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Impact of social media strategies on stock price: the case of Twitter

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Abstract

Purpose – Social media have recently become an important strategic marketing tool to increase firm value. Based on an integrated theoretical framework, this study aims to examine the market reaction at the time of the creation of a Twitter platform for 312 firms from the Fortune 500 firms.

Design/methodology/approach – To test the hypotheses related to the effect of social media platforms on firm value, the event history analysis (EHA) was used, also known as event study, usually designed to examine the impact of a historical phenomenon for the US Fortune 500 firms that developed a Twitter platform.

Findings – A significant market reaction was found around the starting date of Twitter activities for the subsample of firms that are not contaminated by any other corporate announcements, but not for the overall sample. The market reaction is higher for firms with two-way interaction strategies rather than one-way messaging in both the uncontaminated subsample and the overall sample. It is higher in smaller firms, firms with losses and those with a family and/or a dominant shareholder. Further, firms in the contaminated subsample are likely to follow a two-way strategy after a positive revision of their earnings per share. We have run several robustness checks, including cross-validation on a holdout sample, and these findings remain consistent.

Research limitations/implications – The integrated theoretical framework is another significant contribution. To our knowledge, this is the first study across disciplines that integrates the social exchange theory (SET), social representation theory (SRT), social network analysis (SNA), social identity theory (SIT), signaling theory (ST) and the impression management theory (IMT) into one framework that is built around information as a resource and social interaction.

Practical implications – The results suggest that Twitter can be used to add value if firms interact and reciprocate with the various stakeholders.

Social implications – Firms using social media must interact and reciprocate with the various stakeholders.

Originality/value – This research is different than the published research on this topic in that it examines the impact on stock prices of the introduction of a specific social media platform, i.e. Twitter. The present results of the paper add to the prior research on database marketing and show that marketing "with" the customer is adding more value than marketing "to" the customer. The use of the net extends the scope of database marketing into a certain form of interaction marketing with "face-to-face" interaction within the relationships between the firm and its customers. Finally, the conditions under which social media platforms are used in an interactive manner are shown, and depicts that firms are more likely to use a two-way interactive strategy following a one-year period of positive momentum.

Keywords Interaction, Social media, Twitter, Market reaction, Messaging

Paper type Research paper

Introduction

One bad Twitter "tweet" can lose companies as many as 30 customers (Sarah Shannon - November 25, 2009, Bloomberg).

EJM

Social media is a technological phenomenon that facilitates communication and collaboration embedded in humans' lives (Goldenberg *et al.*, 2012; Tucker, 2014). Firms adopt policies and plans to achieve business goals in which insights gleaned from information exchange support the decision-making process (Bayus, 2013; Holsapple and Singh, 2000). Social media platforms are more frequently used as strategic marketing tools and channels to promote new products – goods and services (Park *et al.*, 2010), to reach, observe and get closer to customers (Gopinath *et al.*, 2013), to better understand their individual preferences (Li and Shiu, 2012) and to build customer equity (Drèze and Bonfrer, 2008). Further, these platforms provide stakeholders with several benefits and services including location-based recommendations (Zhao and Lu, 2012), user reviews (Hoehle *et al.*, 2012) and development of personal and company brands, which is likely to result in a greater incremental value.

However, the credibility of a social media strategy depends on how effective it is in helping the firm achieve its strategic goals and objectives. Despite the increasing number of companies using social media platforms, little is known about how the use of a particular social medium may affect the value of originator firms. In a recent survey looking at the use of social media by trading and investment firms, OneMarketData (2013) – a leader in tick data management and analytics – indicated a growing interest in social media in financial markets, but also some skepticism about the ability of social media to transmit quality signals to the market[1].

Because it may be hard to determine whether the benefits of promoting a business via the internet outweigh its costs, the present study examines investor reaction to the usage of social media. To reach a broad set of investors and reduce information asymmetry, corporations usually use public disclosure and rely on the press media. Firms may also use social networks such as Twitter to distribute hyperlinks to their press releases and to complement traditional media (Blankespoor *et al.*, 2014). They find that firms that use Twitter to send to investors links to press releases that are provided via traditional disclosure methods, have lower abnormal bid-ask spreads, greater abnormal depths and thus higher liquidity. Within this context, we examine the market reaction at the time of the creation of a Twitter platform, and test whether the creation of social media platforms, such as Twitter, is likely to be perceived as a good initiative by firms seeking to further communicate with various stakeholders. Moreover, social media platforms maybe used to generate awareness of the firm by stakeholders following a one-way messaging practice, where the flow of information is primarily in one direction from the firm to the stakeholders. Our empirical results confirm the value relevance of launching a Twitter platform to investors. We show evidence of a positive market reaction in the subsample of firms that are not contaminated by other corporate announcements, but not in the entire sample. We also find that the market reaction is higher for firms with two-way interaction strategies rather than one-way messaging in both the uncontaminated subsample and the overall sample.

Some companies use their Twitter accounts to communicate general or financial news about the firm and/or to advertise their products and services, without responding to potential customers' retweets. Alternatively, other firms engage stakeholders in two-way interactions and seek their feedback and opinions, thus considering them as collaborators. A two-way interaction strategy is based on the concept of interactivity which is defined as:

> [. . .] the degree to which two or more communication parties can act on each other, on the communication medium, and on the messages and the degree to which such influences are synchronized (Liu and Shrum, 2002 p. 54).

Such firms would talk to their various stakeholders, ask for their opinion and provide basic customer support, using tweets and retweets. In other words, a two-way interaction reflects the reciprocal communication between companies and users, as well as between users themselves (Goldfarb and Tucker, 2011). Thus, the nature of social media strategy, one-way versus two-way, is clear from the nature of the content of the communication in the Twitter account. Moreover, we find that the market reaction to the launching of a Twitter platform is negatively related to firm size, but it is higher in firms with losses, and those with family-dominant shareholders. Twitter is used to communicate with customers, potential customers and investors, all of whom are important stakeholders from a marketing standpoint. In our empirical analysis, we verify our basic assumption that investors pay attention to the launching of a Twitter platform.

Our paper sheds light on three important, yet unresolved, issues that are critical for firms preparing to launch a social media platform. First, our paper complements prior research suggesting mixed evidence on the value relevance of engaging in a social media strategy. As long as firms are not able to evaluate the consequences of social media strategies on their value, they cannot effectively align such initiatives with their organizational goals (Culnan *et al.*, 2010). Second, as a communication platform, social media may be used to foster relational bonds with customers, thus leading to long-term relationships and reliable repeat business, which is consistent with the basic principles of relationship marketing. As such, beyond the transaction of a good or a service, we argue that social media can be used as a holistic tool at the core of relationship marketing, where firms interact with their customers. Given that some firms use Twitter as a tool to communicate one-way messages about various issues ranging from their mission and vision to their products and services, while others engage in a close dialogue with their customers to share and create knowledge (Grönroos, 2004), it is important to examine the differential effect of the choice of the social interaction level, one-way messaging versus two-way interaction, on firm value. Finally, the choice of the level of social interaction is not exogenous. Indeed, some firms communicate corporate news around the launching date while others do not. Our study indicates that investors need to better understand the conditions under which social media platforms are used in an interactive manner, and the association between stock market reaction and firm characteristics.

