Soft Information in the Financial Press and Analysts' Recommendation Revisions

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Abstract

Prior research establishes that both sell-side analysts and the media act as information intermediaries in the capital markets, providing investors with value-relevant pricing information. This study investigates the association between sell-side analyst recommendations and information from firm-specific print news coverage. We document descriptive evidence that the quantity of news coverage of a firm is positively associated with subsequent recommendation revisions, and the tone of the news coverage is, on average, consistent with the direction of the revisions. Our primary empirical prediction is that soft information in news coverage is more significant than hard information for informative recommendation revisions. Indeed, the association between firm news coverage and market reactions to analysts' recommendation revisions is mostly explained by soft news in news coverage. Taken together, our paper is the first to document the association between news coverage of firms and analysts' assimilation of that news as part of their mosaic of information and their role in the efficiency of capital markets.

Key words: Media, analysts, stock recommendations, tone, soft and hard news
JEL Codes: G12, G14, G24

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Soft Information in the Financial Press and Analysts' Recommendation Revisions

1. Introduction

Sell-side analysts are a primary information intermediary in the capital markets (Womack 1996, Jegadeesh et al. 2004, Ramnath, Rock and Shane 2008). A growing body of research investigates the media as another information intermediary. Beginning with studies like Miller (2006) and Tetlock (2007), finance and accounting researchers have become keenly interested in the direct role the media plays in the flow of information within capital markets.[1] Bushee et al. (2010) conclude that the media serves as an information intermediary, which they define as "an agent that provides information that is new and useful to other parties" (pp. 1-2). In this study, we examine whether sell-side analysts generate more useful recommendations by assimilating information in the financial press, especially soft information.[2] We expect that the relation between these two information intermediaries is symbiotic, but there is limited research that examines the joint roles of the media and analysts in providing new and useful information to investors.

Analysts extensively use numerous information triggers, such as market prices, financial information and management disclosures.[3] As a practical example, Regulation Fair Disclosure presumes that analysts rely on multiple sources and types of information, claiming "Analysts can provide a valuable

[1] There are many finance and accounting studies on the role of the press, which precede the dates of these studies, and our intent with this statement is not to disregard earlier studies. Indeed, our literature review discusses many such studies. Nevertheless, our review of this literature suggests that beginning around 2006-2007, studies on the role of the business press have grown into a well-defined area of the capital markets literature.

[2] In this study, our use of 'media' may include any platform for distributing information, including the broadcast, digital, and print media. Our use of 'financial press' refers specifically to business-focused outlets and, because we ultimately examine the largest newspapers, primarily captures the *print* financial press. Due to the cost of acquiring information conveyed via digital financial media (including the online sites for newspapers), we do not examine this important information environment, although we see opportunities for future research on these outlets that might parallel our analysis.

[3] For example, analysts rely on information garnered from prior earnings changes (Conrad et al. 2006, Ivković and Jegadeesh 2004), stock price changes (Abarbanell 1991), dividend changes (Denis, Denis and Sarin 1994), annual report disclosures (Hope 2003), management forecasts (Williams 1996), management guidance (Cotter, Tuna and Wysocki 2006), firm conference calls (Bowen, Davis and Matsumoto 2002), bond rating changes (Ederington and Goh 1998), broker-hosted investor conferences (Bushee, Jung and Miller 2011, Green et al. 2014), other analysts' research (Trueman 1994), and so on. Together, these studies characterize analysts as processing multiple information signals.

service in sifting through and extracting information that would not be significant to the ordinary investor to reach material conclusions." Thus, we expect analysts to consume information distributed through the financial press.[4] While a large volume research attempts to understand where analysts obtain their information and how they process it, there is little research on the likely direct information flow from the financial media to analysts. Lawrence, Ryans, and Sun (2017) study investor demand for sell-side analyst research, and find that analysts often do not issue revisions on media coverage days when there is a high investor demand for analyst research. We investigate whether analysts are able to provide new and useful information to investors by processing information conveyed by the financial press.

Analysts provide information to their clients by synthesizing numerous information sources and making useful recommendations. Analysts should possess a comparative information advantage because of their ability to generate assessments about the quality of a firm's fundamentals based on public information. Public information conveyed through the media could increase information asymmetry but allow analysts to process information and make informed opinions about a firm's fundamentals that are superior to those of other market participants (Kim and Verrecchia 1994, 1997). This is consistent with the evidence in Kross, Ro and Schroeder (1990) and Lys and Sohn (1990), who document that analysts' earnings forecasts are more informative when they are preceded by corporate accounting disclosures.

On the other hand, if print news and analyst reports are competing information channels, analysts' research based on media information may *not* be informative to investors for a number of reasons. First, the mere existence of such widely distributed news may reduce or 'crowd out' the informativeness of

[4] It is possible to argue that analysts may choose to *not* rely on the information from the media. First, there is evidence that analysts ignore or only partially impound public information (Abarbanell and Bernard 1992, Bradshaw, Richardson and Sloan 2001). Much of the 'news' in the print press is stale (Tetlock 2011), thus analysts may respond to either new or stale information, both, or neither. Third, to the extent that the media sometimes serves merely as an information conduit (i.e., pass-through of information) rather than an information intermediary (i.e., producer of information), it is possible analysts obtain the underlying information from more direct sources such as the firm itself (Hassell, Jennings and Lasser 1988) or newswires (Li, Ramesh and Shen 2011). Finally, Jensen (1979) expresses a sardonic characterization of news coverage as a form of entertainment, which diminishes the role of the media as a source of 'new and useful' information.

analyst reports (Ivkovic and Jegadeesh 2004). Second, studies like Lin and McNichols (1998) and Irvine, Lipson and Puckett (2007) argue that analysts' research has a marketing role, reducing the importance of any particular source of information, including that conveyed in the media. Third, while prior studies conclude that analysts are information agents with the ability to process information and affect stock prices (Womack 1996; Michaely and Womack 2005), Altinkilic and Hansen (2009) characterize analysts' research as "information free" and argue that analysts "piggyback" on firm news and consequently issue uninformative reports. To the extent that the media sometimes serves merely as an information conduit (i.e., a pass-through of information; distribution) rather than an information intermediary (i.e., producer of information), it is possible analysts obtain the underlying information from more direct sources such as the firm itself (Hassell, Jennings and Lasser 1988) or newswires (Li, Ramesh and Shen 2011).[5]

Much of our understanding of analysts' role in the capital markets is based on their quantitative outputs (i.e., earnings forecasts, discrete stock recommendations, or target prices), but these items are less important than qualitative factors such as their industry knowledge, access to management, and written reports (Bradshaw 2013). Likewise, information conveyed through news coverage is both quantitative and qualitative. Liberti and Petersen (2017) provide a thoughtful discussion of difference between 'soft' and 'hard' information, and conclude that there is a continuum and that a crisp dichotomy is unclear. However, hard information is almost always quantitative. Soft information is not, and in contrast to the ease with which hard information can be summarized and disseminated, soft information is not so easily shared. As Liberti and Petersen (2017) describe, "If we don't know what the information will be used for, or which parts of the information are relevant or useful, it is difficult to code and catalog it for future use." (p. 9) Our examination of whether analysts respond to information in news coverage is focused on separately measuring the amount of soft versus hard information in firm-specific news coverage and, more

[5] Of course, this is also a construct validity issue that we discuss later and attempt to address in our empirical design.

importantly, examining which type of news is most strongly associated with analysts' belief revisions, captured by changes in recommendations and investor price reactions.

The first link we document is whether cross-sectional variation in the quantity of news coverage of a firm is associated with subsequent analysts' recommendation revision activity. We also examine whether any such association is conditional on the tone of news coverage. While a finding that analysts' revisions are positively associated with news coverage of the firm might not be surprising, we are not aware of any prior studies that document such a link. The closest study is Cao et al (2014), who document an association between country-level media competition and analyst earnings forecast properties. The confirmation of the existence of such a link is important because it provides preliminary evidence consistent with analysts processing information conveyed by news coverage. However, such a relation could also reflect analysts responding to the same information with a lag, analysts merely piggybacking off of public information disclosure, or some endogenous link between exogenous news and both media and analyst reactions. We address these alternative explanations through our primary analysis of how soft information in the financial press is associated with analysts' research and subject these analyses to numerous empirical tests.

We focus on stock recommendation revisions conditional on the type of information conveyed in the financial press. If analysts process information in news coverage, achieving information discovery, and this information is not yet impounded into prices, we would expect more pronounced market reactions to analyst recommendation revisions subsequent to news coverage of a firm. If, however, analysts respond to information with a lag or piggyback on information releases, we should not see any permanent market reaction to a duplication of previously released news. Thus, we examine event window market reactions to analysts' stock recommendation revisions and investigate whether market reactions are stronger for firms with greater news coverage preceding the recommendation revision.

Our descriptive statistics are consistent with firm-specific news coverage being associated with higher levels of analysts' stock recommendation revision activity in the following 30-day window. A single news article is associated with a 1.66% increase in monthly revision activity, representing a 44% increase relative to the unconditional average revision frequency of 3.76%. We also find that the tone of the news corroborates the direction of revision activity.

More importantly, we demonstrate that the market reaction to recommendation changes is stronger for firms with greater recent news coverage. A one standard deviation change in our variable capturing news coverage is associated with an incremental 0.6 percent negative return for downgrades and 0.4 percent positive return for upgrades. These incremental impacts are larger than several other mediating variables for stock recommendation reactions documented in previous literature, such as price momentum and herding (Loh and Stulz 2010). Our empirical results are robust to a battery of diagnostic and sensitivity checks. In our final analysis of the relative contribution of soft versus hard news to analysts' recommendation revisions and the associated stock price reactions, we substantiate an intuitive prediction that the stronger association between firm-specific news coverage and market reactions to recommendation revisions is driven primarily by analysts' interpretation of soft news.

Our study faces several empirical challenges, but we attempt to mitigate such concerns through our research design in several ways. The primary concern relates to identification, as our basic results presume the media is the source of firm-specific information impounded by analysts, but both the media and analysts may obtain the information from the same source. To mitigate this possibility, we omit newswires, which capture direct firm releases and rely instead on news coverage in the ten largest print newspapers. We also randomly selected 250 news articles to manually determine the source of the firm-specific information conveyed in the article. We find that 68% reflect 'investigative reporting,' sometimes supplemented by publicly-available factual information (Appendix A), but 32% of the articles report firm-

specific news plausibly sourced from the firm (or another external reporting source).[6] Thus, the majority of this random sample does not merely transmit information likely sourced from a firm, but acts as an information intermediary that generates new information. [We are currently collecting and examining a full sample of analyst reports to specifically identify recommendations that mention the media.]

Even if all of the news coverage we examine were prompted by firm-specific disclosures (which is unlikely given our random sample), our focus is on analysts and market reactions in windows centered on analyst revisions that appear in the *month following* the associated news coverage. If news coverage is preceded by firm-specific disclosures through the newswires, the time lag between such disclosures and analysts' revisions would be inexplicably long, and in such a case, even in a semi-strong form market investors would unlikely react to previously publicly-released firm-specific information.[7] More important, we find that roughly half of all recommendation revisions are *contrarian* relative to the market reactions to the initial news article releases, suggesting analyst recommendations do not merely "regurgitate" information in recent news articles, and investors seem to wait on analysts to process this information.

Nevertheless, despite this small sample evidence to the contrary, some unobservable aspect of the news coverage we examine could be the driver of both the news coverage, analysts' revisions and market reactions. Engelberg and Parsons (2011) describe how this ephemeral identification problem hinders inferences in numerous studies on causal impacts of the media. To provide preliminary evidence on this issue, we use a sample of analyst reports of S&P 500 companies in 2012 to identify the proportion of reports that specifically reference one of the ten largest print newspapers, which corresponds to the news

[6] This result is consistent with the inference in Li (2015), who investigates how the media produces information. Li (2015) finds that financial journalists rely on first-hand access to management, institutional investors, and other external experts to produce informative news.

[7] It is possible that analysts might use the same information from another source. 8-K disclosures are considered one of the important firm-specific disclosure channels. To test this possibility, we conducted a robustness check by including firm-specific 8-K disclosures during the same period as the news coverage period. Our results remain qualitatively similar as those presented in the paper (see section 5 for more details).

sources of our primary sample.[8] We find a mention rate of 30%, suggesting analysts rely on information from news coverage to support their research (Appendix B). We also believe that our deliberate delay between the firm-specific news coverage and our sample analysts' subsequent revision activity minimizes concerns that any incremental market reaction to analysts' subsequent revision activity is merely a proxy for some unobservable aspect of the news coverage. The questionable alternative is that news would have to be very slowly processed by both analysts and investors for us to find significant incremental market reactions with our research design. Even if our data were manifestations of these concerns, our results nevertheless still speak to the use of information in the print media by analysts given our test specification. While it is fundamentally challenging to address the identification problem of news attribution, the results from various sensitivity analyses are collectively consistent with analysts using information in the media.

