The Informativeness of Stale Financial Disclosures

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ABSTRACT:

Investors have at their fingertips an almost unlimited supply of financial disclosures. Some of these disclosures are recently released, but most have been in the public domain for months or even years. In this study, we evaluate whether such "stale" disclosures continue to be informative to investors. Using a novel dataset that tracks search requests on the SEC EDGAR database, we find evidence that the acquisition of stale disclosures from EDGAR is positively associated with absolute returns and trading volume within the next two hours. We investigate several potential explanations for why investors might find previously released disclosures informative and we find evidence consistent with two explanations: first, investors appear to request stale information to provide context for new information releases; second, investors appear to request stale information to resolve cases of high prior information uncertainty. In addition, we do not find evidence that the relation between requests for stale disclosures and market activity is driven by unsophisticated investors. Our results highlight the value of historical disclosures and their archives to equity markets.

1. Introduction

Decades of capital market research in accounting provide compelling evidence that the release of financial information triggers increased market activity.[1] The financial market reactions to corporate events such as earnings announcements are consistent with semi-strong-form market efficiency, which holds that competitive forces quickly drive gains to new information to zero, subject to the costs of acquiring and processing it (Ball [2009]). Thus, once stock prices reach a competitive equilibrium with respect to news (i.e., the marginal benefits of exploiting the public information equal the marginal costs of exploiting it), the new information is rendered "stale." However, regulators spend considerable resources to make old financial disclosures publicly available and investors appear to reference these disclosures frequently (Drake et al. [2012b]).

The objectives of this paper are twofold. First, we evaluate whether financial disclosures that have been in the public domain for a period of time, labeled "stale" disclosures, remain informative to investors.[2] Second, we investigate three potential reasons for these disclosures to remain informative. The first explanation is that rational investors can use old information to provide important context for new information releases and current events. For example, investors may turn to previously filed 10-Ks to assess how managers' previous discussions of firm strategic initiatives played out in current periods. The second explanation is that there exists uncertainty about previously filed disclosures that is resolved when new information is

[1] For example, important corporate disclosures such as earnings releases (Beaver [1968]), SEC filings (Griffin [2003], Li and Ramesh [2009]), management forecasts (Foster [1973], Patell [1976]) and restatement announcements (Palmrose et al. [2004]) are all associated with short-window stock market activity.

[2] We use the label "stale" because it is commonly used in the literature to describe information that has been in public domain for a period of time and thus, in theory, should already be reflected in securities prices. For examples see, Barberis et al. [1998], Tetlock [2011] , and Gilbert et al. [2012]. Throughout the paper, we use the terms "stale," "old," "previously filed," and "historical" interchangeably.

released (Francis, et al. [2007]). That is, traders learn more slowly when considering a noisy information signal, and thus continue to access prior information to learn about that signal (Vives [2008]). The third explanation is that unsophisticated investors acquire and trade on stale information because they are "late to the game", i.e., they access information in an untimely manner and fail to realize that the information is no longer value-relevant. We further develop these arguments in Section 2.

The notion that stale financial disclosures remain informative has been relatively unexplored in accounting research. A potential reason for this gap in the literature is that it is difficult to measure the timing of investors' acquisition of stale information. The market's acquisition and use of *new* financial information is relatively straight-forward to measure using standard event study methodologies: new information arrives to the market through an information release event and we measure investors' reaction during the event period. The assumption here is that once information is made publicly available, it is quickly acquired, processed, and used by investors to reallocate capital. However, outside the event window, it is very difficult to tie the actions of investors to information that was previously disclosed.

We overcome this measurement problem using a novel dataset that tracks all investor requests for disclosures on the SEC's EDGAR database. Our proxy for stale information acquisition is the number of investor requests for disclosures that have been publicly available on EDGAR for at least 30 days at the time of the request. The dataset records every "click" made by an investor to request a regulated filing, such as a 10-K or 8-K, from EDGAR and thereby provides a direct proxy for investor information acquisition. As a result, these data allow us to empirically observe the acquisition of previously disclosed financial information without

relying on assumptions of horizons or information arrival, as required in an event study. Our assumption is that if a user requests a particular company's disclosure, it is highly likely that this user is interested in the information contained within the filing about the company; in other words, they find the disclosure to be informative.[3]

To test the informativeness of stale disclosures, we examine the association between investor requests for these disclosures from EDGAR and subsequent short-term market activity, measured as absolute returns and trading volume. To strengthen the causal link between these two measures, we conduct our analysis at the intraday level using hourly requests for disclosures on EDGAR and hourly aggregations of equity market data from the Trade and Quote (TAQ) database. We interpret stale disclosures to be informative if requests for stale disclosures are positively associated with subsequent short-term trading activity.

We find that requests for stale disclosures are positively associated with absolute returns and total trading volume in the subsequent two hours. This result holds after controlling for requests for contemporaneous information from EDGAR, contemporaneous and lagged market activity, firm size, and the inclusion of hour-of-day fixed effects. When we focus on requests for periodic *accounting* filings (10-Ks and 10-Qs), our results are uniformly stronger than results for all disclosures, underscoring the importance of historical, periodic accounting reports to equity markets. Overall, our evidence is consistent with the notion that stale accounting information is informative to equity markets.

We test three potential reasons *why* stale financial disclosures are informative. First, we investigate whether the informativeness of stale information derives from the context it

[3] As we discuss in further detail below, we find that users commonly request filings that have been available on EDGAR for more than 30 days, i.e., they express a demand for stale information.

provides to current events. We test this notion by examining whether the observed positive association between requests for stale disclosures and subsequent market activity is particularly strong (more positive) in the presence of an important current event: the earnings announcement. We identify the exact time of the earnings announcement and find that the positive associations between requests for stale disclosures and market activity are indeed stronger during the eleven hour period (five hours before and after) around the earnings release. Thus, the evidence suggests that earnings announcements trigger investors to acquire previously filed financial information to help them assess the implications of current earnings. In follow-up analyses, we find that the positive association between requests for stale disclosures and market activity are also stronger when there are more requests for contemporaneous disclosures. This provides additional evidence that stale financial information is most useful to equity markets when used together with contemporaneous events.

A second potential reason why stale financial disclosures could be informative to markets relates to information uncertainty. The idea (following in the spirit of Brav and Heaton [2002] and Francis et al. [2007]) is that a noisy information signal is associated with investor uncertainty about the signal's value-relevance for investment payoffs; given this uncertainty, investors require more time to process and contextualize the information. Thus we examine whether the relation between requests for stale disclosures and subsequent market activity is stronger when there is more uncertainty about the firm. We measure uncertainty using the "information uncertainty" measure from Francis et al. [2007] and find that the associations between requests for stale disclosures and market activity are increasing in information

uncertainty and that this association is stronger when the requests are for periodic accounting reports.

