit for female entrepreneurs. And the second suggests that male entrepreneurs are more likely to have their businesses financed by ECF.

The results obtained for the negative text sentiment of these news items suggests that this variable does not appear to influence the disposition of investors to place their financial resources in ECF ventures, given that the estimated coefficient for negative news items is negative and not significant ($\widehat{\gamma_4}$ = -0.002). This result contrasts with a portion of the literature that investigates the impact of news items on the market, but this may suggest that investors do not attach much importance to negative information published by the mass media in making their decisions to invest in startups. However, the unprecedented results obtained in this study provide evidence to those who suggest that the ECF market appears to react to the text sentiment of positive news items.

Positive news can encourage greater capital contributions to startup financing campaigns by ECF. This should serve as a signal to attract new investors (Courtney et al., 2017) and also to increase the chance of success of campaigns, as greater capital contributions accelerate the achievement of the financial goals of these businesses (Felipe & Ferreira, 2020). Thus, H_4 was supported only for positive news items. As shown in models I, II, III, and IV, positive news had a positive and significant association with the value of investments ($\widehat{\gamma_5}$ = 0.008; p < 0.05). This should indicate that people may be sensitive to positive news items, in such a way that their behavior is modified by the feelings that the publications give them (Ammann & Schaub, 2017).

People tend to share their enthusiasm, and this may be reflected in their investment behavior. This result supports the conclusions of Tetlock (2007) and Jegadeesh and Wu (2013), who note that the news can influence investment behavior. Our finding converges with the conclusions of the studies by Nitani et al. (2019) and Meoli and Vismara (2021), which suggest that investors demonstrate certain rationality to allocate capital in ECF ventures based on consideration of business signals, financial statements, and opinions of other investors. We believe that our finding helps understand investor behavior and their entry into the ECF market (Hornuf & Schwienbacher, 2018).

The lambda coefficient of the Heckman selection model was not significant and presented a positive effect ($\widehat{\gamma_6}$ = 1.838). In other words, the error terms of the estimated models for the selection and the initial model are not correlated. Thus, non-observed elements that could contribute in a deeper manner to the value of investments are not associated with the success or failure of the campaigns of these ECF ventures.

It should also be noted that the venture category may have some association with the value of the financial investments ($\widehat{\gamma_7}$ = -0.237). The ventures with a business focus on products tend to receive less investment than those linked to services. There seems to be some preference for businesses that offer services. In terms of the stage of the ventures and whether this variable affects the investing of financial resources in these ventures, those that are in the expansion stage tend to receive larger investments than those in the validation stage (new ones). This behavior can be attributed to the fact that already existing ventures can offer more information, especially financial information (Berger & Udell, 1998).

Additional analyses and robustness tests

There are reasons to believe in the influence of geographic aspects on the disposition of investors to place their financial capital in ventures, given the literature on other types of crowdfunding (Agrawal et al., 2011), though there does not appear to be any evidence regarding the subject of this study, ECF. Thus, it is believed that significant associations may be found between geographic distance and the value of investments made in these ventures.

More than 44% of the operations carried out were for projects with geographic distances of less than 50 km. In other words, the distance between the investor and the venture is limited for ventures, which is not unlike what has been observed for traditional and venture capital financing. A total of 28.76% of the investments were made in ventures with a geographic distance of between 50 km and 500 km, 19.58% were between 500 km and 1,500 km, and approximately 5% of the investments had geographic distances between 1,500 km and 2,500 km. Just 3% of the investments had distances greater than 2,500 km. Figure 2 presents the dispersion of the capital investments in these ventures, emphasizing the geographic distance between the entrepreneur and the investor.

