The Power of Stakeholders' Voice:

The Effects of Social Media Activism on Stock Markets

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Abstract

Building on social movement theory, this study assesses the influence of social media activism on the stock market performance of targeted firms. We focus on information published on Twitter by two critical stakeholders: consumer associations and trade unions. To the extent that social media represent a valid medium to mobilize stakeholders' activism, protests on Twitter may damage firm reputation, leading to capital market reactions. Using a corpus of over 1.5 million tweets referring to Spanish listed banks, we study the impact of activism by looking at targeted firms' abnormal variations in price and trading volume. Our findings suggest that the Twitter activism of key stakeholders has a significant impact on investors' decisions. Further, our empirical analyses indicate that the mechanisms affecting investors' behavior differ depending on the characteristics of the stakeholder group. Hence, this study contributes to understanding how social movements influence corporate behavior via social media.

Keywords: *stakeholder engagement, activism, social media, social movement theory, banking industry, market reaction*

1. Introduction

While the Internet can be a channel to communicate corporate social responsibility (CSR) information (Guimarães-Costa and Pina e Cunha, 2008), and engage with stakeholders (Unerman and Bennett, 2004), recently social media (SMe) have democratized the process of dialogue between companies and stakeholders (Coombs, 1998; Jansen et al., 2009). The novel role of SMe such as Twitter or Facebook, where one-to-one and one-to-many conversations can be held, is relevant because these Internet-based networks are beyond the control of companies (Qualman, 2010). Stakeholders can initiate and discuss any issue of their interest and engage in dialogue *about* and *with* the company, in a media characterized by almost immediate and worldwide diffusion.

SMe have become important for mobilizing social activism (Kahn and Kellner, 2004; Yang, 2013). This is corroborated by anecdotal evidence, such as the more than 100 million users in 196 countries of the petition website Change.org.[3] In this context, social activists have found a new voice. While the dialogue with stakeholders has become an essential strategy to ensure the financial stability of companies (Ruf et al., 2001; Alniacik et al., 2011; Vasi and King, 2012; Michelon et al., 2013; Boesso et al., 2015), the use of SMe also enhances the complexity of managing corporate reputation and identity (Bebbington et al., 2008; Heikkurinen and Ketola, 2012).

Despite its growing importance, it is still not well understood whether activism in SMe gains sufficient traction to reach the mainstream and represent another pathway of stakeholder influences on corporations (Henriques and Sharma, 2005). Initial diffusion

[3] Change.org is a web platform where users can start or support a petition. The aim is to create social pressure to change things. Change.org website <http://www.change.org/about>, accessed December 2016.

is fast and wide-reaching, but its impact may not be long-lasting and diffusion may stall just as fast.[4] Building on social movement theory (SMT), and specifically on the work of King and Soule (2007), we study the mobilization of activism in SMe and the impact of protests started in Twitter. If SMT has traditionally addressed *why* social movements emerge and *how* they engage supporters in collective action (Carroll and Hackett, 2006), we contribute to understanding whether social movements influence corporate behavior (King and Soule 2007; Vasi and King 2012).

While King and Soule (2007) empirically analyze how *protests* affect market reactions of targeted firms, we consider such effect in the innovative context of activism in *social media*, and particularly Twitter. SMe facilitate the presence of organized activism and a wide dissemination of campaigns. However, the extent to which SMe activism can affect investors' perceptions and therefore, stock price, is still unclear. We look at SMe activism and its impact on abnormal market returns in the Spanish banking industry for a period of 187 days (from 14 November 2013 to 19 May 2014). According to the Barometer Survey of the Spanish Centre for Sociological Research (CIS, 2012), Spanish banking institutions are among the main concerns of Spaniards, and Spain has assisted to the rise of activism demanding more ethics in finance.[5]

Our findings demonstrate that Twitter activism by critical stakeholders, such as consumer associations and trade unions, has a significant impact on investors' decisions. Specifically, we identify a significant impact of tweets by trade unions both on stock price and trading volume. In contrast, the number of trade unions' followers

[4] Twitter trends represent the most visible topics. They are highly dynamic, since they are determined by an algorithm that identifies *"the most popular topics at the moment, rather than the topics that have been popular for a while or on a daily basis"*. Twitter website: FAQs about trends on Twitter <https://support.twitter.com/articles/101125>, accessed April 2017.

[5] Europa Press (2013), "Ethical banking grows 60 percent in savings and 20 percent in loans during 2012", <http://www.europapress.es/epsocial/responsables/noticia-amp-banca-etica-crece-60-ciento-ahorro-20-prestamos-2012-20130509131307.html>. Accessed December 2016.

does not affect stock prices or trading volume. The mechanisms of influence of civic and consumer associations are opposite. These organizations affect investors' decisions through their visibility and influence in social media rather than through the intensity of their posts, as we detect a negative effect on stock prices, both under bearish and bullish market conditions, when the protest by these associations reaches many Twitter users.

Our paper makes several contributions. First, we integrate King and Soule's (2007) analysis by considering the influence of SMe activism on the stock market. The lens of SMT is innovative as it extends stakeholder theory and thus contributes to a more comprehensive vision of the business-society relation (Steurer, 2006). Furthermore, it allows better understanding of how stakeholders can put pressure on firms and impact market perceptions. As such, it complements prior studies on stakeholder salience, by focusing on the power to influence the company (Mitchell et al., 1997; Grafé-Buckens and Hinton, 1998; Henriques and Sharma, 2005; González-Benito and González-Benito, 2010; Bolton and Landells, 2015) by showing that organized, collective and public stakeholder power can affect investors' decision and thus corporate financial performance. We also contribute to the social and environmental accounting literature and stakeholder engagement stream (Unerman and Bennett, 2004; Onkila, 2011; Boesso et al., 2013; Dobele et al., 2014; Rodrigue, 2014; Amran et al., 2015; Rodrigue et al. 2015; Kumar et al. 2016) by considering a new form of engagement that may have the potential to affect firms' behavior via changing investors decisions in the stock market. Finally, our research shows the impacts of SMe activism in the current socio-economic context, with the growth of social movement protests in Southern Europe (Sampedro and Lobera, 2014), and the development of social networks as predominant communication channels, that have remarkably enhanced and transformed social

movements (Anduiza et al., 2014). Therefore, it is important to investigate the role SMe play as tools that enhance stakeholders' activism.

The reminder of the paper is organized as follows. We first provide the theoretical framework and insights over how SMe activism can affect corporate behavior. We then present our formal hypotheses and research methodology. Section 5 presents the empirical results, which are then discussed in Section 6, concluding the paper.

