

**Asymmetric Roles of Advertising and Marketing Capability in Financial Returns to News:  
Turning Bad to Good and Good to Great**

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### *Abstract*

News reports that carry positive or negative sentiment about a firm influence the firm's stock price performance. This study examines the role of firm controllable marketing factors, namely, advertising spending and marketing capability, in moderating the relationship between news stories and firm stock returns. Drawing on a large panel data sample of over 7000 firm-month observations, the results indicate that the moderating roles of the two marketing factors are asymmetric and complementary: while advertising reinforces the positive impact of positive news on abnormal stock returns, marketing capability mitigates the negative impact of negative news. We explore the mechanisms via which these moderating effects occur and find that they operate through different stakeholders. Whereas the moderating effect of marketing capability is attributable to its influence on customers thus impacting the level and volatility of future cash flows, advertising moderates the effect of news through investors' attention and response to the news. The econometric analysis accounts for the potential endogeneity between news reports, stock returns, and marketing variables. The results are also robust to alternative measures and analysis approaches.

*Keywords:* advertising, marketing capability, abnormal stock returns, cash flows, investor attention

Both the business press and the academic literature have for long recognized that news reports can influence firms' stock market performance (e.g., Chan 2003; Financial Times 2007). Tetlock (2007) studied the immediate impact of the *Wall Street Journal's* "Abreast of the Market" column and found that "news media content can predict movements in broad indicators of stock market activity". Similarly, Engelberg and Parsons (2011) showed that news reports strongly impact trading activities after controlling for earnings, investor attributes, and the nature of events being reported. This literature finds that individual investors face significant difficulty in acquiring and processing information about companies' future prospects. Media coverage not only provides access to such information, but also enhances credibility and perceived importance with investors. As anecdotal evidence, Apple's share prices fell quickly following two news stories from *Wall Street Journal* and Japan's *Nikkei* (January 14<sup>th</sup>, 2013) reporting the weaker-than-expected demand of iPhone 5 based on Apple's cut in its component orders. In contrast, according to *MarketWatch* (July 16<sup>th</sup>, 2009), "Shares of Nissan Motor Co. climbed Friday on a newspaper report that the automobile major is aiming to develop its own technology for hybrid vehicles". Unlike earnings related news stories which report on scheduled events, such non-earnings news reports are less anticipated and typically contain more soft information. Hence, some companies hire investor relations firms to selectively position the soft information favorably to investors, leading to higher stock prices (Solomon 2012).

A growing body of artificial intelligence research has recently illustrated the use of computerized sentiment analysis based on text mining of news articles to develop stock trading strategies (Mittermayer and Knolmayer 2006a; Zhang and Skiena 2010). Leveraging these techniques, institutional investors and hedge fund firms are using advanced computerized systems (e.g., Reuters' Lexalytics) to process almost-instantaneous information received

electronically to automatically adjust their trading strategies accordingly. One important type of information input into the system is news reports, which are analyzed in real time by sentiment analysis algorithms (Financial Times 2007).

While news articles about a firm can cover a variety of issues, both practitioners of algorithmic trading and academic researchers have widely employed a “three-category model” in analyzing and predicting news reports’ impact on stock returns (e.g., Zhang and Skiena 2010, Mittermayer and Knolmayer 2006a&b, Fung, Yu, and Lam 2002, and Wuthrich et al. 1998). Based on a lexicon of a large number of empirically verified sentiment-laden words, the news reports are classified into *positive, negative, and neutral* categories. The positive category consists of news articles that are likely to lead to a positive change in the firm’s stock price (i.e., stock price increase), while the negative and neutral categories are defined accordingly. The level of positiveness or negativeness in news reports for a firm during a particular period is reflected by polarity measures (i.e., the number of positive or negative news references relative to the total number of news references including neutral references). Since news articles report firm-related facts and opinions in a most speedy manner, the news sentiments can serve as an *index* providing timely measures of not only their occurrences but also the significance<sup>1</sup>. The positive or negative sentiments in the interpretations, speculations, unique insights, and even rumors in news stories about a firm can drive its stock returns. Table 1 provides examples of news articles with positive / negative sentiment. Figure 1 shows the news sentiments and stock market performance for a sample of firms over time.

[Table 1 and Figure 1 About Here]

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<sup>1</sup> Note that, the focus of this paper is *not* to explain the antecedents of news sentiments. Instead, we use the news sentiment index as indicative of “what has happened” to the firm, and focus on the role of firms’ marketing efforts in moderating its financial impact. Importantly, after accounting for the endogeneity of news sentiments and including the underlying facts such as product recall, new product introduction, and unexpected earnings as control variables, news sentiments still have statistically significant effects on stock prices.

Since news reports about a company can significantly impact stock prices, a firm has great interest in seeing if it can (or not) manage this impact of news reports to its own benefit. However, little research exists on the role marketing can play in influencing the effect of news stories on firm stock market performance. As an initial effort in marketing research to investigate this topic, we focus on the roles of two manager-controllable marketing variables, namely, advertising and marketing capability, for two reasons. First, marketing managers face significant pressure and challenge in justifying to senior managers and shareholders the financial contributions of advertising spending and investments in marketing capability (e.g., Joshi and Hanssens 2010; Bahadir, Bharadwaj and Srivastava 2009). Second, although existing theories imply that both advertising and marketing capability could interact with news to influence consumer attitude and firm performance<sup>2</sup>, these effects on the stock market and how the effects occur are largely unknown. Against this backdrop, we address the research question: “Do advertising and marketing capability enable firms to mitigate or amplify the effects of (positive and negative) news stories on their stock market performance?” In addition to examining *whether* such moderating effects exist, we empirically explore *why* and *how* the effects occur.

We employ both the Arellano-Bond general method of moments (GMM) and the vector autoregression (VAR) models to account for endogeneity, and use a portfolio approach as robustness check. We find that the two marketing variables play asymmetric and complementary roles: advertising amplifies the positive impact of positive news on firm abnormal stock returns, whereas marketing capability mitigates the negative impact of negative news. Interestingly, the mechanism via which advertising moderates the impact of news reports on stock returns is

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<sup>2</sup> For example, experimental research provides competing arguments about advertising’s impact in refuting negative news (e.g., Tybout, Calder and Sternthal 1981; Klein and Ahluwalia 2005). Moorman and Slotegraaf (1999) argue that marketing capabilities are valuable because they can serve as flexible strategic options for firms to cope with marketplace changes. We discuss these theories in detail in the following section.

different from that of marketing capability. Specifically, we find that the moderating role of marketing capability is due to its influence on consumers and thus the firms' future cash flow performance following a news release. In contrast, the interaction between advertising and news does *not* influence future cash flows<sup>3</sup>. Instead, advertising affects the stock market's reaction to news reports by attracting individual investors' attention and response (i.e., trading).

This study makes the following contributions. First, it departs from and extends the literature on advertising's financial impact in two ways. (1) Extant finance research finds mixed results regarding the financial value of advertising (see Cheng and Chen 1997 for a review). Recently, marketing researchers (e.g., McAlister, Srinivasan, and Kim 2007; Joshi and Hanssens 2010; Kim and McAlister 2011; Osinga et al. 2011) have examined the *main effect* of advertising spending on firm stock returns and risks. However, little research exists on the moderating role of advertising. One exception, Srinivasan et al. (2009) study six automobile firms and find that product innovation's effect on stock returns is enhanced by advertising. Our study adds to this nascent literature by examining how advertising spending moderates the impact of firm-related positive and negative news on stock returns across a broad spectrum of industries. We find that advertising significantly enhances the effect of positive news on stock returns, but does not moderate the effect of negative news. (2) Because most prior studies focus on the direct link between advertising and stock returns, they fail to examine the process through which the effects take place. While Joshi and Hanssens (2010) *conjecture* that advertising can directly influence stock returns (beyond its impact on sales and profits) by impacting investor attention and trading behavior, they neither measure investor attention nor empirically test how advertising impacts the investors. In contrast, in this study, we explicitly measure investor attention using Google

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<sup>3</sup> Although the *interaction* between advertising and news does not significantly impact future cash flows, we find advertising does have significant *main effect* on cash flows, which is consistent with the literature (e.g., Joshi and Hanssens 2010).

search frequency of firm ticker symbols, and thus provide empirical evidence to identify whether the moderating impact of advertising is due to its effect on a firm's future cash flows (generated from consumers) *or* due to its effect on investor attention. Thus, this study makes a case to consider the effect on not only consumers but also investors when making advertising decisions.

Second, we contribute to the marketing capability literature. Extant research finds that firms with strong marketing capabilities enjoy superior brand strength and profitability (Dutta et al. 1999; Bharadwaj et al. 1993). This study adds to the literature by demonstrating the financial value of marketing capability from a novel perspective, i.e., marketing capability as a moderator of the relationship between news and stock returns. We find that, when negative news reports get published, firms with different levels of marketing capability have varied financial performance. Strong marketing capabilities enable firms to mitigate the harm of negative news. We also provide empirical evidence that the interaction between marketing capability and news influences the level and volatility of future cash flows, thus explaining the process for the stock return effect.

In the rest of the article, we first develop theoretical arguments drawing on the marketing, finance, and accounting literatures, and then present the empirical analysis. We conclude with implications for managers, investors, and researchers.

### ***THEORY***

The financial market pays attention to a multitude of information sources such as news articles, firm disclosures, and government announcements to learn about a firm. Among these sources, news articles play an important part in influencing investors' assessment of firm future cash flow performance prospects and stock value (e.g., Chan 2003; Zhang and Skiena 2010). Positive news stories about a firm may enhance brand image and investors' expectations about its future product-market performance, thus increasing firm abnormal stock returns (Gurun and

Butler 2012). Negative news is viewed by investors as an indicator of potential losses that can reduce the size and stability of firm future cash flows, thus decreasing firm value (Tetlock 2007).