Our results are consistent with various findings in the literature showing that analysts incorporate qualitative information into their analyses. For example, prior research demonstrates associations between analysts' recommendations and narrative annual report disclosures (Rogers 1996), an assessment of the quality of management (Barker 1999), a qualitative 'strengths-of-argument' variable (Asquith, Mikhail and Au 2005), and positive or negative affect in managerial presentations (Mayew and Venkatachalem 2012). More importantly, our study contributes to our understanding of the role of the media as an information intermediary in the capital markets. Bushee et al. (2010) examine news coverage of firms during earnings announcement windows and document a significant reduction in information asymmetry. We extend their research by demonstrating that one of the channels through which the media contributes to the information flow in the capital markets is through another intermediary – financial analysts. Our analysis links firm-specific news coverage to analyst revision activity and incremental impacts on stock price reactions to those revisions. Our study also extends the large literature on analysts' role as a primary

[8] We collected analyst reports from the Investext database of Thomson ONE.

user of financial information. Prior research analyzes how analysts differentially use various sources of information such as the income statement versus balance sheet (Previts et al. 1994), audited versus unaudited information (Rogers 1996), and management sourced versus independently gathered information (Williams, Moyes and Park 1996). Our results confirm the conjecture in Lawrence et al. (2017) that analysts require time to process soft information in media coverage, which implies that "the largest opportunity for analysts to meet unmet demand for analyst information is after media coverage" (p. 145). We document that firm-specific news coverage provides information that not only impacts analysts' subsequent firm-specific revision activity, but interacts with that revision activity to strengthen market reactions to analysts' revisions.

2. Background and predictions

2.1 Background

Our study is related to several strands of research. First, a growing body of research is interested in how market participants react to information disseminated through the media. A seminal study in this area is Cutler, Poterba and Summers (1988), who document on average small stock market reactions to major news events (and the reverse, limited news events to justify the largest stock price movements), which for many years cast doubt on the view that stock price movements are attributable to news coverage. However, recent empirical evidence suggests news coverage sometimes leads, and sometimes lags stock price movements. For example, using a popular *Wall Street Journal* column "Abreast of the market," Tetlock (2007) documents that news coverage predicts stock market movements. Tetlock (2011) investigates investors' reaction to 'stale news stories,' and documents evidence of strong return reversals for stocks with above-average individual investor trading activity. Other evidence suggests news coverage contains value relevant information on firm fundamentals that is not directly impounded into stock prices (e.g., Tetlock, Saar-Tsechansky and Macskassy 2008, Engelberg 2008, and Tetlock 2011), which allows

some market participants to obtain an advantage from processing this information (see Engelberg, Reed and Ringgenberg 2012 for short sellers; Bushman, Williams and Wittenberg-Moerman 2013 for banks; Chuprinin, Gaspar and Massa 2013 and Fang, Peress and Zheng 2013 for mutual funds; and Bonsall, Green and Muller 2013 for rating agencies).[9] We contribute to this line of research by investigating the extent to which financial analysts facilitate security price discovery in the capital markets through the incorporation of relevant information from news coverage into their research products.

Second, our research is related to the extensive literature on financial analysts (see Brown 1993 and Schipper 1991 for commentaries on early research, and Ramnath, Rock and Shane 2008 and Bradshaw 2013 for reviews on recent research). Financial analysts are considered sophisticated information intermediaries in the capital markets. Beyer et al. (2010) review recent literature on firms' financial reporting environment, and suggest that analysts provide 22% of accounting-based information about a firm. Prior research has almost exclusively focused on analysts' use of hard information, such as stock prices (Lys and Sohn 1990, Abarbanell 1991), financial statement information (Mendenhall 1991, Bradshaw, Richardson and Sloan 2001), and other performance measures (Han and Wild 1990).[10]

Analysts have access to other information sources such as private communication with managers and public information including news coverage. Our objective in this paper is to shed light on whether and how analysts incorporate the information content of news coverage in their research outputs. The information in the financial press seems largely qualitative (i.e., "soft" information, as opposed to "hard" information that characterizes much of financial reports and earnings announcements). The cost of

[9] Recent commentators (Goldberg 2003) argue that major media outlets report news with a political bias. However, Mullainathan and Shleifer (2005) examine the determinants of media accuracy using a demand-side model, and find that in the aggregate readers should have an unbiased perspective if they have access to all news sources.

[10] Prior studies also investigate the sources of the usefulness of analyst research, such as the discovery of private information and/or interpretation of public information (Ivkovic and Jegadeesh 2004, Asquith, Mikhail and Au 2005). While Francis, Schipper and Vincent (2002) document evidence supporting the complementarity of analyst research and earnings announcements, Chen, Cheng and Lo (2010) find that information discovery (interpretation) dominates in the week before (after) firms' earnings announcements, supporting the co-existence of both roles.

processing soft information is high (Liberti and Petersen 2017; Engelberg 2008), which presents an opportunity for analysts to transform such soft information into inputs for their research. Indeed, soft information is a key element of the "mosaic" of information discussed in Reg FD.

Empirical evidence is generally consistent with the media providing news coverage of corporate events, creating new information, and disseminating the information (Dyck, Volchkova and Zingales 2008, Miller 2006, Bushee et al. 2010, and Ahern and Sosyura 2013). Further, news coverage contains value relevant information on firm fundamentals and is processed and used by different capital market participants. For example, Bonner, Hugon and Walther (2006) document that media coverage of an analyst is positively related to investors' reactions to forecast revisions. Similarly, Rees, Sharp and Twedt (2013) study the determinants of news about individual analysts in the financial press and the effects of that news on the career outcomes of analysts. Their evidence suggests that media coverage provides valuable exposure for analysts. However, these two studies focus on the information flow from analysts to the financial press, which leaves open the question of the other direction of information flow. The media and analysts serve similar roles as information intermediaries, gathering, processing, and disseminating information, and both are likely to use the outputs from each other.

Anecdotal evidence appears in analysts' formal reports and suggests that analysts consume and their opinions are shaped by news coverage. For example, Barclays analysts covering Apple (NASDAQ: AAPL) noted, "As we previously reported, according to the *Wall Street Journal* ('Apple Plots its TV Assault,' 12/19/11), Apple executives have been meeting with media executives to discuss the future of television" (Reitzes and Thorwart 2012). In a report on Wachovia Corp (NYSE: WB), a Punk, Ziegel & Company analyst states, "If published reports in the *Wall Street Journal* and *New York Times* are correct, it would appear that Wachovia's stock is about to plunge once again and stay down for an extended period. Both newspapers report that the company is close to a deal to acquire Golden West Financial" (Bove

2006). Finally, Janney Capital Markets analysts discuss a promising product for Crumbs Bake Shop (NASDAQ: CRMB) by referencing that, "A *Boston Globe* article describes the … croissant-doughnut hybrid as a food portmanteau. Ansel's Cronut has been featured on Late Night with Jimmy Fallon, The Today Show, Good Morning America, and Piers Morgan Live on CNN with host Anthony Bourdain" (Kalinowski and Babington 2013). Consistent with the anecdotal evidence, we find that for a sample of analyst reports of S&P 500 companies in 2012, 30% of the analyst reports refer to news coverage to support their research, further supporting that news coverage is an important information source for analysts (Appendix B).

While anecdotal evidence shows analysts sometimes refer to the financial press in their reports, it is an open empirical question whether and how analysts assimilate information in financial press, and whether their research outputs incorporating such information facilitate security price discovery and improve efficiency in the capital market. Our objective is to provide evidence on this direct flow of information from the media to analysts.

2.2 Empirical predictions

Our empirical analysis proceeds in several stages. In the first stage, we provide descriptive baseline evidence about the link between the incidence of news coverage and analysts' recommendation revision activity. Our unit of analysis here is a firm and the population of analysts providing stock recommendations for that firm. It seems obvious that firm-specific news coverage is associated with subsequent analysts' recommendation revisions, as analysts assimilate information in the news coverage in their recommendations. However, Lawrence, Ryans, and Sun (2017) find that analysts do not always issue revisions on the media coverage days when there is a high investor demand for analyst research, suggesting that analysts might need time to process information in news coverage. We note that we are not aware of any empirical evidence on this association, but the confirmation of such a link is an important

first step to investigate the role of media in providing information that is subsequently used by analysts in generating research.

After documenting the association between firm-specific news coverage and analysts' revision activity, our primary focus turns to evidence of information processing by analysts. As discussed previously, we are primarily interested in whether part of analysts' information set is information provided by the news coverage. If so, then the descriptive evidence would be consistent with news coverage possibly being used by analysts to trigger updates to existing stock recommendations. However, a stronger test is to examine whether the market reaction to analysts' revisions is incremental in the presence of recent news coverage on the firm being followed by the analyst. Altinkilic and Hansen (2010) argue that analysts tend to piggyback on public news about firms, so piggybacking may explain any association between news coverage and recommendation revision activity. Our primary prediction relies on investors' processing of analyst revisions. If analysts use superior information processing skills to convert information in the news coverage to inputs for stock recommendations, and if such information in the news coverage reflects aspects of firms' fundamentals that have not been impounded in stock prices, we would expect more pronounced market reactions to analyst recommendation revisions when there is more coverage of the firm. Our first hypothesis is as follows.

> *H_1: The association between analysts' stock recommendation revisions for a firm and stock returns is positively related to recent news coverage of the firm.*

We are also interested in capturing the nature of the information reflected in news coverage. One approach to characterizing the content of news would be to perform a content analysis, and manually code the specific types of information conveyed in news coverage (see, Asquith, Mikhail and Au 2005, for example). This is costly and subject to coding bias. An alternative that permits processing of a large sample of news articles and number of firms is to use machine-based textual analysis to characterize the composition of hard versus soft news and the tone of the information contained in the news coverage.

These partitions are coarse relative to a manual content analysis, but they are popular in the literature due to their ease of computation and demonstrated ability to provide insights at a relatively low cost.[11]

We predict that the primary value obtained by analysts from consuming news coverage is in the soft information provided. Our argument is similar in spirit to that offered by Schneider (1972). He laments the lack of soft information in Securities and Exchange Commission filings because soft information is "highly relevant to investment decisions" (p. 254).[12] Accordingly, we believe that analysts' processing of information lies largely in the piecing together of various soft and hard information into a cogent opinion on the suitability of investing in a security. Analysts are typically viewed as quantitatively focused, using inputs from the financial statements. However, as noted in any text on financial analysis, much of the process is qualitative in nature, involving the selective processing of different strategic and economic conditions that are not amenable to quantification. Sedor (2002) discusses theories regarding information processing, and states that communication of information often takes place as "narratives." For example, narratives are used by managers in conference calls to discuss soft information like future plans, new products, timelines, and trends. Sedor (2002)'s fieldwork interviews of financial analysts also suggest that they generate forecasts by integrating historical quantitative financial information with qualitative, forward looking narratives from managers and other information sources (Webby and O'Connor 1996). As such, we predict that this type of information is the most likely to be useful to analysts assembling a mosaic of information that would trigger market reactions. Our second hypothesis is as follows.

> *H_2: The association between analysts' stock recommendation revisions for a firm and stock returns is more strongly related to soft news as opposed to hard news.*

[11] See Tetlock, Saar-Tsechansky and Macskassy (2008), Kothari, Li and Short (2009), and Engelberg, Reed and Ringgenberg (2012) for the use of dictionary method to extract tonal information from news media. We use Loughran and McDonald's (2011) dictionary, which is more suitable for interpreting financial information based on 10-K filings.

[12] He acknowledges that there is no sharp dividing line between hard and soft information. For example, "Audited historical financial statements are normally considered to be a classic type of hard information. Accounting is not an exact science, however, and many subjective evaluations and other types of soft information must be considered in order to prepare audited financials." (p. 256)

Our final prediction relates to the tone of the news coverage. Tone has been examined in several contexts of financial disclosures. For example, Henry (2008) finds that the tone of earnings announcements significantly affects investors' reactions. She cites (Maat 2007), who explains that tone affects information processing because tone is "a stronger argument for a particular conclusion than the non-reinforced version" (p. 365). Similarly, Rogers, Van Buskirk and Zechman (2011) examine the impact of earnings announcement disclosure tone on shareholder litigation. Following this interpretation of the effect of tone on the receiver, we also predict that tone will affect analysts' use of the information. The differential impact of positive versus negative tone is more salient in the context of management press releases and disclosures that are affected by strategic disclosure (e.g., Lang and Lundholm 2000).

