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Management's tone change, post earnings announcement drift and accruals

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Abstract This study explores whether the management discussion and analysis (MD&A) section of Forms 10-Q and 10-K has incremental information content beyond financial measures such as earnings surprises and accruals. It uses a classification scheme of words into positive and negative categories to measure the *tone change* in the MD&A section relative to prior periodic SEC filings. Our results indicate that short window market reactions around the SEC filing are significantly associated with the tone change of the MD&A section, even after controlling for accruals and earnings surprises. We show that management's tone change adds significantly to portfolio drift returns in the window of 2 days after the SEC filing date through 1 day after the subsequent quarter's preliminary earnings announcement, beyond financial information conveyed by accruals and earnings surprises. The drift returns are affected by the ability of the tone change signals to help predict the subsequent quarter's earnings surprise but cannot be completely attributed to

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this ability. We also find that the incremental information of management's tone change depends on the strength of the firm's information environment.

Keywords Textual analysis · Earnings drift · Accruals · Earnings surprises · Management tone change · MD&A

JEL Classification G12 · G14 · M41

1 Introduction

There is a substantial body of literature in financial economics and accounting that examines the value relevance and information content of conventional *quantitative* factors in the pricing of stocks, using economic and statistical tools that have become increasingly sophisticated over the years. While there is no doubt that these studies have contributed to our understanding of the structure and characteristics of financial markets, they have also led to the growing realization that incorporating information conveyed by quantitative factors alone may not be adequate to explain the movement of stock prices. As early examples of this growing realization in the finance literature, Shiller (1981), Roll (1988) and Cutler et al. (1989), demonstrate that stock prices cannot be explained by quantitative measures of firm fundamentals alone. In the accounting literature, Lev and Thiagarajan (1993) and Amir and Lev (1996) are two early examples of research that has shown the inadequacy of conventional quantitative financial measures in pricing a firm's stock. There are many more recent papers in accounting and finance that make the same point.[1]

It is not difficult to understand why prior research has primarily focused on quantitative factors to study the formation and movement of stock prices. Quantitative data is easily available, is more objective, and certainly less controversial to incorporate than qualitative data. However, there is no reason to expect that market participants communicate solely through quantitative information. Firms and even the federal government (Boukus and Rosenberg 2006) routinely provide qualitative information to investors through explanatory statements, disclosures, elaborations, clarifications etc., in different forums and media. Such disclosures have become even more frequent in recent years with transparency and good governance assuming high importance. Clearly financial market participants would be expected to process and analyze these pieces of information (in addition to the quantitative data) provided to them while making their decisions. Consequently, analyzing the impact of these qualitative communications can only enhance our current understanding of the financial markets.

The obvious difficulty in studying the role and impact of qualitative communications in the financial markets is to find an objective quantitative measure of the information being conveyed. However, given recent developments in other fields of research that face similar problems (such as computer science, linguistics, psychology, and statistics), there are specific methods and tools available now that can be used to

[1] We discuss prior work relevant to our paper in our literature review below.

quantify the information content of verbal communications in a relatively objective fashion. Tetlock (2007) is, arguably, among the best known works to use these recently developed tools to quantify qualitative information and provide persuasive evidence on the incremental predictive content of qualitative verbal information.[2] He shows that the depth of pessimism expressed in a daily news column from *The Wall Street Journal* (titled *Abreast of the Market* and covering the stock market activity on the previous day) exerts a significant downward (temporary) pressure on prices of the stock indices.[3] In a follow up, using similar tools for quantifying qualitative communications, Tetlock et al. (2008) show that increases in the negative words used in *The Wall Street Journal* and the *Dow Jones News Service* columns about S&P 500 firms relative to prior stories predict larger negative shocks to future earnings. Furthermore, they also provide evidence that potential profits could be made by trading on negative words from *Dow Jones News Service*—a timely news service.[4]

From a methodological viewpoint, the Tetlock (2007) and Tetlock et al. (2008) papers are the main motivators for our work.[5] However, by focusing on news stories in the media, their work is more concerned with the information content of verbal communications by outsiders (media-persons). While these papers make a strong case for the predictive value of pessimism expressed by outsiders on stock prices and future earnings, they may not completely capture the views of mangers (or insiders), who are required to express their views in Securities and Exchange Commission (SEC) filings. It can be argued that managers are better informed than outsiders, and assuming that they truthfully report their views (under SEC scrutiny and penalty of litigation), their statements may have higher predictive ability than outsiders' reports.[6]

Our study investigates the information content of the "tone change" conveyed through management discussion and analysis (MD&A) disclosures for a large sample of firms. By "tone change," we mean the optimism or pessimism of the information embedded in qualitative verbal disclosures by managers in the MD&A section of firms' periodic SEC filings as compared with prior periodic filings of the same firm. We focus on the effects of management's tone change on immediate and delayed stock returns beyond what is captured by preliminary earnings surprises and accruals, the two accounting variables best known to be informative about the future stock performance of the firm.[7]

[2] The history of research trying to assess the information content of qualitative information is long. Our literature review below discusses earlier and contemporaneous works.

[3] We discuss the specific findings of Tetlock (2007) in some detail in our literature review.

[4] The authors acknowledge that these profits could be wiped out by transactions costs from high frequency trading.

[5] We emphasize that while the Tetlock papers motivated our methodology in our paper, there are a number of other papers discussed later that are also related to our work.

[6] Kothari and Short (2003) is probably the first paper to recognize this and examine the information content of MD&A disclosures in addition to the information content of analysts' forecasts and media reports using a methodology similar to Tetlock (2007) and Tetlock et al. (2008). However, they focus on the effects of the MD&A's sentiment on the firm's cost of capital and risk (stock price volatility), not on their ability to predict future stock prices and earnings.

[7] In an earlier version of this paper, we had also controlled for operating cash flows (OCF) with similar results to those obtained here. We have dropped the OCF in this version of the paper at the suggestion of an anonymous reviewer who pointed out that OCF and Accruals are correlated.

We find that the change in tone of the MD&A section of the SEC filings from prior periodic filings, in fact, contains significant information beyond accruals and earnings surprises. We show by regression analysis and by construction of buy-and-hold portfolio strategies, that the optimism, pessimism, and the differential optimistic tone change measure (the change in optimism net of pessimism) yield excess average stock returns over the short window surrounding the filing of the MD&As but also that returns continue to drift for longer periods that extend until after the subsequent quarter's preliminary earnings announcement. As can be expected, the change in MD&A tone is incrementally more informative when the information environment surrounding the firm (as measured by size and analyst following) is weaker. The tone change is also a weaker signal for value firms, which are typically more mature and easier to understand. We also find the tone change signal to have stronger implications for firms with positive earnings surprises; this may be because these are cases where investors need additional information beyond quantitative disclosures. The implication is that the qualitative tone change expressed in MD&As can be potentially exploited to earn significant excess returns over and above those associated with well known trading strategies based on accruals and earnings surprises alone. It should be emphasized, though, that consistent with most of the literature to date, the incremental contributions of using qualitative information beyond quantitative signals are not large when compared with the total unexplained variation in returns (that is, the incremental contribution to R^2 is statistically significant, but the level of the R^2 still remains low). This implies that either the potential of qualitative information is low or that the tools we currently have to quantify qualitative information are too crude.

Our results contribute in general to research on the information content and value relevance of SEC filings and mandated disclosures. Specifically, our paper contributes to the value relevance of disclosures in the MD&A statements. To the best of our knowledge, this is the first paper to measure and show that the tone change expressed by management through words (qualitative communications) in MD&A is associated with immediate market reactions and can also predict future stock prices beyond well-known measures of company performance. Our findings should be relevant to academics who are interested in such issues as market efficiency and how well public (especially qualitative) information is captured in security prices and to those academics who are concerned with the effects of the information environment on the associations between public information and security returns. The results of our study should also be of interest to policy-makers, because they show the incremental valuation relevance of required qualitative information. Since the tone change in SEC filings (which are filed regularly) can be used to improve portfolio performance beyond quantitative variables, our results should interest practitioners as well.[8]

The rest of the paper is organized as follows: the next section reviews the relevant literature and motivates our research hypotheses. Section 3 describes the

[8] The set-up costs required for analyzing the tone change of qualitative disclosure may favor professional investors.

sample defines and describes the variables used in our paper. Section 4 presents our results, and Sect. 5 concludes.

2 Prior research and research questions

2.1 Prior research

Broadly speaking, there are two kinds of research relating to the valuation of corporate disclosures in the accounting literature, namely, the voluminous body of work that has examined the value relevance (or information content) of financial disclosures[9] and the relatively smaller set of research papers that have studied the valuation of nonfinancial disclosures. Within the set of studies of value relevance of nonfinancial data there are two major subsets, namely, those that focus on quantifiable data and those that examine qualitative verbal expositions that elaborate and explain quantitative disclosures. Our research examines the information content of narratives from MD&A and so is related to the latter stream of research, that is, the value relevance of nonfinancial, nonquantitative disclosures. However, in examining the incremental value relevance of MD&A disclosures, we also control for the value relevance of other financial variables that have been extensively documented by prior studies.

We cite two papers that examine the incremental information content of quantitative non-financial information.[10] Using a large sample of firms from 1974 through 1988, Lev and Thiagarajan (1993) show that certain non-audited quantitative information, such as order backlogs and the strength of their labor force, provide information for company valuation beyond the traditional financial accounting information. Amir and Lev (1996) build on this theme by studying the value relevance of financial and nonfinancial data for a sample of wireless communication firms and find that financial data alone show very little value relevance, but if combined with quantitative nonfinancial data (specifically, proxies for potential customers) the value relevance of these financial variables is considerably enhanced.

Some of the early research relating to MD&A is mostly descriptive. Bagby et al. (1988) provide a historical review of MD&A and the social usefulness of qualitative disclosures within a broader framework of federally mandated disclosures using a critical examination of legal cases relating to mandated disclosures. Dieter and Sandefur (1989) outline the MD&A requirements mandated by the SEC and suggest guidelines on drafting an MD&A that would satisfy these regulations in form and substance.

Shroeder and Gibson (1990) is among the earliest papers to try and quantify the readability quotient of the exposition in the MD&A and also the president's letter. Borrowing techniques from the psychology literature, they construct the so-called

[9] We refer the interested reader to the book by Beaver (1997) for a discussion and analysis of the value relevance of financial disclosures.

[10] These papers provide citations for the interested reader.

Flesch Index scores (a measure of reading ease) using a standard formula based on the word length and sentence length and by also examining the general tenor of the language used (active vs. passive voice in sentence constructions), they conclude that MD&A statements are, in general, less than readable.

One of the earliest papers in the accounting literature that use linguistic techniques to analyze narrative disclosures is Frazier et al. (1984). Using a computer program called WORDS to identify the most important words (or factors) that could be reasonably interpreted as positive or negative narrative themes for a sample of 74 annual reports of firms in 1978, they show that there are no significant differences in managerial narratives across the ownership structure of these firms. They also provide evidence to support their hypothesis that the positive and negative factors (and the associated themes) can predict the cumulative abnormal annual returns for the next year (1979).[11]

Pava and Epstein (1993) study the MD&A disclosures of 25 randomly selected firms during 1989 and find that while the disclosures provided adequate details of historical events, they did a better job of predicting firm-specific, industry-specific, and economy-specific good news than predicting bad news for 1990. They conclude that managers may be withholding disclosures related to bad news.

In 1989, the SEC issued guidelines to clarify what was expected in MD&A disclosures in an attempt to make them more informative. Hooks and Moon (1993) attempt to measure the differences between the actual and expected frequency of MD&A disclosures across a spectrum of disclosures that they classify as mandated to those that are classified as voluntary and show that these differences have decreased for certain items after the SEC MD&A guideline release in 1989, indicating firms provide more disclosure in their MD&A after 1989.