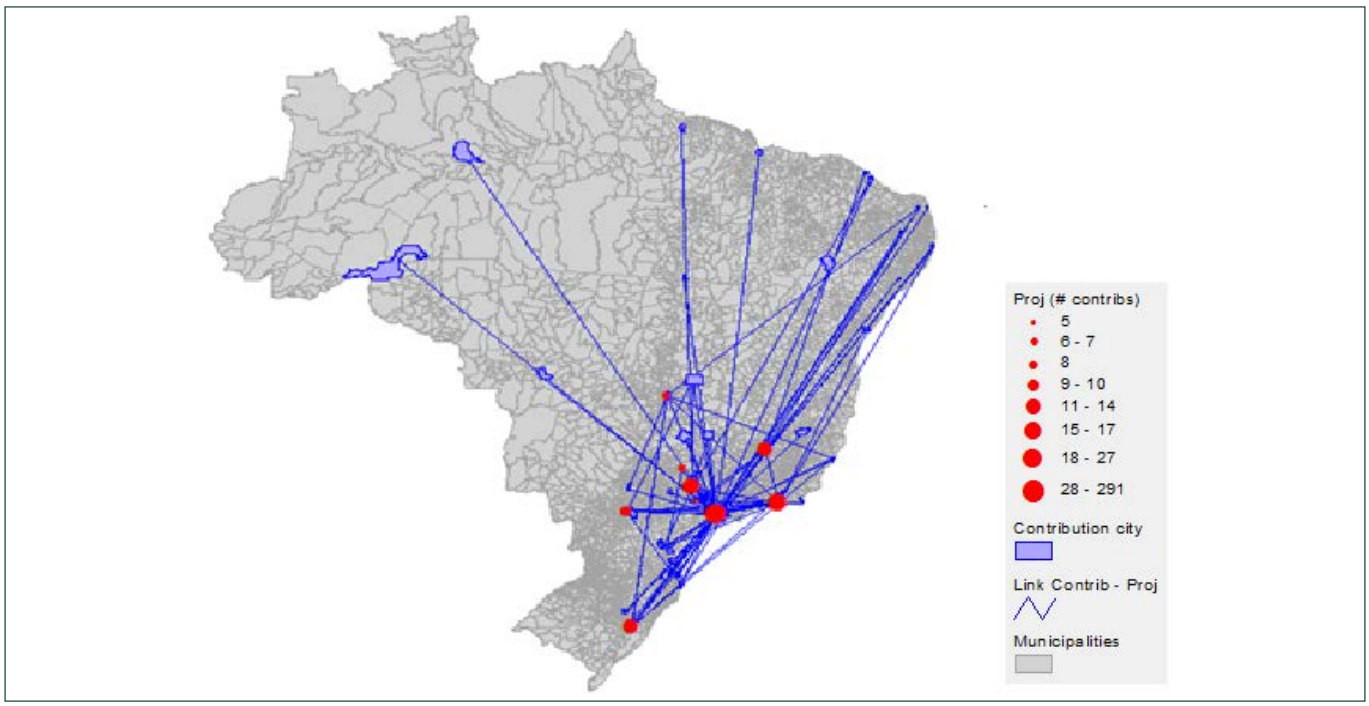

Figure 2. Geographic dispersion of the investments made in ECF projects.
Source: Prepared by the authors. This figure presents the geographic dispersion of the investments made in ECF projects. The circles in red represent startups financing projects that have sought resources on the Kria platform. The investments made in these projects are highlighted by the areas in blue.

Table 5 presents the estimated coefficients for the five models having the dependent variable of the value of the capital investments made in these ventures, and it should be noted that model V was estimated using a GWR (geographically weighted regression) for the significant variables. In all of the estimates, the venture fundraising target presented a significant relationship with the value of the investments made in the ECF market ($p < 0.01$). The largest marginal effect was recorded for model II. However, the estimated coefficients for the other models point to relatively stable results with similar effects. The presence of more experienced investors was also revealed to be important in determining the value of the investments in these ventures ($p < 0.01$).

Table 5. Estimated regressions for the value of ECF investments.

	OLS				
	I	II	III	IV	GWR[a]
Companies' attributes					
Target funding	0.294***	0.327***	0.273***	0.306***	[0.268 ; 0.316]
	(0.099)	(0.096)	(0.097)	(0.094)	
Anchor	0.300***	0.297***	0.288***	0.284***	[0.264 ; 0.350]
	(0.109)	(0.109)	(0.108)	(0.108)	
Geography					
Distance	-0.033**	-0.037**	-0.038**	-0.037**	[-0.041 ; -0.034]
	(0.016)	(0.016)	(0.016)	(0.016)	
Controls					
Category	Yes	Yes	No	No	No
Stage	Yes	No	Yes	No	No
Constant	5.573***	5.433***	5.729***	5.594***	[5.506 ; 5.903]
	(0.849)	(0.843)	(0.837)	(0.832)	
AIC	1,057.3	1,057.0	1,056.5	1,056.4	1,051.31
R^2	0.07	0.07	0.07	0.07	
Adj. R^2	0.08	0.08	0.08	0.08	
Quasi-global R^2					0.09
N	393	393	393	393	393

Note. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. [a] Bandwidth (bwGauss) = 0.768. The standard error of the coefficients is presented inside the parentheses. In estimations I to IV we tested the variables of interest with the presence (or not) of controls. The spatial autoregressive model (SAR) was tested, but it did not obtain a statistically significant adjustment, that is, the spatial influence was only at the local level. This evidence was confirmed by the good fit of the GWR model.