We argue that advertising and marketing capability may moderate the impact of news reports on firm stock returns for two reasons. First, they could moderate the influence of news on the level and volatility of a firm's future cash flows. We label this the *cash-flow effect*. Second, the finance literature has long recognized that stock-price movements are *not* always consistent with firms' "fundamental value", i.e., the net present value (NPV) of future cash flows (e.g., Cutler et al. 1989; Roll 1988), because investors' judgment of firms' financial situations can be influenced or even biased by signals that are not necessarily substantive (Grullon, Kanatas, and Weston 2004). For instance, in addition to "fundamentals", even "fashions" and "fads" influence investment decisions (Lee 2001). The literature also finds that individual investors buy stocks that grab their attention (e.g., Barber and Odean 2008; Dorn 2009). In fact, Shiller (2000) argues that the ease with which regular web users could recall firm names due to the internet revolution encouraged the market boom of the late 1990s. More recently, Frieder and Subrahmanyam (2005) find that a brand's visibility is related to its stock ownership. Compared with institutional investors, individual investors are not as well connected, do not have access to a wide variety of information on investment opportunities, and thus tend to be influenced by firm communication and messaging (Field and Lowry 2009). Hence, we expect that, beyond the possible effects on cash-flows, marketing efforts can enhance investor attention and response, thus increasing the salience of firm-related news to individual investors. We label this the *investor attention effect*. Figure 2 summarizes the conceptual framework. We present the theoretical arguments below.

[Figure 2 About Here]

### ***The Moderating Impact of Advertising Spending***

***On Positive News*** Positive news can make a firm more attractive to its potential customers. Advertising not only increases consumers' awareness of the news about the firm, but also highlights and helps position the news in a more attractive fashion, thus augmenting the impact of positive news (Srinivasan et al 2009; Aaker 1991). Acquisition of new customers can increase the level of future cash flows. However, the increased cash flows may not be stable because new customers are more likely to switch compared to existing loyal customers. Advertising at the time of positive news helps boost the new consumers' post-purchase confidence and satisfaction with the product, reducing their perceived post-purchase risk and cognitive dissonance (e.g., Grewal, Chandrashekar and Citrin 2010). Satisfied consumers are likely to use the product more often and develop greater experience with the product. This further reduces their perceived risk and increases the likelihood of repeated purchase while lowering the chance of brand switching (Rust, Zahorik, and Keiningham 1995). Therefore, advertising can further enhance and stabilize the future cash flows generated from new customers attracted by positive news. The greater the level of future cash flows and the lower the volatility of future cash flows, the greater the net present value of future cash flows – and thus the higher the firm abnormal stock returns (e.g., Rappaport 1986; Srivastava, Shervani and Fahey 1998; Lundholm and Myers 2002; Huang 2009). To sum up, advertising can potentially reinforce the positive impact of positive news via the *cash-flow effect*.

Advertising can also amplify the impact of positive news on stock prices through the *investor attention effect*. The existence of an active business press suggests that investors face costs or challenges in acquiring or processing information about firms. Moreover, non-earnings news stories (unlike those about firm earnings which are scheduled) are not anticipated by investors. It is thus important to attract investors' attention to such positive news so as to magnify its impact on stock prices, since research in finance finds that individual investors

purchase the stocks that draw their attention (Barber and Odean 2008; Huberman 2001; Dorn 2009) and that they are heavily influenced by firm messaging (Field and Lowry 2009). Hence, even the investors who were originally uninformed of the firm's positive news can become drawn to *buy* the firm's stocks because of the increased awareness and attention caused by advertising. Advertising may also help interpret and position the less tangible aspects of non-earnings news more favorably, signifying better prospects for the firm (Solomon 2012). It can thus leverage the positive news stories to highlight and differentiate the firm from other investment options, enhancing investors' likelihood of longing its stocks.

In addition, the finance literature finds that investor attention increases the heterogeneity in investor's beliefs about a stock's value (Gervais, Kaniel and Mingelgrin 2001). When investors have heterogeneous beliefs, pessimistic investors are constrained to selling the stocks they own, since most individual investors' portfolio holdings of individual stocks are very limited (e.g., Barber and Odean 2008 report that, in their sample of a representative large online broker, the median investor owns only 2.61 individual firms stocks). Hence, stock prices will reflect the beliefs of optimistic investors (Miller 1977; Morris 1996; Mayshar 1983; Chemmanur and Yan 2009a). Because of the constrained supply and the increased demand from optimistic investors, a shortage occurs and the price of the stock increases. In sum, advertising highlights the positive news signifying better future prospects for the firm and increases investor attention, which is then associated with increased stock prices due to the reasons listed above.

Taking the *cash-flow effect* and the *investor attention effect* together, we expect that advertising strengthens the positive effect of positive news on abnormal stock return.

***On Negative News*** Negative news can increase consumer uncertainty about a brand (Zhao, Zhao, and Helsen 2011; Creyer and Ross 1997) or even damage brand image or firm reputation,

thus reducing the likelihood of purchase (decreasing the level of future cash flows) and increasing the chance of switching (increasing the volatility of future cash flows).

Advertising can strengthen brand attitude and commitment, which engender customer and distributor loyalty (Mehta, Chen and Narasimhan 2008; Mitra and Lynch 1995) and thus help weather negative news. The motivational view (e.g., Russo, Meloy, and Medvec 1998) suggests that, for those who are familiar with an object (e.g., consumers familiar with the brand), “even a weak liking or preference” may invoke “consistency motivation” (a motivation to consider preference-consistent information only). Hence, consumers with favorable brand attitudes and preferences based on advertising may *not* consider the preference-*inconsistent* negative news as relevant, because they tend to selectively avoid inconsistent information, generate counter arguments, and distort information (see Klein and Ahluwalia 2005 for a summary). Advertising can also signal brand credibility which mitigates consumer’s perceived risk (Erdem, Swait and Valenzuela 2006) in the presence of negative news. Taken together, advertising’s impact may serve as a buffer against negative news, reducing the likelihood of change in consumer purchase behavior and pattern (thus enhancing and smoothing future revenue streams or cash flows).

In contrast, the information processing theory suggests that advertising may be ineffective in changing consumer belief about the negative news. Tybout, Calder and Sternthal (1981) show that, when there are rumors associating a firm’s product to certain undesirable attributes (e.g., a rumor reported in the *Chicago Tribune* about McDonald’s using red worm meat in hamburgers), advertising or refutation can increase rehearsal of the rumor in the consumers’ mind, strengthening the stored association between the product and the undesirable attributes. Consistently, Schwarz et al. (1991) suggest that advertising may make negative news more easily retrievable and thus more salient. Hence, when a firm faces negative news, advertising may not

be able to increase consumer purchase (and thus future level of cash flows) and might even worsen the situation. In sum, the competing theoretical arguments suggest that advertising's *cash-flow effect* may or may not mitigate the detrimental effect of negative news on stock returns.

On the other hand, advertising may increase investors' attention to the firm at the time of the negative news. If so, its *investor attention effect* can augment the negative impact of negative news on stock returns. However, the finance literature points that selling by individual investors is constrained given that their portfolio holdings of individual stocks are limited (Barber and Odean 2008; Chemmanur and Yan 2009a). The lack of supply<sup>4</sup> neutralizes the decreased demand, and thus the *investor attention effect* of advertising in the presence of negative news may not significantly influence stock price.

Taken together, if advertising's *cash-flow effect* is strong and its *investor attention effect* is weak, it can potentially mitigate the negative impact of negative news. However, if its *cash-flow effect* is weak and the *investor attention effect* is strong, it may enlarge the negative impact of negative news. Since both possibilities exist, the moderating effect of advertising on negative news appears to be an empirical question.

### ***The Moderating Impact of Marketing Capability***

The resource-based view considers a firm as a combination of resources and capabilities, and defines "capability" as a firm's ability to deploy its resources to achieve a desired end (Amit and Schoemaker 1993). Relatedly, marketing capability is not the mere possession of marketing resources; it requires efficient integration and conversion of resources into desired marketing outcome. It not only depends on a firm's prior investments, but also on a consistent on-going investment in sustenance and maintenance which makes it path dependent (Bharadwaj, Varadarajan

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<sup>4</sup> Institutional investors, in contrast, are less constrained in stock holdings, more sophisticated and have access to better information sources (Nagel 2005; Cohen et al. 2002). They do not have to depend on advertising to highlight the news and can sell as soon as the news releases, leading to the main effect of news on stock prices.

and Fahy 1993). Following Dutta, Narasimhan, and Rajiv (1999), we define marketing capability as a firm's efficiency in realizing marketing resources into sales revenue.

Recent studies suggest that investors do consider firms' marketing capabilities when appraising firm value (e.g., Bahadir, Bharadwaj and Srivastava. 2009). Stock market investors can develop an understanding about a firm's level of marketing capability based on the firm's historical marketing outcomes relative to its marketing inputs. For instance, for two firms with similar amount of marketing and promotional efforts and comparable product technologies, the firm that is able to generate more sales revenue is likely to have higher marketing capability than the other firm. In addition, firms appear to actively inform the investors about their marketing capabilities during investor events including roadshows, analyst and shareholder meetings (e.g., Unilever Investor Relations Seminar March 2007: Building Marketing Capability by CMO Simon Clift; Coca-Cola Consumer Analyst Group of Europe Conference 2013). Social media also serves as a new channel for investors to directly observe a firm's efficiency in responding to market changes (e.g., how much and how fast it can learn from the customers).

We contend that a firm with high efficiency in utilizing its marketing resources can efficiently exploit the opportunity in the case of positive news and resolve the problem in the case of negative news, thus increasing and smoothening future cash flows for the following reasons. First, marketing capability depends on a firm's ability to understand consumer needs and their influencers, which "requires skill at monitoring the environment and building strong relationships with customers" (Dutta, Narasimhan, and Rajiv 1999). A firm with strong marketing capability can thus better predict customer reactions and changes in customer behavior following the release of positive or negative news (or even before the news is released if the firm closely monitors the environment and detects traces of changes or weak signals in the market).

Superior market knowledge helps firms understand the dynamics of supply and demand better than their competitors, enabling them to correctly gauge the likelihood and magnitude of the impact of news stories and take actions accordingly. For example, firms such as Procter & Gamble have built war rooms to monitor brand-related news and consumers' reactions in real time and quickly react to the market information.

