Individual Investors' Attention to Accounting Information: Message Board Discussions*

Job Market Paper

Alina Lerman
Accounting Department
Stern School of Business
New York University
alerman@stern.nyu.edu

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ABSTRACT

Accounting standard setters and financial information providers are interested in individual investors' use of accounting information, but find it difficult to assess with conventional data sources. Financial message boards provide a unique medium to analyze individuals' attention to accounting information on a large scale and in great detail. I examine accounting-related content in 1.94 million messages for 1,858 firms and find that individual investors pay considerable attention to accounting information. In accordance with the expectation that investors react to relevant information events, I find that accounting-related discussion is significantly elevated around earnings releases, periodic reports, and 8-K reports. I also examine whether investors expand their accounting information acquisition and processing efforts in poor information climates. I show that accounting-related discussion increases in an environment of greater uncertainty, measured by information availability (lower analyst coverage), information precision (higher analyst forecast dispersion), and information ambiguity (higher trading volume). Lastly, I propose that greater attention to accounting information should be associated with evidence of a better-informed investor. In accordance with this hypothesis, I find that higher accounting discussion around earnings announcements is associated with a reduction in information asymmetry and a reduction in the post earnings announcement drift.

Keywords: individual investors, information environment, message boards, corporate disclosures

JEL Classification: D81; D83; G14; M41

1. Introduction

The purpose of this study is to measure the attention of individual investors to accounting information. Individual investors are often considered the least informed users of financial statements (Easley and O'Hara 1987; Hirshleifer and Teoh 2003). Measuring their actual aggregate use of accounting information with conventional data sources is a challenge. The emergence and growth in popularity of Internet message boards, whose participants primarily are current and potential individual investors (Wysocki 1999), allow me to observe the exchange and collective interpretation of information by individuals interested in financial analysis and portfolio management.[1] I extract and analyze accounting-related discussion from a sample of 1.94 million messages in 1,858 firm-specific financial message boards. I document individual investors' overall level of attention to accounting information, the increase in that attention around information releases, and the cross-sectional variation in attention associated with the degree of information uncertainty. In addition, I provide evidence that greater attention to accounting information around preliminary earnings announcements is associated with a reduction in information asymmetry and a reduction in the post earnings announcement drift.

Accounting standard setters are concerned with the extent and quality of information to which individual investors have access. The Financial Accounting Standards Board specifies that "users" of financial statements include both institutional and individual investors.[2] Similarly, the Securities and Exchange Commission [SEC] notes that the vast majority of the 6,000 comment letters received on the proposed Regulation Fair Disclosure came from individual investors who urged adoption of the new

[1] In this paper I refer to "information exchange" as a general type of message board dialogue. It encompasses not only explicit requests for and narrations of information but also collective analysis and interpretation of such information by message board participants. Anecdotal evidence and case-study based prior literature show that online discussions exhibit various facets of "information exchange" including dissemination of public information, speculation regarding private or forthcoming information, in-depth analysis of data, comparisons among firms and industries, and personal interpretation or sentiment (Balloun et al. 2000; Felton and Kim 2002; Das et al. 2005).

[2] Concepts Statement No. 1 states that: "Individual investors, creditors, or other potential users of financial information understand to varying degrees the business and economic environment, business activities, securities markets, and related matters. Their understanding of financial information and the way and extent to which they use and rely on it also may vary greatly. Financial information is a tool and, like most tools, cannot be of much direct help to those who are unable or unwilling to use it or who misuse it. Its use can be learned, however, and *financial reporting should provide information that can be used by all—nonprofessionals as well as professionals*—who are willing to learn to use it properly." (par. 36, emphasis added).

guidance and expressed frustration with the old practice of selective disclosure of material information by issuers. Furthermore, the SEC highlights the importance that the Internet has played in leveling the informational playing field:

> Other comments suggested that today's self-directed, online investors do not expect to rely exclusively on research and analysis performed by professionals, as was more common in the past. With advances in information technology, most notably the Internet, information can be communicated to shareholders directly and in real time, without the intervention of an intermediary. This online revolution has created a greater demand, expectation, and need for direct delivery of market information. (Regulation Fair Disclosure par. II.A.1)

The most recent NYSE share ownership survey (1998) found that 34 million individuals directly own shares in publicly traded companies. Evidence that firms actively attempt to attract small investors supports the notion that individuals are non-trivial market participants (Vogelheim et al. 2001). However, while both accounting standard setters and financial information providers are interested in individual investors' use of accounting information, such use is difficult to assess.

Understanding individuals' investing decisions is an active area of interest in the academic literature (Lee 1992; Barber and Odean 2000; Bhattacharya 2001; Barber and Odean 2008). Numerous studies find that individual investors' response to information is limited or naïve, concluding that individuals do not effectively utilize all available information (Malmendier and Shanthikumar 2007; Hirshleifer et al. 2008). Most of these studies do not identify which, if any, accounting items beyond bottom-line earnings individuals consider. Through analysis of discussions on a large sample of financial message boards, I show that individuals pay attention to a wide range of accounting items. I classify nearly 20 percent of 1.94 million messages in the sample as accounting-related.[3] More than 50 distinct accounting terms are discussed in a non-trivial number of messages. Individual investors pay most attention to, in order of frequency, earnings, cash, and revenues. They discuss dividends and share repurchases more frequently for large firms and firms in the finance and banking industry, while governance and control issues are more prominent in discussions of small firms. Other frequently

[3] Appendix A contains a list of words used for accounting classification. I classify a message as accounting-related if it includes at least one accounting term from Appendix A. Examples of messages classified as accounting are included in Appendix B.

discussed items include current and periodic reports, P/E ratios, assets, and expenses. Compared to non-accounting discussion, accounting discussion is more interactive, with a greater frequency of questions and a larger number of responses to each originator message. This finding is consistent with information dissemination and collective analysis being prominent reasons for accounting-related dialogue on message boards.

Prior literature reports mixed results regarding individual investors' reaction to information events such as earnings announcements and periodic report filings (Lee 1992; Bhattacharya 2001; Asthana et al. 2004; Battalio et al. 2009). I provide evidence that individuals react strongly to these and other information releases. The percentage of accounting-related discussions increases to 38 percent on earnings announcement days (compared to 18 percent on non-event days) and is significantly elevated for several days before and after the announcement, suggesting investors both anticipate the information releases and discuss their substance. Investors also react to 10-Q filings and to 10-K filings of small firms. Lastly, they pay attention to Form 8-K filings, with particularly high accounting discussions around news of non-reliance on previously issued statements and costs associated with exit or disposal activities. Overall, the results suggest that individuals scrutinize various information disclosures.

Next, I examine how the information environment influences the level of investors' accounting-related discussion. Psychology literature shows that increased communication activity occurs more frequently under conditions of uncertainty (Newcomb 1953). Likewise, accounting and finance studies suggest that information users spend more effort on information acquisition and processing, by expanding their analysis to additional items and private data, when faced with an inferior information environment (Francis and Schipper 1999; Ely and Waymire 1999; Hope 2003). However, when uncertainty surrounding accounting information is excessively high, investors may rely on non-accounting information (Amir and Lev 1996) or forego valuation altogether. Thus, the relationship between investor attention to accounting information and the characteristics of the information environment is an open question that I explore with message board data. I present evidence that attention to accounting information increases with the lack of information availability (lower analyst coverage), with lower

information precision (higher analyst forecast dispersion), and with greater information ambiguity (higher trading volume turnover). This evidence suggests that individual investors increase their accounting information acquisition and processing efforts for firms with poor information environments.

I also consider the effect financial reporting quality has on individual investors' attention to accounting information. Financial disclosures of higher quality may be more relevant to investors or easier to use in analysis. On the other hand, high financial reporting quality may reduce the need for additional information acquisition or processing efforts. Using accruals quality, earnings persistence, and earnings relevance as proxies, I find weak evidence that high financial reporting quality is associated with greater attention to accounting information. Examining a measure of readability based on the extent of use of plain English in 10-K reports (Loughran and McDonald 2009), I find that less complex reports are associated with more accounting discussion.

My final empirical tests explore whether more frequent accounting-related discussion is associated with an improvement in apparent information availability and information processing. Prior literature finds that, in general, enhanced dissemination of information is associated with a reduction in information asymmetry (Bushee et al. 2009). However, it does not investigate the association between individual investors' attention to accounting information and changes in information asymmetry. I find that greater accounting-related discussion at earnings announcements is associated with a reduction in the bid-ask spread. In addition, I examine the tendency of stock prices to move in the direction of the earnings surprise subsequent to the earnings announcement (i.e. the post earnings announcement drift) in order to provide some evidence on the effect of individual investors' information processing. Prior studies suggest that the post earnings announcement drift may be due, in part, to the behavior of individual investors (Bartov et al. 2000; Brown and Han 2000). I find that the drift effect is lower for firms with greater levels of accounting discussion at the earnings announcement.[4]

[4] It is not possible to determine whether the information asymmetry and the drift results are driven by greater investor attention or by the message-board discussions themselves. In other words, it may be that greater attention to accounting information indicates some latent factors which cause individuals to increase their information acquisition and processing efforts around certain earnings announcements. For these more-discussed information

This study contributes to the literatures examining the behavior of individual investors[5], the disclosure of accounting information, and the use of message boards. It is the first to document when and how individuals pay attention to accounting information using large sample content analysis. This evidence should be of interest to academics who face significant challenges in observing individual investors' belief formation and valuation processes. The findings are also relevant to practitioners, particularly to firms with poor information environments. Such firms should consider the implications of the fact that current and potential investors are turning to their peers to supplement or interpret disclosed information. Examining the level and content of message board discussion may aid firms in discerning what aspects of disclosure should be enhanced to reduce further processing costs by investors or to influence their reaction. Analysis of message board data may also be of interest to standard setters concerned with leveling the informational playing field. Message boards are likely to remain a popular medium of communication and exchange of information among individual investors for the foreseeable future. They provide fertile ground for future accounting research because the nature and format of discussions make the message board data practical for content analysis, event studies, and both large sample and case study type research.

The rest of the paper is organized as follows: section 2 provides background on message boards and the related literature, section 3 develops the research questions, section 4 discusses data collection and the descriptive statistics, section 5 reports the results of analyses, and section 6 concludes.

releases, investors may also analyze the announcements more carefully and pay more attention to other sources of information such as conference calls, analyst reports, financial press articles, etc. Alternatively, it is possible that the message boards themselves are an effective tool of information dissemination and processing and thus an increase in discussion reduces the asymmetry and the drift. I do not attempt to distinguish these two theories in documenting that greater accounting-related discussion is associated with enhanced information processing.

[5] Message boards contain the views of only a subset of individual investors, those motivated enough to engage in online discussion. Thus, the findings may not be generalizable to all individual investors. However, since, as noted by FASB in Concepts Statement No. 1, financial information is a tool for those able and willing to use it, this group may represent a particularly relevant subset.

2. Background

2.1 Message Boards

An Internet message board (also known as a forum) is an online discussion site. The growth of general Internet use and the expansion of online stock trading opportunities have spurred the popularity of stock-related message boards over the last decade. In the past only the opinions of investment and valuation professionals were widely disseminated, but the interactive boards now allow all individuals to share their views. Participants do not have to be online simultaneously to engage in a dialogue as the messages remain publicly available for some time. There are many public and private (fee based) investment oriented message boards such as Yahoo!, RagingBull, MotleyFool, SiliconInvestor, MorningStar, ActiveTrader, TheLion, and HotCopper. Discussants are generally quasi-anonymous – any individual may select one or more screen names and may voluntarily reveal certain information about himself. There are both frequent and occasional posters, as well as unobserved readers who do not need to register. Participants exhibit a diversity of backgrounds, expertise, and goals which leads to discussions that greatly vary in quality and tone.

The nature of messages varies widely and includes information requests, knowledge sharing, performance forecasts, trading recommendations, and general observations. While it is relatively easy to understand why individual investors may rely on message boards to enhance their information, what motivates them to share their knowledge and insight? Reputational incentives motivate many contributions to online discussions. These incentives stem from an individual's psychological need for recognition, a desire to be considered an expert in, or an important contributor to, some field, in this case the field of financial analysis and portfolio management. In addition, some incentives are altruistic, based on the desire to contribute to the collective production of public knowledge, or quasi-altruistic, rooted in the realization that maintaining a certain degree of constructive discussion is necessary to ensure the retention of members who are able to assist with questions or offer insights. Open source virtual communities devoted to the construction of public goods, such as Wikipedias and software projects, have been effective largely based on altruistic and reputational incentives. Theoretical models also suggest that

investors with limited trading capacity may attain economic gain from sharing credible private information – because the price impact of an individual trader is negligible the investor has private information left after trading and may benefit from collective trading of those following his advice (Van Bommel 2003). It is important to note that regardless of the incentives of message board participants, the observed credible discussion should reflect factors contributing to the belief formation process of individual investors. In addition, individuals may have self-serving incentives to share false or misleading information. However, their choice to rely on accounting-related items in apparent manipulation attempts is also significant as it signals the perceived importance of accounting information to trading decisions. Overall, it is not necessary to differentiate incentives in order to examine the main research question of this paper – the association between the information environment and the attention to accounting information in the cross-section of firms.

The source of the data for this study is Yahoo! stock message boards website. These boards are the most comprehensive (in terms of stock coverage) and the most active (in terms of the average number of postings). Yahoo! opened its stock message boards in 1997 and has expanded them over the years. A single board corresponds to one firm. Within each board there are multiple topics initiated by various individuals. A topic contains the original message and all the replies posted (each one constitutes a separate identifiable message). As of September 2009 Yahoo! contained over 35,000 non-empty stock boards. While a majority of the boards are sparsely populated (only 7,000 stocks feature a history of more than 100 messages), a number enjoy immense popularity (the 100 most discussed boards have a median history of 150,000 messages).

Message board data have considerable potential for accounting research. The data can be electronically collected and analyzed for many firms and over significant time periods, capturing the beliefs, questions and attitudes of investors. Messages are marked with precise date and time enabling event-study analysis. Because messages are composed by individuals in free form (without preset templates) the data offer more heterogeneity than survey-based data. Message board discussions provide a measure of individual investor activity alternative to measures based on the magnitude of trades, the latter

having become less reliable in classifying investor type after market decimalization. De Bondt (1998) notes that individual investors' perceptions of firm value often depend on popular, socially shared models and empirical evidence suggests that investors are influenced by the beliefs of their peers through "word of mouth" (Hong et al. 2005; Ng and Wu 2008). Message boards are a unique and rich source of shared commentary on a multitude of public companies.

2.2 Extant Message Board Literature

The majority of prior research on message boards focuses on whether board activity (in terms of volume and/or sentiment) is correlated with trading behavior. The findings in the literature are mixed regarding the predictive power of message board postings. Several papers conclude that message board activity predicts stock returns and trading volume, suggesting that message boards contain new information (new at least to some investors) which gets incorporated into trading strategies (Wysocki 1999; Antweiler and Frank 2004; Gu et al. 2006; Sabherwal et al. 2006). In contrast, other papers find that message board activity reflects rather than predicts stock movements and conclude that market information influences postings but not the other way around (Tumarkin and Whitelaw 2001; Tumarkin 2002; Dewally 2003; Koski et al. 2004; Das et al. 2005; Das and Chen 2007). Because the literature has not reached a consensus on the causal relationship between message board and stock market activity I explore both directions in my analysis of message board postings and the information environment (hypotheses 1 and 2 below).

