The battle of social media platforms: The use of Twitter, Youtube and Instagram in corporate communication*

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Abstract

This study examines whether corporate communication through Twitter, YouTube and Instagram facilitates dissemination of earnings news. We build on the investor inattention hypothesis and document that low-attention firms, captured by low analyst coverage and earnings growth potential, are more likely to announce earnings news on social media. Independently of the news content, investors react more positively and exhibit lower heterogeneity in earnings expectations if firms communicate on the three social platforms. Twitter posts increase earnings response coefficients and the effect is stronger among retail investors. YouTube videos and Instagram pictures have either negative or no effect on investors' ability to interpret earnings news. Our results suggest not all social media platforms help investors interpret earnings news, though social media communication is perceived to signal commitment to transparency.

JEL classifications: G14; G25; G29; D82; D83

Keywords: Social media; Price reaction

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1. Introduction

Corporate communication takes on many forms. Traditional channels include investor relations pages, regulatory and press releases, and investor calls. In recent years, companies started using social media to communicate with investors. At first glance, social media seem ill suited to transmit vast and complex financial information. For example, Twitter messages are limited to 140 characters, and Youtube videos are unsuitable to present detailed financial accounts. A study of Twitter posts in a two-week window in August 2009 concluded that around 40% of posts were "pointless babble", 38% were "conversational", less than 4% included news content, and the remainder included self-promotion, spam, and pass along (Pear Analytics, 2009). However, social media may have critical advantages over traditional corporate communication channels by cutting information acquisition and processing costs. Specifically, social media messages tend to be simpler and can be "pushed" to investors in a timely fashion reducing search costs. This levels the playing field as information is accessible simultaneously by all investors and is easier to process by less sophisticated investors. Users can also enrich firms' messages through comments and can share the messages within their own networks increasing the news' impact.[1] Thus, whether corporate communication through social media facilitates dissemination of earnings news is an empirical question.

We build on the limited attention hypothesis to study the efficacy of social media in corporate communication. Theory predicts that investors have limited resources they can devote to information acquisition and processing (Hirshleifer and Teoh 2003 and Dyck and Zingales 2003). Investors are particularly selective in what information they acquire and analyse when corporate events cluster in time, such as during the earnings announcement season (Hirshleifer,

[1] Carl Icahn's tweets about Apple sent to his 90,000 followers increased Apple's market capitalization by $18 billion (Carr, 2013).

Lim, and Teoh 2009). Social media communication can reduce investors' information search and processing costs, and attract attention to the firm. This can be particularly important to retail investors who have limited information sources and higher cost of processing complex financial information (Barber and Odean 2008, Nofsinger 2001). Social media communication can also signal a firm's commitment to transparency and willingness to respond to investor scrutiny. Firms can credibly build reputation for transparency and openness because social media communication is costly in terms of time necessary to prepare and manage the message, and unfavourable user comments can expose the company to unwanted media or regulatory investigation (Alexander and Gentry 2014). Higher investor attention should translate into more efficient stock pricing and greater homogeneity in investor beliefs about firm's prospects (Dougal, et al. 2012, Peress 2014, Drake et al. 2014, Barber and Odean 2008).

The most popular social platforms, Twitter, Youtube and Instagram, take different approaches to the way information is presented to the user. Twitter emphasizes short text messages, Youtube promotes videos, and Instagram pictures. Companies can choose the mix of platforms most suitable to disseminate corporate information. However, no study to date examined the various platforms' usage rates and their efficacy in earnings news communication. Our study offers several insights in this area. First, we analyse adoption rates and potential trade-offs between platforms, e.g. why some companies may favour one platform over another? Second, we study the efficacy and potential substitution effects between the platforms in corporate communication. To illustrate, Figure 1 shows that both Twitter and Instagram allow users to post images and text making the two platforms close substitutes. Finally, we examine the importance of firm and user engagement for the impact of the message. Thus, our study fills an important research gap in corporate communication literature.

Because using multiple platforms is costly, we focus on social media adoption among largest corporations that are constituents of the FTSE 100 index as they have the resources to engage in multi-prong communication. Further, because communication through social media should be particularly important if corporate events cluster in time, we focus on semi-annual and annual earnings announcements. Consistent with previous studies (Skinner 1994, Healy and Palepu 1995, Aboody and Kasznik 2000, McVay 2006), we measure the news content by the earnings surprise, which is the standardized difference between actual earnings and consensus forecasts.

We document that 64% of FTSE 100 companies over the period January 2015–April 2018 used Twitter to communicate with investors around earnings announcements, with the usage rate increasing from 56% in 2015 to 69% in 2018. On average, firms tweeted 7.6 times in a 14-day window centred on the earnings announcement, and 19% of companies used twitter to pre-announce earnings releases. The uptake of other social media platforms is comparatively smaller with 6% of companies using Youtube and 4.2% Instagram. Earnings news dissemination on social media is more common in customer-facing industries, such as retail, which reflects their experience from using social media for non-corporate communication.

We find little evidence of trade-offs in platform usage. Rather, firms consider various social media as complements. To illustrate, not a single company used YouTube without using Twitter as well. Similarly, Instagram posts are more likely if a firm is also using Youtube. Firms are strategic in their use of social media and are more likely to report positive earnings news on social media (Jung et al. 2016). This serves to "boost" the message as the magnitude of the surprise tends to be smaller compared to firms that do not use social media.

To test if firms use social media to attract investor attention, we estimate a logit model predicting whether a firm will communicate earnings news on any of the three social platforms. Consistently, earnings news dissemination on social media is more common for firms with lower analyst following and high book-to-market ratio, which are stocks where acquiring and processing information is more costly. Firms are also more likely to post earnings news on social media if they use social media for non-corporate communication, such as advertising. This result suggests experience using social media to attract non-corporate audiences, e.g. customers, helps convince investor relations departments to extend the use to corporate communication.

To examine if social media communication affects investor decision making, we look at whether social media dissemination strengthens the impact of earnings news. Firms communicating through Twitter have higher earnings response coefficients and the effect is economically large–a one standard deviation increase in an earnings surprise communicated on Twitter leads to a 12.5% stronger price reaction. This result is driven by higher attention from retail investors who react more strongly to earnings news communication on Twitter. Further, unconditionally on the content of earnings news, tweeting associates with more positive price reactions for firms with high retail ownership, which suggests retail investors view firm's presence on social media as commitment to transparency. This result is important as on, average, retail investors tend to react less favourable to earnings announcements compared to institutional investors independently of the news content. Consistent with retail investors viewing social media communication as a sign of higher transparency, retail ownership increases in firms that communicate through social media. Jointly, these results are consistent with social media communication attracting investor attention and strengthening the impact of earnings news.

YouTube communication reduces price sensitivity to earnings news, which suggests YouTube videos are ill-suited to communicate financial information disclosed at earnings announcement. Instagram posts have no effect on how investors interpret earnings news. These results suggest that investors do not find YouTube and Instagram messages helpful in understanding and contextualizing firm financial results. However, unconditionally on the news content, investors tend to react more positively to firms communicating earnings news on YouTube and Instagram, particularly when retail ownership is high. These results reinforce the view that retail investors perceive social media communication as a signal of higher disclosure effort that levels the playing field with institutional investors.

Firms can "boost" the impact of social media communication by increasing the frequency of social media messages. Consistently, we find that a higher number of Twitter and YouTube posts leads to more positive price reactions unconditionally on the news content. Higher user engagement with a tweet or an Instagram message, through reposts, comments and likes, has a similar positive effect on price reactions. These results support the signalling effect of social media posts.

We recognize that firms choose to communicate on social media if the expected benefits of such communication are high. To address this selectivity, we use two-stage least square regressions where we first model the decision to report earnings news on social platforms. As instruments, we use the proportion of FTSE100 firms that communicated on a social media platform in a three-week period before firm's earnings announcement and whether a firm has a social media account on at least one of the three platforms. We expect the decision to use social media to communicate earnings news will depend on the behaviour of company's peers and whether the firm has prior experience using social media. However, we do not expect that peer's

choices to use social media or firm's past use of social media for non-corporate communication will affect price reaction to the focal firm's earnings announcements. Thus, the instruments meet both the relevance condition and the exclusion restriction. We then estimate conditional pricing regressions and find our conclusions unchanged. As an additional test, we also examine if our results could reflect investor overreaction to earnings news that are "hyped" on social media, rather than rational information processing. However, we find no evidence that social media communications associates with negative post-earnings abnormal returns.

If social media communication facilitates information processing and increases its reach, we should observe higher homogeneity in investor beliefs about the firm's prospects (Morris and Shin 2002). We build on Abarbanell et al. (1995) and Barron et al. (1998) and use abnormal dispersion in analyst earnings forecasts to capture heterogeneity in investor beliefs. Posts on all social platforms help reduce dispersion in analyst forecasts, with the effect of Twitter dominating the other two channels. Overall, our results support the prediction that social media communication helps align investor expectations about firm's prospects.

Our results suggest social media communication at earnings announcements benefits companies and investors. A natural question that arises is whether companies using social media to communicate corporate news are considered better investments? We document that analysts are more likely to upgrade a firm that communicates earnings results on Twitter in a 30-day period after earnings announcements. These results suggest that analysts perceive Twitter disclosures as an important indicator for which stocks to invest in.