Second, a firm that understands customer needs can provide products and services that are of better fit than its competitors, thus nurturing strong customer relationships (Hoch and Deighton 1989). This lowers the likelihood of customer switching when negative news occurs and stabilizes revenues, thus decreasing the volatility of future cash flows (e.g., Tuli et al. 2010).

Third, a firm with strong marketing capability can maximize the benefit of its technology strengths (e.g., patents) and respond to market changes (following positive / negative news) with new product offerings quickly (Narasimhan et al. 2006). Coupled with broad retailer acceptance and accelerated product diffusion (Xiong and Bharadwaj 2011), it enables quicker and higher cash flows. Such firms can also proactively adjust their production cycles in a timely manner in the presence of news (negative or positive), lowering the mismatch between firm inventory and customer orders (Bharadwaj, Bharadwaj, and Bendoly 2007) and thus reducing the volatility in inventory costs (decreasing the volatility of cash outflows). A case in point, when the Coca-Cola company noticed a number of consumer complaints on the internet about its white can promotion causing confusion in 2011, it immediately reacted and activated its distribution channel to withdraw the white cans and launch the traditional red cans in an extremely short time period.

Fourth, firms rich in marketing capability can better handle customer complaints following negative news, and thus reduce the costs of service recovery (decreasing the level of cash outflows). For instance, strong customer intelligence enables a firm to efficiently identify

the key customer groups or segments to communicate with. A case in point, McDonald's Corporation recently faced negative news based on a rumor about the firm charging African-American customers a higher price in their outlets. Because of its strong marketing capability, the firm was able to not only monitor the news as it started circulating online (even over a weekend), but also respond with great agility. It reached out to key influencers in the community on Twitter and requested them to dispel the story as a hoax. The stock market reacted positively and the firm stock price rose six percent on the following Monday.

Thus, firms with strong marketing capabilities can sense the market reactions and respond to news efficiently, thus enhancing the level of future cash flows and lowering their volatility. In sum, the *cash-flow effect* of marketing capability helps amplify the positive effect of positive news and mitigate the negative effect of negative news.

### ***DATA AND MEASURES***

We assembled a list of firms from multiple industries that represented a broad spectrum of the economy including consumer products (SIC20, SIC28), petroleum refining (SIC29), industrial equipment (SIC35), electronics (SIC36), motor vehicles (SIC37), retailers (SIC56 and 59), restaurants and recreation services (SIC58 and 70), financial and insurance services (SIC 60, 62, and 63), business and computing services (SIC73), and conglomerates (SIC99). In line with the literature (e.g., Srinivasan et al 2009; Joshi and Hanssens 2009; Tuli and Bharadwaj 2009), we focus on large firms in their industries, since the results based on large firms' stocks are less likely to be biased by the bid-ask bounce<sup>5</sup> (e.g., Da, Engelberg, and Gao 2011).

We obtained the monthly news data (frequency of positive, negative, and neutral news references over time) for the firms from *Lydia TextMap* (Lloyd, Kechagias, and Skiena 2005), a

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<sup>5</sup> The bid-ask bounce refers to the bouncing of trade prices between the bid and ask sides of the market. It impacts the stock price movements due to impatient traders demanding and dealers requiring a premium for bearing the inventory risk of illiquid stocks.

high-speed text processing system. *Lydia* analyzes over 500 international, nation-wide, and local newspapers and processes favorable (positive) and unfavorable (negative) words co-referenced with occurrences of each company based on the lexicon of thousands of sentiment-laden words. The lexicon was constructed following a graph-theoretic approach (Godbole, Srinivasaiah, and Skiena 2007), which expands synonyms/antonyms from small groups of seed words that are associated with domains including Business, Politics, Crime, Health, Media, etc. Aggregating the lexicons from all different domains, the General Domain has been shown to be the most relevant to financial market performance (e.g., Zhang and Skiena 2010). Detailed information on the *Lydia* analysis methods and their validation are provided by Bautin, Vijayarenu, and Skiena (2008) and Godbole, Srinivasaiah, and Skiena (2007) and summarized in the Web Appendix A.

We collected monthly advertising expenditure data from TNS Ad\$ponder, stock market data from CRSP and the Kenneth French website, monthly analysts' forecast data from the Thomson Reuters I/B/E/S database, and quarterly firm accounting information (sales revenue, income, R&D expenditures, assets, and liabilities) from COMPUSTAT. Following Sorescu et al. (2007), we searched all publications about each sample firm containing the keywords “announce”, “launch”, “introduce”, and “beta” in FACTIVEA to compile a list of new products, identified the date on which each product is reported for the first time, and then recorded the monthly number of new product introductions. The monthly number of product recalls for each firm was collected by searching the Consumer Product Safety Commission (CPSC) website and the product recall category of FACTIVEA (Chen et al. 2009; Cleeren et al. 2013). The final sample consists of monthly panel data for 141 firms from November 2004 through February 2010. After eliminating firm-months with incomplete information, the final sample is an unbalanced panel including 7,880 firm-month observations.

*Abnormal stock return.* We follow Srinivasan and Hanssens (2009) and calculate the abnormal stock return for firm  $i$  in month  $t$  based on the extended Carhart four-factor financial model

(Carhart 1997) as specified in Equation (1),

$$(R_{it} - R_{rf,t}) = \alpha_i + \beta_{mi} (R_{mt} - R_{rf,t}) + s_i \text{SMB}_t + h_i \text{HML}_t + u_i \text{UMD}_t + e_{i,t} \quad (1)$$

where  $R_{it}$  is the stock return of firm  $i$  at time  $t$ ,

$R_{rf,t}$  is the risk-free rate of return at  $t$ ,

$R_{mt}$  is the market factor (market return at  $t$ ),

$\text{SMB}_t$  is the size factor (difference between the return on a value-weighted small-market capitalization stock portfolio and the return on a big-market capitalization portfolio),

$\text{HML}_t$  is the value factor (the difference between the return on a value-weighted high-book-to-market stock portfolio and the return on low-book-to-market portfolio), and

$\text{UMD}_t$  is the momentum factor (the difference between the average return of two high prior-return portfolios and the average return of two low prior-return portfolios).

The abnormal stock return in month  $t+1$ ,  $\text{Abn}R_{it+1}$  is calculated as  $(R_{it+1} - R_{rf,t+1}) - \hat{\beta}_{mi} (R_{mt+1} - R_{rf,t+1}) - \hat{s}_i \text{SMB}_{t+1} - \hat{h}_i \text{HML}_{t+1} - \hat{u}_i \text{UMD}_{t+1}$ , where the parameters  $\hat{\beta}_{mi}$ ,  $\hat{s}_i$ ,  $\hat{h}_i$ , and  $\hat{u}_i$  are firm risk covariates estimated from regression of Equation (1) in a rolling estimation window of 36 months ending two months prior to the event month (altering the length of estimation window as 24 or 48 months yields consistent results). We examine stock returns across many years, and the rolling window estimation allows firm risk factors and covariates to change over time (e.g., Jacobson and Mizik 2009). As a robustness check, instead of using  $\text{Abn}R$  as the dependent variable, we estimate a stock response model and find consistent results (see Web Appendix).

*Percent of positive (negative) news references.* The variable is measured by the number of positive (negative) news references to a given entity (i.e., firm) divided by the total number of references in the corpus including neutral references. Using the percent measures while controlling for total news frequency is consistent with the practice in the finance and artificial intelligence literatures (see Zhang and Skiena 2010).

*Advertising spending.* Following the literature (e.g., McAlister et al. 2007; Chemmanur and Yan 2009b), advertising spending is measured as the firm's advertising dollars deflated by its sales

(converted to percentage). As will be shown in the Robustness Check section, using firm assets or previous quarter's sales to deflate advertising dollars yields consistent results.

*Marketing capability.* Because investors' understanding of a firm's marketing capability is based on publicly available information of the firm, we derive the marketing capability measure based on information from corporate disclosures with an input-output stochastic frontier model (e.g., Dutta, Narasimhan, and Rajiv 1999; Xiong and Bharadwaj 2011). Specifically,

$$Revenue_{it} = f(X_{it}; Resources_{it}, \alpha) \times \exp(\varepsilon_{it}) \times \exp(-\eta_{it}) \quad (2)$$

where  $\varepsilon_{it}$  captures random shocks beyond the firm's control (e.g., luck) and  $\eta_{it}$  captures the firm's inefficiency of converting resources into revenue. Following Dutta, Narasimhan, and Rajiv (1999), the resources include the firm's technology (patents), SGA (sales, general, and administrative) expenses, and receivables. Since resources from previous years can influence current revenue, we use a Koyck lag function with higher weights on more recent years to derive measures of patent stock, SGA stock, and receivable stock, and then use these "stock" variables as inputs ( $X_{it}; Resources_{it}$ ) in Equation (2). We derive the maximum likelihood estimate of the inefficiency term  $\eta_{it}$ , then rescale the estimate  $\eta_{it}^*$  to be between 0 and 100, and use  $100 - \eta_{it}^*$  as the marketing capability measure (higher inefficiency means lower marketing capability). More details about the stochastic frontier estimation procedure are provided in Web Appendix B.

*Control variables.* We control for (1) the news sentiments about a firm's competitors using the average percent of positive (negative) news references of all other firms in the same industry (two-digit SIC; results remain consistent using three-digit SIC) as the focal firm, and (2) the absolute amount of error in analysts' forecast to account for the deviation in the firm's actual earnings per share (EPS) from investors' prediction (Krishnaswami and Subramaniam 1999). Following Srinivasan et al. (2009), we also include the unexpected changes (i.e., autoregressive

residuals; when using of the levels instead of unexpected changes in the following controls, the effects of news and marketing variables and their interactions remain consistent) in (3) sales growth (since stock prices can be driven by changes in operating outcomes), (4) industry concentration ratio (which indicates industry maturity and barriers to entry thus impacting cash flow and stock performance; Hou and Robinson 2006), (5) significant events including new product introductions (Sorescu et al. 2007) and product recalls (Chen et al. 2009), and (6) R&D intensity (R&D expenditure divided by sales; McAlister et al. 2007). As a robustness check, we add (7) brand equity as a control for a subsample of the firms from 2004 to 2006 where we have access to brand equity data (see Web Appendix for more details).