Finally, the relation between stale disclosures and subsequent market activity could be explained by unsophisticated investors who request and trade on the information for irrational reasons. We follow prior research in assuming that sophisticated traders initiate larger trades (e.g., Frankel et al. [1999]). Thus, if unsophisticated investors are trading on stale information, we expect that stale information acquisition will be associated with smaller trade sizes on average. However, we find that requests for stale disclosures are *positively* associated with the mean dollar value of individual trades in the subsequent two hours. Thus, the evidence does not support the hypothesis that demand for stale disclosures is driven by smaller, unsophisticated investors.[4]

This study investigates an old question (whether disclosures are informative) in a new setting. We augment prior tests of efficient market reactions to financial disclosures with data that allow us to observe how long the market has had to incorporate the information in disclosures. The evidence in this paper is consistent with the idea that the incorporation of information into asset prices requires both time and effort by investors. Our evidence supports investor rationality in that investors appear to use old disclosures in trading when old disclosures provide context for current disclosures or when there is greater information uncertainty.

[4] We acknowledge that trade size is a noisy proxy for investor sophistication because large investors often break up their trades to reduce their impact on prices (Chakravarty [2001]). On the other hand, large trades are not likely to be executed by small investors. Thus, we interpret the evidence as rejecting the notion that small traders drive the relation between stale information acquisition and trading activity, rather than accepting the notion that large traders drive this relation.

Our study contributes to the emerging literature that investigates whether stale or redundant news is informative to markets (e.g., Gilbert et al. [2012], Tetlock [2011]). Tetlock [2011] finds evidence consistent with individual investors trading on stale news, defined in his paper as the similarity of a current news article to past news articles. Our results complement those in Tetlock [2011] by using a different measure of staleness combined with different measures of information acquisition and investor sophistication. In contrast to Gilbert et al. [2012] and Tetlock [2011] who examine reactions to the release of stale information (i.e., supply), we examine reactions to *actual investor requests* for stale information (i.e., demand). In contrast to the evidence in those studies, our evidence does not support the conclusion that unsophisticated investors are driving the relation between historical information acquisition and trading activities. Moreover, we extend the literature by analyzing the settings in which stale information is particularly informative to equity markets.

Our paper also provides new evidence on the informativeness of accounting information. The concept of the usefulness of earnings dates back to landmark papers in the 1960s, such as Beaver [1968] and Ball and Brown [1968]. However, evidence on the information content of earnings news is largely based on the relation between earnings and returns, which Lev [1989] notes is often negligible and is unstable over time. As a result, much of the research on the earnings-return relation can say little about the utility and social usefulness of accounting (Lev [1989]). To improve our understanding of the concept of accounting usefulness, Lev calls for research on "the actual use of reported data by investors [to understand] the process of financial statement analysis" (p. 155). His call has largely gone unanswered. Our study answers this call by providing evidence that investors use historical financial reports in trading

and that historical financial important have higher informativeness around current events (i.e., earnings announcements) and when there is greater information uncertainty.

2. The Informativeness of Stale Information

A fundamental step in assessing the informativeness of a disclosure is to test whether investors acquire and use the information contained in that disclosure. Research in accounting and finance has long been interested in understanding the role that information acquisition plays in the price discovery process, but has been hampered by the lack of an available proxy for information acquisition. One line of research uses variation in broad firm characteristics such as firm size, analyst following, or institutional ownership to proxy for variation in incentives to acquire information about a particular firm (e.g., Atiase [1985], Dempsey [1989], El-Gazzar [1998]). More recent research has begun to examine whether information acquisition can be inferred using different channels of information dissemination, including conference calls (Frankel et al. [1999], investor conferences (Bushee et al. [2011]), the internet (Drake et al. [2012a], Gao et al. [2001]), and the media (Soltes [2009], Bushee et al. [2010], Engelberg and Parsons [2011], Busse and Green [2002]).

These papers *infer* information acquisition (and thereby informativeness) by examining how disclosure events are associated with differential trading activities by investors before, during and after the event. For example, Frankel et al. [1999] find that capital market activity, such as absolute returns and trading volume, is higher for all measures during conference calls than during the control period. Bushee et al. [2011] find significant short window increases in stock returns and trading volume during managerial presentation at conferences. Drake et al.

[2012a] show that daily Google search volume is associated with the market pricing of earnings while Gao et al. [2011] and Da et al. [2011] associate daily (weekly) Google search volume with daily (weekly) trading volume. Busse and Green [2002] and Engelberg et al. [2012] show that information is acquired through media television programs by showing increases in market activity during and after a stock is mentioned on the shows. Thus, the general evidence using these proxies for information acquisition is that when contemporaneous information is acquired by investors, it leads to increases in trading activities, which suggests that these events are informative to investors.

Using a more direct measure of information acquisition, our objective is to assess the informativeness of stale information. However, there are several reasons why one would not expect previously filed financial disclosures to be informative to markets. Given the volumes of macro-, industry-, and firm-specific information available on a more timely basis through analysts, the business press, and the internet, some argue that financial information filed with the SEC is "old news" upon arrival to the market (Collins et al [1994]); Ball and Shivakumar [2008]). Furthermore, the semi-strong form of the efficient markets hypothesis predicts that the information in disclosures that have been in the public domain for a period of time should be fully reflected in stock prices. This conjecture holds especially true for disclosures that are costless to obtain and widely-disseminated, as is the case for many of the disclosures available on EDGAR. The preeminence of the efficient market hypothesis has waned in recent years with widespread evidence of market anomalies (e.g., Fama and French [2008]) and theories to explain those anomalies, such as the Incomplete Revelations Hypothesis (Bloomfield [2002]) and the Limited Attention Hypothesis (Hirshleifer and Teoh [2003]). However, academics

continue to argue that it is still generally descriptive of how financial markets react to the public release of information (e.g., Ball [2009], Malkiel [2003]). This discussion provides the basis for our first hypothesis, stated in the null:

H1: The acquisition of stale information is not associated with subsequent market activity.

If we find evidence rejecting *H1*, the important follow-up question is *why* previously disclosed financial information is associated with market activity. A rational explanation for the informativeness of stale disclosures follows from the standard approach to fundamental analysis, which calls for the use of historical information in estimating firms' intrinsic values. A number of studies find that historical information is predictive of future returns (e.g., Ou and Penman [1989], Abarbanell and Bushee [1998], Piotroski [2000]). Newly disclosed information generally requires comparison with previously disclosed information; i.e., the older information contextualizes the new information and provides expectations against which the new information can be measured. Thus, new disclosures may contain information that cannot be fully exploited unless it is analyzed in connection with information provided in previously filed disclosures. Similarly, information may exist in old disclosures that cannot be fully exploited until subsequent disclosures are made. Thus, current disclosures may trigger demand for stale disclosures as investors seek context. This discussion leads to our second hypothesis, stated in the alternative:

H2: The association between stale information acquisition and market activity is positively influenced by contemporaneous information releases and contemporary information acquisition.