While these studies are related to our work, their samples are small and limited to specific early years prior to revised SEC's guidelines on MD&A and the availability of SEC filings on the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system. The small sizes and limited analysis of data is these early studies is understandable, given that they were constrained by the available computing power, data sets, and data analysis techniques available to them in those years. One of the more recent papers by Li (2008a) vividly illustrates the contrast between earlier studies and the current state of the art. Motivated by the SEC requirements that firms provide easy to read and plain disclosures, Li examines whether the readability and the writing style of annual corporate reports (including the MD&A section) of a large sample of firms during the years 1993–2003 can predict future firm earnings and returns. Using measures from linguistics for readability and writing styles, Li concludes that firms with poor performance put out hard-to-read reports and that profitable firms with more complicated reports have a lower persistence of earnings but finds that these measures do not correlate with future stock returns. Li (2008b) examines the tone and content of forward looking statements extracted from the MD&A section of a large sample of 10-Ks and 10-Qs filed with the SEC between 1994 and 2007 using a computer intensive Bayesian learning algorithm (rather than the dictionary approach used by Tetlock and others including our paper) and shows

[11] The paper also discusses other applications of WORDS in finance and accounting.

that tone of the forward looking statements has significant predictive power for future earnings and liquidity. He also shows that firms with better current performance, lower accruals, smaller size, lower market-to-book ratio, and less return volatility tend to have more positive forward-looking statements in MD&As.[12]

Bryan (1997) examines if the specific accounting related narratives from MD&A have incremental information content beyond quantitative financial statement information regarding future financial variables such as the directions of changes in future sales, future earnings per share, future operating cash flows, and future capital expenditures. Using a sample of MD&A disclosures by 250 firms in 1990 (a year after clearer guidelines were issued by the SEC), he finds that there is a strong association between MD&A disclosures and the direction of changes in the aforementioned future financial variables 3 years into the future. In addition, he demonstrates that MD&A disclosures, especially the disclosure relating to capital expenditures, are significantly associated with financial analyst forecasts and stock returns around the release date of MD&As. Bryan's paper differs from our work in that we are interested in the predictive ability of the overall tone change of the MD&A rather than the contents of individual MD&A disclosures. He does not examine if abnormal stock returns can be earned or study the issue of post-announcement drift in stock prices. Furthermore, the content analysis by Bryan is subjective as opposed to the more objective tone change index used here and by Tetlock (2007) and Tetlock et al. (2008). Finally, our sample size is much larger and is drawn from years when the legal and disclosure environments are substantially different.

There are few papers that examine the relationship between MD&A disclosures and analyst forecasts. One such paper is by Barron and Kile (1999). Using a large sample of firms drawn from 1987 through 1989 MD&A disclosures of 26 different industries and after controlling for quantitative financial factors, they show a strong association between the accuracy of analysts' forecasts and the quality of MD&A disclosures (as measured by scores assigned by personnel at the SEC), especially disclosures relating to capital expenditures. Clarkson et al. (1999) document that MD&A disclosures are found to be useful to sell-side analysts who are members of the Toronto Society of Financial Analysts based on 33 responses to questionnaires. In addition, using a sample of 55 firms on the Toronto Stock Exchange in 1991 and 1992, they show that the levels and the changes in the quality of various sub-sections of the MD&A disclosures (where the quality of disclosures is a score provided by the Toronto Analysts) are generally determined by expected firm performance, financing activities (mainly increased equity financing), firm size, independent press reports, and major firm related events.

Cole and Jones (2004) use MD&A disclosures from a sample of 150 firms for the period 1996 through 1999 from the retail industry to show that certain types of quantifiable disclosures, (namely sales growth, store openings and closings and

[12] Interestingly, Li (2008b) also finds that the information content of MD&As has not changed significantly after the passage of the Sarbanes-Oxley Act. This may partially contradict the findings of Loughran and McDonald (2008), who find fewer strong modal words relative to weak ones after the passage of this act.

capital expenditures), can predict future profitability and are associated with contemporaneous stock returns. Sun (2007) examines the MD&A disclosures explaining inventory increases between 1998 and 2002 for 568 manufacturing firms and shows that favorable explanations are associated with future profitability and sales growth and that firms in growth industries and competitive industries tend to disclose more.

Kothari and Short (2003) is perhaps the first accounting work to have used the General Inquirer classification (which is one of two word lists that we use in this study) to assess the effects of the tone (as opposed to tone change used in our paper) expressed in MD&A disclosures on the firm's cost of capital.[13] They extend the work of Botosan (1997) by studying the effect of the positive and negative sentiments expressed in MD&A, analyst reports, and the financial press between 1996 and 2001 on the cost of capital and risk (stock price volatility) for a sample of 887 firms from four industries (technology, telecommunications, pharmaceutical, and financial). They find that aggregated (across all three sources) positive (favorable) disclosures decreased the cost of capital and the stock return volatility of the firm, while negative (unfavorable) disclosures had the opposite effects. However, when disclosures are analyzed by sources, they find that positive sentiments expressed in corporate MD&As do not have an effect on the cost of capital, while negative sentiments significantly increase it. They attribute this to skepticism on the part of investors regarding positive disclosures (that is, they are viewed more as self serving) but find negative sentiments credible because management would not normally reveal bad news. Disclosures relating to analysts' sentiments seem to have no effect on the cost of capital, and this is attributed to the lack of credibility. They attribute this to the fact that analysts are seen to be reporting their sentiments after the market has already absorbed them. Finally, they find that positive media stories and disclosures seem to decrease the cost of capital and negative disclosures increase it.[14] Related to this line of enquiry is Li (2006), who examines whether the risk sentiments and change in risk sentiments expressed in annual reports are associated with future firm performance and future stock returns. Using a large sample of annual reports from 1994 to 2005, Li constructs an intuitive quantitative measure of levels and changes in risk sentiments extracted from the text of these reports and finds large increases in risk sentiments to be associated with lower future earnings and significantly lower stock returns.

We note that our paper differs from Kothari and Short (2003) in that we are not interested in analyzing the effects of soft disclosures on the firm's cost of capital or the variability of stock returns. We are also different from Li (2006), who is interested in the incremental effects of the subjective measures of references to risk changes in annual reports (including the MD&As) on future stock prices and

[13] Since managers usually use prior MD&As as a blueprint for producing a new and incremental MD&A, there could be considerable similarities in MD&As that are close in years. This suggests that our tone change measure may be a better measure of information content than the tone level measure used by Kothari and Short (2003).

[14] This supports the findings of Tetlock (2007), who shows similar results for a market index (Dow Jones). That is, when the media reports are pessimistic, the stock index price drops and market volatility increases.

earnings. We are not concerned with any measure of risk but rather with the incremental effects of general tone changes in MD&As on immediate and future stock returns. There are other differences between the Li (2006) paper and our work as well. He searches corporate disclosures for any mention of the word "risk" or related terms that are usually scattered throughout the periodic reports and does not restrict his search to MD&A section. We are solely concerned with MD&As. Furthermore, terms referring to risk may or may not have positive or negative content as we (and others such as Tetlock) define tone. While there may be some overlap in the words in Li's set and ours, we use a much more comprehensive word list than Li. Finally, Li'smeasure of changes in risk sentiments is different from our tone change metric.[15]

As mentioned before, the two papers that motivated our study are by Tetlock (2007) and Tetlock et al. (2008). They do not focus on pessimism and predictive content of MD&As but on news columns and releases. Tetlock (2007) uses the General Inquirer text analysis computer program to assess the negative quotient of *The Wall Street Journal* daily column *Abreast of the Market* from 1984 to 1999 and finds results consistent with pessimistic articles putting temporary downward pressures on market prices (Dow Jones stock index) and increasing trading volume in the New York Stock Exchange (NYSE). The increased volume of trade is consistent with microstructure theory that predicts high absolute values of pessimism should lead to a group of liquidity traders trading more and refutes the suggestion that the pessimism factor is a proxy for transaction costs (Tetlock 2007).[16] It is important to note that Tetlock (2007) finds that higher pessimism leads to higher volatility (risk) for the Dow Jones portfolio of stocks. This contradicts the intuition that higher pessimism should lead to lower returns, or equivalently, lower risk, suggesting that the pessimism factor captured by negative words may be distinct from risk. This is further corroborated by the fact that the effects of pessimism seem to be temporary and future stock returns reverse.[17] Continuing this line of research, Tetlock et al. (2008) examine the ability of media pessimism measured by the proportion of negative words in the real time stories news from *Dow Jones News Service* and daily news stories in *The Wall Street Journal* from 1984 to 2004 relating to S&P 500 firms to predict future earnings and returns. They show that the change in the proportion of negative words (especially those relating to firm fundamentals) in these news releases does convey information about firm future earnings. They also find that the proportion of negative words in the timely news releases from *Dow Jones News Service* leads to lower stock returns the following trading day and that this trend persists over the next 10 days. These results remain robust even after controlling for other sources like analysts' forecasts,

[15] Li measures changes in risk sentiments simply as a change across consecutive years in the (log of) the numbers of occurrences of risk-related words rather than the standardized measure of tone change used in our paper, by Tetlock (2007) and by Tetlock et al. (2008). Tetlock et al. (2008) discusses the merits of using standardized metrics to measure changes in sentiments.

[16] If the pessimism factor were a proxy for transactions costs, then higher levels of pessimism should lead to lower volumes of trading on the following periods (see Tetlock 2007).

[17] This reversal seems to be slower for small firms' stocks relative to stocks of big firms when the tests are run on stocks other than those in the Dow Jones Index.

past stock returns, and historical accounting data. The authors show that a simple trading strategy of constructing portfolios by short selling stocks of firms with negative words in the *Dow Jones News Service* news stories the previous day, and going long on stocks with relatively few negatively worded stories, produces significant abnormal returns (excluding transactions costs).

Demers and Vega (2007) extend the analysis in the Tetlock (2007) and Tetlock et al. (2008) by examining the incremental information content of sentiments expressed in "soft" or "verbal" text in voluntary, nonmandated management's quarterly press releases. Using a different linguistic program, Diction 5.0, to extract the sentiments expressed in almost 15,000 corporate earnings announcements over the period from 1998 to 2006, they show that "unexpected" sentiment does have incremental information content in partially explaining the well known post-announcement earnings drift in market prices. Furthermore, they provide evidence suggesting that the lack of clarity in press releases seems to be associated with abnormal trading and increased trading volumes. Engelberg (2008) is another extension of the Tetlock (2007) and Tetlock et al. (2008) papers. Using a large sample of earnings announcements in the Dow Jones index obtained from the Factiva database for the period 1999–2005, he shows that "hard-to-understand" textual qualitative information is value relevant and contributes uniquely to the well-known post earnings announcement drift phenomenon. Specifically, Engelberg (2008) refines the Tetlock studies by teasing out the context and meaning of qualitative statements in Dow Jones index using modern tools from natural language processing and shows that certain combination of words relating to positive fundamentals (such as sales, profits, income etc.) and future prospects help predict future returns. He further shows that the harder the textual information is to understand and process, the more slowly it diffuses into prices.[18] Davis et al. (2008) examine the tone of 23,400 quarterly earnings press releases published on the PR Newswire between 1998 and 2003 using the linguistic program Diction.[19] They find that there is a significant positive (negative) association between increased optimism (pessimism) and future measures of firm performance (measured by the return on assets) and that increased optimism (pessimism) is positively (negatively) associated with market returns around the announcement dates. Using a sample of firms from the telecommunications and computer services industries and related equipment manufacturers for the period 1998–2002, Henry (2008) also finds that the tone and style of press releases incrementally influences short window stock prices.[20]

In related research, Abrahamson and Amir (1996) perform content analysis of over 1,300 president's letters to shareholders of NYSE firms written between 1986

[18] We emphasize that Engelberg (2008) does not examine the 10-Q and 10-K filings or the MD&A reports. We elaborate on the importance of this point below.

[19] Some of the other papers that use Diction to extract investor sentiment are Bligh and Hess (2007), Ober et al. (1999) and Yuthas et al. (2002).

[20] Henry (2008) uses a metric for tone that is similar to the one used in our paper. Others, notably, Das et al. (2005) and Das and Chen (2007), examine the association between stock price movements and online discussions and news activities using their own tone (or sentiment) index based on five distinct natural language processing algorithms that classify such discussions as bullish, bearish, or neutral.

and 1988. They show that the relative negative content of a letter (measured by a proprietary computer program) is strongly negatively associated with past and future performance as measured by accounting variables, strongly negatively associated with past and contemporaneous (yearly) returns, and weakly negatively associated with future returns.

As can be imagined, given the modern tools of data analysis and the exponentially increasing computing power available, there has a been an explosion of papers in recent years trying to explain well-known anomalies such as the post-announcement earnings drift by analyzing qualitative data and how it is priced by market participants. The rich potential of this growing area of research is perhaps seen from some recent papers. While it would be infeasible to cite all papers in the area, we content ourselves with citing two recent works to indicate the nature of this line of research. Boukus and Rosenberg (2006) analyze the characteristic themes of Federal Open Market Committee minutes released publicly from 1987 through 2005 using a statistical method called the Latent Semantic Analysis and provide evidence that the Treasury yields are not just affected by these releases but that the depth of the reaction is a function of the themes expressed. This finding has obvious implications for the equity markets. Hanley and Hoberg (2008) use computer intensive methods to study the qualitative information content from different sections of a large sample of initial prospectuses (including amendments) of firms during the initial public offering (IPO) process during 1996 through 2005 and show that this information can predict both the IPO price and the prices 1 year beyond. Of particular interest to us is the fact that they find that the MD&A section of the prospectus is particularly informative in the formation of prices during the IPO process and beyond.