Another stream of literature focuses on rumors disseminated via message boards. These papers support the notion that when message boards contain information truly new to the market (rumors frequently originate on the boards) investors change their beliefs, and correspondingly their trading behavior, in response to this information. Bagnoli et al. (1999) find that unofficial whisper forecasts of earnings (distributed via message boards among other sources) are both accurate and representative of market expectations. Felton and Kim (2002) and Balloun et al. (2003) examine message boards of firms involved in fraud or other misconduct investigations and find evidence of foresight on the part of at least

some participants. Lastly, Clarkson et al. (2006) and Bettman et al. (2007) find market reaction to takeover rumors.

Based on both anecdotal and academic evidence I assume that the majority of posters within finance message boards are individual investors (as opposed to institutional investors, analysts, etc.). Anecdotally, multiple articles from the financial press refer to message board posters as individual investors, whether committed day traders or "weekend warriors" (Bryan-Low 2001; Curran 2009). Empirically, Wysocki (1999) finds that a 10 percent increase in the number of shareholders results in about a 1 percent increase in the number of postings while a 10 percent increase in institutional holdings results in a 1 percent decrease in postings. He interprets these findings to mean that individual shareholders are the primary drivers of message postings. I confirm the negative association between institutional ownership and message board activity for my sample. The average number of total messages in the sample period increases monotonically from 703 for the quintile of firms with the highest percent of institutional ownership to 1,812 for the quintile of firms with the lowest. The assumption that posters are individual investors is consistent with other prior research (Antweiler and Frank 2004; Das et al. 2005).

2.3 The Individual and the Message Board

Given the abundance of information available today why would an investor use message boards to obtain data? The seminal paper of Easley and O'Hara (1987) proposes that information sets used by small traders are systematically inferior to those used by large traders and many empirical papers provide support to this notion (Lee 1992; Barber and Odean 2000; Bhattacharya 2001). This asymmetry persists because individuals have limited gathering and processing resources. An individual requires unlimited attention and cognitive ability to quickly and accurately analyze all publicly disclosed information. Hirshleifer and Teoh (2003) model firm disclosures under the assumption that some investors have limited attention and processing power. They show that informationally equivalent disclosures can have different effects on investors' perceptions, concluding that investors neglect relevant aspects of the economic environments they face. Studies in experimental accounting show that individuals may not be

able to use all relevant information even when it is available to them (see Libby et al. 2002 for a survey of this literature). Other studies provide evidence that investors react to information which has been previously disclosed but which is brought to their attention via formats such as media articles (Huberman and Regev 2001; Barber and Odean 2008). Because of individual investors' limited abilities, the boards may aid the dissemination and the interpretation of information by allowing a large group of participants to jointly carry out these processes. The Das et al. (2005) interview of the most prolific poster on the Yahoo! boards for Amazon.com Inc. supports this conjecture:

> "I don't think there was any truly inside information...the whole group had no better idea than the next person." However, they did have the time, experience, and inclination to carefully analyze the fundamental data on Amazon. As he explains. "I was perceiving this firm as a retailer and I was in the retail business. There was no question that the cost of fulfillment was higher than in regular stores. Others didn't understand issues of costs." Although much of this information was in public disclosures, it was buried in footnotes and labor intensive to pull out. This information was "missed by a lot of the analysts." (p. 109)

Overall, an investor is likely to rely on message boards in order to supplement his information set, incomplete due to gathering and processing limitations. He seeks opinions on items which are important but unclear to him and offers his own opinions formed as a result of his personal information search (again likely focusing on items which he considers important enough to research). While I do not claim that items not discussed on message boards are not significant in individuals' belief formation, it is likely that items which *are* discussed represent information relevant to the investor. Of course, message board participants may engage in discussions for reasons other than information exchange (for example socialization). These reasons are beyond the scope of this study. Focusing the analysis on accounting-related discussions allows me to maximize the probability that the findings are based on informationally driven dialogue.

3. Research Question

3.1 Individual Investors' Attention to Accounting Information

My first objective is to document for my sample that individuals pay attention to 10-K/Q filings, earnings announcements, and 8-K filings (other than earnings announcements). Prior literature reports

mixed results as to whether investors generally, and individual investors specifically, react appropriately to various information events. While there is strong evidence going back to Ball and Brown (1968) and Beaver (1968) that investors as a whole react to preliminary earnings announcements, it is less clear to what extent individual investors respond to these signals. Prior studies show that investors differ in their level of sophistication and that small traders (often presumed to be individual investors) do not respond appropriately to earnings news (Lee 1992; Bhattacharya 2001). Wysocki (1999) documents an increase in total message board activity around earnings announcements but does not address whether this increase is driven by discussions of announcement content or by discussions of the associated stock price movements on that day.

There is also no consensus in the literature regarding the market reaction to the filings of 10-K and 10-Q reports. Early empirical research (e.g. Foster et al. 1983; Stice 1991; Easton and Zmijewski 1993) finds little evidence of investor reaction to 10-K and 10-Q reports while later studies using post EDGAR samples do find evidence of overall investor reaction (Qi et al. 2000; Griffin 2003; Callen et al. 2006). However, even in the later studies, the extent of reaction is unclear and is small in comparison to the preliminary earnings announcements (You and Zhang 2008; Li and Ramesh 2009). The reaction of individual investors to periodic report filings is even more ambiguous. Under the functional fixation hypotheses unsophisticated investors focus only on a few accounting items, such as net earnings, which are generally disclosed in the preliminary earnings announcements. While some studies show that small traders increase activity around 10-K filings (Cready and Mynatt 1991; Asthana et al. 2004), others find that they do not respond to signals released in these reports (Battalio et al. 2009). Lastly, while there is some evidence that the market as a whole reacts to 8-K filings (Lerman and Livnat 2009), to my knowledge there is no empirical support to the conjecture that individual investors specifically respond to these reports.

If individual investors are interested in accounting information and are monitoring the disclosure of periodic reports and current reports, then I expect an increase in accounting-related discussion around the filing dates of these reports. How quickly after the filing any such increase is observed and how long

it remains is an open question given prior evidence that unsophisticated investors are slow to respond to firm disclosures (Lee 1992). If individuals are not interested in accounting information, do not monitor the dissemination channels or do not promptly analyze the disclosed information then the volume of accounting-related discussion will remain the same as in non-event periods. Overall, I expect that the volume of accounting-related discussion will be greater around the issuance of periodic reports and current reports as compared to the volume in non-event periods.

3.2 The Effect of Information Environment

3.2.1 Information Uncertainty

It is more difficult to assess incomplete, imprecise or ambiguous information.[6] Investors in firms with greater information uncertainty are subject to higher information acquisition and processing costs and face lower reliability of valuation estimates based on that information. This leads me to propose two alternative associations between measures of information uncertainty and accounting-related discussion. On one hand, more frequent accounting-related message board discussion may represent increased efforts by individuals to collect and interpret information which they find relevant but difficult to obtain through other means or to process. The psychology literature suggests that increased communication activity occurs more frequently under conditions of uncertainty and disequilibrium (Newcomb 1953). Prior accounting and finance studies also suggest that information users expend greater efforts on information acquisition when faced with information uncertainty. As the valuation relevance of certain accounting items declines, investors increasingly process information about other accounting metrics (Collins et al. 1997; Francis and Schipper 1999; Ely and Waymire 1999). Similarly the role of private information becomes more salient when other financial disclosures are ambiguous (Hope 2003). For these reasons message boards may contain more accounting content for firms with greater information uncertainty.

[6] Poor information environments and more volatile operating environments both contribute to noisier value estimates. I do not distinguish between these two sources of uncertainty because both affect the valuation process and are likely to affect in the same direction my empirical measures of uncertainty (analyst coverage, analyst forecast dispersion and trading volume).

On the other hand, investors may pay less attention to accounting information, as evidenced by less accounting-related discussion, when they perceive accounting information as less reliable or less relevant. For example, when the informativeness of GAAP earnings is low, information users rely less on GAAP numbers and more on pro forma earnings (Lougee and Marquardt 2004). When uncertainty surrounding accounting information is especially high, investors rely more on non-accounting information (Amir and Lev 1996) and may forego valuation altogether. In this case I expect to observe a lower level of accounting-related discussion for firms with higher information uncertainty (less reliable accounting information). Wysocki (1999) shows that the overall volume of message board discussion increases in various measures of information uncertainty. However non-accounting discussion may be driven by considerations other than those related to the valuation process and may be impacted by information uncertainty differently. I propose the following two-sided hypothesis stated in the alternate form:

Hypothesis 1a: The level of information uncertainty influences the volume of accounting-related discussion.

Various measures of information uncertainty capture difficulty in valuation. I examine three measures which represent different aspects of the information landscape and which may affect the amount of accounting-related discussion. I use analyst coverage to capture the availability of information, analyst forecast dispersion for information precision, and trading volume for ambiguity (differential interpretation). There is ample support for use of these variables as measures of information uncertainty as discussed below.

Prior literature finds that financial analysts improve the informational efficiency of capital markets (Barth and Hutton 2004). Wider analyst coverage in particular implies greater information availability about the firm, less information asymmetry, and less underreaction to earnings signals (Brown and Han 2000; Gleason and Lee 2003; Roulstone 2003). Botosan (1997) finds that greater disclosure

levels reduce the cost of capital only for low coverage firms, suggesting that analysts are an important channel for disseminating information. Thus I use analyst coverage to measure information availability.[7]

Analyst forecast dispersion is widely used as a measure of analysts' uncertainty or information uncertainty in general (Imhoff and Lobo 1992; Barron 1993; Zhang 2006). Lang and Lundholm (1996) find that firms with more informative disclosures have less dispersion in analyst forecasts. Johnson (2004) finds dispersion is negatively associated with future returns and provides a model in which forecast dispersion is treated as a measure of information risk (i.e. the extent of uncertainty in the relationship between available information and firm value). Lastly Barron et al. (2009) find that levels of forecast dispersion reflect unsystematic uncertainty.[8] I use analyst dispersion as a measure of information imprecision.

Beaver (1968) suggests that trading volume reflects the change in expectations of individual investors. Karpoff (1986) illustrates that trading volume is stimulated both by investors' heterogeneous reaction to information and by concurring reaction of investors with diverse prior beliefs. Other analytical research also suggests a link between trading volume and differential beliefs (Kim and Verrecchia 1991; Dontoh and Ronen 1993) and empirical works support this link (Barron 1995; Bamber et al. 1997). I use trading volume as a measure of information ambiguity or differential interpretation.

3.2.2 Financial Reporting Quality

Prior literature finds that measures of financial reporting quality are associated with more expansive and more useful accounting information (DeFond et al. 2007; Francis et al. 2008). Cognitive models and empirical evidence suggest that information users underreact to complex information or information more costly to process (Bloomfield 2002; You and Zhang 2008). Financial reporting quality measures which either increase in usefulness or decrease in complexity of disclosures are expected to be

[7] Prior literature identifies some tension in this measure due to the fact that analyst coverage is, at least in part, determined by incentives of analysts. Barth et al. (2001) argue that analysts have greater incentives to cover firms with more intangible assets (and less informative prices).

[8] Although unsystematic risk could potentially be eliminated through diversification, it is not apparent that individuals engaging in message board discussions would be willing or able to do so. As shown in section 4 individuals generally participate in a very small number of boards suggesting on average a small portfolio (or at least a small number of firms with significant interests).

positively associated with accounting message board discussions. However, if lower reporting quality increases information acquisition efforts the relation will be reversed. The hypothesis in alternate form is:

Hypothesis 1b: The financial reporting quality influences the volume of accounting-related discussion.

Following prior research (Francis et al. 2004; Schipper and Vincent 2003) I construct empirical proxies for financial reporting quality based on accruals quality and on value relevance and persistence of earnings. To capture the complexity of disclosed information I also use a measure of readability of the financial reports (Loughran and McDonald 2009).

3.3 Enhancement of Information Availability and Processing

Lastly, I examine whether greater accounting-related discussion appears to give rise to a better informed individual investor. Bushee et al. (2009) find that higher business press coverage is associated with a reduction in information asymmetry due to greater dissemination of information. Message boards may facilitate a similar dissemination effect. Greater discussion may also be associated with better processing of accounting information. Studies of psychology and cognition show that both talking and writing are connected to thinking and problem solving (Cohen and Spencer 1993; Kim 2002) and that electronic discussion, specifically, improves critical thinking skills of participants (Greenlaw and DeLoach 2003). If such enhancement of participant abilities applies to stock message boards then there should be evidence of more informed trading subsequent to periods of more intense discussion.[9] The hypothesis in alternate form is:

Hypothesis 2a: Greater accounting-related discussion reduces information asymmetry around the earnings announcement date.

As an additional test of enhanced information processing I examine whether accounting-related message board discussion accelerates the impounding of relevant information into valuation. Prior literature

[9] Theoretical models suggest that herding may direct an individual to follow the behavior of his peers disregarding his own information (Bikhchandani et al. 1992). Thus, it is possible that message boards may enable the less informed but active participants to influence their more informed peers. However, there is no empirical or anecdotal evidence to suggest that this commonly occurs. Therefore I present the hypotheses in one-sided form.

suggests that the tendency of stock prices to move in the direction of the earnings surprise, the post earnings announcement drift, is, at least in part, caused by uninformed investors (Bartov et al. 2000; Brown and Han 2000). The experimental study of Dietrich et al. (2001) suggests that market inefficiencies are partially attributable to individual information processing biases and shows that more explicit disclosures of accounting information can improve efficiency despite apparent redundancy. Thus, if greater accounting-related discussion is associated either with expanded effort on the acquisition and processing of accounting information or with enhanced dissemination of such information then it should reduce the post earnings announcement drift. The hypothesis in alternate form is:

Hypothesis 2b: Greater accounting-related discussion at the earnings announcement reduces the post earnings announcement drift.

4. Data Collection and Description of the Data

4.1 Data Collection Procedure

I obtain data from the Yahoo! stock message boards website, specifically the individual stock boards in the category *Yahoo! Message Boards > Business & Finance > Investments > Stocks (A to Z).*[10] Because message collection requires significant time and computing resources, I choose a representative set of stock message boards for my analysis. I examine the messages for firms in the Standard & Poor's 500, MidCap 400 and SmallCap 600 indices [S&P1500 sample], as well as the top 600 historically most discussed firms outside of these indices [nonS&P sample]. I focus on messages posted from April 2007 through March 2008 because Yahoo! systematically eliminates old posts. Specifically, as of September 2009, it is only possible to reliably collect the most recent 5,000 topics for any given firm. This makes collection of older messages impossible for actively discussed firms and limits the start date for a large sample study. I stop before the latter part of 2008 because subsequent events (the economic crisis and the elections) overwhelmed the discussion on many boards. I choose a full year in order to allow for potential fluctuations based on fiscal quarter and to capture the release of all three quarterly reports as well as the

[10] http://messages.yahoo.com/yahoo/Business_%26_Finance/Investments/Stocks_%28A_to_Z%29/index.html

annual report. From this period, I am able to collect 1.94 million messages for 1,858 firms.[11] Each message is uniquely identified by the company's ticker symbol, Yahoo! firm number and the message board sequence number. The message information also includes time and date of posting, the screen name of the author, the ID number of the topic to which the message belongs, and the title and body of the message itself.