Another rational explanation for the informativeness of stale disclosures is that there is high uncertainty about the valuation implications of the disclosures. When there is greater

uncertainty about valuation, the market can rationally under-react to new information as it arrives.[5] Consistent with this argument, prior research finds evidence of lower market reactions to earnings announcements when earnings quality is lower (Francis et al. [2007]) or when earnings credibility is lower (Teoh and Wong [1993]). Thus, we conjecture that a stale disclosure acquired by an investor is more likely to be informative when there is high prior uncertainty about a firm's information disclosures. This leads to our third hypothesis, stated in the alternative:

> *H3: The association between stale information acquisition and market activity is positively influenced by information uncertainty.*

Our final explanation for the informativeness of stale disclosures is that unsophisticated investors are trading on the information. Researchers have posited that a subset of unsophisticated investors are likely to be those that use stale information, either because these investors are (i) slow to acquire and process disclosures, (ii) exhibit cognitive biases (Dietrich et al. [2001]), or (iii) do not recognize when disclosures have become stale (Gilbert et al. [2012]). For example, Hand [1990] and Huberman and Regev [2001] provide examples of (presumably unsophisticated) investors underreacting to an important news announcement, and subsequently overreacting when the news announcement was re-released. Similarly, Gilbert et al [2012] and Tetlock [2011] provide evidence that investor inattention is linked to trading on stale information, which leads to subsequent mispricing. This leads to our final hypothesis, stated in the alternative:

[5] Bloomfield [2002] refers to "extraction costs", i.e., the costs of "…identifying, collecting, compiling, printing and processing data…" along with the "…cognitive difficulty of extracting information from data that has already been identified and collected" (p. 236). Information with high extraction costs is reflected in price slowly, i.e., investors underreact to this information. Logically, information with uncertain valuation implications has higher extraction costs.

H4: Stale information acquisition is negatively associated with the average trade size.

We now turn to discussion of our unique dataset and how we use this dataset to test the hypotheses above.

3. Data and Research Design

3.1 Data and Sample

The primary data used in this study capture investor information acquisition of stale and current disclosures stored on the SEC EDGAR servers. As these data are described in detail in Drake et al. [2012b], here we provide only a brief description of the data and we refer the reader to that study for more details. The SEC maintains server logs that record every request for financial disclosures hosted on the EDGAR servers. Through the assistance of the SEC's division of Risk, Strategy & Financial Innovation, we obtained the server log for the period beginning December 24, 2007 and ending July 6, 2008. Each entry in the server log allows us to observe the partial IP address of the user, the date and time of the request, the Central Index Key (CIK) of the company that filed the requested form, and a link to the particular filing.[6] We use these data as a direct measure of financial information acquisition.

The data are subject to some caveats. First, we emphasize that our data on investor requests for filings in EDGAR represents a lower bound of total information acquisition of SEC filings. Many SEC filings are freely available to investors on company investor relations websites, financial websites (e.g., Yahoo! Finance), and brokerage websites. In addition,

[6] Consistent with Drake et al. [2012b], we focus our analyses of requests made by investors, rather than those made by automated webcrawlers. We identify investor requests as coming from any IP address that makes no more than 5 requests per minute during a given 1 minute period of time. Also consistent with Drake et al. [2012b], we remove server log entries that reference an "index" or that reference a request for an image.

institutional investors can directly access SEC filings from commercial data aggregators such as Bloomberg, Capital IQ, or Morningstar Document Research. Institutions can also directly subscribe to the filings through the Public Dissemination Service.[7] Second, our sample period is limited to six months of data; thus, to the extent that information acquisition via EDGAR during this period is systematically different, our results may not generalize.

On the other hand, the EDGAR data provide several key advantages, as described in Drake et al [2012b]. Foremost, it reflects actual information acquisition of mandatory filings by interested parties. That is, it reflects *actions* undertaken by individuals to acquire mandatory disclosures. Secondly, it reflects investor *choice*—given the myriad of financial disclosures at their fingertips, the EDGAR request data allow us to identify the specific piece of information (i.e., the actual filing) that the user chooses to download. Finally, the data come directly from the primary source of regulatory disclosure—the SEC. In summary, these data provide a powerful tool that we deploy to help us understand investors' use of stale financial information and whether that use increases subsequent trading activity.

The EDGAR server log allows us to observe the precise time when any disclosure is acquired by an investor. This level of detail enables us to conduct our analyses at the intra-day level, which allows us to approximate a causal link between the acquisition of stale information in a given hour and market activity in the subsequent hours. We obtain intra-day data on trading activity from the TAQ (Trade and Quote) database available on WRDS. Due to the extreme computational demands involved in analyzing intra-day trading and intra-day EDGAR

[7] See the following website for more details on the Public Dissemination Service: http://www.sec.gov/info/edgar/ednews/dissemin.htm

server log data, we use a random sample of 200 firms with data available from TAQ and our EDGAR dataset over the January 1, 2008 through June 30, 2008 time period.

In Table 1, Panel A we present descriptive statistics (means and medians) of selected firm characteristics for our random sample of 200 firms and for all firms with available data in the intersection of the COMPUSTAT and CRSP database. We assess the representativeness of our random sample by testing for statistical differences between the means and medians of each firm characteristic, which we define in Appendix A. As reported in Table 1, Panel A we find the *Market Value of Equity*, *Total Assets*, *Book-to-Market*, *Return-on-Assets*, *Leverage, Analyst Following*¸ and *Institutional Ownership* for the random sample are statistically indistinguishable from the universe of firms with available data. In Table 1, Panel B we compare the distribution of the randomly selected firms across industries (Fama-French Classification 17) to that of the universe of firms with available data and again find that the industry distributions are very similar. Overall, we conclude from the results in Table 1 that our random sample of 200 firms is representative of the population of available firms in Compustat and CRSP.

3.2 Variables and Empirical Models

To measure the timing of investor requests, we divide each day into 24 one-hour periods. Our primary measure of information acquisition of a disclosure is the count of investor requests made for a firm's disclosures in a particular hour. To separate information acquisition for stale disclosures from that for contemporaneous disclosures, we sum all investor requests for disclosures on EDGAR for each one-hour period in the day separately for disclosures that are publicly available for greater than or equal to 30 days (*StaleDisc*) and less than 30 days

(*RecentDisc*).[8] These two variables are the explanatory variables of interest in the study. The choice of a 30-day threshold is arbitrary; we chose that threshold under the assumption that a month in the public domain is sufficient time for a disclosure to become stale.[9] Our predictions of informativeness rely on increased market activity following disclosure requests in EDGAR. We employ two measures of market activity as dependent variables: the absolute value of the raw stock return during the hour (*AbsRet*) and the total dollar value of trading volume during the period (*Volume*).[10] If no trades are recorded during the hour, these values are set to zero.