The descriptive statistics and correlation matrix of the variables are provided in Web Appendix C. As shown later in the robustness analysis section, we also derive the unanticipated changes in the news and marketing variables with time-series extrapolations (Srinivasan and Hanssens 2009) and use them as alternative measures for robustness check.

## ***ANALYSIS PROCEDURE***

### ***Model Choice***

We face two major econometric challenges in testing the proposed effects. First, stock market performance may not only cause changes in marketing budget (e.g., advertising), but also influence news stories. Hence, the explanatory variables can be endogenous. Second, unobservable time-invariant firm characteristics can be correlated with the explanatory variables.

Existing studies have proposed the vector-autoregression (VAR) model to analyze endogenous time-series variables. Since standard VAR model can only be conducted for one firm at a time, it does not account for cross-sectional heterogeneity (variation across firms) and is typically applied when a small number of firms from similar industries are being studied (e.g., five PC manufacturers and four sporting goods companies in Joshi and Hanssens 2010; and

fifteen manufacturers of consumer goods in Tirunillai and Tellis 2012). In contrast, this study uses data of one hundred forty-one different companies from multiple industries. The number of cross-sectional units (firms) is much larger than the number of time points (months) observable for each firm. It is thus important to account for not only longitudinal but also cross-sectional variability, both of which are significant in our data (see Panel 1 of Web Appendix C for more details on between and within variances).

To address the endogeneity concern in related research problems with cross-sectional time-series panel data, marketing researchers (e.g., Tuli et al. 2010; Narasimhan et al. 2006) have employed the two-step Arellano-Bond General Method of Moments (GMM) approach to obtain consistent and unbiased estimates (Wooldridge 2001). Moreover, this approach can effectively eliminate the bias of unobservable time-invariant firm characteristics.

For these reasons, we estimate the model below using Arellano-Bond GMM. We also employ the VAR model one firm at a time as a robustness check.

$$\begin{aligned} \text{AbnR}_{it} = & \alpha \text{AbnR}_{it-1} + \\ & \beta_1 \text{Pos}_{it} + \beta_2 \text{Neg}_{it} + \beta_3 \text{Freq}_{it} + \beta_4 \text{Ad}_{it} + \beta_5 \text{MC}_{it} + \\ & \beta_6 \text{Pos}_{it} \times \text{Ad}_{it} + \beta_7 \text{Neg}_{it} \times \text{Ad}_{it} + \beta_8 \text{Pos}_{it} \times \text{MC}_{it} + \beta_9 \text{Neg}_{it} \times \text{MC}_{it} + \\ & \gamma' \times \text{Controls}_{it} + u_i + e_{it} \end{aligned} \quad (3),$$

where  $\text{Pos}_{it}$  ( $\text{Neg}_{it}$ ) is the percent of positive (negative) news references about firm  $i$  at time  $t$ ,  $\text{Freq}_{it}$  is frequency of all news references about the firm,  $\text{Ad}_{it}$  is firm  $i$ 's advertising spending deflated by sales,  $\text{MC}_{it}$  is firm marketing capability, and  $\text{Controls}_{it}$  is a vector of control variables specified in the previous section.

$\text{Pos}_{it}$ ,  $\text{Neg}_{it}$ ,  $\text{Ad}_{it}$ , and  $\text{MC}_{it}$  are mean-centered. Coefficients  $\beta_6$  and  $\beta_7$  ( $\beta_8$  and  $\beta_9$ ) represent the moderating effects of advertising (marketing capability) on positive and negative news.

### ***Accounting for Endogeneity and Unobserved Firm-Specific Effects***

To cope with the problem of unobserved fixed effects (contained in the error term consisting of the unobserved firm-specific effects  $u_i$  and the observation-specific errors  $e_{it}$ ), the

Arellano-Bond GMM approach uses first-differences to transform the model into the format of

$$\Delta y_{it} = \Delta y_{i,t-1} + \Delta x'_{it}\beta + \Delta v_{it} \quad (4),$$

where  $\Delta v_{it} = \Delta u_i + \Delta e_{it} = (u_i - u_i) + \Delta e_{it} = \Delta e_{it}$ . This transformation removes the unobserved firm-specific fixed effects. Note that, after the transformation, the lagged dependent variable  $\Delta y_{i,t-1}$  is correlated with the error term  $\Delta e_{it}$  since  $e_{i,t-1}$  is a component in not only  $\Delta e_{it}$  (because  $\Delta e_{i,t-1} = e_{i,t-1} - e_{i,t-2}$ ) but also  $\Delta y_{i,t-1}$  (because  $\Delta y_{i,t-1} = y_{i,t-1} - y_{i,t-2}$  and  $e_{i,t-1}$  is a component of  $y_{i,t-1}$ ). To account for the endogeneity of the lagged dependent variable, we use the levels of  $y$  lagged two or more periods to serve as instruments of the first differences (e.g.,  $\text{AbnR}_{i,t-2}$  and further lags are used as instrument for  $\Delta \text{AbnR}_{i,t-1}$ ). As illustrated by Arellano and Honore (2001),  $y_{i,t-2}$  and further lags are valid instruments for  $\Delta y_{i,t-1}$  when  $E[e_{i,t-1}, e_{i,t-2}] = 0$  for two reasons. First,  $y_{i,t-2}$  is correlated with  $\Delta y_{i,t-1}$ , because  $\Delta y_{i,t-1} = y_{i,t-1} - y_{i,t-2}$ . Second,  $y_{i,t-2}$  is not correlated with  $\Delta e_{it}$  because  $\Delta e_{it} = e_{it} - e_{i,t-1}$  does not contain the element of  $e_{i,t-2}$ ; and, based on the assumption  $E[e_{i,t-1}, e_{i,t-2}] = 0$ , the  $e_{i,t-1}$  element is not correlated with  $e_{i,t-2}$ . The AR(2) tests (Arellano and Bond 1991) suggest that the second-order differenced error terms  $(e_{it} - e_{i,t-1})$  and  $(e_{i,t-2} - e_{i,t-3})$  are not correlated, indicating that  $e_{it}$  is not serially correlated and thus the assumption  $E[e_{i,t-1}, e_{i,t-2}] = 0$  holds. Moreover, the Hansen tests of overidentifying restrictions fail to reject the null, indicating that the instruments are valid (the  $p$ -values of AR(2) and Hansen tests are reported in Table 2). Following the same logic, we treat the other endogenous variables with lagged levels as instruments (e.g., for advertising,  $\text{Ad}_{i,t-1}$  and further lags are used to instrument  $\Delta \text{Ad}_{it}$ ). Hence, the Arellano-Bond GMM approach effectively accounts for the endogeneity of news and marketing variables.

### ***Alternative Models***

***Vector Autoregression (VAR) Model*** We employ the VAR model as a robustness check. For each firm in the sample, we specify the  $L$ th-order VAR model with exogenous variables as,

$$v_t = \sum_1^L \Gamma_l v_{t-l} + \Psi Z + u_t, \quad (5)$$

where  $v_t$  is the vector of all the endogenous variables including abnormal stock returns, news variables, advertising, marketing capability, and the interaction terms;  $v_{t-l}$  is the vector of the lagged endogenous variables and  $\Gamma_l$  is the matrix of their coefficients;  $Z$  is a vector of exogenous control variables including new product introductions and product recalls and  $\Psi$  is the matrix of its coefficients (the endogeneity and exogeneity of the variables are verified by Granger causality tests); and  $u_t$  is the error term;  $t = 1, 2, \dots, T_i$  for each firm  $i$ . The optimal number of  $L$  is determined by the Schwarz BIC criterion (Lutkepohl 2005). We conducted the augmented Dickey-Fuller (ADF) tests for stationarity and the Johansen test for cointegration before running the VAR model for each firm. The Johansen tests show no cointegration among the variables. If a variable is non-stationary based on ADF test (we summarized the ADF test results in Web Appendix D), we use its first difference in the VAR model.

Note that, the VAR system can account for the potential feedback effects between any pair of endogenous variables included in the system (e.g., impact of news on advertising). We estimate one hundred forty-one VAR models (one for each firm) following established procedures in the literature, using GMM to account for heteroskedasticity and autocorrelation and conducting simulations of the generalized impulse response functions to ensure the results are unaffected by the ordering of the variables (e.g., Joshi and Hanssens 2010; Tirunillai and Tellis 2012). Please see more details about the VAR model in Web Appendix D.

***Portfolio Approach*** We also check the robustness of the results using a portfolio approach similar to Fornell et al. (2006). First, we divide the sample into two subsamples based on the sentiments in the news reports. If the percent of positive news references is larger than that of negative news references, the firm-month observation is categorized into the Positive-Sentiment Subsample. Accordingly, the Negative-Sentiment Subsample consists of firm-month observations that have a larger percent of negative news references than positive news references. Next, to test the moderating effect of advertising, we construct two matching portfolios within each sub-sample. To be included in the first portfolio in a certain month, the firm has to rank in the top 30 percent in terms of the advertising-to-sales ratio (if, in the next month, the firm still ranks in top 30 percent, it is still qualified to be included in the portfolio; otherwise, it will be

dropped from the candidate list). We thus name this portfolio the Top-Ad\$ Portfolio. To make a comparable portfolio (the Bottom-Ad\$ Portfolio) that includes matching firms of the Top-Ad\$ Portfolio, we identify firms that rank in the bottom 30 percent (in terms of the advertising-to-sales ratio) and belong to the same 2-digit SIC classifications. Following Mizik (2010), if we cannot identify a matching firm at the 2-digit SIC level, we make a selection from the 1-digit SIC level; a firm without any matching firm at 1-digit SIC level is not included in the Top-Ad\$ Portfolio. As a result, in each month the two matching portfolios have an equal number of firms from the same industry sectors, but differ in advertising intensity. Following a similar approach, we construct Top-MktCap Portfolio and Bottom-MktCap Portfolio, as well, based on a firms' rank in marketing capability. The average monthly abnormal stock returns in month  $t$  over  $N_p$  firms in Portfolio  $p$  is calculated as  $(\sum_1^{N_p} \text{AbnR}_{it}) / N_p$  (Fornell et al. 2006).