The paper is structured as follows. First, we review the literature, present a theoretical framework and derive the main hypotheses. Then, we discuss the database and methodology. The empirical results are described and some further analyses conducted, including tests of robustness. Finally, we discuss the managerial implications, contributions, limitations and potential areas of future research.

Theoretical framework
We develop a theoretical framework by integrating seven different streams of literature: the social representation theory (SRT), the social exchange theory (SET), the social network analysis (SNA), the social identity theory (SIT), the impression management theory (IMT), the signaling theory (ST) and the efficient market hypothesis (EMH). These theories are discussed briefly.

Theoretical construct of social media and market reaction
The launching of a Twitter platform could be used by firms to develop their social presence and representation. Social representation consists of values, ideas, attitudes, beliefs and practices that are shared among the members of groups and communities (Voelklein and Howarth, 2005). In the SRT, the adoption of social media can thus be interpreted as an action

EJM

and a social interaction which plays a critical role in the construction of social representations (Gillespie, 2008).

However, social media platforms may go beyond a simple fostering of social representations, as they engage firms into exchanges and interactions with their stakeholders. Social exchange comprises actions contingent on the rewarding reactions of others, which over time provide for mutually and rewarding transactions and relationships. Reciprocity or repayment in kind is probably the best known exchange rule (Cropanzano and Mitchell, 2005). According to the SET, human relationships are formed using a subjective cost-benefit analysis and the comparison of alternatives. If the rewards exceed the costs, the result is a positive relationship. Thus, social exchange that adds value, i.e. rewards the actors or participants, will result in positive relationships and will be viewed positively. Greater opportunities for such social exchange will lead to more positive evaluations (Luo and Donthu, 2007). Thus, exchanges based on two-way (multi-way) communication that allow reciprocity are likely to be more rewarding than one-way exchanges in which the flow of information or other resources is unidirectional.

Indeed, social media platforms may create a social representation and allow for social exchange, thus leading to the creation of a social network. The latter is defined as a social structure made up of a set of social actors (such as individuals or organizations) and a set of ties between these actors. The SNA views social relationships in terms of the network theory, consisting of nodes (representing actors) and ties (which represent relationships between the actors, such as friendship, social interaction, etc.) (Katona *et al.*, 2011), which are usually defined by mutuality and reciprocity (Jones and Volpe, 2011). Thus, social media strategies that foster reciprocity by way of two-way communication result in more positive outcomes.

The interaction between firms and their stakeholders could help the firm build a social identity, which is defined as the portion of an individual's self-concept derived from perceived membership in a relevant social group (Jones and Volpe, 2011). According to the SIT, individuals are intrinsically motivated to achieve positive distinctiveness. In other words, individuals strive for a positive self-concept through strategies such as social creativity and social competition. Social media may support positive distinctiveness, thereby engendering positive reaction. Therefore, a two-way communication will elicit more positive reaction than a one-way communication.

As per the IMT, impression management is a goal-directed conscious or unconscious process in which people attempt to influence the perceptions of other people by regulating and controlling information in a social interaction. Individuals or organizations must establish and maintain impressions that are congruent with the perceptions they want to convey to others, for example, to their consumers. Esteem (individual/organizational) maintenance is an important motivation for strategic self-presentation online (Westphal and Graebner, 2010). Therefore, opportunities for online presentation, as afforded by social media involving two-way communication are welcomed.

Beyond the social identity and the impression that could be developed through the launching of a social platform, firms may use social media to signal their qualities to outside investors. The ST tackles the problem of information asymmetry, which arises when there are inequalities to access of information. Typically, one party, the sender, must choose whether and how to communicate (or signal) that information, and the other party, the receiver, must choose how to interpret the signal. Then, feedback is sent by the receiver to the sender using countersignals. Thus, from a ST perspective, we argue that the launching of a social media platform could be used by as a signaling mechanism directed to customers and investors. Furthermore, two-way communication allows the receivers to send

meaningful countersignals to the firm. Note that the ST implications are not necessarily in contradiction to the EMH. The EMH states that financial markets are "informationally efficient" (Jung and Shiller, 2005). Prices on traded assets (e.g. stocks, bonds or property) already reflect all publicly available information, and they instantly change to reflect new public information and may even reflect hidden or "insider" information. The EMH implies that information made available through social media is already reflected in the stock price of the firm. As such, investors immediately include the expected effect of launching a social media platform in the stock price, and their market reaction depends on the choice of the interaction level and on the firm characteristics. Schweidel and Moe (2014) provide another recent example linking stock prices to social media activity.

Integration and application to social media
The notion of information flow and social interaction is common to all the theories, although it is only implicit in the EMH. Information is a resource and social interaction can be managed and facilitated to build desired social representations (SRT), rewarding relationships (SET), social network (SNA), positive distinctiveness (SIT), wanted perceptions and impressions (IMT) and convey desired signals and countersignals (ST). In the context of financial markets, all of these would be reflected in the prices of traded assets, such as stocks (EMH). Social media can be used to generate information and social interaction. By nature, two-way communication allows for greater social interaction than one-way communication. It should be noted that our intent here is to provide a macro integration that would support hypotheses development at a general level. Given the complexity and detail involved, it is beyond the scope of our work to look at causal flows in these theories and attempt a microlevel integration; nor is such a microlevel integration necessary for our purpose. For example, it has been shown that social identity moderates the relationship between the sender and receiver in the ST. The ST has also been integrated with some other theories (discussed in Connelly *et al.*, 2011). Likewise, the SET is not one theory but a frame of reference within which many theories can be integrated (Luo and Donthu, 2007).

From an interactionist sociological perspective, corporations, as actors, may use various verbal, nonverbal or artificial venues to control their relationships, social representations, social capital, distinctiveness and impressions, images or signals to the audience (target stakeholders) to achieve desired end states such as establish a desirable identity or repair a damaged identity (Avery and McKay, 2006; Bolino *et al.*, 2008). Compared to mass media messaging and advertising, a two-way communication would encourage prospects to identify themselves, and "motivate and capture all pertinent interactions with the community, not just transactions" (Duncan and Moriarty, 1998, p. 7).

As such, corporations may use social media platforms to build their brand, promote and maintain an image to various stakeholders, and the decision to launch a social media platform is likely to affect firm value (Schniederjans *et al.*, 2013). Social media incorporating two-way communication would thus facilitate and personalize the relationships and allow firms to compete and retain customers by communicating "with" the customers, rather than "to" the customers. Investors may perceive the new communication strategy as advertising spending that affects the expected future cash flows (Mizik and Jacobson, 2004). They may, thus, predict that a new social media strategy will shape the probability distribution of future sales revenues, and incorporate this event in the stock price at the time of the launching of a Twitter platform. However, the market reaction to the social media platform will depend on the interaction level and the firm characteristics. Thus, our theoretical

EJM

framework provides a macrolevel integration of the various theories we have discussed and leads to the following hypotheses:

H1. Market reaction is positive around the launching of a Twitter platform.

