DO SOCIAL MEDIA EFFORTS MATTER FOR A FIRM'S BOTTOM LINE? EVIDENCE FROM FACEBOOK

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Abstract

Despite the increasing attention paid to the business value of social media, it is still not clear how they affect firm performance. This study theorizes and empirically examines how firms' social media efforts—in terms of intensity, richness, and responsiveness—influence consumer behavior (engagement and attention) and firm performance. Using detailed data collected from the Facebook pages of 63 firms over the 2010-2012 period, we find that the richness and responsiveness of a firm's social media efforts are significantly associated with the firm's market performance, captured by abnormal returns and Tobin's q. Interestingly, the intensity of a firm's social media efforts is not significantly associated with firm performance. We also find that not only do consumer engagement and attention directly impact firm performance, but they also mediate the relationship between a firm's social media efforts and firm performance. Unlike prior studies that examine the impact of third-party or consumer-initiated social media, such as blogs and consumer ratings, our study focuses on estimating financial returns to firms' own efforts on firm-initiated social media, thereby assessing the business value of social media directly.

Keywords: social media, firms' social media efforts, firm performance, business value of social media

1 INTRODUCTION

Social media applications have the potential to provide business value by enabling the formation of online customer communities that can support branding, sales, customer service, and product development (Culnan et al. 2010). In order to tap this potential, many organizations are actively utilizing social media, such as Facebook and Twitter, in communicating and interacting with their current and potential customers (Ling 2013). For example, many firms have official Facebook "pages" where they post messages for their customers (e.g., product/service promotions) and respond to messages left by their customers ("fans" of a certain page). Recent industry reports suggest that social media may positively impact businesses' bottom line and brand image; as a result, firms need to invest in social media and integrate social media into their business strategies (Hardy 2012; J.D.Power 2013; Wessel 2011). However, many practitioners remain skeptical about the returns to investments in social media because of the low reach rate of firms' social media presence and the difficulty in measuring returns (Dyer 2013; Mueller 2011). Despite the fact that firms are increasingly investing in and using social media, relatively little research has been conducted to examine the returns to firms' social media efforts. In particular, to our best knowledge, prior studies have neither considered the different dimensions of firms' social media efforts, nor have they examined the differential effects of these dimensions on firm performance. Further, extant research has not explicated the mechanisms through which firms' social media efforts can influence firm performance. As a result, there is limited guidance for firms on how to use social media strategically - especially with respect to the particular dimensions of social media efforts they should emphasize - when communicating and interacting with their customers in order to maximize returns to their social media efforts.

We conceptualize Intensity, Richness, and Responsiveness as the three dimensions of a firm's social media efforts and examine the relationship between these dimensions and the firm's market performance. In order to uncover the mechanisms through which firms' social media efforts impact firm performance, we also consider the mediating role of consumer engagement (captured by customers' various activities, including postings, comments, and "likes" on a firm-initiated social media site) and consumer attention (captured by web traffic on the firm's website). Based on detailed data collected from 63 firms' Facebook pages and the firms' financial data over the 2010-2012 period, we find that the impact of the richness and responsiveness of a firm's social media efforts on the firm's market performance is positive and significant. Interestingly, we do not find a significant impact of the intensity of a firm's social media effort on the firm's market performance. Further, our results suggest that consumer engagement and attention not only directly impact firm performance, but also mediate the relationship between a firm's social media efforts and performance.

This study makes several contributions to research. First, while recent studies (Luo & Zhang 2013; Luo et al. 2013) have examined the impact of third-party- or consumer-initiated social media (blogs and consumer ratings) on firm equity value, our study focuses on firm-initiated social media (Facebook pages in our case), and empirically examines whether a firm's social media efforts matter for the firm's market performance. Although a number of studies have examined the outcomes of social media (e.g., Goh et al. 2013; Miller & Tucker 2013; Rishika et al. 2013; Tirunillai & Tellis 2012), our study, to our best knowledge, is among the first to quantify the financial returns to firms' social media efforts. In particular, we contribute to this nascent literature by conceptualizing Intensity, Richness, and Responsiveness as key dimensions of a firm's social media efforts, by measuring them from the firm's actual activities on its Facebook page, and by estimating the differential effects of the three dimensions on firm performance. Second, we uncover the mechanisms through which firms' social media efforts impact firm performance by examining both direct and indirect (through consumer engagement and attention) relationships. Whereas prior studies have mostly focused on the direct relationships between two constructs (e.g., social media – consumer behavior, social media – firm performance), we comprehensively examine the structural relationships among firms' social media efforts, consumer engagement and attention, and firm performance, collected from multiple

data sources. Such a comprehensive examination of the structural relationships among these variables allows us to derive richer insights.

2   LITERATURE REVIEW

A handful of studies that have examined the impact of social media can be categorized into two streams. One stream of literature has focused on the impact of social media on firm performance. For example, by employing event study methodology, Yang et al. (2012) showed that a firm's decision to engage in a social network platform positively affects the firm's market value. Researchers have also examined the impact of consumers' actions in social media on firm performance. Notably, Luo et al. (2013) found that consumers' action in social media (i.e., posting content about a firm on blogs, as well as posting reviews about the firm and its products on the website of CNET.com) can influence a firm's market value. Although these studies provide valuable implications by highlighting the importance of social media in a firm's strategy, they do not shed light on the returns to firms' specific social media efforts per se. Extending this stream of research, our paper proposes three important dimensions of a firm's social media efforts (i.e., intensity, richness, and responsiveness), and examines the relationship between these dimensions and the firm's market performance.