It should be noted that the prior studies that have examined the preliminary earnings announcements have looked at announcements by firms, rather than the MD&A sections of periodic reports as we do. The preliminary earnings announcements were typically not filed with the SEC prior to 2003 and therefore not routinely scrutinized by the SEC as periodic reports were. Furthermore, preliminary earnings announcements are voluntary; some firms do not issue them at all or issue them sporadically. In contrast, periodic reports must be filed with the SEC by all firms. Finally, the MD&A sections are intended to disclose qualitative information by management, which the preliminary earnings announcements frequently do not have. Furthermore, even in cases where preliminary earnings announcements contain qualitative information, they frequently do not include information on the same items in a consistent manner, because unlike the MD&A section, preliminary earnings items are voluntary and additional information about them is not required by SEC rules.

2.2 Research questions

Investors in stocks may be able to exploit disclosures of accruals and earnings surprises immediately (short window) following these disclosures and over the longer term as well. Of the two, the influence of earnings surprises (usually calibrated by a metric known as standardized unexpected earnings metric or SUE)

on stock prices is perhaps the oldest and best documented phenomenon. It has been repeatedly shown that positive (negative) earnings surprises exert immediate upward (downward) pressure on prices and surprisingly, this trend continues to persist long after the initial disclosure (the post-announcement drift anomaly). Investors can exploit this anomaly by holding differential positions of stocks with extreme positive and negative SUEs (see Livnat and Mendenhall 2006, for a recent comparison of SUE based on time series and analyst forecasts).

In addition to earnings surprises, the accounting and finance literature has also documented the information relevance of accruals. Sloan (1996) shows that firms with extremely low annual accruals outperform firms with extremely high accruals. His study was corroborated by many subsequent studies with annual accruals and by Livnat and Santicchia (2006) with quarterly accruals. Collins and Hribar (2000), and more recently Battalio et al. (2009), show that earnings surprises and accruals are two distinct anomalies and using each yields incremental abnormal returns beyond the other.

To examine the role of qualitative information on immediate and delayed market reactions, we focus on the change in tone as expressed in periodic MD&A sections filed with the SEC. As in most of the prior literature, we measure tone by examining the proportion of "positive" and "negative" words used by management in the MD&A. However, we argue that the relevant variable to examine is not the level of optimism or pessimism in the current SEC filing, but its change from the most recent past. There are several reasons for this choice.

1. The autocorrelations between adjacent tone levels are very high. We find a correlation of 70% for our measure of negative tone, 65% for positive tone, and 68% for the differential tone measure using MD&A sections of the current and immediately prior quarter. This is reasonable given management's tendency to compose the current year MD&A by slightly modifying the prior year MD&A.[21] In comparison, the earnings to price ratio in our sample has a correlation of 24% with the same ratio in quarter $t - 4$. It is common to measure market reactions to earnings by using earnings changes, since a large proportion of the earnings are expected. Similarly, a large proportion of the tone level can be expected given the high autocorrelations among successive tone levels.
2. The measurement of tone level is dependent on the particular word lists used to classify words into negative and positive and, in some cases, on the particular industry or even specific company name. For example, "waste" may be a negative word in general but a routine word for a firm in the waste management business. Similarly, "casualty" is a common word for an insurance company that has property and casualty insurance business. "Liability" is a negative word in general, but practically all periodic filings will include this word (although not necessarily in the MD&A section) in the financial statements. Thus, cross-sectional comparisons of tone levels may be affected by the particular choice of words in an industry or a company name (such as Insightful

[21] See Clarkson et al. (1999, p. 117–118).

Corp. or Insight Enterprises Inc. if "insight" is a positive word). The use of tone changes mitigates this problem considerably, because it is likely that the boilerplate usage of certain positive or negative words in an industry or a specific company will be stable over time, while changes in tone, in all likelihood, will reflect heightened pessimism or optimism. Furthermore, the results obtained by using a particular word list to classify words into positive and negative are likely to be substantially more robust with tone changes rather than levels, as long as the word list is sufficiently comprehensive. In fact, in this study we have used two word lists with similar results, as explained below.

3. Using changes in tone rather than levels is consistent with the prior literature.[22]
4. As we report in the sensitivity analysis section below, we do not find statistically significant associations between tone levels and return drift.

Our research examines if the tone change expressed in MD&A disclosures is associated with contemporaneous and future abnormal returns (short window following the MD&A disclosure and the post-announcement long-term drift) over and above what is associated with preliminary earnings reports (SUE) and accruals. In the spirit of Tetlock (2007) and Tetlock et al. (2008), we define a pessimistic tone change (signal) as the change in the proportion of negative words among all words in the MD&A relative to the average pessimistic signal in all periodic SEC filings made in the prior 400 days (scaled by the standard deviation of the signal in the same period). The larger this proportion, the more pessimistic is the tone change. We also define a similar measure for optimistic tone change and further define a differential optimistic tone change measure by taking the change in the difference of the positive and negative words divided by total words in the MD&A relative to the average of this measure in all periodic SEC filings made in the prior 400 days (scaled by the standard deviation of the signal in the same period).

Our control variables are SUE and accruals, which we measure as in the prior literature. When there are no analyst forecasts for the quarter, SUE for the quarter is calculated from the Compustat quarterly database by subtracting from the preliminary income (quarterly item 8) for quarter t the "as-first-reported income" for quarter $t - 4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES unadjusted EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter. Accruals/Average Assets equals income before extraordinary items and discontinued operations minus cash from operations (or operating cash flow, OCF), scaled by average total assets during the quarter.

We also investigate whether the information environment affects the associations between the tone change signals and security returns. It is expected that the tone change signal would be more effective for firms that are less heavily followed by analysts, that are smaller, and that are more growth-oriented because their information environments are weaker, leading investors to utilize other information, even the staler information provided by management in the SEC filings after the

[22] See, for example, Davis et al. (2008), pp. 11–14, Demers and Vega (2007), Engelberg (2008) footnote 7, p. 9 and Tetlock et al. (2008).

preliminary earnings releases (and potentially the following conference calls with analysts).

We show that there are significant incremental abnormal returns around the filing date and for the long-term drift by constructing buy-and-hold type portfolio strategies that incorporate the tone change factor in addition to the SUE and accruals, as well as by running quarterly regressions as in Fama and Macbeth (1973).

3 Data and sample selection

3.1 The preliminary and un-restated Compustat quarterly data

Data entry into the Compustat databases has been performed in a fairly structured manner over the years. When a firm releases its preliminary earnings announcement, Compustat takes as many line items as possible from the preliminary announcement and enters them into the quarterly database within 2–3 days. The preliminary data in the database are denoted by an update code of 2, until the firm files its Form 10-Q (10-K) with the SEC or releases it to the public, at which point Compustat updates all available information and uses an update code of 3. Unlike the Compustat Annual database, which is maintained as originally reported by the firm (except for restated items), the Compustat Quarterly database is further updated when a firm restates its previously reported quarterly results. For example, if a firm engages in mergers, acquisitions, or divestitures at a particular quarter and restates previously reported quarterly data to reflect these events, Compustat inserts the restated data into the database, replacing the previously reported numbers. Similarly, when the annual audit is performed and the firm is required to restate its previously reported quarterly results by its auditor as part of the disclosure contained in Form 10-K, Compustat updates the quarterly database to reflect these restated data.

Charter Oak Investment Systems Inc. (Charter Oak) has collected the weekly original CD-Rom that Compustat sent to its PC clients, which always contained updated data as of that week. From these weekly updates, Charter Oak has constructed a database that contains three numbers for each firm for each Compustat line item in each quarter. The first number is the preliminary earnings announcement that Compustat inserted into the database when it bore the update code of 2. The second number is the "as first reported" (AFR) figure when Compustat first changed the update code to 3 for that firm-quarter. The third number is the number that exists in the current version of Compustat, which is what most investors use. The Charter Oak database allows us to use the first-reported information in the SEC filing, so that quarterly earnings, cash flows, and accruals correspond to those reported originally by the firms, which were also available to market participants at the time of the SEC filing. Using the restated Compustat Quarterly database may induce a hindsight bias into back-tests, since we may have used restated earnings, cash flows, or accruals that were not known to market participants on the SEC filing dates.

3.2 Sample selection

To reduce the potential bias that may occur by using a sample of quarterly information that became available through SEC filings before the SEC's EDGAR database and afterwards, this study concentrates on SEC filings that are available through the EDGAR database from the fourth quarter of 1993 through the second quarter of 2007. Conceptually, information in SEC filings on the SEC EDGAR database is likely available to users at a low cost immediately after the filing date indicated in the EDGAR database.[23,24] Prior to EDGAR, information about SEC filings was available from the companies directly or from the SEC library with a lag (see for example, Easton and Zmijewski 1993). The problem with the SEC EDGAR database is that it identifies firms according to CIK codes, which are not well-mapped into other databases used in practice and academe such as Compustat or Center for Research in Security Prices (CRSP) databases.

The Standard & Poors (S&P) Filing Dates database seeks to fill this void.[25] It contains a match between all companies on the Compustat database (identified by GVKEY) with the CIK identifiers on the SEC EDGAR database.[26] The S&P Filing Dates database matches all Compustat firms (by GVKEY) to CIK codes on the SEC EDGAR database as they were known on the Compustat database at the time through the Charter Oak database. Thus, it is useful in constructing a universe of firms that professional investors could have actually been using at the time without survivorship bias. For each 10-K and 10-Q filing on EDGAR, the database includes not only the SEC filing date but also the balance sheet date for the quarter/year, so an accurate match with Compustat information can be made.[27]

For each firm-quarter in the S&P Filing Dates database we obtain the SEC filing dates for the period from the first quarter of 1993 through the second quarter of 2007. We include in our sample only those SEC filings made within 55 (100) days for 10-Q (10-K) forms to ensure exclusion of delayed filings. We further limit the sample to observations with SEC filing dates for initial 10-Q/10-K filings in the S&P Filing Dates database that also have a matching GVKEY on Compustat and a matching PERMNO on CRSP, so we can retrieve financial statements data from Compustat and stock return data from CRSP. We reduce the sample to firms that are listed on NYSE, AMEX, or NASDAQ and have a market value of equity and average total assets at quarter end, as well as total assets during the quarter in excess of $10 million and quarter-end price per share in excess of $5. We further delete observations if the originally reported income before extraordinary items and discontinued operations (Compustat Quarterly item No. 8) is missing, the originally

[23] The low costs should especially apply to professional investors.

[24] The interested reader can refer to Sanders and Das (2000) for guidelines regarding the filing formats for the SEC, the definition of the filing date, other important details regarding filings and the EDGAR database.

[25] The database is available through WRDS or directly from S&P.

[26] The database includes all GVKEYs where the market value of the firm's equity at quarter-end exceeded $1 million.

[27] Because companies may file their 10-Q forms late, the filing date itself cannot be a reliable indication for the specific quarter it relates to.