An innovation of this paper is the use of content analysis to determine if a message contains accounting-related discussion. To identify messages with accounting content I search through the body and the title of each message to locate references to various financial statement items and other accounting terminology. Appendix A contains a list of words used for accounting classification and their groupings and various issues encountered. I classify a message as accounting-related if it includes at least one accounting term from Appendix A. Examples of messages classified as accounting-related are included in Appendix B.

I match the message board data to financial databases by ticker and company name.[12] As expected almost every firm from the S&P1500 sample has the necessary data for the period examined. About a third of the nonS&P sample firms are missing some of the financial data for the period. This occurs because some of the historically most discussed firms are traded on over-the-counter listing services (thus missing CRSP data) or because Yahoo! did not remove the boards of some firms which underwent bankruptcy proceedings or acquisitions before 2007.[13]

4.2 Message Data Description

4.2.1. Firm Characteristics

The use of the three Standard & Poor's indices as well as a group of highly discussed firms outside of the indices provides a sample diverse in both message board activity and firm characteristics. Table 1 Panel A shows the descriptive characteristics for the sample as well as for the S&P1500 and the

[11] I wrote a custom program in Ruby v1.8.6 to retrieve, analyze, and code the data.

[12] The matching was done both with an automated procedure and with hand-collection as needed.

[13] Generally these boards do not exhibit active discussion after such events and do not affect the dataset as a whole.

nonS&P subsamples separately. As expected, S&P1500 firms have larger age and size medians.[14] The nonS&P firms tend to be much less profitable and include more loss-firms and more firms with extreme market to book ratios (mainly high-tech and pharmaceutical firms). Results also indicate that nonS&P firms have a different information environment (volatility, bid-ask spread, analyst coverage, and dispersion) and reporting quality (accruals, earnings persistence, earnings relevance, and report complexity) than S&P1500 firms.

In terms of message data, nonS&P firms have the highest level of activity (by construction). Among the indices (not tabulated), the discussion activity for MidCap and SmallCap firms appears similar and is significantly lower than for LargeCap firms. Finally, the average daily percentage of accounting-related messages is higher for smaller firms among the S&P indices but is lowest for the nonS&P firms. This provides some interesting preliminary evidence – within the S&P1500 sample, firms expected to have a greater level of information uncertainty (younger firms with less analyst coverage and more stock market activity) feature greater accounting discussion, consistent with a premise of increasing information acquisition efforts. However, the nonS&P firms, which feature the greatest information uncertainty by the same measures, exhibit the lowest accounting discussion, perhaps because accounting information is too difficult to acquire and process or is not useful in resolving such uncertainty.

The S&P1500 sample spans a wide range of industries with almost all of the Fama-French 48 industry categories represented (Fama and French 1997). The industries with highest concentration of firms are Business Services with 10 percent and Banking and Trading with 7 percent each. The nonS&P sample is much more concentrated with 60 percent of the firms in four industries: Business Services (mainly computer related), Electronic Equipment, Pharmaceuticals, and Computers. There is variation in terms of both total and accounting-related discussion among industries (not tabulated). The content analysis below provides some insight on the industry variations.

[14] The means of nonS&P firms are relatively large because of inclusion of several large foreign companies (BP p.l.c., UBS AG, Vodafone Group p.l.c., etc.). Seventy-two of the nonS&P firms are foreign companies.

4.2.2 Accounting Content

It is worthwhile to examine which accounting items garner individual investors' attention and to establish a hierarchy among these items. Prior studies show that multiple financial statement items are relevant in firm valuation (Lev and Thiagarajan 1993; Abarbanell and Bushee 1997). These studies generally consider the market as a whole and do not address which items are relevant specifically to individual investors. Several survey studies conclude that individual investors use a surprisingly broad range of items in their investment decision process (Baker and Haslem 1974; Nagy and Obenberger 1994). A challenge of the survey methodology is the difficulty in *ex ante* identifying all possibly relevant items and attributes to be included in the survey. Electronic content analysis of messages permits an examination of a wider range of items. Table 1 Panel B shows the distribution of accounting terms in the sample (the distinct words or phrases comprising the terms can be found in Appendix A). The table presents the distribution of terms separately for the S&P1500 and the nonS&P samples, which have a similar number of total messages. Almost all the terms in the accounting word list appear in a non-trivial number of messages. For both samples the most frequently discussed items are, in order, earnings, cash, and revenues. Dividends and buybacks of stock are discussed more frequently for the S&P1500 sample.[15] On the other hand, references to current reports (earnings announcements, 8-Ks, conference calls, etc.) and periodic reports (annual reports, financial statements, 10-Ks) appear more frequently for nonS&P firms. Other items which appear significant to both groups are P/E ratios, earnings per share measures, assets, and expenses. References to control issues (board of directors, SOX, material weaknesses), audits, restatements, and going concern issues are more prominent for nonS&P firms suggesting that investors question the internal control structures of smaller firms. Also, S&P1500 messages contain more references to analysts – not surprising given the difference in coverage observed. Overall 70 (71) percent of the messages classified as accounting-related contain only one accounting term for the S&P1500

[15] While dividends and repurchases are financing choices I include them in the accounting dictionary because message board posters frequently perceive them as signals about the operating and financial health of a firm. For robustness I exclude both terms from classification of a message as accounting-related. I find that all results remain unchanged.

(nonS&P) sample. For the messages which contain more than one term I examine the items that appear together (via correlation among indicator term variables) and find that significant correlations are, for the most, part logical: asset and balance sheet, cash and buyback, goodwill and book value, asset and write down, etc. (not tabulated).

I also examine the distribution of terms separately by Fama-French 48 industry classification. Panel C of Table 1 presents the distributions for the 4 industries most prominent in the sample: Business Services, Electronic Equipment, Trading (financial institutions, REITs, etc.), and Pharmaceuticals. While earnings, revenues, and cash generally top the list for all four industries, I observe significant variation in the distribution of other terms. For Business Services control issues and managerial guidance gain more prominence. For Electronic Equipment there is more discussion of profits and R&D and less discussion of dividends. On the other hand, for Trading firms dividends is the most discussed item (while revenues is relegated to eighth place) and items which gain prominence include leverage, impairment, financial instruments, fair value, and securitization (as expected given the nature of these firms). Lastly, Pharmaceutical firms show cash occupying the top of the discussion hierarchy as well as a predictably high number of R&D related messages.

4.2.3 Message Characteristics

In addition to shedding light on the substance of message board discussions via content analysis, I examine the format of these discussions. On average, 41 percent of accounting-related messages contain a question (as indicated by the presence of a question mark) but only 35 percent of non-accounting messages do. The difference is statistically significant at 1 percent level. This suggests that accounting-related discussion takes the form of an information request more frequently than other discussions. Accounting messages also tend to belong to higher discussed topics (topics which include more responses) indicating that accounting-related dialogue is more interactive. Only 14 percent of originator messages which did not receive any responses are classified as accounting-related. However, 17 percent

of all messages in topics with 1 or 2 responses, 19 percent of messages in topics with 3 to 6 responses, and 20 percent of messages in topics with 7 to 15 responses are classified as accounting-related.[16]

As shown in prior literature (Antweiler and Frank 2004) the total number of messages spikes drastically during trading hours and tapers off after 4pm EST. This is true also for accounting messages albeit to a lesser degree (reflecting the fact that the total number of accounting messages per day increases in the total number of messages per day). Figure 1 shows the distribution of accounting and non-Accounting messages over the hours of the day. Overall, during the trading hours, the average percent of messages classified as accounting is 16 percent, statistically significantly lower than the 19 percent classified as accounting in the non-trading hours. This may correspond to the widespread practice by firms of releasing financial information and holding conference calls outside of business hours. There is also a significant weekday effect with Saturday and Sunday exhibiting a much lower number of total messages and a slightly higher percentage of accounting messages.

The messages are written by 158,874 authors.[17] Seventy percent of these authors write on the board of one firm, 15 percent write on the boards of two firms and 10 percent on three to five boards.[18] There is a variation in the extent of activity – 82 percent (130,196 authors) post between 1 and 10 message in the year, 17 percent (26,386 authors) post between 11 and 150 messages, and the remaining 1 percent post over 150 messages each. There is no correlation between the number of messages posted by an author in the year and the percent of these messages that is accounting-related.

[16] The pattern is reversed for the highest discussed topics. Only 12% (7%) of messages in topics with 50 through 74 (75 and more) responses are accounting related. The number of such topics is fairly small and detailed readings of several such topics reveal that, in fact, they are often dialogues on subjects not directly related to the firm.

[17] As noted above an individual may possess several screen names. Thus, the number of individuals may be smaller.

[18] Messages of authors who post on over 40 boards were deleted from the sample. Analysis revealed a high probability that these messages are generated by automated programs and not individuals. The number of authors (84) and messages (6,872) thus removed is not material to the sample.

5. Analysis

5.1 Individual Investors' Attention to Accounting Information

I begin by examining whether message board discussion is different around information events compared to non-event periods. First I present a distribution of discussion activity around the preliminary earnings announcements. Panel A of Table 2 shows the average number of total messages, the average number of accounting-related messages and the average percent of accounting discussion in days -2 through +13 around earnings announcements in column grouping 1.[19] Consistent with prior literature (Wysocki 1999) I observe that the total number of messages is significantly greater in the immediate window around the earnings announcement, and particularly on the day of the announcement itself. Not only does the total number of accounting messages exhibit a similar pattern, but the percent of accounting-related discussion also increases around earnings announcements, spiking to 38 percent on the date of the announcement. Thus, accounting discussion increases at a greater rate than non-accounting discussion at the release of new information. Interestingly, the number and percent of accounting messages is abnormally high even two days before the release of the announcement (with total messages exhibiting no such increase). This suggests that some investors expect the information release and speculate regarding its contents, consistent with the findings of Bagnoli et al. (1999) regarding whisper forecasts. The increase in accounting discussion lingers for almost a week after the announcement suggesting that investors take time to process this information.[20]

Next, I examine the filings of periodic and current reports. Panel A of Table 2 shows the distribution of discussion activity in days -2 through +13 around the filing dates of 10-K and 10-Q reports in column groupings 2 and 3 respectively. Again, in the immediate window surrounding the filing, and specifically on the day of the filing, the total number of messages and the number and percent of accounting-related messages is greater than on subsequent days. The effect is more pronounced for filings

[19] Only days with non-zero message board activity are included in the analysis (days where at least one message was posted on the board).

[20] Because messages remain publicly available for a long time, investors may continue to read the boards subsequently.

of 10-Q than of 10-K reports. Li and Ramesh (2009) show that quarterly reports are associated with significant stock price reactions only when firms concurrently issue an earnings press release, or when quarterly reports are the first public source of earnings information. To examine whether this is the case with message board discussion I limit the sample to periodic reports which were preceded by a preliminary earnings announcement and which were filed at least 3 days after that announcement (not tabulated). The magnitude of discussion around the filings of the reports remains higher than at non-event days although the differences are less pronounced, especially for 10-K filings. Overall, these results provide evidence that both total discussion and accounting-related discussion increase around filings of periodic reports suggesting that investors monitor their releases and process information contained therein. Accounting attention levels remain elevated for several days.

I examine the filings of Forms 8-K, to see whether individuals pay attention to these timely releases of significant developments.[21] Table 2 Panel B shows the average discussion activity around news of various events disclosed in current report filings. For all but one event the number of both total and accounting-related messages is greater at current reports than at non-event days. With the exception of Bankruptcy, all the events also have a higher percentage of accounting messages than non-event days. The events that generate the greatest percentage of accounting discussion are Results of operations, Cost associated with exit or disposal activities, Non-reliance on previously issued statements, Material impairments, and Changes of accountants.

The final test of this section involves estimating multivariate regressions of accounting-related discussion activity on indicator variables for the information events of interest. The main model is:

$$\begin{aligned} AccDiscVolume_{it} = {} & \alpha + \beta_1 10K_{it} + \beta_2 10Q_{it} + \beta_3 EA_{it} + \beta_4 8K_{it} + \beta_5 SP1500_i + \\ & + \beta_6 DiscVolume_{it} + \beta_7 Turnover_{it} + \beta_8 absRet_{it} + \sum_d \beta_d WeekDay_t \end{aligned} \quad (1)$$

[21] Since it is impossible to know whether a company disclosed a press release at the event date or whether the filing of the 8-K is the first disclosure of the information I mark both the 3 days around the event that triggered the form and the three days around the filing of the form itself as 8-K days. This is a minor consideration since an overwhelming majority of 8-Ks are filed within four business days of the event (Lerman and Livnat 2009).

The dependent variable is either the number of accounting messages per day (in natural logarithm form) or the daily percent of accounting messages. The indicator variables (10K, 10Q, EA, 8K) represent the three days around periodic filings, earnings announcements, and current filings (other than those containing the earnings announcement).[22] I also include an indicator variable for the S&P1500 sample, a measure of total message activity (in natural logarithm form)[23], a variable for the daily share turnover (trading volume scaled by shares outstanding), daily absolute raw returns of the stock, and indicator variables for days of the week. Prior literature shows that daily volume, daily return and day of the week variables are associated with daily total message volume (Wysocki 1999; Tumarkin and Whitelaw 2001).[24] Panel C of Table 2 presents the results of the regression for messages of firms which have at least one information event in the year (1,706 firms). The results indicate that both overall discussion (columns 1 and 2), and, more importantly, accounting-related discussion (columns 3 through 6) significantly increase at the filings of both 10-Q and 8-K reports as well as at the earnings announcements.

Both the overall level of message board discussion and the accounting-related discussion are not significantly different from non-event days at the filings of the 10-K reports. Examining the 10-K filings separately for firms of different size, I find that accounting discussion is statistically significantly elevated for firms in the lowest size quintile (not tabulated). Similarly, the reaction around the 10-Q filings is more pronounced for small firms (although positive and significant for all firms except those in the highest size quintile). Thus, individual investors increase attention to accounting information around periodic filings of smaller firms but do not exhibit a similar increase for largest firms, possibly due to the richer information set of the latter. Overall, the results in Table 2 provide evidence consistent with my prediction that the volume of accounting-related discussion is elevated around information releases.

[22] The window around day zero includes at least one business day before and one business day after – if the filing or event date is on Friday then Thursday through Monday will be marked, and if the filing or event date falls on the weekend then Friday through Monday will be marked. I only include periodic (10-K and 10-Q) reports when filed at least three days after the preliminary earnings announcement.

[23] Here and elsewhere I include the measure of total activity in the regression of percent of accounting discussion because accounting discussion does not increase in a linear fashion with total discussion.

[24] Including spread to control for possible effects that liquidity has on discussion levels does not change the results.