2. Theoretical framework

2.1. Social movement theory and corporations

Social movements arise as collective expressions of complaint or proposals for solutions to a problem that affects a particular group (Tilly, 1978). Theoretical research highlights the role that social movements play on institutional change in modern societies, and propose a framework for convergent research in organizational studies and social movements (Davis et al., 2005; Schneiberg and Lounsbury, 2008). Hiatt et al. (2009) recognize that social activism can harm certain business models, but also provide new opportunities. Weber et al. (2009) find that social movements can affect internal decision-making processes. Lozano (2015) identifies NGOs activism and stakeholder pressure as drivers for corporate engagement in sustainable practices. McDonnell and King (2013) detect significant changes in the communication strategy of companies under boycott. Specifically, they find that communication is biased towards socially acceptable behaviors. Overall, the evidence in this literature is aligned with findings in social and environmental reporting (e.g. Cho, 2009; Cormier and Magnan, 2015; Vourvachis et al., 2016) and suggests that companies modify their behavior when social activists target them (Grolin, 1998).

Corporations are institutions of public interest but, unlike governmental organizations, are not directly responsible for the welfare of the entire society. As such, corporations rarely set up communication channels with stakeholders to effectively respond to their claims, so outsiders use alternative means to influence corporate decision-making processes. Hirschman (1970) refers to these alternative means as "exit" or "voice" strategies: "exit" is a reactive strategy which involves looking for alternatives as consumers of products or services (e.g. boycott); "voice", a proactive strategy which aims at changing the behavior of a firm by publicly reporting a situation that causes dissatisfaction or discomfort on critical stakeholders. When the group is very fragmented and stakeholders constitute an insignificant share of the firm's base or of the consumers of a specific product, exit may be ineffective and voice a better option. However, the two alternatives are not mutually exclusive. Even when consumers opt for exit, they could still use an expression of voice to make the company aware of the claims that motivate their action.

The expression of stakeholders' voice as a driver of corporate change represents the link between SMT and organizational studies. The recent research on how social movements explain changes in corporate behavior has been primarily related to employee (see e.g.: Manheim, 2001; Scully and Segal, 2002; Greven, 2003; Raeburn, 2004), or environmental issues (Lounsbury 2001, Lounsbury et al., 2003). King and Soule (2007) instead examine the effect of various activists' protests between 1962 and 1990 on abnormal stock price returns, which they suggest is a good indicator of how investors react to a focal event. Overall, prior research suggests that mass media in general play a catalyst role for the impact that stakeholders' protests have on business decisions (Dobele et al., 2014). While voice is a means for stakeholders to protest, and promote changes in business practices, SMe constitute an ideal catalyst for the

expression of stakeholders' voice, since they facilitate the implementation of collective, organized and public protest actions.

2.2. The role of social media in social activism

The growing penetration of SMe in all areas of life is emerging as a key factor in a complex socio-political and economic environment, particularly after the last financial crisis and the subsequent European sovereign-debt crisis. In a context of economic instability, political unrest, and remarkable social mobilization, SMe constitute a key instrument to disseminate social claims of various movements. Several studies have examined the role of SMe in processes of political upheaval, especially the Arab Spring (Eltantawy and Wiest, 2011; Youmans and York, 2012) and #Occupy movements (Juris, 2012). However, we still have little information about the role they play on the relationship between companies and society, conceived as the stakeholders directly or indirectly affected by business activities.

While prior literature on stakeholder salience (Mitchell et al., 1997) has focused on traditional mechanisms for stakeholder power, (Grafé-Buckens and Hinton, 1998; Henriques and Sharma, 2005; Dobele et al., 2014), we argue that SMe represents a novel medium that channels, catalyzes and, potentially gives rise to, activism. In a world where corporations operate globally, SMe offers a unique platform where fragmented international constituencies can come together and mobilize. SMe enhance and diffuse protests that may otherwise die out, without reaching potential audiences. Specifically, SMe protests fulfill the three requirements of social movements: they are collective, organized and public.

First, SMe protests are (a) *collective*. Social movements need to involve a sufficient (but variable) number of stakeholders. In the work of Lipsky (1968), activist groups involve no more than 10 people at any given protest. King and Soule (2007) simply require any protest to involve more than one person, and the average size of their protest samples is 90 people. Large protests have greater impacts, as they can grab the attention of authorities and media coverage (Lipsky, 1968; Baron, 2005) and thus reach the wider public. Large protests are more threatening, since they could bring greater disruption to their targets (Earl et al. 2003; 2004). SMe protests are considerably large, as the degree of involvement is more limited than in person-protesting and the possibility of anonymity encourages the participation of reticent individuals, turning it into a ground where protests can flourish, without need for clear leadership.[6]

A second key element is that protests should be (b) *organized*. Two aspects show the well-organized character of protest actions in SMe. There are several platforms that facilitate the organization of on-line protest actions such as: Change.org, Avaaz.org[7], Oiga.me[8] or MoveOn.org.[9] These platforms allow the development of organized protests and subsequent monitoring. Second, facilitators of traditional protests, such as trade unions or consumer associations, are also present in SMe.

[6] To illustrate the collective nature of protests in social media, on February 2016, out of the 200 most recent petitions on Change.org Spain, 45.5% reached more than a hundred supporters, and 11.5% had exceeded a thousand supporters. On-line activism platforms serve other social networks, mainly Facebook and Twitter, to spread the campaigns. Albeit anecdotal, this information supports the remarkable mobilization power of social media and the collective nature of their protests.

[7] Website of the on-line activism platform Avaaz.org Spain: <http://www.avaaz.org/es/>, accessed February 2016.

[8] Website of the on-line activism platform Oiga.me: <https://oiga.me/>, accessed February 2016.

[9] Website of the on-line activism platform MoveOn.org: <http://front.moveon.org/>, accessed February 2016.

Finally, protests need to be (c) *public*. The public nature of these protests is obvious by the socializing purpose of social media. Microblogs on Twitter (i.e. tweets) are, by default, public.

3. Hypotheses development

Whilst the impacts of SMe are still not well understood, recent evidence suggests their effects are economically significant. We find anecdotal evidence that on-line activism causes changes in corporate behavior. We have identified several cases of successful campaigns related to the Spanish banking sector achieving, for example, the elimination of bank fees,[10] the cancellation of mortgage debt,[11] the granting of social rent[12] or the suspension of evictions.[13]

We specifically study the effect of SMe activism on investor's decisions, and hence on stock price, as a means of pressure to bring about changes in corporate behavior. The SMe environment meets the two premises of King and Soule (2007) for activist groups' protests to negatively affect stock prices. SMe platforms have a large presence of activist groups that achieve rapid dissemination of their protests on the Internet, and can involve the main stakeholders.