H2. Market reaction to the launching of a Twitter platform is higher for two-way interaction than for one-way messaging.

Market reaction and the moderating effects of firm characteristics
Firm size and social media. Corporate size is significantly and positively associated with disclosure levels (Ahmad and Courtis, 1999 for a review). Large firms are more likely to have processes and procedures that are organized and transparent. They also have marketing processes and practices that are more structured than those in smaller size firms (Shama, 1993), and they are likely to provide extensive disclosures via the internet (Marston and Polei, 2004; Ettredge *et al.*, 2002). Compared to large firms, small firms have limited resources (Schollhammer and Kuriloff, 1979), lack strategic orientation (Weinrauch *et al.*, 1991) and are characterized by less rigid and sophisticated structures (Carson *et al.*, 1995). Given their low costs, social media strategies allow small firms with resource constraints to benefit from their greater flexibility, strengthen their networks, obtain information/feedback and develop their business more than large and complex organizations. Hence, we expect a negative association between firm size and market reaction, as the marginal gain of a new social media platform is likely to be higher for smaller and less-known firms:

H3. The market reaction to the launching of a Twitter platform is higher for smaller size firms.

Social media and firm profitability. From a signaling perspective, profitable firms distinguish themselves from firms with losses to attract investors and maximize their value (Lev and Penman, 1990). Consequently, firms with good news have the incentives to signal and market themselves, and the web is one way to achieve this. However, corporate actions are often constrained by profitability. Singhvi and Desai (1971) argue that higher profitability motivates the management to provide greater information as it increases investors' confidence, and this is evidenced by the greater information provided in their annual reports to signal their superior performance (Wallace and Naser, 1995).

However, marketing is an expensive strategic process that is necessary for the development of a business, as it emphasizes products and services, engages with customers and strengthens relationships between the firm and its community (Coviello *et al.*, 2000). An effective marketing strategy is thus likely to increase sales, breadth of production and geographic coverage, which in turn improves firm performance. Hence, we expect firms with losses, usually financially constrained, to benefit from social media marginally more than profitable firms that are usually investing in marketing. Hence:

H4. The market reaction to the launching of a Twitter platform is higher for firms with losses.

Social media and family/dominant shareholder dummy. Prior research suggests that family or dominant shareholders are more actively involved in firms' management. This leads to lower asymmetric information and greater monitoring of managers (Anderson and Reeb, 2003). However, from an agency perspective, firms with a dispersed shareholding structure are more likely to have conflicts of interest between the management and the shareholders (Shleifer and Vishny, 1997). Investors with small share ownership have limited

access to information and may feel disadvantaged compared to large investors who can obtain information about the company from internal sources. Thus, they are less likely to engage in and influence active disclosure practices (Patelli and Prencipe, 2007). Moreover, families and large shareholders may suffer from concentrated equity holdings, and a greater voluntary disclosure may help them reduce their cost of capital. Family and large shareholders may thus prefer more voluntary disclosure than other owners (Ali *et al.*, 2007). Given that the internet provides a cheap and accessible platform for small investors, we expect family firms and those with a dominant shareholder, *family/dominant shareholder dummy*, to increase amount of the information communicated through social media platforms, which is likely to have a positive impact on firm value:

H5. The market reaction to the launching of a Twitter platform is higher for firms with a family/dominant shareholder.

Database and methodology

To test our hypotheses related to the effect of social media platforms on firm value, we use the event history analysis (EHA), also known as event study, usually designed to examine the impact of a historical phenomenon (Homburg *et al.*, 2014; Srinivasan and Hanssens, 2009) for the US Fortune 500 firms that developed a Twitter platform. Twitter was founded in 2006, and is currently one of the leading social media platforms with 330 million monthly active users at the end of 2017 (https://twitter.com/). Twitter provides a way to broadcast brief posts, with a maximum of 140 characters, where originators tweet, i.e. post original messages in their Twitter accounts, and have the possibility to retweet and maintain a continuous interaction (or reciprocation) with their followers. An increasing number of firms, for example, Dell, Starbucks, Pizza Hut and Southwest Airlines, are currently using the Twitter application in sales, customer service and branding (Miller, 2009; Reisner, 2009), and many firms have teams to monitor comments posted on Twitter. Looking at the online sources on the webpages or Twitter pages of the firms in our sample, we found that 355 firms launched their Twitter platforms till the end of 2013, which represents 71 per cent of Fortune 500 firms[2]. We were able to identify the launching date of Twitter platform for 350 firms. We focus on the first date at which a firm opens and uses a Twitter account regardless of whether the communication is addressed to customers, potential customers, investors or any other stakeholders[3]. Looking at the nature of the tweets, a large number of companies tweeted general company news or products and few firms started with financial tweets, and we thus looked at firms communicating using a Twitter platform regardless of whether this is about the firm or a specific product. Focussing on the day of the launching of a Twitter platform, we classify a firm as following a one-way messaging when it only posts financial news, company news, product advertisements, etc. and does not reply to customers' retweets or is not looking to interact with the customers. Firms are classified as having two-way communication if they actually ask for customer opinion, provide basic customer support or they talk to their customers via tweets, retweets or favorites, during the first tweets following the launching of their Twitter platform[4].

We then excluded firms that were not listed at the date of the launching of their Twitter account, and we further focussed on firms for which we were able to identify the nature of the interaction from the starting date, one-way or two-way communication strategies, and to find their stock prices using the Datastream database. The final sample includes 312 firms. Although not shown, we compared the studied sample of 312 firms that launched Twitter to the remaining 188 S&P 500 firms that did not[5]. Our comparative analysis on an annual basis does not show any significant difference in market capitalization, family/dominant

ownership, profitability and dividend yield (the control variables in our study) between the studied firms and the remaining firms within the Fortune 500 list. Thus, sample selection bias does not appear to be an issue. Table I presents the distribution of the studied sample per industry membership (Panel A) and per year (Panel B). Panel A indicates a fair distribution of the sample in industry classes 2 to 6 and Panel B shows a concentration of firms creating their Twitter platforms in 2009.

In-line with prior research on the EMH, we calculate a cumulative abnormal return (CAR) over three windows around the launching date of a Twitter platform ($t - 1$ to $t + 1$ day, $t - 1$ to $t + 3$ days and $t - 1$ to $t + 5$ days), and test our hypotheses on the market reaction around the launching date of a Twitter social media platform (Srinivasan and Hanssens, 2009; Sorescu *et al.*, 2017).[6] Our window of time starts with $t - 1$ to control for an information leakage before the launching date. CAR is equal to the sum of daily abnormal return, $\Sigma (R_i - R_M)$, where i is the daily rate of return of the firm (i) and M is the daily rate of return of an equally weighted portfolio of the S&P 500 firms within the same 1-digit SIC, used as a benchmark portfolio for performance comparison. This controls for differences across industries[7]. In further robustness tests, we use the S&P 500 as a market portfolio for performance comparison in the calculation of the CAR, and the results are also consistent with the present findings of the paper[8].