5.2 The Effect of Information Environment

5.2.1 Information Uncertainty

To investigate Hypothesis 1a on the relationship between information uncertainty and investors' attention to accounting information I regress measures of accounting-related discussion on three aspects of the information environment: analyst coverage, analyst forecast dispersion, and average trading volume turnover. My main cross-sectional model is as follows:

$$AccDiscVolume_i = \alpha + \beta_1 AnalystCoverage_i + \beta_2 AnalystDispersion_i + \beta_3 Turnover_i + \\ + \beta_4 SP1500_i + \beta_5 DiscVolume_i \quad (2)$$

The dependent variable is either the number of accounting messages per day (in natural logarithm form) or the daily percent of accounting messages averaged over the sample period.[25] I include an S&P1500 indicator variable because of differences in average board activity between the samples noted earlier, and a measure of total message activity (in natural logarithm form). Recall I use analyst coverage to capture the availability of information, analyst forecast dispersion for information precision, and trading volume for ambiguity (differential interpretation). For all tests, I construct these measures of information environment in such a way that a higher value corresponds to greater information uncertainty. Specifically, in the model above, I use the inverse of analyst coverage. For each firm I use all the fiscal quarters with earnings announcements within the sample period. For each quarter I collect individual analyst forecasts issued from one day after the previous earnings announcement to one day before the current earnings announcement (retaining only the latest estimate per analyst) from the I/B/E/S Detail file. I count the total number of analysts covering the firm in each quarter and average those to estimate a firm-year measure of analyst coverage. For each quarter I calculate the standard deviation of analyst forecasts and divide it by the stock price at quarter end. I average the quarterly scaled standard deviations to obtain a firm-year measure of analyst forecast dispersion. Lastly, I average the daily trading volume

[25] Both measures are averaged over days with non-zero message board activity (days where at least one message was posted on the board).

scaled by total shares outstanding to estimate a firm-year measure of volume turnover. To allow for outliers and nonlinearities in the relationships I code the uncertainty variables into quintiles.

Table 3 Panel A presents the results of the multivariate regression of accounting-related message board activity on information uncertainty measures. Columns 1 and 4, respectively, present the results for the natural logarithm of daily accounting-related messages and the daily percentage of accounting-related messages. The results provide evidence that the percentage of accounting discussion increases for firms with lower availability of information (lower analyst coverage), lower information precision (higher analyst forecast dispersion), and greater ambiguity of information (higher turnover). The daily volume of accounting messages exhibits a similar relationship with the exception of not significant coefficient on dispersion.[26] The results indicate that accounting-related discussion is greater for firms with lower quantity or quality of available information, thus suggesting that individual investors increase their information acquisition and processing efforts for such firms.

There are other measures representing various aspects of information environment which could influence individual investors' valuation processes. These include market to book ratio, bid-ask spread, stock return volatility, analyst forecast errors, firm size, and firm age. I include these variables in my analysis to examine whether any of them have significant explanatory power and whether they subsume the reported relationship for the three variables of interest. Columns 2 and 5 contain the results of the regression of accounting discussion on all the uncertainty variables together. I observe that the findings on the three variables of interest remain the same with the exception of the loss of statistical significance on the dispersion variable. Of the newly added variables, only the market to book ratio and the inverse of firm age show statistical significance.

Given that some of the variables included in the regression may represent similar facets of the information environment and are correlated, I proceed with principal components analysis. Examining the correlation matrix (not tabulated), I observe that five of the six additional uncertainty variables (excluding

[26] Excluding the dispersion variable from analysis allows the inclusion of firms not covered by analysts in the sample and does not change reported results for the coverage and turnover variables.

market to book ratio) exhibit high correlations. I use principal components analysis to compute a composite measure of these five variables (spread, volatility, absolute analyst surprise, inverse of size and inverse of age) using the first principal component which captures more than half of the total variance in these measures and is the only component with an eigenvalue greater than one. Including both the Uncertainty Principal Component 1 and the market to book ratio I observe that the three variables of interest – inverse of coverage, dispersion, and turnover are all positive and significant in explaining the percent of accounting discussion (column 6) and both coverage and turnover are significant for total accounting discussion levels (column 3). The coefficient on the Uncertainty Principal Component 1 is also positive but not statistically significant.[27] Interestingly, the market to book ratio has a strong negative association with the extent of accounting discussion. High market to book ratios are generally considered to characterize either growth firms or "glamour" firms - firms which capture the market's attention. It appears that for these firms accounting information is considered less relevant for valuation as evidenced by lower discussion.

5.2.2 Financial Reporting Quality

Next I investigate Hypothesis 1b regarding the relationship between financial reporting quality and investors' attention to accounting information. Following prior research (Francis et al. 2004; Schipper and Vincent 2003) I construct measures of financial reporting quality based on accruals quality and the relevance and persistence of reported earnings. I measure accruals quality by estimating a cross-sectional regression mapping total current accruals to past, present and future cash flows from operations. Relevance is measured as the adjusted R^2 from a firm-specific time-series regression of the price of the stock on annual earnings and the book value of the firm. Persistence is estimated as the coefficient on

[27] I also considered using principal component analysis on all eight of the measures of uncertainty (still excluding market to book ratio due to very low correlation with any other variable). Not surprisingly, given the weaker correlations between turnover, dispersion and other variables it is necessary to use at least two principal components to capture a significant amount of the total variance. The coefficient on the first principal component is positive and significant for analysis of both daily accounting messages and daily percent of accounting messages and the coefficient on the second principal component is positive and significant for the former only (positive and insignificant for the latter).

lagged earnings from an autoregressive model of earnings per share.[28] To capture a forward-looking aspect of reporting quality I also use a measure of readability of 10-K reports.[29] All of the variables are transformed into quintile ranking. I regress the measures of accounting-related discussion (as defined in the previous subsection) on the financial reporting quality variables as follows:

$$AccDiscVolume_i = \alpha + \beta_1 AccrualsQuality_i + \beta_2 Persistance_i + \beta_3 Relevance_i + \beta_4 Readability_i + \\ + \beta_5 SP1500_i + \beta_6 DiscVolume_i \quad (3)$$

The results of the regression appear in Panel B of Table 3. I observe that only Persistence and Readability measures are positive and significant in explaining the number of total accounting messages per day (column 1). For the regression of daily percent of accounting messages (column 3) none are statistically significant. Columns 2 and 4 contain the same model with the inclusion of uncertainty variables examined previously. The conclusions regarding the reporting quality variables remain the same and I observe that analyst coverage and average volume turnover remain positive and significant despite a smaller sample. Overall, there is some evidence that more persistent earnings and less complex financial reports contribute to greater accounting-related discussion. I also examine the interaction between the information environment and the reporting environment. Univariate analysis of measures of information uncertainty and financial reporting quality (not tabulated) shows that the highest level of accounting discussion is generally observed for firms which feature both high levels of information uncertainty *and* high levels of financial reporting quality. This suggests that financial reporting quality may impact attention to accounting information in poor information environments. However, the results are not robust in multivariate analysis (possibly due to the small number of firms in the relevant cross-sections), thus this question remains open for further research.

[28] Estimation of measures is detailed in Appendix C.

[29] This is a measure capturing the extent of "Plain English" language in the 10-K report as discussed in Loughran and McDonald (2009). The readability measure is derived from normalized changes based on the mean and standard deviation of data from the same Fama-French 48 industry category in the past year. The data were generously shared by Tim Loughran and Bill McDonald.

5.3 Enhancement of Information Availability and Processing

Lastly, I examine whether greater discussion around information releases is associated with mitigation of information asymmetry. I regress changes in the bid-ask spread on the abnormal volume of total discussion and the abnormal percent of accounting discussion around issuances of preliminary earnings announcements. The model is as follows:

$$changeSpread_{EAit} = \alpha + \beta_1 AbnAccDiscVolume_{EAit} + \beta_2 AbnDiscVolume_{EAit} + \\ + \beta_3 SP1500_i + \beta_4 Size_{it} + \beta_5 absSurprise_{it} + \beta_6 ROA_{it} \quad (4)$$

I calculate the change in spread (daily absolute bid ask spread scaled by the closing price) as the difference between the daily spread in the period (-30,-2) days before the earnings announcement and the daily spread in the period (+2, +30) days after. The measures of total discussion and accounting discussion are the averages of the daily variables in the period (-1,+1) business days around the earnings announcement scaled by the averages of these measures in the control period of (-30,-2) days. I include the indicator variable for the S&P1500 index sample and controls for financial characteristics of the given firm-quarter, specifically, firm size which is calculated as the natural logarithm of the market value of assets, the absolute value of analyst surprise scaled by the stock price, and the reported returns on assets (income before extraordinary items scaled by lagged total assets). Table 4 presents the results of the regression. I find a negative association between abnormal percent of accounting discussion and the bid-ask spread around earnings announcements. While the coefficient is small in magnitude, it is statistically significant, suggesting that either increased investor attention to accounting information, or the message board discussion itself, may reduce the information asymmetry around instances of information releases.

Finally, to test Hypothesis 2b regarding the impact of the volume of accounting discussion at the earnings release date on the post earnings announcement drift, I regress abnormal buy and hold returns from two days after the earnings announcement through one day after the subsequent earnings announcement on the earnings surprise, the volume of discussion (both total and accounting-related) and the interaction between the measures of discussion and the surprise:

$$AbnReturn_{it} = \alpha + \beta_1 Surprise_{it} + \beta_2 AbnAccDiscVolume_{EAit} + \beta_3 Surprise_{it} \times AbnAccDiscVolume_{EAit} + \beta_4 AbnDiscVolume_{EAit} + \beta_5 Surprise_{it} \times AbnDiscVolume_{EAit} + \beta_6 SP1500_i + \beta_7 Size_i \quad (5)$$

The abnormal returns are calculated against the Fama-French six portfolios matched by size and book to market.[30] The earnings surprise is calculated as reported earnings minus mean analyst forecasts made from one day after the prior earnings announcement to one day before the current one (retaining only the latest estimate per analyst) and scaled by the price at fiscal quarter end. As above, the abnormal message board activity variables are calculated as the daily averages in the three business days around the earnings announcement scaled by the daily averages in the control period of (-30,-2) days. The results of the regression are reported in Table 5. The results indicate that the interaction between the abnormal measure of accounting discussion (a continuous variable) and the earnings surprises is negative and statistically significant, suggesting that increased accounting discussion is associated with faster incorporation of information into prices and, thus, a reduction in the subsequent drift.

6. Conclusion

Individual investors' attention to accounting information is of interest to academics, standard-setters and firms. In this study I use Internet stock message board data to empirically evaluate investors' attention. With a sample of 1.94 million messages for 1,858 firms I document that approximately twenty percent of all message board discussions are accounting-related and describe a hierarchy of attention, which spans a multitude of items and is topped by discussions of earnings, cash, and revenues. My findings add to the literature on individual investors' reaction to various corporate disclosures. Specifically, I show that attention to accounting information increases significantly around earnings releases as well as periodic and 8-K report filings. These results suggest that individuals monitor these channels of disclosure and evaluate the information contained therein.

Next I examine whether individual investors' attention varies depending on the firm's information environment. Specifically, adopting a cross-sectional approach and using analyst coverage,

[30] I obtain the cut-off points to determine the size and B/M matched portfolios from Ken French's data library. The cut-off and portfolio data are available at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

analyst forecast dispersion, and volume turnover, which respectively represent availability, precision, and ambiguity of information, I find that investors discuss accounting information more frequently for firms with greater uncertainty. This is consistent with investors expanding their data acquisition and processing efforts in poor information environments. Lastly, I examine whether greater attention to accounting information leads to an evolution of a better-informed investor. I document that higher accounting discussion around earnings announcements is associated with a reduction in information asymmetry (as measured by the bid-ask spread) and with a reduction in the post earnings announcement drift. Thus, greater accounting discussion is associated with an improvement in information availability and information processing.

The study opens up avenues for future research that could examine investor attention to specific accounting items, to the interaction of accounting and non-accounting variables significant for valuation, and to managerial reputation. Another area for future study is the tone of the discussion and the extent of disagreement among individual investors as related to the nature and quality of information disclosures and as compared to the sentiment of and disagreement among more sophisticated users such as analysts.

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Appendix A – Accounting Word List

This word list is used to classify a message as related to accounting. I create a binary variable for each accounting word in order to record whether this word is present in the message at least once (176 binary variables are created). A message is classified as related to accounting if it contains at least one of the words on the list. The focus of this list is on financial reporting and disclosure – these are the accounting-related words that an investor is likely to encounter in examination of various disclosures regarding the firm. In preliminary analysis, for each accounting word, a sample of messages containing this word was examined in order to identify whether each message is in fact accounting-related.[31] The following issues are addressed in the classification:

1. Words frequently found in non-business or non-accounting context:
   Some words are relevant to accounting and to financial analysis but they are also common in other contexts and their presence in the message cannot reliably classify the message as accounting-related. Examples of words excluded for these reasons are:
   credit, account, borrow, budget, income, cost, debt, interest, prepaid, tax, sales, unearned, financing, restructuring, reserve, provision, capitalize, depletion, consolidation, brand name, …
   It is possible to qualify some of these words to ensure their relevance to accounting discussions. For example, while the words "income" and "cost" may be observed in discussion of everything from welfare reform to cost of living, the phrases "operating income", "income from operations" and "cost of goods" are very likely to be accounting-related. So where possible these common words were modified to be included in the list.

2. Words frequently found in financial context:
   Much of the discussion on the boards is about the immediate past and future movements of the stock price and the implication of such movements for traders. Some accounting-related words are frequent in such discussions or in other discussions of stock characteristics (rather than characteristics of the underlying firm). Examples of words excluded for these reasons are:
   stock, bond, price, gain, loss, hedge, financial, invest, investment, liquidity, stock split, valuation, turnover (as in "share turnover")*, market value, ROI* (as in return to stockholders)*, capitalization, …*
   Again, where possible these words were qualified into phrases which more reliably indicate accounting context. For example: "price to earnings", "owner's equity", etc.

3. Plurals and alternative formats:
   In all relevant instances the plural of the noun is recognized as well as the singular. The capitalization of the word is irrelevant for classification. The list also allows for various foreseeable formatting differences in the writing, for example "mark to market" will be recognized if written also as "mark-to-market" or "mark – to – market" and "10-K" will be recognized as "10-k" "10K", "10 K" , "10 – K", etc. (but not as "10 kilometers" or "100 K"). Commonly utilized acronyms are recognized unless they also frequently refer to non-accounting words - for example for "market to book" the program will recognize M-B and M/B but not M.B. or MB because the latter often refer to M.B.A., MBA, megabyte, etc.

[31] Even with such preliminary analyses and the resulting disambiguation modifications discussed below any given message may be misclassified – no classification can be 100% correct given the fact that simply too few words are related to accounting but to no other context. Any potential misclassification will bias against finding significant result in tests of accounting discussion.

4. Errors:
   Misspellings will not be recognized by the program. Some terms which are technically incorrect are never-the-less frequently discussed in the accounting context and as thus are included in the list – for example "capital expense" (where capital expenditure is meant).

5. Lack of usage:
   Some of the less known accounting words are not included in the list because they are practically never used (as observed in preliminary testing). Words sought but not found include:
   reacquisition, acid test, discontinuation of business, earnings management, income management, earnings smoothing, big bath, cookie jar reserve, significant deficiency, control deficiency, post-retirement, return on sales

All words are grouped into terms to allow for exploratory analysis of general topics discussed. These terms are not meant to be precise accounting categories but rather are conceptual buckets which may include items from different financial statements and items which vary in accounting application (for example while *extraordinary* and *non-recurring* are distinct accounting concepts they are both found under the term "unusual").