Our study contributes to several literature streams. This is the first study to examine the efficacy of key social media platforms in earnings announcements communication. In the age of digitization, social media play an important role in disseminating information, yet little attention

has been devoted to their efficacy in corporate communication. Our evidence highlights that social media communication is multiplatform, which stands in contrast to past literature that assumes Twitter captures the role and usefulness of social media (e.g. Curtis et al. 2016, Bartov et al 2018, Blankespoor et al. 2014). Importantly, we document that not all social media platforms are effective in helping investors interpret earnings news. This result suggests investor relations departments have to carefully choose the platforms to communicate with investors.

Our study extends earlier work that examines how Twitter messages affect investor behaviour. Previous studies focused on the information content of *investor* tweets (Curtis et al. 2016, Bartov et al 2018), and the effects tweets have on firm liquidity (Blankespoor et al. 2014) and price reactions around product recalls (Lee et al. 2015). We add to this literature by showing how Twitter communication strengthens price reaction to earnings news and reduces between-investor information asymmetry.

Our results add important new evidence to the corporate disclosure literature (Skinner 1994, Healy and Palepu 1995, Aboody and Kasznik 2000, Trueman 1986, McVay 2006). Recent trends in this literature focus on examining how qualitative information and readability of financial information affect investor ability to process earnings information (Li 2008, You and Zhang 2009, Lehavy et al. 2011). Our findings highlight that *how* companies disseminate their results matters and that investors react to both the content of earnings news and the dissemination method. Thus, investor relations managers should consider including social media as part of their corporate communication to increase firm value (Miller and Skinner 2015). Our results echo the recommendation of the Securities and Exchange Commission (SEC), which

promotes the use of social media to disseminate corporate news to enhance corporate transparency.[2]

2. Background and hypothesis development

Rational asset pricing models assume investors gather and efficiently process all available information that could influence their investment allocation decision (Sharpe 1964, Lintner 1965, Black 1972, Merton 1973). However, Hirshleifer and Teoh (2003) suggest that information acquisition is costly in terms of time and effort necessary to find and process information and investors select what information they acquire. Limited attention and processing power means investors more readily absorb information that is salient and easier to process. Consistent with investor inattention, previous studies document that investors tend to underreact to earnings announcements (Ball and Brown 1968, Bernard and Thomas 1989), fail to process implication of complex accrual accounting (Sloan 1996, Teoh et al. 1998, Xie 2001) or information disclosed in footnotes (Amir 1993). Clustering of corporate events further increases selectivity in information acquisition. Consistently, Hirshleifer et al. (2009) count the number of earnings announcements on a day to proxy for investor distraction and find weaker price reaction to earnings news on high news days. Lower press and analyst coverage reduce investor recognition of firm news and associate with higher investor inattention (Fang and Peress 2009, Bushee et al. 2010).

Social media can facilitate attracting investor attention by reducing information acquisition and processing costs. Further, because recipients can share the message within their networks, social networks can broaden the reach of earnings news. Higher investor attention

[2] In 2013, SEC accepted the use of Twitter to communicate corporate announcements. In 2014, it allowed firms to release financial information via social media (SEC, 2013; 2014). In 2015, SEC accepted that a startup can post a Twitter message about its stock or debt offering to gauge interest among potential investors.

should strengthen price reaction to news announcement facilitating efficient news pricing. Early survey evidence in Shiller and Pound (1989) suggests investors use information gathered through their physical social networks to make decisions. They highlight that networks facilitate information gathering and processing and facilitate dissemination of news through "the word of mouth". Virtual networks on social platforms such as Twitter play similar roles to physical networks though their setup cost is much smaller and their reach is broader.

Previous studies focused on the usefulness of Twitter as a medium for information sharing by investors. Twitter, a micro-blogging site, allows firms to post 140-character long messages that can be accompanied by links to external sources, videos and images. Curtis et al. (2016) and Bartov et al (2018) focus on *investor* Twitter activity before earnings announcements and find that higher sentiment about a firm increases sensitivity of earnings announcement returns to earnings surprises. Sprenger et al. (2014) study the sentiment of Twitter posts and find that high daily volume of Twitter activity and more positive sentiment about a stock predict next period returns. Research also shows that Twitter communication can attenuate negative price reactions to product recalls (Lee et al. 2015) and improve stock liquidity, as measured by bid-ask spreads, for less visible stocks (Prokofieva 2015, Blankespoor et al. 2014). Finally, Jung et al. (2016) report that firms are more likely to use Twitter to disseminate good news, but they do not examine market implications of social media communication.[3]

To the best of our knowledge, no study to date examined the use of social media to communicate earnings news. Further, previous studies focus on Twitter ignoring the role other social platforms, such as YouTube or Instagram, play in corporate communication. YouTube

[3] As part of their sensitivity analysis, Jung et al. (2016) look at the effect the number of Twitter followers has on price reaction to earnings announcements but find no evidence that larger following strengthens price reaction to earnings announcement content.

facilities video sharing and users can comment, share and "like" videos. Instagram allows users to post pictures that can be accompanied by short text and hyperlinks to external sites. Figure 1 presents an example of corporate communication around earnings announcements for the three social media platforms. Companies select the portfolio of social media they want to use to communicate with investors considering similarities and differences between the platforms. For example, visually, the content presented on Twitter and Instagram is similar making the two platforms potential substitutes. YouTube emphasis on video content makes the platform distinct from Twitter and Instagram. The literature, to date, ignored potential trade-offs in firm's choice of different social media platforms.

[Insert Figure 1 around here]

Engaging with investors on social media to disseminate earnings news has important advantages compared to traditional channels. The company communicates directly with investors avoiding intermediaries, such as Bloomberg or brokerage houses, which avoids delays in information sharing and message content distortions. "Pushing" the message simultaneously to all users reduces information acquisition costs. Further, the message can be shaped to meet the informational needs of various audiences, e.g. using visual aids in communicating with retail investors and text with hyperlinks to communicate with institutional investors. Thus, posting earnings news on social media should lead to more efficient impounding of the news content into the stock price. This prediction leads to our main hypothesis:

Hypothesis 1: Social media communication strengthens the price reaction to earnings news.

Social media communication can signal a firm's commitment to higher transparency and willingness to respond to investor scrutiny and questions. Firms can credibly build reputation for transparency and openness because social media communication is costly in terms of time

necessary to prepare and manage the message, and unfavourable user comments can expose the company to unwanted media or regulatory investigation. Thus, our second hypothesis is:

Hypothesis 2: Investors perceive social media communication as a signal of higher firm transparency.

3. Data

We hand collect data on Twitter posts by FTSE 100 firms for the full- and half-year earnings announcements over the period January 2015 to April 2018. We focus on earnings announcements because that they are an important and persistent component of corporate communication (Kothari 2001) with significant impact on investor portfolio allocation decisions (Ball and Brown 1968 and Beaver 1968), properties of analyst forecasts (Schipper 1991, Ivkovic and Jegadeesh 2004, Altinkilic and Hansen 2009) and managerial compensation and turnover (Matsumoto 2002). We focus on largest UK firms as they have the resources to engage in multiplatform communication, which is essential for the study. We focus on the UK as it offers a unique research setting to examine the effect of social media communication. First, retail ownership in UK listed firms is generally higher compared to the US. The UK Office for National Statistics listed individual investors as the largest ownership group for FTSE 100 stocks in 2016 after "Rest of the world" and ahead of domestic insurance companies and pension funds.[4] The importance of retail investors is reflected in corporate communication. To illustrate, the annual report of Saga plc recognizes that "Saga has a diverse shareholder register which is

[4] See https://www.ons.gov.uk/economy/investmentspensionsandtrusts/bulletins/ownershipofukquotedshares/2016. Bena et al. (2017) report that 67% of listed US stocks were owned by domestic institutional investors compared to 12% in the UK (foreign institutional ownership was 8% and 20% respectively).

formed of both institutional and retail ownership, the latter numbering over 170,000" (Saga, 2018, p.82).

Second, listed UK firms have more dispersed ownership (Leech 2001, Goergen and Renneboog 2001). Further, regulatory constraints introduced through the Cadbury (1992), Hampel (1998) and Newbold (2001) corporate governance committees reproached institutional investor to become more passive (Goergen and Renneboog 2001, Stapledon 1996, Faccio and Lasfer 2000). This means that both retail and institutional investors are likely to rely on public channels of communication. Significant retail holdings, dispersed ownership and reliance on public communication means social media should play an important role to reach various investor groups in the UK.

Our source of social media posts is Crimson Hexagon, a social-analysis platform. The platform contains over one trillion posts on various social media and is considered "the largest repository of public social data". McClellan et al. (2017, p.497) use Crimson Hexagon to collect tweets related to depression and suicide and emphasize that "Crimson Hexagon provides more comprehensive data compared to other tools that have been used in previous studies, such as the free Twitter application interface" and includes "a full census of public tweets since 2010". Jiang and Shen (2017) use Crimson Hexagon to study how Twitter covers business scandals, Ceron et al. (2014) to examine the relation between social media sentiment and political preferences and Uede et al. (2017) to analyse the relation between Twitter coverage of celebrity suicides and population suicide rates. Financial data is from Compustat Global Fundamentals and market data is from Compustat Global Security Daily file. Analyst data is from I/B/E/S and stock ownership data is from Factset. Our final sample includes 383 earnings announcements by 93 unique firms.