In our empirical context, we are not aware of any evidence suggesting a strategic objective of financial news coverage. Further, we do not have any priors on whether analysts might differentially process positive versus negative tone. On one hand, analysts' ability to assemble and process a mosaic of information is expected to be neutral to the tone of the news coverage, so tone will be associated with the direction of recommendation changes, and by extension, market returns. On the other hand, it is well documented that sell-side analysts' forecasts are routinely optimistic. The typical explanation for this phenomenon is that analysts wish to maintain cordial relationships with the covered firms. If this is the case, analysts might react more strongly to positive tone of news coverage relative to negative tone of news coverage.[13] Given that the investors are aware of analysts' optimistic bias, the market is not expected to strongly react to analysts' recommendation revisions associated with good news. In contrast, the market is likely to respond strongly to react to analysts' recommendation revisions associated with bad news because such revisions are more credible. Given that we do not have a clear prediction related to the tone of the news coverage, we form our final hypothesis as a null hypothesis.

[13] It is also possible that analysts might strategically reference the media because of the need to provide cover, which would apply primarily for bad news coverage, i.e., news coverage with negative tone. We examine this possibility in section 5.3.

H_3: The association between analysts' stock recommendation revisions for a firm and stock returns is not correlated with the tone of the news.

3. Data and Variable Measurement

3.1 Data

The financial news texts are downloaded from Factiva. Following Engelberg (2008) and Gurun and Butler (2012), we use Factiva's Intelligent Indexing to match firms and news, and require that the firm's name appear at least once in the article to ensure the accuracy of matching.[14] We employ Factiva's algorithm to exclude duplicates. We omit newswires that would capture direct firm releases, and rely instead on news coverage in the ten largest print newspapers. The news sources include top national newspapers (*Wall Street Journal*, *New York Times*, *Washington Post*, and *USA Today*) and top local newspapers (*Atlanta Journal Constitution, Boston Globe*, *Denver Post*, *Pittsburgh Post-Gazette*, *St Louis Post-Dispatch*, and *Minnesota Star Tribune*).[15] Following Tetlock (2011), we exclude news articles with fewer than 50 words to alleviate the concerns about articles being a short summary. We collect analyst data from I/B/E/S, stock return data from *CRSP*, and financial data from *Compustat*.

The sample period spans 1998 to 2012. We begin with 1998 because Intelligent Indexing is not reliable before 1998. We limit our firm universe to the S&P 1500 because smaller firms rarely receive any coverage in these larger publications. Our empirical tests are conducted at different samples, and we also impose restrictions on data as they become necessary in testing the hypotheses. As a result, our samples

[14] Given analysts' value as industry specialists (Kadan et al. 2012; Bradshaw 2013), news articles that contain macro or industry-specific information might be more useful to an analyst. However our sampling procedure on firm-specific news articles precludes us from including such articles in the sample. Along those lines, it would be interesting to examine how analysts incorporate information from industry trade journals because they contain a real cogent set of news that analysts would be in the position to capitalize upon. This is an appealing approach to investigate the interaction between analysts' industry expertise and industry level media coverage, but it is beyond the scope of the current paper.

[15] The initial list of newspapers is from Engelberg and Parsons (2011). When we collected data from the Factiva database, some local newspapers used in Engelberg and Parsons (2011) were not retrievable through the system. We thus only collected news articles available from the Factiva system at the time of data collection. We only consider the version of print news, but not online version or the blogs.

vary across different tests. We explain the sample details when we discuss the results of each empirical test.

3.2 Variable Measurement

3.2.1 Media Variables

The key media variables used in the paper are the overall frequency of news coverage, the distribution of soft versus hard information included in news coverage, and the tone of the news. We proxy the frequency of press coverage for each firm as the number of news articles about the firm between days {-30, -3} centered on the analyst recommendation revision date (*#NEWS*). *#NEWS* is highly right-skewed, so we use a log transformation in the empirical analyses (*log#NEWS)*, calculated as log (1+*#NEWS*). We argue that *#NEWS* also captures important news about the firm. While it is difficult to measure the importance of news coverage, we use the market reactions to the news articles as a proxy of the importance of the news. Given that the sum of news announcement returns is mechanically correlated with *#NEWS*, we use the maximum of absolute value of news announcement returns. We find a positive and significant correlation of 0.55 between *#NEWS* and the maximum of absolute value of news announcement returns, our proxy of the importance of news.[16] This result supports the use of *#NEWS* as a proxy of the import news about the firm. As an additional validity check, we use the sample of analyst reports of S&P 500 companies in 2012. Specifically, for each analyst report, we find that the number of news counts over the (t-30, t-3) window before the analyst report date is positively and significantly correlated with the probability of one or more of the major newspapers being mentioned in the report (Appendix B).

We also measure the frequency of soft versus hard information within news coverage. While soft information is difficult to observe, we need proxies to capture it. There are three empirical approaches to

[16] We also replace log (1+*#NEWS*) with the maximum of absolute value of news announcement returns in the regression analysis, and find qualitatively similar results.

measure soft/hard information in the literature based on (1) whether the information is verifiable or not; (2) whether the information is quantitative or qualitative; (3) specific empirical settings such as the distance between borrower and lender as a proxy for the lender's ability to use soft information (Agarwal et al. 2010). It is challenging to capture whether the information is verifiable or not using textual analysis. To the extent quantitative information is more likely to be verifiable than qualitative information, we adopt the quantitative (hard) versus qualitative (soft) approach suggested in Liberti and Petersen (2017).

Specifically, we designate textual information as soft and numerical information as hard, and construct a variable *HSRATIO*, equal to the number of numerical words in an article (phrases consist of digits, decimal points, commas, percentage and/or dollar such as $1.08, 50% or 20,000) divided by the sum of the number of positive words, negative words, and numerical words in the article. We use the classification method by Loughran and Mcdonald (2011) to identify positive and negative words.[17] We estimate *HSRATIO* for each article, and classify an article as a hard news article if *HSRATIO* is above 0.4, the median *HSRATIO* of all news articles, and as a soft news article otherwise. We present examples of the hard and soft news articles and the associated *HSRATIO* in Appendix C. We count the number of soft news articles and the number of hard news articles, and use a log transformation for the empirical analyses (*log#SOFTNEWS* and *log#HARDNEWS*).

Finally, we adopt a dictionary method to evaluate the tone of news article. We parse the news articles and count the number of positive and negative words using the classification method proposed by Loughran and McDonald (2011), who show that their word classification scheme is more suitable in the finance and economics context than the Harvard IV classification used in Tetlock (2010). We follow

[17] Loughran and McDonald (2011) propose a new financial dictionary based on the words used in the 10-K filings. The authors manually classify the word lists into negative, positive, uncertainty, litigious, strong modal and weak modal categories, and we follow their approach to identify positive and negative words in the news article. On the other hand, numbers are identified using the following rule: the string needs to start with a space or a dollar sign, and then a string that combines digits, commas, and dots follows immediately. For example, $1.35 is considered as a number and FY13 is not counted as a number. To exclude numbers that mark the years, whole numbers from 1950 to 2020 are not included in the total counts.

Tetlock (2007) and Dougal et al. (2012) to define several measures of the tone of articles: (1) the percentages of positive words (*%POS*) is defined as the number of positive words divided by the total number of words in the article, and the percentage of negative words (*%NEG*) is defined similarly; (2) the net tone of the article is defined as $TONE = \%POS - \%NEG$. *TONE* is constructed to capture the net effects from both the positivity and negativity of an article. In some regressions, we also include a variable *%HARD*, which is measured as the percentage of numerical words in an article, to capture the proportion of quantitative information (hard information) in the news coverage.

3.2.2 Analyst Variables

We focus on analyst recommendation revisions to make inferences on analysts' assimilation of useful information in the financial process. Specifically, we examine three recommendation revision variables during month t of any given year.

> *$\%REVISING_t$:* The proportion of analysts revising their recommendation, calculated as the percentage of analysts revising recommendations (of all analysts covering the firm) during month t.
>
> *ΔREC_t:* The change in mean recommendation for firm i from month t-1 to month t. I/B/E/S defines recommendation level 1 as strong buy and 5 as strong sell, but we invert these measures so that higher numbers reflect higher recommendation levels.
>
> *CAR:* The market reactions to analyst recommendation revisions, proxied by the abnormal stock returns upon analyst recommendation revisions. Following Loh and Stuz (2010), we use a two-day window (0, 1), and calculate abnormal stock returns upon analyst recommendation revisions as $CAR_i = \sum_{t=0}^{1} R_{it} - \sum_{t=0}^{1} R_{it}^{DGTW}$, where R_{it} is the return of firm i, and R_{it}^{DGTW} is the return on a benchmark portfolio with the same size, book-to-market, and momentum characteristics as the stock (constructed in similar fashion as in Daniel et al. 1997 and Wermers 2003, DGTW hereafter).

3.2.3 Control Variables

In our regression analyses, we include a number of control variables as suggested in the prior research on analyst recommendation revisions (Jegadeesh et al. 2004, Green 2006 and Loh and Stulz 2010, among others). They include firm size (*logMV*), analyst following (*#ANALYSTS*), the book-to-market ratio

(*logB/M*), six month price momentum ending 30 days prior to the recommendation revision (*MOMENTUM*), stock return volatility in the 60-days preceding the recommendation revision, (*logVOLATILITY*), average daily share turnover in the 60-days preceding the recommendation revision (*TURNOVER*), earnings forecast revision (ΔEPS), the deviation of the recommendation from the consensus (*RECDEV*), the analyst's lagged earnings forecast accuracy (*ACCRANK*), lagged 30-day stock returns (*lagRET*), and indicators for whether a firm makes an earnings announcement before (*POSTEARN*) or subsequent to (*PREEARN*) the recommendation revision

4. Empirical Results

4.1 Descriptive Statistics

Table 1 reports descriptive statistics for each newspaper. *The Wall Street Journal* has the highest number of news articles followed by the *New York Times* and the *Washington Post*. Local newspapers in general have fewer number of articles compared to national newspapers. The average number of words per article ranges from 496 to 706 words. There are slightly more negative than positive words for each article, which might reflect the need to attract the attention of readers (Hamilton and Zeckhauser 2004). On the other hand, the levels of news tone do not appear to differ across publications.

Table 2 presents summary statistics on analyst recommendation revision and firm level variables used in the paper. The mean (median) ΔREC is -0.019 (0.000), and the mean (median) *CAR* is -0.385 (-0.039), indicating that our sample includes more downward revisions (50,983) than upward revisions (45,666). The table also shows that sample firms are quite heterogeneous on dimensions such as size, growth opportunity, and performance. The *TONE* of news articles is slightly negative, echoing the results in table 1 regarding *%NEG*. The average proportion of analysts who revise their recommendations is 4.2 percent, which we use as the baseline revision frequency when discussing the economic significance of

our results later. Finally, the average numbers of articles deemed to be hard news versus soft news are both just larger than 1, but both are right-skewed, which is why we use log transformations in our tests.

4.2 News Coverage and Analyst Research Updates

To examine the link between firm-specific news coverage and analyst revisions, we perform the following regression analysis:

$$\%REVISING_{i,t} = \alpha + \beta_1 \, log\#NEWS_{i,t-1} + \beta_2 \, |lagRET_{i,t-1}| + \beta_3 \, logMV_{i,t-1} + \beta_4 \, \#ANALYSTS_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

The dependent variable (*PROP_REVISING*) captures the likelihood of analysts revising their recommendations for firm i in month t. In this analysis, we start with S&P 1500 firms for a period of 15 years, and we arrive at a sample of 268,197 firm-month observations after losing observations in the process of merging with CRSP, IBES, and the media data. *log#NEWS* is the variable of interest that captures the frequency of news coverage in the (-30, -3) window relative to the analyst revision month. In a different regression specification, we replace *log#NEWS* with two indicator variables, *I (#NEWS=1)* and *I (#NEWS>1)*, to capture the incidences when firms have one news article and when firms have more than one news article in month t. Control variables include the absolute value of lagged stock returns (|*lagRET*|), firm size (*logMV*), and the number of analysts covering the firm (*#ANALYSTS*). We standardize all continuous explanatory variables at mean 0 and standard deviation 1 to facilitate comparison of the economic magnitudes of coefficients.

Panel a of Table 3 presents the panel regression results, with standard errors clustered by year-month. Column (1) shows the results using indicator variables of news coverage, and column (2) reports the results using the continuous variable of news coverage *log#NEWS*. In column (1), we find that both indicator variables, *I (#NEWS=1)* and *I (#NEWS>1)*, are positive and statistically significant. Regarding economic significance, the coefficient on *I (#NEWS=1)* indicates that a single news article is associated with a 1.66% increase in monthly recommendation revision activity, representing a 44% increase relative

to the regression intercept of 3.76%. Given that all independent variables are demeaned, the intercept therefore reflects the proportion of analysts revising for the mean firm in the sample. However, the coefficient on *I (#NEWS>1)* has similar magnitude and significance as that on *I (#NEWS=1)*. In column (2), we find a positive and significant coefficient on *log#NEWS*, supporting the intuition that firm-specific news coverage is associated with greater subsequent analyst revisions.

