

TWEETING AWAY FIRM VALUE:
HOW INVESTORS EVALUATE CEOS' USE OF SOCIAL MEDIA

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ABSTRACT

Our study examines CEOs' use of social media and how investors evaluate such activity. We propose that when a company is comparatively uncommunicative and makes few announcements, a CEO's adoption of social media can improve the information environment and increase the price investors are willing to pay for a share of the company. At the same time, when a CEO sends unusually many posts, sends posts that are mostly non-work related, reaches online "celebrity status," and works for a firm with weak corporate governance, social media activity can be seen as an indication of "unfocusedness" and "self-centeredness" and lower the price investors are willing to pay. Our analysis of S&P 1500 CEOs with active personal Twitter accounts yields strong support for our predictions. We discuss the implications of our findings for the strategic leadership and the corporate governance literatures.

INTRODUCTION

Leaders, including heads of state, increasingly engage with their constituents through their personal social media accounts. This trend is also apparent in the business world as a growing number of chief executive officers (CEOs) have adopted social media platforms, such as Twitter, to communicate with their stakeholders. The goal of our study is to evaluate how shareholders, as a key stakeholder, evaluate CEOs' use of social media.

There are aspects of social media that shareholders or investors² likely view positively. CEOs possess comprehensive information about their companies, and social media can be an important channel for disseminating unique and value-relevant perspectives to investors. Relatedly, using social media to share information can indicate that the CEO intends to be transparent and forthcoming, a trait that investors should view favorably.

But there are also potential downsides. Naturally, the more time CEOs spend on social media, the less time they have for their core responsibilities, such as evaluating product and market trends, conducting reviews, and building relationships with current and future business partners. Since these core tasks are critical to the firm, investors may view CEOs who spend a significant amount of time on social media as unfocused and not acting in their best interests. Relatedly, financial regulators can take issue with some of the information CEOs share through their social media accounts. Social media posts can also create consumer backlash. Investors may perceive CEOs who use social media despite these risks as self-centered and flippant and, again, not acting in their best interests.

Given these considerations, it is conceivable that investors view social media use as an “agency cost” and react negatively to its adoption, particularly when the CEO sends unusually

² In this study, we use the terms shareholders and investors interchangeably.

many posts, when the posts are mostly unrelated to the firm’s operations, when the CEO reaches online “celebrity status” and, thereby, becomes particularly distracted, and when the firm has weak corporate governance structures in place.

The empirical part of our paper quantifies to what degree the above considerations enter investors’ minds. To empirically evaluate investors’ perception of CEOs’ social media use, we consider CEOs of S&P 1500 firms who, at one point during our sample period, establish an active personal Twitter account. Of the various social media platforms, Twitter is the most actively used medium by corporate leaders (CNBC, 2019).³ We find that a total of 162 CEOs became active on Twitter during our 2006-2020 sample period, posting a total of 113,172 tweets. A difference-in-differences analysis reveals that the market value of a firm drops noticeably when its CEO starts tweeting. Crucially, the valuation effect turns positive when a firm is comparatively uncommunicative and files relatively few Form 8-Ks.⁴ On the flip side, we observe that the negative valuation effect is particularly strong when a CEO posts more tweets, when a CEO posts more tweets that are non-work-related, and when a CEO reaches “online celebrity status,” as approximated by the number of retweets and followers. The negative valuation effect is also particularly pronounced when the firm has a low corporate governance score.

In an additional analysis, we conduct a field survey and directly ask investors how they view CEOs’ personal use of Twitter. Our survey pool is unique in that it comprises professional investors working for large US-based financial institutions. 81% of the investors in our sample manage assets worth more than \$100 million. 97% have more than ten years of work experience.

³ As of June 2019, CNBC reported that 48% of S&P 500 and FTSE 350 CEOs now have a social media presence, and 79% of the CEOs maintaining a Twitter presence are actively engaged.

⁴ We describe Form 8-K in our hypothesis development section.

We pose open-ended questions regarding the possible benefits and the possible drawbacks. Regarding the possible benefits, many investors note that CEO tweets could provide unique, value-relevant information and thereby enhance transparency. The investors also suggest that CEOs can use Twitter to increase customer and investor reach.

Regarding the possible drawbacks, our investors state that using Twitter introduces significant legal, reputational, and financial risks to the company. The investors view CEOs' use of Twitter despite these substantial risks as self-serving.

When we ask our investors about the overall effect of having a "social executive" and whether a CEO who regularly tweets from his/her personal Twitter account makes it more or less likely that they would invest in the firm, we find that, on balance, investors think the possible drawbacks outweigh the possible benefits and that social media adoption makes it less likely they would invest in the firm. Overall, our field survey results corroborate our regression-based evidence around CEOs' Twitter adoptions.

Our study makes the following contributions to the literature. First, our study contributes to the upper echelons literature (e.g., Ouyang et al., 2022). Under the upper echelons theory, executives evaluate and make decisions through their own personalized lenses, shaped by their unique sets of experiences and characteristics. Since the proposition of the upper echelons theory, an extensive literature has begun to assess the degree to which specific experiences and characteristics reflect CEOs' preferences and belief systems and how key stakeholders, such as shareholders, evaluate these experiences and characteristics. While earlier work emphasizes features tied to CEOs' core responsibilities (e.g., Hambrick & Fukutomi, 1991; Henderson et al., 2006), the literature increasingly recognizes that tasks not related directly to CEOs' core responsibilities also strongly reflect their cognition, mentality, and preference (Clark, 1984).

Recent studies evaluating this possibility include Nicolosi and Yore (2015), Cain and McKeon (2016), and Ouyang, Tang, Wang, and Zhou (2022), among others. Our study augments the upper echelons literature and enriches the behavioral perspective of strategic leadership research by examining a novel CEO characteristic, namely, the personal use of social media. We study what inferences investors draw from CEOs' social media activity and under what conditions investors view such activity positively or negatively.

Our findings also contribute to current discussions of how the advent of modern information technologies is affecting firms' operations and their governance. Conceptually, CEOs' use of social media could improve or worsen corporate governance. On the one hand, CEOs may use social media for their own non-pecuniary benefit, in which case the use of social media constitutes a new form of agency cost and lowers the amount investors are willing to pay for a share of the company. On the other hand, CEOs could reveal unique and value-relevant information through their social media accounts, causing stock prices to reflect a company's intrinsic value more accurately. In the Principal-Agent framework, a substantial portion of a CEO's compensation should be stock-based, and the alignment of incentives between CEOs and shareholders should improve as stock prices reflect a company's intrinsic value more accurately (Jensen & Meckling, 1976; Murphy, 1999). It is thus conceivable that – by improving stock price accuracy – social media improves the incentive alignment between managers and shareholders, thereby lowering agency costs.

Our evidence suggests that, on balance, CEOs' use of social media increases agency costs. One managerial implication of our result is that solid governance mechanisms need to be in place if one wants to harvest the benefits of social media while limiting the costs.

THEORY AND HYPOTHESES

CEOs' Use of Social Media

The central idea in the upper echelons theory is that CEOs' personal experiences shape their cognitive models and value systems and, consequently, influence firms' decisions and outcomes (Hambrick & Mason, 1984). Although the seminal work by Hambrick and Mason (1984) does not differentiate between work and non-work experiences, existing empirical work has emphasized the former (Carpenter, Sanders, and Gregersen, 2001; Crossland et al., 2014; Hambrick & Fukutomi, 1991). For example, Graf-Vlachy, Bundy, and Hambrick (2020) suggest that CEOs develop more complex cognition as their tenure increases. Zhu, Hu, and Shen (2020) provide evidence that experiences on corporate boards impact CEOs' strategic decisions.

A comparatively small but growing literature has begun to also consider CEOs' experiences outside their corporate duties. For example, Dahl et al. (2012) examine a sample of Danish firms and find that fathering a child influences how a male CEO treats his employees. Liu and Yermack (2012) consider a sample of S&P 500 CEOs and find that a firm's performance declines after the CEO acquires a luxury property. Roussanov and Savor (2014) study the marital status of S&P 1500 CEOs and find that single CEOs are more risk-seeking. Relatedly, in a study of S&P 1500 firms, Nicolosi and Yore (2015) report that CEOs who experience a change in marital status are more likely to initiate risky strategic actions. Cain and McKeon (2016) consider 179 CEOs with pilot licenses and 2,931 non-pilot CEOs, and they find that firms with pilot CEOs are associated with higher leverage, greater stock volatility, and more aggressive takeover activities. Using a similar sample, Sunder et al. (2017) note that firms led by pilot CEOs are more innovative as measured by the number of patents and patent citations. These firms also pursue more diverse and original patents. More recently, Ouyang, Tang, Wang, and Zhou (2022)

provide evidence that firms face greater scrutiny by credit stakeholders when their CEOs pursue the risky hobby of piloting small jets.