Our main independent variable is a two-way interaction dummy, which is equal to 1 if a firm launches a social media platform with a two-way interaction practice, 0 otherwise[9]. We calculate market capitalization at the closing price of the day before the launching date of Twitter platform, using the natural logarithm of the firm size, *lnMarket capitalization*, to control for skewness. *Loss dummy* controls for firm profitability, and this is equal to 1 if the firm had losses during the year before launching the Twitter platform, and 0 otherwise. We also calculate *family/dominant shareholder* as a dummy variable which is equal to 1 if the firm is a family business or has a dominant shareholder, as mentioned in the GMI Ratings database.

Our empirical analyses further include several control variables, such as the percentage of dividend yield, *dividend yield (per cent)*, as calculated before the launching date. Dividend distribution may be used as a signal to heterogeneous dividend clienteles (Allen and Michaely, 2003). Such signaling may also be driven by the need to distribute the firm's free cash flow and reduce potential agency problems (DeAngelo and DeAngelo, 2006). Baker and Wurgler (2004) develop a catering view of dividend in which they argue that dividend distribution is driven by investors who may pay a premium for firms which exhibit salient

Panel A – Sample distribution per SIC			Panel B – Sample distribution per year		
SIC 1-digit	No.	(%)	Year	No.	(%)
1	8	2.564	2006	1	0.321
2	54	17.308	2007	15	4.808
3	61	19.551	2008	58	18.590
4	53	16.987	2009	144	46.154
5	57	18.269	2010	41	13.141
6	46	14.744	2011	39	12.500
7	29	9.295	2012	10	3.205
8	4	1.282	2013	4	1.282
Total	312	100	Total	312	100

Table I.
Sample distribution

Note: This table presents the sample distribution per industry and per year for the entire sample of 312 firms that launched a Twitter platform from 2006 to 2013

characteristics of safety, such as dividend payment. Thus, dividend yield may serve as a useful control variable.

We also use a *Facebook dummy* which is equal to 1 for firms with a Facebook page before the launching date of the Twitter platform, and 0 otherwise. We expect firms that are already engaged in a Facebook platform to have a greater awareness of the value added by social media strategies.

Finally, the market reaction to the launching of a Twitter platform could vary across industries and over time. Firms with a greater uncertainty, such as hi-tech firms, could benefit more from the launching of Twitter. We thus use a *hi-tech dummy* which is equal to 1 if the firm is a hi-tech firm, 0 otherwise[10]. Similarly, retailers and wholesalers could benefit more from a Twitter platform than other industries by getting closer to their customers and understanding their needs, and the empirical tests include a *retail dummy* which is equal to 1 if the firm is a retailer as per the GMI Ratings database, 0 otherwise. Likewise, there could be changes in digital marketing and social media strategies over time. As such, empirical tests include additional industry dummies and year dummies to control for differences in social interaction across industries and for changes in digital marketing over time, respectively.

Model formulation
The decision to have a Twitter platform is not exogenous. While all firms are likely to gradually move into the less-expensive digital marketing era, more successful firms are more likely to develop interactive strategies to share their achievements with the community. We therefore use a Heckman (1979) two-step procedure which deals with the possible endogeneity of the choice of launching a Twitter platform. In the first step, we run a probit regression to estimate the probability that a firm launches a Twitter platform to derive the inverse Mills' ratio (Lambda). In the second step, the inverse Mills' ratio is included as an additional regressor to obtain unbiased coefficient estimates for the social media strategy and the other explanatory variables.

Prior research suggests that managers of firms with a higher profitability have stronger incentives to disclose more information than those firms with lower performance. As such, we expect successful firms with a positive past market performance to use Twitter and disclose more about their achievements. We use two instruments that reflect the positive past market conditions. This includes the buy-and-hold abnormal return (BHAR) over the one-year period before five days before the launching date, *BHAR-1Y*, and the abnormal annualized standard-deviation, *Abnormal std-dev*, during the same period. To calculate the return and standard-deviation of benchmark portfolios, we focus on equally weighted portfolios of S&P 500 firms within the same 1-digit SIC. We expect firms with higher BHAR-1Y and lower abnormal standard-deviation to launch a Twitter platform. Although not shown, we use the Sargan overidentification test and find that instruments are not correlated with the instruments, which confirms that they are valid (Sargan, 1958). We also find F-statistics that are significantly higher than 10, which confirms the strength and the reliability of our selected instrumental variables for the choice of a Twitter platform (Staiger and Stock, 1997). Our testable model is thus as follows:

$$Twitter\ Platform\ dummy = \alpha_0 + \beta_1 x\ BHAR - 1Y + \beta_2 x\ Abnormal\ std - dev$$
$$+ Controls + \varepsilon$$

(1)

$$Performance \; = \; \gamma_0 \; + \; \phi_1 x \, Two-way \, interaction \, dummy \; + \; Controls \; + \; Lambda \; + \; \eta \tag{2}$$

where performance is the calculated CAR over the three different windows of time around the launching date of the Twitter platform[11].

Sample contamination
However, our sample may be contaminated by earnings and other announcements around the launch of the Twitter platform. This contamination must be considered to appropriately test the hypotheses. Accordingly, we divide the sample of 312 firms into uncontaminated and contaminated subsamples, and we test our hypotheses in both subsamples. Uncontaminated firms are those without any firm announcements during the -30-day to $+5$-day period around the launching date. This results in an uncontaminated subsample of 186 firms and a contaminated subsample of 126 firms. The test of our hypotheses is based on the uncontaminated subsample. However, for the sake of interest, we also conduct the analyses on the contaminated subsample and the overall sample. Following conventional practice, we discuss the results for the overall sample first followed by results for the two contamination subsamples.

Empirical results
Cumulative abnormal return statistics
Table II presents the descriptive statistics of the entire sample and for both subsamples of firms with one-way messaging and two-way interaction. Table II relates to *H1*, as it shows the market reaction around the launching of a Twitter platform for the overall sample. Interestingly, the CARs for the entire sample over the three studied windows are not significantly different from 0. However, the market reaction is significantly positive (and different from 0) in the subsample of firms using a two-way interaction strategy (at the 1 per cent level). It is also significantly higher for two-way interaction than for one-way messaging. Although not a strict test, *H2* is supported even for the overall sample.

Further, Table II shows that firms with a two-way strategy are smaller ($p < 1$ per cent) and are more profitable ($p < 1$ per cent) than firms that adopted a one-way messaging strategy. Moreover, the former group of firms with two-way social interaction is less likely to have a family or a dominant shareholder ($p < 1$ per cent), to be a retailer ($p < 1$ per cent) and to have a higher pre-Twitter one-year BHAR ($p < 1$ per cent) and a lower one-year relative "abnormal" standard-deviation ($p < 5$ per cent) than the latter group of companies with one-messaging communication Twitter platforms. The variance inflation factors (VIFs) are lower than 1.58, thus rejecting potential multicollinearities in our empirical tests.

Two-way interaction and market reaction: multivariate analysis
Table III tests *H2* and controls for the endogenous choice of launching a Twitter platform using a two-step Heckman procedure. Model (1) includes the first-stage probit regression of the choice of launching a Twitter platform dummy, and Models 2(a-c) present the second-stage regressions of the stock price performance including the inverse Mills' ratio derived from Model (1).