We next investigate whether analysts' revisions are associated with the tone of recent news coverage. We restrict the sample to the firm-month observations with available news coverage in the prior month, thus the sample is reduced to 41,101 firm-month observations. We expect the direction of recommendation changes to be associated with the tone of the financial news. We perform Fama-Macbeth regressions of ΔREC on the lagged news tone measures along with control variables. The regression model is as follows:

$$\Delta REC_{i,t} = \alpha + \beta_1 TONE_{i,t-1} + \beta_2 \%HARD_{i,t-1} + \beta_3 logMV_{i,t-1} + \beta_4 logBM_{i,t-1} + \beta_5 MOMENTUM_{i,t-1} + \beta_6 lag\Delta REC_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

Table 3 panel B presents the Fama-Macbeth regression results. Tone is measured as *%NEG*, *%POS*, and *TONE* in columns (1), (2), and (3), respectively. We again standardize all continuous explanatory variables at mean 0 and standard deviation 1 to facilitate comparison of the economic magnitudes of coefficients. Column (1) shows that the percentage of negative words in news coverage is associated with downward recommendation revisions with statistical significance at better than the 5% level. On the other hand, we find that the percentage of positive words in news coverage is associated with upward recommendation revisions, but the coefficient on *%POS* is not statistically significant. We control for *%HARD* when we examine the composite measure *TONE* in column (3). The results show a positive and statistically significant coefficient on *TONE*, supporting analysts' recommendations being associated the information content in news coverage. We control for *%HARD* and other control variables (listed in equation 2) in column (4). The inclusion of these control variables does not affect the sign and significance

level on the tone measure, and we continue to observe a positive and significant coefficient on *TONE* in column (4).[18]

4.3 News Coverage and Market Reactions to Analysts Recommendation Revisions

The descriptive results in section 4.2 are consistent with the notion that analysts respond to news coverage by updating their recommendations, and that their recommendation revisions incorporate the qualitative signal from the news articles. Our primary set of analyses are discussed next, and focus on the market reactions to analyst recommendation revisions, which capture investors' evaluation of analyst research updates. We perform separate regressions of *CAR* for recommendation downgrades and upgrades, and regressions of |*CAR*| for both upgrade and downgrade revisions.[19] The regression models are as follows:

$$CAR_{i,t} \text{ or } |CAR_{i,t}| = \alpha + \beta_1 \, log\#NEWS_{i,t-1} + \beta_2 \, logMV_{i,t-1} + \beta_3 \, logBM_{i,t-1} + \beta_4 \, MOMENTUM_{i,t-1} + \beta_5 \, logVOLATILITY_{i,t-1} + \beta_6 \, TURNOVER_{i,t-1} + \beta_7 \, \Delta EPS_{i,t} + \beta_8 \, RECDEV_{i,t} + \beta_9 \, ACCRANK_{i,t-1} + \beta_{10} \, lagRET_{i,t-1} + \beta_{11} \, PREEARN_{i,t} + \beta_{12} \, POSTEARN_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

where *CAR* is the DGTW adjusted abnormal announcement return to analyst recommendation revision, and |*CAR*| is the absolute value of the return. The variable of interest is *log#NEWS*. Similar to Green (2006) and Loh and Stulz (2010), we include a number of control variables as listed in equation (3).

The unit of analysis in this test is each individual analyst recommendation revision. This sample starts with the 268,197 firm-month observations in table 3. Given that each firm has an average of nine analysts following it and the mean proportion of analyst recommendation revision is 0.042, we arrive at a sample of 103,631 analyst recommendation revisions. Further requirements such as having necessary return data to calculate CAR reduces the sample to 96,649 recommendation revisions, with 50,983 upward

[18] Note that the results in table 3 are also consistent with the strategic timing story, in which analysts await the arrival of news for cover. We provide additional analyses to address this possibility in Section 5.3.
[19] Reiterations are excluded from our analyses.

and 45,666 downward revisions.[20] A legitimate concern on this sample is that the fact that analysts not revising recommendations does not suggest that they did not use the information from the media. However, restricting the sample to recommendation changes makes empirical inferences feasible (e.g., Beaver 1968; Loh and Stulz 2010).

Table 4 panel A reports the results from the regressions on the market reactions to analyst recommendation revisions for the event window [0, +1], with standard errors two-way clustered by firm and analyst. We standardize all continuous explanatory variables at mean 0 and standard deviation 1 to facilitate comparison of the economic magnitudes of coefficients. Columns (1) and (2) show the results for downgrade revisions, columns (3) and (4) show the results for upgrade revisions, and the last two columns include both upgrade and downgrade revisions. We find a negative and significant coefficient on *log#NEWS* for downgrade revisions (columns (1) and (2)), suggesting more negative market reactions to downgrade revisions when there is more news coverage on the firm. Likewise, we observe a positive and significant coefficient on *log#NEWS* for upgrade revisions (columns (3) and (4)), suggesting more positive market reactions to upgrade revisions when there is more news coverage on the firm. Finally, the coefficient on *log#NEWS* is positive and significant in columns (5) and (6) when we examine |*CAR*| for both upgrade and downgrade revisions. In terms of economic significance, the results indicate that a one standard deviation of *log#NEWS* is associated with a 0.59 percent change in abnormal returns for downward revisions (column 2), corresponding to roughly 19% of the mean abnormal returns in the two-day window. Similarly, the change in abnormal returns associated with one standard deviation of *log#NEWS* is 0.36 percent for upward revisions, equivalent to 14.5% of the mean abnormal returns in the two-day window (column 4). Collectively these results provide support for H_1.

[20] We consider the possibility that overlapping news coverage surrounding analyst revisions might contaminate our main results. We thus conduct a sensitivity analysis by removing from our sample revisions with overlapping news coverage, which leaves us with 41,135 downward revisions and 37,316 upward revisions. The regression results from this sensitivity analysis are similar to those reported in the paper.

The signs of coefficients on control variables are in general opposite to each other in downgrade and upgrade regressions, consistent with results in prior studies (see Green 2006, for example). Large, high *BM*, high *MOMENTUM*, and low *VOLATILITY* firms experience less negative returns upon downward revisions, and less positive returns upon upward revisions. When there is a concurrent EPS revision and when the revision deviates from consensus, the abnormal returns are more negative upon downward revisions, and more positive upon upward revisions.

The lag between our measurement of financial news and the analysts' subsequent recommendations lessens the likelihood that the revisions are merely piggybacking on financial press news. The lag is also consistent with the observation in Lawrence et al. (2017) that analysts do not issue revisions immediately on media news days. Moreover, stronger market reactions in the presence of recent press coverage are inconsistent with the piggybacking explanation of Altinkilic and Hansen (2009). However, it is important for us to establish the robustness of our primary results. Before we investigate analysts' processing of hard versus soft information in media coverage, we conduct supplemental analyses and robustness tests to mitigate concerns that other factors might explain our findings.

We first consider the possibility that the market price reactions at high volume news days could be a result of investor attention to content, rather than the revelation of firm fundamentals. For example, investors may more strongly react to information in recommendations preceded by more news coverage, which leads to stronger price reactions around the event date. To explore this possibility, we investigate the price reaction from day 2 to day 5 after the analyst recommendation revision date. If higher price reactions are merely due to investor attention, then we would expect the price reaction to reverse in day 2 to day 5. We find that the coefficient on *log#NEWS* becomes smaller on each of the subsequent days and lacks statistical significance, but there is no evidence of price reaction reversals. The results are not tabulated for brevity, but are available upon request.

To illustrate the results, we estimate both upgrade and downgrade regressions of $CAR_{i,t} = \alpha + \beta\ log\#NEWS_{i,t-1} + \varepsilon_{i,t}$ for each trading day after the recommendation revision date. The first graph of Figure 1 shows the plot of the β coefficients (on the vertical axis) that correspond to the number of days after the recommendation revision day (on the horizontal axis). As is evident from the graph, the β coefficient has the largest magnitude at day 0, and declines rapidly after the revision day. Taken together, these results are consistent with the view that analyst recommendation revisions, in particular those associated with more intense news coverage, are informative to the capital market.

Second, we address concerns about the impact of several confounding factors: (1) we collect data on firms' 8-K filings, and include the number of firm-specific 8-K filings during the same news coverage period in the regression model to address the possibility of media coverage as a proxy of firm-specific news releases from other information sources; (2) we remove recommendation revisions concurrent with earnings announcements to separate the impact of earnings announcement events; (3) we control for stock market reactions to the initial news article releases; (4) we remove articles related to analysts (17,000 articles, 3.6% of the sample); and (5) we include firm fixed effects. The regression results after incorporating the above considerations are reported in panel B of table 4. Row (1) to Row (5) show the results of incorporating each of the above controls/sample restrictions, and row (6) presents the results of incorporating all the five in one regression. We continue to observe similar results on media coverage for each regression specification, suggesting that those factors, either individually or collective, are unlikely to be the primary driver of our empirical results.[21, 22]

[21] In additional to the five modifications to the regression model, we additionally take into consideration of the impact of management earnings forecasts. Rogers and Van Buskirk (2013) show that bundled forecasts as a percentage of all forecasts increased substantially to 70% in the post Reg FD period. Therefore we restrict the sample period to the post Reg FD period and repeat the regression. We continue to observe qualitatively similar results on media coverage (untabulated).

[22] Additional robustness tests include controlling for earnings surprises and the direction of change in recommendation revisions in the market reaction regressions. The inferences from these alternative specifications are the same as those from the main specification reported in the paper. These results are not tabulated, but are available upon request.

4.4 Analyst Interpretation of Hard versus Soft Information

Although the collective empirical evidence thus far suggests that analysts incorporate firm-specific information from news coverage in their research updates and such research updates are valuable to investors, it is not clear what type of information in the news coverage analysts primarily rely on to revise their opinions. While information conveyed by the financial press is both quantitative and qualitative, recent studies suggest the media contains important soft information. The cost of processing soft information is considerably high (Liberti and Petersen 2017), which creates a demand for analysts to process this type of information. In addition, soft information seems to be an important element of the "mosaic" of information discussed in Reg. FD. Our investigation of whether analysts respond to business press information allows us to separately measure the amount of soft versus hard information in the news coverage, and shed light on whether analysts respond to the information content of firm-specific soft information. Specifically we revisit the market reactions to analyst recommendation revisions, and examine whether the market reactions differ in response to hard (quantitative) versus soft (qualitative) information in press coverage. We implement the following panel regressions:

$$CAR_{i,t} \text{ or } |CAR_{i,t}| = \alpha + \beta_1 \, log\#SOFTNEWS_{i,t-1} + \beta_2 \, log\#HARDNEWS_{i,t-1} + \beta_3 \boldsymbol{X}_{i,t-1} + \varepsilon_{i,t} \qquad (4)$$

where *CAR* is the DGTW adjusted abnormal announcement returns to analyst recommendation revisions. The variables of interest are *log#SOFTNEWS* and *log#HARDNEWS*. The vector $\boldsymbol{X}$ represents the same set of control variables as in equation (3).

Table 5 presents the results from the regressions on the market reactions to analyst recommendation revisions for the event window [0, +1], with standard errors two-way clustered by firm and by analyst. We again standardize all continuous explanatory variables at mean 0 and standard deviation 1 to facilitate the comparison of the economic magnitudes of the coefficients. Columns (1) and (2) show the results for downgrade revisions, columns (3) and (4) show the results for upgrade revisions,

and the last two columns include both upgrade and downgrade revisions. For downward revisions (columns (1) and (2)), we find a negative and significant coefficient on *log#SOFTNEWS*, but an insignificant coefficient on *log#HARDNEWS*. The difference in the two coefficients is statistically significant at better than the 5% level. We interpret the results as more negative market reactions to downgrade revisions when there is more qualitative press coverage on the firm, but not quantitative coverage. For upgrade revisions (columns (3) and (4)), we observe positive and significant coefficients on both log *log#SOFTNEWS* and *log#HARDNEWS*. Although the coefficient on *log#SOFTNEWS* is larger in magnitude, the difference in the two coefficients is not statistically significant. When we examine |*CAR*| for both upgrade and downgrade revisions in columns (5) and (6), we find that the coefficient on *log#SOFTNEWS* is positive and significant, but the coefficient on *log#HARDNEWS* is not statistically significant. The difference in the two coefficients is statistically significant at better than the 1% level.

To illustrate the results, we estimate both upgrade and downgrade regressions of $CAR_{i,t} = \alpha + \beta\ log\#SOFTNEWS_{i,t-1} + \varepsilon_{i,t}$ and $CAR_{i,t} = \alpha + \beta\ log\#HARDNEWS_{i,t-1} + \varepsilon_{i,t}$ on each trading day after the recommendation revision date. The second graph of Figure 1 shows the plot of the β coefficients (on the vertical axis) of *log#SOFTNEWS* that correspond to the number of days after the recommendation revision day (on the horizontal axis), and the third graphs shows the plot of the β coefficients (on the vertical axis) of *log#HARDNEWS*. The β coefficient of *log#SOFTNEWS* has the largest magnitude at day 0, and declines rapidly over time. In contrast, we do not observe patterns on the β coefficients of *log#HARDNEWS*. Collectively, these results are consistent with H_2, supporting that analysts contribute to the security price discovery by sifting through and extracting soft information in news coverage.