One potential concern is that requests for stale disclosures may be motivated by past market activity in the stock. Trading volume, for example, is often used as a proxy for "attention-grabbing" activity that focuses investors on a stock (Gervais et al. [2001], Barber and Odean [2008]). Such relations can cause a spurious relation between disclosure requests and future market activity. Thus, we control for market activity that is contemporaneous with the search activity by including as control variables two hourly lags of the dependent variable, two hourly lags of absolute returns, and the prior day's absolute return and share turnover. We also control for requests for recent disclosures (those filed within the past 30 days) in EDGAR because investor requests for stale and contemporaneous information are likely to be correlated; excluding the requests for recent disclosures would induce a correlated omitted variable problem. We also control for the decile rank of the market value of equity (*RankMVE*). We

[8] In raw form, *StaleDisc* and *RecentDisc* are highly skewed; thus, we use the natural log of one plus the raw value of these variables in our tests. Our results, however, are robust to using the raw values.
[9] In section 5, we provide evidence that the results are robust to different thresholds.
[10] We use the absolute value of returns rather than the signed return because we do not have signed predictions. That is, we do not evaluate the market reaction to a news release (which could contain either positive or negative news), but rather evaluate whether, on the average day, the amount of requests for stale disclosures is associated with increased market activity.

include this control because firm size is correlated with both market activity (returns and volume) and with information acquisition (Drake et al. [2012b]).

Given that investor disclosure requests on EDGAR are made throughout the day, but TAQ only records trades from 4am through 8pm (EST) each day the market is open, we construct indicator variables for times when the market is closed: *Morning* is set to one from midnight to 4am and to zero otherwise; *Evening* is set to one from 8pm to midnight and to zero otherwise; and *Weekend* is set to one during the weekend and on holidays, and to zero otherwise. In estimating the empirical models, these indicator variables are interacted with both the requests for stale disclosures (*StaleDisc*) and the requests for recent disclosures (*RecentDisc*). Finally, we include hour-of-day fixed effects and we cluster the standard errors by day to control for cross-sectional residual correlation.[11]

We estimate the following general model for all firms *i* (subscripts omitted) and hours *t*:

$$\textit{Market Activity}_t = f(\textit{StaleDisc}_{t-1}, \textit{StaleDisc}_{t-2}, \textit{RecentDisc}_{t-1}, \textit{RecentDisc}_{t-2}, \textit{Market Activity}_{t-1}, \textit{Market Activity}_{t-2}, \textit{AbsRet}_{t-1}, \textit{AbsRet}_{t-2}, \textit{RankMVE}, \textit{PriorDay\_AbsRet}, \textit{PriorDay\_Turnover}, \textit{Controls for Market Closed}, \textit{Hour Fixed Effects}) \quad (1)$$

where,

Market Activity = one of two dependent variables: *AbsRet* or *Volume* as defined above;

Controls for Market Closed = set of control variables which includes the *Morning*, *Evening*, and *Weekend* indicator variables defined above, as well as the interaction of each of these indicator variables with $\textit{StaleDisc}_{t-1}$, $\textit{StaleDisc}_{t-2}$, $\textit{RecentDisc}_{t-1}$, and $\textit{RecentDisc}_{t-2}$;

all other variables are defined above.

[11] We have also run the models excluding relatively time-invariant variables (such as firm size) and instead including firm fixed effects. All results are insensitive to this design choice.

H1 predicts that the acquisition of stale information should not be associated with trading activity. The coefficients on $StaleDisc_{t-1}$ and $StaleDisc_{t-2}$ are the test variables for *H1* in estimations of model (1). A significantly positive coefficient on those variables is consistent with investor acquisition of stale disclosures leading to significant capital market activity, which rejects *H1*.

All subsequent analyses are tests for potential reasons why *H1* might be rejected. We test *H2,* which posits that the relation between stale information acquisition and market activity is positively influenced by contemporaneous information releases and acquisition. We test *H2* using two sets of analyses. First, we obtain the hour and date of any quarterly earnings announcement issued by our sample firms during the sample period from the IBES time stamp. We employ a very short window (11 hours) to increase the likelihood that the EDGAR filing request is motivated by the earnings announcement and not by other factors. Thus, we construct an indicator variable (*EarnAnnHour(-5,5)*) set equal to one for the 11-hour period centered on the earnings announcement hour and to zero otherwise. We then include this variable in model (1) and interact it with the EDGAR request variables as a tests of *H2*. We also interact *RankMVE* with both EDGAR request variables in the model to ensure that the earnings announcement indicator variable is not contaminated with a size effect.[12] The model is as follows:

$$Market\ Activity_t = f(StaleDisc_{t-1}, StaleDisc_{t-2}, RecentDisc_{t-1}, RecentDisc_{t-2}, EarnAnnHour(-5,5),$$

[12] In all models that include interactions, we also interact *RankMVE* with the EDGAR variables (*RecentDisc* and *StaleDisc*). As noted in Drake et al [2012b], the amount of EDGAR requests is strongly linked to firm size; in addition, our market variables (especially trading volume) are also strongly linked to firm size. Hence, the choice to interact the primary variables with firm size is important to mitigate the joint effect of firm size on both the dependent and independent variables. Excluding the interaction from the models would result in an omitted correlated variable problem that would bias our main coefficients and thus influence the interpretation of our results.

StaleDisc$_{t-1}$ x EarnAnnHour(-5,5), StaleDisc$_{t-2}$ x EarnAnnHour(-5,5), RecentDisc$_{t-1}$ x EarnAnnHour(-5,5), RecentDisc$_{t-2}$ x EarnAnnHour(-5,5), RankMVE, StaleDisc$_{t-1}$ x RankMVE, StaleDisc$_{t-2}$ x RankMVE, RecentDisc$_{t-1}$ x RankMVE, RecentDisc$_{t-2}$ x RankMVE, Market Activity$_{t-1}$, , Market Activity$_{t-2}$, AbsRet$_{t-1}$, AbsRet$_{t-2}$, PriorDay_AbsRet, PriorDay_Turnover, Controls for Market Closed, Hour Fixed Effects) (2)

where all variables are defined above. A significantly positive coefficient on the *StaleDisc x EarnAnnHour(-5,5)* supports *H2* and indicates that the association between requests for stale disclosures and market activity is stronger when there is a current information release.