Although the relevant literature on this issue is scarce, prior research has investigated the influence of SMe on stock markets, although not in terms of collective, organized and public protest. For instance, Tumarkin and Whitelaw (2001) find a

[10] Successful campaign on Change.org against 'La Caixa' (Caixabank): <https://www.change.org/p/la-caixa-eliminad-las-comisiones-por-utilizar-la-banca-por-internet>, accessed December 2016.
[11] Successful campaign on Change.org against BBVA: <https://www.change.org/p/bbva-condonadnos-la-deuda-que-mis-hermanos-y-yo-heredamos-cuando-nuestros-padres-fallecieron>, accessed December 2016.
[12] Successful campaign on Change.org against 'La Caixa' (Caixabank): <https://www.change.org/p/la-caixa-me-concedan-dación-en-pago-total-alquiler-social>, accessed December 2016.
[13] Successful campaign on Change.org against Banco Popular: <https://www.change.org/p/ayúdame-a-salvar-a-mi-familia-del-desahucio>, accessed December 2016.

positive relationship between Internet message board activity in financial forums and abnormal stock returns and trading volume. Blankespoor et al. (2014) show that the use of Twitter to disseminate news by non-visible companies increases the liquidity of their securities. Wei et al. (2016) show that Twitter volume spikes are useful to assist stock options trading. Furthermore, various authors find a correlation between collective sentiment on Twitter and several market indicators suggesting that this microblogging network can predict future movements in stock markets (Bollen et al., 2011; Joseph et al., 2011; Chen et al., 2014). According to Luo et al. (2013), the predictive value of SMe is even faster than other conventional on-line media.

Following the above discussion, we expect that market participants perceive social mobilization protests on SMe as damaging to corporate reputation, leading to capital markets reactions. We predict that the intrinsic characteristics of the protest, such (1) its intensity and (2) its visibility, are predictors of capital market reactions to SMe protests. Thus, we formulate the following two hypotheses:

Hypothesis 1: *The intensity of the protest disseminated by stakeholders on social media is associated with a negative price reaction for the target firm.*

Hypothesis 2: *The visibility of the protest disseminated by stakeholders on social media is associated with a negative price reaction for the target firm.*

Prior literature shows that investors' reaction to surprises is significantly stronger in bear markets than in bullish market conditions (Chen, 2007; Kurov, 2010). In other words, when share prices are continuously dropping, and investors believe this downward trend will continue in the long run (bear market), the effect of bad news (or, in our case, of a protest) on the market price will be stronger than when investors have faith that the positive trend will continue (bull market). Thus, we posit that market bear

vs. bullish conditions affect the relation between protest and market reaction, and formally state the following hypotheses:

Hypothesis 1a: *The intensity of the protest disseminated by stakeholders on social media is associated with a greater negative price reaction under bear than under bull market conditions.*

Hypothesis 2a: *The visibility of the protest disseminated by stakeholders on social media is associated with a greater negative price reaction under bear than under bull market conditions.*

Second, we argue that stakeholders can affect corporate decision-making process by influencing investors' behavior. Thus, we study the effect of protest on the *trading volume* to provide further insights on different investors' reactions. Specifically, higher trading volume is associated with actions of sophisticated (or informed) investors (e.g. institutional investors), rather than uninformed traders (Stickel and Verrecchia, 1994). If the protest influences the investment decisions of sophisticated investors, then we would expect to see an effect on trading volume. Therefore, we posit the following hypotheses:

Hypothesis 3: *The intensity of the protest disseminated by stakeholders on social media will increase the trading volume of the target firm's stocks.*

Hypothesis 4: *The visibility of the protest disseminated by stakeholders on social media will increase the trading volume of the target firm's stocks.*

4. Methodology

4.1. Sample and data

The sample includes the eight banks listed on the Spanish Stock Exchange: Bankia, Bankinter, BBVA, CaixaBank, Liberbank, Banco Popular, Banco Sabadell and Banco

Santander. We choose this sector because of its high social impact and long profound crisis, as evidenced by the rise of important social movements (Castañeda, 2012). Amongst these activism initiatives, we can highlight the Platform of People Affected by Mortgages (PAH), several platforms of people affected by the fraudulent selling of complex financial products to unsophisticated retail bank savers, and the trade unions that represent banks' employees affected by Redundancy Dismissal Procedures. The Spanish banking industry is facing an unprecedented scenario, with consumers seeming more sensitive to ethics in finance, and CSR becoming an essential tool to meet new market conditions and mitigate reputational risk (Gomez-Carrasco et al., 2016).

The period of analysis comprises of 187 days (from 14 November 2013 to 19 May 2014), of which 127 are trading days and 60 are weekends or holidays. The sample is balanced in such way that each company has a full set of information for the 127-day period. Overall, we collected 1,534,435 tweets through a four-phased procedure, summarized in Appendix A. The tweets considered for our analysis are only those that present a negative tone, as an expression of protest, which were identified manually by the authors. Appendix B reports few examples of these tweets.

Following this extensive and careful data collection on the tweets, for each firm and day we compute the following measures: (1) total number of tweets; (2) total number of tweets with a hashtag; (3) total number of tweets with a link to a website; (4) total number of retweets; (5) the number of followers of the Twitter accounts posting the tweets. We also differentiate tweets of two groups of key stakeholders: trade unions, and civic and consumer associations. We focus on these groups for two reasons: (1) they are the outsiders with strong influence on corporations (King and Soule, 2007), and (2) our fieldwork confirms that they are most active terms in Twitter. The most frequent keywords (*eviction, abusive, giving in payment, affected, unions, strike, demonstration,*

activists, rally, protest, police, occupy) and hashtags (*#stopevictions, #yeswecan, #outrage, #affectedpreferredshares, #floorclause, #noalere* - "no to redundancy dismissal procedure," abbreviation in Spanish-, *#theywontmoveus*) illustrate the general tone of protest of the tweets.

Amongst civic and consumers' associations, it is worth mentioning the mobilization power of the Platform for People Affected by Mortgages or PAH (Spanish: Plataforma de Afectados por la Hipoteca), a social movement started to prevent the systematic eviction of debtors across Spain, other platforms of retail customers affected by the preferred shares case (Zunzunegui, 2014) and ADICAE, the main Spanish association specialized in financial issues. Regarding the trade unions, we find that the most active accounts in Twitter belong to the organizations with the largest number of members: COMFIA-CCOO, FeS-UGT and FESIBAC-CGT.

The stock market data on daily prices and trading volumes are obtained through the Madrid Stock Exchange[14] and relevant facts from the Spanish Securities and Exchange Commission (CNMV).[15]

4.2 Variables and models

Given the novel setting of our research, we study the protest posted by stakeholders on Twitter from a general perspective. Specifically, the flow of information on Twitter is permanent and makes hot topics relatively short lasting, taking only a few hours before being replaced by more recent ones. As illustrated in Figure 1, given the permanent flow, it is virtually impossible to establish fixed windows to delimit the

[14] Official website of the Madrid Stock Exchange: <http://www.bolsamadrid.es/ing/aspx/Portada/Portada.aspx>.
[15] Official website of the Spanish Securities and Exchange Commission (CNMV): <http://www.cnmv.es/portal/home.aspx?lang=en>.

market reaction impact of each peak of protest. Thus, given this setting[16], we run linear regressions models[17] with panel data, firm-fixed effects[18] and robust standard errors[19], based on daily observations.