The largest observed set of the variables' marginal effects was revealed by the GWR model. That is, the effects of independent variables on the value of investments were registered with greater intensity by the spatial model. This model reports a minimum and maximum interval for the variation in the estimated

coefficients, revealing the smallest and largest one-off effects of the examined variables. In addition, the fit of the GWR model enables us to infer that the influence of the spatial autocorrelation of the observed data is given by local statistical associations, or in other words, the smallest unit of geographic analysis. The evidence presented by the GWR estimate suggests that spatial models may have a greater explanatory capacity in terms of the effects of geographic characteristics on the value of investments in the ECF market.

These findings are in line with Lukkarinen et al. (2016), who relate that ECF ventures make themselves more attractive to the extent that their attributes present the information necessary for the process the individual pursues in making an investment decision. These results suggest that ventures with fundraising targets that are aligned with investor expectations and that signal the participation of experienced investors in the funding process tend to attract larger investments of capital. In relation to the effect of geographic distance on the value of these investments, all of the estimated models converged in terms of effect and significance.

This is to say that it was demonstrated that the geographic distance between the entrepreneur and the investor negatively affects the value of investments. Given this, when the geographic distance is greater, these individuals tend to make smaller investments. Almost half of the investments made were made from a distance between 0 km and 50 km, and they decrease as we deal with wider ranges. Therefore, it should be noted that even though Brazil is a country of continental dimensions, the geographic concentration of ECF investors still presents behavior that is similar to other methods of financing startups, such as venture capital.

CONCLUDING REMARKS

In this paper, we have analyzed the disposition of investors to place their funds in projects that are being financed through ECF platforms, using a unique data set of ECF investors. Our sample included 736 investments made in 2015 and 2016 (all the data we were able to collect during this period) using the largest platform in the recently regulated Brazilian ECF market. Our results suggest that the attributes of ECF can positively influence the value of capital investments made regarding the capital target and the participation of an anchor investor in the collective funding process, and negatively when the entrepreneur is male. In other words, ventures led by women tend to receive larger investments compared to those managed by men. We also have found that ventures that offer products tend to receive less financing when compared to those that offer services.

In terms of investor behavior in relation to media news items, we have found that positive news items are capable of motivating financial investments. Since the ECF market tends to be riskier than others (Hossain & Oparaocha, 2017), information that helps reduce the uncertainty of this market may be useful to investors (Cumming et al., 2021b; Hornuf & Schwienbacher, 2018). In this way, it should be noted that as happens in more traditional markets, in ECF news items can be useful in reducing the asymmetry of information and as a result, they moderate the uncertainties related to investment opportunities in this market. However, we were not able to make the same conclusions regarding negative news items. The behavior of ECF investors does not seem to be sensitive to pessimistic news.

In the same way as traditional and venture capital markets, it appears that ECF investors are sensitive to the geographic distance of these ventures, with greater geographic distances between the entrepreneur and the investor being associated with a lower propensity for investors to place their funds in these ventures. Thus, regarding the Brazilian market, we were not able to support the arguments of Agrawal et al. (2011), who argue that crowdfunding is capable of overcoming conventional barriers of spatial credit restrictions.

Since Brazil is an emerging market of considerable size and is the dominant one in the region, the results of this study may be relevant in terms of government policy to support startups and small and medium-sized companies, which do not encounter restrictions in funding projects of a larger scale through ECF. Capital markets may help develop companies that may stimulate the Brazilian economy, collaborating to achieve more competitiveness, and thereby providing more and better products and services to the country's citizens, something that is desirable in capitalist economies and is especially relevant for emerging markets. In addition to this, our results have practical implications for other agents. First, for managers of crowdfunding platforms, we provide evidence that points to the need for a more accurate selection of campaigns with the greatest potential for success. We also understand that our findings should be useful for policymakers, who work to improve the legislation for the functioning of the ECF and need more information about the dynamics of capital allocation in this market. Finally, we believe that the discussion promoted here may be relevant for entrepreneurs who use the ECF, since knowing that news can influence investors' behavior, they can choose the best timing for the dissemination of their campaign.

We should point out that there are limitations inherent to the scope of this study. We recognize that the

relationship between text sentiment and investor sentiment may be heterogeneous (Kearney & Liu, 2014) and it was not possible to extend the data collection period. These limitations, in interaction with the results obtained in this work, point to avenues of future study in the field of finance. We suggest, among other studies: (a) analyzing the relationship between this market and the sentiment of mass communication through other forms of media, like Twitter or Facebook, for example; and (b) using machine learning methods to generate forecasting models for some of the investments in this and other similar markets.

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