A key lifestyle component that the literature has yet to examine is a CEO's use of social media. Social media has become ubiquitous in private lives and workplaces alike. Whereas in 2005, only five percent of adults in the United States reported using social media, by 2019, that number had grown to around 70 percent.⁵ Social media usage among CEOs is also increasing steadily (*Wall Street Journal*, 2018). Despite its growing prevalence, we have yet to understand how stakeholders evaluate CEOs' use of social media. Building upon prior theory that on-the-job and off-the-job activities reflect a CEO's belief system and preferences, we predict that social media use is an important CEO characteristic that affects how investors perceive a CEO.

How Markets Respond to CEOs' Use of Social Media

It is natural for investors to like some aspects of a CEO using social media while disliking others. In this section, we spell out the aspects that we conjecture investors like and dislike. We also hypothesize under what conditions investors' assessments and reactions are likely to be particularly pronounced.

We start with the possible benefits. As key decision-makers in their firms, CEOs possess comprehensive information about their firms, and investors should yearn to hear from them. It is possible that investors' desire to hear from CEOs extends to CEOs' social media posts. Social media posts can contain company- or product-related announcements. Even posts describing work-related day-to-day activities can provide insight into positive or negative developments at work.

⁵ <https://www.pewresearch.org/fact-tank/2019/04/10/share-of-u-s-adults-using-social-media-including-facebook-is-mostly-unchanged-since-2018/>

One ameliorating factor is whether investors cannot obtain the information that CEOs share via social media through other dissemination channels already.

Prior to the emergence of social media, hearing from a CEO was uniformly rare. Kim and Meschke (2014) find that even within the subsample of CEOs who appear on CNBC at least once, the average CEO appears only 0.82 times a year.

Many times, even hearing directly from a firm constitutes a rare event. The US Securities and Exchange Commission (SEC) requires all publicly traded companies to file Form 8-K to announce “significant” events. The SEC provides a list of what constitutes a significant event but also notes that the list is non-comprehensive. Firms thus have significant discretion in whether to file Form 8-K, and we observe substantial variation in the number of Form 8-Ks filed even within firms that reside in the same industry and firms that are similar based on various observable firm characteristics (Noh et al., 2018). Noh et al. find that the average firm files only eight Form 8-Ks a year, four of which are the quarterly and annual earnings announcements. 34% of the firms issue the bare minimum of four Form 8-Ks a year.

All in all, it appears conceivable that investors view CEO social media posts as improving the information environment. This perception should increase the less communicative the corresponding firm is.

How would a perceived improvement in the information environment affect the corresponding firm’s market valuation? As alluded to in the introduction, a richer information environment can boost the stock price accuracy and improve the incentive alignment between shareholders and CEOs. This should increase the price investors are willing to pay for a share of the company. A large literature in finance also shows theoretically and empirically that an enhanced information environment leads to improved stock market liquidity and greater investor

participation, both of which, in turn, increase firm valuation (Glosten and Milgrom, 1985; Easley and O'Hara, 1987; Diamond and Verrecchia, 1991). In the end, we propose the following hypothesis:

Hypothesis 1 (H1): *The less frequently a company makes announcements of material events, the more positive the valuation effect of a CEO's social media activity.*

We stress that it is not unambiguous that investors view CEO social media posts as improving the information environment and that this leads CEOs' social media activity to have a positive valuation effect, particularly when a firm is uncommunicative. Indeed, if our hypothesis was unambiguous, there would be little need to assess it empirically. The key point in our development of Hypothesis 1 and our four hypotheses below is that they are theoretically defensible.

While investors may like the information environment aspect of social media, we conjecture that they dislike other facets of a CEO's social media adoption. The theoretical backbone of Hypotheses 2-5 is our proposition that managerial attention is a scarce resource (March & Simon, 1958). Sound decision-making requires that the decision-maker collects, processes, and interprets information comprehensively, necessitating high levels of effort and attention. Naturally, the more time CEOs spend on social media, the less time they have for other, more critical tasks. Shareholders may thus view CEOs spending time on social media as not being in their best interest and, instead, see it as an indication of unfocusedness.

Relatedly, the use of social media is accompanied by large downside risks. While social media posts could improve the information environment, financial regulators may deem certain posts as misleading or as violating the Regulation Fair Disclosure. In fact, the information that CEOs have transmitted through their personal social media account has already triggered

multiple investigations by the SEC.⁶ An investigation by the SEC not only carries financial risk but further detracts CEOs from their core responsibilities. Moreover, while CEOs' use of social media may raise consumer awareness, social media posts can also easily create customer backlash. Recent cautionary tales include Twitter's then-CEO Jack Dorsey's tweets encouraging his followers to visit Myanmar⁷, Amazon's then-CEO Jeff Bezos' tweet about dog sledding on Earth Day⁸, and former CrossFit CEO Greg Glassman's tweet regarding George Floyd⁹. Given these risks, investors may view CEOs who are active on social media as flippant and, again, not acting in their best interests.

Our proposition that CEOs' social media activity could not be in shareholders' best interests and, instead, be an indication of unfocusedness and self-centeredness and represent an agency cost is likely more relevant under certain conditions. In particular, while the occasional use of social media is unlikely to represent a meaningful distraction, it is questionable whether a CEO who is highly active on social media is fully focused on his or her core responsibilities. Similarly, while the occasional, careful use of social media is unlikely to be accompanied by large downside risks, the risks should be non-negligible for CEOs who are highly active on social media. We propose the following hypothesis:

Hypothesis 2 (H2): *The more a CEO uses social media, the more negative the valuation effect of a CEO's social media activity.*

Social media can be used for both work- and non-work-related purposes. A CEO sending

⁶ See, for example, <https://www.cnbc.com/id/100289227> and <https://www.nytimes.com/2022/07/14/technology/twitter-elon-musk-sec.html>.

⁷ <https://www.washingtonpost.com/technology/2018/12/09/latest-public-figure-face-backlash-his-tweets-twitter-ceo-jack-dorsey/>

⁸ <https://www.inc.com/chris-matyszczyk/amazon-ceo-jeff-bezos-showed-off-his-exciting-vacation-on-twitter-what-happened-next-wasnt-pretty.html>

⁹ <https://www.cbsnews.com/news/crossfit-ceo-greg-glassman-apologizes-george-floyd-19-tweet/>

mostly non-work-related posts can be seen as an indication that the CEO uses social media primarily to gain personal benefits, such as social recognition and psychological comfort (Jan, Soomro, and Ahmad, 2017). Investors may, therefore, view CEOs who send mostly non-work-related posts as particularly unfocused. Posts that are not centered on a company and, instead, veer into the social domain are also more likely to create customer backlash. We propose the following hypothesis:

Hypothesis 3 (H3): *The greater the proportion of non-work-related posts coming out of a CEO's personal social media account, the more negative the valuation effect of a CEO's social media activity.*

Some CEOs have become highly popular on social media. CEOs can have many followers on their social media accounts; a tweet by a CEO can be retweeted many times. When a CEO becomes highly popular on social media, the CEO may enjoy the limelight in the virtual world and become even more distracted from real-world business operations. Relatedly, the literature suggests that becoming a celebrity does not make the CEO a better decision-maker. Hayward, Rindova, and Pollock (2004) find that a CEO's popularity increases the CEO's (over-)confidence and generates inertia for critical, necessary changes. Wade, Porac, Pollock, and Graffin (2006) find evidence that firms with more popular CEOs perform worse, even though the CEOs receive higher compensation. Malmendier and Tate (2005) show that firms run by "superstar CEOs" (i.e., CEOs who have won awards) subsequently underperform because their CEOs spend more time on activities outside their core responsibilities, such as writing autobiographies. Given the above considerations, it appears plausible that investors become particularly concerned about a CEO's social media activity when the CEO reaches high online popularity. We, therefore, propose the following hypothesis:

***Hypothesis 4 (H4):** The more popular a CEO is on social media, the more negative the valuation effect of a CEO's social media activity.*

Suppose the market regards CEOs' social media use as a form of agency cost. One factor that could alleviate the market's concern is good corporate governance. Corporate governance is a multi-faceted construct that includes several mechanisms to align CEOs' actions with shareholders' interests. A key mechanism is the threat to remove the CEO should shareholders feel that the CEO is no longer acting in shareholders' best interests and, instead, is accruing private benefits (Manne, 1965; Bebchuk, 2002; Bebchuk et al., 2009). A large literature has compiled evidence that when this mechanism is weakened and CEOs are entrenched, CEOs are more likely to shirk, build empires, and extract private benefits (please see Bebchuk (2002) for a survey). In the end, we predict that when governance structures are strong and CEOs are not entrenched, CEOs' social media use is less likely to represent an agency cost.