Figure 2 presents the time-series distribution of earnings news posts on social media across the three platforms. Around 56% of FTSE100 firms used Twitter to announce their results in 2015 with the proportion increasing to almost 70% in the first half of 2018. The frequency of posts on YouTube and Instagram are smaller though increasing over time. The proportion of YouTube posts increases from around 2% in 2015 to 13% with a similar pattern for Instagram.

[Insert Figure 2 around here]

Table 1 shows the proportion of firms communicating earnings news on social media across ten Fama-French industries. Twitter use varies between 100% for consumer-facing industries, such as consumer durables (e.g. cars, TV's and furniture), and 46.9% for business-to-business industries, such as wholesale and manufacturing. The use of YouTube and Instagram also tends to be more pronounced among customer-oriented industries, such as the non-durables industry (e.g. food, tobacco, textiles, apparel, leather, toys). Together, Table 1 results suggest significant heterogeneity in the use of social media across industries. In untabulated results, we find that the Pearson correlation between Twitter and YouTube posts of earnings news is 0.190 and between Twitter and Instagram posts is 0.130. The correlation between YouTube and Instagram posts is 0.222. Positive correlations provide preliminary evidence that firms use various social media platforms as complements rather than substitutes.

[Insert Table 1 around here]

3. Research methods

We search for company social media posts for seven days before and after the earnings announcement. Companies can post tweets before official earnings announcement to pre-announce the *release* of earnings news and can tweet to review and discuss the results after the announcements. Pre-releases can attract investor attention to the stock and post-announcement

tweets can facilitate information processing. A dummy variable *Tweet* takes a value of one if a firm was active on Twitter within the 15-day window. We count the number of firm-initiated tweets (*#Twitter posts*) to capture the intensity of firm communication. If a company has more than one account on a social platform that it uses to announce earnings results, we sum up the activity across all accounts.[5]

Crimson Hexagon's software ForSight calculates the total number of followers for the firm (*#Twitter Followers*), which we use to capture firm following. A larger number of users following a firm should facilitate the spread of the message. We count the number of retweets, likes and comments (*#Twitter RLC*) to gauge user engagement with the firm's Twitter posts. Higher engagement should facilitate broader reach of the message. We only consider engagement with the firms' original posts and remove instances when firms repost other tweets, e.g. a retweet from CNBC commenting on firm's performance.

Companies can use cashtags to facilitate dissemination of financial information. Cashtag, a combination of currency sign and the listing ticker, groups tweets that present and discuss firm's financial performance. Companies can use cashtag links in tweets to direct the user to more granular information on their financial performance reducing information search costs. We code as one if a firm included a cashtag (*Cashtag*) in a tweet and zero otherwise.

Next, we collect information for YouTube and Instagram posts. A dummy variable *YouTube* takes a value of one if a firm posted a YouTube video in a 15-day window around earnings announcements and zero otherwise. *Instagram* takes a value of one if a firm posted on Instagram and zero otherwise. Similarly to Twitter, we collect information on the number of company posts on both social platforms (*#YouTube posts* and *#Instagram posts*). We also

[5] For example, AstraZeneca has a group and a US-specific account.

measure user engagement through likes (also dislikes on YouTube) and comments (*YouTube Eng* and *Instagram Eng*).[6]

Our prediction is that social media communication will facilitate dissemination and processing of earnings news. Consistent with previous studies, we measure news revealed at earnings announcements by the difference between actual earnings, EPS_a, and analyst consensus forecast, $\overline{EPS_f}$. To make earnings surprises comparable across firms, we scale this difference by the standard deviation in analyst EPS estimates, $STD(EPS_f)$, i.e. $SUE = \frac{EPS_a - \overline{EPS_f}}{STD(EPS_f)}$. We then interact the earnings surprise with the indicator for social media posts and regress the surprise and its interaction term on cumulative abnormal returns measured in a four day window around the earnings announcement, CAR(-1,2). We focus on two days after the announcement to capture potential effects from post-announcements social media activity.[7] The basic regression takes the form:

$$CAR = \beta_0 + \beta_1 SUE + \beta_2 SUE \times Social\ media\ post + \beta_3 Social\ media\ post + \Phi Controls + \Phi Year\ effects + \Omega Industry\ effects + e \quad (1)$$

where $Social\ media\ post$ is one of the three social media communication channels. β_2 captures the incremental price reaction at earnings announcements for firms that communicate through social media, i.e. a higher earnings-response coefficient. If social media communication signals firm's commitment to higher transparency, we would expect a positive coefficient on β_3. Standard errors are adjusted for heteroskedasticity and within-firm correlation. Year and industry

[6] Crimson Hexagon allows only one year of data for the number of followers on YouTube and Instagram, which is why we do not measure user following for these two platforms.

[7] The choice of the event window reflects a trade-off in power of tests for hypothesis 1 and 2. As investors react only to the news revealed at the announcement, extending the event window reduces power of tests for hypothesis 1 as we include more noise in abnormal return calculation Brown and Warner (1980, 1985). If social media posts before and after earnings announcement reinforce investors' perception of firm's commitment to transparency, longer event windows can positively affect power of hypothesis 2 tests. Sensitivity tests examine windows (-2,4) and (-7,7) to ensure our main conclusions are not affected by the choice of the event window.

effects account for heterogeneity in price reactions over time and across industries and resultant residuals serial correlation.

We recognize that firms self-select to disclose information on social media and anticipating higher benefits will entice a firm to post earnings news on social media. The decision to disclose earnings news on social media can be modelled as

$$Social\ media\ post = 1 \text{ if } Z_i'\alpha + e_i \geq 0$$

and

$$Social\ media\ post = 0 \text{ if } Z_i'\alpha + e_i < 0$$

where $Z_i'\alpha + e$ captures the latent decision to disclose earnings news on social media and the model is standardized so that non-zero values capture positive expected benefits from social media posts. A consistent estimation of equation (1) requires conditional estimation based on the outcome of the latent model to allow the effect of firm choice to communicate on social media to affect price reaction to earnings announcement. The estimation can be performed consistently by including an inverse Mills ratio from a model predicting the choice to communicate earnings news on social media in equation (1). Specifically, the conditional regression takes the form

$$\begin{aligned} CAR = {} & \alpha_0 + \alpha_1 SUE + \alpha_2 SUE \times Social\ media\ post + \alpha_3 Social\ media\ post \\ & + \Lambda Controls + \Pi Year\ effects + B Industry\ effects + IMR + u \end{aligned} \tag{2}$$

where

$$IMR = \frac{\varphi(Z_i'\alpha)}{\Phi(Z_i'\alpha)}\ if\ Social\ media\ post = 1$$

and

$$IMR = \frac{-\varphi(Z_i'\alpha)}{1 - \Phi(Z_i'\alpha)}\ if\ Social\ media\ post = 0.$$

This conditional model has been used in Lee (1978), Dunbar (1995), Fang (2005) and Golubov et al. (2012). We use equation (2) to account for endogeneity in firm's choice to post earnings news on social media.

The set of controls includes variables previous studies find to associate with price reactions to earnings announcements. Lower information environment quality means investors attach more weight to new information as it becomes available, which can increase price reaction to news announcements. We count the number of analysts following the firm, *#Analysts*, as higher analyst following associates with higher quality information environment. Investors may attach more weight to earnings news when heterogeneity in investor expectations is higher. We capture investor heterogeneity by stock price volatility, *Volatility*, calculated as the share price standard deviation measured over two months ending two weeks before earnings announcements and scaled by the mean stock price. Though FTSE100 index includes the largest listed firms, there remains considerable variation in size between the top and bottom 1% of firms. We use firm's market capitalization, *MV*, to capture differences in media and investor attention to firms within the index. We control for the number of institutional investors in a stock, *#IO*, as greater investor dispersion should associate with stronger price reactions. We measure the proportion of retail ownership, *Retail ownership*, as higher retail ownership can lead to less efficient pricing of earnings news and weaker price reactions. Earnings news are more important for growth stocks, captured by the book-to-market ratio, *B/M*, as they reveal how firms convert growth options into cash flows. We control for leverage, *Leverage*, as investors may react more strongly to disappointing earnings news for financially distressed firms.

4. Descriptive statistics

Our first analysis examines if firms use YouTube and Instagram as complements or substitutes for Twitter communication. Figure 3.1 reports that firms are more likely to post results on YouTube and Instagram when they also communicate on Twitter. This result is consistent with complementarities between the use of various social media platforms. Figure 3.2 expands on this result to test if there are substitution effects between Instagram and YouTube. Firms are more likely to use Instagram when they also post on YouTube, which suggests the two platforms are also complements. Jointly, Figure 3 results suggest firms use various social media outlets as complements when communicating earnings news.

[Insert Figure 3 around here]

Figure 4.1 reports the proportion of firms using social media to communicate positive and negative earnings surprises. Firms are more likely to communicate positive than negative earnings surprises on Twitter and Instagram, a result consistent with Jung et al. (2016). However, firms are equally likely to comment on positive and negative results on YouTube, which suggest that video messages may be better suited to explain negative earnings results.