Term	Word	Words and phrases will recognize:
accounting	accountant	accountant
	accounting	accounting
	CPA	CPA
accrue	accrual	accrual
	accrue	accrue, accrues, accrued, accruing
AFS	AFS	AFS
	available_for_sale	available for sale
analyst	analyst_estimate	analyst (within 10 letters of) estimate/forecast
	earnings_estimate	earnings estimate, eps estimate, per share estimate
asset	asset	asset
audit	audit	audit, audited, auditing
	auditor	auditor
bad_debt	bad_debt	bad debt
	doubtful_account	doubtful account
	loan_loss	loan loss
	uncollectible	uncollectible
book_value	book_value	book value
	carrying_value	carrying value, carrying amount
	historical_cost	historical cost
BS	balance_sheet	balance sheet
	position_statement	statement of financial position
buyback	buyback	buy back, buying back
	repurchase	repurchase, repurchasing
capex	capex	capex, cap ex
	capital_ex	capital expenditure, capital expense

Term	Word	Words and phrases will recognize:
cash	cash	cash
cash_flow	cash_flow	cash flow, cashflow
cash_flow_statement	cash_flow_statement	cash flow(s) statement, statement of cash flow(s)
CI	comprehensive_income	comprehensive income
	OCI	OCI, AOCI
COGS	COGS	COGS
	cost_of_goods	cost of goods
	cost_of_sales	cost of sales
contingent	contingent_gain	contingent gain, gain contingency
	contingent_liability	contingent liability
	contingent_loss	contingent loss, loss contingency
control	board	board of directors, board members
	corporate_governance	corporate governance
	error	accounting error
	fraud	accounting fraud, fraudulent accounting
	internal_control	internal control, internal audit
	SOX	Sarbanes Oxley, S.O.X.
	weakness	material weakness
covenant	covenant	covenant
current	current_ratio	current ratio
	quick_ratio	quick ratio
	working_capital	working capital
current_report	conference_call	conference call
	current_report	current report
	earnings_announcement	earnings announcement
	earnings_release	earnings release
	k8	8 K, 8-K
	SEC_filing	SEC filing
defer	defer	defer, deferred
	deferral	deferral
depreciate	amortization	amortization
	amortize	armortize, amortized
	depreciate	depreciate, depreciated
	depreciation	depreciation
discontinue	discontinue	discontinue operations, discontinued operations
dividend	dividend	dividend
earnings	earnings	earnings
EBIT	EBIT	EBIT
	EBITDA	EBITDA

Term	Word	Words and phrases will recognize:
EPS	earnings_per_share	earnings per share
	EPS	EPS, e-p-s
	income_per_share	income per share, profit per share
equity	equity	owners(') equity, stockholders(') equity, shareholders(') equity
	paid_in_capital	paid in capital
expense	expense	expense
	expensed	expensed, expensing
fair_value	fair_market_value	fair market value, fmv
	fair_value	fair value
	mark_to_market	mark-to-market, mark(ed) down/up to market
financial_instrument	derivative	derivative
	financial_instrument	financial instrument
GAAP	accounting_rule	accounting principle/rule/regulation/standard, SFAS
	FASB	FASB, F.A.S.B.
	GAAP	GAAP, G.A.A.P.
going_concern	going_concern	going concern
goodwill	goodwill	goodwill
guidance	earnings_guidance	earnings/eps/per share guidance/forecast
	forward_guidance	forward (looking) guidance/forecast
	manager_guidance	manager/management/company (within 10 letters of) guidance/forecast
	negative_guidance	negative guidance/forecast
	period_guidance	year/yearly/quarter/quarterly/1q/2q/3q/4q guidance/forecast
	positive_guidance	positive guidance/forecast
	revenue_guidance	revenue guidance/forecast
HTM	held_to_maturity	held to maturity
	HTM	HTM
impair	charge_off	charge/charged/charging off
	impair	impair, impaired, impairing
	impairment	impairment
	write_down	write/written/writing down
	write_off	write/written/writing off
income	continuing_income	income from continuing
	gross_income	gross income
	net_income	net income/loss
	operating_income	operating income/loss, income/loss from operations
intangible	intangible	intangible, intangibles
inventory	inventory	inventory
IS	income_statement	income statement, income report
	operations_statement	statement of operations/earnings
	pl_statement	P and L, P&L, profit and(&) loss statement, statement of profit and loss

Term	Word	Words and phrases will recognize:
lease	lease	lease, leasing
	leaseback	leaseback
	leasehold	leasehold
leverage	capital_ratio	capital ratio
	debt_assets	debt to (total) assets, debt/assets, debt ratio
	debt_equity	debt to equity, debt/equity
	deleverage	deleverage, deleveraged
	leverage	leverage, leveraged
liability	liability	liability
M_B	M_B	M/B, M-B
	market_book	market to book, market/book, book-market
	times_book	times book
marketable_securities	marketable_securities	marketable security
MDA	management_discussion	management('s) discussion and(&) analysis
	MDA	MD&A
minority_interest	minority_interest	minority interest
	noncontrolling_interest	non controlling interest
OBS	OBS	off balance sheet
	SPE	SPE, SPV, qSPE
	special_purpose	special purpose
	variable_interest	variable interest
P_E	earnings_multiple	earnings multiple
	P_E	PE, P/E
	price_earnings	price earnings, price to earnings
payable	accounts_payable	account(s) payable
	notes_payable	note(s) payable
	taxes_payable	tax(es) payable
pension	pension_expense	pension expense
	pension_liability	pension liability
	pension_obligation	pension obligation
periodic_report	annual_report	annual report
	financial_report	financial report
	financial_results	financial results
	financial_statement	financial statement
	footnotes	footnotes
	k10	10 K, 10-K
	periodic_report	periodic report
	q10	10 Q, 10-Q
	quarterly_report	quarterly report
PPE	fixed_assets	fixed asset, tangible asset
	long_lived_assets	long lived asset, long live asset
	PPE	PPE, PP&E
	property	property plant and(&) equipment
pro_forma	nongaap	non GAAP, nongaap
	pro_forma	pro forma, proforma

Term	Word	Words and phrases will recognize:
profit	gross_profit	gross profit
	net_profit	net profit
	operating_profit	operating profit
	profit_margin	profit margin, gross margin
RD	RD	R&D, R and D
	research_development	research and(&) development
receivable	receivable	receivable
restate	restate	restate, restated, restating
	restatement	restatement
return_on	return_on_assets	return on assets, return on total/net assets
	return_on_equity	return on equity
	ROA	ROA
	ROE	ROE
revenue	revenue	revenue
	sales	net sales, gross sales
	top_line	top line
securitize	securitize	securitize, securitization, securitizing
SGA	selling_general	selling general and(&) administrative
	SGA	SG&A, SGA
stock_option	backdating	backdate, backdated, backdating
	eso	ESO
	stock_option	stock option
unusual	extraordinary	extraordinary gain/loss/charge/item
	non_recurring	non recurring, nonrecurring
	one_time	one time gain/loss/charge/item
	special	special charge/item

Appendix B – Examples of Accounting-related Discussions

Company: H&R Block, Inc.
Title: *What exactly is the **liability** between HRB and the Trusts?*
"I've seen a lot of talk on this board on the issue of what residual **liability** HRB has relative to the mortgage trusts where they have dumped most of the mortgage loans.
I have not seen an explanation of the exact nature of this **liability**.
Seems that is the key issue of whether or not HRB is doomed to crash or not.
Anyone actually know details?
Thanks."

> Company: H&R Block, Inc.
> Title: *Re: What exactly is the **liability** between HRB and the Trusts?*
> "IF the **off balance sheet** vehicles are profitable and functioning properly, agreements can be made such as 'hrb will not be liable for more than 10% of the amount of the **buybacks'**. However, is the trusts are failing, the owner must make them whole. Just like Citi is doing with it's SIV's. Trust/SIV all the same thing really."

Company: The Coca-Cola Company
Title: ***Earnings***
"Following this company for a decade, I must admit their PR department is awesome.
Look at that PR piece. Sparkling this, sparkling that. When was sparkling deserving of such attention? Wonderful wordsmithing.
Top line lead... 17% rev boost. From many sources. Currency appreciation. Buying bottlers. A nice bump in syrup sales and pricing and mix are the important categories (6 and 3% respectively). The latter two count, the former 2 don't. How much of this is one quarter sliding to another are an easy 1Q06, I do not know.
But the PR maestro is incredible. Take a look at Germany's performance. Or note how the flagship territory, NA, sagged 3% and the trend is not a friend. Let's look at Germany:
>>>Unit case volume in Germany increased 11 percent, cycling a 1 percent decline in the prior year quarter. The results were driven by improved marketplace execution, solid growth in Trademark Coca-Cola which benefited from the continued success of Coca-Cola Zero, increased availability in the discounter channel, the timing of Easter and favorable weather. The acquisition of Apollinaris, a premium source water brand, contributed 6 percentage points of unit case volume growth in the quarter. <<<
Read it carefully. Germany has historically been in the top 3 markets for profit margin. Note that the 2 year average volume gain is only 2.5%. Read it carefully, again...
It could be a turnaround. Could be. But I'm not buying into it. Holiday period movement has impact. Note that the **top line** increased 17%, but much of it was buying bottlers, currency exchange, etc. Note how costs jumped 24% and **SGA** 13%. These are going to be sticky costs, imo. It doesn't look like KO is firing on all cyclinders, although the body design is sure pretty.
Kudos to the PR maestro."

Company: Krispy Kreme Doughnuts
Title: *a little insight please*
"Long time investor here, and I stress investor. Not a trader/pumper/dumper. I'm looking at maybe another entry point and am trying to get behind the numbers. Seems to me that this is a great opportunity, 2qtr results being from **one time charges**.
Anyhow, will someone please help me understand KKD's **revenue** stream of the KK Supply Chain. At first glance it appears to be a double booking of **revenue**, then the company debits "intersegment elimination" which is what I am assuming is the internal sales figure. But that leaves $24MM counted towards **revenue**, 2q. Who are the buyers or what is the source?
Thanks for anybody's help.
Good luck longs."

> Company: Krispy Kreme Doughnuts
> Title: *Re: a little insight please*
> "The problem with "**one time charges**" as they relate to KKD, is that they've had a string of them over the last three years or so. Think they're done closing stores? The PR says otherwise. Of the $27M **net loss**, $22M was related to "**one-time charges**." So, a **pro-forma net loss** of $5M for the quarter is enough to make you want to jump in for more abuse?
> If they are **accounting** for things properly these days and eliminating intercompany sales, the **revenue** from the supply chain operations is derived from sales to independent franchisees."

Company: Agilent Technologies Inc.
Title: *Re: Senior Notes: What for*
"I agree given Agilent's **cash** position and operating **cash flow** that offering senior notes for **working capital** or **capital expenditures** makes no sense and are red herrings.
Perhaps Adrian feels that Agilent stock is such a steal at $36-$38 a share that he needs to initiate a big **buyback** before the price gets away from him!
Although they would never publicly admit it, maybe Bill and Adrian feel pressured by Danaher's acquisition of Tek and have been goaded into making a big play of their own. Given the abysmal acquisition track record of the company, I worry that they will once again overpay. If they are going down this path, let's at least hope that any acquisition will be on the LSCA side of the house. The electronic test industry with its likely growth rate of 4-5% doesn't merit more capital investment.
Could it be that Adrian is still trolling for a buyer and is loading up the **balance sheet** with even more **cash** offset by long-term debt at relatively low cost?"

Company: Top Ships, Inc.
Title: ***Dividend****?*
"It has been almost a year since we got paid any dividens. What are anyone thoughts, do you think we will see any this year?"

> Company: Top Ships, Inc.
> Title: *Re:* ***Dividend****?*
> "TOPT is bleeding.
> Before an investor believes that they'll pay a **dividend**, he must first ask where they money would come from to pay said **dividend**.
> Don't be fooled by any that tell you they'll make any significant amount of money this quarter. They are likely the ones that thought TOPT would make money last quarter, when they posted worse than expected losses. Record losses.
> They are projected by JP Morgan to have a loss for the year 2007. The rate spike may help them this quarter, to break even, but how much better than that is in doubt. A regular **dividend** is probably at least a year away from recurring.
> Will they sell their remaining few ships to pay a **dividend**? Maybe, but that's not something for which an investor should hold his or her breath.
> Will they borrow money to pay a **dividend**, like GMR? Never put anything past Pisty, but probably not.
> Can they use their **cash** reserve to pay a **dividend**? Maybe. But, I'm thinking they've got six ships on order and other plans for the **cash**. Like paying bonuses, and **expenses** that are not covered by income. Back to those continuing losses, again.
> So, I ask *YOU*. Do you think they'll be paying a **dividend** any time soon?
> I don't think so.

Company: The Home Depot, Inc.
Title: *HD* ***P/E*** *raio*
"H D is now trading at an all-time low **PE** ratio of less than 11x and 9.5x next years earnings. Even in the worse case scenario this is way oversold."

> Company: The Home Depot, Inc.
> Title: *HD* ***P/E*** *raio*
> "Did you read my post about Black and Decker? B&D lowered projections because remodeling demand is falling. So, maybe your projected **earnings** need to be adjusted down. In other words, how do you know what next years **earnings** will be to determine your 9.5 **PE** ratio?"

Appendix C – Variable Definitions

Measures of Message Board Discussion:

Messages per Day: Total number of messages posted from 12:00AM EST to 11:59PM EST

Accounting Messages per Day: Number of accounting messages posted (per Appendix A classification) from 12:00AM EST to 11:59PM EST

% of Accounting Messages : Number of accounting messages as a percent of total messages per day

Average measures of discussion (annual, quarterly or other) are calculated using days with non-zero discussion activity, i.e. days with at least one message posted in the period from 12:00AM EST to 11:59PM EST. Where appropriate total and accounting message variables are transformed using natural logarithm transformation. For calculations of abnormal discussion around the earnings announcement the average discussion (both total and accounting) over the three days around the earnings announcement is scaled by the average discussion in the control period from thirty to two days before the earnings announcement.

Other Variables – Daily Event Study Analysis:

10-K: Indicator variable for the three days around the filing date of the 10-K report[32]

10-Q: Indicator variable for the three days around the filing date of the 10-Q report

EA: Indicator variable for the three days around the preliminary earnings announcement date

8-K: Indicator variable for the three days around the filing date or an event date of an 8-K report (not containing item 2.02 Results of Operations)

Turnover: Daily share trading volume divided by total shares outstanding

Abs(Return): Absolute value of daily stock return

Monday-Saturday: Indicator variable for the day of the week

Other Variables - General:

S&P1500: Firms in the S&P500, S&P MidCap 400 or S&P SmallCap 600 indices

nonS&P: Firms not in the S&P1500 sample

Other Variables – Cross Sectional Information Uncertainty Analysis:

Inverse(Coverage): Inverse of average analyst coverage. Quarterly coverage is calculated as the number of individual analysts issuing a forecast for the quarter from one day after the prior earning announcement to one day before the current one. Annual measure is the average over all the quarters where earnings announcement was between April 1, 2007 and March 31, 2008

[32] For 10-K, 10-Q, EA, and 8-K indicator variables, the window includes at least one business days before and one business day after – if the filing or event date is on Tuesday, then Monday through Wednesday will be marked as event days, if the filing or event date is on Friday then Thursday through Monday will be marked, and if the filing or event date falls on the weekend then Friday through Monday will be marked.