## **RESULTS**

***Arellano-Bond GMM Model*** The coefficient estimates of the Abnormal Stock Return Model (Equation 3) are reported in Table 2<sup>6</sup>. We employ the Windmeijer (2005) robust estimator for standard errors to account for heteroskedasticity and finite sample bias.

Both the percent of positive news references and the percent of negative news references have significant effects in the expected direction. The interaction effect between positive news and advertising is significant and positive (.0096,  $p < .01$ ), supporting our theoretical arguments. In contrast, the interaction between negative news and advertising does not have the significant effect. It is possible that the competing effects we proposed in the theoretical development cancel each other out.

On the other hand, marketing capability does not have a significant moderating effect on

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<sup>6</sup> Variance-inflation-factors (VIFs) of all variables including interactions range from 1.01 to 1.61 (mean = 1.18). Moreover, estimates of the main effects remain consistent across the two models in Table 2. Hence, the interaction variables do not pose significant multicollinearity problem.

positive news. However, as we expected, marketing capability significantly moderates the impact of negative news on abnormal stock return (.0033,  $p < .05$ ).

[Table 2 About Here]

**VAR Model** We estimated the VAR model for one firm at a time and the results averaged across firms are reported in Table 3.1<sup>7</sup>. The generalized impulse response function traces the effect of one unit of shock (standard deviation) of any variable in the VAR system (e.g., positive news sentiment) on all the other variables in the system. We are interested in the effects of news sentiments, marketing variables, and their interactions on abnormal stock returns. The main effect variables all exhibit significant impact. More importantly, the interaction terms ( $Pos_{it} \times Ad_{it}$  and  $Neg_{it} \times MC_{it}$ ) have significant immediate effects, which are consistent with the findings using the Arellano-Bond GMM approach and support our theoretical arguments. More details about the VAR results are provided in the Web Appendix D.

[Table 3 About Here]

**Portfolio Approach** The results of  $t$ -tests comparing the abnormal stock returns for matching portfolios are in Table 3.2. The  $t$ -stat (3.384,  $p < .01$ ) for the Top-Ad\$ Portfolio versus the Bottom-Ad\$ Portfolio is significant for the Positive-Sentiment Subsample, indicating that, among the firms with strong positive news, those ranking top in advertising out-perform those ranking bottom in advertising. The finding is consistent with the result of the Arellano-Bond GMM model. Also consistent, we find that firms ranking top in marketing capability out-perform those in the bottom for the Negative-Sentiment Subsample ( $t$ -stat=5.983,  $p < .01$ ).

### ***Robustness Check Using Alternative Measures***

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<sup>7</sup> Following Tirunillai and Tellis (2012), we present the median values in Table 3.1. More details about how the results vary across firms are in Web Appendix D. We conducted post-estimation standard tests of residuals (Lagrange multiplier tests of autocorrelation and Jarque-Bera tests on multivariate normality). The tests do not exhibit significant positive results, indicating the robustness of the model specification.

First, we derive the unanticipated changes for positive and negative news sentiments and the moderators (advertising and marketing capability) and use them to re-estimate the model (Equation 3). The unanticipated change  $U\Delta V_{it}$  in variable  $V_{it}$  is the estimate of the residual  $\xi_{it}$  in the first-order autoregressive model (Lev 1989; Jacobson and Mizik 2009; Srinivasan et al. 2009):

$$V_{it} = \theta_0 + \theta_1 V_{i,t-1} + \xi_{it}. \quad (6)$$

Second, instead of using percentages and controlling for the overall news frequency, we use the number of raw positive and negative news references (logged) for a robustness check.

Third, we deflate advertising spending with the previous quarter's sales and firm assets, respectively, instead of the current quarter's sales. As reported in Table 3.3, the results are largely consistent when employing these alternative measures.

### ***EXPLORING THE UNDERLYING MECHANISMS OF THE STOCK PRICE IMPACT***

So far, we have demonstrated the moderating effects of marketing variables (advertising spending and marketing capability) on the relationship between the sentiments in news reports and firm abnormal stock returns. As argued in the theoretical development, these effects may result from the possibility that the interactions between marketing variables and news sentiments influence the level and volatility of firm future cash flows, i.e., the *cash-flow effect*. Beyond the possible *cash-flow effect*, another possibility is that advertising can influence investors' reactions to news reports via the *investor attention effect*. To empirically test the two explanations, we conduct four additional analyses by examining the effects of the interactions between news and marketing variables on the level of cash flows, the variability of cash flows, insider trades, and investor attention and response, respectively. In each of the four additional analyses, we estimate the effects using the Arellano-Bond GMM model after accounting for relevant control variables following the

literature<sup>8</sup>. Table 4.1 summarizes the outcome variables and control variables used in the Arellano-Bond GMM models, and Table 4.2 presents the results. We also find consistent results with regard to the interaction effects using VAR models. We discuss the findings subsequently.

[Table 4 About Here]

### ***Effect of the Interaction between News and Marketing Variables on The Level and Volatility of Cash Flows***

As well established in the prior literature, both the level and the volatility of future cash flows drive their net present value and thus firm abnormal stock returns (Rappaport 1986; Srivastava, Shervani and Fahey 1998). The higher the level of future cash flows and/or the lower the volatility of future cash flows, the higher the firm value (e.g., Lundholm and Myers 2002; Huang 2009).

As reported in Table 4.2, the interaction effect between negative news and marketing capability is positive on the level of cash flows (.0442,  $p < .05$ ), and negative on the volatility of cash flows (-.1753,  $p < .1$ ). In other words, marketing capability mitigates the effect of negative news in decreasing (increasing) the level (volatility) of cash flows. Hence, we find support for the theoretical expectation that the *cash-flow effect* is one plausible reason that marketing capability mitigates the negative effect of negative news on abnormal stock returns.

In contrast, although advertising has a main effect on the level of cash flows in the following quarter (.0221,  $p < .1$ ) as expected in prior research (Joshi and Hanssens 2010; Osinga et al 2012), it does not have significant interaction effects with news sentiments on either the level or the volatility of cash flows. Hence, the positive effect of the interaction between advertising and positive news on abnormal stock returns does *not* appear to have been caused by the *cash-flow*

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<sup>8</sup> As a robustness check, we employ a seemingly unrelated regression (SUR) model for panel data (Biorn 2004) to estimate the system of equations with the level of cash flows, the volatility of cash flows, insider purchase, and investor attention, respectively, as dependent variables. SUR accounts for potential correlations between the error terms across equations. The multistep maximum-likelihood estimates of the equation system remain consistent with the equation-by-equation estimates.

*effect*. How else does advertising moderate the impact of positive news on abnormal stock returns? We will test the other possible mechanism of advertising's moderating role, i.e., the *investor attention effect*, in a section that follows.

We also test the cash-flow effects using the VAR model, by including cash flow level and volatility as endogenous variables in the VAR system. We compute the immediate impact of the interaction terms using the impulse response functions and find consistent results: averaged across all sample firms, one unit (standard deviation) of shock in the interaction between negative news and marketing capability leads to .0624 units of shock (95% confidence interval between .0013 and .1235) in the level of cash flows; one unit of shock in the  $Neg_{it} \times MC_{it}$  interaction leads to a significant immediate shock in cash flow volatility (-.1764, with a 95% confidence interval between -.3499 and -.0028). The effects of news, marketing variables, and their interactions on abnormal stock returns remain consistent after adding cash flow variables in the VAR system.

### ***Effect of the Interaction between News and Marketing Variables on Insider Purchasing of Shares***

The accounting literature has documented that insider trades reflect managers' private superior information about the firm's future cash flows (e.g., Ke, Huddart, and Petroni 2003). For example, Piotroski and Roulstone (2005) find strong empirical evidence of the positive linkage between insider trades and firm future earnings performance. Therefore, insider trading can serve as an alternative dependent variable to test the cash-flow effect. The cash-flow effect would be supported if the interactions between news and marketing variables significantly influence insider trades, because insider trades reflect superior future cash flow information. Moreover, insider trading decisions are made based on not only managers' private information about firm future cash flows, but also public investors' undervaluation or overvaluation of the firm (e.g., Piotroski and Roulstone 2005; Fama and French 1992; Lakonishok, Shleifer, and

Vishny 1994). For instance, when external investors undervalue (overvalue) the firm, insiders can profit by purchasing (selling) the firm's shares. If the interaction of news and marketing variable triggers significant insider purchases of security, it can indicate that public investors undervalue the moderating effect of advertising or marketing capability.

As reported in Table 4.2, no significant effect of the interaction between positive or negative news and advertising is observed. However, the interaction between positive news and marketing capability has a significant and positive coefficient (.0409,  $p < .01$ ), and so does the interaction between negative news and marketing capability (.0262,  $p < .01$ ). The results indicate that marketing capability may moderate the impact of news reports on stock market outcomes by influencing future cash flow performance (because insider trades reflect superior cash flow information). Moreover, the moderating effects of marketing capability may be undervalued by public (or external) investors, and thus the insiders of a firm with strong marketing capability can profit by purchasing the firm's shares upon news release.

#### ***Effect of the Interaction between News and Advertising on Investor Attention and Response***

Given the finding that the moderating role of advertising is not due to the *cash-flow effect*, we examine the alternative explanation, i.e., advertising's moderating impact through *investor attention effect*. We adopt an investor attention measure recently developed in the finance literature, i.e., log of the search frequency of firm tickers on Google<sup>9</sup> (Da, Engelberg, and Gao 2011). As shown in Table 4.2, we find empirical support for the *attention effect* of advertising when using ticker search frequency to measure investor attention (.0178,  $p < .05$  for the  $Pos_{it} \times$

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<sup>9</sup> This can serve as a direct measure of investor attention because (a) Google is the most widely used search engine accounting for 72.1% of all search queries in the U.S. as of February 2009 ([www.hitwise.com/press-center/hitwiseHS2004/google-searches-feb-09.php](http://www.hitwise.com/press-center/hitwiseHS2004/google-searches-feb-09.php)) and thus potentially representative of investors' online search behavior; (b) it is a revealed measure of investor attention (one is certainly paying attention to the stock if s/he is searching for it). Google search logs have been employed by researchers from a variety of fields since it provides the most timely and broad-reaching monitoring system to measure attention and predict behavior (e.g., Ginsberg et al 2009; Choi and Varian 2009).