In-line with *H2*, Models 2(a-c) confirm the positive effect of two-way interaction, which suggests that firms that reciprocate are more likely to benefit from their social media strategies and generate value ($p < 1$ per cent). In-line with *H3*, Models 2(a-c) indicate a negative association between firm size and market reaction ($p < 1$ per cent). This suggests

Variables	Full sample (N = 312)		One-way messaging (N = 175)		Two-way interaction (N = 137)		p-values t-test for differentiation
	Mean	SD	Mean	SD	Mean	SD	
CAR −1/+1	0.005	0.045	0.000	0.043	0.011***	0.047	0.029
CAR −1/+3	0.004	0.042	−0.001	0.042	0.009***	0.041	0.032
CAR −1/+5	0.002	0.050	−0.004	0.049	0.010***	0.050	0.016
Market capitalization (in $mil)	25.041	47.819	34.578	59.327	12.859	21.434	0.000
Loss dummy	0.138	0.345	0.189	0.392	0.073	0.261	0.003
Family/dominant shareholder dummy	0.449	0.498	0.547	0.500	0.371	0.485	0.002
Dividend yield (%)	0.018	0.021	0.017	0.018	0.020	0.025	0.320
Hi-tech dummy	0.147	0.355	0.171	0.378	0.117	0.322	0.178
Retailer dummy	0.144	0.352	0.086	0.281	0.219	0.415	0.001
Buy-and-hold abnormal return-1Y	0.048	0.321	0.010	0.333	0.097	0.299	0.010
Abnormal std-dev	1.828	1.034	1.938	1.200	1.687	0.753	0.033

Notes: This table presents the descriptive statistics in mean and standard-deviation for the entire sample. It also compares the characteristics of firms with one-way messaging and two-way interaction strategies at the time of the launching of their Twitter platforms. We focus on the day of the launching of a Twitter platform, and we classify a firm as following a *one-way messaging* when it only posts financial news, company news, product advertisements, etc. and does not reply to customers' retweets or is not looking to interact with the customers. Firms are classified as having *two-way interaction* if they actually ask for customer opinion, provide basic customer support or they talk to their customers via tweets, retweets or favorites. The *CAR* is calculated as the sum of daily abnormal returns over three windows around the launching date of a Twitter platform ($t − 1$ to $t + 1$ day, $t − 1$ to $t + 3$ days and $t − 1$ to $t + 5$ days), using an equally weighted portfolio of the S&P 500 firms within the same 1- digit SIC, as a benchmark portfolio. *Market capitalization* is calculated at the closing price of the day before the launching date of Twitter platform. *Loss dummy* is equal to 1 if the firm had losses during the year before launching Twitter platform, and 0 otherwise. *Family/dominant shareholder* is a dummy variable which is equal to 1 if the firm is a family business or has a dominant shareholder, as mentioned in the GMI Ratings database Corporate Library database. *Dividend yield (%)*, is calculated before the launching date. *Facebook dummy* is equal to 1 for firms with a Facebook page before the launching date of the Twitter platform, and 0 otherwise. *Hi-tech dummy* is equal to 1 if the firm is a hi-tech firm, 0 otherwise. *Retail dummy* is equal to 1 if the firm is a retailer as per the GMI Ratings database, 0 otherwise. *BHAR-1Y* is the BHARs over the one-year period five days before the launching date, and *Abnormal std-dev* is the abnormal annualized standard-deviation during the same period. ***denotes significantly different from 0 at the 1% level (for the two-sided test)

Table II.
Descriptive statistics

that social media allows small firms to grasp a greater opportunity to market themselves and understand customers' need than large firms. Moreover, market reaction is positively related to Loss dummy, which is consistent with *H4*, and suggests that financially constrained firms are more likely to benefit from cheaper and accessible marketing processes (at the 5 per cent level or more). Further, the market reaction is higher in firms with a family or a dominant shareholder where firms are more likely to use Twitter, as a cheaper platform, to share information with the community ($p < 5$ per cent), which is in-line with *H5*.

In terms of control variables, Models 2(a-c) show that market reaction is higher in dividend-paying firms which are likely to use social media to enhance the attractiveness of their stocks (at the 5 per cent level or more), and it is lower for firms with an already established Facebook platform ($p < 5$ per cent). The market reaction is also positively

	Twitter Platform dummy probit (1)	CAR −1/+1 OLS (2a)	CAR −1/+3 (2b)	CAR −1/+5 OLS (2c)
Constant	13.569	0.035	0.055*0.033	0.056
	9.535	0.026		0.043
Buy-and-hold abnormal return-1Y	0.527***			
	0.191			
Abnormal std-dev	−0.059**			
	0.024			
Two-way interaction dummy		0.011***	0.018***	0.022***
		0.004	0.005	0.007
lnMarket capitalization	0.101**	−0.005***	−0.005***	−0.007***
	0.049	0.001	0.002	0.002
Loss dummy	0.287*	0.025***	0.017***	0.013**
	0.166	0.006	0.006	0.006
Family/dominant shareholder dummy	0.690***	0.011**	0.011**	0.011**
	0.132	0.004	0.005	0.005
Dividend yield (%)	7.277***	0.168**	0.229***	0.383***
	2.368	0.074	0.074	0.074
Facebook dummy		−0.009**	−0.011**	−0.014**
		0.004	0.005	0.006
Hi-tech dummy	−0.026	0.010***	0.018***	0.018***
	0.198	0.003	0.004	0.005
Retailer dummy	0.499**	0.015*	0.016**	0.019**
	0.239	0.009	0.008	0.008
Lambda		−0.006*	−0.007*	−0.007*
		0.004	0.004	0.004
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Adjusted R-squared (Pseudo $R2$)	(0.161)	0.148	0.137	0.124
F-statistic (LR- chi-squre)	(327.050)	3.460	3.230	3.060
Prob $> F$ (Prob $>$ chi-square)	(0.000)	0.000	0.000	0.000
Number of observations	(4,000)	312	312	312

Table III.
Market reaction and the endogenous choice of a Twitter platform

Notes: Table III presents the two-step Heckman procedure which tests *H2* on the association between market reaction to the launching of a Twitter platform and the choice of communication strategy (two-way interaction vs one-way messaging). Model (1) includes the first-stage probit regression of the two-way interaction dummy and Models 2(a), 2(b) and 2(c) present the second-stage regressions of the stock price performance including the inverse Mills' ratio derived from Model (1) ***, **, and *denote significance at the 1%, 5%, and 10% levels (for the one-sided test), respectively

related to hi-tech dummy ($p < 1$ per cent) and positively related to retail dummy (at the 10 per cent level or more). This suggests that hi-tech firms are likely to have a dense interpersonal network with their community, which is expected to generate greater transfer of information and feedback (social interaction), which is expected to create novelty and knowledge, thus encouraging innovation and leading to higher market reaction (Obstfeld, 2005). Although not shown in the table, looking at the year dummies in Model (1), the choice of launching a Twitter platform is positive and significant at the 1 per cent over the entire period. However, the coefficients do not indicate any clear trend on whether late "comers", i.e. companies adopting Twitter late, are more likely to adopt a two-way interaction and to learn from the experience of previous firms. Specifically, the coefficients decrease from the range of 2.12-1.93 in 2006-2008 to 1.81 in 2010, and then increase to 2.01-2.22 in 2011-2012

and then decrease again to 1.83 in 2013. This suggests that in choosing to launch a Twitter platform in general, or a one-way messaging versus two-way interaction Twitter strategy in particular, firms are not influenced by prior experiences of other firms, and the choice depends primarily on the characteristics of adopting firms.