Insert Figure 1 around here

We measure the intensity of the protest considering the total number of tweets about a bank (*tweets*), the number of tweets posted by civic and consumer platforms (*tweets platforms*) and by trade unions (*tweets unions*). We measure the visibility of the protest with the number of followers potentially reached by those tweets. Specifically, we consider the total number of followers of those tweets (*followers*), of civic and consumer associations (*followers platforms*) and trade unions (*followers unions*).

Our dependent variables are, alternatively, the abnormal return for bank *i* on the trading day *t* (AR_{it}) or the abnormal trading volume of bank *i* on the trading day *t* (AV_{it})[20] (see Appendix C for the calculation procedure).

[16] The evidence reported later in Table 2 also supports such statement. The correlation between shareholder-related tweets and abnormal return (*AR*) and trading volume (*AV*) is significant only within the same day (*tweets stockmarket*) rather than when considering shareholder-related tweets from the previous day (*tweets stockmarket-1*).

[17] As in prior literature about social media and stock markets (see e.g., Blankespoor et al., 2014), the low R^2 values in the diverse regression results show that the explanatory power of the models is reduced, and thus no long-run estimates can be derived from them.

[18] We control for idiosyncratic and unobservable factors that may simultaneously cause an abnormal return and a greater or smaller amount of tweets and followers. While our sample only comprises eight banks, there are remarkable differences between them in terms of size, financial performance, solvency, credit rating, exposure to mass media, etc. that cannot be controlled since they remain virtually stationary throughout the period of analysis. Therefore, we consider that the fixed effects model is an appropriate method to test our hypotheses. Moreover, due to the longitudinal nature of our data, given the small number of individuals, most of the variability occurs in the time domain, which also supports our choice.

[19] The modified Wald test for group-wise heteroskedasticity in fixed effect regression model detects heteroskedasticity in our model.

[20] The only difference with AR regressions relies on the inclusion of an additional control variable, R_{it-1}, which is the rate of return for the stocks of firm *i* on the previous trading day, since prior literature finds a significant correlation between remarkable variations of the stock price and the trading volume in the following trading day (Gallant et al., 1992).

We include as control variables: (1) *relevant facts* is a dummy variable which equals one the day on which the Spanish Securities and Exchange Commission (CNMV) publishes any relevant fact related to the firm and zero otherwise, and (2) *tweets stockmarket* reflects the number of tweets containing stock price information or analysts' recommendations issued by twitter users other than the stakeholders analyzed in the present study. In this way, we take care of any confounding effects related to strictly financial information. The models for testing, respectively, H1, H2, H3 and H4 are as follows:

(1) $AR_{it} = \alpha_{it} + \beta_1$ *relevant facts*$_{it} + \beta_2$ *tweets stockmarket*$_{it} + \beta_3$ *tweets*$_{it} + \varepsilon_{it}$

(2) $AR_{it} = \alpha_{it} + \beta_1$ *relevant facts*$_{it} + \beta_2$ *tweets stockmarket*$_{it} + \beta_3$ *followers*$_{it} + \varepsilon_{it}$

(3) $AV_{it} = \alpha_{it} + \beta_1 R_{it-1} + \beta_2$ *relevant facts*$_{it} + \beta_3$ *tweets stockmarket*$_{it} + \beta_4$ *tweets*$_{it} + \varepsilon_{it}$

(4) $AV_{it} = \alpha_{it} + \beta_1 R_{it-1} + \beta_2$ *relevant facts*$_{it} + \beta_3$ *tweets stockmarket*$_{it} + \beta_4$ *followers*$_{it} + \varepsilon_{it}$

We expect β_3 (models (1) and (2)) and β_4 (models (3) and (4)) to be positive and statistically significant. We separately study the impact that our variables of interest have in bear vs. bull market conditions (H1a and H2a). As such, we consider abnormal losses (AL_{it}) and abnormal profits (AP_{it}). We run a logit model, also with panel data and firm-fixed effects, in which the dependent variable takes value one when we detect strictly negative (positive) abnormal return and zero otherwise[21]. We expect the β_3 coefficients to be positive and significant in the AL_{it} regression and negative and significant in the AP_{it} regression (activism on SMe penalizes stock prices by increasing losses and reducing benefits). Finally, we expect the effect of SMe activism to be more significant in a context of abnormal losses than of abnormal profits.

[21] In these models, all variables, except for the dummy *relevant facts*, are logarithmic transformations.

5. Results

Table 1 reports the descriptive statistics. On average, we count 1,000 tweets per day. Civic and consumer platforms (*tweets platforms*) present more than three tweets per day, although we see peaks as high as 301 per day (maximum). Unions are less active, with an average of less than one tweet per day (*tweets unions*), and a maximum of 19. The use of tweets tagged with the symbol "#" (*hashtags*) is less common than the inclusion of links to external websites (*links)*. While the use of external links serves to overcome the limit of 140 characters per tweet, the *retweet* function serves to forward tweets originally posted by one user by another one. Tweets by unions have a wider diffusion (*retweet unions*) than civic and consumer platforms (*tweets platforms*), with more than five retweets per day and a maximum as high as 935 per day. We also detect that stakeholders, which represent a small number of the total tweets, use hashtags more than average, evidence of the tone of protest of their posts. The civic and consumer associations' Twitter accounts count on average 11,495 followers per observation (firm and day) on average, well above the 463 average followers of trade unions' accounts. Regarding the dependent variables, abnormal returns range from -10% to +8%, while abnormal trading volume variability is much higher, ranging from 133% to 626%. The mean value is zero for both variables. The correlation matrix is reported in Table 2.

Insert Table 1 around here

Insert Table 2 around here

Columns (1) and (4) in Table 3 shows the market reaction around the general flow of tweets (*tweets*) or visibility of the firm (*followers),* rather than the specific effects of the protest (Columns (2) and (3)) and its visibility (Columns (5) and (6)). We start by

observing a negative and significant effect on stock prices for the number of tweets (at the $p<0.05$ level) and the number of followers (at the $p<0.01$ level). These findings support the general negative bias of Twitter information related to contested business sectors. We find a negative market reaction related to the number of tweets by trade unions (*tweet unions*), and to the followers of civic and consumer associations (*followers platforms*). These associations have a remarkable number of followers in Twitter and thus their posts have great visibility. Since their tweets by themselves do not show a significant influence on investors' behavior, we interpret the evidence as follows. The negative impact on stock price comes more likely from their power to disseminate the protest rather than from the content and intensity of the protest itself. The opposite happens with trade unions. These organizations have a long tradition in Spain and have historically demonstrated an important power of social mobilization. Consequently, despite having a reduced dissemination in SMe, their posts have a significant effect on investors' decisions. These results support H1 in the case of trade unions and H2 for civic and consumer associations[22].