Table 1 Sample construction and distribution

Number of SEC filings which start with 10-K, 10K, 10-Q or 10Q on the June 2008 version of the S&P SEC Filing Dates Database, that are not amended filings, and are not more than 100 (55) days after the fiscal year (quarter) end	382,435
Merging with the Compustat Point-In-Time File, requiring a valid CUSIP, market value of equity at quarter-end in excess of $10 million, and average total assets during the quarter in excess of $10 million, price per share at quarter-end in excess of $5.00, and an available earnings surprise (see definition in notes to Table 2)	218,524
Observations with filing date short-window excess returns and drift returns from filing to next earnings announcement (see definitions in notes to Table 2)	201,586
Eliminate observations before Q4/1993 and after Q2/2007 due to a small number of observations in these quarters	201,285
Observations where the MD&A section has more than 30 words and the (Pos–Neg) signal can be computed (see notes to Table 2)	193,226
Observations where the change in tone variables can be calculated (requiring at least three prior 10-Q or 10-K filings) from Q3/1994 to Q2/2007	153,988

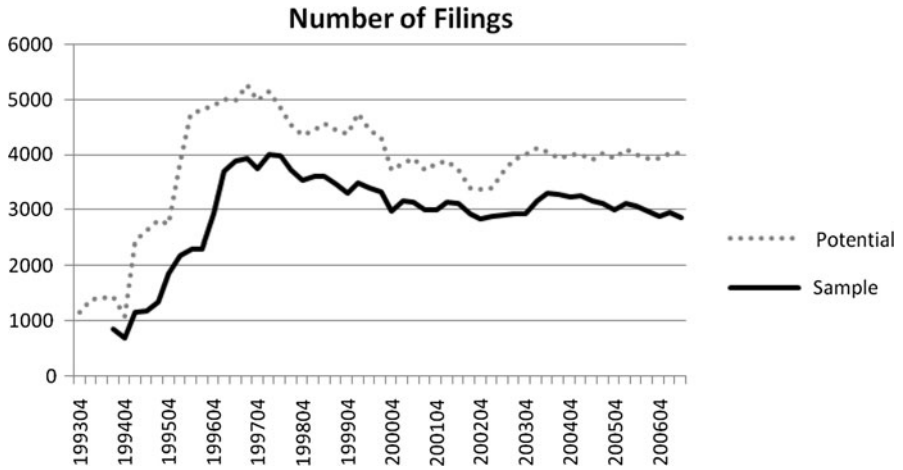

Fig. 1 Number of potential and sample filings. The figure reports the number of filings per calendar quarter that fulfill the first two selection criteria of Table 1 (designated as Potential, 218,524 filings, 10,729 unique firms) and sample filings (all criteria of Table 1, 153,988 filings, 8,219 unique firms)

reported quarterly net operating cash flow (Compustat Quarterly item No. 108) is missing, the market value at the end of the prior quarter is unavailable, or total assets (Compustat Quarterly item No. 44) at the end of the prior quarter or at the end of the current quarter are missing. Table 1 provides details on our sample selection, and Fig. 1 shows the distribution of firms across time.

3.3 Variable definitions

To reduce the survival bias, we use holding periods of 90 days after the SEC filing date if the subsequent quarterly earnings announcement date is missing. If a security

is de-listed from an exchange before the end of the holding period, we use the delisting return from CRSP if available, and −100% if the stock is forced to de-list by the exchange or if the delisting is due to financial difficulties. After delisting, we assume the proceeds are invested in the benchmark size-B/M-momentum portfolio. This is the procedure used by Kraft et al. (2004). We first calculate the buy-and-hold return on the security during the holding period and then subtract the buy-and-hold return on a similar size-B/M-momentum benchmark portfolio for the same holding period. We construct the benchmark returns based on classification of the population into 18 (two size, three B/M, and three momentum) portfolios. We use the procedure in Daniel et al. (1997) to construct the benchmark portfolios, except that we use daily returns in our analysis and we use 18 instead of 125 benchmark portfolios to increase the number of stocks in each benchmark portfolio (some of the benchmark portfolios with 125 portfolios have less than 10 stocks during certain months).[28]

Consistent with the accruals literature, we estimate accruals as earnings minus net operating cash flows and scale by average total assets during the quarter. Accruals are based on the as-first-reported data in the Charter Oak database and are not subject to Compustat's subsequent restatement of data. We estimate the preliminary earnings surprise as IBES (unadjusted for splits) actual EPS minus mean forecasted (unadjusted for splits) EPS by all analysts with quarterly forecasts in the 90-day period prior to the preliminary earnings announcement, scaled by price per share at quarter end.[29] If there are no analyst forecasts of earnings on IBES, we use preliminary net income (Compustat quarterly item No. 8) minus net income as reported for the same quarter in the prior year, scaled by market value of equity at the end of the previous quarter.

To eliminate the undue influence of outliers and estimate the returns on hedge portfolios constructed according to various signals, we independently sort all firms into quintiles of various signals each quarter. We then use the scaled quintile rank as the independent variable in regression equations, where the scaling is performed by dividing the ranked quintile (0–4) by 4 and subtracting 0.5. Thus, the intercept in regressions of returns on the signal should be equal to the mean excess buy-and-hold returns (BHR) for the period, and the slope coefficient on the signal represents the return on the hedge portfolio that is long the highest signal quintile and is short the bottom signal quintile.

To obtain signals about the tone change of the MD&A section in the 10-Q or 10-K, we extract the MD&A section from the relevant SEC EDGAR filings and count the number of words in the section. The process begins by identifying all initial (rather than amended) SEC filings that contain the prefix 10-Q, 10Q, 10-K, or 10 K, and that were filed in a timely manner (within 55 [100] days from the 10-Q [10-K] report date). These filings were first matched to Compustat and CRSP to ensure data availability for our quantitative variables. We have used a PERL

[28] To make sure that our results are not driven by observations with extreme returns as argued by Kraft et al. (2004), we repeated the analysis but deleted all extreme 0.5% observations with buy-and-hold excess returns in any of the two return periods used. The results are similar to those reported here.

[29] We use the most recent forecast for each analyst in the 90-day window.

program to retrieve the MD&A section from each relevant SEC filing. To identify the MD&A section within a 10-Q or a 10-K filing, we use the surface patterns (item number, titles, surrounding language, and new item number to indicate end of section) in dozens of examples, which were used to develop general retrieval rules that were tested on another sample, where it obtained an accuracy rate of over 99% in identifying the MD&A section. We first convert certain HTML codes into characters, such as "&amp" into "&" and eliminate all other embedded HTML codes. We proceed to process only the remaining embedded text in counting words. We eliminate cases where the total number of words in an MD&A section is less than 30.[30] We count the number of positive and negative words as classified by Tim Loughran and Bill McDonald, after properly handling prefixes and suffixes.[31] In a prior version of this study, we employed the more widely used Harvard's General Inquirer.[32] The advantage of the Loughran and McDonald list as compared to the General Inquirer list is that it is constructed by using words that appear frequently in SEC filings and is therefore more suitable to a business environment. Specifically, the Loughran and McDonald list recognizes that a substantial number of words that are construed to be negative in the Harvard list are typically not so in the financial context. Based on this, Loughran and McDonald construct a reduced list of words that have negative implications in the financial context. In addition, Loughran and McDonald introduce four additional categories of words, namely positive, uncertain, litigious, and strong and weak modal verbs.[33,34] By construction, the Loughran and McDonald list is smaller than Harvard's General Inquirer even though Loughran and McDonald include new words not found on the original Harvard list. However, it is fairly new and has not yet been extensively tested as the General Inquirer. We report below major differences in the results between the two words lists. As both are comprehensive lists of words and we are using tone changes rather than tone levels, it is not surprising that most of the empirical findings are robust to the choice of words list.

We define three main variables as our tone signals: the number of positive (negative) words, (Pos, Neg, and Pos–Neg), all divided by the number of total words. To identify changes in the tone of MD&A from past filings and to scale signals for their variability, we subtract from each signal the mean signal in periodic SEC filings made within the preceding 400 calendar days and divide by the standard

[30] As pointed out by one of our reviewers, some firms incorporate by reference the MD&A section in their annual report to shareholders (ARS) in their Form 10-K. Our minimum word count of 30 may not be sufficient to guard against inclusion of these references to ARS in our sample, in which cases the changes in tones of these 10-K Forms may be random. This is likely to bias our study against finding significant results for tone changes. Less than 5% of our sample of 10-K Forms has fewer than 700 words. Also, as we report in the robustness tests below, our main results are insensitive to fourth quarter versus interim quarters.

[31] http://www.nd.edu/~mcdonald/Word_Lists.html.

[32] See description and categories in http://www.wjh.harvard.edu/~inquirer/homecat.htm.

[33] It is worth noting that Loughran and McDonald concentrate more on the negative word category because negative words seem to have a more pervasive effect on the financial markets than positive words (Tetlock 2007; Tetlock et al. 2008).

[34] Loughran and McDonald find that firms reduce the usage of strong modal verbs relative to weak ones after the passage of the Sarbanes-Oxley Act in 2002.

deviation of the signal in the periodic SEC filings made within the preceding 400 calendar days. Because the MD&A sections of periodic filings are expected to vary little from one period to another, we do not use the proportion of the number of negative (positive) words but its change from the past. When management is aware of changes that occurred during the current period from prior periods (such as declining sales, new products, additional expenses, new liquidity concerns), it is likely to discuss those changes in the current MD&A, leading to tone changes from previous periodic filings. Note that the benchmark that we use to standardize the proportion of positive (negative) words is the average of the signal in the MD&A sections of prior periodic (10-Q and 10-K) filings of the same firm, because other filings such as immediate reports (Form 8-K), registration statements, proxies, etc. are likely to include other words, and their average signal is likely to be affected by the reason for the filing. Note that we use the standard error of the signal in the periodic filings made in the prior 400 days, ensuring that we must have at least three such periodic filings to estimate the tone change used in the current study.[35] We expect high scores on the Pos and Pos-Neg signals to have higher immediate and subsequent returns than those with low scores. Conversely, we expect immediate and subsequent returns on high Neg scores to be lower than those on low Neg scores. Consistent with prior results, we expect firms with high scores on earnings surprises to have greater immediate and subsequent returns than those with low scores. The converse should hold for accruals.

Table 1 shows that, our initial sample had 382,435 SEC filings with 10-K, 10 K, 10-Q, or 10Q on the June 2008 version of the S&P SEC Filing Dates Database that are not amended filings and are not more than 100 (55) days after the fiscal year (quarter) end. Merging with the Compustat Point-In-Time File, requiring a valid CUSIP, market value of equity at quarter-end in excess of $10 million, and average total assets during the quarter in excess of $10 million, price per share at quarter-end in excess of $5.00, and an available earnings surprise reduced the sample size to 218,524 observations. Including only observations with filing date short-window excess returns around the SEC filing (that is, days [−1, +1] where day 0 is the SEC filing date)[36] and drift returns from 2 days after the SEC filing through 1 day after the preliminary earnings announcement for the subsequent quarter, and eliminating observations before the fourth quarter of 1993 and after the second quarter of 2007 due to scarce number of observations in these quarters, yields a sample of 201,285 firm-quarters. For 193,226 observations, the MD&A section has more than 30 words and the positive, negative, and differential tone signal can be computed. However,

[35] We first estimate the signal for each periodic filing in a specific quarter and then use the prior periodic filings to estimate the tone change. Thus, all means and standard errors are based on initial 10-Q and 10 K forms and not their subsequent amendments.

[36] We follow standard convention in what we mean by short-window abnormal returns and long-term excess returns. Short-window abnormal returns surrounding MD&A disclosures are defined as buy-and-hold return on a stock minus the average return on a matched size-B/M-momentum portfolio over the days [−1, +1], where day 0 is the SEC filing date. As a matter of abundant caution, day −1 is included to capture any leakage of information that may have affected stock prices. The excess drift return for the longer-term is the buy-and-hold return on a stock minus the value weighted average return on a matched size-B/M-momentum portfolio from two days after the SEC filing date through one day after the subsequent quarter's preliminary earnings announcement.

Table 2 Summary statistics

Variable	*N*	Mean	SD	Min	10th Pctl	Median	90th Pctl	Max
(Positive–Negative) signal	153,988	−0.107	3.366	−230.036	−2.103	−0.06	1.851	281.047
Positive word signal	153,988	0.025	3.026	−323.173	−1.807	−0.056	1.929	188.719
Negative word signal	153,988	0.231	4.132	−333.503	−1.69	0.019	2.222	287.127
No. of positive words	153,988	40	38	0	6	28	95	488
No. of negative words	153,988	48	57	0	4	28	116	592
No. of words	153,988	4,741	3,709	31	1,032	3,614	10,805	16,763
Standardized earnings surprise (SUE)	153,988	0	0.043	−3.547	−0.007	0	0.007	8.125
Standardized earnings surprise, analyst forecasts, SUEAF	103,710	0	0.014	–	–	0	0.004	0.55
Accruals/average assets	128,237	−0.012	0.052	−1.857	−0.052	−0.01	0.03	1.328
Abnormal buy and hold return—filing	153,988	−0.001	0.052	−0.814	−0.049	−0.002	0.048	2.916
Abnormal buy and hold return—Filing through next earnings	153,988	−0.005	0.199	−1.56	−0.205	−0.011	0.19	7.952
Market value—quarter-end ($million)	153,988	3,242	15,054	10	58	455	5,253	602,433
Price per share	153,988	42.95	1,157.17	5	8	21	48.94	109,990
Number of forecasts	153,988	3.8	4.9	0	0	2	10	47

Notes:

1. The sample is based on 10-Q and 10-K filings for quarters spanning Q4/1993-Q2/2007. SEC filings are retrieved from S&P's SEC Filing Dates database. Sample firms are those with available data and passing the selection criteria described in Table 1 and the text

2. (Positive–Negative) signal is based on the number of positive words minus the number of negative words, scaled by total words. Positive (Negative) signal is based on the number of positive (negative) words divided by the total number of words. For all three signals, the signal subtracts the average signal in all periodic SEC filings made in the prior 400 days and divides by the standard deviation of the signal in the same period

3. No. of Positive (negative, All) Words is the total number of positive (negative, all) words in the MD&A section of the SEC filing

4. When there are no analyst forecasts for the quarter, SUE is calculated from the Compustat quarterly database as preliminary income (Quarterly item 8) for quarter t minus as-first-reported income for quarter $t-4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter. SUEAF is based only on analyst forecasts

5. Accruals/Average Assets equal income before extraordinary items and discontinued operations minus cash from operations (OCF), scaled by average total assets during the quarter

6. BHR is the buy-and-hold return on a stock minus the average return on a matched size-B/M-momentum portfolio. The Filing window spans days $[-1, +1]$, where day 0 is the SEC filing date (Filing). The other window spans 2 days after the SEC filing through 1 day after the subsequent quarter's preliminary earnings announcement (filing through next earnings)

requiring the tone change variable further reduces the final sample size to 153,988 observations (firm-quarters), with 696 in the fourth quarter of 1994 (minimum per quarter in our sample) climbing to a high of 4,005 in the first quarter of 1998 (the maximum for a quarter). Thus, there are sufficient numbers of observations for each of the quarters in our sample period to construct meaningful portfolios.