$Ad_{it}$  interaction; .0159,  $p < .1$  for the  $Neg_{it} \times Ad_{it}$  interaction).

We also include ticker search frequency in the VAR system to test the effect. Based on the median values of impulse response estimates, the immediate impact of  $Pos_{it} \times Ad_{it}$  interaction on investor attention is .2530 (95% confidence interval between .0711 and .4350), but that of  $Neg_{it} \times Ad_{it}$  is not significant at the 95% confidence level (.2039, confidence interval between -.0196 and .4276). The effects of news, marketing variables, and their interactions on abnormal stock returns remain consistent after adding ticker search frequency in the VAR system.

In addition, we use abnormal trading volume as an alternative outcome variable to proxy investor attention and response as it captures the actual trading behavior of investors (e.g., Chemmanur and Yan 2009a) and find similar results (Table 4.2; coefficient of  $Pos_{it} \times Ad_{it}$  is .0111,  $p < .1$ ). In summary, consistent with our theory, advertising moderates the effect of news on stock prices by grabbing the attention of investors and influencing their response.

## DISCUSSION

### *Theoretical Contribution*

This study utilizes a unique dataset and examines the interaction between marketing variables (advertising and marketing capability) and the sentiment in news reports. Our model accounts for endogeneity and unobserved firm-specific factors, and eliminates alternative explanations by including a set of control variables based on the literature. The results are robust across a broad range of sensitivity analyses with alternative measures and methods. This study contributes to the literature on the impact of marketing activities / assets on stock market performance (Hanssens et al. 2009; Srinivasan and Hanssens 2009). Moreover, to the best of our knowledge, it is the first marketing study to directly identify and test the *cash flow effect* and the *investor attention effect* as the two mechanisms through which marketing variables influence

stock market performance. In that, we add to the marketing strategy literature by broadening the list of stakeholders that marketers need to be cognizant of when justifying marketing spending.

The impact of advertising on firm value has attracted growing attention of marketing researchers (e.g., Kim and McAlister 2011; Osinga et. al 2011; Joshi and Hanssens 2010; Srinivasan et al 2009). This study adds novel insights by demonstrating the moderating role of advertising: it amplifies the positive impact of positive news on firm value, in other words, it turns good (news) to great (results). Moreover, we theoretically propose and empirically test two possible pathways to explain this process. We find that the moderating role of advertising results from its effect of attracting investors' attention and response to the firm's news, rather than its impact on future cash flows<sup>10</sup>. In addition, our results suggest that advertising has asymmetric effect in moderating positive versus negative news. Specifically, it does not significantly mitigate the negative effect of negative news on firm value. With stock market performance as the outcome variable, our study complements extant experimental research that demonstrates the ineffectiveness of advertising in changing consumer attitude at the time of negative news (e.g., Tybout, Calder and Sternthal 1981; Schwarz et al. 1991).

We also add to the literature on marketing capability (e.g., Moorman and Slotegraaf 1999; Bahadir, Bharadwaj and Srivastava 2009) by demonstrating its interaction effect with news on firm stock market value. We also find that marketing capability moderates the impact of news on abnormal stock returns because it improves future cash flow performance (i.e., enhancing the level of cash flows and reducing future cash flow variability) after a news release. However, the results suggest that the moderating effect of marketing capability may be undervalued by external investors, creating opportunities for insider trading.

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<sup>10</sup> Note that, we are focusing on the interaction effect between advertising and news. Meanwhile, advertising does have a main effect on abnormal stock returns, and this main effect could be attributed to advertising's main effects on the level of cash flows and investor attention.

This study introduces to the marketing literature a novel measure of investor attention and takes a first step in addressing the call for marketing research focusing on investor relations (Srinivasan and Hanssens 2009). Although there is a large amount of research on marketing-sales relations and marketing-R&D relations, little is known about marketing's relations with investors. This study provides motivation for such a research domain with the finding that advertising plays a role in attracting investors' attention to firm-related news.

### ***Managerial Implications***

Shareholder value is the ultimate measure of a firm's business success. The results indicate that advertising can increase investors' attention to positive news about the firm, which leads to greater stock market returns. Managers should thus look beyond the impact of advertising on the consumer market and realize the impact of advertising on the stock market via the investment attention effect. When making strategic decisions on advertising and firm communication, marketing managers need to broaden the vision of the stakeholders on whom they focus to the investors. Consistent with our recommendation, a growing number of firms have started to target a broader range of stakeholders in their advertising. A *BusinessWeek* story on Southwest Airlines showed that a change in the focus of its advertising message from low prices (primarily focused on consumers) to the firm's strengths (e.g., the number of planes owned and the number of routes and destinations served) could attract investor attention and increase its stock market value by nearly \$400 million ([businessweek.com/stories/2007-07-08/what-price-reputation](http://businessweek.com/stories/2007-07-08/what-price-reputation)). Hence, firms should develop expertise in targeting advertising to investors to communicate their strengths, highlight positive news stories in media and attract their attention. On the other hand, our results suggest that advertising should not be used to refute the negative news so much as to accentuate the positive news.

We find that marketing capability can turn bad (news) to good (financial results) by mitigating the deleterious impact of negative news on abnormal stock returns. Although it requires continuous investments for firms to build marketing capability, this study shows that such investments do pay off financially, especially during the time of negative news. Marketing capability not only serves as a critical tool that managers can leverage to mitigate negative news, but also enables the firm to turn it into an opportunity to enhance shareholder value. While advertising is directly observable by investors, it can be relatively more difficult for investors to correctly estimate firm marketing capability and we find that the moderating role of marketing capability is undervalued by public investors. Hence, to further enhance the financial benefits of marketing capability, the firm should better communicate its marketing capability to the investment community. However, managers need to be cognizant of the trade-off that it could make the firm's marketing capabilities more salient and visible to competition, which may lead to imitation of the capabilities and thus reduce the competitive benefits.

Justifying marketing budgets has been a difficult task for marketing managers, because managers' understanding of marketing outcomes is traditionally limited to consumer attitude and sales (c.f., Joshi and Hanssens 2010). Results in this study indicate that marketing variables can turn good (news) to great (financial results) and bad (news) to good (financial results) on the stock market and thus demonstrate the monetary contribution of advertising spending and marketing capability to shareholder value. This helps marketing managers better communicate the financial benefits of marketing spending to CEOs and financial managers, and thus justify marketing budgets as investments instead of expenses. Although all marketing managers may not have the decision rights to make financial investments in developing marketing capability, this study suggests that it is well worth the investment. Moreover, the two marketing controllable

factors examined are complementary in the sense that, while advertising is helpful to leverage positive news, marketing capability is useful in mitigating negative news.

The findings in this study provide implications not only to marketing managers, but also to stock market investors. For example, institutional investors using computerized algorithm trading systems can consider adding advertising spending and marketing capability factors in their algorithms and make more accurate predictions and trading decisions upon a news release.

### ***Limitations and Directions for Future Research***

This study is not without limitations, but they offer opportunities for future research. First, in line with the majority of the marketing-finance interface studies (e.g., Pauwels et al 2004; Gruca and Rego 2005; Srinivasan et al 2009; Tuli and Bharadwaj 2009; Joshi and Hanssens 2010), our sample consists of only the firms in the top 30% of their industries in terms of size. If data is available, future research could compare the moderating roles of marketing variables for small and emerging firms versus large firms given that investors may place different weights on certain variables when valuing small firms (Xiong and Bharadwaj 2011). The second limitation of our dataset is that the news data, stock returns, and cash flows are all on the firm-level and thus we match these data with firm-level advertising and marketing capability. Hence, we cannot examine the moderating effects of marketing variables on the performance of specific products or brands of a firm. Researchers could also develop more fine-tuned measures of positive and negative news by categorizing them on functional and strategic types. In addition, it can be meaningful for future research to delineate the boundaries or thresholds of the effects of advertising and marketing capability.

The majority of the literature has focused on advertising spending (dollars), rather than advertising content (the information or message contained in advertisement), because (1) the

research objective is to examine the financial value of advertising-based marketing efforts, the level of which can be effectively captured by advertising spending (see Joshi and Hanssens 2010; Luo and de Jong 2012); and (2) the interpretation of advertising content is subjective and thus the coding of advertising content is very difficult, especially for a large sample of firms over time. We thus follow the literature and examine advertising spending as well. However, if data permits, it can be fruitful for future research to examine whether the content in advertising plays a role in moderating the effects of news. Social media and online word-of-mouth might also compliment advertising in influencing the effect of news.