Insert Table 3 around here

Tables 4 and 5 show the examination of, respectively, negative abnormal returns (AL_{it}), and positive abnormal returns (AP_{it}). For abnormal losses, Table 4 shows that the variables related to the followers of civic and consumer associations (*followers*

[22] In order to test whether our main evidence is affected by "rumors" spreading in the market before the official date of release of any relevant fact, we have run "placebo" tests, in which we artificially move the *relevant facts* variable, as if the relevant facts were actually out in the public domain one or two days ahead of the actual and official release date. Our main evidence remains unchanged. Furthermore, we point the attention of the reader to the fact that it is unlikely that any other relevant fact is unaccounted for in our models. On Twitter, any breaking news are promptly incorporated into the debate since traditional media (newspapers, TV channels, radio stations, etc.) publish tweets with the news as soon as they are informed. Hence, the influence of press coverage on stock price is covered by our variable *tweets stockmarket*.

platforms) and tweets published by trade unions (*tweets unions*) retain their negative and significant effect on stock price at the $p<0.05$ and $p<0.1$ level, respectively.

Insert Table 4 around here

Table 5 replicates the analysis for positive abnormal returns, yielding different outcomes. The significant effect of trade unions' tweets (*tweets unions*) disappears, and the negative influence of the visibility of civic and consumer associations in Twitter (*followers platforms*) reduces its significance to the $p<0.1$. These findings support hypotheses H1a and H2a. We conclude that the negative impact of stakeholders' activism in SMe intensifies on trading days with a bearish tendency and tones down under bull market conditions.

Insert Table 5 around here

Finally, Tables 6 and 7 show the analysis on daily trading volume (H3 and H4), using the two metrics for abnormal trading volume explained in Appendix C. The results highlight the influence of the tweets published by trade unions (*tweets unions*), which is significantly and positively associated with the trading volume of the affected firms the day in which these stakeholders publish their microblogs. This finding supports the impact of trade unions' activism in SMe on informed investors' decision. The SMe visibility achieved by civic and consumer associations through their followers (*followers platforms*) has no significant effect on the trading volume, in contrast with findings on stock prices. This evidence may be indicative of a lower influence of civic and consumer associations on informed than uninformed investors.

Insert Table 6 around here

Insert Table 7 around here

5. Discussion and Implications

Building on social movement theory, our study is a first attempt to assess the influence of stakeholders' activism on the stock performance of the targeted firms in the thriving environment of SMe, which are radically changing the way that companies engage their stakeholders (Qualman, 2010). Our findings demonstrate that Twitter activism of critical stakeholders, such as consumer associations and trade unions, has a significant impact on investors' decisions, which is consistent with the conclusions achieved by King and Soule (2007) for traditional activism. Our empirical analyses show that the mechanisms affecting on investors' behavior depend on the characteristics of the stakeholder group.

We identify a significant and negative impact of tweets published by trade unions both on stock price and trading volume. The market reaction is more significant on trading days with a bearish tendency than under bull market conditions. This Twitter activism also produces significant increases in trading volume, a fact that reinforces the importance of this protest on the expectations of informed investors (Stickel and Verrecchia, 1994). In contrast, the number of followers of the trade unions' does not significantly affect stock prices or trading volume. We interpret these results as investors being interested in the content of trade unions tweets rather than in their visibility. Trade unions are well-established in the Spanish socio-economic context, where they have historically shown a strong and effective mobilizing power through strikes, protests, and boycotts. As such, investors react to their tweets despite the relatively small number of followers.

The mechanisms of influence of civic and consumer associations are opposite. These organizations, very active in Twitter and with many followers, indirectly affect

investors' decisions through their visibility and influence in SMe rather than through the content or intensity of their posts. In Spain, civic and consumer associations do not have a long history and their tweets have less impact on investors. Notwithstanding this, their posts are widely distributed and can become "trending topic" (a ranked list with the most popular and talked-about topics within a relatively narrow time frame) at regional, and even national, level. Consequently, Twitter users, despite of whether they follow or not these organizations, can easily read their tweets. Interestingly, we detect a significant and negative influence on stock prices, both under bearish and bullish market conditions when the protest prompted by these stakeholders reaches many Twitter users. The effect on trading volume is not significant, which could mean that the influence of consumer associations is not greater on informed than uninformed investors. We leave to future research the investigation of this issue.

Our findings speak about the role of SMe in the relationship between companies and their stakeholders, providing evidence that it is an issue that can have financial impact even in the short run. Our conclusions may have implications for the extensive literature addressing the relationship between social and financial performance (Nakao et al., 2007; Callan and Thomas, 2009; Ducassy, 2013; Michelon et al., 2013; Boesso et al., 2015; Kumar et al. 2016), as well as studies on CSR (Vos, 2003; Cramer, 2005; Welford et al., 2008; Gomez-Carrasco et al. 2016), organizational theory (Ransom and Lober, 1999; Bowen, 2000), stakeholder salience (Banerjee and Bonnefous, 2011; Haddock-Fraser and Tourelle, 2009) and social movements (Jenkins, 2004). As our work focuses on the use of this new communication media that channels activism, it opens an exciting avenue for the study of novel ways for stakeholders to influence companies' decision-making processes and enhance the urgency of their claims. SMe are accessible to any Internet user, allowing wide dissemination beyond the control of

companies and traditional mass media. Therefore, these versatile communication tools meet all the main features to bring about changes in the business behavior of the targeted firms.

Like any study, ours is not without limitations. First, we examine the effects of SMe activism on stock markets in the Spanish banking sector while future research could consider other countries and industries, and thus test the market effect of protest on other institutional settings and on different business and societal issues. Secondly, we have analyzed a single social network, Twitter. However, prior research detects an intense interconnection between the major social networking sites (Muralidharan et al., 2011), implying that the conclusions of this research could be extended to other popular social networks like Facebook. Finally, the pressure on corporations through SMe by stakeholders can be part of a more comprehensive strategy including diverse social protest actions and it is difficult to isolate the effect of each specific action. While the use of firm fixed effects empirically mitigates this concern, future research could specifically focus on how different channel for protest may lead to different outcomes on the long-term effects on corporate financial performance, by analyzing how social media activism affects sales and profitability, and investigate the relationship between on-line and off-line activism to separate the effect of each domain and explore the synergies.