Another stream of literature has focused on the impact of social media on consumer behavior. Based on individual-level data regarding social media participation (Facebook page) and transactions, Rishika et al. (2013) find that customers' social media participation increases their website visit frequency and profitability. In a similar vein, Goh et al. (2013) analyze user- and firm-generated content on a firm's Facebook page, and find that user-generated content has a stronger effect on purchase behavior, compared to firm-generated content. Although these studies provide important implications regarding the impact of social media on customers' purchase behavior, they are based on data from a single firm and do not examine the different dimensions of firms' social media efforts. Further, these studies do not examine the comprehensive relationships among firms' social media efforts, consumer behavior, and firm performance.

In general, active firm promotion involving word of mouth has been found to be effective in managing firms' social presence (Godes & Mayzlin 2009). Although previous studies provide several ways of measuring the usefulness of user-generated content to firms (e.g., Sawhney et al. 2005), as well as the theoretical implications of firms' efforts on online communities (Dellarocas 2006), they have not examined the effect of firms' social media efforts and the subsequent actions of customers, with the exception of Miller and Tucker (2013). The authors show that active social media management drives more user-generated content in a healthcare setting. Specifically, by using cross-sectional data for 5,035 hospital Facebook pages, they find that firms (e.g., hospitals) who actively manage their Facebook pages through regular posts are likely to induce more postings from internal employees, compared to external customers. Their findings suggest that active management of social media does not lead to the customer-side benefits that firms put forward before adopting social media strategies. Although their study empirically suggests a strategic benefit to firms who decide to actively participate in social media, only the use of social media in healthcare was considered; other metric types of customer-generated content frequency, such as comments and Likes, were not examined to explain customer-side benefits. Our study extends this stream of literature by examining the effect of a firm's social media efforts on the subsequent actions of the firm's customers, as well as its financial performance.

3   THEORY

This study builds on prior literature that has looked at the impacts of social media on firm performance and consumer behavior. As depicted in Figure 1, we first examine the direct relationship between firms' social media efforts (in terms of intensity, richness, and responsiveness) and firm performance (RQ1). Further, we propose two key intermediate processes – consumer engagement (RQ2) and

consumer attention (RQ3) – that mediate the relationship between firms' efforts and their financial performance. Finally, we also investigate the relationship between consumer engagement and attention (RQ4).
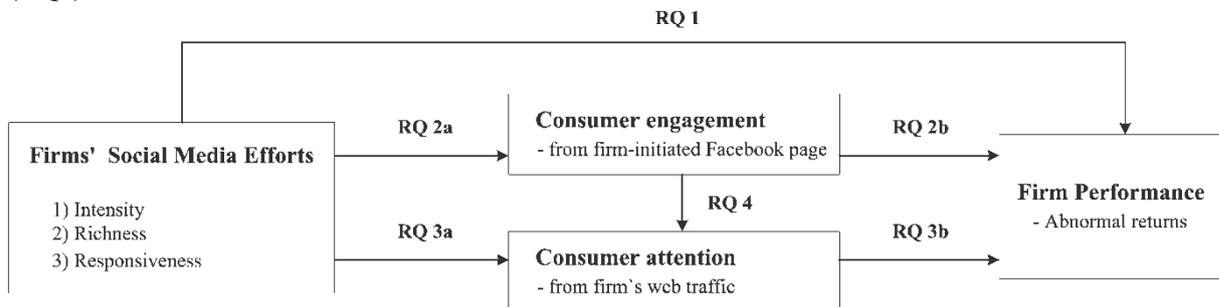

Figure 1.   The Conceptual Model

3.1   Value of Firms' Social Media Efforts

Social media can significantly enhance firms' ability to interact with customers, which leads to fundamental changes in terms of ease of contact, volume, speed, and the nature of these interactions (Culnan et al. 2010; Gallaugher & Ransbotham 2010). Firm-initiated social media sites allow firms to easily disseminate information on new products/services, promotions, customer relationships and corporate social responsibility. With the growing impact of social media on business, there is a heavy managerial emphasis on studying the returns to investments in firms' social media efforts. A firm's efforts to communicate through social media will affect its market value, as the information disseminated can affect the stock price of the firm by providing signals about the marketing strategy, customer service quality, and growth potential of the firm to potential and current investors.

Although firms provide information to investors through financial statements and other disclosures, such as annual reports, numerous studies have suggested the existence of asymmetric information between firms and investors (Healy & Palepu 2001). To overcome this asymmetry, investors seek additional information from multiple sources, such as new product announcements (Chen et al. 2011), expert reviews (Tellis & Johnson 2007), and user-generated content (Tirunillai & Tellis 2012). Communication between a firm and its consumers on social media provides one such source of information to investors, who can infer the firm's level of involvement with its customer base, and the firm's commitment to improving its relationships with customers from its social media efforts.

Firms' social media efforts provide consumers with easy access to various types of useful information, including firms' offerings, promotions, and actions (e.g., CSR activities). Such information can easily spread to consumers and potential investors, thereby engendering greater trust and customer loyalty (Algesheimer et al. 2005; Thompson & Sinha 2008). Thus, a firm's social media efforts can affect product/service sales by influencing the awareness, attitudes, perceptions, purchase decisions, and brand loyalty of the potential and current customers who receive the messages. To the extent that active interactions between a firm and customers influence the product awareness and/or likelihood of sales, a firm's social media efforts serve as a good signal to indicate its sound customer relationship management; therefore, investors' valuation of the firm's stock will be associated with the quality and quantity of firms' social media activity. However, it is an open empirical question as to whether there is valuable information contained in firms' communication exchanges on social media. Therefore, we examine the following research question:

- **RQ 1**: *Does a firm's social media efforts (in terms of the quantity and quality of information posted by the firm on a firm-initiated social media site) influence its market performance?*

Specifically, in order to examine the differential effects involving the different dimensions of firms' social media efforts, we identify three dimensions of a firm's efforts on a social media site: 1) the intensity of the firm's efforts (i.e., the volume of messages posted by a firm); 2) the richness of the

firm's efforts (i.e., the information richness of messages posted by a firm); and 3) the responsiveness of the firm's efforts (i.e., the extent to which a firm responds to consumers' messages).