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**Table 1: Examples of Positive and Negative News Reports**

Example topics	News reports with positive sentiment	News reports with negative sentiment
<b>New product launch*</b>	<p><b>New Panasonic Color Scanners Loaded with Impressive Performance Features</b> (Business Wire, 12/13/2004)                      ... Panasonic's new scanners are loaded with an impressive array of performance features, yet are priced so competitively... (they) may have significant impact on the document scanning market.</p>	<p><b>The Latest Kindle: Bigger, Not Better, Than Its Sibling</b> (WSJ, 06/11/2009)                      There's a brand-new variant of the Amazon Kindle e-reader... available starting this week... its size and weight made it awkward and tiring to hold for long periods of reading...</p>
<b>Optimism or pessimism about business performance based on unique data, speculations, or rumors</b>	<p><b>Wal-Mart Dominates Holiday Shopping</b> (MarketWatch, 12/17/2008)                      ... About 66% of American consumers shopped at Wal-Mart last week compared with 41.3% last year... But so far the optimism seems to be focused on only the Bentonville, Ark.-based retail giant (WMT, US)... Clearly, this is good for Wal-Mart...</p>	<p><b>Apple Cuts Orders for iPhone Parts</b> (WSJ, 01/12/2013)                      Apple Inc. has cut its orders for components for the iPhone 5 due to weaker-than-expected demand, people familiar with the situation said Monday... The move indicates that sales of the new iPhone haven't been as strong as previously anticipated and demand may be waning.</p>
<b>Reviews or concerns about product quality</b>	<p><b>Ford Touts Quiet Vehicles</b> (Wireless News, 12/22/2009)                      ... Ford vehicles have fewer wind noise, squeak and rattle issues than any other volume automaker... Key to Ford's success in crafting quiet cabins is the use of ... to identify and eliminate unwanted sounds... Ford brands also have higher interior quietness customer satisfaction scores than their Asian competitors...</p>	<p><b>Sony Failed to Fully Study Battery Trouble</b> (AFP, 10/02/2006)                      Sony Corp was aware of faults in its personal computer batteries ... but failed to fully study the trouble ... Sony did not examine batteries it had produced for companies other than Dell... Sony already faces multimillion-dollar losses from embarrassing recalls of its potentially hazardous lithium-ion computer batteries.</p>
<b>Improvement or issues on customer service</b>	<p><b>Home Depot Tries to Make Nice to Customers</b> (WSJ, 02/20/2007)                      Home Depot is trying to reverse a reputation for shoddy service... plans to devote to shoring up customer service and refurbishing the stores... The retailer spiffed up displays and rewarded stores for improved customer service...</p>	<p><b>Service Problems Plague Wells Fargo ATMs</b> (WSJ, 08/21/2007)                      Service problems disabled ATMs and online accounts at Wells Fargo &amp; Co. starting Sunday afternoon. Wells Fargo wouldn't say how many customers or machines were affected but acknowledged that services were down throughout the company... Customers complained at many of the bank's 6,000 branches nationwide.</p>
<b>Opportunities for the industry or threats posed by competitors**</b>	<p><b>Chocolate: A Health Food?</b> (WSJ, 07/17/2012)                      ... cocoa flavanols, or compounds that can also be found in dark chocolate, can be good for blood circulation... confection makers including Nestle SA and Kraft Foods Inc.,... may soon be able to make a health claim on product labels... The company predicts considerable market potential for applications in items like chocolate drinks, cereal bars and cookies.</p>	<p><b>Sanofi-Aventis faces competition for Acomplia drug in India</b> (Les Echos, 05/24/2007)                      Sanofi-Aventis is facing competition from generic drugs producers in India. At least three low-cost versions of the group's Acomplia drug for obesity, which has barely been launched on the market in Europe, have already come on to the Indian market... the company has applied for approval for Acomplia in India, although the drug's potential is expected to be limited, given the competition from low-cost versions.</p>

Note: Other commonly seen news topics include reports on releases of actual earnings and product recalls. We control for the deviation of earnings from forecast and product recall announcements in the model.

\* We include new product launch as a control variable in the model. Clearly, news articles do not simply report new product launch, but also express their positive or negative views about these new products. News sentiments can influence investor trading beyond the underlying event itself.

\*\* A news article that carries positive/negative sentiment about one entity (company) may at the same time be classified as positive or negative for another entity (company). In this study, the results remain robust even after controlling for news sentiments about companies in the same industry.

**Table 2**  
**Results of the Abnormal Stock Return Model**

Variable	Main effect model			Full model			Expected effects
	Coefficient	WC-robust Std. Err.	<i>p</i> -value	Coefficient	WC-robust Std. Err.	<i>p</i> -value	
Lagged Abnormal Stock Return ( $AbnR_{i,t-1}$ )	.07325	.01924	.000	.06646	.02255	.003	
%Positive ( $Pos_{it}$ )	.02829	.01362	.038	.02546	.01267	.045	
%Negative ( $Neg_{it}$ )	-.03229	.01550	.037	-.04428	.02181	.042	
News Frequency ( $Freq_{it}$ )	.00041	.00027	.129	.00137	.00104	.186	
Advertising ( $Ad_{it}$ )	.00387	.00196	.048	.00509	.00237	.032	
Marketing Capability ( $MC_{it}$ )	.00594	.00372	.110	.00663	.00447	.138	
<b><math>Pos_{it} \times Ad_{it}</math></b>				.00957	.00328	.004	+ (supported)
<b><math>Neg_{it} \times Ad_{it}</math></b>				.00434	.00348	.212	+ or -
<b><math>Pos_{it} \times MC_{it}</math></b>				.00011	.00123	.926	+
<b><math>Neg_{it} \times MC_{it}</math></b>				.00330	.00142	.020	+ (supported)
Sales Growth	.01272	.01098	.247	.01009	.01428	.480	
Absolute Amount of Analysts' Forecasting Error	.00022	.00013	.091	.00031	.00020	.121	
Industry Concentration	.00061	.00061	.321	.00078	.00069	.258	
Avg. Competitors' %Positive	.02409	.02694	.371	.01106	.03222	.731	
Avg. Competitors' %Negative	-.04854	.02547	.057	-.05006	.03146	.111	
New Product Introduction	.00057	.00011	.000	.00050	.00014	.000	
Product Recall	-.00985	.00697	.158	-.00825	.00661	.212	
R&D Intensity	-.06364	.08126	.434	-.00088	.08670	.992	
<i>p</i> -value of AR(2) test	.2631			.1780			
<i>p</i> -value of Hansen test	.8706			.9219			

Note: The Full Model includes the interaction effects, as specified in Equation (3). Entries are coefficients, the Windmeijer robust estimators of standard errors (WC-robust Std. Err.) that account for heteroskedasticity and finite sample bias, and the *p*-values (two-tailed).

Results of the Arellano-Bond test for AR(2) suggest no correlation between the second-order differenced error terms and thus the assumption  $E[e_{i,t}, e_{i,t-1}] = 0$  holds. The Hansen test for overidentifying restrictions also cannot reject the null. The instruments used are thus valid (detailed discussions are provided in the text).

**Table 3**  
**Robustness Check**

**Table 3.1: Using the Vector Autoregression (VAR) Model and Impulse Response Functions**

		Impact on abnormal stock returns	95% Confidence interval
%Positive ( $Pos_{it}$ )	Immediate effect	<b>.18836</b>	(.04380, .33293)
	Cumulative effect	<b>.20786</b>	(-.02791, .44364)
%Negative ( $Neg_{it}$ )	Immediate effect	<b>-.23395</b>	(-.34616, -.12174)
	Cumulative effect	<b>-.25059</b>	(-.48050, -.02069)
Advertising ( $Ad_{it}$ )	Immediate effect	<b>.07260</b>	(.03749, .10772)
	Cumulative effect	<b>.11139</b>	(.01402, .20876)
Marketing Capability ( $MC_{it}$ )	Immediate effect	<b>.05252</b>	(.01417, .09087)
	Cumulative effect	<b>.06944</b>	(.00304, .13584)
$Pos_{it} \times Ad_{it}$	Immediate effect	<b>.43323</b>	(.20468, .66177)
	Cumulative effect	<b>.53613</b>	(.25949, .81277)
$Neg_{it} \times MC_{it}$	Immediate effect	<b>.37854</b>	(.15099, .60608)
	Cumulative effect	<b>.43991</b>	(.03377, .84605)

Note: Entries are estimated through simulations of generalized impulse response function using the VAR model. Values in the first column represent the immediate or cumulative effect of one unit of shock (one standard deviation) of each variable on abnormal stock returns. Immediate effects are derived from the first time period, and cumulative effects are computed with ten time periods. Median values across all firms are reported. More details about how the effects vary across firms are provided in the Web Appendix. The interactions terms  $Neg_{it} \times Ad_{it}$  and  $Pos_{it} \times MC_{it}$  do not lead to significant responses and are removed from the model to enhance model fit.

**Table 3.2: Using the Portfolio Approach (One-tail T-tests Comparing Abnormal Stock Returns of Matching Portfolios)**

	Positive-sentiment subsample	Negative-sentiment subsample
Top-Ad\$ Portfolio versus Bottom-Ad\$ Portfolio	3.384, $p = .001$	.601, $p = .275$
Top-MktCap Portfolio versus Bottom-MktCap Portfolio	-.968, $p = .168$	5.983, $p = .000$

**Table 3.3: Using Alternative Measures in the Arellano-Bond GMM Model**

Variable	Using auto- regression residuals of the variables		Using counts of positive & negative news references		Using previous quarter's sales to deflate advertising		Using assets to deflate advertising	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
%Positive ( $Pos_{it}$ )	.01484	.00872			.02894	.01480	.00733	.00525
%Negative ( $Neg_{it}$ )	-.04407	.00830			-.04315	.01981	-.04342	.00913
Num of Positive Refs ( $Pos_{it}$ )			.01131	.00643				
Num of Negative Refs ( $Neg_{it}$ )			-.00801	.00385				
Advertising ( $Ad_{it}$ )	.00350	.00190	.00698	.00672	.00399	.00212	.00300	.00140
Marketing Capability ( $MC_{it}$ )	.00378	.00661	.00466	.00987	.00273	.00223	.00541	.00351
$Pos_{it} \times Ad_{it}$	.01932	.01006	.00095	.00053	.00625	.00316	.00792	.00375
$Neg_{it} \times Ad_{it}$	.00357	.00811	-.00022	.00074	.00334	.00257	.01031	.01098
$Pos_{it} \times MC_{it}$	.00479	.00805	-.00021	.00036	-.00028	.00128	.00027	.00138
$Neg_{it} \times MC_{it}$	.01014	.00526	.00030	.00014	.00332	.00143	.00316	.00109

Note: Entries are coefficients and the Windmeijer robust estimators of standard errors. All the control models specified under Equation (3) are included when estimating the models.