In our second test of *H2*, we examine whether the association between investor acquisition of stale disclosures and subsequent market activity is influenced by investor EDGAR requests for current financial disclosures. We test this conjecture by interacting the two EDGAR request variables for each one hour time period (*StaleDisc x RecentDisc)* and by entering these interactions into model (1). Given that investors disclosure requests are highly positively correlated with firm size (Drake et al [2012b]), we also interact *RankMVE* with both EDGAR request variables in the model as well. Our third model is as follows:

Market Activity$_t$ = f (StaleDisc$_{t-1}$, StaleDisc$_{t-2}$, RecentDisc$_{t-1}$, RecentDisc$_{t-2}$, StaleDisc$_{t-1}$ x RecentDisc$_{t-1}$, StaleDisc$_{t-2}$ x RecentDisc$_{t-2}$, RankMVE, StaleDisc$_{t-1}$ x RankMVE, StaleDisc$_{t-2}$ x RankMVE, RecentDisc$_{t-1}$ x RankMVE, RecentDisc$_{t-2}$ x RankMVE, Market Activity$_{t-1}$, Market Activity$_{t-2}$, AbsRet$_{t-1}$, AbsRet$_{t-2}$, PriorDay_AbsRet, PriorDay_Turnover, Controls for Market Closed, Hour Fixed Effects) (3)

where all variables are defined above. A significantly positive coefficient on the *StaleDisc x RecentDisc* provides further support for *H2* and indicates that the association between requests for stale disclosures and market activity is stronger when there are more requests for contemporaneous financial information.

Our third hypothesis, *H3*, examines whether prior information uncertainty plays a role in explaining the association between EDGAR requests for stale financial disclosures and subsequent market activity. We follow prior literature and estimate information uncertainty using a measure of earnings quality that captures the extent to which current accruals map into cash flows (e.g., Dechow and Dichev [2002], Francis et al. [2005], Francis et al. [2007]). We select an earnings-based measure of information uncertainty because earnings relates directly to equity-investment payoffs. We estimate information uncertainty, *InfoUncertain,* using the residuals from the following model for all firms *i* in years *T*:

$$CurrAccr_T = f(CFO_{T-1}, CFO_T, CFO_{T+1}, \Delta REV_T, PPE_T) \quad (4)$$

where,

CurrAccr	= total current accruals;
CFO	= cash flow from operations;
ΔREV	= change in revenues; and
PPE	= gross value of property, plant, and equipment.

We provide more detailed variable definitions in Appendix A. We follow Francis et al. [2007] in estimating model (4) for each industry (Fama-French 48 classifications) with at least 20 observations and for each year *T*. We capture the residual for each sample firm and estimate the standard deviation of the residuals (*InfoUncertain*) over the past 5 years (years *T-4* through *T*). Larger variation in the residuals suggests that cash flows map poorly into accruals and thus indicates greater information uncertainty.

We test *H3* by interacting the EDGAR request variables for each one hour time period with our measure of information uncertainty (*StaleDisc x InfoUncertain* and *RecentDisc x InfoUncertain)* and entering these interactions into model (1). Given that information

uncertainty is highly negatively correlated with firm size (Dechow and Dichev [2002]), we also interact *RankMVE* with the EDGAR requests variables (*StaleDisc x RankMVE* and *RecentDisc x RankMVE*). The model is as follows:

$$\begin{aligned} \textit{Market Activity}_t = f(\ & \textit{StaleDisc}_{t-1}, \textit{StaleDisc}_{t-2}, \textit{RecentDisc}_{t-1}, \textit{RecentDisc}_{t-2}, \textit{InfoUncertain}, \textit{StaleDisc}_{t-1} \\ & \times \textit{InfoUncertain}, \textit{StaleDisc}_{t-2} \times \textit{InfoUncertain}, \textit{RecentDisc}_{t-1} \times \textit{InfoUncertain}, \\ & \textit{RecentDisc}_{t-2} \times \textit{InfoUncertain}, \textit{RankMVE}, \textit{StaleDisc}_{t-1} \times \textit{RankMVE}, \textit{StaleDisc}_{t-2} \times \\ & \textit{RankMVE}, \textit{RecentDisc}_{t-1} \times \textit{RankMVE}, \textit{RecentDisc}_{t-2} \times \textit{RankMVE}, \textit{Market Activity}_{t-1}, \\ & , \textit{Market Activity}_{t-2}, \textit{AbsRet}_{t-1}, \textit{AbsRet}_{t-2}, \textit{PriorDay\_AbsRet}, \textit{PriorDay\_Turnover}, \\ & \textit{Controls for Market Closed}, \textit{Hour Fixed Effects}) \end{aligned} \quad (5)$$

where all variables are defined above. A significantly positive coefficient on the *StaleDisc x InfoUncertain* supports *H3* and indicates that the association between requests for stale disclosures and market activity is stronger when there is greater information uncertainty in the firm.

Our final hypothesis, *H4*, posits that the relation between stale disclosure acquisition and market activity is negatively related to sophisticated trading. Following prior research, we use the average trade size during the hour (*TradeSize*) as a proxy for sophisticated trading (e.g., Frankel et al [1999]) under the assumption that larger trades are unlikely to be initiated by unsophisticated investors. We enter *TradeSize* as the dependent variable in model (1) as follows:

$$\begin{aligned} \textit{TradeSize}_t = f(\ & \textit{StaleDisc}_{t-1}, \textit{StaleDisc}_{t-2}, \textit{RecentDisc}_{t-1}, \textit{RecentDisc}_{t-2}, \textit{Market Activity}_{t-1}, \textit{Market} \\ & \textit{Activity}_{t-2}, \textit{AbsRet}_{t-1}, \textit{AbsRet}_{t-2}, \textit{RankMVE}, \textit{PriorDay\_AbsRet}, \textit{PriorDay\_Turnover}, \\ & \textit{Controls for Market Closed}, \textit{Hour Fixed Effects}) \end{aligned} \quad (2)$$

where all variables are defined above. A negative coefficient on $\textit{StaleDisc}_{t-1}$ and/or $\textit{StaleDisc}_{t-2}$ is consistent with *H4* and provides evidence that stale information acquisition is associated with smaller trades on average (i.e., less sophisticated traders).

4. Findings

4.1 Descriptive Statistics and Correlations

In Table 2, we provide descriptive statistics for disclosure requests by hour of the day. In Panel A of Table 2 we present the mean, standard deviation, and maximum number of stale and recent disclosure requests for any form in EDGAR during the hour, aggregated across all 200 firms. Broadly, we find that both stale and recent disclosures are in highest demand during normal trading hours, and in particular, in the hours just before the markets close. We also find that across all time periods the mean number of requests for stale disclosures is greater than the mean number of requests for recent disclosures. This finding should certainly be viewed in light of the fact that there is a much greater supply of stale financial disclosures available on EDGAR; however, it does underscore the value of historic financial information and the benefits from storing these disclosures in an archival database such as EDGAR. Untabulated findings show that the median number of days between the filing date and the request date is 370 days for the stale disclosure sample and 1 day for the recent disclosure sample.

In Panel B of Table 2 we present descriptive statistics for the four dependent variables used in models (1) and (2) by hour of the day. We find that *AbsRet* and *Volume* are highest during the middle hours of the day (from 10:00 to 15:00 EST). In contrast, *TradeSize* is generally greatest during the opening and closing hours of the market (around 9:00 EST and 16:00 EST). As described above, in our empirical models we include hour of day fixed effects to control for these observed differences in market activity throughout the hours of the day.