Figure 1 provides a graphical representation of the number of filings per calendar quarter that fulfill the first two selection criteria of Table 1 (designated as potential, 218,524 filings, 10,729 unique firms) and sample filings that satisfy all the criteria of Table 1, (153,988 filings, 8,219 unique firms).

Table 2 provides summary statistics. As can be seen, our sample consists of firms with a wide distribution of sizes. The sample median market value is $455 million and the mean is $3.242 billion. The median price per share is $21 with a mean of $42.95; recall that there is a minimum price per share of $5.00 for sample inclusion. Thus, we have a wide distribution of firm size and price per share. About two-thirds of the observations (103,710) have quarterly forecasts on IBES, with a median coverage by two analysts. Consistent with prior studies, the mean and median accruals are negative, largely due to the effects of depreciation. The mean and median SUEs are roughly zero, indicating that our earnings forecast models are reasonably good for the median firm. The mean number of positive words is smaller than the mean number of negative words in MD&A disclosures, although the medians are the same. When using Harvard's General Inquirer word list, we found many more positive and negative words than with the Loughran and McDonald word list and about 50% more positive words than negative words, indicating a possible optimistic tone in MD&A disclosures on average. The positive and negative signals indicate a slight skewness, with the means slightly larger than the medians.

4 Results

4.1 Returns and signals analysis

Table 3 shows the mean excess returns for three subgroups of our sample firms formed using different signals, where mean excess returns is defined as the BHR on a stock minus the average returns on a matched size-book to market (B/M)-momentum portfolio over the days [−1. +1], with day 0 identified as the SEC filing date. Firms are classified into three groups using the bottom 20%, middle 60%, and top 20%. Consistent with the prior literature about short-window reactions around the preliminary earnings announcement, firms in the bottom (top) SUE quintile have a negative (positive) mean excess return of −0.6% (+0.3%) in the 3-day window centered on the SEC filing. The top and bottom quintiles have statistically different mean excess returns as indicated by the rightmost column at the .001 level of significance. In contrast, we do not observe any such differences for the accruals signal, although the accrual anomaly is not for the short-window around the SEC filings but for subsequent returns.

The interesting observation in this table pertains to the tone change signals in the MD&A sections. Both positive and negative sentiments are associated with

Table 3 Mean excess returns around SEC filing for various signals

Signal	Bottom 20%	Middle 60%	Top 20%	Significance top–bottom
(Positive–Negative) signal	**−0.002**	**−0.001**	0.000	**.001**
Positive word signal	**−0.002**	**−0.001**	−0.001	**.002**
Negative word signal	−0.000	**−0.001**	**−0.002**	**.001**
Accruals	**−0.001**	**−0.001**	**−0.002**	.516
SUE	**−0.006**	**−0.001**	**0.003**	**.001**
SUEAF	**−0.005**	**−0.001**	**0.003**	**.001**
N	30,777	92,425	30,786	

Notes:

1. The table presents mean excess returns around SEC filings based on various signals. Bold entries represent mean excess returns that are statistically different from zero with a significance level below 5%

2. (Positive–Negative) signal is based on the number of positive words minus the number of negative words, scaled by the total number of words. Positive (Negative) signal is based on the number of positive (negative) words divided by the total number of words. For all three signals, the signal subtracts the average signal in all periodic SEC filings made in the prior 400 days and divides by the standard deviation of the signal in the same period

3. When there are no analyst forecasts for the quarter, SUE is calculated from the *Compustat* quarterly database as preliminary income (Quarterly item 8) for quarter t minus as-first-reported income for quarter $t-4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter. SUEAF is based on analyst forecasts only

4. Accrual/Average Assets equals income before extraordinary items and discontinued operations minus cash from operations (OCF), scaled by average total assets during the quarter

5. The excess return is the buy-and-hold return on a stock minus the average return on a matched size-B/M-momentum portfolio over the days $[-1, +1]$, where day 0 is the SEC filing date

6. Significance Top-Bottom shows the significance level of a two-sample t-statistic that tests the equality of means for the top and bottom excess returns

7. N is the number of observations in each group for each signal. N is slightly smaller for accruals and SUEAF

significant short-window mean excess returns in the expected direction. The bottom (top) negative tone change quintile has mean excess returns for the short window around the SEC filing of 0.0% (−0.2%), with the means statistically different across the two extreme quintiles at the 0.001 level of significance. The converse is evident for the positive and (positive–negative) signals, where the bottom quintiles have mean excess returns of −0.2% for both, and the top quintiles mean excess returns of −0.1% for the positive signal and 0.0% for the (positive–negative) signal, with the two extreme quintiles having statistically different means at the 0.001 and 0.002 levels of significance.

Table 4 provides a correlation matrix between the excess return in the 3-day window centered on the SEC filing, BHR-Filing, the subsequent drift, BHR drift, the control variables, namely, accruals, SUE, and the tone change measures. As is to be expected, the differential tone variable (Pos–Neg) is significantly correlated with each of the other tone variables (0.471 and −0.688). Interestingly, the correlation

Table 4 Correlations among regression variables

	BHR-drift	BHR-filing	Accrual	SUEAF	SUE	(Pos–Neg)	Pos
BHR-filing	−0.004						
Accrual	**−0.040**	0.001					
SUEAF	**0.040**	**0.053**	**0.026**				
SUE	**0.057**	**0.059**	**0.061**	**0.947**			
(Pos–Neg)	**0.013**	**0.013**	0.005	**0.069**	**0.077**		
Pos	**0.010**	**0.010**	**−0.016**	**0.047**	**0.051**	**0.471**	
Neg	**−0.012**	**−0.010**	**−0.021**	**−0.057**	**−0.063**	**−0.688**	**0.018**

Notes:

1. The table presents Pearson correlations between regression variables, which include excess buy-and-hold returns (BHR) on scaled signal ranks. Each signal is assigned its quintile rank, is divided by 4, and 0.5 is subtracted to obtain the scaled signal rank. The table is based on all available observations. Bold entries represent correlations that are statistically different from zero with a significance level below 5%

2. (Positive–Negative) signal is based on the number of positive words minus the number of negative words, scaled by the total number of words. Positive (Negative) signal is based on the number of positive (negative) words divided by the total number of words. For all three signals, the signal subtracts the average signal in all periodic SEC filings made in the prior 400 days and divides by the standard deviation of the signal in the same period

3. When there are no analyst forecasts for the quarter, SUE is calculated from the Compustat quarterly database as preliminary income (quarterly item 8) for quarter t minus as-first-reported income for quarter $t-4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter. SUEAF is based on analyst forecasts only

4. Accruals/average assets equal income before extraordinary items and discontinued operations minus cash from operations (OCF), scaled by average total assets during the quarter

5. BHR-Filing is the buy-and-hold return on a stock minus the average return on a matched size-B/M-momentum portfolio over the days [−1, +1], where day 0 is the SEC filing date. BHR-Drift is the excess BHR over the period from 2 days after SEC filing through 1 day after the preliminary earnings announcement in the subsequent quarter

between the two pure tone variables, (negative and positive) is very low (0.018). Consistent with the evidence in Table 3, SUE is positively and significantly correlated with the short-window excess return around the SEC filing date, BHR-Filing (0.059). The differential tone signal (Pos–Neg) exhibits significant positive correlation (0.013) with the short-window excess return around the SEC filing, the negative signal exhibits a significant negative correlation of −0.010, and the positive signal exhibits a positive correlation of 0.010. The significant correlations among the variable in Table 4 suggest a need to control for the relationships in a multivariate analytic setting.

Consistent with the prior literature, the excess return during the period from the SEC filing through the subsequent quarter's earnings announcement, BHR-Drift, is negatively correlated with accruals (−0.040) and positively correlated with both SUE (0.057) and SUEAF (0.040). The negative tone signal is significantly negatively correlated with BHR-drift (−0.012), whereas the positive signal is significantly positively associated with BHR-Drift (0.010). The differential tone change signal, (Pos–Neg), is strongly positively correlated with the drift, BHR-

Drift, at 0.013. Note that both SUE and SUEAF are positively and significantly correlated with the differential (Pos–Neg) and positive tone signals and negatively with the negative tone signal. The accruals signal is negatively correlated with the positive tone signal as would be expected but is insignificantly correlated with the differential tone signal and negatively correlated with the negative tone signal.

Table 5 Regression of SEC filing returns on various signals

Model	1	2	3	4	5	6
Intercept	**−0.001**	**−0.001**	**−0.001**	**−0.002**	**−0.002**	**−0.002**
Significance	**0.001**	**0.001**	**0.001**	**0.036**	**0.038**	**0.035**
Accruals	0.0002	0.0003	0.0002	−0.0005	−0.0004	−0.0004
Significance	0.707	0.613	0.699	0.411	0.470	0.423
SUE				**0.0093**	**0.0094**	**0.0094**
Significance				**0.001**	**0.001**	**0.001**
(Pos–Neg)	**0.0022**			**0.0014**		
Significance	**0.001**			**0.016**		
Pos		**0.0016**			0.0009	
Significance		**0.002**			0..072	
Neg			**−0.0016**			**−0.0011**
Significance			**0.002**			**0.017**
Average *R*-square (%)	**0.16**	**0.13**	**0.14**	**1.5**	**1.5**	**1.5**

Notes:

1. The table presents mean coefficients from 52 quarterly regressions of the excess buy-and-hold return (BHR) around SEC filing dates on scaled signal ranks. Each signal is assigned its quintile rank, is divided by 4, and 0.5 is subtracted to obtain the scaled signal rank. Quarterly regressions have on average about 2,460 observations. Bold entries represent correlations that are statistically different from zero with a significance level below 5%. Significance levels are based on the standard error of the coefficient across the 52 quarterly regressions in a manner of Fama and MacBeth (1973)

2. (Positive–Negative) signal is based on the number of positive words minus the number of negative words, scaled by the total number of words. Positive (Negative) signal is based on the number of positive (negative) words divided by the total number of words. For all three signals, the signal subtracts the average signal in all periodic SEC filings made in the prior 400 days and divides by the standard deviation of the signal in the same period

3. When there are no analyst forecasts for the quarter, SUE is calculated from the Compustat quarterly database as preliminary income (quarterly item 8) for quarter t minus as-first-reported income for quarter $t - 4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter

4. Accruals/average assets equal income before extraordinary items and discontinued operations minus cash from operations (OCF), scaled by average total assets during the quarter

5. BHR-Filing is the buy-and-hold return on a stock minus the average return on a matched size-B/M-momentum portfolio over the days [−1, +1], where day 0 is the SEC filing date

6. Regression models 4–6 also include log of market value, log of price per share, number of forecasts, and the ratio of traded shares in the prior 60 days to total shares outstanding, as independent variables (see definitions at the bottom of Table 7). Except for the number of forecasts, which is significantly and positively associated with the filing date excess returns, none of the variables is significant. For brevity, we do not tabulate these independent variables

Overall, these correlation patterns indicate that we need to control for SUE and accruals in our drift tests.