Dispersion: Quarterly dispersion is calculated as the standard deviation of quarterly analyst forecasts (latest forecast retained per analyst) issued from one day after the prior earning announcement to one day before the current one, scaled by the stock price at fiscal quarter end. Annual measure is the average over all the quarters where earnings announcement was between April 1, 2007 and March 31, 2008

Turnover: Average of daily volume turnover (daily share trading volume divided by total shares outstanding) over the period of April 1, 2007 through March 31, 2008

Market to Book Ratio: Ratio of market value of equity (price per share multiplied by total shares outstanding) to book value of total shareholders' equity calculated at fiscal year end occurring between April 1, 2007 and March 31, 2008

Bid-Ask Spread: Average of daily absolute value of bid-ask spread divided by the closing stock price over the period of April 1, 2007 through March 31, 2008

Return Volatility: The standard deviation of weekly (Thursday through Wednesday) stock returns over the period of April 5, 2007 through March 26, 2008

Abs(Surprise): Quarterly value of absolute analyst surprise is calculated as the absolute value of the difference between actual Earnings Per Share and the average of individual analyst forecasts made in the period from one day after the prior earnings announcement to one day before the current one (latest forecast retained per analyst), scaled by the stock price at fiscal quarter end. Annual measure is the average over all the quarters where earnings announcement was between April 1, 2007 and March 31, 2008

Inverse(Size): Inverse of the natural logarithm of the market value of equity (price multiplied by total shares outstanding)

Inverse(Age): Inverse of the natural logarithm of the number of years since the firm's first observation in CRSP database

Uncertainty PC 1 (from 5): First principal component from the principal component analysis of bid-ask spread, return volatility, absSurprise, invSize and invAge

Other Variables – Cross Sectional Financial Reporting Quality Analysis:

Accruals Quality: I estimate for each of the Fama-French 48 industries the following regression:

$$TCA_{it} = \alpha + \beta_1 1/ATA_{it} + \beta_2 CFO_{it-1} + \beta_3 CFO_{it} + \beta_4 CFO_{it+1} + \beta_5 chREV_{it} + \beta_6 PPE_{it} + \varepsilon_{it}$$

where for firm i TCA is the total current accruals (difference between income and cash flow from operations), ATA is the average total assets, CFO is the cash flow from operations, chRev is the change in sales less change in accounts receivables, PPE is the property, plant and equipment. For each firm the standard deviation of the residuals is calculated from the cross-sectional regression over the period t-4 to t (where t is fiscal year end between April 1, 2007 and March 31, 2008). The accruals quality is the inverse of the standard deviation variable

Relevance: I estimate a firm specific regression: $P_{it} = \alpha + \beta_1 E_{it} + \beta_2 BV_{it} + \varepsilon_i$ where P is the price per share three months after fiscal year end, E is annual earnings per share, and BV is the book-value per share at the end of the year. I run the model over t-10 to t (where t is fiscal year end between April 1, 2007 and March 31, 2008) and require that firms have a minimum of five annual observations. Relevance is the adjusted R^2 from this regression

Persistence: I estimate a firm specific regression: $E_{it} = \alpha + \beta_1 E_{it-1} + \varepsilon_i$ where E is annual earnings per share and persistence is the coefficient on lagged E from estimating the model for fiscal years t-10 to t (where t is fiscal year end between April 1, 2007 and March 31, 2008) and requiring that firms have a minimum of five annual observations

Readability: This is a measure capturing the extent of "Plain English" language in the 10-K report (for the latest report available before 2008). The readability measure is derived from normalized changes based on the mean and standard deviation of data from the same Fama-French 48 industry category in the past year. For details on the measure see Loughran and McDonald (2009)

Other Variables – Change in Information Environment Analysis:

Change in Spread: Average of the daily absolute value of the bid-ask spread divided by the closing stock price in the period (+2,+30) days after the preliminary earnings announcement minus the average of the daily absolute value of the bid-ask spread divided by the closing stock price in the period (-30,-2) days before the preliminary earnings announcement

Size: Natural logarithm of the market value of equity (price per share multiplied by total shares outstanding) at the fiscal quarter end

Abs(Surprise): The absolute value of the difference between actual reported Earnings Per Share and the median analyst consensus forecast (last available consensus from the I/B/E/S Summary file before the earnings announcement date) scaled by the stock price at fiscal quarter end

ROA: Income before extraordinary items divided by the total assets

Abn(Return): Buy and hold returns of the stock from two days after the earnings announcement through one day after the subsequent earnings announcement minus the buy and hold return of the appropriate portfolio matched by size and book to market of the Fama-French six portfolios

Surprise: Actual Earnings Per Share minus the average of individual analyst forecasts made in the period from one day after the prior earnings announcement to one day before the current one (latest forecast retained per analyst) scaled by the stock price at fiscal quarter end

Figure 1 – Distribution of accounting and non-accounting messages throughout the day

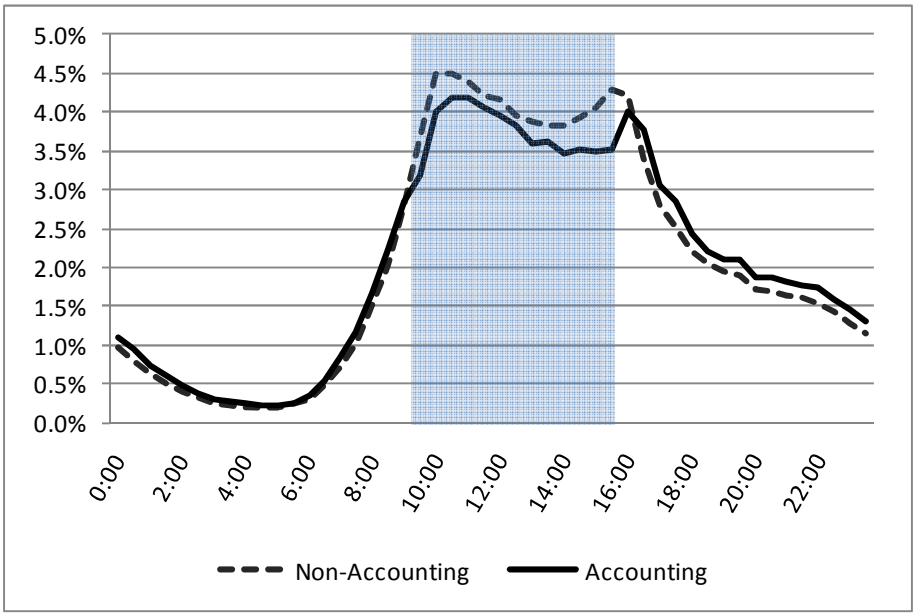

Figure Notes: The above figure presents the accounting messages (classified according to Appendix A) and the non-accounting messages (all other) in a given half-hour (e.g. 9:00 am through 9:29 am) as a percentage of total accounting and non-accounting messages in the sample respectively. The classification is done according to the message time stamp (reported in EST). The shaded area represents the trading hours during the day (9:30EST through 3:59EST).

Table 1: Descriptive Statistics

Panel A: Firm Characteristics

	All (1,858 firms)				S&P1500 (1,404 firms)				nonS&P (454 firms)			
	N	Mean	StDev	Median	N	Mean	StDev	Median	N	Mean	StDev	Median
Total Messages (for full-year firms only)	1,690	844	1,549	188	1,306	637	1,258	155	384	1,550	2,133	597
Total Message Days (for full-year firms only)	1,690	126	109	90	1,306	115	98	81	384	165	132	171
Avg Messages per Day	1,858	5.4	9.2	2.2	1,404	3.8	5.4	2.0	454	10.3	15.0	4.7
Avg Accounting Messages per Day	1,858	1.0	1.5	0.6	1,404	0.8	1.0	0.5	454	1.5	2.5	0.8
Avg (daily) % of Accounting Messages	1,858	20%	11%	19%	1,404	22%	11%	21%	454	13%	10%	13%
Age	1,856	32	21	28	1,404	36	21	37	332	22	16	16
Market Value of Equity	1,731	6,276	16,804	1,544	1,399	6,743	15,698	2,072	332	4,309	20,744	185
Total Assets	1,733	8,864	54,899	1,644	1,404	8,618	27,228	2,135	329	9,914	112,881	162
Market-to-Book Ratio	1,727	4.4	39.7	2.2	1,399	3.5	11.2	2.3	328	8.6	88.1	1.9
Income before Extraordinary Items	1,733	332	1,191	69	1,404	361	1,028	95	329	208	1,718	(4)
EPS (diluted, before EI)	1,733	1.43	3.05	1.29	1,404	1.86	2.67	1.56	329	(0.38)	3.82	(0.09)
Average (daily) Turnover	1,729	12.3	9.3	10.2	1,402	12.1	6.9	10.4	327	13.5	15.7	8.9
Average (weekly) Volatility	1,728	0.059	0.031	0.053	1,402	0.052	0.018	0.050	326	0.090	0.051	0.076
Average (daily) Bid-Ask Spread	1,729	0.003	0.005	0.001	1,402	0.002	0.002	0.001	327	0.008	0.010	0.004
Average Analyst Coverage	1,858	7	6	6	1,404	8	5	7	454	3	4	1
Average Analyst Surprise	1,603	(0.00)	0.09	0.00	1,367	(0.00)	0.02	0.00	236	(0.02)	0.23	0.00
Average |Analyst Surprise|	1,603	0.01	0.10	0.00	1,367	0.00	0.02	0.00	236	0.05	0.26	0.01
Average Analyst Dispersion	1,603	0.003	0.017	0.001	1,367	0.001	0.005	0.001	236	0.010	0.043	0.002
Accruals Quality	1,307	(0.20)	0.82	(0.07)	1,029	(0.18)	0.82	(0.06)	278	(0.29)	0.78	(0.14)
Earnings Persistence	1,718	0.39	1.11	0.37	1,324	0.39	0.40	0.39	394	0.40	2.20	0.28
Earnings Relevance	1,678	0.35	0.37	0.39	1,305	0.39	0.34	0.42	373	0.20	0.40	0.17
Readability (Plain English)	1,518	1.13	2.23	1.04	1,272	0.95	2.23	0.77	246	2.05	2.01	2.12

Table Notes: This table presents mean and median values as well as the standard deviation of all relevant variables over the period from April 1, 2007 to March 31, 2008 for the full sample as well as the subsamples of S&P1500 firms (S&P 500, S&P MidCap 400, S&P SmallCap 600 indices) and the nonS&P firms. *Total Messages* represents the total number of messages for firms where a full year of data was collected. *Total Message Days* is the number of days with at least one message posted for firms where a full year of data was collected. *Avg Messages per Day* is the average number of messages a firm had on non-zero message days in the period. *Avg Accounting Messages per Day* is the average number of messages classified as accounting-related (according to Appendix A) a firm had on non-zero message days in the period. *Avg (daily) % of Accounting Messages* is the number of accounting messages per day divided by the number of total messages per day averaged over all non-zero message days in the period. *Age* is the number of years since the first firm observation in CRSP. *Market Value of Equity* is the price per share at fiscal year end times total shares outstanding (in millions) at fiscal year end (FYE here and elsewhere is taken to be between April 1, 2007 and March 31, 2008). *Total Assets* are at fiscal year end (in $millions). *Market to Book Ratio* is the market value of equity as defined above divided by the book value of total shareholders' equity at fiscal year end (in $millions). *Income before Extraordinary Items* is at fiscal year end (in $millions). *EPS* is Net Income Per Share excluding extraordinary items, diluted. *Average Turnover* is the average of daily volume turnover (daily share trading volume divided by total shares outstanding) over the period of April 1, 2007 through March 31, 2008. *Average Volatility* is the standard deviation of weekly (Thursday through Wednesday) stock returns over the period of April 5, 2007 through March 26, 2008. *Average Bid-Ask Spread* is the average of daily absolute value of bid-ask spread divided by the closing stock price over the period of April 1, 2007 through March 31, 2008. *Average Analyst Coverage* is the average of quarterly coverage over all the quarters where earnings announcement was between April 1, 2007 and March 31, 2008 – the quarterly coverage is calculated as the number of individual analysts issuing a forecast for the quarter from one day after the prior earning announcement to one day before the current one. *Average Analyst Surprise* is the average of quarterly surprise variables over all the quarters where earnings announcement was between April 1, 2007 and March 31, 2008 – the quarterly surprise is calculated as the actual Earnings Per Share minus the average of individual analyst forecasts made in the period from one day after the prior earnings announcement to one day before the current one (latest forecast retained per analyst) scaled by the stock price at fiscal quarter end. *Average |Analyst Surprise|* is average of the quarterly absolute values of the surprise as defined above. *Average Analyst Dispersion* is the average of quarterly dispersion variables over all the quarters where earnings announcement was between April 1, 2007 and March 31, 2008 – the quarterly dispersion is calculated as the standard deviation of quarterly analyst forecasts (latest forecast retained per analyst) issued from one day after the prior earning announcement to one day before the current one, scaled by the stock price at fiscal quarter end. *Accruals Quality* is estimated as follows: estimate for each of the Fama-French 48 industries the following regression: $TCA_{it} = \alpha + \beta_1 1/ATA_{it} + \beta_2 CFO_{it-1} + \beta_3 CFO_{it} + \beta_4 CFO_{it+1} + \beta_5 chREV_{it} + \beta_6 PPE_{it} + \varepsilon_{it}$ where for firm i TCA is the total current accruals (difference between income and cash flow from operations), ATA is the average total assets, CFO is the cash flow from operations, chRev is the change in sales less change in accounts receivables, PPE is the property, plant and equipment. For each firm the standard deviation of the residuals is calculated from the cross-sectional regression over the period t-4 to t (where t is fiscal year end between April 1, 2007 and March 31, 2008). The accruals quality is the inverse of the standard deviation variable. *Relevance* is estimated as follows: estimate a firm specific regression: $P_{it} = \alpha + \beta_1 E_{it} + \beta_2 BV_{it} + \varepsilon_i$ where P is the price per share three months after fiscal year end, E is annual earnings per share, and BV is the book-value per share at the end of the year. I run the model over t-10 to t (where t is fiscal year end between April 1, 2007 and March 31, 2008) and require that firms have a minimum of five annual observations. Relevance is the adjusted R2 from this regression. *Persistence* is estimated as follows: estimate a firm specific regression: $E_{it} = \alpha + \beta_1 E_{it-1} + \varepsilon_i$ where E is annual earnings per share and persistence is the coefficient on lagged E from estimating the model for fiscal years t-10 to t (where t is fiscal year end between April 1, 2007 and March 31, 2008) and requiring that firms have a minimum of five annual observations. *Readability* is a measure capturing the extent of "Plain English" language in the 10-K report (for the latest report available before 2008). The readability measure is derived from normalized changes based on the mean and standard deviation of data from the same Fama-French 48 industry category in the past year. For details on the measure see Loughran and McDonald (2009).