The first dimension captures the quantity of effort, while the other two represent the quality of the effort. Higher intensity (i.e., a greater amount or volume of a firm's postings and comments) would mean more opportunities for the firm's current and potential customers to see and act on the information disseminated by the firm. By actively managing their social media sites through regular posts, firms not only induce more user-generated content (Miller & Tucker 2013), but also identify issues and foster innovation (Gallaugher & Ransbotham 2010). To the extent that the volume of the information provided by a firm can increase customers' awareness of and engagement with the firm, the intensity of a firm's efforts is likely to influence its market value. Therefore, we examine the following question:

- **RQ 1a)** *Does the intensity of a firm's efforts (i.e., the volume of messages posted by a firm) on a social media site affect its market performance?*

Our second dimension, the richness of a firm's social media efforts, represents the richness of the messages and comments posted by the firm. In the context of social media, posting messages serves as an important medium to convey information. Messages delivered through different media - texts, pictures, or videos - have varying abilities to deliver information, and accordingly, we can determine the richness of these various types of media (Daft & Lengel 1986). Richer messages are more likely to be noticed and propagated (i.e., through message sharing) by consumers because they are more engaging and informative. Research suggests that messages delivered using pictures are richer than text, as they require less processing effort (Larkin & Simon 1987). Further, it has been shown that video is superior to static pictures because it is more explicit and easier to understand (Park & Hopkins 1992). It can be argued that as one moves from text to pictures, and from pictures to video, more information cues can be communicated. To the extent that such additional information cues lead to engaging and valuable content that can enhance the social engagement of prospects, thereby differentiating the firm from competitors and boosting customer awareness and loyalty (Emerson 2012b), the richness of a firm's social media efforts will be reflected in the firm's market value. Therefore, we study the following question:

- **RQ 1b)** *Does the richness of a firm's efforts (i.e., the informational richness of messages posted by a firm) on a social media site affect its market performance?*

Finally, firms' social media efforts can be distinguished in terms of the nature of the participation. A firm generally broadcasts messages to convey information to its subscribers. However, a firm may also choose to interact with its customers by responding to customer comments. Such responsiveness (or interactivity) tends to increase social presence and enhance the depth of information sharing (Miranda & Saunders 2003). Although responsiveness comes at a relatively high cost, as it requires customized messages rather than the same message broadcasted to all subscribers, being responsive (as well as being perceived as responsive) is critical to survival and to building strong social capital on a social media platform (York 2012). However, the value of responsiveness has not been empirically established. Therefore, we investigate the following question:

- **RQ 1c)** *Does the responsiveness of a firm's efforts (i.e., responding to consumers' messages) on a social media site affect its market performance?*

3.2   Role of Consumer Engagement as a Mediator

Firms' actions on firm-initiated social media can be highly visible and contagious because the information posted by a firm is immediately delivered to current subscribers (fans) of the firm's page through its news feed, and non-fans who are friends of current fans can also observe activities and interactions on the page involving their friends (Gallaugher & Ransbotham 2010). The information that a firm intends to convey to its audience can be diffused through two modes – the subscription mode and the social contagion mode. In the subscription mode, messages are received by the consumers who subscribe to the firm's news feed (i.e., those who "like" the firm's page). On the other

hand, in the social contagion mode, the message reaches those consumers who are not subscribers, but are directly connected to the subscribers within the social network due to consumer engagement (i.e., specific actions such as posting messages, liking or commenting on a post on a firm's social media page). Consumer engagement is essential for creating the social contagion effect, whereby the awareness of a firm's brand and its message reaches non-subscribers or those not participating in a conversation with the firm.

The direct effect of a firm's social media efforts on its market value, which we focused on earlier, is primarily due to the propagation of information through the subscription mode. However, to the extent that the social contagion effect is significant and leads to the viral propagation of messages to those who otherwise would not have received it, we expect that the effect of a firm's social media efforts on its market value will be partially mediated by consumer engagement.

In other words, by actively managing its social media site through regular posts (i.e., a high volume of messages posted by a firm), providing more informative information (i.e., focusing on multimedia messages, such as pictures and videos), and frequently interacting with its customers (i.e., responding to customer comments), a firm not only sends a strong signal of its health to its current and potential investors (which should be reflected in its market value), but also increases the possibility that existing (via the subscription mode) and potential customers (via the social contagion mode) engage in the firm's social media site through their postings, comments, and "Likes." Specifically, network relations between a firm and customers on a firm-initiated social media site are socially embedded and entail expectations and norms associated with social attachment from the interactions. In these relationships, the social capital (Coleman 1988) generated tends to take the form of mutual trust and goodwill (Adler & Kwon 2002), resulting in a high level of consumer engagement.