Descriptive results in table 3 suggest that analysts impound the qualitative signal from news coverage (i.e. the tonal information) in their recommendation revisions. We now formally document that the stock market responds to the tonal information contained in analyst recommendation revisions. First,

we note that our results from both table 4 and table 5 suggest that the market responds significantly to the amount of news coverage for both upward revisions and downward revisions. The upward (downward) revisions are generally triggered by the positive (negative) tone of the media coverage. The significant coefficients on *log#NEWS* in both upward and downward revision samples provide support that these revisions are informative to the investors. Second, we employ another research design to test such a link, and also consider the interactions between the tone measures and news coverage intensity. Given that we need news articles to calculate tonal measures, we remove all observations without news coverage, which results in a sample of 29,993 recommendation revisions. Specifically, we estimate the following panel regressions:

$$CAR_{i,t} = \alpha + \beta_1 TONE_{i,t-1} + \beta_2 log\#NEWS_{i,t-1} + \beta_3 TONE_{i,t-1} * log\#NEWS_{i,t-1} + \beta_4 \boldsymbol{X}_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

$$CAR_{i,t} = \alpha + \beta_1 TONE_{i,t-1} + \beta_2 log\#SOFTNEWS_{i,t-1} + \beta_3 TONE_{i,t-1} * log\#SOFTNEWS + \beta_4 log\#HARDNEWS_{i,t-1} + \beta_5 TONE_{i,t-1} * log\#HARDNEWS + \beta_6 \boldsymbol{X}_{i,t-1} + \varepsilon_{i,t} \quad (6)$$

where *CAR* is the DGTW adjusted abnormal announcement returns to analyst recommendation revisions. The variables of interest are the tone measures and the interactions between the tone and news coverage measures. Again, the vector $\boldsymbol{X}$ represents the same set of control variables from equation (3).[23]

Table 6 presents the results from these panel regressions, with standard errors two-way clustered by firm and by analyst. We again standardize all continuous explanatory variables at mean 0 and standard deviation 1 to facilitate the comparison of the economic magnitudes of the coefficients. The results on the control variables are not tabulated for brevity, but they are in general consistent with those presented earlier in table 3. Columns (1) to (3) report the regression results with three different tone measures,

[23] Given that we are interested in the effect of tone measure, we pool all the recommendation revisions together to run the regression, which is different from the research design in tables 4 and 5.

%POS, *%NEG*, and *TONE*, but without news coverage measures. Consistent with the expectation (H_3), we observe a positive coefficient on *%POS*, a negative coefficient on *%NEG*, and a positive coefficient on *TONE*, with all three coefficients highly statistically significant. We infer from the results that the stock market responds to the tonal information analysts extract from news coverage and impound in their research updates.

Column (4) presents the results estimating equation (5). Our focus is on the interaction of the tone and the news coverage measures. The results reveal that *TONE* is no longer statistically significant, but there is a positive and significant coefficient on the interaction term. Thus, the qualitative signal in the news coverage has a significant market impact when the press coverage is more intense.

Column (5) presents the results estimating equation (6). Our focus is again on the interaction of the tone and the news coverage measures, but we also separate quantitative news coverage from qualitative news coverage. Similar to column (4), we do not find a significant coefficient on *TONE*. However, the coefficients on the two interaction terms are positive and statistically significant, although the coefficient on the *log#SOFTNEWS* interaction is higher in magnitude relative to that on the *log#HARDNEWS* interaction. This result implies that the tone signal in the news coverage has a significant market impact when press coverage, in particular the qualitative press coverage, is more intense. Taken together, we interpret the empirical evidence in the paper as analysts extracting qualitative information from the news coverage, and providing such information to investors through recommendation revisions.

5 Extensions

5.1 Investors' Reactions to Initial News Articles and Their Reactions to Recommendation Revisions

We first investigate investors' reactions to initial news articles (*NEWSCAR*) to provide further evidence on analysts' information role in the capital markets. For each stock recommendation revision, we measure *NEWSCAR* as the average two-day stock market reactions to the initial news article releases.

We then link *NEWSCAR* to the direction of analyst recommendation revisions. The results are presented in Table 7, panel A. For recommendation revisions preceded by positive market reactions (*NEWSCAR*>0), 46.8% of the revisions are upgrades (confirming revisions) compared to 53.2% downgrades (contrarian revisions). Likewise for recommendation revisions preceded by negative market sentiment (*NEWSCAR*<0), 48.1% of the revisions are upgrades (contrarian revisions) relative to 51.9% downgrades (confirming revisions). Therefore, roughly half of the recommendation revisions are contrarian to the prevailing market reactions following news coverage, consistent with the slight negative correlation between *NEWSCAR* and *CAR*.[24] The evidence from this analysis suggests analyst recommendations do not merely "regurgitate" recent news articles and investors seem to wait on analysts' opinions.[25]

We provide preliminary evidence on differences between 'confirming' and 'contrarian' recommendation revisions. We estimate equation (6) again but separately for confirming and contrarian revisions. Column (1) in Table 7 panel B presents the regression results for contrarian revisions, and column (2) reports the results for confirming revisions. Our focus is on how the interactions of the tone and the soft/hard news coverage measures vary for confirming versus contrarian revisions. For contrarian revisions, we find a positive and significant coefficient on the interaction of *TONE* and *log#SOFTNEWS*, but an insignificant coefficient on the interaction of *TONE* and *log#HARDNEWS*, suggesting that analysts' processing of the tonal information in soft news articles is more informative to investors. In contrast, we

[24] The mean absolute value of *NEWSCAR* is 2.2%, compared to 4.3% for *CAR*, indicating that the overall investor reactions to recommendation revisions are stronger than that of previous news articles. To address the concern that *NEWSCAR* might be a correlated omitted variable in the analyses of *CAR*, we conduct a robustness check by including *NEWSCAR* in all our *CAR* regressions (we assume zero *NEWSCAR* for the recommendation revisions without news coverage). The coefficient of *NEWSCAR* is insignificant in all regressions, and we continue to find qualitatively similar results as those reported in the paper (row 5 in table 4 panel B).

[25] Another competing story underlying our empirical results is that analysts issue recommendation revisions to resolve uncertainty in the information signal that the market already received from news coverage. To investigate this possibility, we partition our sample firms into three sub-samples based on uncertainty (proxied by stock return volatility). For each the low (medium, high) uncertainty sub-sample, |*NEWSCAR*| is 1.26% (1.97%, 3.74%) compared to |*CAR*| of 3.23% (4.83%, 7.97%). The difference in market reactions between news article and recommendation revision dates does not seem to vary with the level of uncertainty. Therefore, it is unlikely that the primary results in our paper are driven by this resolving uncertainty story.

find positive and significant coefficients on both interaction terms for confirming revisions, consistent with the view that analysts' processing of the tonal information in both soft news articles and hard news articles is equally informative to the market. Taken together, we interpret the evidence as consistent with the notion that analysts' ability of processing qualitative information from the news coverage is particularly important for them to issue informative recommendation revisions that change prevailing market sentiments.

5.2 Do Analysts Strategically Reference the Media?

Analysts might *strategically* reference the media as "cover" for recommendation downgrades, so we examine the number of days between analyst revisions and news articles. The mean (median) distance is 15.76 (15.55) days for upgrade revisions, and 15.58 (15.55) days for downgrade revisions, which does not support the media being cover for downgrades. Alternatively, revisions following closer to news articles are more likely to be those for which analysts are strategically citing them, whereas later revisions are those where analysts actually process the information as in the mosaic theory. For each revision, we partition the sample based on the lag. We then estimate the regressions of model (3) on the market reactions to analyst recommendation revisions for the event window [0, +1] using the two subsamples separately, with standard errors two-way clustered by firm and by analyst. Table 8 reports the results.

Columns (1) and (2) show the results for downgrade revisions, columns (3) and (4) show the results for upgrade revisions, and the last two columns include both upgrade and downgrade revisions. The results for the subsample of revisions closer to the news articles are presented in columns (1), (3), and (5), and those for the distant subsample are in columns (2), (4), and (6). There are no significant differences in the *log#NEWS* coefficient between the two subsamples of interest, suggesting similar market reactions to revisions regardless of the timing lag.

5. Conclusion

To our knowledge, this is the first study to examine the role of the media in providing information that is subsequently used by analysts in generating informative research. Whereas researchers most commonly presume that analysts primarily obtain information from financial reports and disclosures by firms, recent research has highlighted that analysts obtain non-financial information from alternative sources, such as manager forecasts (Hutton, Lee and Shu 2012), industry-level information (Kadan et al. 2012), broker-hosted investor conferences (Green et al. 2014), and nonverbal cues during manager presentations (Mayew and Venkatachalam 2012). We extend these studies by examining analysts' use of information, especially soft information, from firm-specific print news coverage.

We investigate whether sell-side analysts use information conveyed by the financial press. Our specific examination is of the link between information disseminated by the media, its assimilation by analysts, and the communication of their analyses to investors. We document that analysts are more likely to revise their stock recommendations following greater news coverage of a firm. Moreover, investors' reactions to analysts' revisions are stronger when such revisions are linked to previous news coverage. Finally, we partition news by tone and type, and find not only that analysts and investors respond to both optimistic and pessimistic tone, but that the usefulness of news coverage by analysts and investors is primarily driven by soft information rather than hard information in the news. The collective empirical evidence suggests analysts meet investor demand for sell side research after media coverage, probably due to the time requirement to process soft information in the financial press. Our study primarily contributes to the general literature on the efficiency of capital markets, which is achieved through the free flow of information among participants in the capital markets.

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Appendix A: Descriptive Statistics from News Articles

	News Category	N	Percentage
(1)	Company News: Firm Source	41	0.164
(2)	Company News: External Reporting	38	0.152
(3)	Investigative Reports	36	0.144
(4)	Mix: News + Comments & Analyses	110	0.440
(5)	Other News	25	0.100
	Total	250	1.000
(1) + (2)	Company News	79	0.316
(3) + (4)	Investigative + Mix	146	0.584

(1) Company news, firm source: news articles covering both corporate-issued press releases
(2) Company news, external reporting: articles about corporate news, but from a third-party perspective
(3) Investigative reports: articles with reporters investigate a topic of interest (the most prominent example is the WSJ article about Enron frauds in October 2011).
(4) Mix: articles with both company news and some investigative evidence such as comments and analyses.
(5) Other news: non corporate news articles (e.g. legislation or political news)

Appendix B: Descriptive statistics from S&P 500 Analyst Reports 2012

Fraction of Analyst Reports that Mentions a News Outlet		Overall	National	Local
	Percentage	29.04%	29.04%	0.00%
	N	28,047	27,992	98
Regression Analysis		I(News Mention = 1)		
	log#NEWS	0.0594***		
		(0.0118)		

Appendix C: Examples of Hard News Articles and Soft News Articles

C.1. Hard News Articles:

The HSRATIO for the article about Apple is 0.769, and for the article about Microsoft is 0.592.

Apple Earnings Bolstered By iPod and Notebook Sales

By JOHN MARKOFF

570 words
20 July 2006
The New York Times
NYTF
Late Edition - Final
3
English

SAN FRANCISCO, July 19 -- Confounding Wall Street skeptics, **Apple** Computer released quarterly financial results Wednesday that showed strong growth in both its iPod music player and its MacBook portable computer businesses.
Some analysts speculated in recent weeks that the extraordinary growth in its portable digital music business might be coming to a close. The company reported that it sold 8.1 million iPod players, however, an increase of 32 percent over the comparable quarter a year ago.

And the company cited a recent report from the market research company NPD that said **Apple** still held a 75 percent share of the digital music player market.

Apple, based in Cupertino, Calif., said net income increased 48 percent, to $472 million, or 54 cents a share, from $320 million, or 37 cents, a year earlier. Revenue for the period, the third quarter of its fiscal year, climbed 24 percent, to $4.37 billion, from $3.52 billion a year earlier. Thompson Financial reported that analysts had expected earnings of 44 cents a share.

"We are thrilled to have reported the second-highest quarterly sales and earnings in **Apple**'s history," said Peter Oppenheimer, **Apple**'s chief financial officer. The company's strongest quarter ever was its holiday quarter last year -- the first quarter of its 2006 fiscal year-- when it announced record profit and revenue.

The star this quarter was **Apple**'s new MacBook portable computer.

"It was a terrific quarter on an earnings basis," said Charles Wolf, a financial analyst at Needham & Company. "The absolutely astonishing number in my estimation was the sale of notebooks."