In Table 3 we present Pearson (above) and Spearman (below) correlations for all of the variables used in the regression models. We find that $StaleDisc_{t-1}$ is positively associated with

RecentDisc$_{t-1}$ with a correlation coefficient of 0.32, providing univariate evidence that disclosures filed at different times are requested often together. We also find that *StaleDisc* is positively associated with each market activity variable and with prior day absolute returns and turnover. We now turn to the test results of the formal hypotheses.

4.2 Tests of H1

In Table 4 we present the estimation results for model (1) using *AbsRet*$_t$ and *Volume*$_t$ as the dependent variables in columns (1) and (2), respectively. In Panel A of Table 4, we estimate the regressions using stale and recent disclosure requests for *all* disclosures in EDGAR and in Panel B of Table 4, we focus on requests for periodic accounting disclosures (i.e., requests for 10-Ks and 10-Qs only). The purpose of Panel B is to examine whether stale *accounting* disclosures are informative to equity markets. For parsimony, we do not tabulate the coefficients on variables used to control for time periods when the market is closed or the time fixed effects.

In column (1) of Table 4, Panel A we find that *StaleDisc*$_{t-1}$ is positively associated with *AbsRet*$_t$. This coefficient on *StaleDisc*$_{t-1}$ captures the market reaction to the acquisition of the stale disclosure. We interpret this result as evidence that stale financial information is informative to markets. The result remains significant after controlling for requests for recent disclosures in EDGAR (*RecentDisc*), the magnitude of news that hit the market (lagged *AbsRet*) during the same time periods as the request, and the magnitude of news and trading volume realized in the prior day. In economic terms, the magnitude of the coefficient on *StaleDisc*$_{t-1}$ is significant: going from 1 to 10 requests during a particular hour is associated with a 1.04 basis

point increase in absolute returns over a subsequent one-hour trading period.[13] We also find that $RecentDisc_{t-1}$ is positively associated with $AbsRet_t$ and that the coefficient magnitude is 2.5 times greater than that on $StaleDisc_{t-1}$. The larger magnitude is intuitive given that more recently filed financial statements are more likely to disclose information not yet incorporated into prices. An untabulated F-test confirms that this difference in the coefficient is statistically significant ($F = 11.13$, $p < 0.01$).

The results using $Volume_t$ as the dependent variable are presented in column (2) of Table 4, Panel B and provide similar evidence of a positive association between requests for stale information and market activity. Here, we find that $StaleDisc_{t-1}$ and $StaleDisc_{t-2}$ are both positively associated with $Volume_t$. The magnitude of the coefficient on $StaleDisc_{t-1}$ suggests that going from 1 to 10 requests during a particular hour is associated with a $1.3 million increase in trading volume over a subsequent one-hour trading period.[14] Thus, our evidence rejects *H1* using either returns and trading volume as dependent variables.

Turning to Panel B of Table 4, our analysis of EDGAR requests for *accounting* disclosures provides very similar evidence to that in Panel A using all disclosure requests. That is, in column (3) $StaleDisc_{t-1}$ is positively associated with $AbsRet_t$ and in column (4) $StaleDisc_{t-1}$ and $StaleDisc_{t-2}$ are both positively associated with $Volume_t$. We note that while the coefficient magnitudes on $StaleDisc_{t-1}$ and $StaleDisc_{t-2}$ in the two panels are relatively similar when $AbsRet_t$ is the dependent variable, the magnitudes are considerably larger in Panel B when $Volume_t$ is the dependent variable.

[13] The economic magnitude calculation is as follows: 0.000061 x [ln(1+10) – ln(1+1)] = 0.0104 percent. We report the results of similar calculations in subsequent tables but do not footnote the calculations for parsimony.

[14] Although the coefficient on $StaleDisc_{t-1}$ is slightly higher than the coefficient on $RecentDisc_{t-1}$, an untabulated F-test reveals that the difference is not statistically significant ($F= 1.77$, $p > 0.10$).

Overall, the evidence presented in Table 4 rejects the first hypothesis. That is, we find evidence consistent with the notion that stale disclosures are informative in that increases in requests for stale disclosures are associated with increases in returns and trading volume within two hours of the request. Thus, not only do stale requests appear informative, but also they appear to be quickly traded upon. The remaining tests examine three potential reasons *why* we observe this result.

4.3 Tests of H2

H2 posits that contemporaneous information acquisition has a positive influence on the association between stale disclosure acquisition and market activity. In Table 5, Panels A and B we present the results of estimating model (2) using all disclosure requests and period accounting report requests, respectively. Consistent with *H2*, in Panels A and B we find positive and significant coefficients on the $StaleDisc_{t-1}$ *x EarnAnnHour(-5,5)* interaction across all four model specifications and samples. This evidence indicates that stale disclosures are particularly informative to equity markets when the disclosures are requested in short windows around the release of the quarterly earnings report. We note that the coefficients on the main effect, $StaleDisc_{t-1}$, remain positive and statically significant for all models; however, the magnitude of the coefficient on the main effect relative to that on the interaction is considerably smaller. For example, in Table 5, Panel B, column (2), the coefficient on $StaleDisc_{t-1}$ is 362.77, which indicates that going from 1 to 10 requests during a particular hour is associated with a $0.62 million increase in dollar value of subsequent hourly trading volume. The sum of the coefficients on $StaleDisc_{t-1}$ and $StaleDisc_{t-1}$ *x EarnAnnHour(-5,5)* is 1,827.87, which indicates that

going from 1 to 10 requests during the 11-hour earnings announcement period is associated with a $3.1 million increase dollar value of in subsequent hourly trading volume. This evidence highlights the importance of investor assess to historical financial reports during periods when firms are announcing current news.

As a second test of *H2,* we investigate whether the positive association between stale information acquisition and market activity is increasing in requests for contemporaneous information. In Table 6, Panels A and B we present the results of estimating model (3) using all disclosure requests and period accounting report requests, respectively. Consistent with *H2*, in Panel A we find positive and significant coefficients on the *StaleDisc x RecentDisc* interaction coefficients using requests during the prior hour when $AbsRet_t$ is the dependent variable and during the prior two hours with $Volume_t$ is the dependent variable. We find similar evidence in Panel B using requests for periodic accounting reports, but here the *StaleDisc x RecentDisc* are only significant when $Volume_t$ is the dependent variable. This evidence further supports *H2* and indicates that stale disclosures are particularly informative to equity markets when they are used in conjunction with more recent disclosures, and vice versa.