[Insert Figure 4 around here]

Figure 4.2 documents a comparatively smaller magnitude of positive earnings surprises for firms that use social media. This result is consistent with firms using social media to boost relatively weak positive earnings news rather than to magnify an already high earnings surprise. Figure 4.3 repeats the analysis for negative earnings surprises: firms that communicate on social media have smaller negative earnings surprises, which suggests social media may help explain small disappointing results, but firms abstain from social media communication when reporting large negative surprises.

To formalize the analysis on firm's choice to use social media to communicate earnings news, we estimate a logistic regression where the dependent variable, *Social media communication*, is one if a firm communicates earnings results on any of the three social platforms, and zero otherwise. The model takes the form

$$P(Social\ media\ communication) = \gamma_0 + \gamma_1 Social\ media\ account + \gamma_2 SUE + \Gamma Controls + \Xi Year\ effects + \Theta Industry\ effects + e \quad (3)$$

where *Social media account* equals one if a firm has either a Twitter, YouTube or Instagram account that they use for non-corporate communication. The set of controls in equation (3) are dummy variables for whether firm controls from equation (1) are higher compared to the respective FTSE 100 average calculated over the previous 12 months. We use indicator rather than continues variables for two reasons: (1) to capture within-FTSE100 index variation in characteristics that can affect firm's decision to communicate on social media and (2) because variations in some characteristics are relatively small, e.g. all FTSE100 constitutes tend to have relatively high and similar analyst following, which biases coefficients towards zero. Equation (3) also controls of year and industry effects. Standard errors are adjusted for heteroskedasticity and within-firm correlation.

Column "Social media posts" in Table 2 reports regression result for equation (3). Firms are more likely to post earnings results on social media if they already have a social media account. This result suggests presence on social media builds familiarity with the platform increasing the likelihood it will be used for corporate communication. Consistent with Figure 4 results, firms are more likely to post positive earnings news. Value stocks and firms with smaller analyst following are more likely to communicate earnings news on social media. Lower analyst

following associates with higher information acquisitions costs thus lower investor attention (Peress 2014). Media and investors tend to pay more attention to firms with high earnings growth (Peress 2008) and value stocks may use social media to gain investor attention. Jointly, Table 2 results are consistent with firms subject to lower investor attention communicating their results on social media.

[Insert Table 2 around here]

Column "YouTube and Instagram posts" in Table 2 repeats the analysis where the dependent variable equals one if a firm communicates earnings news on YouTube or Instagram, and zero otherwise. We also augment model (3) to include indicator variables for firm posting earnings news on Twitter, and whether a firm has a Twitter account (*Twitter account*) and YouTube and Instagram accounts (*YouTube or Instagram accounts*). We estimate this model to test if firms use YouTube or Instagram to complement or substitute their communication on Twitter. Regression results support the prediction that firms post earnings news on YouTube and Instagram to complement Twitter dissemination.

4. Social communication on Twitter

This section examines if social media communication strengthens the price reaction to earnings news. Table 3 presents descriptive statistics for the variables in equation (2). The average abnormal price reaction around earnings announcements is 0.18% with 63.97% of firms using Twitter to communicate earnings results. 18.78% of companies pre-announced the release of their earnings results in a 7-day window before earnings announcements, 98.78% tweeted on the earnings announcement day, and 7.35% followed up with tweets in a 7-day window after earnings announcements. Firms released on average 7.641 tweets and have on average 26,430

Twitter followers. On average, users commented or retweeted firm posts 114.571 times with 12.65% of firms using cashtags in their tweet messages. The proportion of firms using YouTube and Instagram is 6.01% and 4.18%, respectively. There were around 11.609 YouTube likes and comments on firm posts and 250.438 likes and comments on Instagram. Descriptive statistics for controls variables are similar to other studies that focus on FTSE100 firms (Abraham and Cox, 2007, Skovoroda and Bruce 2017).

[Insert Table 3 around here]

Panel A in Table 4 reports regression results for equation (1). Column "Model 1" confirms that firms posting earnings news on Twitter enjoy stronger price reactions and the effect is economically significant. A one standard deviation increase in the earnings surprise leads to a 12.5% stronger price reaction for firms that post on Twitter. The significant impact of tweeting on price reactions to earnings news is evident across longer event windows as reported in columns "Model 2" with CAR(-7,7), which suggests the effect is not dependent on our choice of the event window.[8] In untabulated results, we also recalculated the earnings surprise as the difference between the actual and the consensus EPS scaled by the share price measured 20 days before earnings announcements and find consistent results. Panel A results support hypothesis 1 that social media communication facilities dissemination of earnings news increasing price reaction to the news content.

[Insert Table 4 around here]

The last columns of Panel A report results from estimating the conditional price reaction model (2). The first stage regression estimates the likelihood a firm will communicate earnings news on Twitter. As instruments, we use the proportion of FTSE100 firms that communicated on

[8] Our results are unchanged when we also consider other event windows such as CAR(-2,2) and CAR(-2,4).

Twitter in a three-week period before focal firm's earnings announcement, *Avg Twitter use*, and whether a firm has social media account on at least one of the three platforms, *Social media account*. We expect that the decision to use social media will depend on the behaviour of company's peers and whether the firm has prior experience using social media. However, we do not expect that peers' choices to use social media or firm's past use of social media will affect price reaction to the earnings announcement. Thus, the instruments meet both the relevance condition and the exclusion restriction. First stage regression results show significant loadings on *Avg Twitter use* and *Social media account*. Column "Second stage" shows results from estimating equation (2) when we include the inverse Mills ratio.[9] The conclusions from the conditional model are similar to the main regression results.

Column "Magnitude of the surprise" in Panel B of Table 4 disaggregates *SUE* into four components: positive earnings surprises that are higher than 0.1 pence, *positive SUE*, small positive surprises in a range [0,0.1], *small positive SUE*, small negative surprises in a range [−0.1,0), *small negative SUE*, and negative surprises smaller than −0.1 pence, *negative SUE*. The cut-off point of 0.1 reflects the bottom decile of the unscaled mean surprise of 1.017, but the conclusions are robust to other cut-off points. We then interact the four earnings surprise terms with *Tweet*. The positive coefficient on the interaction *small positive SUE*Tweet* and a negative coefficient on the term *small negative SUE*Tweet* are consistent with social media communication boosting price reactions to relatively small earnings surprises and moderating the negative effect of small negative news. This result is consistent with Figure 4 evidence showing that firms are more likely to use social media for small positive and small negative earnings surprises.

[9] For eight observations the predicted values are one and we are unable to define the inverse Mills ratios, which reduces the sample size to 375 observations.

Column “Tweeting day CAR(-7,7)” in Panel B examines the effect of timing the earnings tweet. We find that it is tweets on the earnings announcements day that elicit incremental price reaction to earnings news. Pre-announcements of earnings releases and tweets that follow earnings news have no significant effect on price reactions as they do not reveal new information. These results are consistent with relatively infrequent posts on Twitter before and after earnings announcements.

Social media are often perceived as displacing traditional print media as a medium for information diffusion (Kayany and Yelsma 2000). Our next test examines if higher press coverage of a firms reduces the usefulness of social media posts. Column “Press coverage” reports results for equation (1) when we control for the number of press articles about a firm in a 30-day window ending seven days before earnings announcements, *# of news*. The regression also includes interaction terms between *# of news* and the earnings surprise and whether the firm posts earnings results on Twitter. Firms with high press coverage who post earnings results on Twitter experience incrementally higher price reactions unconditionally on the earnings news content and have higher earnings response coefficients. This result suggests tweets complement traditional media channels in diffusing information to investors.

4.1 Characteristics of Twitter communication

Social media communication may be particularly important to investors with high information acquisition and processing costs, such as retail investors, as the messages tend to be shorter and easier to process, e.g. presented through graphs and videos, and can be “pushed” to users in a timely fashion. To test if social media communication is particularly valuable to retail investors, we first create an indicator variable *High retail ownership*, which takes a value of one if retail

ownership is in the top quartile of all FTSE100 constituents and is zero otherwise. We then augment equation (1) with interaction terms between *High retail ownership* and *Tweet* and *SUE*. Columns "Retail ownership" in Panel C of Table 4 report a positive coefficient on the triple interaction term *SUE*Tweet*High retail ownership*, which suggests social media communication helps retail investors better process earnings information. Further, the positive coefficient on *Tweet*High retail ownership* suggests retail investors react on average more positively to firms that communicate on Twitter. This result is consistent with retail investors perceiving social media communication as signalling firm's commitment to higher transparency. This conclusion is supported by the negative coefficient on *High retail ownership*, which suggests that failing to communicate on Twitter is perceived negatively by retail investors.

Firms can boost the impact of social media communication by posting a larger number of tweets around earnings announcements and by including cashtags to direct the reader to more detailed financial information. We create an indicator variable *High # Tweet Posts*, which equals one for the tercile of stocks with the highest number of Twitter posts, and is zero otherwise. Further, we code as one variable *Cashtags* if a firm uses cashtags and set it to zero otherwise. Columns "Number of tweets and cashtags" in Panel C show that investors react more positively to firms that engage with investors by posting a larger number of tweets unconditionally on the sign of earnings news. This result is consistent with higher engagement being perceived as a signal of higher transparency. However, we do not find that using cashtags affects price reactions.