***Hypothesis 5 (H5):** The better the corporate governance of the firm employing the CEO, the less negative the valuation effect of the CEO's social media activity.*

METHOD

Sample

We test our predictions using a sample of CEOs of publicly traded firms in the US. We first compile a list of all CEOs in Execucomp from 2006 through 2020. Execucomp covers all the top executives of S&P 1500 companies and companies that were once part of the S&P 1500 index and are still trading. We start in 2006 as Twitter was founded in 2006. We end in 2020 as our data collection started in early 2021. Our list comprises 5,242 CEOs working for 2,738 distinct companies.

To identify whether a CEO has a personal Twitter account, we recruited six research assistants and provided them with the list of the 5,242 CEOs. The list contained the CEO's first name, last name, and company affiliation. We asked the research assistants to check whether a particular CEO had an active personal account on Twitter. Each CEO was searched by two research assistants. When the research assistants found a potential match, we checked whether the Twitter account information overlapped with personal information from Execucomp, including the CEO's age, gender, and past work experience. We also browsed the Twitter profile page and read a few tweets. In general, we erred on the side of caution and dropped accounts that we were not entirely sure belonged to the CEO in question. We determined that 249 CEOs have authentic, active personal Twitter accounts. We collected the following information for each of these Twitter accounts: account identifier ("screen name"), personal biography, account registration date, and the number of followers as of May 2021.

We define the date a CEO posted his or her first tweet as that CEO's Twitter adoption date. Our final analysis only considers cases for which the Twitter adoption occurs during a CEO's tenure. That is, we omit cases where a person adopts Twitter before that person becomes a CEO. We also omit cases where a person adopts Twitter after that person has resigned from the CEO position. If a CEO switches jobs and activates a second personal Twitter account tied to the second firm, we only consider the Twitter adoption with the first firm (There is only one such case in our sample.). Our final analysis comprises 162 Twitter adoptions.

We combined two approaches to downloading CEOs' tweets, which include both the original tweets they posted and the retweets/replies to other accounts' tweets. First, we wrote a program using Twitter's official API (<https://developer.twitter.com/>) and retrieved all timeline tweets for each CEO's Twitter account. The limitation of this approach is that the official API

returns only the most recent 3,200 tweets of a Twitter account. We, therefore, augmented the first approach with the “snsrape” Python package, a popular tool for scraping data from social media sites. The second approach allowed us to collect the older tweets from a Twitter account through the advanced web search function (<https://twitter.com/search-advanced>). In total, we retrieved 113,172 tweets posted by 162 CEOs from 2008 through 2020. We have the following information for each tweet: account identifier (“screen name”), tweet identifier, date, time, the content of the tweet, and the tweet’s number of retweets.

Given our large sample of tweets, we combined manual labeling with machine-learning-based labeling to code whether a tweet is work-related or non-work related. We first recruited eight research assistants and asked them to categorize a subset of 34,585 tweets into the following three types: “Type-1 tweets,” which are company-related news announcements; “Type-2 tweets,” which describe a CEO’s day-to-day work activities; and “Type-3 tweets,” which describe a CEO’s personal interests, hobbies, or activities unrelated to work. Each tweet was read by three research assistants and assigned the type that at least two research assistants (i.e., the majority) chose. When all three research assistants disagreed, we had the tweet read by a fourth research assistant to break the tie.

An example of a Type-1 tweet is, “*Tesla has suspended vehicle purchases using Bitcoin. We are concerned about rapidly increasing use of fossil fuels for Bitcoin mining and transactions, especially coal, which has the worst emissions of any fuel. [...]*” (a tweet sent on 5/13/2021 by Elon Musk, CEO of Tesla).

Examples of tweets about a CEO’s day-to-day work activities (Type-2 tweets) include “*Earnings call. T-1 hr away. I enjoy taking a step back from the day to day and reflecting on all we have accomplished over the past qtr*” (a tweet sent on 10/29/2009 by John Heyman, CEO of

Radiant Systems) and “*Meeting with our partner and customer in Shanghai; Mr Chen Hong, President of SAIC. Helping me eat. <http://t.co/Jik93eMMxZ>*” (a tweet sent on 2/26/2014 by Alex Molinaroli, CEO of Johnson Controls).

Examples of non-work-related tweets (Type-3 tweets) include “*Dinner at Hammersley's in Boston—this is still a great restaurant!!*” (a tweet sent on 10/23/2008 by George F. Colony, CEO of Forrester Research) and “*Heading to the @Aaarena for the BIG @MiamiHEAT OKC Thunder match-up. Tip is 8pm sharp be there loud & in Black.*” (a tweet sent on 4/4/2012 by Micky Arison, CEO of Carnival).

To label the remaining 78,587 tweets, we built a machine-learning model based on the manually-labeled tweets. We randomly split the sample of human-coded tweets into a training set and a testing set at a ratio of seven to three. We used the training set to train the model and the testing set to conduct out-of-sample model performance evaluations. We considered five popular classification algorithms to train the machine learning model. These classification algorithms include Logistic Regression (LR), Naïve Bayes (NB), Random Forest (RF), Support Vector Machine (SVM), and Extreme Gradient Boosting (XGBoost). The SVM algorithm performed the best of the five algorithms. We, therefore, used the SVM algorithm to categorize the remaining 78,587 tweets. The other four classification algorithms produce similar results (the results are available upon request).

Variables

Dependent Variable

We use Tobin’s Q , TBQ , to measure the value investors attach to a specific company (Dezso and Ross, 2012; Jayachandran et al., 2013; Awaysheh et al., 2020). TBQ is the firm’s market value of

assets divided by the book value of its assets as of the most recent fiscal year-end, and it is calculated within COMPUSTAT as $(AT-SEQ+PRCC*CSHO)/AT$.

Key Independent Variable

To assess how positively or negatively investors evaluate a CEO's Twitter activity, we conduct a difference-in-differences (DID) analysis around the three years before a CEO adopts Twitter and the three years after a CEO adopts Twitter. Specifically, we consider a firm that employs a CEO who eventually adopts Twitter ("treated firms") and compute the change in firm valuation around the adoption of Twitter relative to that of a similar firm employing a CEO who does not adopt Twitter ("matched control firms"). We describe how we found the matched control firms in the "Analysis Techniques" section.

Our key independent variable is the interaction between *TwitterGroup* and *AfterCEOAdoption*. *TwitterGroup* is set to one if firm *i* employs a CEO who adopts Twitter during our study period and zero otherwise. For each treated firm and its matched control firm, *AfterCEOAdoption* changes to one once the treated firm's CEO adopts Twitter.

Moderators

To test our five hypotheses, we conduct subsample analyses by splitting our sample into halves based on five constructs: the corresponding firm's communicativeness, a CEO's intensity of Twitter use, a CEO's Twitter content, a CEO's popularity on Twitter, and the corresponding firm's corporate governance.

To examine the effect of a firm's communicativeness, we count the total number of Form 8-Ks that the firm files in the year before the Twitter adoption and separate observations by

whether the number is greater than or equal to the median or below the median.¹⁰ If the number is greater than or equal to the median, we assign both the treated firm and its corresponding control firm to the “top-half group;” if the number of tweets is below the median, we assign both the treated firm and its corresponding control firm to the “bottom-half group.”

Similarly, to examine the effect of a CEO’s intensity of Twitter use, we draw from *#Tweets* and separate observations by whether the number of tweets posted by a CEO within the first year of Twitter adoption is greater than or equal to the median or below the median. To examine the effect of a CEO’s Twitter content, we draw from *Non-work-related* and separate observations by whether the fraction of non-work-related tweets within the first year of Twitter adoption is greater than or equal to the median or below the median. To examine the effect of a CEO’s popularity, we use two measures: *#Retweets* and *#Followers*. We separate observations by whether the average number of retweets within the first year of Twitter adoption is greater than or equal to the median or below the median. We also separate observations by whether the number of followers at the time of our data collection (i.e., May 2021) is greater than or equal to the median or below the median. Finally, to examine the effect of a firm’s corporate governance, we draw from *Governance* and separate observations by whether the firm’s E-Index is greater than or equal to the median or below the median. The E-Index is defined as in Bebchuk, Cohen, and Ferrell (2009) and serves as a measure of governance weakness based on six indicators of CEO entrenchment, including staggered boards, poison pills, golden parachutes, supermajority requirements for charter amendments, supermajority requirements for bylaw amendments, and supermajority requirements for mergers.