In addition to signaling the viral propagation and consequent increase in the market reach of a firm's message, higher consumer engagement also signals customer satisfaction. Prior studies show that that customer satisfaction is positively associated with firm value (Anderson et al. 2004; Fornell et al. 2006; Gruca & Rego 2005). These studies suggest that customer satisfaction can lead to additional purchases and can be an economic asset that is expected to influence firm value with high returns and low risk (Fornell et al. 2006). In the social media context, comments on a firm's postings and positive reactions such as "Like" can serve as positive word of mouth (WOM), which is expected to influence firm performance. Consumer engagement in a social media site tends to signal repeat buying, increased market share and long-term growth of the firm, and tends to reduce customer complaints and price elasticity. Therefore, consumer engagement is likely to impact firms' market value. However, assessing the value of consumer engagement in a firm's social media site, and mediating the role of consumer engagement between a firm's social media efforts and its market value is an open empirical question. Therefore, to assess the mediating role of consumer engagement as described above, we examine the following question:

- **RQ 2a)** *Does a firm's social media efforts (i.e., intensity, richness, and responsiveness) affect its consumer engagement (i.e., "Likes," comments and posts by consumers on the firm's Facebook page)?*
- **RQ 2b)** *Does consumer engagement affect firm performance?*

3.3   Role of Consumer Attention as a Mediator

Consumers generally have to visit a firm's website to gain information and to process their transactions with the firm. Therefore, one of the primary objectives of a firm having an online presence is to attract the attention of consumers to its website. A firm employs various marketing channels to reach potential consumers, attract them to visit its website, and then convert the website visitors into buyers. The amount of website traffic reflects consumers' interest in and attention to the firm. Therefore, website traffic acts as a valuable signal to investors about the market share and growth of a firm (Luo & Zhang 2013; Rajgopal et al. 2000; Trueman et al. 2000). In addition, some of the website visitors may be current or potential investors who access the website to obtain information

relevant for making investment decisions. Thus, website traffic may also be associated with the number of investors interested in the firm. To the extent that website traffic, also referred as the "eyeball effect," contains a valuable signal to the investor community and complements the accounting data (Demers & Lev 2001; Dewan et al. 2002; Luo & Zhang 2013; Trueman et al. 2000), website traffic will be positively associated with market value.

A firm's effort spent on social media is one of the various ways to increase consumer attention, which is typically captured by website traffic. By providing informative contents and by actively interacting with its customers (i.e., focusing on intensity, richness, and responsiveness), a firm creates opportunities to direct its current and potential customers who subscribe to the social media site (e.g., Facebook page) to its website, thereby increasing consumer attention (Luo & Zhang 2013). Similar to the role of consumer engagement, consumer attention may be influenced by the social contagion effect. Thus, the effect of a firm's social media efforts on its market value will be partially mediated by consumer attention. Although proponents of social media advocate that firms should spend significant resources and should actively manage their social media channels to increase their website traffic (Emerson 2012a; Vahl 2014), the empirical evidence connecting firms' social media efforts to website traffic is lacking. Therefore, we examine the impact involving the different dimensions of firms' social media efforts on website traffic. Specifically, we assess the mediating role of consumer attention by examining the following question:

- **RQ 3a)** *Does a firm's social media efforts (i.e., intensity, richness, and responsiveness) affect consumer attention (i.e., website traffic)?*
- **RQ 3b)** *Does consumer attention affect firm performance?*

3.4 Relationship between Consumer Engagement and Consumer Attention

Consumer engagement not only affects firms' market value directly, but can also indirectly contribute to market value through its impact on consumer attention. As discussed earlier, social media not only create new firm-customer interactions; they also expose these interactions to others, thus creating social contagion (Aral & Walker 2011; Bond et al. 2012; Ugander et al. 2012). As more customers comment on and like a firm's messages on its social media site, the messages will become more visible to more people through social contagion, which can increase people's awareness of the firm and may induce more people to visit the firm's website. In this sense, consumer engagement (e.g., "Likes" and comments) on a firm's social media site can function as a credible word-of-mouth channel. As the information comes from one's friends or friend's friends, people are more likely to trust the information, compared to information from other sources (e.g., TV or Internet ads). This, in turn, can attract their attention to the firm and increase the likelihood for them to visit the firm's website to gain more information or conduct transactions there. However, there is a lack of empirical research examining the presence and strength of the relationship between consumer engagement and consumer attention. Therefore, we empirically examine the following question:

- **RQ4)** *Does consumer engagement affect consumer attention?*

4 DATA AND METHOD

We chose South Korea's top 100 firms in terms of the total market value, sales, and net income as our sample for two reasons. First, focusing on large firms can ensure active interactions between firms and consumers because larger firms' Facebook pages are likely to be updated and accessed more frequently. Second, the top 100 firms are likely to invest more in their social media, compared to smaller firms (due to relatively higher levels of advertising expenditures). Our sample firms from diverse industries are publicly traded and have, on average, 17,210 fans who "like" their Facebook pages. Our initial sample contained 8,324 firm-week observations from 100 firms over the period from January 1, 2010 to December 30, 2012. We removed 2,514 observations with missing quarterly R&D spending and 1,602 observations with missing or zero advertising expenditures. Hence, the final sample consists of 4,208 observations from 63 firms spanning 100 weeks.