The company shipped 798,000 notebook computers during the quarter, Mr. Wolf said, and its entry-level notebook, the MacBook, was on sale for just six weeks during the quarter.

The company shipped 1.33 million Macintosh personal computers, a 12 percent increase over the comparable quarter a year ago, and said that its new Intel-based product line was growing strongly. The 12 percent increase exceeded the 9.5 percent industrywide increase in sales of PC's reported Wednesday by the market research firm, International Data. According to the Gartner Group, **Apple**'s market share has risen to 4.6 percent, from 4.3 percent, in the United States in the last year.

The company also said it benefited in the quarter from favorable component pricing and that it expected those trends to continue in the next quarter. It counseled analysts that it expected revenue of $4.5 billion to $4.6 billion for its fourth quarter.
Apple is in the midst of a transition from computers that use a microprocessor made by I.B.M. to ones made by Intel. The company said that it believed that some of its professional users had delayed purchases of new desktop computers while they awaited an Intel-based version.

Analysts and industry executives expect the company to introduce those models at its annual World Wide Developers Conference, which will begin Aug. 7 in San Francisco.

In a conference call with analysts after its announcement, **Apple** said that it had been significantly increasing its share in the United States education market. The company's share increased by 11 percent for the entire educational market, which shrank 4 percent in the last year, according to Timothy D. Cook, **Apple**'s chief operating officer.

MICROSOFT SUIT DRAGS MARKET TO THIRD CONSECUTIVE LOSS

469 words
19 May 1998
St. Louis Post-Dispatch
SLMO
EDITION: FIVE STAR LIFT
PAGE: C9
English

U.S. stocks fell for a third day after the government filed an antitrust suit against **Microsoft** Corp. that could prevent the world's biggest personal-computer software company from quickly tapping into new markets.

The suit could have a bigger impact than just slowing down one of the stock market's fastest-growing companies, investors said. "I don't think the government really thought out the economic consequences," said Elizabeth Bramwell, president of Bramwell Capital Management, which oversees $600 million. "If you slow down product rollouts, you affect job creation and tax revenues."

Oil shares contributed to the market's decline, as the price of crude dropped below $14 a barrel for the first time since March. Losses were tempered by gains in drugmakers, and by optimism that Federal Reserve policymakers will keep benchmark interest rates unchanged at their meeting today.

The Dow Jones Industrial Average fell 45.09, or 0.5 percent, to 9050.91, led by Hewlett-Packard Co., down 3 5/16 to 66 1/8, and Chevron Corp., down 2 5/16 to 82 11/16. The Dow is down 1.7 percent since setting a record on Wednesday. The Standard & Poor's 500 Index lost 2.91, or 0.3 percent, to 1105.82, while the Nasdaq Composite Index dropped 15.15, or 0.8 percent, to 1831.62.

Microsoft dropped 3 3/8 to 86 1/16, bringing its loss in the past three and a half weeks to 13 percent. The U.S. Justice Department and 20 states sued **Microsoft** after last-minute negotiations failed over the weekend.

The showdown could disrupt the pipeline of new software throughout the industry, and slow **Microsoft**'s push to develop products for the fast-growing Internet, analysts said.

Microsoft rose about 50 percent annually in the past decade, more than double the S&P 500 Index's 19 percent annual return. The stock is the S&P 500's second-biggest, behind only General Electric Co. - so bad news for **Microsoft** is troublesome for the market.

The decline in computer shares overshadowed optimism that corporate borrowing costs will stay low. The yield on the benchmark 30-year Treasury bond, which moves opposite to its price, fell to 5.92 percent from 5.97 percent.

Falling bond yields are good for stocks because they make it cheaper for companies to expand their businesses and also boost the attraction of returns on equities.

"The bond market is telling us that the Fed's not going to do anything on interest rates tomorrow," said Louis Todd, head of equities trading at J.C. Bradford & Co. in Nashville, Tennessee.

C.2. Soft News Articles:

The HSRATIO for the article about Apple is 0.285, and for the article about Abbott is 0.324.

Apple Plots Its TV Assault

By
Jessica E. Vascellaro And
Sam Schechner
December 19, 2011

Apple Inc. is moving forward with its assault on television, following up on the ambitions of its late co-founder, Steve Jobs.

In recent weeks, Apple executives have discussed their vision for the future of TV with media executives at several large companies, according to people familiar with the matter.

WSJ's Sam Schechner reports on Apple's plans to build its own television that would feature wireless streaming to access shows, movies and content.

Apple is also working on its own television that relies on wireless streaming technology to access shows, movies and other content, according to people briefed on the project.

In the recent meetings with media companies, the Apple executives, including Senior Vice President Eddy Cue, have outlined new ways Apple's technology could recognize users across phones, tablets and TVs, people familiar with the talks said.

In at least one meeting, Apple described future television technology that would respond to users' voices and movements, one of the people said. Such technology, which Apple indicated may take longer than some of its other ideas, might allow users to use their voices to search for a show or change channels.

Apple is still saying little about what specific software and devices it is working on. The people familiar with the meetings said the Cupertino, Calif., company was "vague" and that Apple hasn't made proposals to license shows for any new product offering.

Still, the talks—some of which were made at the request of media companies seeking an update on Apple's plans—suggest that Apple's TV strategy is advancing. The technology company often keeps its products and ideas, close to the vest until as late as possible.

Apple executives have given some specifics in its talks with media companies. The company, for example, has discussed new ways they could stream media companies' content, allowing a user to watch a video on a TV set, then pick up another device, such as a smartphone, and keep watching the video on the move, one of the people familiar said.

Another person familiar with the talks said the types of new services Apple and the media companies are discussing could be done with Apple's existing technologies, which include its Apple TV set-top box.

Apple's Eddy Cue, seen in October, is involved in the company's TV plans.

Around three months after it started selling a new, $99 version of the set-top box last year, Apple said it had sold more than a million but hasn't provided sales figures since.

Apple's uptick in talks with its media partners is part of the company's strategy to change the way consumers watch TV, just as the company transformed the music and cellphone industries. Mr. Jobs envisioned building a TV that would be controlled by Apple's mobile devices in order to be easier to use and more personalized, according to people familiar with the matter.

The company has worked on prototypes for years. Before his death in October, Mr. Jobs told biographer Walter Isaacson that he had "finally cracked it," according to Mr. Isaacson's book.

The TV device Apple is working on would use a version of Apple's wireless-streaming technology AirPlay to allow users to control it from iPhones and iPads, according to people briefed on the matter. When the company plans to start selling such a device and whether it would receive traditional broadcast or cable signals remains unclear, said these people, who say Apple may change its plans.

The technology could allow users to stream video from mobile devices to their televisions, without a set-top box. That process is already possible through its Apple TV set-top box, but it is cumbersome and some media companies, such as Time Warner Inc.'s cable channel HBO, prevent their apps from using the technology because they want closer control of how and where their content appears. An HBO spokesman says it hopes to use AirPlay once it is comfortable with the antipiracy protection.

Apple has worked on technologies for integrating DVR storage and iCloud, its online syncing and storage service, into the device, according to a person briefed on the matter. Such technologies could allow users to watch shows they have saved or purchased on two different devices, like a TV and a computer, without having to buy or record the shows twice.

Other media outlets have reported that Apple is developing a TV. An Apple spokesman declined to comment.

Apple is one of a number of companies rushing to re-imagine TV by making it resemble watching video on devices like computers and tablets. Like Apple, these companies are taking the approach of trying to tie together the multitude of devices consumers use daily but that don't currently talk to each other.

Google Inc. is trying to enable users to access apps and Internet video on traditional TVs through its Google TV software, which shares some technology with its Android mobile operating system and can be controlled via Android and iPhone apps. Microsoft Corp. offers a mobile app to search for and play entertainment content on its Xbox live gaming console, which streams an array of video. Cable, satellite and phone companies are launching their own video services for computers and tablets and reformatting their traditional interfaces to resemble them.

The efforts are changing the definition of television and the business models around it. In the past, watching television meant tuning in to a TV network live. Now, it means watching video on a broad array of devices from a growing number of providers.

The pace of change puts media companies that make TV shows and program TV channels in a dilemma. On one hand, they hope that they can increase their profits by selling new services on new devices. But they are worried that a proliferation of new services could undermine the existing TV business, which brings in more than $150 billion a year in the U.S. in advertising and consumer spending on monthly TV subscriptions from cable, satellite and telecommunications companies.

What kind of cooperation Apple is seeking from media companies remains unclear. Over the years, Apple has had mixed success getting television companies to agree to new business arrangements for its iTunes store.

The company has also talked to television-service providers about teaming up on new video services for Apple devices, according to people familiar with the matter. It has also broached the idea of licensing content directly from media companies for some sort of subscription-TV service, resembling the packages offered now by cable operators, but the talks have been "exploratory," according to people familiar with the matter.

In meetings as far back as 2010, Mr. Jobs met with a series of cable and satellite executives to discuss next-generation television services for Apple devices, according to people familiar with the matter. Among the questions Mr. Jobs asked in the series of meetings was how much of the universe of video content the providers actually had the rights to, according to a person familiar with the meetings.

Apple's own executives have wondered what the company had up its sleeve. Last year, at its "top 100" meeting for senior managers in Carmel, Calif., an attendee asked Mr. Jobs whether Apple was developing a television.

He responded that it would be a bad business to get into, noting that the margins on television are far lower than the margins Apple makes from its other devices and that consumers don't buy new televisions very frequently, according to this person.

Stents Perform Well, Studies Demonstrate

By Jon Kamp
701 words
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The Wall Street Journal Online

Stent heart devices from Abbott Laboratories and Medtronic Inc. outperformed an older device from Boston Scientific Corp. in three-year data from two studies by better helping patients avoid serious events, Abbott and Medtronic said Monday.

Abbott and Medtronic each released fresh study details during the Transcatheter Cardiovascular Therapeutics conference in San Francisco. The data came from separate, company-funded studies that the companies used to win approval for their drug-coated stents in the U.S. last year. These stents—tiny scaffolds used to hold open heart arteries—use medication to fight renarrowing and constitute a roughly $4 billion global market.

Abbott's Xience stent leads the domestic market behind solid study data, and Medtronic has been working to improve modest sales for its Endeavor stent by highlighting the device's long-term safety profile.

In both studies released Monday, the companies measured their devices against the Taxus Express stent from Boston Scientific that formerly led in the U.S. and has since been replaced by a newer version called Taxus Liberte. Abbott and Medtronic have argued that their studies remain relevant, however, because of similarities between the newer and older Boston Scientific devices.

Donald S. Baim, chief medical and scientific officer at Boston Scientific, said in a statement the company was "very pleased" with how Taxus Express performed in the Abbott trial's match-up.

The Spirit III study for Abbott's Xience stent has previously shown Xience outperforming the Boston Scientific device on certain fronts, including a composite measurement of serious events that includes death and heart attacks.

In the three-year data from the 1,002-patient study, Abbott's stent had a 9.1% rate of so-called major adverse cardiac events, compared with a 15.7% rate for Taxus Express, Abbott said. In addition to cardiac death and heart attacks, that composite measurement includes retreatment of the same area in the affected artery.

On another combined measure of events called target lesion failure, the rate was 8.3% with Xience and 14.4% with the Boston Scientific stent, Abbott said. The company also noted that Xience had no additional cases of late-developing, stent-related clots in the study between years two and three.

The rise of Xience has both helped and hurt Boston Scientific. While its Taxus device lost the market lead, Boston Scientific has maintained a strong position because it also sells the Xience stent under the name Promus and a profit-sharing deal with Abbott.

Abbott cited market-share estimates for July from an outside firm that show Xience and Promus holding more than half the U.S. market combined. Taxus Liberte is next at 20%, followed by a Johnson & Johnson stent and Medtronic's Endeavor.

Endeavor's share has been squeezed by Xience and Promus, but also the perception created by some earlier study data that Endeavor isn't a strong performer when it comes to avoiding renarrowing that can lead to repeat procedures.

The fresh evidence from Medtronic's 1,548-patient Endeavor IV study doesn't show a difference between Endeavor and Taxus Express at three years on measures of retreatment. But it does show fewer late-developing clots for Endeavor between years one and three, and this fuels a finding of fewer heart attacks with theMedtronic stent at three years, the company said.

Medtronic also noted better performance for Endeavor on a combined measure of death due to heart events and heart attacks.

Avoiding rare but potentially deadly clots that develop after a year became a serious concern in the coated-stent market after evidence arose three years ago about the dangers of such developments. While clotting worries have since eased, the need to keep coated-stent patients on long courses of anticlotting drugs has kept doctors from using those devices in many cases.

In the Endeavor IV study, Endeavor had more cases of clots through 360 days than Boston Scientific's stent. But there was one case among Endeavor patients between 360 days and 1,080 days, and 11 cases among Taxus Express patients in that span.