¹⁰ Our results are qualitatively similar when we count the total number of press releases by a firm in a given year.

Control variables

For each firm in our DID analysis, we checked whether the firm has an official, firm-managed Twitter account. We then reran our scraping programs to collect the tweets posted by these firm-managed Twitter accounts. 146 of the 162 tweeting CEOs work for firms with firm-managed Twitter accounts. In 38 of these 146 cases, the CEO first adopted Twitter; in the remaining 108 cases, the CEO adopted Twitter after their firm set up a firm-managed Twitter account.

We also include the following control variables based on Knill et al. (2022): (a) *Institutional Holding*, which is the proportion of shares held by institutional investors as of the most recent calendar quarter-end. (b) *Size*, which is the natural logarithm of the firm's book value of assets as of the most recent fiscal year-end and calculated within COMPUSTAT as Ln(AT) . (c) *Sales*, which is the firm's sales divided by the book value of its assets as of the most recent fiscal year-end and calculated within COMPUSTAT as SALE/AT . (d) *Sales Growth*, which is the firm's sales growth rate and calculated within COMPUSTAT as REVT in the present year divided by REVT in the previous year. (e) *Surplus Cashflows*, which is the firm's surplus cash flow divided by the book value of its assets as of the most recent fiscal year-end and calculated within COMPUSTAT as $(\text{OANCF} - \text{DPC} + \text{XRD})/\text{AT}$. (f) *Stock Returns*, which is the firm's buy-and-hold stock return over the previous year. (g) *R&D*, which is the firm's R&D expenditure divided by the book value of its assets as of the most recent fiscal year-end and calculated within COMPUSTAT as XRD/AT . (h) *Loss*, which is an indicator variable set to one if the firm has reported negative earnings as of the most recent fiscal year-end. (i) *Z-score*, which is the Altman Z-score predicting whether a company is headed for bankruptcy (Altman, 1968) and calculated within COMPUSTAT as $3.3 \times \text{OIADP/AT} + 1.2 \times (\text{ACTLCT})/\text{AT} + \text{SALE/AT} + 0.6 \times \text{PRCC_C} \times \text{CSHO}/(\text{DLTT} + \text{DLC}) + 1.4 \times \text{RE/AT}$.

We use the Heckman correction procedure to control for potential selection bias (Heckman, 1979) and include the Inverse Mills Ratio (*IMR*) as of the previous year in our regression model.¹¹ Specifically, in each year within our study period, we regress the Twitter adoption status on a set of lagged independent variables, as shown in Table 3. For each firm/year observation, the *IMR* is the ratio of the probability density function to the cumulative distribution function. The *IMR* gauges the likelihood that the firm’s CEO will adopt Twitter in a given year.

Empirical Design

Difference-in-Differences Model

To test how investors evaluate a CEO’s Twitter adoption, we measure the change in value that investors attach to the firm after the corresponding CEO adopts Twitter relative to the change in the value of an observationally identical firm whose CEO does not adopt Twitter. If we were to look only at the firms whose CEOs adopt Twitter, it would be unclear whether the observed changes come from the Twitter adoptions or some macro- or industry-specific event that tends to coincide with Twitter adoptions. By comparing the treated firm’s valuation change over the valuation change experienced by a highly similar firm, we strive to remove the effect of such confounding events.

Our DID model is specified in Equation (1).

$$TBQ_{i,t} = \alpha_i + \delta_t + \beta \text{TwitterGroup}_i \times \text{AfterCEOAdoption}_{i,t} + \mu X + \varepsilon_{i,t} \quad (1)$$

The unit of analysis is at the firm/year level. The dependent variable $TBQ_{i,t}$ is firm i ’s Tobin’s Q in year t . α_i and δ_t are firm- and year-fixed effects. The firm-fixed effects control for

¹¹ Other work that uses the Heckman correction procedure within a DID framework includes (Neuhauser & Raphael, 2004; Chen, Crossland, and Huang, 2016). Analyses without the Heckman correction procedure produce results similar to those presented in this study.

time-invariant firm characteristics. The time-fixed effects account for common shocks that affect all firms. $TwitterGroup_i$ and $AfterCEOAdoption_{i,t}$ do not appear in the model due to the inclusion of firm- and time-fixed effects. Our primary variable of interest is the interaction term, $TwitterGroup_i \times AfterCEOAdoption_{i,t}$. The coefficient estimate of $TwitterGroup_i \times AfterCEOAdoption_{i,t}$ reveals how much a firm's valuation changes once its CEO adopts Twitter, above and beyond any change experienced by an observationally identical matched control firm over the same time frame. X denotes our set of control variables. We cluster our standard errors by both firm and year.

Propensity Score Matching

The DID model requires that the matched control firms are similar to the treated firms, implying that, in the absence of the treatment, the change in the dependent variable would be roughly the same between the treated and matched control firms.

We conduct propensity score matching (Rosenbaum & Rubin, 1983; Dehejia & Wahba, 2002; Caliendo & Kopeining, 2008) to identify observationally identical matched control firms. The idea is that CEOs with similar characteristics have the same propensity to become treated (i.e., adopt Twitter). Still, by chance, the CEOs of the treated firms adopted Twitter, while the CEOs of the matched control firms did not.

We estimate a probit regression to predict whether a CEO adopts Twitter. We consider various executive and firm characteristics. The variables are as follows: (a) *CEO Age*, which is the CEO's age. (b) *CEO Tenure*, which is the number of years the CEO has served as CEO. (c) *Male CEO*, which is an indicator set to one if the CEO is male, and zero otherwise. (d) *Extravert*, which is a measure of a CEO's level of extraversion from Green et al. (2019). (e) $Ln(Total$

Compensation), which is the natural logarithm of the CEO's total compensation. (f) *Size*, which is the corresponding firm's market capitalization in millions. (g) *Book-to-market*, which is the corresponding firm's book value of assets, divided by the market value of assets, both measured as of the most recent fiscal-quarter end and calculated within COMPUSTAT as $ATQ / (ATQ - CEQQ + (\#Shares\ Outstanding[in\ millions] * Price))$. (h) *Cash Flow*, which captures how much cash at hand the corresponding firm has and is calculated within COMPUSTAT as $([OIBDP - XINT - TXT - CAPX] / AT)$. (i) *ROA*, which measures the accounting profitability of the firm and is calculated within COMPUSTAT as $(OIBDP / AT)$. (j) *Leverage*, which measures how much debt the firm has on its books and is calculated within COMPUSTAT as $([DLC + DLTT] / AT)$. (k) *Dividend*, which measures how much of the profits the firm decides to pay as dividends to its investors and is calculated within COMPUSTAT as $(DVPSP_F / PRCC_F)$. (l) *Capital Expenditures*, which measures how much the firm invests in physical assets and is calculated within COMPUSTAT as $(CAPEX/AT)$. (m) *R&D*, which measures how much the firm invests in research and development and is calculated within COMPUSTAT as (XRD/AT) . (n) *Sales/Total Assets*, which is the annual sales scaled by the book value of total assets. (o) *Sales Growth*, which measures the growth in revenue and is calculated within COMPUSTAT as $(REVT / REVT_{t-1})$. (p) *Loss*, which is an indicator set to one if a firm has negative net income in a given year, and zero otherwise. (q) *Tax*, which is the effective tax rate and is calculated within COMPUSTAT as $(TXT/EBIT)$. And (r) $\text{Log}(\text{Firm Age})$, which is the natural logarithm of the cumulative number of years the firm has been publicly traded.

To control for time-invariant firm characteristics and time effects, such as the increasing popularity of social media over time, we include firm- and year-fixed effects. We measure all our variables at the end of year $t-1$ to investigate whether they have predictive power for a CEO

having a personal Twitter account as of year t . We adopt the single nearest neighbor matching method with common support within a caliper to find the matched control firm.

RESULTS

Table 1 provides descriptive statistics for the firms with CEOs that have an active Twitter account and the matched firms whose CEOs do not have an active Twitter account. Between the two groups, there are no statistical differences in *Tobin's Q*, *Institutional Holding*, *Firm Size*, *Sales*, *Sales Growth*, *Surplus Cashflows*, *Stock Returns*, *R&D*, *Loss*, and *Z-score*. However, firms with tweeting CEOs post significantly more tweets through their official firm-managed Twitter accounts. *#Company Tweets* is 792 per year for tweeting CEOs but only 249 per year for matched CEOs. A t-test suggests a significant difference (p-value <0.01). In Table 2, we report descriptive statistics and correlations for the variables used in our DID model.