Finally, our research may be of interest to corporate decision makers who, once aware of the impact of stakeholders' activism on SMe, can adjust their on-line communication policies to the demands of critical stakeholders and mitigate the negative market effect of the protests. Social movements can also use our findings to plan their protests through social networking sites for greater influence on business

decisions. SMe activism usually targets firms' decision makers, however, as derived from our results, they can also influence investors and shareholders, which reveals another channel through which they can put pressure on companies.

Future researchers examining external stakeholders' influence through social media may expand on the findings of this paper by considering the long-term effects on financial performance of targeted companies, by analyzing how social media activism affects sales and profitability, and also the reaction of companies in terms of reporting and actual behavior. Future research might also investigate the relationship between on-line and off-line activism to separate the effect of each domain and explore the plausible synergies between them.

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Appendix A – Data gathering procedure

Phase #1: Storage of information (tweets)	Tweets are stored in a database incorporating the following information: (a) search term, (b) identifier code of twitter user, (c) date and exact time of the tweet, (d) if applicable, link with a previous tweet (retweet or reply) and (e) post or tweet itself.
Phase #2: Systematic extraction of tweets and corpus creation	An on-line software transforms the files into a list of keywords sorted from highest to lowest frequency of use when mentioning each banking institution. The process of corpus creation is the same for keywords and hashtags (words preceded by the "#" symbol, which are labelled in this way to get more visibility). Twitter users are also sorted in a list from highest to lowest degree of participation.
Phase #3: Content filtering	Prior to the creation of the final corpus, a data cleaning process is performed to delete non-relevant tweets and facilitate the subsequent manual coding.
Phase #4: Manual classification	This process consists of associating each keyword, hashtag and user to one of the criteria which reflect the issues that primarily affect the key stakeholders of the Spanish banking industry. This phase is also important to exclude any tweet from stakeholder that did not have a relation to the protest being analyzed.

Appendix B – Examples of protest tweets*

Civic associations (*tweets platforms*)	1. @15mSantMarti: "*Next Friday we'll continue with social pressure to prevent BBVA from evicting Rosa and her parents: (link)*" 2. @LA_PAH: "*Arrested several @PAHasturias' comrades for demanding @BBVA to stop Loli's house auction #AllwithLoli #BBVAcriminal*" 3. @DRYmadrid: "*Because the banks always win, let's put them on their place! Thursday rally in front of Banco Santander, Canalejas Square #Santander*" 4. @StopdesahucioGr: *"@credimo cheats and scams with the help of @caixabank, who still do not give solutions @LA_PAH @PAH_Madrid @PAH_Sevilla*" 5. @Info15m: *"#returntothesquare Stop Evictions supports a family ruined by La Caixa in court: (link) #occupy*"
Unions (*tweets unions*)	1. @comfia: "*New problems for Liberbank: employees vacation will go to court (link) #ERE*" 2. @ugtcaixabank: "*Extended working hours in Villacis. Thanks to the complaint of UGT, the labor inspector investigates CaixaBank… (link)*" 3. @lacnt: "*Conflict Isban-Banco Santander: Interview with workers in struggle in Madrid: Interview with activists… (link)*" 4. @Comfia_CyL: *"Santander dismisses 3,441 employees in 14 months (link)*" 5. @CCOO_Sabadell: "*CCOO demands to improve the working conditions of the workforce to consolidate the future of Banco Sabadell. Read more in (link)*"

* Translated from the original tweets in Spanish.

Appendix C – Calculation of abnormal return and abnormal volume

• Abnormal return

We calculate the daily abnormal return (AR) for each bank (*i*) and trading day (*t*) by applying the formula: $AR_{it} = R_{it} – (a_i + b_i R_{mt})$, where R_{it} is the rate of return for firm *i* on day *t*, and a_i and b_i are regression coefficients taken from the following expected return equation for all observations within the 127-trading day period of analysis**:** $R_{it} = \alpha_{i +} \beta_i R_{mt} + \varepsilon_{it}$

In this last equation, R_{it} is the rate of return for firm *i* for day *t*, and R_{mt} is the rate of return of IBEX 35, the benchmark index in the Spanish Stock Exchange, for each trading day. α_i is the rate of return for firm *i* when the rate of return of IBEX 35 is zero, β_i is the systemic risk of bank *i* (i.e., a measure of the volatility of bonds relative to the benchmark) and ε_{it} is the serially independent disturbance term whose expected value is zero, $E(\varepsilon_{it}) = 0$.

R_{it} can be interpreted as the expected return for firm *i* when the rate of return of the overall market portfolio is considered constant or, in other words, the part of the rate of return that cannot be explained by variations in the overall market portfolio.

Abnormal return (AR_{it}) is then calculated as the difference between the actual return for firm *i* in each trading session and the expected return for that session based on its correlation with the benchmark index IBEX 35. The difference between the actual and the expected rate of return reflects those factors which influence the stock price and cannot be explained by overall market fluctuations or by the normal behavior of the stock.

• Abnormal volume

Similarly to Joseph et al. (2011), abnormal trading volume is calculated through the following expression: $AV_{it} = (V_{it} – V_{i,avg}/V_{i,avg})$, where V_{it} is the trading volume of firm *i* on day *t*, and $V_{i,avg}$ is the average trading volume for firm i over all the period of observation. Un-tabulated graphs show a clear predominance of abnormally high trading volumes. The positive variations of trading volume are much more accentuated than the negative variations.

We also determine another measure of abnormal trading volume which considers the abnormal trading volume of the overall market portfolio, represented by the benchmark index IBEX 35, as follows: $AV'_{it} = (V_{it} – V_{i,avg}/V_{i,avg}) – (V_{mt}\text{-}V_{m,avg}/V_{m,avg})$

Where V_{mt} is the trading volume of the IBEX 35 overall portfolio on day *t*, and $V_{m,avg}$ is the average trading volume of IBEX 35 portfolio throughout the period studied. This permit to refine the abnormal trading volume variable excluding the variations that affect the overall market.

Table 1. Descriptive statistics

	Variable[1]	Obs[2]	Mean	Std. Dev.	Min	Max
1	*AR*	1016	0.00	0.02	-0.10	0.08
2	*AV*	1016	-0.01	0.51	-1.33	6.26
3	*AR-1*	1016	0.00	0.02	-0.10	0.08
4	*relevant_facts*	1016	0.20	0.40	0	1
5	*tweets stockmarket*	1438	135.21	418.83	0	5348
6	*tweets stockmarket-1*	1437	135.30	418.96	0	5348
7	*tweets*	1438	1067.80	1721.73	2	18057
8	*tweets platforms*	1438	3.37	12.35	0	301
9	*tweets unions*	1438	0.40	1.43	0	19
10	*hashtags*	1438	271.96	477.13	0	8077
11	*hashtags platforms*	1438	2.05	7.10	0	121
12	*hashtags unions*	1438	0.01	0.15	0	3
13	*links*	1438	659.71	1055.94	0	9582
14	*links platforms*	1438	2.51	10.15	0	301
15	*links unions*	1438	0.38	1.40	0	19
16	*retweets*	1438	657.89	1449.99	0	18057
17	*retweets platforms*	1438	3.90	24.35	0	489
18	*retweets unions*	1438	5.51	42.60	0	935
19	*followers*	1438	2236802	3548712	0	33300000
20	*followers platforms*	1347	11495.55	35290.76	0	383543
21	*followers unions*	1347	463.72	1420.63	0	10361