Our data come from two major sources. First, we collected detailed information on all activities (e.g., posts, comments, and "Likes") from 100 firms' official Facebook pages over a period of one hundred and fifty weeks. Our Facebook data were collected by our custom-designed distributed computing platform, the Apache Hadoop Hive-based crawler. By using thirty Linux x86 servers running in parallel, data-mining agents queried the Facebook servers in order to acquire the specific posts and comment information on each firm's Facebook page. Specifically, we collected all available data through the Facebook graph API (Application Programming Interface) for each firm. It is important to note that we could obtain the timestamp of the posts/comments and the anonymized unique user identification numbers. Similar to Da et al. (2011), we aggregated the data at the weekly level for each firm and constructed a panel dataset containing each firm's weekly social media activities and consumers' weekly responses. Please note that we do not use daily data because the variation of firms' social media activities at the daily level was relatively small (e.g., the average number of postings was 3.21, and the standard deviation of postings was 3.57). Because some firms operate several Facebook pages for different purposes (e.g., brand page, CSR page, promotion page, and so on), we manually tracked every official Facebook page for each sample firm. We then aggregated all activities from the multiple Facebook pages for each week of our sample period.

Second, since all sample firms are listed on the Korea Stock Exchange (KSE) or Korean Securities Dealers Automated Quotations (KOSDAQ), we obtained quarterly firm-level financial data from Korea Investors Service, Inc. To match those financial variables with our weekly social media metrics, we followed the data-coding scheme used in prior studies (Luo 2009; Pauwels 2004). Specifically, we assigned the same values of earnings forecasts, cash flows, and other financial data to all 12 weeks contained in a given quarter. We checked the robustness of our results by using VAR-bootstrapping specifications with 5,000 simulated databases (Luo et al. 2013; Statman et al. 2006) and confirmed that our results are not sensitive to temporal aggregation.

4.1 Firm's Social Media Efforts and Consumer Engagement

Recall that we conceptualized three dimensions of firms' social media efforts: Intensity, Richness, and Responsiveness. To capture the Intensity of a firm's social media efforts, we use two measures of firms' Facebook activities: the number of postings and the number of comments. Using principal component analysis (PCA), we extracted one factor from the two measures, and the pattern of factor loadings supports the existence of a single dimension. In the main analysis, we use a weighted average of the number of a firm's postings and comments in week t to measure Intensity (weighted by their loadings in the underlying principle components). We then scaled it by the network size, which is the total number of Facebook fans of a focal firm in week t to adjust for the network effect and the ripple effect. The richness of a firm's social media efforts was measured as the ratio of the number of the firm's enriched postings (e.g., flash, videos, photos, and music) to the total number of the firm's postings in week t. A larger value of this measure reflects the firm's greater efforts spent on social media in terms of the richness of information provided to consumers. The responsiveness of a firm's social media efforts was measured by the ratio of the number of the firm's comments to the total number of comments made by both the firm and its fans in week t. It reflects the magnitude of the firm's reciprocal action toward its customers through comment threads following a certain post. As shown in Table 1, on average, a firm posts or comments about 37.4 times per week; approximately 57% of them contain enriched information; and about 15% of the comments are made by firms. To capture consumer engagement, we use a weighted average of the number of postings, comments, and "Likes" by customers in week t (weighted by their factor loadings in the underlying principle components) as a single-item measure.

4.2 Firm Performance

As our main dependent variable, we use abnormal returns that capture a firm's market performance beyond the firm's expected stock market returns. To estimate abnormal returns, we use the extended Fama-French model (Fama & French 1993; Fama & French 1996). The Fama-French model has been

recognized as a good proxy for stock market performance by considering market risk, firm size, as well as multiple value factors (Luo et al. 2013; Tirunillai & Tellis 2012). We thus follow the extended Fama-French model:

$$R_{it} - R_{ft} = \beta_{0i} + \beta_{1i} (R_{mt} - R_{ft}) + \beta_{2i} SMB_t + \beta_{3i} HML_t + \beta_{4i} MOM_t + \varepsilon_{it}, \qquad (1)$$

where R_{it} is the returns for firm i on week t ; R_{ft} is risk-free rate; R_{mt} is average market returns; SMB_t is the small-minus-big capitalization factor; HML_t is the high-minus-low book-to-market equity factor; and MOM_t is the momentum factor in the given time period. Stock price data are obtained from Korea Investors Service, Inc., and data for Fama-French factors and momentum (R_{ft}, R_{mt}, SMB_t, HML_t, and MOM_t) are obtained from FnGuide, Inc. We ran Equation (1) for a rolling window of 250 trading days prior to the target day. The abnormal returns are then calculated as the difference between the actual returns and the expected returns. The mean value of weekly abnormal returns is 0.141%.

4.3   Consumer Attention

As mentioned earlier, we use Web traffic to capture consumer attention to a firm. As similar to Facebook pages, most of firms operate several Websites for different purposes, we manually tracked every official Websites for each sample firm. We then collected Web traffic data from Nielsen Korean Click and aggregated all Web traffics from multiple Websites for each week of our sample period. Specifically, we obtained the following weekly measures of Web traffic for our sample firms: unique visitors (the number of distinct individuals requesting pages from the Website), page views (the total number of page views), reach rate (the ratio of the number of visitors to a firm's website to the total Internet users in South Korea tracked by Nielsen Korean Click), and average visit duration which can be traffic metrics of time duration. Our use of these measures of Web traffic is in line with prior literature (Demers & Lev 2001; Luo et al. 2013; Trueman et al. 2000). Based on these metrics, we use page views per user, reach rate, and average visit duration to measure Web traffic for the empirical model. Among different Web traffic measures, reach rate which is more comparable across firms (e.g., Luo et al. 2013) has a best fit in our empirical estimations. We thus report our results with reach rate as consumer attention.