**Table 4**

**Additional Analysis to Explore the Underlying Mechanisms of the Stock Price Impact**

**Table 4.1 Summary of Variables in the Additional Analysis**

<b>Outcome Variable</b>	<b>Definition</b>	<b>Data Source</b>	<b>References</b>
Cash Flow Level $_{it}$	The level of firm $i$ 's cash flows in the quarter following month $t$ (see more details of this measure in Web Appendix E)	COMPUSTAT	Morgan & Rego (2005)
Cash Flow Volatility $_{it}$	The standard deviation of firm $i$ 's quarterly net cash flows from operations in one year following month $t$ (see Appendix C for details about starting quarters) divided by the standard deviation of cash flows from the broader market in the same period (given that all sample firms are large competitors in their industries, we use S&P 500 firms to proxy the broader market)	COMPUSTAT	Gruca & Rego (2005)
Insider Purchase $_{it}$	Insider purchase ratio $_{it} = \text{BUY}_{it} / (\text{BUY}_{it} + \text{SELL}_{it})$ , where $\text{BUY}_{it}$ ( $\text{SELL}_{it}$ ) is the number of shares purchased (sold) by registered insiders (executives & directors) of firm $i$ in month $t$	Thomson Financial First Call Insiders*	Piotroski & Roulstone (2005)
Investor Attention $_{it}$	Search frequency of firm $i$ 's ticker on Google in month $t$	Google Trend	Da et al. (2011)

\* Consistent with the accounting literature (e.g., Rozeff and Zaman 1998; Piotroski and Roulstone 2005), the insider trades data are restricted to open-market transactions and we do not include firm-months without any open-market transactions in the sample.

<b>Model</b>	<b>Control Variables</b>	<b>Definitions</b>	<b>Data Source</b>	<b>References</b>
Model of Cash Flow Level	R&D Expenditure $_{it}$	R&D spending of firm $i$ in month $t$ (quarterly spending divided by three)	COMPUSTAT	Morgan & Rego (2005)
	Firm Size $_{it}$	Total assets of firm $i$ in month $t$		
	Industry $_{it}$	HIC industry concentration ratio in month $t$		
Model of Cash Flow Volatility	Income $_{it}$	Net income of firm $i$ in month $t$ (quarterly income divided by three). Firms of larger operations scale are more likely to have stable cash flows.	COMPUSTAT	Sloan (1996), Gruca & Rego (2005)
	Industry $_{it}$	HIC industry concentration ratio in month $t$		
Model of Insider Purchase	Book-to-Market $_{it}$	The book value of common equity scaled by market capitalization	CRSP; COMPUSTAT Execucomp	Piotroski & Roulstone (2005)
	Grants $_{it}$	The number of shares of restricted stock and stock options granted in month $t$ (scaled by the number of total shares outstanding) to capture compensation-related changes in insider holdings		
	Options Exercised $_{it}$	The number of stock options exercised in month $t$ (scaled by the number of total shares outstanding) to capture compensation-related changes in insider holdings		
Model of Investor Attention	Absolute Stock Return $_{it}$	The absolute magnitude of contemporaneous stock return in month $t$	CRSP	Bamber et al. 1997; Da et al. 2011
	Common Equity $_{it}$	The market value of firm $i$ 's common equity in month $t$		

**Table 4.2 Results of Additional Analysis Using the Arellano-Bond GMM Method**

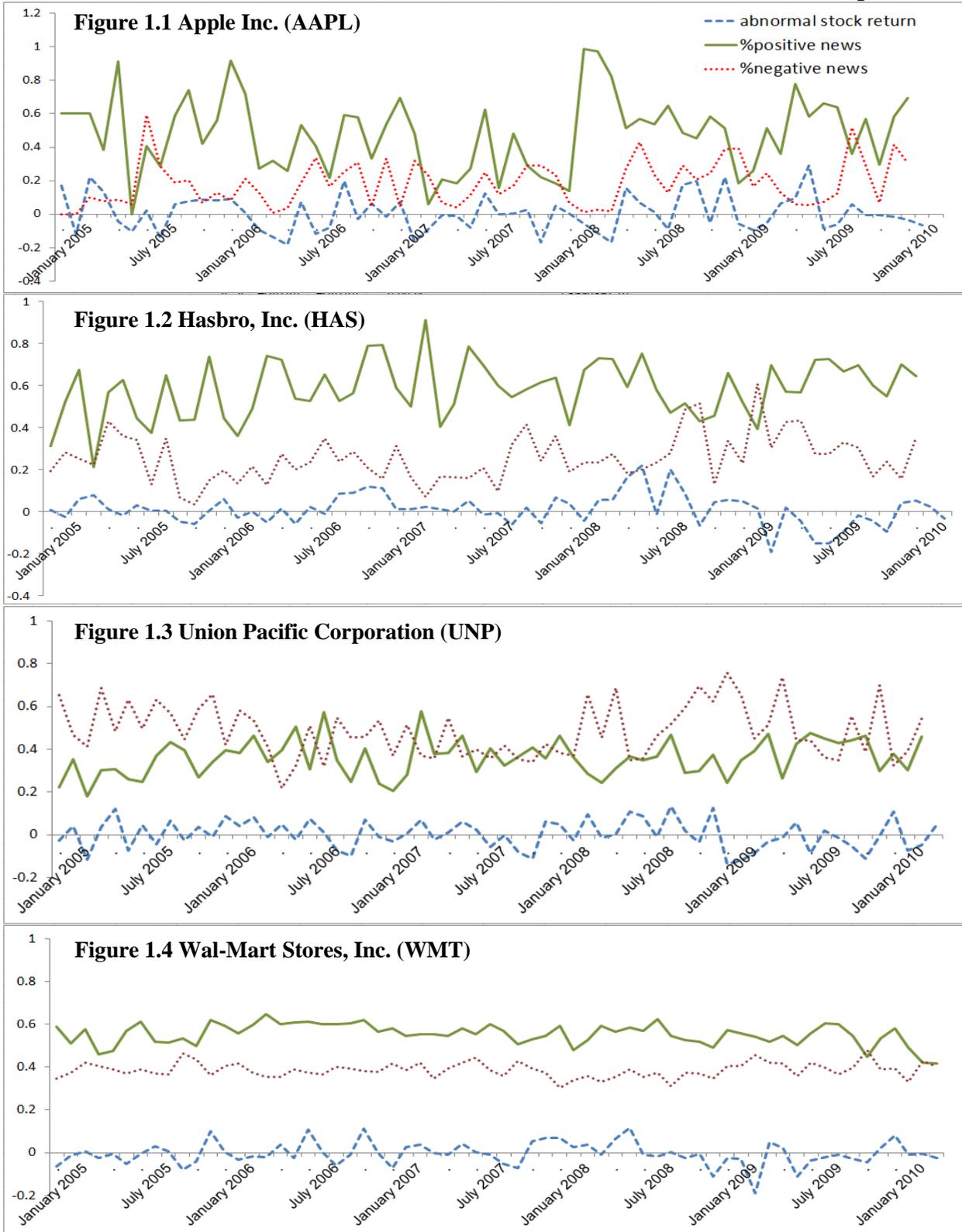
	Cashflow Level Model		Cashflow Volatility Model		Insider Trading Model		Investor Attention & Response Models			
	Coef.	WC-	Coef	WC-	Coef.	WC-	Ticker search		Trading volume	
		Robust Std. Err.		Robust Std. Err.		Robust Std. Err.	Coef.	WC- Robust Std. Err.	Coef.	WC- Robust Std. Err.
Lagged D.V. ( $DV_{i,t-1}$ )	.5467	.3046	<b>.6296</b>	.0597	-.0329	.0762	<b>.7972</b>	.0059	.0452	.0258
%Positive ( $POS_{it}$ )	.5241	.6238	.9126	.7216	.0409	.0656	<b>.0957</b>	.0348	.0399	.0217
%Negative ( $Neg_{it}$ )	<b>-.3829</b>	.1685	.3190	.1765	.0908	.0645	.0560	.0372	.1415	.0803
Frequency ( $Freq_{it}$ )	.0278	.0597	<b>.2464</b>	.1130	.0398	.0292	<b>.0135</b>	.0036	.0061	.0059
Advertising ( $Ad_{it}$ )	.0221	.0113	.0341	.1216	.0001	.0072	<b>.0356</b>	.0086	<b>.0347</b>	.0153
Marketing Capability ( $MC_{it}$ )	.2318	.1234	-.8149	.5135	-.0168	.0243				
<b>Pos<sub>it</sub> × Ad<sub>it</sub></b>	.0042	.0592	-.0831	.1690	.0518	.0393	<b>.0178</b>	.0076	.0111	.0059
<b>Neg<sub>it</sub> × Ad<sub>it</sub></b>	.0273	.0486	.0469	.1203	.0379	.0461	.0159	.0096	.0007	.0225
<b>Pos<sub>it</sub> × MC<sub>it</sub></b>	-.0169	.0278	-.0621	.0648	<b>.0409</b>	.0151				
<b>Neg<sub>it</sub> × MC<sub>it</sub></b>	<b>.0442</b>	.0218	-.1753	.1002	<b>.0262</b>	.0096				
R&D Expenditure <sub>it</sub>	-.2011	1.5362								
Firm Size <sub>it</sub>	.0022	.0013								
Industry <sub>it</sub>	-.0248	.0194	-.0556	.0358						
Income <sub>it</sub>			<b>-.0002</b>	.0001						
Book-to-Market <sub>it</sub>					.7708	.5238				
Grants <sub>it</sub>					-.0133	.0109				
Options Exercised <sub>it</sub>					-.0313	.0179				
Absolute Stock Return <sub>it</sub>							<b>.0169</b>	.0061	<b>.0135</b>	.0045
Common Equity <sub>it</sub>							-.0049	.0105	-.0253	.0385
<i>p</i> -value of AR(2) test	.1890		.1447		.8015		.1575		.4586	
<i>p</i> -value of Hansen test	.9672		.8988		.8927		.9879		.5028	

Note: Entries are coefficients and , the Windmeijer robust estimators of standard errors (WC-robust Std. Err.) that account for heteroskedasticity and finite sample bias. Coefficients that are significant at the 95% confidence level (two-tailed) are presented in bold.

Results of the Arellano-Bond test for AR(2) and the Hansen test for overidentifying restrictions suggest that the instruments used are valid.

**Figure 1**

**Plots of News Sentiments and Abnormal Stock Returns over Time for Some Sample Firms**



**Figure 2**  
**Conceptual Framework**