If social communication serves to reach a wider audience, its impact should increase as a larger number of users engage with the firm's tweet by either commenting on it or retweeting the post. Variable *High #Twitter RLC* takes a value of one for the top tercile of stocks based on the

number of retweets, likes and comments, and is zero otherwise. Columns "Engagement" confirm that higher engagement with the company's tweet associates with higher price reactions unconditionally on the sign of earnings surprise, a result consistent with social media communication being perceived as signalling commitment to transparency.

Firms may build large following on social media, which in turn can facilitate dissemination of earnings news. We create an indicator *High # Followers* which equals one for the tercile of stocks with the highest number of followers and is zero otherwise. Columns "#Followers" report results for equation (1) augmented with an interaction term for the number of Twitter followers. The information on the number of Twitter followers is available only for the last two years (2017–2018), which reduces the number of observations to 192. We can collect the data for semi-annual results only, which we extrapolate to annual results. None of the coefficients is significant, which suggests that larger following does not affect price reactions to social media posts. We conclude that it is engagement with the news, not the number of Twitter followers, that affects price reaction to earnings news.

4.2 Social communication on YouTube and Instagram

This section examines if firm communication on YouTube and Instagram has an incremental effect on price reactions to earnings announcements. Table 5 reports results for equation (1) when we include indicator variables for YouTube and Instagram earnings posts and their interactions with earnings surprises. Contrary to our evidence for Twitter posts, YouTube communication reduces price sensitivity to earnings news. This result suggests YouTube videos are ill-suited to communicate financial information disclosed at earnings announcement. However, a positive coefficient on the YouTube dummy suggests investors perceive YouTube

posts to signal commitment to transparency. Instagram posts do not associate with incremental price reactions, which suggests investors do not perceive this channel as incrementally useful to YouTube and Twitter in disseminating earnings news.

[Insert Table 5 around here]

Companies can enhance the clarity and content of YouTube and Instagram messages by posting a larger number of messages. Consistently, columns "#posts" report a positive effect from a higher number of YouTube videos released by a firm as measured by the positive earnings-response coefficient and the positive coefficient on the variable counting number of YouTube posts. Higher number of Instagram posts has no effect on stock prices, which mirrors our main results.

Columns "Engagement" show no evidence that higher user engagement on YouTube associates with stronger price reactions. This result likely reflects that YouTube engagements usually take the form of "likes" rather than comments and the overall engagement level is low. Higher Instagram engagement leads to significantly higher returns around earnings announcement unconditionally on the earnings news. This result supports the signal role of social media posts. However, higher engagement on Instagram associates with lower sensitivity of returns to earnings news, which suggests Instagram posts do not help investors to efficiently process earnings news.

The emphasis on video and graphics to present information may appeal to retail investors. Columns "Retail investors" report results from equation (1) augmented with interaction terms with percentage retail ownership in a stock. The positive coefficient on the interaction *Instagram*Retail* confirms that retail investors perceive social media communication as a signal of commitment to transparency. However, earnings response coefficients are lower for Instagram

earnings posts when retail ownership is high, which suggests that Instagram does not facilitate processing earnings news by retail investors. This finding helps explain the earlier result that higher engagement on Instagram associates with a weaker price-earnings coefficient as retail investors are more likely to engage with posts through likes and comments (Chawla, Da, Xu, and Ye 2015, Ammann and Schaub 2017).

Panel B reports results for equation (2), which controls for endogeneity in the firm's choice to post on YouTube and Instagram. Because the two platforms are complements, the signs of predictors for YouTube posts should be similar to that for Instagram posts. The first stage regression models the likelihood a firm will post either on YouTube or Instagram. As instruments, we use the proportion of firms posting on YouTube and Instagram in a 60-day window before firm's earnings announcements, *Avg YouTube and Instagram use*. We use a longer window to search for peers' YouTube and Instagram posts than for Twitter messages because the former are less frequent. We also control for whether a firm has a social media account on at least one of the three platforms, *Social media account*. First stage regression documents significant loadings on the two instruments. Second stage regression shows that controlling for selectivity in YouTube and Instagram communication leaves our conclusions unchanged.

4.3 Further tests

Our results suggest retail investors perceive social media communication as a signal of higher disclosure effort that levels the playing field with institutional investors. Lower between-investor asymmetry should entice retail investors to increase their holdings in firms that communicate on social media. To test this prediction, we first create an indicator variable for an increase in retail

ownership between the quarter-end prior to the earnings announcement and the quarter-end of the earnings announcement. If earnings announcements fall at quarter-end, we measure holdings at the end of next quarter. We then use a logit model to predict an increase in retail ownership after earnings announcements conditionally on whether a firm posts earnings news on social media. The regression includes the earnings surprise and control variables from equation (1). Table 6 shows that retail ownership is more likely to increases for firms that communicate on social media with posts on Twitter having the largest effect.

[Insert Table 6 around here]

Our results could reflect investors' overreaction to earnings news that are "hyped" on social media, rather than rational information processing. To test this prediction, we calculate CAR(3,90), which we then regress on the indicators for firm earnings communication on social media, the earnings surprise and control variables from equation (1). Table 7 shows no evidence that social media communication associates with negative post-earnings abnormal returns. Thus, our results are likely to reflect more efficient information pricing at earnings announcements rather than irrational investor behaviour.

[Insert Table 7 around here]

If social media communication facilitates information processing and increases its reach, we should observe higher homogeneity in investor beliefs about the firm's prospects (Morris and Shin 2002). To test this prediction, we use abnormal dispersion in analyst earnings forecasts to capture heterogeneity in investor beliefs (Abarbanell et al. 1995 and Barron et al. 1998). We find that posts on all social platforms help reduce dispersion in analyst forecasts, with the effect of Twitter dominating the other social channels. These results support the prediction that social media communication helps align investor expectations about firm's prospects.

[Insert Table 8 around here]

Our results suggest investors perceive social media communication as signalling firm's commitment to transparency and react more positively to earnings announcements communicated on social media. To build confidence in these conclusions, we validate them by testing analysts' perception. Specifically, we examine if analysts are more likely to upgrade stocks for firms that use social media to communicate earnings news, which reflects analysts' improved assessment of the firm's investment potential. Table 9 confirms that analysts are more likely to upgrade a firm that communicates earnings results on Twitter in a 30-day period after earnings announcements compared to a 50-day window ending ten days before earnings announcements. These results suggest that analysts perceive Twitter disclosures as an important indicator for which stocks to invest in.

[Insert Table 9 around here]

5. Conclusions

This study examines corporate communication around earnings announcements on Twitter, YouTube and Instagram. Building on the investor inattention hypothesis, we examine if social media communication facilitates dissemination of earnings news. Investors react more positively if firms communicate on the three social platforms independently of the earnings news content and the effects are stronger for stocks with high retail ownership. These results suggest social media communication is perceived to signal commitment to transparency. Consistently, we find that after earnings announcements, retail investors increase holdings in firms that communicate earnings news on social media and analysts upgrade stock recommendations for these stocks.

Twitter posts increase earnings response coefficients and the effect is stronger among retail investors, a result consistent with Twitter communication reducing information asymmetry and attracting higher investor attention to the stock. YouTube videos and Instagram pictures have either negative or no effect on investors' ability to interpret earnings news. These results suggest that not all social media platforms help investors interpret earnings news.

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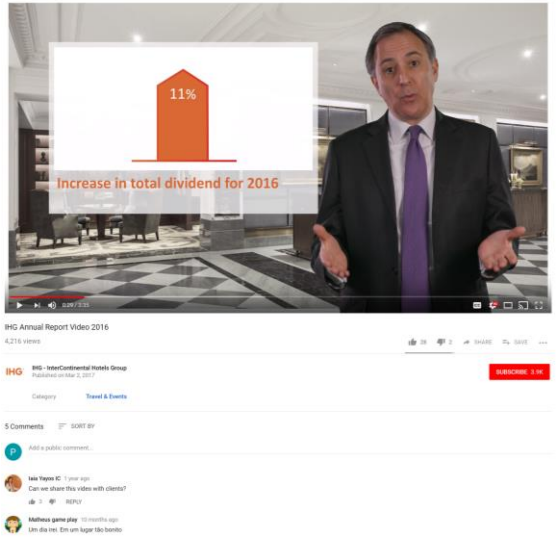
Figure 1. An example of social media posts around earnings announcements for International Hotel Group: Twitter, YouTube and Instagram