Determinants of CEO Twitter Adoption

Table 3 presents the results from our probit regressions, which predict whether a CEO adopts Twitter. The Model 1 column shows the regression results for the full sample of S&P 1500 companies, and the Model 2 column shows the regression results for the matched sample we use in our DID analysis.

The Model 1 results show that the likelihood of Twitter adoption is higher for CEOs with a shorter tenure, female CEOs, CEOs with lower total compensation, CEOs who are more extravert, and CEOs of firms that have greater sales growth and pay higher taxes. In other words, the adoption of Twitter is not random and can be predicted by various CEO and firm characteristics.

Unlike in Model 1, the Model 2 column shows that none of the coefficient estimates are statistically significant at the 10% level (and, consequently, the 1% or 5% levels), suggesting that the CEOs of the treated firms and the CEOs of the matched control firms have the same propensity to adopt Twitter. By chance, the former adopted Twitter, while the latter did not.

Our matching quality evaluation, tabulated in Appendix A, shows that all covariates in the matching regression are balanced with standardized mean differences of less than 10 percent. These results indicate further that the matched firms are observationally identical to the treated firms except for the treatment condition.

CEO Twitter Adoption and Firm Valuation

Table 4 reports the regression results from our DID model. In Model 1, we evaluate the overall effect of CEOs' Twitter adoptions on their firms' Tobin's Q. The results show that CEOs' Twitter adoptions are negatively correlated with Tobin's Q ($\beta = -0.17$, $p\text{-value}=0.06$). The estimate suggests that, after a CEO adopts Twitter, the CEO's firm experiences a drop of 0.17 in Tobin's Q relative to a matched firm whose CEO does not adopt Twitter. To put this drop in perspective, the median Tobin's Q in our sample is 1.59. Our results thus suggest that the median firm sees an abnormal drop of 10.7% in its Tobin's Q, implying that, on balance, investors perceive the drawbacks of social media as significantly outweighing the benefits.

Models 2 through 13 test the moderating effects proposed in our five hypotheses. Models 2 and 3 test Hypothesis 1 regarding the moderating effect of a firm's communicativeness. We find that in the subgroup of firms filing fewer Form 8-Ks and thus residing in poorer information environments, firms experience an increase of 0.04 ($p\text{-value}=0.69$) in Tobin's Q after the CEO becomes active on Twitter. In sharp contrast, in the subgroup of firms filing more Form 8-Ks,

firms experience a drop of 0.28 (p-value=0.02) in Tobin's Q. These findings are consistent with Hypothesis 1: the less frequently a company makes announcements of material events, the more positive the valuation effect of a CEO's social media activity.

Models 4 and 5 test Hypothesis 2 regarding the moderating effect of the number of CEO tweets. We find that in the subgroup of CEOs posting more tweets than the median CEO, firms experience a drop of 0.27 (p-value=0.05) in Tobin's Q after the CEO becomes active on Twitter. By contrast, in the subgroup of CEOs posting fewer tweets, firms experience only an economically and statistically insignificant drop of 0.02 (p-value=0.85) in Tobin's Q. These findings are consistent with Hypothesis 2: the more a CEO uses social media, the worse investors view such activity.

Models 6 and 7 present the results for Hypothesis 3. In the subgroup of CEOs posting more non-work-related tweets, Twitter adoptions lead to a drop of 0.20 (p-value=0.06) in Tobin's Q; in the subgroup of CEOs posting fewer non-work-related tweets, Tobin's Q drops by 0.14 (p-value=0.24). These results imply that when CEOs use Twitter more for non-work-related purposes, the negative impact of CEOs' Twitter adoption on firms' valuations is slightly greater. However, the economic and statistical significance of this moderating effect is not particularly strong. Part of the low significance may be the result of measurement errors in how we categorize tweets as work-related and non-work-related tweets and the associated low statistical power. Ultimately, we conclude that Hypothesis 3 is supported weakly.

Models 8 through 11 test the moderating effect of a CEO's popularity on Twitter as proposed in Hypothesis 4. We find a noticeable difference in the valuation effect between the more popular tweeting CEOs and the less popular ones, regardless of whether popularity is measured by the number of retweets or the number of Twitter followers. Specifically, the drop in

Tobin's Q after the CEO adopts Twitter is 0.24 (p-value=0.09) for CEOs whose tweets receive more retweets but only 0.07 (p-value=0.46) for CEOs whose tweets receive fewer retweets. The drop in Tobin's Q is 0.17 (p-value=0.04) for CEOs with more Twitter followers but only 0.04 (p-value=0.17) for CEOs with relatively few followers. These findings are consistent with Hypothesis 4: the more popular a CEO is on social media, the more concerned investors are about the CEO's activity on social media.

Models 12 and 13 test our moderating hypothesis regarding a firm's corporate governance (Hypothesis 5). We find that firms with high governance scores experience an increase of 0.09 (p-value=0.60) in Tobin's Q. By comparison, firms with poor governance scores suffer a drop of 0.32 (p-value=0.01). The findings are consistent with Hypothesis 5: the better the corporate governance, the less negative (or even positive) the effect of social media adoption on firm valuation.

Survey-Based Evidence on How Investors View CEOs' Twitter Use

Our previous analysis infers investors' perceptions of social executives and the corresponding stock price implications from observed changes in valuation around CEOs' Twitter adoptions. One concern is that despite our DID analysis, we cannot rule out that the observed valuation changes are driven by an unobserved event that tends to coincide with Twitter adoptions. In addition, while the results from Models 2 through 13 point to an information- and agency-cost explanation, we have so far not provided *direct* evidence that information environment and agency costs are important considerations to investors.

This section presents complementary survey-based evidence to address these two concerns. In particular, we ask investors directly whether, on balance, they view CEOs' Twitter

activity positively or negatively and, if positively or negatively, what benefits or drawbacks weigh most heavily on their minds.

There are broadly two groups of investors, professional or institutional investors and individual or retail investors. The average institutional holdings of our sample firms are 75%. Put another way, institutional investors hold 75% of the stocks, and retail investors hold the remaining 25%. In the US stock market, institutional investors accounted for more than 85% of the trading volume during our sample period (Bloomberg Intelligence, 2021). We, therefore, exerted great effort to obtain survey evidence from institutional investors.

To reach institutional investors, we collaborated with CoreData Research (<https://coredataresearch.com>). CoreData Research is a market research firm that conducts investor surveys for large financial institutions. Our subject pool comprises one hundred US-based institutional investors. 81% of the institutional investors in our sample report managing assets worth more than \$100 million; 34% report managing more than \$2.5 billion of assets. 97% of the institutional investors in our sample have more than ten years of work experience; 69% have more than twenty years of work experience. We present the details of the survey design in Appendix B. In short, we are careful to phrase open-ended questions to avoid inserting ourselves into the data-generating process.

The survey results, also presented in Appendix B, indicate that the perceived benefits of CEOs using social media broadly fall into two categories: (1) valuable information to investors and (2) greater customer and investor awareness. The perceived drawbacks broadly fall into the following three categories: (1) potential charges of market manipulation, (2) risk of antagonizing customers and investors, and, relatedly, (3) seemingly flippant corporate leadership that is not aligned with shareholder interests. To expand on the third point, many investors believe that the

personal use of Twitter creates significant legal, reputational, and financial risks to the firm. Many investors view CEOs' use of Twitter despite these substantial risks as self-serving and not in line with shareholder interests.

On balance, the institutional investors in our sample state that the perceived drawbacks outweigh the perceived benefits. Correspondingly, the average institutional investor in our sample states that CEOs' Twitter activity lowers the likelihood that she or he will invest in the corresponding stock. For instance, while 49% of the investors state that a CEO active on Twitter would "*make it somewhat less likely*" or "*make it much less likely*" that they would invest in the corresponding firm, only 18% state that the adoption of Twitter would "*make it somewhat more likely*" (none of the investors report that it would "*make it much more likely*").

Overall, our survey responses provide direct evidence that investors view information environment considerations as a key benefit of CEOs' adopting Twitter. Our survey responses also provide direct evidence that agency concerns are one of the key aspects that investors view negatively. Our survey-based evidence thus corroborates our hypotheses regarding the channels that give rise to investors' perceptions of CEOs' Twitter activity.