Two-way interaction and market reaction in contaminated versus uncontaminated subsamples
Our event study tests the hypotheses related to the effect of launching a Twitter platform on stock returns. However, the market reaction to the launching of a Twitter platform may be contaminated by other corporate announcements that occur at the same time, and might influence a firm's share price. As such, we isolated the share price reaction of firms without any earnings announcement and examined our hypotheses.

Table IV includes the CAR statistics of the market reaction in both the uncontaminated and contaminated subsamples as well as according to the choice of the interaction level (one-way or two-way strategy). Panel A shows that the market reaction around the launching of Twitter in the uncontaminated subsample is positive and significant (at the 5 or 10 per cent level), but it is not significant for the contaminated sample, which provides support for *H1*. Panel B focusses on the uncontaminated subsample and in-line with the results in Table III for the entire sample, it shows that the market reaction for firms adopting a two-way interaction strategy is positive and significant (at the 1 per cent level), providing support for *H2*. Thus, both *H1* and *H2* are supported in the uncontaminated sample that is of interest. Interestingly, Panel C shows that the market reaction around the launching of Twitter is not significantly different from 0 in the case of the contaminated sample, regardless of the interaction strategy.

Table V tests our hypotheses for both the uncontaminated and contaminated subsamples. Panel A focusses on the uncontaminated subsample and confirms our prior conclusions in Table III. Panel B examines the contaminated subsample where firms announce their corporate earnings in the −30-day to +5-day period around the launching of their Twitter platforms. Although the univariate figures in Table IV do not show any significant difference between the one-way and two-way interactions, the results in Panel A and following two-step Heckman procedure controlling for the endogenous decision of launching a Twitter platform confirms its positive effects on market reaction (at the 1 per cent level).

Moreover, the results in Panel B for the contaminated subsample corroborate those in the uncontaminated subsample showing that firms use interactive strategies after a one-year period of positive momentum (at the 10 per cent level)[12]. Cross-validation on a holdout sample provides additional evidence on the efficacy of our analyses[13].

Interestingly, while Panel A validates all our hypotheses on the market reaction around the launching of a Twitter platform, Panel B indicates that firm size does not affect market reaction in the contaminated subsample.

Further investigations
As an alternative to the Heckman model, we used a 3SLS regression system with a two-way interaction as a first-stage regression and performance (CAR) as a second-stage regression. The results were similar to those obtained with the Heckman model enhancing our confidence in the findings. So far, we argue that investors observe the launching event of a social media platform, and respond to the choice of one-way messaging versus two-way interaction strategy within the first days of the use of

	CAR −1 + 1	CAR −1 + 3	CAR −1 + 5
Panel A – Market reaction in uncontaminated vs contaminated subsamples			
Uncontaminated (N = 186)			
Mean	0.007**	0.005*	0.006*
Std-dev	0.046	0.043	0.044
Contaminated (N = 126)			
Mean	0.001	0.001	−0.003
Std-dev	0.044	0.041	0.057
p-values for *t*-test for difference	0.304	0.357	0.126
Panel B – Market reaction in the uncontaminated sub-sample: one-way messaging vs two-way interaction			
Uncontaminated (N = 186)			
One-way messaging (N = 101)			
Mean	−0.002	−0.002	−0.002
Std-dev	0.043	0.043	0.039
Two-way interaction (N = 85)			
Mean	0.017***	0.014***	0.015***
Std-dev	0.046	0.041	0.048
p-Values for *t*-test for difference	0.005	0.017	0.007
Panel C – Market reaction in the contaminated subsample: one-way messaging vs two-way interaction			
Contaminated (N=126)			
One-way messaging (N = 74)			
Mean	0.002	0.000	−0.006
Std-dev	0.042	0.041	0.061
Two-way interaction (N = 52)			
Mean	0.001	0.002	0.001
Std-dev	0.048	0.041	0.053
p-Values for *t*-test for difference	0.949	0.735	0.487

Table IV.
Market reaction to
Twitter launching:
contaminated vs
uncontaminated
subsamples

Notes: Table IV presents the descriptive statistics in mean and standard-deviation for the market reaction in various contexts. Panel A compares the market reaction in uncontaminated vs contaminated subsamples. Panel B (Panel C) compares the market reaction in firms with one-way messaging vs those with two-way interaction in the uncontaminated (contaminated) subsample. ***, **and *denote significantly different from 0 at the 1%, 5% and 10% levels (for the two-sided test), respectively

Twitter. In further investigations, we investigate the effect of the launching of Twitter on market liquidity using the number of trades and the average size per trade, used as proxies for market liquidity, for the entire sample and for both contaminated and uncontaminated subsamples. Our results indicate that the choice of interactive social networks is likely to attract investors and promote trading activities. Thus, investors pay attention to the launching of Twitter, which provides support for our basic assumption and corroborates our study of the market reaction. These results are not provided owing to space constraints but are available on request.

Discussion
Using the example of Twitter, the present research shows that investor reaction is not significant around the launching of a Twitter platform for the overall sample, but the effect is positive and significant in the case of the uncontaminated subsample that is of interest. Moreover, there is evidence of a positive and significant association between the market reaction and the endogenous choice of using a Twitter social

	Panel A- uncontaminated subsample (N = 186)			Panel B- contaminated subsample (N = 126)		
	CAR −1/+1 OLS (3a)	CAR −1/+3 OLS (3b)	CAR −1/+5 OLS (3c)	CAR −1/+1 OLS (4a)	CAR −1/+3 OLS (4b)	CAR −1/ +5 (4c)
Constant	0.026	0.022	0.011	0.108*	0.039	−0.012
	0.033	0.040	0.051	0.060	0.080	0.104
Two-way interaction dummy	0.016***	0.017***	0.017***	0.009*	0.010*	0.012*
	0.006	0.006	0.006	0.005	0.006	0.006
lnMarket capitalization	−0.005***	−0.006***	−0.008***	−0.004**	−0.003**	−0.004**
	0.002	0.002	0.003	0.002	0.002	0.002
Loss dummy	0.027***	0.021***	0.016**	0.015***	0.015**	0.012**
	0.007	0.007	0.007	0.006	0.007	0.006
Family/dominant shareholder dummy	0.007**	0.011***	0.007**	0.013*	0.014*	0.014**
	0.003	0.003	0.003	0.007	0.007	0.006
Dividend yield (%)	0.051	0.085	0.159	0.253**	0.339**	0.644***
	0.187	0.250	0.325	0.132	0.160	0.204
Facebook dummy	−0.016***	−0.010**	−0.009**	−0.002	−0.011*	−0.005
	0.004	0.004	0.004	0.005	0.006	0.008
Hi-tech dummy	0.015***	0.014***	0.011**	0.013**	0.016**	0.016*
	0.006	0.005	0.005	0.005	0.007	0.009
Retailer dummy	0.016*	0.026***	0.032***	0.014*	0.036***	0.046***
	0.009	0.009	0.012	0.008	0.013	0.014
Lambda	−0.006*	−0.006*	−0.006*	−0.005	−0.007*	−0.006
	0.004	0.004	0.004	0.004	0.004	0.004
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.218	0.220	0.200	0.110	0.137	0.178
F-statistic	3.350	3.320	2.910	2.660	2.800	3.100
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
Number of observations	312	312	312	312	312	312