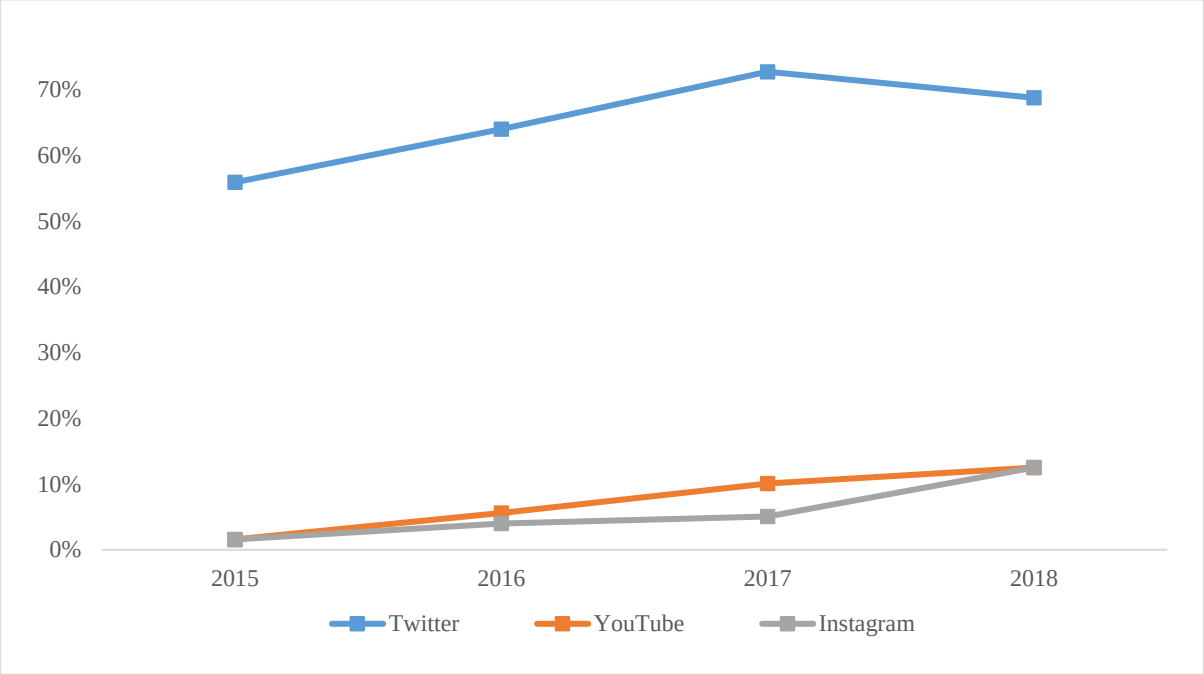
Twitter



YouTube

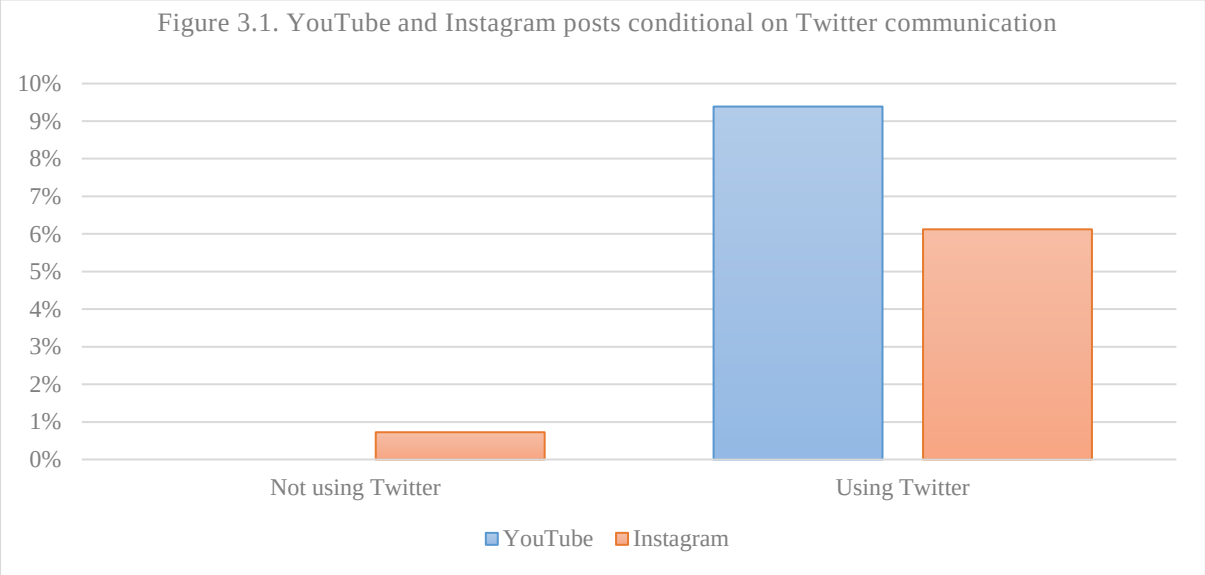
Instagram

Figure 2. The frequency of Twitter, YouTube and Instagram earnings communication over time



The graph reports the frequency of firms using social media for earnings communication over time.

Figure 3. YouTube and Instagram posts: complementary effects



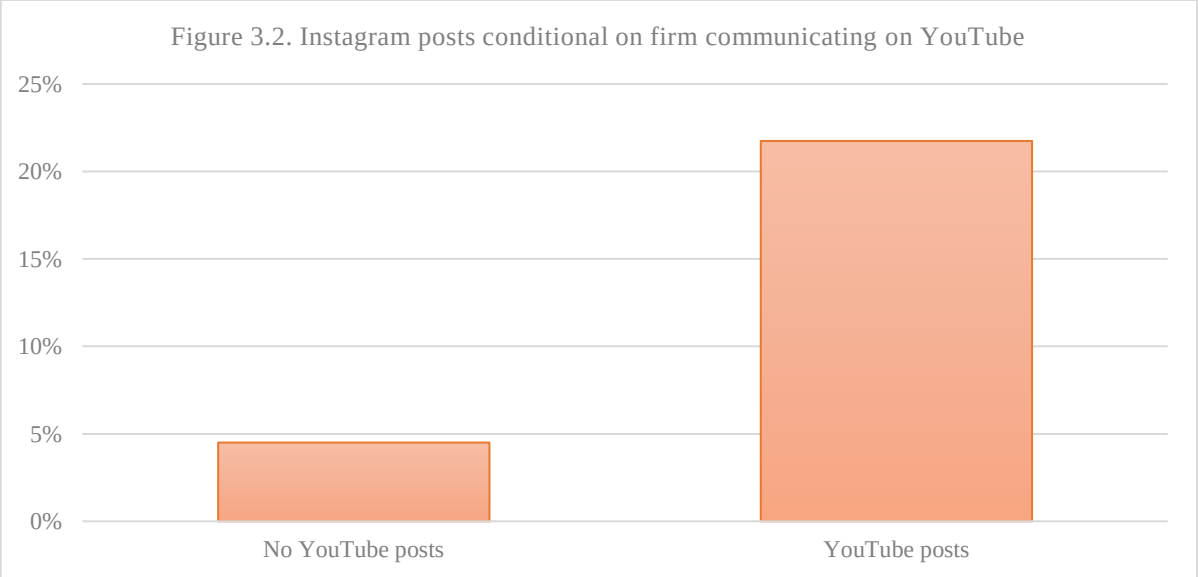
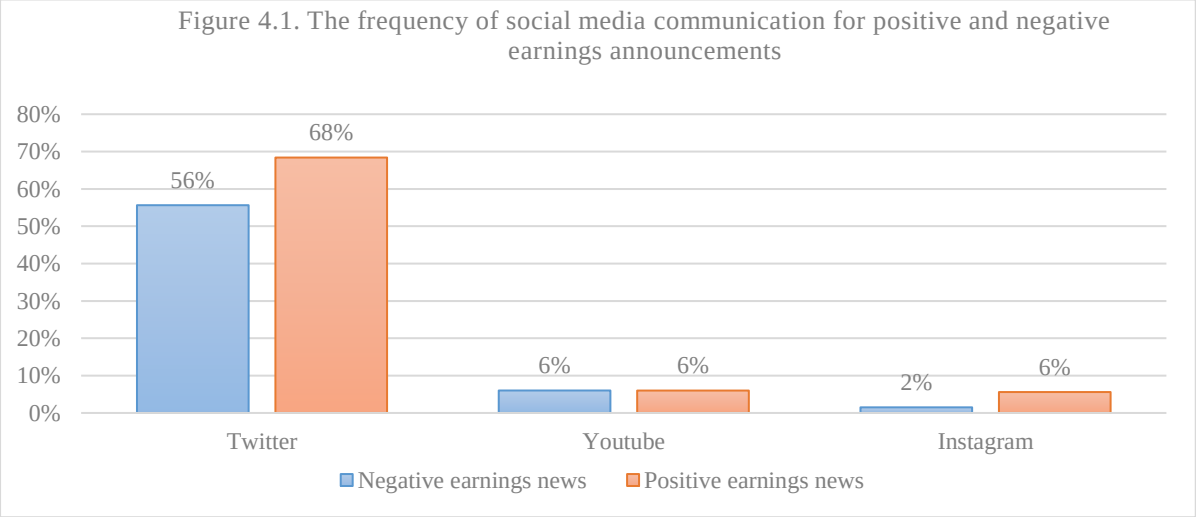
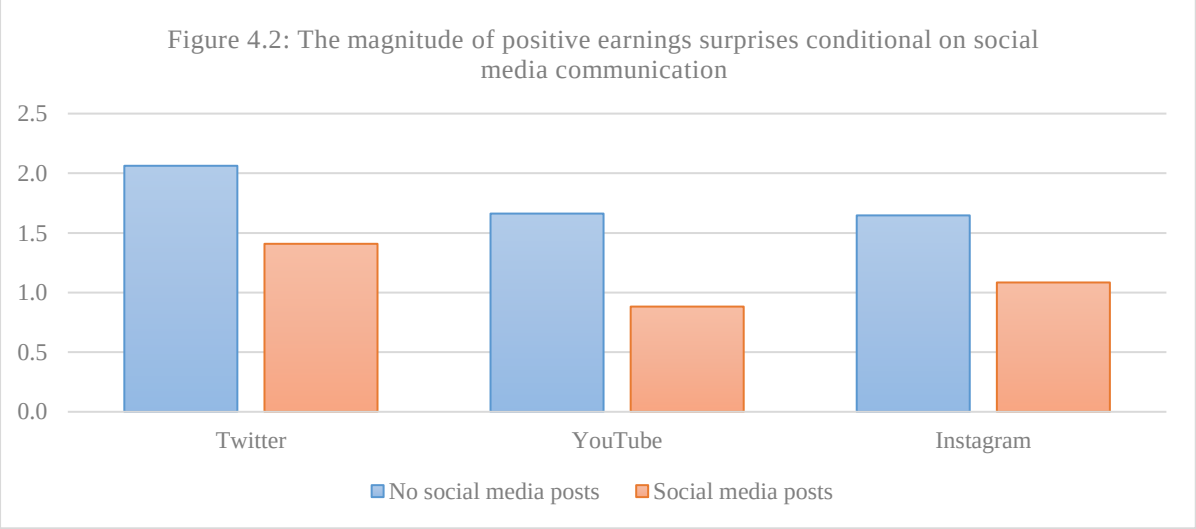