Our survey-based evidence also shows that, on balance, investors view CEOs' Twitter activity negatively and suggests that the sharp drop in market value we observe around a CEO's Twitter adoption is indeed causally tied to the Twitter adoption.

Supplemental Analysis

We perform various additional analyses to confirm the robustness of our results. A key assumption for any DID analysis is the parallel-trend assumption. We formally test the parallel-trend assumption within a regression framework. For our Tobin's Q analysis, for which we have

three years in the pre-treatment period, we create *AfterSocialPlacebo*, which is set to one for the last year and zero for the first two years. We then estimate our DID model with the interaction term $TwitterGroup \times AfterSocialPlacebo$ on our pre-treatment observations. We do not observe a significant placebo treatment effect, suggesting that the dependent variables for the two groups are parallel before the treatment.

Second, to study the moderating effects, we split our sample in half based on the moderator rather than conducting a triple-difference analysis. One challenge arising from including three-way interaction terms is that three of our moderators pertain to a CEO's Twitter activity and are thus only observable for treated firms and missing for the matching control firms. We could estimate a regression with three-way interaction terms by setting all missing values to zero. But treating missing values as zeroes can introduce attenuation biases into the coefficient estimates. In additional analyses, we nevertheless explore this path and estimate the coefficients of $TwitterGroup \times AfterCEOAdoption \times Moderator$ while setting missing values to zero. The results are similar in terms of economic significance, but the coefficient estimates are only marginally statistically significant.

DISCUSSION

One key message of this study is that CEOs' use of social media can have undesirable consequences for their firms. Specifically, our analysis suggests that investors consider CEOs' use of social media as a form of agency cost, particularly when CEOs post more tweets and are more popular on social media. As a result, once executives begin tweeting, their firms start to trade at a discount. Investors' concerns tend to be assuaged when the firm has better corporate governance.

Implications

Our findings have important implications for the field. First, research into the upper echelons theory has examined the effects of various on-the-job and off-the-job activities. Social media is an important component of daily life, and many well-known CEOs are active on social media. It is natural to inquire whether and how such activities affect their firms. Existing management research is largely silent on this issue. By filling this void, our study provides insights into the connection between an increasingly prevalent CEO characteristic and investors' evaluation of firms led by such CEOs.

Our findings also resonate with one of the initial corollaries of upper echelons theory – that we can predict the influence of upper echelon characteristics on firm strategic choices better by considering their contextual factors (Hambrick & Mason, 1984). We highlight that there is no absolute, unequivocal answer to the question of whether the use of social media is good or bad for the firm. Instead, the answer is highly context-dependent and varies with the firm's information environment and governance as well as other contextual factors, including how many tweets the CEO posts, whether such posts are work-related or not, and how popular the CEO is on social media.

Limitations and Future Research

Our study suffers from limitations that pave the road for future research. First, we acknowledge that our measure of CEOs' use of social media is coarse as we only consider CEOs' Twitter accounts. CEOs may use other social media platforms. Fortunately, not considering the use of other social media should bias our results downward by reducing the variance of our predictor and making it more difficult to find supporting evidence for our hypotheses (Hambrick &

Mason, 1984). Nevertheless, the operationalization of our key variable could be refined. A measure considering CEOs' comprehensive use of social media would be particularly helpful.

Second, while our study focuses on the relationship between a CEO's use of social media and market valuation, a CEO's use of social media can potentially influence a wide range of corporate decisions and outcomes (Hambrick & Mason, 1984). It would be fruitful for future research to explore how and why a CEO's social media usage affects firm decisions and outcomes, such as mergers and acquisitions, alliance formation, and innovation.

Third, our findings speak to publicly traded firms in the US. They may not generalize to private firms and firms operating in other institutional and economic settings since they have different objectives and constraints and deal within different business cultures. We leave it to other researchers to re-examine our conclusions for firms with different ownership structures embedded in different social and institutional contexts (Wiersema and Bird, 1996).

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Table 1. Summary Statistics

Variables	Tweeting CEOs (N=162×6)		Matched CEOs (N=162×6)	
	Mean	SD	Mean	SD
<i>TBQ</i>	2.18	1.69	1.94	1.48
<i>#Company Tweets</i>	791.70	2469.20	248.99	2302.37
<i>Institutional Holding</i>	0.75	0.23	0.74	0.26
<i>Size (in Billion \$)</i>	29.23	113.85	32.54	28.80
<i>Sales</i>	0.90	0.62	0.94	0.86
<i>Sales Growth</i>	1.11	0.23	1.08	0.22
<i>Surplus Cashflows</i>	0.06	-0.11	0.05	-0.09
<i>Stock Returns</i>	0.09	0.17	0.08	0.16
<i>R&D</i>	0.03	0.06	0.02	0.06
<i>Loss</i>	0.15	0.36	0.12	0.33
<i>Z-score</i>	7.93	11.56	7.99	9.76

Table 2. Pairwise Correlation

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
<i>1.TBQ</i>	2.06	1.59	1.00											
<i>2.#Company Tweets</i>	520.34	2402.01	0.00	1.00										
<i>3. Institutional Holding</i>	0.75	0.24	0.00	0.01	1.00									
<i>4.Size (in Billion \$)</i>	20.88	83.44	-0.02	0.14	-0.07	1.00								
<i>5.Sales</i>	0.92	0.75	0.12	0.00	0.04	-0.11	1.00							
<i>6.Sales Growth</i>	1.10	0.22	0.23	-0.03	-0.04	-0.01	-0.03	1.00						
<i>7.Surplus Cashflows</i>	0.05	-0.10	0.30	0.00	0.09	0.02	0.18	-0.03	1.00					
<i>8.Stock Returns</i>	0.08	0.17	0.08	-0.03	-0.29	-0.06	-0.01	0.03	-0.19	1.00				
<i>9.R&D</i>	0.03	0.06	0.45	-0.02	-0.06	-0.04	-0.07	0.18	-0.15	0.20	1.00			
<i>10.Loss</i>	0.14	0.34	-0.01	-0.03	-0.11	-0.07	0.00	0.00	-0.34	0.23	0.28	1.00		
<i>11.Z-score</i>	7.46	10.70	0.24	0.00	-0.04	-0.04	0.20	0.09	0.10	0.07	0.20	-0.01	1.00	
<i>12.TwitterGroup</i>	0.50	0.50	0.08	0.11	0.03	0.10	-0.03	0.07	0.01	0.02	0.08	0.04	0.04	1.00

Table 3. Determinants of CEO Twitter Adoption

DV: <i>TwitterGroup</i>	Full Sample (1)	Matched Sample (2)
<i>Executive Age</i>	0.00 (0.61)	-0.01 (0.47)
<i>Tenure</i>	-0.04 (0.00)	-0.01 (0.56)
<i>Male Executive</i>	-0.97 (0.00)	0.04 (0.88)
<i>Log(Total Compensation)</i>	-0.17 (0.00)	-0.03 (0.71)
<i>Extravert</i>	0.16 (0.00)	-0.02 (0.92)
<i>Size</i>	0.03 (0.37)	0.02 (0.64)
<i>Book-to-market</i>	-0.02 (0.72)	0.09 (0.16)
<i>Cash Flow</i>	-0.48 (0.49)	0.12 (0.88)
<i>ROA</i>	0.17 (0.85)	0.01 (0.99)
<i>Leverage</i>	0.12 (0.53)	0.22 (0.58)
<i>Dividend</i>	-135.43 (0.08)	-35.16 (0.78)
<i>Capital Expenditures</i>	-0.89 (0.47)	2.21 (0.21)
<i>R&D</i>	1.20 (0.28)	-0.90 (0.41)
<i>Sales/Total Assets</i>	-0.02 (0.77)	-0.07 (0.43)
<i>Sales Growth</i>	0.01 (0.00)	0.00 (0.95)
<i>Loss</i>	-0.12 (0.39)	0.08 (0.78)
<i>Tax</i>	0.06 (0.01)	0.01 (0.69)
<i>Log(Firm Age)</i>	0.01 (0.94)	-0.08 (0.72)
Industry Fixed Effect	Yes	Yes
# Obs.	1401	324
Adj. R^2	0.173	0.097

Note: p-values in parentheses.