4.4   Control Variables

We include a number of control variables. To control for the effect of Network Size, we include the total number of Facebook fans of a focal firm in week t. We include average Post Length of firm in week t (unit: bytes) to control for the amount of information. We also control for the Influence Duration of a firm's post by including average time gap between the time when a firm posts a message and the time when the last comment to the message is posted in week t (unit: days). On average, a firm has about 4,800 Facebook fans and length of posting is about 200 bytes. Also, the mean value of influence duration of firm's postings is 0.73 days. Because Web traffic to a firm's website can be influenced by the intensity of Internet search related to the firm, we control for Internet Search. We obtained Internet search data from Google trend. Following Luo et al. (2013), we measure search intensity by the mean of "firm key words" search frequencies at google.com in week t. The mean search intensity is 40.32 a week. To control for the growth opportunities available to a firm, we include R&D Intensity, computed as the total R&D expenditures in a given quarter, divided by total sales. We also include various firm-level measures: Total Asset (to control for firm size), and Advertising Intensity (the ratio of advertising expenditures to total sales), Operating Margin (ratio of net income to total sales), Leverage (the ratio of long-term debt to total sales), and Liquidity (the ratio of current liability to current asset). At the industry level, we control for industry Concentration by including the Herfindahl-Hirschman Index (HHI) (Han & Mithas 2013). Finally, industry dummies were used to control for time-invariant industry-specific effects. Industries correspond to Korean standard industrial classification (KSIC-9) narrow level. Week dummies were included in our model to control for week-specific effects. Table 1 presents the descriptive statistics for the key variables and the correlations among them.

	Mean	Std.	1	2	3	4	5	6	7	8	9
1. Abnormal Return	0.14	0.52	1.00								
2. Intensity	37.48	50.13	0.03	1.00							
3. Richness	0.57	0.29	0.04	-0.01	1.00						
4. Responsiveness	0.15	0.16	0.05	0.01	0.02	1.00					
5. Consumer Engagement	0.36	3.02	0.03	0.06	0.03	0.07	1.00				
6. Consumer Attention	2.90	9.54	0.02	0.06	0.03	0.02	0.03	1.00			
7. Network Size	4767.4	15470	0.06	0.12	0.15	-0.04	-0.02	0.04	1.00		
8. Posting Length	196.7	111.4	-0.01	-0.05	-0.01	-0.03	-0.03	0.02	0.01	1.00	
9. Influence Duration	0.73	0.49	0.01	0.01	0.08	0.19	-0.01	0.03	0.02	0.02	1.00
10. Internet Search	40.32	22.80	-0.01	-0.01	-0.13	0.08	-0.02	0.12	-0.02	-0.03	0.01

Table 1.   Correlation Coefficient among Key Variables

4.5   Model Specification and Procedure

We estimate three equations to test our research questions. Equation (1) assesses the relationship between a firm's social media efforts and consumer engagement. Specifically, the equation includes three dimensions of a firm's social media efforts: intensity, richness, and responsiveness. We then include network size, post length, and influence duration to control for exogenous factors that can affect consumer engagement. Equation (2) assesses the relationship between a firm's social media efforts and consumer attention. Note that this equation includes consumer engagement to test its effect on consumer attention, in line with our research framework (see Figure 1). In addition to the control variables in Equation (1), we include Internet searches to control for web traffic from generic searches. Equation (3) assesses the interrelationships among consumer engagement, consumer attention, and firm performance. To predict firm value, this equation incorporates consumer engagement, consumer attention, and the control variables included in Equation (2). Further, we include a comprehensive set of firm-specific exogenous variables, as noted earlier. In sum, our system of equations is specified as follows: i denotes each firm in our sample, t denotes each week, and each equation includes time-period dummies and industry dummies.

$Consumer\ Engagement_{i,t}$

$$= \alpha_1\ Intensity_{i,t} + \alpha_2\ Richness_{i,t} + \alpha_3\ Responsiveness_{i,t}$$

$$+ \alpha_4\ ln(Network\ Size)_{i,t} + \alpha_5\ ln(Post\ Length)_{i,t} + \alpha_6\ Influence\ Duration_{i,t}$$

$$+ \Sigma\ \alpha_s\ Time\ Dummies_s + \Sigma\ \alpha_k\ Industry\ Dummies_k + \varepsilon_{i,t}\ ;$$
(1)

$Consumer\ Attention_{i,t}$

$$= \beta_1\ Intensity_{i,t} + \beta_2\ Richness_{i,t} + \beta_3\ Responsiveness_{i,t}$$

$$+ \beta_4\ Consumer\ Engagement_{i,t} + \beta_5\ ln(Network\ Size)_{i,t} + \beta_6\ ln(Post\ Length)_{i,t}$$

$$+ \beta_7\ Influence\ Duration_{i,t} + \beta_8\ Internet\ Search_{i,t}$$

$$+ \Sigma\ \beta_s\ Time\ Dummies_s + \Sigma\ \beta_k\ Industry\ Dummies_k + \delta_{i,t}\ ;$$
(2)

$Firm\ Performance_{i,t}$

$$= \gamma_1\ Intensity_{i,t} + \gamma_2\ Richness_{i,t} + \gamma_3\ Responsiveness_{i,t}$$

$$+ \gamma_4\ Consumer\ Engagement_{i,t} + \gamma_5\ Consumer\ Attention_{i,t} + \gamma_6\ ln(Network\ Size)_{i,t}$$

$$+ \gamma_7\ ln(Post\ Length)_{i,t} + \gamma_8\ Influence\ Duration_{i,t} + \gamma_9\ Internet\ Search_{i,t}$$

$$+ \Sigma\ \gamma_j\ Firm\ Controls_{j,t} + \Sigma\ \gamma_s\ Time\ Dummies_s + \Sigma\ \gamma_k\ Industry\ Dummies_k + \varphi_{i,t}.$$
(3)