Figure 3.1 reports the proportion of firms that use YouTube and Instagram to communication earnings announcements conditional on the firm also communicating on Twitter. Figure 3.2 documents the percentage of firms using Instagram conditional on the firm also communicating on YouTube.

Figure 4. The frequency of social media communication for positive and negative earnings announcements





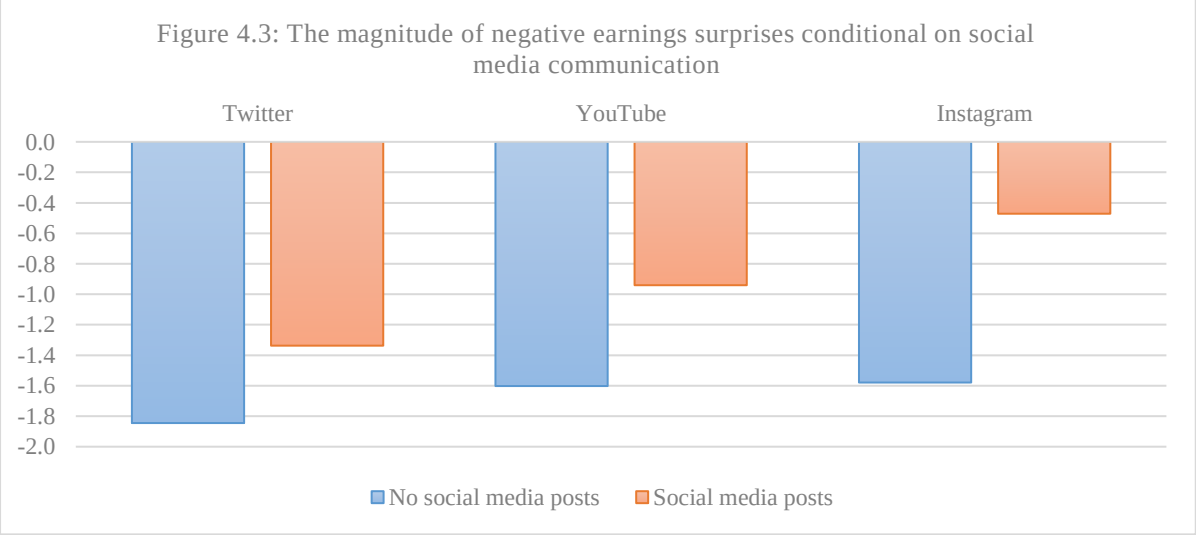


Figure 4.1 reports the proportion of firms using social media to communicate earnings results conditional on the sign of earnings news. Figures 4.2 and 4.3 report the magnitude of positive and negative earnings surprises conditional on social media communication.

Table 1. Social media use across industries

	Nondurables (e.g. food, tobacco, textiles, apparel, leather, toys)	Consumer durables (e.g. Cars, TV's, furniture)	Manufacturing	Oil and Gas	Business Equipment (e.g. Computers, software, electronic equipment)	Tele-communication	Wholesale and Retail	Healthcare, Medical Equipment	Utilities	Other (e.g. mines, transportation, business services, entertainment, finance)
N	43	6	42	2	14	17	49	15	13	182
% Twitter posts	88.4%	100.0%	50.0%	100.0	57.1%	58.8%	46.9%	60.0%	69.2%	65.4%
% YouTube posts	11.6%	0.0%	0.0%	0.0%	7.1%	0.0%	4.1%	6.7%	0.0%	7.7%
% Instagram posts	9.3%	0.0%	2.4%	0.0%	0.0%	0.0%	2.0%	0.0%	0.0%	5.5%

The table shows the distribution of social media communication on Twitter, YouTube and Instagram across ten Fama-French industries for the sample of FTSE100 companies.

Table 2. Predicting the likelihood a firm will post earnings news on social media

	Social media posts			YouTube and Instagram posts	
	Estimate	ME	p	Estimate	p
Intercept	-15.567		0.000	-26.392	0.000
Social media account	15.376	96%	0.000		
Tweet				2.552	0.024
Twitter account				9.755	0.000
YouTube or Instagram accounts				12.933	0.000
Positive surprise	0.787	21%	0.002	0.552	0.343
SUE	0.001	0%	0.974	0.026	0.418
High #Analysts	-0.554	-15%	0.059	-0.250	0.493
High Retail ownership	-0.257	-7%	0.528	-0.527	0.386
High #IO	-0.223	-5%	0.751	0.523	0.357
High B/M	1.520	40%	0.009	0.167	0.741
High Leverage	0.756	21%	0.138	-0.923	0.137
High MV (£ billion)	0.421	11%	0.473	1.508	0.011
High Volatility	0.088	2%	0.791	-0.126	0.846
N	382			382	
Wald Chi2	0.000			0.000	

Column "Social media posts" reports results from estimating equation (3) that predicts the likelihood a firm will communicate earnings news on any of the three social platforms: Twitter, YouTube and Instagram. Column "YouTube and Instagram posts" reports regression results for a model predicting a firm will communicate earnings news on YouTube or Instagram. Standard errors are adjusted for heteroskedasticity and with-in firm correlation. Column "ME" reports marginal effects.

Table 3. Descriptive statistics

	Mean	Median	Std Dev	Lower Quartile	Upper Quartile
Panel A: Price reaction and Twitter activity					
CAR (-1,2)	0.18%	0.25%	4.88%	-3.14%	3.30%
Tweet	63.97%	100.00%	48.07%	0.00%	100.00%
Tweet before	18.78%	0.00%	39.13%	0.00%	0.00%
Tweet on the day	98.78%	100.00%	11.02%	100.00%	100.00%
Tweet after	7.35%	0.00%	26.14%	0.00%	0.00%
#Twitter posts	7.641	5.000	8.825	2.000	10.000
#Twitter followers (in 000) N=192	26.43	1.135	4.353	0.374	2.470
#Twitter RLC	114.571	40.000	244.117	14.000	116.000
Cashtag	12.65%	0.00%	33.31%	0.00%	0.00%
Panel B: Other media					
YouTube	6.01%	0.00%	23.79%	0.00%	0.00%
YouTube engagement	11.609	8.000	16.770	3.000	13.000
Instagram	4.18%	0.00%	20.03%	0.00%	0.00%
Instagram engagement	250.438	42.500	526.521	11.500	134.500
Panel C: Controls					
SUE	0.512	0.404	4.361	-0.327	1.191
#Analysts	8.799	7.000	6.581	3.000	13.000
Retail ownership	0.621	0.593	0.132	0.529	0.666
#IO	383.428	308.000	276.266	255.000	389.000
B/M	0.581	0.392	0.563	0.201	0.778
Leverage	0.663	0.641	0.219	0.494	0.846
MV (£ billion)	16611.540	7450.360	20499.910	5304.750	17162.150
Volatility	0.039	0.034	0.024	0.023	0.048

The table reports descriptive statistics for the sample of FTSE100 firms reporting earnings over the period January 2015 to April 2018.