[1] Variables description:

AR: Abnormal return of firm i on the day t

AV: Abnormal trading volume of firm i on the day t

AR-1: Abnormal return of firm i on the day t-1

relevant facts: Dummy variable that equals 1 if CNMV (Spanish Securities and Exchange Commission) issues any relevant fact for firm i on the day t and 0 if otherwise

tweets stockmarket: Number of tweets related to the shareholders of firm i on the day t

tweets stockmarket-1: Number of tweets related to the shareholders of firm i on the day t-1

tweets: Number of tweets issued about the firm i on the day t

tweets platforms: Number of tweets issued by civic platforms and consumers' associations about the firm i on the day t

tweets unions: Number of tweets issued by trade unions about the firm i on the day t

hashtags: Number of tweets including a hashtag issued about the firm i on the day t

hashtags platforms: Number of tweets including a hashtag issued by civic platforms and consumers' associations about the firm i on the day t

hashtags unions: Number of tweets including a hashtag issued by trade unions about the firm i on the day t

links: Number of tweets including a link issued about the firm i on the day t

links platforms: Number of tweets including a link issued by civic platforms and consumers' associations about the firm i on the day t

links unions: Number of tweets including a link issued by trade unions about the firm i on the day t

retweets: Number of retweets about the firm i on the day t

retweets platforms: Number of retweets of the microblogs issued by civic platforms and consumers' associations about the firm i on the day t

retweets unions: Number of retweets of the microblogs issued by trade unions about the firm i on the day t

followers: Sum of the number of followers of the Twitter accounts that issued tweets about the firm i on the day t

followers platforms: Sum of the number of followers of the civic platforms and consumers' associations Twitter accounts that issued tweets about the firm i on the day t

followers unions: Sum of the number of followers of the trade unions Twitter accounts that issued tweets about the firm i on the day t

[2] Observations:

The data collection system failed 7 days within the 187-day period analysed. Additional errors occurred in the collection external stakeholders' tweets of Bankinter, which explains the difference in the number of observations

Table 2. Pearson correlation matrix

Variable[1]	1	2	3	4	5	6	7	8	9	10
1 *AR*	1.0									
2 *AV*	0.01	1.0								
3 *AR-1*	0.05	0.07**	1.0							
4 *relevant_facts*	-0.02	0.13**	0.00	1.0						
5 *tweets stockmarket*	0.06 **	0.12**	0.10**	0.20**	1.0					
6 *tweets stockmarket-1*	0.02	0.04	0.10**	0.01	0.46**	1.0				
7 *tweets*	0.00	0.06*	0.05	0.05	0.62**	0.40**	1.0			
8 *tweets platforms*	-0.03	0.02	-0.01	0.03	0.06**	0.00	0.21**	1.0		
9 *tweets unions*	0.00	0.05	-0.02	-0.01	-0.03	-0.05*	-0.08**	-0.02	1.0	
10 *hashtags*	-0.01	0.06*	0.03	0.04	0.49**	0.34**	0.90**	0.29**	-0.08**	1.0
11 *hashtags platforms*	-0.03	0.03	0.01	0.04	0.05*	-0.02	0.17**	0.72**	-0.02	.029**
12 *hashtags unions*	0.01	-0.02	-0.02	-0.03	-0.02	-0.01	-0.03**	-0.03	0.13**	-0.03
13 *links*	-0.02	0.07**	0.04	0.07**	0.61**	0.38**	0.96**	0.23**	-0.06**	0.85**
14 *links platforms*	-0.04	-0.01	-0.02	0.02	0.03	0.00	0.13**	0.93**	-0.02	0.18**
15 *links unions*	-0.01	0.05	-0.02	-0.01	-0.03	-0.05*	-0.08**	-0.02	0.99**	-0.07**
16 *retweets*	0.06*	0.03	0.10**	0.00	0.59**	0.43**	0.82**	0.02	-0.06**	0.69**
17 *retweets platforms*	0.02	0.03	0.07**	0.02	0.04	-0.01	0.16**	0.36**	0.01	0.19**
18 *retweets unions*	0.00	-0.03	0.02	-0.02	0.00	-0.01	0.18**	0.05*	0.02	0.14**
19 *followers*	-0.02	0.07**	0.01	0.07**	0.52**	0.30**	0.87**	0.23**	-0.08**	0.79**
20 *followers platforms*	-0.08**	-0.03	0.01	0.02	0.16**	0.07**	0.41**	0.45**	0.01	0.44**
21 *followers unions*	0.03	0.01	-0.03	0.00	0.00	-0.04	-0.08**	-0.02	0.74**	-0.07**

*p < 0.1; **p < 0.05; two tailed tests

[1] Variables definitions are reported in the notes to Table 1.

Variable[1]	11	12	13	14	15	16	17	18	19	20	21
11 *hashtags platforms*	1.0										
12 *hashtags unions*	-0.03	1.0									
13 *links*	0.19**	-0.03	1.0								
14 *links platforms*	0.52**	-0.02	0.16**	1.0							
15 *links unions*	-0.01	0.11**	-0.06**	-0.02	1.0						
16 *retweets*	0.01	-0.04	0.74**	-0.04	-0.06**	1.0					
17 *retweets platforms*	0.30**	-0.02	0.16**	0.26**	0.01	0.09**	1.0				
18 *retweets unions*	0.03	-0.01	0.13**	0.02	0.03	0.12**	0.43**	1.0			
19 *followers*	0.19**	-0.04	0.89**	0.13**	-0.08**	0.66**	0.12**	0.06**	1.0		
20 *followers platforms*	0.50**	-0.03	0.45**	0.29**	0.00	0.16**	0.23**	0.06**	0.44**	1.0	
21 *followers unions*	-0.01	0.18**	-0.06**	-0.03	0.73**	-0.07**	0.07**	0.02	-0.08**	-0.02	1.0

*p < 0.1; **p < 0.05; two tailed tests

[1] Variables definitions are reported in the notes to Table 1.