Panel B: Frequency of Messages Containing Accounting Terms

	S&P1500 (Total N = 1,014,792)		nonS&P (Total N = 929,434)	
Term	N	Order	N	Order
earnings	65,218	1	34,679	1
cash	33,160	2	31,012	2
revenue	22,276	3	24,201	3
dividend	20,927	4	8,621	8
buyback	18,287	5	9,581	7
P E (price to earnings)	15,762	6	6,368	10
current report	13,294	7	12,645	4
EPS	12,158	8	5,663	11
asset	11,332	9	10,475	5
cash flow	7,566	10	5,305	12
periodic report	7,539	11	10,407	6
inventory	7,283	12	3,576	16
expense	7,130	13	6,518	9
BS (balance sheet)	5,747	14	3,797	15
impair	5,393	15	3,120	19
accounting	4,560	16	4,080	13
analyst	4,524	17	2,101	24
leverage	3,974	18	3,062	21
control	3,924	19	3,847	14
profit	3,904	20	3,356	17
book value	3,536	21	3,326	18
stock option	3,411	22	2,060	25
income	3,151	23	3,072	20
guidance	3,149	24	1,842	27
fair value	2,716	25	1,691	29
liability	2,662	26	1,744	28
lease	2,215	27	1,913	26
R&D	2,042	28	2,893	22
GAAP	1,772	29	1,606	30
audit	1,401	30	2,854	23
capex	1,378	31	798	37
EBIT	1,348	32	1,120	31
depreciate	1,165	33	824	36
financial instrument	1,128	34	986	34

Panel B: Frequency of Messages Containing Accounting Terms (continued)

	S&P1500 (Total = 1,014,792)		nonS&P (Total = 929,434)	
Term	N	Order	N	Order
unusual	1,034	35	732	39
return on	1,019	36	505	46
pro forma	983	37	854	35
restate	973	38	1,023	33
goodwill	884	39	558	45
defer	805	40	1,065	32
IS (income statement)	752	41	686	40
SG&A	717	42	481	49
bad debt	611	43	268	52
covenant	606	44	482	48
equity	589	45	502	47
receivable	534	46	686	40
current	528	47	793	38
securitize	524	48	567	43
OBS (off balance sheet)	470	49	196	54
accrue	459	50	567	43
intangible	393	51	353	50
COGS	345	52	217	53
PP&E	300	53	337	51
discontinue	214	54	105	61
M B (market to book)	211	55	121	60
going concern	188	56	623	42
cash flow statement	178	57	145	58
payable	168	58	162	55
AFS (available for sale)	94	59	156	57
marketable securities	76	60	134	59
minority interest	75	61	158	56
pension	41	62	23	63
contingent	34	63	22	64
HTM (held to maturity)	20	64	19	65
CI (comprehensive income)	16	65	34	62
MD&A	12	66	19	65

Table Notes: This table presents the number of messages in the period from April 1, 2007 through March 31, 2008 which contain references to 66 accounting terms (see Appendix A for details on words and phrases comprising the terms). The frequencies are presented separately for S&P1500 firms (S&P 500, S&P MidCap 400, S&P SmallCap 600 indices) and the nonS&P firms. *Order* indicates the relative rank of frequency within each subsample.

Panel C: Frequency of Messages Containing Accounting Terms – By Industry (for four most frequent industries in the sample)

	Full Sample	Business Services (221 Firms)		Electronic Equipment (151 Firms)		Trading (110 Firms)		Pharmaceuticals (109 Firms)	
Term	Order	N	Order	N	Order	N	Order	N	Order
earnings	1	12,501	1	12,387	1	3,842	2	6,048	2
cash	2	7,340	3	9,369	3	3,349	3	7,240	1
revenue	3	7,628	2	9,380	2	934	8	4,537	3
dividend	4	1,941	9	1,213	17	5,487	1	1,643	6
buyback	5	3,565	4	4,227	4	1,086	6	2,125	5
current report	6	3,059	5	3,752	5	1,040	7	2,920	4
P E (price to earnings)	7	2,803	6	2,521	6	604	12	1,207	10
asset	8	1,674	10	1,972	9	2,408	4	1,069	12
periodic report	9	2,296	7	2,289	8	1,162	5	1,536	7
EPS	10	2,181	8	2,319	7	517	14	1,287	9
expense	11	1,555	11	1,842	10	408	16	1,397	8
cash flow	12	1,266	12	1,692	12	642	11	690	14
inventory	13	322	32	1,217	16	130	27	358	25
BS (balance sheet)	14	786	17	1,192	18	497	15	602	15
accounting	15	1,165	13	1,265	15	365	17	531	16
impair	16	562	23	787	25	685	10	450	20
control	17	877	14	1,020	20	196	24	1,003	13
profit	18	756	18	1,793	11	111	29	394	23
leverage	19	538	24	767	26	743	9	450	19
book value	20	520	25	929	22	589	13	389	24
analyst	21	649	21	985	21	233	23	481	17
income	22	851	15	909	23	274	21	427	21
stock option	23	844	16	1,312	14	89	32	457	18
guidance	24	703	19	1,061	19	88	33	322	27
R&D	25	426	29	1,388	13	7	57	1,133	11
fair value	26	496	26	431	31	359	18	406	22
liability	27	462	27	337	32	267	22	326	26
audit	28	683	20	756	27	124	28	189	28
lease	29	271	34	204	41	288	20	155	31
GAAP	30	648	22	896	24	177	25	154	32
EBIT	31	301	33	268	35	34	48	63	45
capex	32	126	42	581	28	20	51	32	51
financial instrument	33	213	35	171	43	341	19	156	30

Panel C: Frequency of Messages Containing Accounting Terms – By Industry (for four most frequent industries in the sample) (continued)

Term	Full Sample Order	Business Services (221 Firms) N	Business Services (221 Firms) Order	Electronic Equipment (151 Firms) N	Electronic Equipment (151 Firms) Order	Trading (110 Firms) N	Trading (110 Firms) Order	Pharmaceuticals (109 Firms) N	Pharmaceuticals (109 Firms) Order
restate	34	386	31	501	30	55	41	131	33
depreciate	35	190	38	319	34	105	30	97	39
defer	36	396	30	240	36	102	31	115	36
pro forma	37	445	28	567	29	41	46	102	38
unusual	38	191	37	323	33	52	42	65	43
return on	39	100	44	179	42	57	40	116	35
goodwill	40	135	41	214	39	46	45	59	46
IS (income statement)	41	173	39	210	40	61	39	111	37
current	42	167	40	233	37	49	43	66	42
receivable	43	192	36	144	44	47	44	69	41
SG&A	44	98	46	228	38	5	60	81	40
equity	45	86	47	143	46	80	35	63	44
securitize	46	44	52	21	59	172	26	10	57
covenant	47	46	51	61	51	70	37	25	53
accrue	48	98	45	68	50	68	38	161	29
bad debt	49	75	48	32	54	82	34	6	63
going concern	50	120	43	97	47	74	36	123	34
intangible	51	59	50	144	45	15	53	46	49
OBS (off balance sheet)	52	39	56	21	60	40	47	8	60
PP&E	53	64	49	93	48	30	50	36	50
COGS	54	28	59	76	49	7	58	50	48
M B (market to book)	55	29	58	29	56	13	54	11	56
payable	56	35	57	33	53	3	63	16	55
cash flow statement	57	27	60	32	55	20	52	17	54
discontinue	58	41	53	24	57	9	55	10	58
AFS (available for sale)	59	24	61	24	58	31	49	28	52
minority interest	60	41	54	54	52	8	56	7	61
marketable securities	61	40	55	20	61	4	62	58	47
pension	62	4	64	10	62		65	1	65
contingent	63	2	65		66	5	61	1	64
CI (comprehensive income)	64	5	62	5	63	3	64	9	59
HTM (held to maturity)	65	2	66	1	65	6	59		66
MD&A	66	4	63	1	64		66	7	62

Table Notes: This table presents separately for the four most common industries in the sample the number of messages in the period April 1, 2007 to March 31, 2008 which contain references to 66 accounting terms (see Appendix A for details on words and phrases comprising the terms). The industries are based on the Fama and French (1997) 48 categories. The table is presented in the order of frequency calculated on the full sample.

Table 2: Effect of Information Releases on Discussion Activity

Panel A: Distribution of Discussion Activity in the Days around Earnings Announcement, 10-K Filings and 10-Q Filings

	Preliminary Earnings Announcement [1]				10-K Filing [2]				10-Q Filing [3]			
Days	N	Total Messages	Accounting Messages	% of Acc. Messages	N	Total Messages	Accounting Messages	% of Acc. Messages	N	Total Messages	Accounting Messages	% of Acc. Messages
-2	2,662	7.7	1.8	28%	639	7.5	1.7	21%	1,960	9.7	2.4	25%
-1	3,105	10.0	2.6	31%	690	9.7	2.3	23%	2,194	11.8	2.8	26%
0	4,506	21.2	6.7	38%	796	12.1	3.0	25%	2,456	12.7	3.3	28%
1	4,167	15.7	3.9	31%	671	9.3	2.1	22%	2,145	10.2	2.3	25%
2	3,295	9.8	2.2	27%	598	7.6	1.6	21%	1,796	7.4	1.5	22%
3	2,810	8.3	1.8	25%	641	7.9	1.4	20%	1,678	7.3	1.5	23%
4	2,832	7.9	1.6	24%	632	6.9	1.1	17%	1,771	7.9	1.4	21%
5	2,819	8.7	1.7	23%	613	7.0	1.3	19%	1,842	7.8	1.4	20%
6	2,982	9.6	1.8	22%	635	7.8	1.3	18%	1,951	8.6	1.5	20%
7	3,144	9.8	1.7	21%	692	8.2	1.4	18%	2,052	8.9	1.5	19%
8	3,032	9.3	1.6	20%	601	7.2	1.2	19%	1,885	7.9	1.3	19%
9	2,649	8.2	1.4	21%	556	7.8	1.2	17%	1,611	7.3	1.2	19%
10	2,370	7.6	1.3	20%	560	8.3	1.2	17%	1,593	6.6	1.2	18%
11	2,461	7.4	1.2	20%	573	7.7	1.3	16%	1,683	7.2	1.2	17%
12	2,611	7.6	1.3	21%	589	7.4	1.2	18%	1,696	7.9	1.2	18%
13	2,735	8.8	1.5	19%	613	8.6	1.3	16%	1,774	8.4	1.3	17%

Table Notes: This table presents the means of discussion variables in the days surrounding the information releases made by the firm. The events examined are preliminary earnings announcements and filings of 10-K and 10-Q reports with the SEC. *Days* represent weekdays (not business days). *N* is the number of non-zero firm-day observations, i.e. firm-days where at least one message was posted, all metrics are averaged over non-zero message days only. *Total Messages* represent the total number of messages in the day (from 12:00AM EST to 11:59PM EST). *Accounting Messages* is the average number of messages classified as accounting-related (according to Appendix A) in the day. *% of Acc. Messages* is the number of accounting messages in the day divided by the number of total messages in the day.

Panel B: Average Discussion Activity in the Three Days around Form 8-K Events or Filings

	N	Total Messages	Accounting Messages	% of Acc. Messages
CONTROL: Neither 8-K (event or filing) or 10-Q filing or 10-K filing or Earnings Announcement	180,922	7.4	1.2	18%
1.01 Entry into a Material Definitive Agreement	12,548	12.1	2.2	21%
1.02 Termination of a Material Definitive Agreement	1,445	19.4	3.0	19%
1.03 Bankruptcy or Receivership	57	236.8	25.6	11%
2.01 Completion of Acquisition or Disposition of Assets	1,664	9.5	1.7	22%
2.02 Results of Operations and Financial Condition	25,049	11.7	3.1	30%
2.03 Creation of a Direct Financial Obligation or an Obligation under an Off-Balance Sheet…	3,561	7.8	1.6	22%
2.04 Accelerate/Increase a Direct Financial Obligation under an Off-Balance Sheet…	249	67.3	8.8	18%
2.05 Cost Associated with Exit or Disposal Activities	961	15.0	3.4	25%
2.06 Material Impairments	522	10.1	2.4	24%
3.01 Notice of Delisting or Failure to Satisfy a Continued Listing Rule or Standard; Transfer of Listing	1,448	20.5	3.1	22%
3.02 Unregistered Sales of Equity Securities	1,484	15.4	2.2	18%
3.03 Material Modifications to Rights of Security Holders	617	13.5	2.4	21%
4.01 Changes in Registrant's Certifying Accountant	409	10.7	2.2	24%
4.02 Non-Reliance on Previously Issued Financial Statements …	387	19.3	4.2	28%
5.01 Changes in Control of Registrant	72	6.7	1.4	19%
5.02 Departure of Directors or Principal Officers; Election of Directors…	21,333	9.7	1.8	21%
5.03 Amendments to Articles of Incorporation or Bylaws; Change in Fiscal Year	4,237	9.2	1.8	22%
5.04 Temporary Suspension of Trading Under Registrant's Employee Benefit Plans	160	12.4	2.7	19%
5.05 Amendments to the Registrant's Code of Ethics, or Waiver of a Provision of the Code of Ethics	235	11.5	2.3	23%
7.01 Regulation FD Disclosure	12,780	9.5	1.9	23%
8.01 Other Events	17,958	11.4	2.1	22%
9.01 Financial Statements and Exhibits	56,205	10.6	2.3	24%

Table Notes: This table presents the means of discussion variables in the days surrounding the events and filings dates of Form 8-K reports (three day window or window including at least one business day before and one business day after). *N* is the number of non-zero firm-day observations, i.e. firm-days where at least one message was posted, all metrics are averaged over non-zero message days only. *Total Messages* represent the total number of messages in the day (from 12:00AM EST to 11:59PM EST). *Accounting Messages* is the average number of messages classified as accounting-related (according to Appendix A) in the day. *% of Acc. Messages* is the number of accounting messages in the day divided by the number of total messages in the day.

Panel C: Event Study Regression

	Ln(Total Messages)				Ln(Accounting Messages)				% of Accounting Messages			
	[1]		[2]		[3]		[4]		[5]		[6]	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Intercept	1.302	160.2 ***	1.618	206.6 ***	-0.217	-58.6 ***	-0.279	-71.4 ***	0.184	80.6 ***	0.180	79.8 ***
10-K filing	0.015	0.6	0.003	0.1	0.015	1.5	0.011	0.9	-0.004	-0.6	-0.005	-0.7
10-Q filing	0.060	3.7 ***	0.000	0.0	0.042	5.9 ***	0.031	3.9 ***	0.021	4.8 ***	0.020	4.3 ***
Earnings Announcement	0.450	44.4 ***	0.276	25.6 ***	0.352	80.1 ***	0.337	69.3 ***	0.145	53.5 ***	0.151	53.8 ***
8-K event/filing (not EA)	0.157	23.0 ***	0.113	14.8 ***	0.031	10.6 ***	0.026	7.6 ***	0.013	7.3 ***	0.015	7.6 ***
S&P1500	-0.678	-134.9 ***	-0.767	-128.4 ***	0.058	25.5 ***	0.048	17.0 ***	0.032	22.7 ***	0.027	16.8 ***
Ln(Total Messages)					0.373	415.0 ***	0.380	359.0 ***	-0.010	-17.9 ***	-0.010	-16.3 ***
Turnover			0.013	86.0 ***			0.003	41.3 ***			0.000	1.4
Abs(Return)			3.766	35.5 ***			0.243	5.1 ***			-0.095	-3.4 ***
Monday - Saturday	*Yes*				*Yes*				*Yes*			
Monday - Thursday			*Yes*				*Yes*				*Yes*	
N	231,878		179,893		231,878		179,893		231,878		179,893	
Adj R-squared	10.7%		15.2%		46.4%		48.8%		1.7%		2.1%	

Table Notes: This table presents the results of the regressions that investigate the effects that information releases have on message board discussions between April 1, 2007 and March 31, 2008. Specifically the following model is used:

$$AccDiscVolume_{it} = \alpha + \beta_1 10K_{it} + \beta_2 10Q_{it} + \beta_3 EA_{it} + \beta_4 8K_{it} + \beta_5 SP1500_i + \beta_6 DiscVolume_{it} + \beta_7 Turnover_{it} + \beta_8 absRet_{it} + \sum_d \beta_d WeekDay_t$$

The dependent variable is in turn the natural logarithm of total messages posted during the day (columns 1 and 2), the natural logarithm of accounting messages (classified according to Appendix A) posted during the day (columns 3 and 4), and the percent of accounting messages out of total messages (columns 5 and 6). *10-K* (*10-Q*) is an indicator variable for the three days around the filing date of the 10-K (10-Q) report. Only reports made at least three days after the preliminary earnings announcement are included. *EA* is an indicator variable for the three days around the preliminary earnings announcement date. *8-K* is an indicator variable for the three days around the filing date or the event date of an 8-K report (not containing item 2.02 Results of Operations). All the windows around day zero includes at least one business days before and one business day after day zero. *S&P1500* is an indicator variable for firms in the S&P500, S&P MidCap 400 or S&P SmallCap 600 index. *Ln(Total Messages)* is the natural logarithm of total messages posted during the day. *Turnover* is daily share trading volume divided by total shares outstanding (both in millions). *Abs(Return)* is the absolute value of daily stock return. *Monday-Saturday* are indicator variables for day of the week (*Monday –Thursday* used for regression with CRSP data). Regressions are carried out on messages of firms which have at least one information event in the year (1,706 firms). All results are robust to use of the Huber/White Robust standard errors of estimates clustered at firm level. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively (two-tailed tests).