Table 4. CEO Twitter Adoption and Firm Performance

DV: <i>TBQ</i>	Full Sample	Better Information	Worse Information	More #Tweets	Less #Tweets	More Non-work-related	Less Non-work-related
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Treatment</i> × <i>AfterBecomingSocial</i>	-0.17 (0.06)	-0.28 (0.02)	0.04 (0.69)	-0.27 (0.05)	-0.02 (0.85)	-0.20 (0.06)	-0.14 (0.24)
<i>Log(1 + # Company Tweets)</i>	-0.05 (0.01)	-0.05 (0.04)	-0.02 (0.44)	-0.04 (0.13)	-0.07 (0.01)	-0.05 (0.09)	-0.06 (0.03)
<i>Institutional Holding</i>	-0.06 (0.62)	0.07 (0.70)	-0.10 (0.56)	-0.11 (0.62)	-0.03 (0.83)	-0.09 (0.65)	0.01 (0.94)
<i>Size</i>	-0.02 (0.60)	-0.02 (0.69)	-0.03 (0.60)	-0.07 (0.18)	0.02 (0.48)	-0.05 (0.41)	-0.00 (0.98)
<i>Sales</i>	0.47 (0.00)	0.52 (0.00)	0.30 (0.01)	0.41 (0.01)	0.56 (0.00)	0.57 (0.00)	0.45 (0.00)
<i>Sales Growth</i>	0.13 (0.32)	0.65 (0.10)	0.08 (0.57)	0.22 (0.20)	0.05 (0.83)	0.33 (0.12)	0.02 (0.90)
<i>Surplus Cashflows</i>	3.29 (0.00)	4.50 (0.01)	2.62 (0.02)	3.13 (0.02)	3.54 (0.02)	2.79 (0.03)	3.88 (0.03)
<i>Stock Returns</i>	0.18 (0.48)	0.46 (0.08)	0.42 (0.21)	-0.20 (0.54)	0.39 (0.29)	0.38 (0.38)	0.05 (0.90)
<i>R&D</i>	9.78 (0.00)	6.10 (0.01)	14.03 (0.01)	9.82 (0.00)	10.40 (0.03)	6.72 (0.01)	11.16 (0.00)
<i>Loss</i>	-0.16 (0.07)	-0.02 (0.87)	-0.14 (0.15)	-0.25 (0.04)	-0.06 (0.54)	-0.04 (0.70)	-0.16 (0.18)
<i>Z-score</i>	0.00 (0.74)	0.00 (0.04)	-0.00 (0.00)	0.00 (0.56)	0.00 (0.68)	0.00 (0.03)	-0.00 (0.58)
<i>IMR</i>	0.09 (0.10)	-0.10 (0.24)	0.23 (0.01)	0.06 (0.46)	0.14 (0.04)	0.04 (0.59)	0.15 (0.08)
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# Obs.	1,944	1,069	875	984	960	720	1,224
Adj. R^2	0.712	0.705	0.757	0.72	0.71	0.68	0.73

Note: p-values in parentheses.

Table 4. Continued

DV: <i>TBQ</i>	More #Retweets (8)	Less #Retweets (9)	More #Followers (10)	Less #Followers (11)	Worse Governance (12)	Better Governance (13)
<i>Treatment</i> × <i>AfterBecomingSocial</i>	-0.24 (0.09)	-0.07 (0.46)	-0.17 (0.04)	-0.04 (0.17)	-0.32 (0.01)	0.09 (0.60)
<i>Log(1 + # Company Tweets)</i>	-0.05 (0.07)	-0.05 (0.05)	-0.05 (0.06)	-0.05 (0.03)	-0.05 (0.03)	-0.05 (0.14)
<i>Institutional Holding</i>	-0.36 (0.11)	0.16 (0.31)	-0.24 (0.41)	-0.01 (0.93)	-0.01 (0.93)	-0.77 (0.02)
<i>Size</i>	-0.03 (0.57)	0.01 (0.78)	-0.06 (0.27)	0.00 (0.91)	-0.02 (0.62)	-0.00 (0.96)
<i>Sales</i>	0.34 (0.01)	0.61 (0.00)	0.27 (0.02)	0.66 (0.00)	0.38 (0.01)	0.28 (0.05)
<i>Sales Growth</i>	0.18 (0.26)	0.05 (0.85)	0.22 (0.21)	0.07 (0.74)	0.14 (0.40)	0.12 (0.41)
<i>Surplus Cashflows</i>	1.97 (0.03)	5.75 (0.00)	5.14 (0.00)	2.76 (0.04)	3.48 (0.01)	3.10 (0.00)
<i>Stock Returns</i>	-0.15 (0.67)	0.58 (0.11)	0.07 (0.90)	0.14 (0.61)	0.17 (0.59)	0.35 (0.50)
<i>R&D</i>	8.60 (0.00)	11.87 (0.00)	10.82 (0.00)	9.62 (0.01)	11.37 (0.00)	2.60 (0.39)
<i>Loss</i>	-0.19 (0.13)	-0.03 (0.74)	-0.26 (0.10)	-0.07 (0.51)	-0.13 (0.16)	-0.11 (0.48)
<i>Z-score</i>	0.00 (0.16)	-0.00 (0.46)	0.00 (0.18)	-0.00 (0.95)	0.00 (0.11)	-0.00 (0.00)
<i>IMR</i>	0.14 (0.14)	0.07 (0.29)	0.06 (0.47)	0.08 (0.21)	0.06 (0.39)	0.08 (0.33)
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
# Obs.	888	1,056	780	1,164	1,421	523
Adj. R^2	0.72	0.72	0.72	0.70	0.709	0.811

Note: p-values in parentheses.

Appendix A. Matching Quality

Variable	Mean			t-test	
	Treated	Control	%bias	t	p> t
<i>Executive Age</i>	53.36	53.91	-7.5	-0.73	0.47
<i>Tenure</i>	4.66	5.21	-8.2	-0.88	0.38
<i>Male Executive</i>	0.87	0.87	0.0	0.00	1.00
<i>Extravert</i>	0.25	0.23	4.3	0.41	0.69
<i>Log (Total Compensation)</i>	7.80	7.74	4.5	0.45	0.66
<i>Size</i>	7.38	7.38	0.2	0.02	0.98
<i>Book-to-market</i>	0.42	0.38	6.3	0.28	0.78
<i>Cash Flow</i>	0.01	0.00	8.3	0.64	0.52
<i>ROA</i>	0.04	0.03	4.0	0.32	0.75
<i>Leverage</i>	0.23	0.24	-4.8	-0.41	0.68
<i>Dividend</i>	0.00	0.00	-6.5	-0.87	0.38
<i>Capital Expenditures</i>	0.04	0.04	5.5	0.56	0.58
<i>R&D</i>	0.08	0.09	-3.8	-0.31	0.76
<i>Sales/Total Assets</i>	1.01	1.02	-1.3	-0.11	0.92
<i>Sales Growth</i>	2.61	2.97	-3.6	-0.23	0.82
<i>Loss</i>	0.16	0.15	1.8	0.15	0.88
<i>Tax</i>	0.39	0.45	-2.1	-0.24	0.81
<i>Log(Firm Age)</i>	1.72	1.74	-5.1	-0.45	0.66

Appendix B: Survey of Institutional Investors

Methodology

As displayed in Table B-2, our online survey asks the following two “text entry” questions:

QBenefits: *“You likely have encountered tweets that a CEO sent from his/her personal Twitter account. In your opinion, what are some possible benefits of such personal Twitter activity to the firm that employs the CEO? Please list one to three possible benefits or leave everything blank if you think there are no benefits to the firm and simply move on to the next question.”*

QDrawbacks: *“Again, you likely have encountered tweets that a CEO sent from his/her personal Twitter account. In your opinion, what are some possible drawbacks of such personal Twitter activity to the firm that employs the CEO? Please list one to three possible drawbacks or leave everything blank if you think there are no drawbacks to the firm and simply move on to the next question.”*

We choose open-style “text entry” questions so as not to insert ourselves into the data-generating process.

We compile the perceived benefits. We then group common responses. We follow the same procedure for the perceived drawbacks. Our next section describes the common-response categories and presents sample responses for each category.