Table 3. Fixed effects regression of abnormal returns, with robust standard errors

Variable	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Constant	0.13807	***	0.07557	***	0.08463	***	0.15022	***	0.11510	***	0 .08008	***
	(.0303)		(.01488)		(.0118)		(.02749)		(.02306)		(.01528)	
relevant facts	-0.15067	*	-0.13568	*	-0.13907	*	-0.12897	*	-0.08038		-0.08702	
	(.075)		(.07075)		(.07293)		(.06869)		(.08772)		(.08878)	
tweets stockmarket	0.00040	**	0.00025	**	0.00026	**	0.00039	**	-0.00001		-0.00002	
	(.00015)		(.00010)		(.00010)		(.00012)		(.00016)		(.00016)	
tweets	-0.00008	**										
	(.00003)											
tweets platforms			-0.00319									
			(.0021)									
tweets unions					-0.05036	***						
					(.01117)							
followers							-0.00000005	***				
							(.00000001)					
followers platforms									-0.000003	**		
									(.000001)			
followers unions											-0.00001	
											(.00002)	
R-squared												
Within	.009		.006		.007		.01		.006		.0007	
Between	.11		.07		.10		.24		.48		.24	
Overall	.009		.006		.004		.01		.007		.0002	
Observations	992		992		992		992		929		929	

*p < 0.1; **p < 0.05; ***p < 0.01; two tailed tests.
Robust standard errors, obtained by clustering firm observations, are reported under each coefficient in parentheses. Variables definitions are reported in the notes to Table 1.

Table 4. Logit fixed effects regression of abnormal negative returns or abnormal losses

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
relevant facts	0.12063	-0.23613	-0.12207	0.12150	-0.28420	-0.15167
	(.17289)	(.26540)	(.58084)	(.17284)	(.26691)	(.56523)
log (tweets stockmarket)	-0.05009	0.04459	0.03624	-0.04708	0.05269	0 .05751
	(.04892)	(.06700)	(.12537)	(.04755)	(.06757)	(.12921)
log (tweets)	0.11536					
	(.10047)					
log (tweets platforms)		-0.05211				
		(.09320)				
log (tweets unions)			0.66931 *			
			(.35720)			
log (followers)				0.09519		
				(.08035)		
log (followers platforms)					0.14025 **	
					(.06945)	
log (followers unions)						-0.15970
						(.98080)
Log likelihood	-630.56	-262.76	-61.26	-630.52	-260.84	-63.10
Observations	946	405	103	946	405	103

*p < 0.1; **p < 0.05; ***p < 0.01; two tailed tests.
Standard errors are reported under each coefficient in parentheses. Variables definitions are reported in the notes to Table 1.

Table 5. Logit fixed effects regression of abnormal positive returns or abnormal profits

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
relevant facts	-0.07626	0.24185	0.20007	-0.07237	0.27059	0.21377
	(.17295)	(.26681)	(.56952)	(.17293)	(.26793)	(.56267)
log (tweets stockmarket)	0.04676	-0.05711	-0.03128	0.05417	-0.06535	-0.04381
	(.04886)	(.06760)	(.12266)	(.04751)	(.06815)	(.12852)
log (tweets)	-0.03541					
	(.10016)					
log (tweets platforms)		-0.00952				
		(.09418)				
log (tweets unions)			-0.44894			
			(.34384)			
log (followers)				-0.06424		
				(.08014)		
log (followers platforms)					-0.11927 *	
					(.06917)	
log (followers unions)						0.04741
						(.94449)
Log likelihood	-632.32	-259.47	-63.23	-632.06	-257.97	-64.10
Observations	946	405	103	946	405	103

*p < 0.1; **p < 0.05; ***p < 0.01; two tailed tests.
Standard errors are reported under each coefficient in parentheses. Variables definitions are reported in the notes to Table 1.

Table 6. Fixed effects regression of abnormal trading volume, with robust standard errors

Variable	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Constant	-0.07446	***	-0.07131	***	-0.07476	***	-0.08316	***	-0.06250	**	-0.07254	***
	(.01463)		(.01826)		(.02004)		(.01633)		(.02182)		(.02070)	
AR-1	4.1898	**	4.1947	**	4.2618	**	4.2355	**	5.2016	**	5.1695	**
	(1.7844)		(1.7820)		(1.8123)		(1.7642)		(1.7109)		(1.7221)	
relevant facts	0.17273	*	0 .17010	*	.17135	*	0.16960	*	0.13601		0 .13429	
	(.076879)		(.07714)		(.07686)		(.07716)		(.08455)		(.08479)	
tweets stockmarket	0.00011	*	0 .00013	**	.00013	**	0.00010	*	0.00029	**	0.00029	**
	(.000062)		(.00004)		(.00004)		(.00005)		(.00011)		(.00011)	
tweets	0.000001											
	(.00001)											
tweets platforms			0.00113									
			(.00114)									
tweets unions					.01843	***						
					(.00484)							
followers							0.000000008	*				
							(.000000004)					
followers platforms									-0.000001			
									(.000001)			
followers unions											-0.000001	
											(.000004)	
R-squared												
Within	.06		.05		.05		.05		.06		.06	
Between	.19		.21		.20		.23		.05		.06	
Overall	.04		.05		.05		.04		.06		.06	
Observations	991		991		991		991		929		929	

*p < 0.1; **p < 0.05; ***p < 0.01; two tailed tests.
Robust standard errors, obtained by clustering firm observations, are reported under each coefficient in parentheses. Variables definitions are reported in the notes to Table 1.

Table 7. Fixed effects regression of firms' abnormal trading volume minus IBEX 35 abnormal trading volume, with robust standard errors

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-0.05756 ***	-0.05931 **	-0.06871 **	-0.06272 ***	-0.05307 **	-0.06333 **
	(.01544)	(.01931)	(.02233)	(.01560)	(.01928)	(.02323)
AR-1	1.9518	1.9569	2.0651	1.9698	2.6203	2.5682
	(1.7138)	(1.7105)	(1.8066)	(1.7043)	(1.8792)	(1.8783)
relevant facts	0.13287	0 .13191	0.13237	0.13201	0.10974	0.10791
	(.07374)	(.07361)	(.07348)	(.07442)	(.07691)	(.07707)
tweets stockmarket	0.00011 *	0 .00011 **	0.00011 **	0.00009 *	0.00023 *	0.00023 *
	(.00005)	(.00004)	(.00004)	(.00005)	(.00011)	(.00011)
tweets	0 .000001					
	(.00001)					
tweets platforms		0.00063				
		(0.00103)				
tweets unions			0.02717 **			
			(.01163)			
followers				0.000000003		
				(.000000005)		
followers platforms					-0.000001	
					(.000001)	
followers unions						-0.000001
						(.000007)
R-squared						
Within	.03	.03	.03	.03	.04	.04
Between	.18	.21	.14	.23	.06	.07
Overall	.03	.03	.03	.03	.04	.04
Observations	991	991	991	991	929	929

*p < 0.1; **p < 0.05; ***p < 0.01; two tailed tests.
Robust standard errors, obtained by clustering firm observations, are reported under each coefficient in parentheses.
Variables definitions are reported in the notes to Table 1.