Table 3: Analysis of the Effect of Information Environment on Message Board Discussions

Panel A: Information Uncertainty

	Ln(Accounting Messages)						% of Accounting Messages					
	[1]		[2]		[3]		[4]		[5]		[6]	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Intercept	-1.586	-24.4 ***	-1.699	-21.1 ***	-1.623	-21.9 ***	0.125	9.81 ***	0.156	9.8 ***	0.162	11.1 ***
S&P1500	0.062	1.4	0.162	3.3 ***	0.154	3.2 ***	0.060	6.9 ***	0.051	5.3 ***	0.049	5.1 ***
Ln(Total Messages)	0.807	46.2 ***	0.831	45.0 ***	0.828	46.7 ***	-0.008	-2.2 **	-0.008	-2.1 **	-0.009	-2.7 ***
Inverse(Coverage)	0.048	4.2 ***	0.041	2.8 ***	0.039	2.8 ***	0.014	6.3 ***	0.011	3.8 ***	0.011	4.1 ***
Dispersion	0.014	1.4	0.008	0.7	0.009	0.8	0.007	3.9 ***	0.004	1.6	0.004	1.7 *
Turnover	0.046	4.4 ***	0.040	3.4 ***	0.041	3.8 ***	0.004	1.7 *	0.005	2.1 **	0.005	2.2 **
M-B			-0.018	-1.7 *	-0.018	-1.7 *			-0.007	-3.4 ***	-0.008	-3.7 ***
Spread			0.000	0.0					-0.002	-0.9		
Volatility			-0.003	-0.2					-0.004	-1.5		
Abs(Surprise)			0.012	0.9					0.000	0.2		
Inverse(Size)			0.009	0.6					0.005	1.5		
Inverse(Age)			0.017	1.7 *					0.003	1.2		
Uncertainty PC 1 (*from 5*)					0.029	1.5					0.000	0.1
N	1,611		1,595		1,595		1,611		1,595		1,595	
Adj R-squared	67.0%		67.9%		67.9%		6.4%		6.5%		6.4%	

Table Notes: This table presents the results of the regressions that investigate the effects that information uncertainty has on message board discussions. Specifically the main model used is: $AccDiscVolume_i = \alpha + \beta_1 AnalystCoverage_i + \beta_2 AnalystDispersion_i + \beta_3 Turnover_i + \beta_4 SP1500_i + \beta_5 DiscVolume_i$

The dependent variable is, in turn, the natural logarithm of accounting messages posted (classified according to Appendix A) (columns 1, 2, 3) and the percent of accounting messages out of total messages (columns 4, 5, 6). The daily measures of accounting activity are averaged for each firm over all non-zero message days (days with at least one message posted) over the period from April 1, 2007 through March 31, 2008. *S&P1500* is an indicator variable for firms in the S&P500, S&P MidCap 400 or S&P SmallCap 600 index. *Ln(Total Messages)* is the natural logarithm of total messages posted (averaged daily observations). *Inverse(Coverage)* is the inverse of average of quarterly average analyst coverage measures - calculated as the number of individual analysts issuing a forecast for the quarter from one day after the prior earning announcement to one day before the current one. *Dispersion* is the average of quarterly analyst dispersion measures – calculated as the standard deviation of quarterly analyst forecasts (latest forecast retained per analyst) issued from one day after the prior earning announcement to one day before the current one, scaled by the stock price at fiscal quarter end. Both coverage and dispersion measures are averaged over the quarters where earnings announcement was between April 1, 2007 and March 31, 2008. Turnover is the average of daily volume turnover (daily share trading volume divided by total shares outstanding) over the period of April 1, 2007 through March 31, 2008. *Market to Book Ratio* is the market value of equity (price per share at fiscal year end times total shares outstanding (in millions) divided by the book value of total shareholders' equity at fiscal year end (in $millions) where fiscal year end falls between April 1, 2007 and March 31, 2008. *Spread* is the average of daily absolute value of bid-ask spread divided by the closing stock price over the period of April 1, 2007 through March 31, 2008. *Volatility* is the standard deviation of weekly (Thursday through Wednesday) stock returns over the period of April 5, 2007 through March 26, 2008. *Abs(Surprise)* is the average of the quarterly absolute values of the surprise – calculated as the actual Earnings Per Share minus the average of individual analyst forecasts made in the period from one day after the prior earnings announcement to one day before the current one (latest forecast retained per analyst) scaled by the stock price at fiscal quarter end. *Inverse(Size)* is the inverse of natural logarithm of market value of equity - the price per share at fiscal year end times total shares outstanding (in millions) at fiscal year end which falls between April 1, 2007 and March 31, 2008. *Inverse (Age)* is the inverse of the natural logarithm of the number of years since the firm's first observation in CRSP. All the uncertainty variables are in quintile ranks with 0 representing the lowest uncertainty and 4 representing the highest uncertainty. *Uncertainty PC 1 (from 5)* is the first principal component from the principal component analysis of bid-ask spread, return volatility, abs(Surprise), inverse(Size) and inverse(Age). *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively (two-tailed tests).

Panel B: Financial Reporting Quality

	Ln(Accounting Messages)				% Accounting Messages			
	[1]		[2]		[3]		[4]	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Intercept	-1.485	-20.0 ***	-1.721	-17.7 ***	0.194	13.5 ***	0.137	7.3 ***
S&P1500	0.064	1.1	0.105	1.7 *	0.032	2.9 ***	0.046	3.8 ***
Ln(Total Messages)	0.805	41.2 ***	0.808	38.2 ***	-0.018	-4.7 ***	-0.015	-3.7 ***
AccrualsQuality	-0.018	-1.6	-0.011	-1.0	-0.003	-1.2	-0.002	-0.8
Persistence	0.025	2.1 **	0.024	2.1 **	0.002	0.8	0.002	0.7
Relevance	-0.004	-0.3	-0.006	-0.5	0.000	0.2	-0.001	-0.3
Readability	0.031	2.8 ***	0.026	2.3 **	0.003	1.6	0.003	1.4
Inverse(Coverage)			0.053	3.8 ***			0.016	5.8 ***
Dispersion			-0.003	-0.2			0.003	1.1
Turnover			0.055	4.3 ***			0.006	2.4 **
N	1,077		1,047		1,077		1,047	
Adj R-squared	65.6%		66.2%		3.8%		6.3%	

Table Notes: This table presents the results of the regressions that investigate the effects that financial reporting quality has on message board discussions. Specifically the main model used is:

$$AccDiscVolume_i = \alpha + \beta_1 AccrualsQuality_i + \beta_2 Persistance_i + \beta_3 Relevance_i + \beta_4 Readability_i + \beta_5 SP1500_i + \beta_6 DiscVolume_i$$

The dependent variable is, in turn, the natural logarithm of accounting messages posted (classified according to Appendix A) (columns 1 and 2) and the percent of accounting messages out of total messages (columns 3 and 4). The daily measures of accounting activity are averaged for each firm over all non-zero message days (days with at least one message posted) over the period from April 1, 2007 through March 31, 2008. *S&P1500* is an indicator variable for firms in the S&P500, S&P MidCap 400 or S&P SmallCap 600 index. *Ln(Total Messages)* is the natural logarithm of total messages posted (averaged daily observations). *Accruals Quality* is the inverse of the standard deviation from a regression of total current accruals on past, present and future cash flows (measurement detail in Appendix C). *Relevance* is the adjusted R-squared from a regression of price per share on earnings per share and book value per share (measurement detail in Appendix C). *Persistence* is the coefficient from an autoregressive(1) model of earnings per share (measurement detail in Appendix C). *Readability* is a measure capturing the extent of "Plain English" language in the 10-K report (measurement detail in Appendix C). *Inverse(Coverage)* is the inverse of average of quarterly average analyst coverage measures - calculated as the number of individual analysts issuing a forecast for the quarter from one day after the prior earning announcement to one day before the current one. *Dispersion* is the average of quarterly analyst dispersion measures – calculated as the standard deviation of quarterly analyst forecasts (latest forecast retained per analyst) issued from one day after the prior earning announcement to one day before the current one, scaled by the stock price at fiscal quarter end. Both coverage and dispersion measures are averaged over the quarters where earnings announcement was between April 1, 2007 and March 31, 2008. *Turnover* is the average of daily volume turnover (daily share trading volume divided by total shares outstanding) over the period of April 1, 2007 through March 31, 2008. All financial reporting quality and uncertainty variables are in quintile ranks with 0 representing the lowest quality/uncertainty and 4 representing the highest quality/uncertainty. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively (two-tailed tests).

Table 4: Message Board Discussions and the Change in Information Asymmetry

	Change in Spread	
	Coeff.	t-value
Intercept	0.0016	10.4 ***
Abn(Avg % of Accounting Messages)	-0.00003	-3.8 ***
Abn(Avg Ln Total Messages)	0.00000	0.4
S&P1500	-0.0005	-5.8 ***
Size	-0.0001	-4.8 ***
Abs(Surprise)	0.0020	15.0 ***
ROA	-0.0043	-7.3 ***
N	2,942	
Adj R-squared	16.0%	

Table Notes: This table presents the results of the regressions that investigate the effects that financial accounting-related message board discussion has on information asymmetry. Specifically the main model used is: $changeSpread_{EAit} = \alpha + \beta_1 AbnAccDiscVolume_{EAit} + \beta_2 AbnDiscVolume_{EAit} + \beta_3 SP1500_i + \beta_4 Size_{it} + \beta_5 absSurprise_{it} + \beta_6 ROA_{it}$ The dependent variable is the change in spread calculated as the average of the daily absolute value of the bid-ask spread divided by the closing stock price in the period (+2,+30) days after the preliminary earnings announcement minus the average of the daily absolute value of the bid-ask spread divided by the closing stock price in the period (-30,-2) days before the preliminary earnings announcement. *Abn(Avg % of Accounting Messages)* is the abnormal average daily percent of accounting messages. It is calculated as the average daily percent of accounting messages (classified according to Appendix A) over the three days around the preliminary earnings announcement minus the average daily percent of accounting messages in the control period of thirty through two days before the earnings announcement. *Abn(Avg Ln Total Messages)* is the abnormal average daily number of total messages. It is calculated as the average of the natural logarithm of total daily messages over the three days around the preliminary earnings announcement minus the average of the natural logarithm of total daily messages in the control period of thirty through two days before the earnings announcement. *S&P1500* is an indicator variable for firms in the S&P500, S&P MidCap 400 or S&P SmallCap 600 index. *Size* is the natural logarithm of the market value of equity (price multiplied by total shares outstanding) at the fiscal quarter end. *Abs(Surprise)* is the absolute value of the difference between actual reported Earnings Per Share and the median analyst consensus forecast (last available consensus from the I/B/E/S Summary file before the earnings announcement date) scaled by the stock price at fiscal quarter end. *ROA* is the income before extraordinary items divided by the total assets. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively (two-tailed tests).

Table 5: Message Board Discussions and the Post Earnings Announcement Drift

	Abnormal Return [1]		Abnormal Return [2]	
	Coeff.	t-value	Coeff.	t-value
Intercept	-0.025	-1.68 *	-0.034	-2.13 **
Surprise	0.289	2.61 ***	0.277	2.47 **
Abn(Avg % of Accounting Messages)	0.001	0.65	0.001	0.79
Surprise x Abn(Avg % of Accounting Messages)	-0.125	-2.32 **	-0.135	-1.91 *
Abn(Avg Ln Total Messages)			0.003	2.39 **
Surprise x Abn(Avg Ln Total Messages)			0.019	0.28
S&P1500	0.038	4.27 ***	0.035	3.77 ***
Size	-0.0001	-0.04	0.000	0.20
N	3,980		3,767	
Adj R-squared	0.6%		0.7%	

Table Notes: This table presents the results of the regressions that investigate the effects that financial accounting-related message board discussion has on the post earnings announcement drift. Specifically the main model used is:

$$AbnReturn_{it} = \alpha + \beta_1 Surprise_{it} + \beta_2 AbnAccDiscVolume_{EAit} + \beta_3 Surprise \times AbnAccDiscVolume_{EAit}$$
$$+\beta_4 AbnDiscVolume_{EAit} + \beta_5 Surprise \times AbnAccDiscVolume_{EAit} + \beta_6 SP1500_i + \beta_7 Size_i$$

The dependent variable is buy and hold returns of the stock from two days after the earnings announcement through one day after the subsequent earnings announcement minus the buy and hold return of the appropriate portfolio matched by size and book to market of the Fama-French six portfolios. *Surprise* is the actual Earnings Per Share minus the average of individual analyst forecasts made in the period from one day after the prior earnings announcement to one day before the current one (latest forecast retained per analyst) scaled by the stock price at fiscal quarter end. *Abn(Avg % of Accounting Messages)* is the abnormal average daily percent of accounting messages. It is calculated as the average daily percent of accounting messages (classified according to Appendix A) over the three days around the preliminary earnings announcement minus the average daily percent of accounting messages in the control period of thirty through two days before the earnings announcement. *Abn(Avg Ln Total Messages)* is the abnormal average daily number of total messages. It is calculated as the average of the natural logarithm of total daily messages over the three days around the preliminary earnings announcement minus the average of the natural logarithm of total daily messages in the control period of thirty through two days before the earnings announcement. *S&P1500* is an indicator variable for firms in the S&P500, S&P MidCap 400 or S&P SmallCap 600 index. *Size* is the natural logarithm of the market value of equity (price multiplied by total shares outstanding) at the fiscal quarter end. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively (two-tailed tests).