To account for sources of possible simultaneity among certain measures (e.g., consumer engagement and attention), we employed three-stage least squares (3SLS) estimation regressions for our system of equations. The 3SLS procedure is used to derive the parameters of the full system because endogenous variables in some equations of the model are used as explanatory variables in other equations. It combines two-stage least squares (2SLS) and seemingly unrelated regression (SUR) methods to take into account the cross-equation correlation of errors among different dependent regressors. Without loss of generality, we normalize Intensity, Information Richness, Responsiveness, and Engagement to 1. In addition to the 3SLS regression, SUR estimations were also performed for robustness checks. The results were qualitatively similar and are not reported here due to space limitations.

5   RESULTS

We begin our analysis by estimating equation (1), (2), and (3) simultaneously. Table 2 presents 3SLS results on our models. The estimates reported in Model 1 provide an answer to RQ2a and suggest that the impact of Intensity, Richness, and Responsiveness on consumer engagement is positive and significant ($\alpha_1 = 0.510$, $p < 0.05$; $\alpha_2 = 0.318$, $p < 0.05$; $\alpha_3 = 0.537$, $p < 0.01$, respectively). These results show that when firms invest more efforts in their social media with respect to both quantity and quality, customers will be more likely to engage in social media sites through postings, comments, or "Likes." Estimates in Model 2, examining RQ3a, suggest that the impact of Intensity and Richness on consumer attention is also significant and positive ($\beta_1 = 1.029$, $p < 0.05$; $\beta_2 = 2.184$, $p < 0.01$, respectively), but the impact of Responsiveness on consumer attention is not statistically significant due to a relatively high standard error ($\beta_3 = 0.170$, $p > 0.1$). These results suggest that as a firm increases the amount and richness of information it provides on its social media site, customers are more likely to pay attention to the firm and access its website.

Dependent variable	(1) Consumer Engagement (Facebook)	(2) Consumer Attention (Web Traffic)	(3) Firm Performance (Abnormal Return)
Firm's Efforts			
Intensity	0.5102** (0.2624)	1.0287** (0.4507)	0.1824 (0.1233)
Richness	0.3176** (0.2055)	2.1836*** (0.2971)	0.3054** (0.1506)
Responsiveness	0.5371*** (0.3567)	0.1697 (0.5761)	0.7131** (0.3503)
Consumer Behavior			
Engagement		1.8472*** (0.3020)	0.2648*** (0.0752)
Attention (Web Traffic)			0.2005** (0.0894)
Control variables			
ln(Network size)	0.2372** (0.0596)	1.0436*** (0.2995)	0.2042*** (0.0762)
ln(Post length)	-0.0029 (0.0045)	0.0269 (0.0214)	0.0157 (0.0107)
Influence duration	0.0143*** (0.0044)	-0.0232 (0.0290)	-0.0073 (0.0144)
Internet search		0.0249*** (0.0040)	0.0075*** (0.0003)
Total asset			-0.3187** (0.1481)
R&D intensity			0.0041 (0.0042)
Advertising intensity			-0.1134 (0.5749)
Operating margin			0.0029 (0.0007)
Leverage			0.7312*** (0.2407)
Liquidity			-0.0137** (0.0057)
HHI			1.7920*** (0.5120)
Dummies	Week/Industry	Week/Industry	Week/Industry
Number of firms	63	63	63
Observations	4,208	4,208	4,208
Model fit	$\chi^2 = 461.62$***	$\chi^2 = 82.88$***	$\chi^2 = 101.64$***
	Adj. $R^2 = 0.545$	Adj. $R^2 = 0.103$	Adj. $R^2 = 0.465$

Table 2   3SLS Estimates Results

Interestingly, the coefficient of a firm's social media efforts reported in Model 3 shows that Richness and Responsiveness are important aspects of a firm's social media efforts, which positively contribute to firm performance ($\gamma_2 = 0.305$, $p < 0.05$; $\gamma_3 = 0.713$, $p < 0.05$, respectively), whereas the Intensity of a firm's social media efforts is not helpful in increasing the firm's market performance ($\gamma_1 = 0.182$, $p > 0.1$). Addressing RQ1a, RQ1b, and RQ1c, these findings suggest that firms' social media strategy of focusing on information richness and responsiveness pays off more than the strategy of focusing on volume, thereby highlighting the relative inferiority of intensity strategy. This also highlights the importance of considering information richness and responsiveness as effective strategies for managing a firm's social media.

In Models 2 and 3, we examine the relationship among consumer engagement, attention, and firm performance. Our analysis reveals that the impact of consumer engagement on consumer attention is significantly positive ($\beta_4 = 1.847$, $p < 0.01$). Answering RQ4 in the affirmative, these results suggest that consumer engagement on a firm's social media site increases the probability of consumers visiting the firm's website. Our results also show that both consumer engagement and attention are important factors that contribute to firm performance ($\gamma_4 = 0.265$, $p < 0.01$; $\gamma_5 = 0.201$, $p < 0.05$, respectively). Thus, we provide empirical answers to RQ2b and RQ3b. In sum, our analysis results suggest that a firm's social media efforts positively affect firm performance, both directly and indirectly through consumer engagement and attention. Interestingly, we find that only the richness and responsiveness dimensions (i.e., qualitative aspects) have a positive effect on firm performance. Further, fans' active engagement on a firm's social media site can increase consumers' attention to the firm through social contagion, thus resulting in more visits to the firm's website.