Notes: Table V tests *H2* on the association between market reaction to the launching of a Twitter platform and the choice of communication strategy (two-way interaction vs one-way messaging) in both uncontaminated and contaminated subsamples (Panels A and B, respectively). Following the two-step Heckman procedure, Models (1 and 5) include the first-stage probit regression of the two-way interaction dummy and Models (4a, b, and c as well as 5a, b, and c) present the second-stage regressions of the stock price performance including the inverse Mills' ratio ***, **, and *denote significance at the 1%, 5% and 10% level (for the one-sided test), respectively

Table V.
Market reaction to
Twitter launch in
both uncontaminated
and contaminated
subsamples

media platform. Empirical results also suggest that firms with positive market momentum (higher historical market performance and lower standard-deviation than the market portfolio) are more likely to use a two-way interaction strategy, and this is also higher in the case of firms announcing positive corporate earnings around the launching of their Twitter platforms, i.e. within the contaminated subsample[14].

Our empirical investigations indicate a negative association between firm size and the market reaction to the launching of a Twitter platform, which suggests that the marginal benefit of social networking sites is higher for smaller firms. While larger firms have the ability and the required resources to engage in both transaction marketing and database marketing, smaller firms are more likely to develop relational marketing and are closer to their customer base and to rely more on the IMT to convey a desired image (Carson *et al.*, 1995). Given their low costs, social media strategies allow

small firms with resource constraints to benefit from their greater flexibility and strengthen their networks (SNA). Smaller firms are more likely to foster greater social interaction via social media, thus leading to stronger relationships (SET), more desired social representations (SRT), greater positive distinctiveness to target consumers (SIT) and signaling (ST) their market value.

Although not shown in the paper, we find that market reaction is higher market in smaller firms using two-way interaction. This suggests that smaller-sized firms that are less known are more likely to benefit from setting an interactive strategy with the community than larger firms; these results are available on request.

We also find that firms with a family/dominant shareholder that engage in a social media strategy benefit more from a greater positive market reaction than other firms. Firms with family or dominant shareholders may rely more on social media for signaling (ST) and for impression management (IMT). They are likely to exert a greater control on the quality of the information and the quality of social interaction, elements that integrate the various theories in our framework, especially the SET, SRT, SNA and SIT.

As corporate actions are often constrained by profitability, firms making losses are likely to rely more on social media as compared to traditional media. We find a higher market reaction to the launching of Twitter in firms with losses, which seem to benefit from social media-generated social interaction comparatively more than profitable firms that are usually investing in traditional marketing. This logic is supported by the SET, SRT and SNA, as outlined earlier.

Market reaction to the launching of a Twitter platform is higher for firms with a higher dividend yield. This suggests that investors may pay a premium for firms which exhibit salient characteristics of safety, such as dividend payment, and managers rationally "cater" to investor demand by paying dividend, which is in-line with the IMT and the role of rewards in the SET. The use of social media by dividend-paying firms engenders social interaction and attracts the attention of investors, which in turn leads to higher market reaction as also supported by the SRT, SNA, and SIT.

Managerial implications
This research helps firms understand the value relevance of social media strategies and the role played by two-way interaction and reciprocity rather than one-way messaging in marketing and community building. Firms that are planning to launch a social media strategy can benefit from our findings: They should interact and reciprocate when communicating with the community, as this increases social interaction, which in turn results in a higher market reaction, i.e. firm value. Our results indicate a positive and significant average market reaction of 2.1 per cent during the 10-day period around the launching of a Twitter platform for firms with a two-way interaction, which is significantly higher than that of firms with one-way messaging (−0.6 per cent, on average).

Our empirical findings help the managers of small and medium-size companies justify their investments in websites and sheds light on the practices that would support the success of their efforts. Similar benefits of a social media strategy accrue to firms with family/dominant shareholders.

Looking at differences across industries, we find evidence of a higher market reaction for firms with two-way interaction in different industries. More interestingly, firms in mining, oil, gas and construction with two-way interaction have a significantly higher market reaction than those with one-way interaction (5.6 versus −3.13 per cent, respectively). This is also higher in transportation, communication, electric, gas and sanitary services with two-versus those with one-way interaction (2 versus −3.6 per cent) or even and to a lesser extent

in the retail industry (+3 versus −0.4 per cent) or manufacturing firms (1.1 versus −1.2 per cent). Within these industries, we find examples of an exemplification behavior where firms try to elaborate and convince of their integrity, social responsibility and moral worthiness to increase the trust of the community. On the contrary, the difference in other industries such as computer office equipment, services or finance is not significantly different according to the choice of communication strategy.

The Securities and Exchange Commission (SEC) recently endorsed the use of social media outlets to distribute material, nonpublic corporate information. This opens new opportunities to use social media to penetrate the financial markets.

Limitations and directions for future research

In terms of limitations, the present paper refers to the EMH and considers that investors are able to predict the effect of the launching of a Twitter platform on future cash flows of the firm and firm value. However, the adoption of a new marketing strategy by a firm is more likely to affect its intangible assets, i.e. brand equity and customer loyalty, which might result in long-term value creation. Moreover, all investors are not experts in marketing developments and in social media strategies. As such, they may not perfectly and accurately evaluate the association between launching a social media platform and future cash flows (Srinivasan and Hanssens, 2009). Also, investors might be subject to hyping and as a result exhibit irrational behavior or exaggerated reaction in response to specific marketing developments (Sirri and Tufano, 1998). Thus, future work should examine the long-term association between social media activities and both operating and market performance.

Another interesting area of future research is the study of the effect on performance of strategic social interaction choices. Interactivity is a multi-faceted concept that goes beyond our definition of two-way communication to further include a high level of user engagement, and timeliness of communication (Liu and Shrum, 2002). A more detailed analysis of the content of posted comments, their frequency and timeliness would add to our understanding on the effect of interactivity on firm performance. Another area of research is to follow those firms that started with one-way messaging and that shifted to two-way communication, and study the causes and consequences of such a strategic change on firm performance.

Finally, if social media strategies are value-relevant, their impact should go beyond testing whether investors approve of firms adopting Twitter as an additional communication channel. Given that Twitter has stopped reporting historical data for more than two years, our research represents a short-term event study, which focusses on signaling effects of the decision to open a Twitter account. To further assess Twitter usage as a strategic tool, future research could consider a much longer window and content analysis of the type of communications issued on Twitter.