4.4 Tests of H3

H3 examines a second potential explanation for the association between stale disclosure acquisition and market activity by positing that prior information uncertainty has a positive influence on the association between stale disclosure acquisition and market activity. In Table 7, Panels A and B we present the results of estimating model (4) using all disclosure requests and periodic accounting report requests, respectively. Consistent with *H3*, Panel A reveals

positive and significant coefficients on the *StaleDisc x InfoUncertain* interactions in seven of the eight cases. This evidence suggests that the link between stale disclosure acquisition and trading is particularly strong when there is more prior uncertainty about the firm's information. The coefficients on the *RecentDisc x InfoUncertain* variable are only positive and significant in three of the eight cases. Furthermore, comparing the coefficient magnitudes across Panel A and Panel B, we find that the results are again stronger when the requests are for periodic accounting reports. Thus, our results support the prediction in *H3*.

4.5 Tests of H4

Finally, we examine whether the positive association between stale disclosure acquisition and market activity can be explained by unsophisticated investors who arrive "late to the game". We employ a commonly used proxy for investor sophistication based on the average trade size that occurs during the hour (*TradeSize*). If unsophisticated investors are trading, we expect that stale disclosure acquisition will be associated with smaller trade sizes.

Table 8, columns (1) and (2) present the estimation of model (2) in which the dependent variable is $TradeSize_t$. In contrast to our prediction in *H4*, we find significantly *positive* coefficients on $StaleDisc_{t-1}$ and $StaleDisc_{t-2}$ when the sample includes requests for all disclosures (column (1)) or when the sample is restricted to requests for periodic accounting reports (column (2)). In particular, four out of a possible four coefficients on *StaleDisc* are positive, and all are at the one percent significance level. Consistent with the results in Table 4, the coefficient magnitudes are generally greater when requests for periodic accounting reports are used. This finding suggests that the positive association between requests for stale information and total

trading volume observed in Table 4 is being driven, in part, by larger values of individual trades. To the extent that larger dollar value trades are more likely to be initiated by sophisticated traders, such as hedge funds and institutional investors, these results are not consistent with unsophisticated investors driving the association between stale information acquisition and market activity.[15] We view these results as purely suggestive given evidence that institutions engage in stealth-trading by trading in smaller sizes then they would otherwise (Chakravarty [2001]). We also acknowledge the concern that unsophisticated investors might not use EDGAR to begin with, which biases against finding evidence consistent with *H2*. However, the absence of unsophisticated investors from EDGAR should not explain the positive associations we observe between EDGAR requests and average trade sizes observed in Table 8.

Overall, our tests for why stale disclosures can be informative to investors provide evidence that supports two rational explanations, but does not support one behavioral explanation. That is, our tests provide no support for the conjecture that trading by unsophisticated investors drives the informativeness of stale information. Instead, the evidence is consistent with rational investors using stale information in cases of higher information uncertainty and in fundamental analysis. The next section discusses robustness tests of these findings.

5. Sensitivity tests

5.1 Different Staleness Thresholds

In the tests above, we use a 30-day threshold to identify stale financial disclosures. While this threshold seems reasonable, we acknowledge that it is arbitrary. Here we test the robustness of the results to two different staleness thresholds. First, we use a threshold of one week. That is, under this alternate research design, *StaleDisc* (*RecentDisc*) captures the amount of investor requests for a financial disclosure that has been on EDGAR for more than or equal to (less than) seven days. We find that the results (untabulated) using this threshold are consistent with those presented in the previous section.

Second, we use a mix of the 30- and 7-day thresholds. Under this alternative, *StaleDisc* measures the number of investor requests for a financial disclosure that has been on EDGAR for more than 30 days and *RecentDisc* measures the number of investor requests for disclosures that have been on EDGAR for less than seven days. Thus requests for disclosures that have been on EDGAR for more than one week, but less than one month, are excluded. Again the results (untabulated) using these alternative thresholds are consistent with those discussed in the previous section. Overall, we conclude that, regardless of the cutoff threshold for the staleness of a financial disclosure, the tenor of results is consistent with investors finding stale disclosures informative for rational reasons.

5.2 Firm Fixed Effects

Another factor that may influence our findings is the existence of unobservable firm characteristics that are not captured in our models. Over our relatively short 6-month sample

period, such characteristics are unlikely to change significantly. Thus, we repeat our analyses including firm fixed effects.[16] The analysis (untabulated) yields results that are consistent with those reported in the tables. Thus, our results are not sensitive to controlling for fixed firm characteristics.

6. Summary and Conclusion

We provide novel evidence that investors find stale disclosures informative. We use disclosure requests on EDGAR as a proxy for information acquisition and test whether the acquisition of stale disclosures is associated with subsequent short-term absolute returns and trading volume. We find evidence suggesting that investors trade on stale disclosures within two hours of acquiring the information and that this result is particularly strong when the acquired information is a periodic accounting report (10-K or 10-Q). We propose and test reasons why stale financial information continues to be informative even after it has been publicly available for an extended period of time. Our evidence suggests that stale disclosures are informative to markets when they provide context for current events and disclosures, and when there is greater prior information uncertainty about the firm. We find no evidence that the association between stale disclosure acquisition and market activity is related to unsophisticated trading.

Although our results provide evidence consistent with stale disclosure informativeness, several caveats apply to our study. First, we do not observe actual usage of the information; we simply observe that investors request the information from EDGAR. We make the assumption

[16] The inclusion of firm fixed effects requires us to exclude the main effects of any time-invariant variables already in the models, such as firm size (*RankMVE*) and information uncertainty (*InfoUncertain*).

that investors would only request the information if they plan to use it. Second, the computational difficulties of our analyses limit our sample to 200 randomly selected firms. Our analyses suggest that these firms are representative, but to the extent that they are not, our results will not apply to a broader cross-section of firms. The same caveat applies to our very limited sample period, which may not apply to other time periods. Finally, investors can gather financial disclosures from various channels. Because EDGAR is designed specifically to maintain historical disclosures, we may overestimate the informativeness of disclosures if investor information acquisition activities are not similar in other channels of information dissemination. With these caveats in mind, we interpret our results as an initial, but important, first step in understanding the informativeness of stale information.

Our results contribute to a burgeoning literature that more clearly tries to examine investor acquisition of information. As Charles Lee states, this line of research … "adopts a 'user,' rather than a 'preparer,' orientation toward accounting information. User-oriented research, such as valuation, is definitely a step in the right direction" (Lee, [2001]). While our study answers this call to provide additional evidence on investors' usage of stale disclosures, there are many questions that remain. For example: what types of investors request stale information? Exactly how do the investors use the information? What substitutes for stale information exist? What components of financial disclosures (such as particular footnotes in an annual 10-K), are associated with trading activities? We look forward to future, user-oriented research that helps answer these types of questions.