Table 4. Price reaction regression results

	Model 1			Model 2		Conditional pricing model			
	CAR(-1,2)			CAR(-7,7)		First stage		Second stage	
	Estimate	ME	p	Estimate	p	Estimate	p	Estimate	p
Panel A: Price reaction to social media communication on Twitter									
Intercept	0.077		0.196	0.105	0.207	-17.230	0.002	0.083	0.166
SUE	0.000	-2.9%	0.408	-0.001	0.047	0.024	0.572	0.000	0.342
Tweet	0.001	0.9%	0.887	-0.003	0.762			0.010	0.486
SUE*Tweet	0.003	12.5%	0.018	0.003	0.057			0.003	0.018
Avg Twitter use						-2.180	0.022		
Social media account						15.465	0.000		
Lambda								-0.006	0.479
Controls	Yes			Yes		Yes		Yes	
Industry effects	Yes			Yes		Yes		Yes	
Year effects	Yes			Yes		Yes		Yes	
N	383			383		383		375	
p(F)/Wald Chi2	0.000			0.000		0.000		0.000	

Table 4 continued on next page

Table 4, continued

	Magnitude of surprise		Tweeting day CAR(-7,7)		Press coverage	
	Estimate	p	Estimate	p	Estimate	p
Panel B: Further results						
Intercept	0.073	0.183	0.083	0.199	0.043	0.510
SUE			-0.001	0.014	0.005	0.064
Tweet	-0.001	0.896			-0.006	0.386
positive SUE	0.000	0.169				
small positive SUE	0.006	0.616				
small negative SUE	0.037	0.000				
negative SUE	0.000	0.994				
positive SUE*Tweet	0.003	0.264				
small positive SUE*Tweet	0.011	0.000				
small negative SUE*Tweet	-0.035	0.026				
negative SUE*Tweet	0.002	0.169				
SUE*Tweet*Pre-announcement			0.003	0.458		
SUE*Tweet*Announcement day			0.003	0.025		
SUE*Tweet*Post-announcement			0.007	0.460		
Pre-announcement			-0.006	0.494		
Announcement day			0.001	0.869		
Post-announcement			-0.002	0.880		
SUE*Tweet					-0.001	0.625
# of news					-0.002	0.002
# of news*SUE					-0.001	0.001
# of news*Tweet					0.002	0.000
# of news*SUE*Tweet					0.001	0.018
Controls	Yes		Yes		Yes	
Industry effects	Yes		Yes		Yes	
Year effects	Yes		Yes		Yes	
N	383		383		326	
p(F)	0.000		0.000		0.000	

Table 4 continued on next page

Table 4, continued

	Retail ownership		Number of tweets and cashtags		Engagement		#Followers	
	Estimate	p	Estimate	p	Estimate	p	Estimate	p
Panel C: The impact of tweeting characteristics								
Intercept	0.076	0.076	0.089	0.141	0.084	0.163	0.125	0.090
SUE	0.001	0.626	0.000	0.374	0.000	0.383	0.003	0.134
Tweet	-0.008	0.124	-0.008	0.264	-0.008	0.287	-0.005	0.557
SUE*Tweet	0.002	0.411	0.005	0.017	0.005	0.018	0.000	0.895
SUE*Tweet*High retail ownership	0.006	0.091						
Tweet* High retail ownership	0.041	0.014						
SUE* High retail ownership	-0.001	0.549						
High retail ownership	-0.033	0.026						
SUE*Tweet*High # Tweet Posts			-0.003	0.352				
High # Tweet Posts			0.015	0.029				
SUE*Tweet*Cashtag			-0.003	0.535				
Cashtag			0.004	0.700				
SUE*Tweet*High #Twitter RLC					-0.003	0.314		
High #Twitter RLC					0.015	0.030		
SUE*Tweet*High # Followers							-0.003	0.412
High # Followers							-0.002	0.846
Controls	Yes		Yes		Yes		Yes	
Industry effects	Yes		Yes		Yes		Yes	
Year effects	Yes		Yes		Yes		Yes	
N	383		383		383		192	
p(F)	0.000		0.000		0.000		0.000	

The table reports regression results for equation (1). Standard errors are adjusted for heteroskedasticity and within-firm correlation.

Table 5. Price reactions to YouTube and Instagram communication

	YouTube and Instagram		#posts		Engagement		Retail investors	
	Estimate	p	Estimate	p	Estimate	p	Estimate	p
Panel A: Regression results								
Intercept	0.073	0.230	0.074	0.213	0.068	0.277	0.075	0.082
SUE*YouTube	-0.012	0.053	-0.047	0.000	0.001	0.920	-0.030	0.457
YouTube	0.017	0.089	-0.015	0.245	0.014	0.242	-0.001	0.979
SUE*Instagram	-0.001	0.923	0.014	0.481	0.006	0.606	0.090	0.066
Instagram	0.017	0.423	-0.007	0.866	0.007	0.739	-0.128	0.032
SUE*# YouTube posts			0.013	0.009				
#YouTube posts			0.008	0.050				
SUE*# Instagram posts			-0.012	0.259				
# Instagram posts			0.011	0.498				
SUE*YouTube Eng					-0.001	0.141		
YouTube_Eng					-0.001	0.461		
SUE*Instagram_Eng					-0.001	0.014		
Instagram_Eng					0.001	0.053		
SUE*YouTube*Retail							0.033	0.603
YouTube*Retail							0.030	0.698
SUE*Instagram*Retail							-0.141	0.035
Instagram*Retail							0.210	0.006
SUE*Retail							0.000	0.997
Retail							-0.010	0.781
SUE	0.000	0.372	0.000	0.384	0.000	0.391	0.000	0.951
Tweet	-0.001	0.866	-0.002	0.671	-0.001	0.872	-0.001	0.854
SUE*Tweet	0.004	0.010	0.004	0.012	0.004	0.010	0.004	0.053
Controls	Yes		Yes		Yes		Yes	
Industry effects	Yes		Yes		Yes		Yes	
Year effects	Yes		Yes		Yes		Yes	
N	383		383		383		383	
p(F)	0.000		0.000		0.000		0.000	

The table reports results from equation (1) where we include controls for firms dissemination of earnings news on YouTube and Instagram. Standard errors are adjusted for heteroskedasticity and within-firm correlation.

Table 5 continued on next page

Table 5, continued

	First stage		Second stage	
	Estimate	p	Estimate	p
Panel B: Self-selection correction				
Intercept	-15.219	0.005	0.068	0.246
SUE*YouTube			-0.012	0.076
YouTube			0.024	0.199
SUE*Instagram			0.001	0.942
Instagram			0.022	0.351
SUE	0.012	0.852	0.000	0.363
Tweet	2.812	0.026	-0.002	0.789
SUE*Tweet			0.004	0.010
Avg YouTube and Instagram use	-5.305	0.039		
Social media account	10.938	0.000		
Lambda			-0.004	0.694
Controls	Yes		Yes	
Industry effects	Yes		Yes	
Year effects	Yes		Yes	
N	383		383	
Wald Chi2/p(F)	0.000		0.000	

Panel A reports results for regressions estimating the impact earnings communication on YouTube and Instagram has on price reaction to earnings news. Panel B reports results controlling for self-selection of firms reporting on YouTube and Instagram. The set of controls is from equation (1) and standard errors are adjusted for heteroskedasticity and within-firm correlation.

Table 6. The likelihood of an increase in retail ownership after earnings announcements

	Estimate	ME	p
Intercept	-50.161		0.000
Tweet	2.953	78.3%	0.000
YouTube	1.238	16.2%	0.009
Instagram	1.772	19.6%	0.001
Controls	Yes		
Industry effects	Yes		
Year effects	Yes		
N	383		
p(F)	0.000		

The table reports results from a logit model predicting an increase in retail ownership at the end of the earnings announcement quarter compared to the quarter-end before earnings announcements. The set of controls, including the earnings surprise, is from equation (1) and standard errors are adjusted for heteroskedasticity and within-firm correlation.

Table 7: Abnormal returns after earnings announcements.

	Estimate	p
Intercept	0.087	0.267
Tweet	-0.015	0.167
YouTube	0.015	0.473
Instagram	0.015	0.653
Controls	Yes	
Industry effects	Yes	
Year effects	Yes	
N	383	
p(F)	0.000	

The table reports regression results where the dependent variable is CAR(3,90). The set of controls, including the earnings surprise, is from equation (1) and standard errors are adjusted for heteroskedasticity and within-firm correlation.

Table 8: Heterogeneity in analyst expectations

	Estimate	ME	p
Intercept	-0.236		0.373
Tweet	-0.057	-15.1%	0.042
YouTube	-0.052	-6.1%	0.087
Instagram	-0.097	-9.7%	0.000
|SUE|	0.000	0.7%	0.922
Controls	Yes		
Industry effects	Yes		
Year effects	Yes		
N	346		
p(F)	0.000		

The table reports regression results where the dependent variable is abnormal analyst forecast dispersion in a five-day window around earnings announcements. Standard errors are adjusted for heteroskedasticity and within-firm correlation.

Table 9: The likelihood of analyst stock recommendation upgrade

	Estimate	ME	p
Intercept	-2.796		0.225
Tweet	0.531	14.1%	0.043
YouTube	-0.124	-1.6%	0.815
Instagram	-1.095	-12.1%	0.110
SUE	0.007	1.7%	0.734
Controls	Yes		
Industry effects	Yes		
Year effects	Yes		
N	383		
p(F)	0.000		

The table reports results from a logit model predicting an upgrade in analyst stock recommendations in a 30-day period after earnings announcements compared to a 50-day window ending ten days before earnings announcements. Standard errors are adjusted for heteroskedasticity and within-firm correlation.