Contributions

Recently, there have been several articles in marketing and finance journals that have investigated stock market reaction and the effect on stock prices of overall marketing and specific marketing activities. Specific aspects of marketing that have been investigated include the roles of advertising (Xiong and Bharadwaj, 2013), brand acquisition, quality and rating (Luo *et al.*, 2013), product innovation (Srinivasan *et al.*, 2009), channel expansion (Homburg *et al.*, 2014) and customer equity and customer satisfaction (Merrin *et al.*, 2013). However, our research is different than published research on this topic in that it examines the impact on stock prices of the introduction of a specific social media platform, i.e. Twitter.

This research provides empirical evidence on the value relevance of engaging in a social media strategy, and brings answers to firms seeking to understand the effects and consequences of social media strategies on firm value to better align their social media initiatives with organizational goals (Culnan *et al.*, 2010). It builds on an integrated theoretical framework in the context of social media strategies, and uses a sample of 312 US firms from the Fortune 500 that developed a Twitter platform. We find no significant market reaction around the starting date of social media activities for the overall sample, but this is positive and significant in the uncontaminated subsample. Furthermore, market reaction is higher for two-way than for one-way messaging for the uncontaminated and the overall sample. We also show that investor reaction is sensitive to firm characteristics. Specifically, the stock price reaction is higher in smaller-sized firms, which are more likely to benefit from being connected than larger and well-known firms, those with losses and those involving a family and/or a dominant shareholder.

Moreover, in examining the specific effects of social interaction, we complement prior results of Schniederjans *et al.* (2013) who analyze the impact of the text posted in a variety of social network platforms (including blogs, forums and corporate websites) on financial performance. When examining the effects of one-way vs two-way communication strategies, we find a positive and significant market reaction around the launching of two-way Twitter activities, and this is likely to be higher in smaller-sized firms. As such, our paper adds to prior research on firm branding, which suggests that the impact of marketing variables on firm value is moderated by the type of branding strategy adopted by a firm (Rao *et al.*, 2004). This is consistent with Andersen (2005) who highlights the importance of feedback to sway the opinions of consumers, and shows that investors expect firms to benefit from setting a conversation which can raise the awareness, persuade and ensure a collaborative dynamic between both firms and customers. The present results of the paper add to prior research on database marketing and show that marketing "with" the customer is adding more value than marketing "to" the customer. The use of the net extends the scope of database marketing into a certain form of interaction marketing with "face-to-face" interaction within the relationships between the firm and its customers.

Finally, we show the conditions under which social media platforms are used in an interactive manner, and depict that firms are more likely to use a two-way interactive strategy following a one-year period of positive momentum. In further robustness checks, we controlled for the change in the consensus earnings per share (EPS) related to the sign of the news in public announcements around Twitter launching in the contaminated subsample. We find that firms with positive consensus EPS revision are more likely to engage in two-way interaction strategies, and both two-way interaction and the percentage EPS revision positively affect stock returns. This suggests that successful firms socially interact, whereas those with bad news prefer to follow one-way messaging strategies. Other robustness checks and cross-validation on a holdout sample enhance confidence in our findings.

Our integrated theoretical framework is another significant contribution. To our knowledge, this is the first study across disciplines that integrates the social exchange theory (SET), social representation theory (SRT), social network analysis (SNA), social identity theory (SIT), signaling theory (ST) and the impression management theory (IMT) into one framework that is built around information as a resource and social interaction. Some of these theories, such as the SRT, are not well-known to the marketing community in the USA and introducing them has merit. We hope that our study will inspire more research in this important area.

Notes

1. "New Survey Points to Growing Influence of Social Media in Trading", OneMarketData, LLC, New York, NY – July 22, 2013.

2. Twitter removed access to historical data in early 2016, which prevented us from updating our database.

3. We conducted an archival analysis, and we failed to find firms that announced their Twitter platforms before the actual launching date.

4. Given the fast nature of Twitter, these tweets "maturity" is at the most a couple of hours, only in the most extreme cases will a tweet remain active for more than a day.

5. Given that portfolio managers and financial analysts closely track the performance of S&P 500 firms, we argue that the remaining 188 firms are subject to similar market pressures.

6. In further robustness tests, we use the CAR over $(t-3)$ to $(t-3)$ days and $(t-5)$ to $(t+5)$ days around the launching day of Twitter and the results remain consistent.

7. In focusing on CAR $t-1$ to $t+1$ or $t+5$, we assume that investors have enough time to learn about the choice of the firm to follow a one-way versus a two-way communication strategy. Investors can see the first tweets and the interaction choice of the firm.

8. In further empirical investigations, we use the buy-and-hold abnormal return (BHARs). We also calculate the abnormal return using the market model based on the one-year beta before the launching date. The results are consistent with the main findings of the paper, and they are available on request.

9. A two-way interaction strategy requires greater resources than a one-way communication strategy (larger team, greater involvement in responding to tweets, etc.). However, we believe that stock market investors will outweigh the benefits related to greater transparency and stock market liquidity in firms choosing a two-way interaction strategy, which is likely to result in a higher abnormal return.

10. In-line with Loughran and Ritter (2004), hi-tech firms are defined as those with SIC codes 3571, 3572, 3575, 3577, 3578 (computer hardware), 3661, 3663, 3669 (communications equipment), 3671, 3672, 3674, 3675, 3677, 3678, 3679 (electronics), 3812 (navigation equipment), 3823, 3825, 3826, 3827, 3829 (measuring and controlling devices), 3841, 3845 (medical instruments), 4812, 4813 (telephone equipment), 4899 (communications services), 7371, 7372, 7373, 7374, 7375, 7378 and 7379 (software). Data are obtained from the GMI Ratings database.

11. In further robustness tests, we repeat our tests using the same instruments to control for the choice of interaction level, i.e. one-way messaging or two-way social interaction. Our results remain robust and consistent with the main conclusions of the paper.

12. In further robustness tests, we use an additional instrument in the first-stage Heckman regression model of the contaminated subsample, Positive EPS Revision dummy. We argue that the market reaction may be impacted by both the newly implemented social media strategy and the updated expectations on firm performance. The second-stage regression of market reaction also controls for an additional independent variable equal to the change in the consensus forecast of the earnings per share (EPS), EPS Revision per cent, during the month period around the launching date. Our results remain consistent and they are available on request.

13. In addition to the subsample analysis of contaminated versus uncontaminated events, we have done cross-validation on a holdout sample. The results remain consistent and they are available on request.

14. In further robustness tests, we examined the market reaction around the launching of a Facebook platform for 189 firms of the Fortune 500. The results remain consistent and indicate a CAR −5/

EJM

+5 days that is not significantly different from 0. We further compared the results for firms with one-way messaging versus two-way interaction model, and we find a higher, but not significantly different, abnormal return for firms with two-way interaction strategies. However, and given that firms might change their posts, we believe that some of the launching dates might not be accurate, which limits the accuracy of our robustness tests using Facebook.

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