Table 1: Summary Statistics for News Coverage

This table presents descriptive statistics on the number of articles for each newspaper, as well as the number of words and news tone measures per article: %NEG is the number of negative words over total number of words for each article. %POS is the number of positive words over total number of words for each article. SD and Mean are standard deviations and sample means of the news articles in the corresponding news outlets.

	# Articles	Mean(Words)	Mean(%NEG)	SD(%NEG)	Mean(%POS)	SD(%POS)
Wall Street Journal	306,824	641	0.018	0.014	0.007	0.006
New York Times	92,806	522	0.018	0.014	0.006	0.004
Washington Post	41,368	708	0.018	0.015	0.006	0.005
USA Today	17,496	685	0.017	0.014	0.008	0.006
Atlanta Journal-Constitution	20,110	706	0.015	0.013	0.007	0.005
Boston Globe	28,430	496	0.016	0.015	0.007	0.008
Denver Post	13,906	596	0.016	0.014	0.006	0.005
Star Tribune	18,383	649	0.016	0.014	0.007	0.006
Pittsburgh Post Gazette	27,440	645	0.017	0.013	0.007	0.006
St Louis Post Dispatch	30,760	527	0.016	0.014	0.006	0.006

Table 2: Summary Statistics for firm Level Variables

This table reports summary statistics firm level variables. We have in total 41,101 firm-months and 88,473 analyst recommendation revisions in this sample. CAR is the DGTW-adjusted two-day [0,+1] return around each recommendation change and |CAR| is its absolute value . TURNOVER is average daily turnover calculated as average trading volume divided by number of shares outstanding over the past 60 days. VOLATILITY is the lag daily volatility over the past 60 days. lagRET is lag return over the past 1 month. ΔREC is the change in recommendation levels. BM is log of book-to-market ratio. MV is market equity in million dollars. TONE is the difference between $\%POS$ and $\%NEG$. MOMENTUM is the stock return over the past 6 months (skipping the most recent month). #ANALYSTS is the number of analysts that cover firm in month t. PREEARN is an indicator variable indicating the recommendation is issued within 15 days before an earnings announcement. PREEARN is an indicator variable indicating the recommendation is issued within 15 days after an earnings announcement. ΔEPS is an indicator variable of whether the analyst issued a change in EPS forecast within the past 3 days. RECDEV is the absolute difference between the recommendation and median analyst recommendation and it proxies for deviation from consensus. ACCRANK is the rank of analyst forecast accuracy. It is a discrete variable ranging from 1 to 5. $PROP\_REVISING$ is the proportion of analyst revise the recommendation in the next month. #NEWS is the number of news articles about the firm between days {-30, -3} prior to the analyst recommendation revision date. #HARDNEWS is the number of hard news articles. #SOFTNEWS is the number of soft news articles. Please refer to section 3.2 for hard news and soft news definitions.

Variable	**Mean**	**Median**	**Std Dev**	**Q1**	**Q3**
|CAR|	4.987	2.667	7.719	1.133	5.767
CAR	-0.385	-0.039	9.182	-2.718	2.613
TURNOVER	2.064	2.099	0.917	1.472	2.694
VOLALTILITY	3.236	2.693	2.044	1.878	3.968
lagRET	0.985	0.776	13.653	-5.312	6.765
ΔREC	-0.019	0.000	1.289	-1.000	1.000
BM	0.594	0.427	0.898	0.247	0.697
MV	27,479.785	8,071.182	53,318.282	2,132.420	25,856.626
MOMENTUM	5.366	5.831	36.296	-9.868	21.062
TONE	-0.012	-0.010	0.014	-0.019	-0.003
#ANALYSTS	9.236	8.000	6.718	4.000	13.000
PREEARN	0.135	0.000	0.117	0.000	1.000
POSTEARN	0.321	0.000	0.467	0.000	1.000
ΔEPS	0.496	0.000	0.499	0.000	1.000
RECDEV	0.906	1.000	0.757	0.000	1.000
ACCRANK	2.953	3.000	1.339	1.000	4.000
PROP_REVISING	0.042	0.000	0.100	0.000	0.048
#NEWS	2.338	0.000	8.854	0.000	1.000
#HARDNEWS	1.169	0.000	3.309	0.000	1.000
#SOFTNEWS	1.169	0.000	6.080	0.000	0.000

Table 3: News Coverage and Analyst Recommendation Change

Panel A tests whether news coverage increases the analyst recommendation changes. The dependent variable is the proportion of analyst issuing a recommendation change in the following month. The independent variables include log#NEWS (log number of news), I(#NEWS = 1) and I(#NEWS > 1) (two indicator variables for number of news equals to 1 and number of news greater than 1), logMV and number of active analyst coverage (#ANALYSTS) and |lagRET| (the absolute return in the previous month). Panel B presents Fama-Macbeth regressions on mean recommendation changes. %NEG is the number of negative words over total number of words for each article published in the month prior to the recommendation revisions. %POS is the number of positive words over total number of words for each article published in the month prior to the recommendation revisions. TONE is the difference between %POS and %NEG. %HARD is the percentage of hard news in the past one month. See Table 2 for the definition of other variables included in the regression. Estimates and standard error are based on the time series of cross-sectional regressions. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: News Coverage Intensity and Analyst Recommendation Revisions

	(1)	(2)
VARIABLES	*PROP_REVISING*	*PROP_REVISING*
I(#NEWS = 1)	0.0166***	
	(0.000708)	
I(#NEWS > 1)	0.0167***	
	(0.00091)	
log#NEWS		0.00473***
		(0.000221)
|lagRET|	0.00421***	0.00428***
	(0.000180)	(0.000180)
logMV	-0.00255***	-0.00218***
	(0.000254)	(0.000255)
#ANALYSTS	0.00176***	0.00118***
	(0.000235)	(0.000232)
Constant	0.0376***	0.0399***
	(0.000197)	(0.000177)
Observations	268,197	268,197
Adjusted R^2	0.031	0.025

Panel B: Predicting Recommendation Change				
VARIABLES	(1) ΔREC	(2) ΔREC	(3) ΔREC	(4) ΔREC
%NEG	-0.263**			
	(0.115)			
%POS		0.154		
		(0.109)		
TONE			0.271**	0.278**
			(0.114)	(0.116)
%HARD			0.0301	0.0945
			(0.124)	(0.123)
logMV				0.126
				(0.157)
logBM				-0.243**
				(0.119)
MOMENTUM				-0.658
				(0.693)
LAG(ΔREC)				-0.780***
				(0.172)
Constant	0.122	0.124	0.139	-0.0438
	(0.168)	(0.166)	(0.169)	(0.175)
Observations	41,101	41,101	41,078	41,078
Average R^2	0.001	0.001	0.001	0.001
Number of groups	179	179	179	179

Table 4: News Coverage Intensity and Announcement Return

This table presents the regression results on recommendation revision abnormal returns with panel A event window [0,+1] and panel B event window [+2, +5]. CAR is DGTW-adjusted returns around the recommendation revision. #NEWS is calculated as $\log(1 + \#NEWS)$, with $\#NEWS$ defined as the number of articles published in the prior month before recommendation revisions. log#HARDNEWS is log(1+#HARDNEWS), where #HARDNEWS is the number of hard news count. log#SOFTNEWS is log(1+#SOFTNEWS), where #SOFTNEWS is the number of soft news count. ΔEPS is an indicator variable on whether there is a concurrent EPS revision. RECDEV is the deviation of the recommendation from the consensus recommendation measure. ACCRANK is the earnings forecast accuracy rank for the analyst(range from 1 to 5). PREEARN is a dummy variable that indicates the firm is going to make an earnings announcement in the next 15 days. POSTEARN is a dummy variable that indicates that the firm made an earnings announcement in the past 15 days. See Table 2 for the definition of other variables included in the regression. Two-way clustered standard errors (by firm and by analyst) are reported in parentheses. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: Return Window (0,1)

	DOWNGRADE		UPGRADE		ALL	
VARIABLES	CAR	CAR	CAR	CAR	|CAR|	|CAR|
	(1)	(2)	(3)	(4)	(5)	(6)
log#NEWS	-0.665***	-0.593***	0.404***	0.364***	0.825***	0.742***
	(0.132)	(0.123)	(0.0710)	(0.0741)	(0.0809)	(0.0702)
logMV	1.123***	1.130***	-1.150***	-1.070***	-1.520***	-1.421***
	(0.0886)	(0.0950)	(0.0590)	(0.0710)	(0.0608)	(0.0611)
logBM		0.675***		-0.174***		-0.605***
		(0.0788)		(0.0598)		(0.0520)
MOMENTUM		0.283***		-0.317***		-0.484***
		(0.0767)		(0.0515)		(0.0404)
logVOLATILITY		-0.791***		0.446***		1.180***
		(0.0838)		(0.0634)		(0.0525)
TURNOVER		-0.0953		0.0735		0.0836*
		(0.0718)		(0.0530)		(0.0475)
ΔEPS		-1.420***		0.333***		0.566***
		(0.103)		(0.0703)		(0.0592)
RECDEV		-0.297***		0.197***		0.00714
		(0.0459)		(0.0336)		(0.0435)
ACCRANK		-0.000311		-0.0162		-0.00145
		(0.0415)		(0.0308)		(0.0230)
lagRET		0.764***		-0.0978		-0.716***
		(0.0872)		(0.0697)		(0.0526)
PREEARN		0.134		0.206*		0.169*
		(0.173)		(0.117)		(0.0967)
POSTEARN		-0.707***		0.799***		1.031***
		(0.133)		(0.0958)		(0.0811)
Constant	-3.127***	-2.150***	2.500***	2.242***	4.544***	3.863***
	(0.0772)	(0.179)	(0.0501)	(0.124)	(0.0604)	(0.112)
Observations	50,983	46,753	45,666	41,720	96,649	88,473
Adjusted R^2	0.014	0.060	0.029	0.044	0.044	0.128

Panel B: Robustness Tests				
	Variables	Downgrade (1)	Upgrade (2)	All (3)
(0) Baseline results from table 4	log#NEWS	-0.593***	0.364***	0.742***
		(0.1230)	(0.0741)	(0.0702)
	# of obs.	46,753	41,720	88,473
(1) After controlling for the amount of 8-K news	log#NEWS	-0.569***	0.358***	0.720***
		(0.1230)	(0.0743)	(0.0705)
	# of obs.	46,753	41,720	88,473
(2) After removing revisions coinciding with Earnings Announcements	log#NEWS	-0.539***	0.237***	0.713***
		(0.1370)	(0.0614)	(0.0756)
	# of obs.	38,773	34,532	73,305
(3) After controlling for NEWSCAR	log#NEWS	-0.583***	0.364***	0.739***
		(0.1240)	(0.0745)	(0.0705)
	# of obs.	46,753	41,720	88,473
(4) After deleting articles mentioning analysts	log#NEWS	-0.573***	0.367***	0.731***
		(0.1230)	(0.0743)	(0.0705)
	# of obs.	46,753	41,720	88,473
(5) After including firm fixed effects	log#NEWS	-0.602***	0.377***	0.752***
		(0.1250)	(0.0756)	(0.0714)
	# of obs.	46,753	41,720	88,473
(6) All above controls	log#NEWS	-0.340**	0.169**	0.737***
		(0.1370)	(0.0861)	(0.0844)
	# of obs.	37,408	33,145	72,247