5.1 Robustness Checks

To check the robustness of our results, we first re-estimate our system of equations separately using Arellano-Bover/Blundell-Bond system GMM models. Our independent variables, except for the week and industry dummies, are instrumented with lagged values of the variables, in both levels and in their own first differences. We use the two-step system GMM estimator, which is asymptotically efficient and robust to any panel-specific autocorrelation and heteroskedasticity. The overall results based on GMM estimations are qualitatively similar to our 3SLS estimation results. Second, it is likely that a firm's social media efforts are not random in our setting. For example, when firms choose high levels of their social media efforts, expecting a positive impact of their efforts on firm performance, social media efforts can be endogenous, and the estimates may be biased (Heckman 1976). To control for this potential selection bias, we estimated the relationship between a firm's social media efforts and firm performance using the Heckman two-step selection model. As a result, we conclude that selection bias is not a serious concern in our estimations. Third, we used Tobin's q as an alternative measure of firm performance. Our aim here is to further corroborate the findings from our main estimation approach. Tobin's q analysis is the most widely used approach to estimate the value of intangible assets and customer satisfaction (Anderson et al. 2004; Hall et al. 2005). Because Tobin's q offers the advantage of capturing both short-term performance and long-term prospects based on the market value, it has been widely used in prior literature (e.g., Bardhan et al. 2013). We calculated Tobin's q for our sample firms on a quarterly basis during our sample period; January 2010 - December 2012. We choose a quarterly interval because it is the smallest interval available. We calculate the quarterly averages of all our independent variables except for firm-specific financial control variables. We have therefore 8 quarters and 428 observations in total. The results corroborate our main results based on weekly abnormal returns, and indicate that firms' social media efforts and subsequent consumer engagement and attention have a significant influence on both the short-term and long-term performance of firms. It is worthwhile to note that although the impact of the intensity dimension of social media efforts on abnormal returns is not significant, the impact of Tobin's q is significant; this suggests that although the intensity (quantity) strategy regarding social media is not effective in the short run, it can pay off in the long run.

6   DISCUSSION AND CONCLUSION

Our study makes several important contributions to the literature. First, we conceptualize and quantify the multiple dimensions of a firm's social media efforts and the important role they play in predicting firm value - *Intensity*, *Richness*, and *Responsiveness*. Although considerable research has been conducted on social media, prior research has not considered these multiple dimensions. Therefore, although social media have become indispensable for firms, the financial returns from a firm's own efforts in social media have been unclear. By conceptualizing Intensity, Richness, and Responsiveness as key strategies in a firm's social media management (quantity vs. quality strategy), and by quantifying these constructs from firms' Facebook data, this study validates the conjecture that a firm's social media efforts contribute to its market performance. Our findings provide a rationale for firms to invest heavily in their social media, while countering those who question the value of social media (Mueller 2011). Second, we develop a comprehensive model that considers consumer engagement and attention as intermediate mechanisms through which a firm's social media efforts influence firm performance. With our research model, our study is the first to uncover the intricate relationships among a firm's social media efforts, consumer engagement and attention, and firm performance. Finally, prior studies have investigated the relationship between web traffic/Internet searches and firm performance (Da et al. 2011; Demers & Lev 2001; Dewan et al. 2002; Trueman et al. 2000), the relationship between web blogs/consumer ratings and firm performance (Luo & Zhang 2013; Luo et al. 2013; Yu et al. 2013), and the relationship between Facebook postings and sales/visit frequency (Goh et al. 2013; Rishika et al. 2013). We extend this stream of research by providing evidence that a firm's own efforts on social media in terms of richness and responsiveness, which can represent the quality dimensions of social media strategy, can be an important driver of both short- and long-term firm performance; however, the intensity of a firm's social media efforts, which corresponds to the quantity dimension of social media strategy, can be a driver of long-term performance only. Together, our study provides a rich understanding of the performance impacts of firms' own social media efforts.

The findings of this study provide practical implications for managing social media and achieving higher firm performance. First, our findings can help managers gauge the impact of their firms' social media efforts in terms of their contribution to firm performance. Second, our study findings can help managers formulate their social media strategies that will affect the returns to their investments in social media. In general, our results suggest that among the various dimensions of a firm's social media efforts, richness and responsiveness (related to quality-oriented social media strategies) are directly germane to firm value (especially in the short run). Thus, social media managers need to focus on delivering useful, richer information and actively responding to consumer comments; merely proving a large amount of uninformative messages is not an effective strategy.

Our study has several limitations and offers directions for future research. First, although we studied the impact of a firm's social media efforts, we did not examine how the valence of messages affects consumer engagement and attention, and firm performance. This was because most of the message postings in our data are either positive or neutral, which limits us from studying the impact of message valence. However, the results would have generally been weaker if there had been a significant proportion of firms that had inevitably faced negative publicity, such as in the cases of product recalls and industrial disasters. In addition, we did not study the differential effects of different types of information that firms post on their social media sites (e.g., promotion related vs. CSR related). It would be interesting to examine whether and how various contents of postings and comments by firms and customers influence consumer behavior and firm performance differently. Second, we focused on large firms that are listed in public stock markets and that have already adopted social media. Our results may not generalize to small firms, which have not invested in social media as actively. Finally, similar to other empirical studies using secondary data, we cannot claim causality, although we have done our best to address reverse causality and endogeneity. Further studies are needed to demonstrate causality between firms' social media efforts on consumer behavior and firm performance.

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