Table 5 presents the results of our Fama-MacBeth type regressions for returns around the SEC filing dates (BHR-Filing) regressed on different sets of financial and tone signals, namely accruals, SUE, and our three tone signals. Each column records the intercept and slope for the regression of the 3-day excess return centered on the SEC filing date, BHR-Filing, on different combinations of these signals. Recall that the slope coefficients can be interpreted as a return on a hedge portfolio that is long in the top quintile and is short in the bottom quintile for a specific signal. Note further that preliminary earnings announcements typically precede the SEC filings, so that new information to market participants around the SEC filing date is in the form of accruals, as well as the tone signals through the newly disclosed MD&A section. Thus, columns 1–3 in the table examine the incremental information in the tone of the MD&A section given information about accruals released in the SEC filing. The accruals signal is positively but insignificantly associated with the short-window returns. Although this may seem inconsistent with prior results about accruals, which had documented significant negative association with returns, the prior evidence is about the association of accruals with *future* returns instead of the contemporaneous short-window returns used in Table 5. Note that all the tone variables are significantly (with the expected signs) associated with the short-window returns around the SEC filing, even after controlling for accruals. Finally, columns 4–6 present the associations of the tone signals with short-window returns around the SEC filings, conditional on the previously disclosed earnings surprise. Note that the return on the hedge portfolio constructed according to the earnings surprise SUE is higher than the hedge return on accruals, implying that market participants get further confirmation from SEC filings about the original earnings surprise. Note further that all tone signals are still significantly associated with short-window returns beyond SUE and accruals, except for the positive tone change signal which has a two-tailed significance level of 0.072. Thus, Table 5 results show that short-window market reactions to all three tone signals are incremental to the widely used financial signals of SUE and accruals.

Table 6 is the counterpart of Table 3 for drift returns instead of the short-window returns around SEC filing dates used in Table 3. The table reports mean excess returns, that is, buy-and-hold return on a stock minus the average return on a matched size-B/M portfolio, from 2 days after the SEC filing through 1 day after the subsequent quarter's preliminary earnings announcement (BHR-Drift). As the table shows and consistent with the post earnings announcement drift literature, the bottom (top) quintile of SUE had a mean drift of −2.1% (1.3%). Also consistent with prior studies, the drift return on the bottom (top) accrual quintile is 0.6% (−1.7%). Of all the tone signals, the negative tone signal has the largest spread in the mean excess drift returns between bottom quintile (−0.8%) and top quintile (−0.1%). The positive signal shows significant mean drift return of −0.6% for the bottom quintile, and −0.2% top quintile, while the differential signal shows a significant mean drift return of −0.8% for the bottom quintile and −0.2% for the top quintile. For all the signals in Table 6, the bottom and top quintile mean excess returns are statistically different as indicated in the rightmost column. Furthermore,

Table 6 Mean excess drift returns for various signals

Signal	Bottom 20%	Middle 60%	Top 20%	Significance top-bottom
(Positive–Negative) signal	**−0.008**	**−0.005**	−0.002	**.001**
Positive word signal	**−0.006**	**−0.005**	−0.002	**.015**
Negative word signal	−0.001	**−0.005**	**−0.008**	**.001**
Accruals	**0.006**	**−0.004**	**−0.017**	**.001**
SUE	**−0.021**	**−0.006**	**0.013**	**.001**
SUEAF	**−0.013**	**−0.006**	**0.010**	**.001**
N	30,777	92,425	30,786	

Notes:

1. The table presents mean excess returns from 2 days after the SEC filing through 1 day after the subsequent preliminary earnings announcement for sub-groups based on various signals. Bold entries represent mean excess returns that are statistically different from zero with a significance level below 5%

2. (Positive–Negative) signal is based on the number of positive words minus the number of negative words, scaled by the total number of words. Positive (Negative) signal is based on the number of positive (negative) words divided by the total number of words. For all three signals, the signal subtracts the average signal in all periodic SEC filings made in the prior 400 days and divides by the standard deviation of the signal in the same period

3. When there are no analyst forecasts for the quarter, SUE is calculated from the Compustat quarterly database as preliminary income (quarterly item 8) for quarter t minus as-first-reported income for quarter $t - 4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter. SUEAF is based on analyst forecasts only

4. Accruals/Average Assets equal income before extraordinary items and discontinued operations minus cash from operations (OCF), scaled by average total assets during the quarter

5. The excess return is the buy-and-hold return on a stock minus the average return on a matched size-B/M-momentum portfolio from 2 days after the SEC filing date through 1 day after the subsequent quarter's preliminary earnings announcement

6. Significance Top-Bottom shows the significance level of a two-sample t-statistic that tests the equality of means for the top and bottom excess returns

7. N is the number of observations in each group for each signal. N is slightly smaller for accruals and SUEAF

all tone and financial signals provide monotonic mean returns across the three groups in the expected direction.

Table 7 is the counterpart of Table 5. The dependent variable in the regression is the drift excess returns buy-and-hold strategy from 2 days after the SEC filing through 1 day after the subsequent earnings announcement, (BHR-Drift), and the independent variables include in addition to our tone change measure control variables that are known to explain drift (including size measured by the market value of equity, price per share, the number of quarterly analysts' forecasts and turnover as measured by traded shares in the prior 60 days scaled by outstanding shares). It reports mean coefficients of cross-sectional quarterly regressions in a Fama and MacBeth (1973) manner. The hedge portfolio return on accruals is consistently negative as expected from prior studies (low accruals imply future

Table 7 Regression of drift excess returns on various signals

Signal	Intercept	Accruals	SUE	Tone	LOGMKT	LOGPRICE	NFORE	RVOL	RSQ
(Pos–Neg)	**−0.0171**	**−0.0255**	**0.0321**	**0.0037**	−0.0001	0.0041	0.0002	0.0026	**2.4%**
Significance	**0.002**	**0.001**	**0.001**	**0.030**	0.941	0.127	0.323	0.839	**0.001**
Pos	**−0.0171**	**−0.0255**	**0.0323**	0.0028	−0.0001	0.0041	0.0002	0.0024	**2.4%**
Significance	**0.002**	**0.001**	**0.001**	0.157	0.954	0.131	0.322	0.848	**0.001**
Neg	**−0.0171**	**−0.0256**	**0.0322**	−0.0034	−0.0022	0.0041	0.0002	0.0027	**2.4%**
Significance	**0.002**	**0.001**	**0.001**	0.061	0.959	0.132	0.325	0.831	**0.001**

Notes:

1. The table presents mean coefficients from 52 quarterly regressions of the excess buy-and-hold drift return on scaled signal ranks. Each signal is assigned its quintile rank, is divided by 4, and 0.5 is subtracted to obtain the scaled signal rank. Quarterly regressions have on average about 2,460 observations. Bold entries represent correlations that are statistically different from zero with a significance level below 5%. Significance levels are based on the standard error of the coefficient across the 52 quarterly regressions in a manner of Fama and MacBeth (1973)

2. Tone represents the tone change signal. (Positive–Negative) signal is based on the number of positive words minus the number of negative words, scaled by the total number of words. Positive (Negative) signal is based on the number of positive (negative) words divided by the total number of words. For all three signals, the signal subtracts the average signal in all periodic SEC filings made in the prior 400 days and divides by the standard deviation of the signal in the same period

3. When there are no analyst forecasts for the quarter, SUE is calculated from the Compustat quarterly database as preliminary income (quarterly item 8) for quarter t minus as-first-reported income for quarter $t - 4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter

4. Accruals/Average Assets equal income before extraordinary items and discontinued operations minus cash from operations (OCF), scaled by average total assets during the quarter

5. The excess drift return is the buy-and-hold return on a stock minus the average return on a matched size-B/M-momentum portfolio from 2 days after the SEC filing date through 1 day after the subsequent quarter's preliminary earnings announcement

6. LOGMKT is the log of market value of equity at quarter-end

7. LOGPRICE is the log of price per share at quarter-end

8. NFORE is the number of quarterly analyst forecasts

9. RVOL is the ratio of traded shares in the 60 days prior to filing, scaled by number of shares outstanding 1 day before filing

positive returns) of about −2.55% per quarter (or roughly 10% annually), which is similar to Sloan's (1996) result. The SUE signal has the highest quarterly hedge drift return of about 3.21%. Despite the presence of accruals, SUE, and the other control variables, the differential tone variable is significantly and strongly associated with drift returns adding 0.37% to the quarterly return. Similar results are obtained for the negative tone change measure, although the significance level is lower (0.061, two-sided). Thus, our tone measures not only contribute incrementally to associations of financial variables with short-window returns around SEC filings but also to drift in returns through the following earnings announcements.

Table 8 records the potential mean payoffs to holding calendar time monthly hedge portfolios using the extreme quintiles of the most recent signals (a strategy

Table 8 Mean calendar time hedge portfolio returns on various signals

	Portfolio	Mean	*t*-Statistic	Significance	*N*	Diff vs. port	Mean	*t*-Statistic	Significance
(Pos–Neg) signal	1	**0.0020**	2.5	0.012	1,046				
Pos	2	0.0001	0.1	0.948	1,046				
Neg	3	**0.0031**	3.4	0.001	1,046				
Accruals	4	**0.0075**	7.1	0.001	871				
SUE	5	**0.0070**	6.0	0.001	1,046				
Neg signal + SUE	6	**0.0108**	5.5	0.001	242	5	**0.0039**	2.6	0.009
Neg signal + accruals	7	**0.0136**	6.8	0.001	171	4	**0.0061**	3.4	0.001
SUE + accruals	8	**0.0138**	5.4	0.001	171				
Neg signal + accruals + SUE	9	**0.0253**	5.5	0.001	41	8	**0.0115**	2.9	0.004

Notes:

1. The table presents mean monthly hedge returns based on 157 months from November 1994 through November 2007. Each month, long (short) positions are held in the top (bottom) quintile, except for Neg and accruals, where quintiles are reversed. The information each month is based on the most recent signal (tone change, accruals, or SUE), as long as the signal is available at least 1 day before the month-end and not more than 120 days before. The hedge portfolio is held for the subsequent month. When hedge portfolios are based on more than one signal, only firms falling into the most extreme quintiles of both signals are held in the portfolio. Bold entries represent hedge returns that are different from zero with significance levels below 5% (one-sided for differences in portfolios). Portfolios are numbered 1–9

2. (Positive–Negative) signal is based on the number of positive words minus the number of negative words, scaled by the total number of words. Positive (Negative) signal is based on the number of positive (negative) words divided by the total number of words. For all three signals, the signal subtracts the average signal in all periodic SEC filings made in the prior 400 days and divided by the standard deviation of the signal in the same period

3. When there are no analyst forecasts for the quarter, SUE is calculated from the Compustat quarterly database as preliminary income (quarterly item 8) for quarter t minus as-first-reported income for quarter $t - 4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter

4. Accruals/Average Assets equal income before extraordinary items and discontinued operations minus cash from operations (OCF), scaled by average total assets during the quarter

5. The excess drift return is the buy-and-hold monthly return on a stock minus the average monthly return on a matched size-B/M-momentum portfolio

6. The *t*-statistics and significance levels are based on the 157 monthly hedge returns

7. *N* is the average number of firms in the hedge portfolio

8. Diff vs. Port is a comparison of the return on the row's hedge portfolio minus the return on the hedge portfolio indicated in the column. For example, the hedge return on Neg Signal + SUE in row 6 is compared with the hedge portfolio return on SUE in row 5. It measures the incremental return obtained by using both SUE and the Neg Signal

that can be followed in practice), that is, holding long (short) positions in the top (bottom) quintile of SUE, the differential tone signal (positive minus negative), and the positive tone change signal. The converse strategy is used to construct a portfolio based on accruals and the negative tone signal. The hedge portfolio is formed on each month-end based on the extreme signal quintiles available on that date. When the hedge portfolio is based on more than one signal, stocks in the portfolio have to be in the extreme quintile for both signals (independent sorts). Note that the ranking of firms into portfolios at a particular month-end may use stale information about earnings, accruals or tone change signals from as far as 2 months ago, that is, we rank each month-end all firm-quarters even if the SEC filing has not occurred during that month. This tends to reduce the strength of the signals, yielding lower future returns but is more characteristic of how large institutional investors are likely to form hedge portfolios in practice.