Table 5: Types of News and Recommendation Announcement Return

This table presents regression results on recommendation revision announcement returns, with event window [0,+1]. CAR is DGTW-adjusted returns around the recommendation revision. log#NEWS is calculated as log(1+#NEWS), with #NEWS defined as the number of articles published in the prior month before recommendation revisions. log#HARDNEWS is log(1+#HARDNEWS), where #HARDNEWS is the number of hard news count. log#SOFTNEWS is log(1+#SOFTNEWS), where #SOFTNEWS is the number of soft news count. The definition of soft news article and hard news article is discussed in the data section. ΔEPS is an indicator variable on whether there is a concurrent EPS revision. RECDEV is the deviation of the recommendation from the consensus recommendation measure. ACCRANK is the earnings forecast accuracy rank for the analyst(range from 1 to 5). PREEARN is a dummy variable that indicates the firm is going to make an earnings announcement in the next 15 days. POSTEARN is a dummy variable that indicates that the firm made an earnings announcement in the past 15 days. See Table 2 for the definition of other variables included in the regression. Two-way clustered standard errors (by firm and by analyst) are reported in parentheses. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	DOWNGRADE		UPGRADE		ALL	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	CAR	CAR	CAR	CAR	|CAR|	|CAR|
log#HARDNEWS	0.0980	0.104	0.108*	0.0946*	0.00775	-0.0270
	(0.0931)	(0.0886)	(0.0560)	(0.0572)	(0.0561)	(0.0514)
log#SOFTNEWS	-0.427***	-0.383***	0.207***	0.185***	0.531***	0.494***
	(0.137)	(0.125)	(0.0616)	(0.0634)	(0.0792)	(0.0705)
logMV	0.952***	0.943***	-1.102***	-1.017***	-1.372***	-1.255***
	(0.0808)	(0.0854)	(0.0563)	(0.0663)	(0.0583)	(0.0557)
logBM		0.636***		-0.163***		-0.571***
		(0.0783)		(0.0591)		(0.0514)
MOMENTUM		0.284***		-0.313***		-0.480***
		(0.0769)		(0.0517)		(0.0406)
logVOLATILITY		-0.806***		0.448***		1.191***
		(0.0852)		(0.0635)		(0.0528)
TURNOVER		-0.152**		0.0946*		0.144***
		(0.0704)		(0.0534)		(0.0467)
ΔEPS		-1.437***		0.345***		0.591***
		(0.103)		(0.0704)		(0.0603)
RECDEV		-0.302***		0.198***		0.00106
		(0.0463)		(0.0336)		(0.0233)
ACCRANK		0.00396		-0.311***		0.0615
		(0.157)		(0.117)		(0.0928)
lagRET		0.767***		-0.0948		-0.713***
		(0.0877)		(0.0699)		(0.0530)
PREEARN		0.0682		0.223*		0.234**
		(0.172)		(0.116)		(0.0963)
POSTEARN		-0.703***		0.806***		1.030***
		(0.134)		(0.0967)		(0.0825)
Constant	-3.138***	-2.146***	2.497***	2.239***	4.546***	3.840***
	(0.0790)	(0.180)	(0.0501)	(0.124)	(0.0613)	(0.113)
Observations	50,983	46,753	45,666	41,720	96,649	88,473
Adjusted R^2	0.011	0.062	0.028	0.043	0.037	0.124
$\beta_{SOFT} - \beta_{HARD}$	-0.525***	-0.445**	0.0988	0.0902	0.524***	0.523***

Table 6: News Coverage Intensity, Tone of News and Recommendation Announcement Return

Panel regression on recommendation revision abnormal returns. CAR corresponds to DGTW-adjusted return for recommendation revisions. log#NEWS is calculated as $\log(1 + \#NEWS)$. log#HARDNEWS is log(1+#HARDNEWS), where #HARDNEWS is the number of hard news count. log#SOFTNEWS is log(1+#SOFTNEWS), where #SOFTNEWS is the number of soft news count. Control variables are included in the regressions, but are not reported in the table. Control variables include: logMV, logBM, MOMENTUM, logVOLATILITY, RECDEV, ACCRANK, lagRET, REEARN, and POSTEARN. See Table 2 for the definition of other variables included in the regression. Two-way clustered standard errors (by firm and by analyst) are reported in parentheses. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

VARIABLES	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR
%POS	0.231***				
	(0.0758)				
%NEG		-0.404***			
		(0.0734)			
TONE			0.419***	-0.0268	0.103
			(0.0771)	(0.121)	(0.100)
TONE * log#NEWS				0.662***	
				(0.157)	
TONE * log#HARDNEWS					0.240***
					(0.0895)
TONE * log#SOFTNEWS					0.469***
					(0.131)
log#HARDNEWS					-0.115
					(0.0734)
log#SOFTNEWS					0.00948
					(0.0844)
log#NUMNEWS	-0.161	-0.162	-0.157	-0.115	
	(0.110)	(0.109)	(0.109)	(0.0980)	
Control Variables	YES	YES	YES	YES	YES
Observations	29,993	29,993	29,993	29,993	29,993
Adjusted R^2	0.018	0.020	0.020	0.024	0.024

Table 7: Confirming vs. Contrarian Recommendations

This table presents the results of regressions on recommendations revision abnormal returns, CAR for contrarian and confirming recommendation revisions separately. CAR is defined as DGTW-ajusted returns for recommendation revisions, while NEWSCAR is the average 2-day stock market reaction to the news article releases (prior to recommendation revisions). A confirming recommendation is a revision that confirms initial market reactions to the news ($NEWSCAR > 0$ followed by an upgrade or $NEWSCAR < 0$ followed by a downgrade). A contrarian recommendation is a revision that is opposite to the initial market reactions to the news ($NEWSCAR > 0$ follwed by a downgrade or $NEWSCAR > 0$ followed by an upgrade). Panel A presents the adjacency table for the distribution of confirming and contrarian recommendation revisions. Panel B presents the regression results on recommendations revision abnormal returns (CAR) for the confirming and contrarian recommendation revisions separately. log#HARDNEWS is log(1+#HARDNEWS), where #HARDNEWS is the number of hard news articles. log#SOFTNEWS is log(1+#SOFTNEWS), where #SOFTNEWS is the number of soft news articles. Control variables include: logMV, logBM, MOMENTUM, logVOLATILITY, RECDEV, ACCRANK, lagRET, REEARN, and POSTEARN. See Table 2 for the definition of other variables included in the regression. Two-way clustered standard errors (by firm and by analyst) are reported in parentheses. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: Adjacency Table

		RECCHG	
		Upgrade	Downgrade
NEWSCAR	(> 0)	N=6985 46.80% (CAR=2.11%)	N=7941 53.20% (CAR=-3.23%)
	(< 0)	N=7246 48.10% (CAR=2.26%)	N=7814 51.90% (CAR=-2.42%)

Panel B: Contrarian vs. Confirming Recommendations		
VARIABLES	Contrarian CAR	Confirming CAR
TONE	0.000325	0.251**
	(0.15)	(0.122)
TONE*log#HARDNEWS	0.176	0.328***
	(0.145)	(0.12)
TONE*log#SOFTNEWS	0.441***	0.380***
	((0.169)	(0.143)
log#HARDNEWS	-0.11	-0.117
	(0.108)	(0.0929)
log#SOFTNEWS	-0.0281	0.0654
	(0.12)	(0.101)
logMV	0.173	0.107
	(0.151)	(0.153)
logBM	0.398***	0.200*
	(0.114)	(0.112)
MOMENTUM	0.598***	0.173
	(0.133)	(0.11)
logVOLATILITY	-0.395***	-0.172
	(0.128)	(0.134)
TURNOVER	0.0211	0.162
	(0.120)	(0.127)
ΔEPS	-0.589***	-0.737***
	(0.153)	(0.146)
RECDEV	-0.245***	-0.0562
	(0.0774)	(0.0734)
ACCRANK	-0.0748	-0.0122
	(0.0633)	(0.0628)
lagRET	0.620***	0.246
	(0.175)	(0.161)
PREEARN	0.351	0.127
	(0.241)	(0.269)
POSTEARN	0.257	0.0828
	(0.235)	(0.21)
Constant	0.122	0.0696
	(0.293)	(0.287)
Observations	15,187	14,799
R-squared	0.036	0.017

Table 8: Subsample Analyses: Recent News versus Distant News

This table presents regression results on recommendation revision announcement returns, with event window [0,+1]. We partition the sample by the median distance (lag) between the news article and the analyst revision dates. The recommendation revisions with average distance below the sample medium are classified as revisions associated with "recent news." Otherwise they are classified as revisions associated with "distant news." For both the "recent news" revision sub-sample and the "distant news" revision sub-sample, we run separate regressions. CAR is DGTW-adjusted returns around the recommendation revision. log#NEWS is calculated as $\log(1+\#NEWS)$, with $\#NEWS$ defined as the number of articles published in the prior month before recommendation revisions. ΔEPS is an indicator variable on whether there is a concurrent EPS revision. RECDEV is the deviation of the recommendation from the consensus recommendation measure. ACCRANK is the earnings forecast accuracy rank for the analyst(range from 1 to 5). PREEARN is a dummy variable that indicates the firm is going to make an earnings announcement in the next 15 days. POSTEARN is a dummy variable that indicates that the firm made an earnings announcement in the past 15 days. See Table 2 for the definition of other variables included in the regression. Two-way clustered standard errors (by firm and by analyst) are reported in parentheses. Significance level: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	DOWNGRADE		UPGRADE		ALL	
	(1)	(2)	(3)	(4)	(5)	(6)
	Recent	Distant	Recent	Distant	Recent	Distant
VARIABLES	CAR	CAR	CAR	CAR	|CAR|	|CAR|
log#NEWS	-1.320***	-1.558***	0.393***	0.740***	1.010***	1.808***
	(0.299)	(0.282)	(0.126)	(0.188)	(0.161)	(0.174)
logMV	1.069***	1.009***	-0.780***	-0.896***	-1.109***	-1.400***
	(0.188)	(0.166)	(0.0929)	(0.122)	(0.102)	(0.0977)
logBM	0.610***	0.766***	-0.341**	-0.253*	-0.675***	-0.683***
	(0.176)	(0.221)	(0.152)	(0.153)	(0.114)	(0.130)
MOMENTUM	0.00729	0.0229***	-0.0129***	-0.00752*	-0.0165***	-0.0278***
	(0.00475)	(0.00661)	(0.00362)	(0.00403)	(0.00252)	(0.00351)
logVOLATILITY	-1.142***	-2.031***	1.011***	1.111***	1.973***	2.274***
	(0.280)	(0.354)	(0.234)	(0.270)	(0.174)	(0.219)
TURNOVER	0.224	0.501**	-0.229*	-0.338**	-0.173	-0.330**
	(0.210)	(0.231)	(0.134)	(0.148)	(0.119)	(0.145)
ΔEPS	-1.224***	-1.644***	0.422***	0.171	0.502***	0.188
	(0.207)	(0.244)	(0.141)	(0.163)	(0.112)	(0.134)
RECDEV	-0.425***	-0.158	0.0199	0.354***	0.260***	0.184**
	(0.118)	(0.143)	(0.0940)	(0.117)	(0.0717)	(0.0835)
ACCRANK	-0.0545	0.0122	-0.0294	-0.0881	-0.00787	0.0121
	(0.0799)	(0.110)	(0.0573)	(0.0703)	(0.0418)	(0.0556)
lagRET	0.0307***	0.0735***	0.0120	-0.0161	-0.0309***	-0.0697***
	(0.0103)	(0.0158)	(0.0109)	(0.0126)	(0.00656)	(0.0105)
PREEARN	0.738*	0.260	0.139	0.0946	0.0706	-0.550***
	(0.382)	(0.353)	(0.321)	(0.230)	(0.236)	(0.202)
POSTEARN	-0.200	-0.386	0.384**	0.718***	0.765***	0.447**
	(0.310)	(0.313)	(0.180)	(0.231)	(0.168)	(0.183)
Constant	-15.45***	-14.30***	13.34***	14.97***	17.88***	21.62***
	(3.005)	(2.739)	(1.432)	(1.985)	(1.615)	(1.597)
Observations	7,776	8,002	7,155	7,084	14,931	15,086
Adjusted R^2	0.072	0.110	0.057	0.051	0.144	0.197

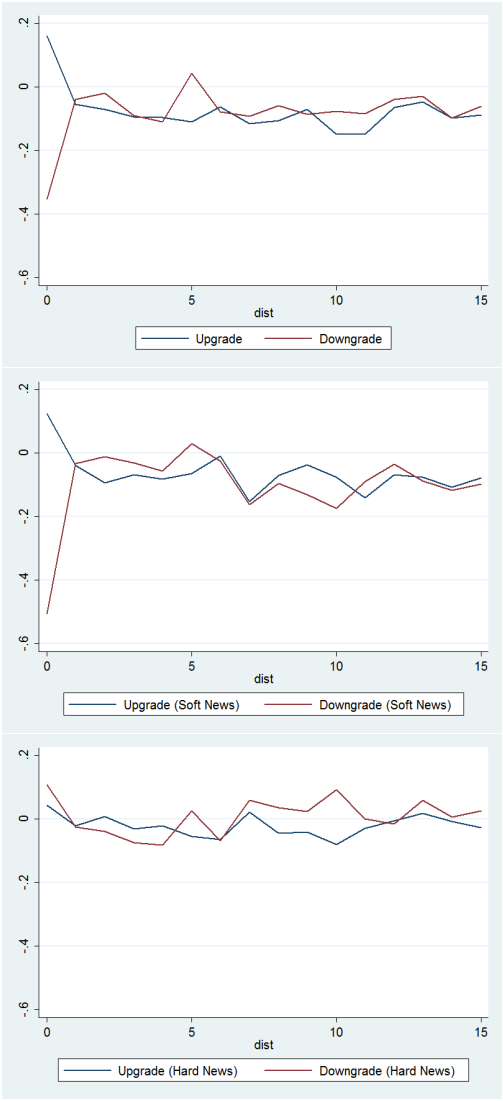

Figure 1: These plots are β coefficients from the regressions $CAR_t = \alpha + \beta log\#NEWS(TYPE) + \epsilon$, where t is the distance between the recommendation announcement date and TYPE is the type of news. The first graph, all news are counted. In the second figure, only the soft news are counted and in the third graph, only hard news are counted. All news variables are normalized with a mean 0 and standard deviation 1