After we queried institutional investors on the perceived benefits and drawbacks of CEOs’ Twitter use, we concluded our survey with two multiple-choice questions:

QNetEffect: *“All in all, would you say that the benefits (drawbacks) outweigh the drawbacks (benefits)? Please choose one of the five options below.*

- a) *The drawbacks strongly outweigh the benefits*
- b) *The drawbacks somewhat outweigh the benefits*
- c) *The Drawbacks match the benefits*

- d) *The benefits somewhat outweigh the drawbacks*
- e) *The Benefits strongly outweigh the drawbacks”*

QLikelihood_Investing: *“Relatedly, consider a CEO who regularly tweets from his/her personal Twitter account. Would such activity make it more or less likely that you invest in the corresponding stock or have no effect at all?”*

- a) *Make it much less likely*
- b) *Make it somewhat less likely*
- c) *Have no effect at all*
- d) *Make it somewhat more likely*
- e) *Make it much more likely”*

In the results section, we report the fractions of investors choosing the various answer options. We also assign answer option “a)” a score of -2, answer option “b)” a score of -1, answer option “c)” a score of 0, answer option “d)” a score of +1, and answer option “e)” a score of +2. We then compute the average scores for **QNetEffect** and

QLikelihood_Investing, weighted by the fractions of investors choosing the corresponding answer options. Negative average scores for **QNetEffect** and **QLikelihood_Investing** signify that, on average, investors feel the drawbacks outweigh the benefits and that CEOs’ Twitter use makes it less likely they will invest in the corresponding stock. Positive average scores signify that, on average, investors feel the benefits outweigh the drawbacks and that CEOs’ Twitter use makes it more likely they will invest in the corresponding stock.

Results

The perceived benefits that our institutional investors list in response to question **QBenefits** largely fall into two broad categories: (1) useful information to investors and (2) greater customer and investor awareness.

Regarding the former, many investors note that CEO tweets could provide incremental, value-relevant information (“*forum to disseminate information that you won't see in statements,*” “*learn how the ceo thinks,*” “*timely CEO thinking,*” “*Unfiltered*”) and thereby enhance transparency (“*More transparent,*” “*transparency*”).

Investors also suggest that CEOs can use Twitter to draw “positive” attention to themselves and their company and products, thereby increasing customer and investor reach. Representative quotes include “*humanizes/familiarizes the CEO,*” “*draw attention to the company/increase awareness,*” “*enhanced name recognition/association,*” “*visibility,*” and “*word of mouth.*”

The perceived drawbacks largely fall into the following three broad categories: (1) potential market manipulation charges, (2) the risk of antagonizing customers and investors, and (3) seemingly flippant corporate leadership.

Regarding the first category, most institutional investors in our sample note that being active on Twitter could lead CEOs to violate disclosure rules inadvertently or be accused of market manipulation by financial regulators (“*Inadvertent non-public information leak,*” “*insider information,*” “*market manipulation,*” “*potential for inside info spill,*” “*regulatory risk*”).

Beyond the potential penalties that accompany the violation of disclosure rules and charges of market manipulation, any investigation by financial regulators poses a great distraction and may leave corporate executives unable to devote themselves to their key responsibilities. The lack of focus could lead to suboptimal decision-making and destroy firms’ value.

Regarding the second category, while CEOs’ Twitter activity may draw “positive” attention to the corresponding companies and products, many institutional investors in our sample point out that tweets can also easily antagonize customers and shareholders

(“alienate,” “Bad press,” “contentious views,” “offensive to some recipients,” “political divisiveness,” “reputational risk,” “unintended consequences”).

Finally, numerous institutional investors suggest that any active Twitter use, despite the legal, reputational, and financial risks, raises questions about the CEO’s judgment and leadership qualities. Quotes include “arrogant,” “I’m more important than you,” “impulsive,” “personal,” “pontification,” “self serving,” and “their personal agenda,” among others.

Table B-2 shows that, on balance, the perceived drawbacks outweigh the perceived benefits to the investors in our sample. The average score for **QNetEffect** is -0.46; the median is -1. The average score for **QNetEffect** is especially negative for investors 55 years or older (-0.77) and, correspondingly, investors with 20 years of experience or more (-0.49). The average score is marginally more negative for investors managing assets worth \$2.5 billion or more (-0.50) than for investors managing less than \$2.5 billion (-0.44).

On balance, CEOs’ Twitter activity lowers the likelihood that institutional investors will invest in the corresponding stock. 19% of our survey participants state that regular Twitter activity would make it “much less likely” that they will invest in the corresponding stock; 30% answer that regular Twitter activity would make it “somewhat less likely” that they will invest.

By comparison, only 18% suggest that Twitter activity would make it “somewhat more likely” that they will invest. None of the institutional investors in our sample state that Twitter activity would make it “much more likely” that they will invest in the corresponding stock. The average score for **QLikelihood_Investing** is -0.50. Again, the average score is particularly negative for older investors (-0.75) and those with greater experience (-0.61). It is marginally more negative for investors managing more than \$2.5 billion in assets (-0.56) than for investors managing less than \$2.5 billion in assets (-0.47).

Table B-1

	Number
Q1: <i>“How old are you?”</i>	
25-34	2
35-44	20
45-54	29
55-64	35
65+	13
<i>Prefer not to say</i>	1
Q2: <i>“Please indicate your gender”</i>	
<i>Female</i>	10
<i>Male</i>	87
<i>Prefer not to say</i>	3
Q3: <i>“Approximately how many years have you worked as a wealth manager/fund manager?”</i>	
< 10 years	3
10-19 years	28
20-29 years	50
30 years +	19
Q4: <i>“What is your company’s overall assets under management (AUM)?”</i>	
\$10 million to \$99.9 million	19
\$100 million to \$249.9 million	25
\$250 million to \$999.9 million	15
\$1 billion to \$2.49 billion	7
\$2.5 billion+	34

Table B-2

QNetEffect: “All in all, would you say that the benefits (drawbacks) outweigh the drawbacks (benefits)? Please choose one of the five options below.”

	<i>“The drawbacks strongly outweigh the benefits”</i>	<i>“The drawbacks somewhat outweigh the benefits”</i>	<i>“The drawbacks match the benefits”</i>	<i>“The benefits somewhat outweigh the drawbacks”</i>	<i>“The benefits strongly outweigh the drawbacks”</i>	Average [Median] Score
	(1)	(2)	(3)	(4)	(5)	(6)
Full Sample ($N = 100$)	30.00%	21.00%	20.00%	23.00%	6.00%	-0.46 [-1.00]
54 years or younger ($N = 51$)	17.65%	23.53%	23.53%	25.49%	9.80%	-0.14 [0.00]
55 years or older ($N = 48$)	41.67%	18.75%	16.67%	20.83%	2.08%	-0.77 [-1.00]
Female ($N = 10$)	10.00%	30.00%	20.00%	40.00%	0.00%	-0.10 [0.00]
Male ($N = 87$)	32.18%	20.69%	19.54%	20.69%	6.90%	-0.51 [-1.00]
19 years of experience or less ($N = 31$)	22.58%	25.81%	22.58%	25.81%	3.23%	-0.39 [0.00]
20 years of experience or more ($N = 69$)	33.33%	18.84%	18.84%	21.74%	7.25%	-0.49 [-1.00]
Less than \$2.5 billion in AUM ($N = 66$)	28.79%	21.21%	22.73%	19.70%	7.58%	-0.44 [-0.50]
\$2.5 billion in AUM or more ($N = 34$)	32.35%	20.59%	14.71%	29.41%	2.94%	-0.50 [-1.00]

Table B-2 Continued.

QLikelihood_Investing: “Relatedly, consider a CEO who regularly tweets from his/her personal Twitter account. Would such activity make it more or less likely that you invest in the corresponding stock or have no effect at all?”

	“Make it much less likely”	“Make it somewhat less likely”	“Have no effect at all”	“Make it somewhat more likely”	“Make it much more likely”	Average [Median] Score
	(1)	(2)	(3)	(4)	(5)	(6)
Full Sample ($N = 100$)	19.00%	30.00%	33.00%	18.00%	0.00%	-0.50 [0.00]
54 years or younger ($N = 51$)	9.80%	29.41%	35.29%	25.49%	0.00%	-0.24 [0.00]
55 years or older ($N = 48$)	27.08%	31.25%	31.25%	10.42%	0.00%	-0.75 [-1.00]
Female ($N = 10$)	10.00%	20.00%	40.00%	30.00%	0.00%	-0.10 [0.00]
Male ($N = 87$)	19.54%	31.03%	32.18%	17.24%	0.00%	-0.53 [-1.00]
19 years of experience or less ($N = 31$)	16.13%	19.35%	38.71%	25.81%	0.00%	-0.26 [0.00]
20 years of experience or more ($N = 69$)	20.29%	34.78%	30.43%	14.49%	0.00%	-0.61 [-1.00]
Less than \$2.5 billion in AUM ($N = 66$)	18.18%	31.82%	28.79%	21.21%	0.00%	-0.47 [-0.50]
\$2.5 billion in AUM or more ($N = 34$)	20.59%	26.47%	41.18%	11.76%	0.00%	-0.56 [0.00]