As can be seen in Table 8, individually, accruals and SUE have the highest payoffs with a mean monthly return of 0.75% (or 2.3% per quarter, or 9.4% annually) and mean monthly return of 0.70%, (or 2.1% per quarter, or 8.7% annually), respectively. This is lower than typical post-earnings-announcement returns (see survey in Livnat and Mendenhall 2006), but this is expected given that (a) portfolios are formed monthly and not immediately after the earnings announcements and that (b) we restrict our sample of firms to those that have quarter-end price per share in excess of $5. The differential tone signal has a significant monthly payoff of 0.20%, which is equivalent to 0.6% per quarter, or 2.4% annually. The negative tone change signal has an even larger monthly abnormal return of 0.31, or 3.8% per year, comprising slightly less than half of the drift in SUE and accruals. When the negative tone signal is combined with SUE, the hedge portfolio monthly return is 1.08%, which is about 3.3% per quarter and 13.8% annually. Note however, that this combined signal hedge portfolio is less diversified with an average of 242 stocks compared with the 1,046 stocks when only SUE is used. Note also that the table reports the results of a statistical test that the mean drift return on this combined portfolio is significantly larger than that of SUE (accruals) alone. It shows that the mean monthly difference is 0.39% (0.61%) with a *t*-statistic of 2.6 (3.4), 0.009 (0.001), two-sided significance level. When SUE is paired with accruals, the hedge portfolio yields a mean monthly return of 1.38%, representing a quarterly excess return of 4.2 and 17.9% annually. However, when the negative tone signal is added to the combination of SUE and accruals, the hedge portfolio return now has a mean monthly drift return of 2.53%, representing quarterly mean excess return of 7.8 and 35% annually, although at a cost of having only 41 stocks on average. Still, the incremental monthly 1.14% to the drift SUE and accruals return due to the negative tone signal is statistically significant with a *t*-statistic of 2.9 (0.004, two sided significance level). Thus, the tone signals based on the MD&A section of the 10-Q or 10-K forms add incrementally to the financial information conveyed by earnings surprises and accruals.[37]

[37] When using Harvard's General Inquirer word list, the differential tone signal had greater associations with future return drift than either the positive or negative signals alone.

Table 9 examines the risk exposure of the monthly calendar hedge portfolios by regressing the hedge portfolio raw returns on the monthly Fama-French factors including momentum. The SUE signal contributes 0.85% per month (*t*-statistic 5.8),

Table 9 Regressions of calendar time hedge portfolio raw returns on Fama-French factors

Hedge Portfolio	Intercept	Market	SMB	HML	Momentum
SUE	**0.0085**	**−0.0009**	0.004	−0.0000	−0.0000
t-Statistic	**5.8**	**−2.4**	1.0	−0.1	−0.0
Accruals	**0.0079**	−0.0003	**−0.0010**	**−0.009**	−0.0000
t-Statistic	**6.0**	−0.9	**−2.7**	**−1.9**	−0.1
(Pos–Neg)	**0.0020**	−0.0002	0.0004	0.0002	0.0002
t-Statistic	**2.2**	−0.8	1.4	0.6	1.0
Pos	0.0001	−0.0001	**0.0005**	0.0004	−0.0000
t-Statistic	0.1	−0.3	**2.1**	1.4	−0.2
Neg	**0.0034**	−0.0000	−0.0001	0.0000	0.0003
t-Statistic	**3.1**	−0.2	−0.49	0.0	1.3
SUE + Neg	**0.0124**	−0.0008	0.0006	0.0001	0.0002
t-Statistic	**5.1**	−1.2	0.9	0.1	0.4
Accruals + Neg	**0.0148**	−0.0004	−0.0008	**−0.0017**	0.0004
t-Statistic	**6.4**	−0.7	−1.3	**−2.2**	0.8
SUE + accruals + Neg	**0.0260**	−0.0006	−0.0011	−0.0012	0.0001
t-Statistic	**4.8**	−0.4	−0.8	−0.7	0.1

Notes:

1. The table presents regressions of monthly hedge raw returns on the Fama and French 3-factors plus momentum, taken from Kenneth French's Data Library, for the 157 months in our calendar time tests. Each month, long (short) positions are held in the top (bottom) quintile, except for Neg and accruals, where quintiles are reversed. The information each month is based on the most recent signal (tone change, accruals, or SUE), as long as the signal is available at least 1 day before the month-end and not more than 120 days before. The hedge portfolio is held for the subsequent month. When hedge portfolios are based on more than one signal, only firms falling into the most extreme quintiles of both signals are held in the portfolio. Bold entries represent regression coefficients that are different from zero with significance levels below 5%

2. (Positive–Negative) signal is based on the number of positive words minus the number of negative words, scaled by the total number of words. Positive (Negative) signal is based on the number of positive (negative) words divided by the total number of words. For all three signals, the signal subtracts the average signal in all periodic SEC filings made in the prior 400 days and divided by the standard deviation of the signal in the same period

3. When there are no analyst forecasts for the quarter, SUE is calculated from the Compustat quarterly database as preliminary income (quarterly item 8) for quarter t minus as-first-reported income for quarter $t - 4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter

4. Accruals/Average Assets equal income before extraordinary items and discontinued operations minus cash from operations (OCF), scaled by average total assets during the quarter

5. The drift return is the monthly buy-and-hold return on a stock

6. Market, SMB, HML, and Momentum are regression coefficients of the raw hedge portfolio returns on the Fama and French factors taken from Kenneth French's Data Library

accruals 0.79% (*t*-statistic 6.0), the negative tone signal 0.034% (*t*-statistic 3.1), and the differential tone change signal (Pos–Neg) 0.20% (*t*-statistic 2.2) individually to the calendar time hedge returns, after accounting for the Fama-French factors. While these are significant numbers in themselves, when the negative tone change signal is combined with SUE, the contribution to the hedge returns increases to a significant 1.24% (*t*-statistic 5.1), and combined with accruals the contribution is 1.48% (*t*-statistic 6.4). Finally, when SUE, accrual and the negative tone change measures are used together, the contribution to the monthly hedge raw returns increases even further to significant 2.6% (*t*-statistic 4.8). Note that there is very little evidence of a significant tilt in the hedge portfolios. There is some size and B/M tilt (towards large and value firms) in the accruals signal and some beta risk for SUE and the positive tone change signal. However, the significant intercepts show that the excess returns on the portfolios are not due to the three known Fama & French risk factors and the fourth factor commonly known as the Carhart momentum factor.

4.2 The effects of the information environment

To examine the effects of the information environment on the incremental information of tone change in the MD&A section, we use three different classifications. The first is based on the number of analyst forecasts available in the IBES database for the quarter. We expect that the incremental contribution of the tone change on prices would be smaller for firms that are followed by more analysts because most of the information in tone change has already been reflected in stock prices through the analysts' interpretations and interactions with management. We examine the effect of firm size, expecting smaller firms to have larger incremental information content for tone change because of their poorer information environments. Finally, we classify firms according to their value-growth characteristics (book to market ratios), expecting the tone change to be a weaker signal for the relatively more stable and easy-to-understand value stocks.

Table 10 reports the results of regressing 3-day excess filing returns and drift returns on accruals, SUE, and the negative tone change signal. As can be seen in Panel B of Table 10, the negative tone change signal is significantly negatively associated with drift returns for all firms but less so (a positive coefficient on the interaction variable Neg*D) for larger firms and firms with greater numbers of analyst following. However, the interaction effects do not indicate results that are statistically significant. Thus, having a strong information environment makes the negative tone change signal less relevant, although these results are directionally correct but not statistically significant.

4.3 Predicting future surprises

Our results show that the tone change signal is incrementally valuable to investors beyond earnings surprises and accruals. However, we have not yet shown whether the tone change measures from MD&As are associated with future returns by helping investors predict SUE at the subsequent earning announcements. In Panel A

Table 10 Regression of SEC filing and drift returns on various signals information environment analysis

	Intercept	Accrual	SUE	Neg	*D*	Acc**D*	SUE**D*	Neg**D*	*N*	*R*-Sq
Panel A: filing returns										
D = size	**−0.0015**	−0.0005	**0.0116**	−0.0010	**0.0009**	0.0002	**−0.0055**	0.0000	2,452	**1.16%**
Significance	**0.001**	0.489	**0.001**	0.148	**0.025**	0.854	**0.001**	0.998		**0.001**
D = B/M	**−0.0011**	0.0001	**0.0086**	−0.0004	0.0001	−0.0013	0.0013	−0.0013	2,452	**1.30%**
Significance	**0.003**	0.842	**0.001**	0.507	0.751	0.181	0.116	0.163		**0.001**
D = number of analysts	**−0.0017**	0.0006	**0.0107**	−0.0012	**0.0011**	**−0.0019**	**−0.0037**	0.0002	2,452	**1.19%**
Significance	**0.001**	0.400	**0.001**	0.120	**0.037**	**0.048**	**0.001**	0.776		**0.001**
Panel B: drift returns										
D = size	**−0.0073**	**−0.0265**	**0.0449**	**−0.0073**	**0.0048**	0.0033	**−0.0283**	0.0055	2,452	**1.13%**
Significance	**0.002**	**0.001**	**0.001**	**0.015**	**0.048**	0.378	**0.001**	0.100		**0.001**
D = B/M	−0.0037	**−0.0268**	**0.0343**	−0.0035	−0.0021	0.0047	−0.0004	−0.0002	2,452	**1.19%**
Significance	0.183	**0.001**	**0.001**	0.228	0.434	0.257	0.916	0.611		**0.001**
D = number of analysts	−0.0046	**−0.0223**	**0.0408**	**−0.0070**	0.0000	−0.0054	**−0.0187**	0.0051	2,452	**1.40%**
Significance	0.064	**0.001**	**0.001**	**0.008**	0.994	0.137	**0.001**	0.115		**0.0001**

Notes:

1. The table presents mean coefficients from 52 quarterly regressions of the excess buy-and-hold return (BHR) around SEC filing dates and drift returns from 2 days after the SEC filing through the next earnings announcement on scaled signal ranks. Each signal is assigned its quintile rank, is divided by 4, and 0.5 is subtracted to obtain the scaled signal rank. Quarterly regressions have on average *N* observations. Bold entries represent correlations that are statistically different from zero with a significance level below 5%. Significance levels are based on the standard error of the coefficient across the 52 quarterly regressions in a manner of Fama and MacBeth (1973)

2. Neg signal is based on the number of negative words, scaled by the total number of words. The signal subtracts the average signal in all periodic SEC filings made in the prior 400 days and divides by the standard deviation of the signal in the same period

3. When there are no analyst forecasts for the quarter, SUE is calculated from the Compustat quarterly database as preliminary income (quarterly item 8) for quarter *t* minus as-first-reported income for quarter $t - 4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter *t* on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter

4. Accruals/Average Assets equal income before extraordinary items and discontinued operations minus cash from operations (OCF), scaled by average total assets during the quarter

5. *D* is a dummy variable that is equal to one if the partitioning variable is above its cross-sectional quarterly median. The dummy variables are size, the market value of equity at quarter-end, the book/market ratio (B/M), and the number of analysts

of Table 11, we present Fama & MacBeth regressions of the next quarter SUE on current quarter SUE, accruals, our differential tone signals, and several control variables for 51 quarters. The table affirms that all tone change signals are incrementally and significantly associated with the next period SUE after controlling for current SUE, accruals, and various other variables. In Panel B, we

Table 11 Regression of preliminary earnings returns and SUE at Quarter $t + 1$ on tone signals and control variables

Signal	Intercept	SUE	Size	Accrual	B/M	NFORE	Price	Signal	*N*	*R*-Sq
Panel A: dependent variable is SUE at quarter t + 1										
SUE	0.0012	**0.0862**	0.0000	−0.0025	**−0.0036**	**−0.0000**	**0.0000**		2,265	**0.0359**
Significance	0.318	**0.001**	0.806	0.532	**0.001**	**0.027**	**0.035**			**0.001**
(Pos–Neg)	0.0013	**0.0853**	0.0000	−0.0025	**−0.0036**	−0.0000	**0.0000**	**0.0009**	2,265	**0.0369**
Significance	0.289	**0.001**	0.882	0.541	**0.001**	0.059	**0.032**	**0.001**		**0.001**
Pos	0.0013	**0.0858**	0.0000	−0.0022	**−0.0036**	**−0.0000**	**0.0000**	**0.0006**	2,265	**0.0365**
Significance	0.293	**0.001**	0.871	0.573	**0.001**	**0.040**	**0.031**	**0.001**		**0.001**
Neg	0.0012	**0.0857**	0.0000	−0.0028	**−0.0035**	**−0.0000**	**0.0000**	**−0.0009**	2,265	**0.0367**
Significance	0.321	**0.001**	0.820	0.489	**0.001**	**0.047**	**0.041**	**0.001**		**0.001**

	Intercept	Residual	*R*-Sq
Panel B: dependent variable is short-window [−1, +1] excess return around preliminary earnings at quarter t + 1			
(Pos–Neg)	**0.0025**	**0.2136**	**0.84%**
Significance	**0.001**	**0.001**	**0.001**
Pos	**0.0025**	**0.2134**	**0.84%**
Significance	**0.001**	**0.001**	**0.001**
Neg	**0.0025**	**0.2135**	**0.83%**
Significance	**0.001**	**0.001**	**0.001**

Notes:

1. Panel A presents mean coefficients from 51 quarterly regressions of the earnings surprise in quarter $t + 1$ on the earnings surprise in quarter t, several control variables, and the tone change signals. Panel B presents mean coefficients from 51 quarterly regressions of the short window excess returns around preliminary earnings announcements at quarter $t + 1$ on the residuals of the respective regressions that included tone variables in Panel A. Excess returns are the buy-and-hold raw returns over the window [−1, +1] where day 0 is the preliminary earnings announcement date, minus the average return on a matched size-B/M-momentum portfolio. Bold entries represent correlations that are statistically different from zero with a significance level below 5%. Significance levels are based on the standard error of the coefficient across the 51 quarterly regressions in a manner of Fama and MacBeth (1973)

2. (Positive–Negative) signal is based on the number of positive words minus the number of negative words, scaled by the total number of words. Positive (Negative) signal is based on the number of positive (negative) words divided by the total number of words. For all three signals, the signal subtracts the average signal in all periodic SEC filings made in the prior 400 days and divides by the standard deviation of the signal in the same period

3. When there are no analyst forecasts for the quarter, SUE is calculated from the Compustat quarterly database as preliminary income (Quarterly item 8) for quarter t minus as-first-reported income for quarter $t - 4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter

4. Size is market value of equity at quarter end. Accruals/Average Assets equals income before extraordinary items and discontinued operations minus cash from operations (OCF), scaled by average total assets during the quarter. B/M is the ratio of book to market value of equity at quarter-end. NFORE is the number of quarterly earnings forecasts in the 90-day period prior to the earnings announcement. Price is price per share at quarter-end

5. N (R-Sq) is the average number of firms (R-Square) in the quarterly cross-sectional regressions

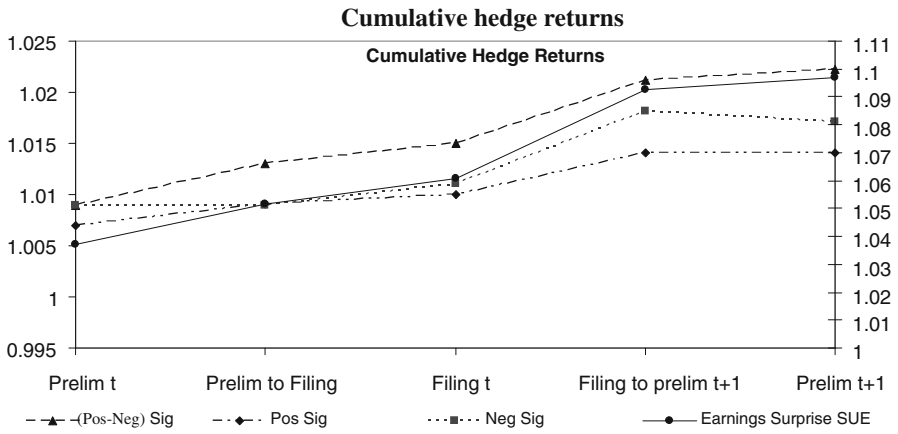

Fig. 2 Cumulative hedge returns. *Notes*: This figure shows the cumulative hedge returns on the earnings surprise (SUE) at various intervals (on the secondary *y*-axes). It also shows the cumulative hedge returns on the various tone signals (along the primary *y*-axes) for the same time intervals. The figure shows the intervals [−1, +1] around preliminary earnings for quarter t (Prelim t), from 2 days after preliminary earnings announcement of quarter t through 2 days prior to the SEC filing for that quarter (Prelim to Filing), [−1, +1] around the filing date for quarter t (Filing t), from 2 days after the SEC filing for quarter t through 2 days prior to the preliminary earnings announcement for quarter $t + 1$ (Filing to Prelim $t + 1$), and [−1, +1] around the subsequent quarter's preliminary earnings announcement (Prelim $t + 1$). All returns assume a long position in the top quintile and a short position in the bottom quintile (except for Neg sig). The returns are raw buy-and-hold returns during the relevant window minus the average return on a matched size-B/M-momentum portfolio. Note that the tone signals are not known until the SEC filings. The returns prior to that date are for illustrative purposes only

regress the short-window [−1, +1] excess returns around preliminary earnings at quarter $t + 1$ on the residuals of the respective regression that included tone variables in Panel A and show that our tone signals are significant in predicting future returns beyond their ability in predicting future SUE. Thus, the tone change signals enable investors to earn excess returns through and beyond their ability to forecast the subsequent quarter earnings surprises. Figure 2 demonstrates this graphically by plotting the cumulative hedge returns on our tone signals and SUE. It does not indicate that the cumulative drift return is earned primarily during the short-window [−1, +1] of the subsequent quarter earnings announcement.[38]

4.4 Confounding versus confirming signals

Another question that we have not addressed concerns the consequences of signals in conflict and also whether the tone change signal is stronger for negative or positive earnings surprises. To illuminate this question, Table 12 reports mean excess filing and drift returns for combinations of signals. The table shows that the additional short-window filing excess returns obtained from high versus low tone change signal (marked by High-Low in the table) is similar for positive and negative earnings surprises. However, the additional excess drift return obtained from the

[38] We thank an anonymous reviewer for suggesting that we incorporate this in our paper.

Table 12 Mean excess returns for signal combinations

	Low tone	Medium	High tone	High-low
Filing returns				
Negative surprise	−0.005	−0.005	−0.004	0.001
N	12,451	32,247	9,608	
Positive surprise	0.000	0.001	0.002	0.002
N	18,326	60,178	21,178	
Drift returns				
Negative surprise	−0.017	−0.018	−0.015	0.002
N	12,451	32,247	9,608	
Positive surprise	−0.002	0.002	0.004	0.006
N	18,326	60,178	21,178	
Low accruals (20%)	0.003	0.007	0.009	0.006
N	5,319	15,234	5,073	
Medium accruals (60%)	−0.005	−0.005	−0.001	0.004
N	15,271	46,269	15,430	
High accruals (20%)	−0.023	−0.016	−0.015	0.008
N	5,228	15,200	5,213	

Notes:

1. The table presents mean 3-day excess returns centered on the SEC filing date (Filing Returns) and mean excess returns from 2 days after the SEC filing through 1 day after the subsequent preliminary earnings announcement (Drift returns) for combinations of signals

2. Tone is based on the (Positive–Negative) signal, the number of positive words minus the number of negative words, scaled by the total number of words. The signal subtracts the average signal in all SEC filings made in the prior 400 days and divides by the standard deviation of the signal in the same period

3. When there are no analyst forecasts for the quarter, SUE is calculated from the Compustat quarterly database as preliminary income (quarterly item 8) for quarter t minus as-first-reported income for quarter $t - 4$, scaled by the market value of equity at the end of the quarter. When there is at least one analyst forecast for quarter t on IBES, the SUE is calculated as the actual IBES EPS minus the mean analyst forecast during the 90-day period before the disclosure of earnings, scaled by the price per share at the end of the quarter. Positive and negative surprise is based on the sign of SUE

4. Accruals equal income before extraordinary items and discontinued operations minus cash from operations, scaled by average total assets during the quarter

5. The excess return is the buy-and-hold return on a stock minus the average return on a matched size-B/M-momentum portfolio from 2 days after the SEC filing date through 1 day after the subsequent quarter's preliminary earnings announcement

6. High (Low) tone is the extreme high (low) 20%. High-Low represents the mean High tone return minus the mean Low tone return

7. *N* is the number of observations and is provided below the mean for each table entry

8. The High-Low returns are statistically different at the 0.001 level between Negative and Positive Earnings surprises for drift returns but are not statistically different (significance level 0.968) for Filing date returns. They are also statistically different at the 0.001 level between low and high accruals for drift returns

tone change signal is significantly larger for positive earnings surprises than negative ones. A possible reason for this could be that investors are more likely to trust management when bad news is reported but are likely to be more skeptical

when good news is reported, seeking further information.[39] Consequently, investors would attempt to obtain confirmation from other sources (tone change of the MD&A section in our case) when good news is reported. However, we see no such pattern for high versus low accruals, possibly indicating investors' ignorance of accruals.

4.5 Robustness checks

In earlier versions of this study, we used Harvard's General Inquirer word list to determine the tone change signals. Results are similar to those we report in the current version, and even stronger in some cases (see footnote 34 for example). We have noted the major differences between the results based on the Harvard and Loughran and McDonald lists in the text or footnotes.

Instead of using a tone change versus the filings for the firm in the prior 400 days as we had described earlier in Sect. 3.3, we use the mean of the Fama-French 48 industry classifications signal in the prior 400 days as the expected tone (scaled by the standard deviation of the Fama-French signal).[40] Our results indicate that the deviation of the tone signal from the prior industry mean is insignificantly different from zero after controlling for earnings surprises and accruals. Thus, it is important to measure changes in tone relative to past filings for the same firm.

We use Quantile regression to assess whether the significant incremental contribution of the tone change signal is present for all levels of excess drift returns.[41] We find that the incremental contribution of the tone change signal is present for all levels of the drift returns, except for very high levels when accruals are a very strong signal. Thus, it seems that the tone change signal is less effective when accruals are negative, earnings surprises are positive, and drift returns are the most positive. This suggests that investors tend to believe management when earnings surprises are positive in spite of low accruals and do not look for confirmation from tone change.

We examine whether the incremental contribution of the tone change signal is different in the fourth fiscal quarter (10-K) from interim quarters (10-Q). We do not observe any significant differences.

We find the main results intact when we require firms to have released a preliminary earnings release prior to the SEC filing.

When we use tone levels instead of tone changes, we find that the signals do not show consistently significant differences between top and bottom quintile or significant associations with filing date returns after controlling for SUE and accruals. We also do not see any significant differences or associations with drift returns when we use tone levels.

[39] This possibility has also been suggested by Kothari and Short (2003).

[40] We cannot use the mean tone of other firms in the same industry for the current quarter because some firms report earlier than others, and we do not wish to use information not yet available at portfolio construction date.

[41] See Koenker 2005, for details on Quantile regressions.

5 Conclusions

This study investigates whether nonfinancial information contained in the MD&A section of SEC filings is associated with excess market returns in the short window around SEC filings and with drift excess returns over the period from 2 days after the SEC filings through the subsequent quarter's preliminary earnings announcements. If management has private information about the firm's prospects and if management shares a portion of this information with investors through truthful disclosures in SEC filings, then market reactions as well as delayed market reactions should be associated with the nonfinancial information disclosed by management in the MD&A section. However, investors need to assess whether the nonfinancial information has favorable or unfavorable implications for contemporaneous and future returns. As a crude measure of whether the nonfinancial information is favorable or unfavorable, this study compares the frequency of positive words, negative words, or the difference between them to the same frequency in recent MD&A sections of the same firm. If managers' assessments of future prospects become more negative (positive), they are likely to use more negative (positive) words in their disclosures. This study has used two word lists to classify words into positive and negative categories, one which is based on specific business world words and a more general one that has been used in many previous studies. Results are very similar across the two word lists.

Our results indicate that nonfinancial signals based on changes in the tone of the MD&A section from the recent past are significantly correlated with short-window contemporaneous returns around SEC filing dates, even after controlling for accrual information available in the SEC filings or the preliminary earnings announcements (earnings surprises). Our results also show that the nonfinancial tone change signals are significantly correlated with drift excess returns, even after controlling for accruals, earnings surprises, and various variables that affect the magnitude of the drift.

The combined evidence in this study shows that market participants seem to behave as if they use nonfinancial information from MD&A disclosures (or other information that is correlated with it), in addition to the financial information provided routinely by firms. This indicates that the MD&A sections do have information content, and that the SEC requirement to provide these discussions by management seems to be justified. Our results are, of course, limited by the perfunctory manner in which we analyze the MD&A section—the mere counting of positive and negative words. Intuitively, stronger results may be obtained by using more sophisticated analytical tools that would classify better the contents of the MD&A as favorable or unfavorable.

Our study contributes to various constituencies. Academic studies that (1) are interested in assessing the effects of non-financial information on security prices, or (2) are interested in the effects of the MD&A disclosures, or (3) are concerned with managerial private information and the forms used to convey it to investors, or (4) how the information environment affects the association between nonfinancial information and security prices may all benefit from our analysis. Regulators may use the results of this study to assess the benefits of mandatory nonfinancial

disclosures. Professional investors may use procedures similar to ours to help improve portfolio selection based on publicly available information. However, we emphasize that this study provides just one way of analyzing the rich set of nonfinancial information that is potentially available to investors. As tools and techniques to analyze and evaluate qualitative data develop further, future studies could be designed to extract finer nonfinancial information and perhaps increase the explanatory power of the empirical models of stock prices.

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