APPENDIX A
Variable Definitions and Data Sources

Variable	Description	Source
AbsRet	The absolute raw stock return during the hour.	TAQ
Analyst Following	The number of analysts in the consensus analyst forecast measured in December 2007.	IBES
Book-to-Market	Common equity (CEQ) divided by the market value of equity (PRCC_F x CSHO) as measured in the fiscal year ending in 2007.	Compustat
Controls for Market Closed	An indicator variable set equal to one during times when the market is closed (evenings, weekends, and holidays). The indicator variable is also interacted with *Edgar Requests*.	TAQ
EarnAnnHour(-5,5)	An indicator variable set equal to one during an eleven-hour window centered on the earnings announcement hour.	IBES
HourFE	Hour of the day fixed effects.	
InfoUncertain	The standard deviation of the residual value of a regression of current accruals on past, current and future cash flows as described in Dechow and Dichev (2002)	Compustat
Inst. Ownership	The percentage of outstanding shares owned by institutions as measured in the last reporting date of 2007.	Thomson
Leverage	Total liabilities (LT) divided by total assets (AT) as measured in the fiscal year ending in 2007.	Compustat
MVE	The market value of equity (PRCC_F x CSHO) as measured in the fiscal year ending in 2007.	Compustat
PriorDay_AbsRet	The absolute stock return for the previous day.	CRSP
PriorDay_Turnover	Total trading volume (in shares) dividend by shares outstanding for the previous day.	CRSP

RankMVE	The quantile rank of the firm's market value of equity as measured in the fiscal year ending in 2007.	CRSP
RecentDisc	The natural log of the count of the number of investor requests during the hour for disclosures that have been publicly available on EDGAR for less than 30 days.	SEC
Return on Assets	Income before extraordinary items (IB) divided by total assets (AT) as measured in the fiscal year ending in 2007.	Compustat
StaleDisc	The natural log of the count of the number of investor requests during the hour for disclosures that have been publicly available on EDGAR for at least 30 days.	SEC
TradeSize	The average dollar value of individual trades executed during the hour.	TAQ
Volume	The dollar value of aggregate trading volume for a given firm during the hour.	TAQ

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TABLE 1

Comparison of the Random Sample to the Universe of Firms

Panel A: Firm Characteristics

	Random Sample (N = 200)		**Universe (N = 5,307)**		**Mean Diff**	**Median Diff**
Variables	Mean	Median	Mean	Median	T-Stat	Z-Stat
MVE ($M)	4,998	401	3,508	422	0.83	-0.39
Total Assets ($M)	10,831	495	13,626	594	-0.60	-0.49
Book-to-Market	47.2%	43.2%	48.4%	44.1%	-0.18	-1.16
Return on Assets	-3.3%	1.6%	-3.1%	2.3%	-0.10	-1.37
Leverage	59.6%	55.7%	54.5%	53.1%	1.60	1.60
Analyst Following	5.1	3.0	4.8	3.0	0.69	0.16
Inst. Ownership	57.3%	58.1%	56.0%	58.3%	0.49	-0.68

Panel B: Industry Distribution

	Random Sample (N = 200)		Universe (N = 5,307)	
Fama-French Classification	N	% of Total	N	% of Total
Food	7	4%	124	2%
Mining and Minerals	2	1%	89	2%
Oil and Petro Products	8	4%	212	4%
Textiles, Apparel, and Footware	4	2%	70	1%
Consumer Durables	4	2%	91	2%
Chemicals	3	2%	89	2%
Drugs, Soap, Perfumes, Tobacco	13	7%	314	6%
Construction	8	4%	117	2%
Steel	2	1%	54	1%
Fabricated Products	1	1%	28	1%
Machinery and Equipment	19	10%	635	12%
Automobiles	3	2%	75	1%
Transportation	10	5%	189	4%
Utilities	9	5%	134	3%
Retail Stores	3	2%	233	4%
Financial Institutions	38	19%	1,122	21%
Other	66	33%	1,685	32%

This table compares the random sample used in our analyses to the universe of CRSP/Compustat firms with available data. Panel A examines whether there is a significant difference in six firm characteristics between the random sample and the universe of firms. The measurement and source of all variables in the panel are described in Appendix A. Panel B compares whether there is a difference in the industry distribution between the random sample and the universe of firms. Industries are defined using the Fama-French 17 classification.

TABLE 2
Descriptive Statistics by Hour of the Day

Panel A: Aggregate Requests for Disclosures in SEC EDGAR

	Requests for Stale Disclosures			*Requests for Recent Disclosures*		
Hour of the Day	Mean	Std	Max	Mean	Std	Max
0:00 to 0:59	134	58	286	65	36	186
1:00 to 1:59	120	56	325	59	34	192
2:00 to 2:59	106	50	248	56	33	149
3:00 to 3:59	99	50	271	50	31	137
4:00 to 4:59	97	51	244	47	28	133
5:00 to 5:59	103	51	306	46	30	127
6:00 to 6:59	96	49	272	53	35	165
7:00 to 7:59	113	64	318	76	52	238
8:00 to 8:59	190	105	421	138	95	420
9:00 to 9:59	335	191	708	217	150	590
10:00 to 10:59	462	266	1006	263	179	682
11:00 to 11:59	511	286	973	276	191	918
12:00 to 12:59	480	247	962	251	167	697
13:00 to 13:59	489	250	1026	268	189	787
14:00 to 14:59	553	289	1168	277	187	734
15:00 to 15:59	542	281	1037	288	200	1016
16:00 to 16:59	526	269	1029	292	194	904
17:00 to 17:59	445	226	868	239	155	616
18:00 to 18:59	335	165	705	186	131	556
19:00 to 19:59	274	126	537	142	90	518
20:00 to 20:59	212	96	513	106	64	311
21:00 to 21:59	198	80	420	100	62	373
22:00 to 22:59	182	80	373	83	47	237
23:00 to 23:59	156	62	297	74	39	198

Panel B: Descriptive Statistics for Market Variables

	AbsRet		*Volume*		*TradeSize*	
Hour of the Day	Mean	Std	Mean	Std	Mean	Std
0:00 to 0:59	--	--	--	--	--	--
1:00 to 1:59	--	--	--	--	--	--
2:00 to 2:59	--	--	--	--	--	--
3:00 to 3:59	--	--	--	--	--	--
4:00 to 4:59	0.000%	0.05%	28	3,904	3	221
5:00 to 5:59	0.000%	0.01%	31	3,702	6	353
6:00 to 6:59	0.001%	0.07%	343	30,284	24	764
7:00 to 7:59	0.006%	0.15%	9,584	886,106	138	1,812
8:00 to 8:59	0.037%	0.38%	133,308	3,509,982	19,939	661,443
9:00 to 9:59	0.610%	1.57%	3,839,664	27,637,567	3,016	6,415
10:00 to 10:59	0.479%	1.18%	5,370,799	32,838,442	2,462	14,668
11:00 to 11:59	0.386%	0.98%	3,966,457	22,335,880	2,487	17,848
12:00 to 12:59	0.320%	0.87%	3,252,127	18,275,319	2,350	9,332
13:00 to 13:59	0.306%	0.80%	3,258,495	18,226,508	2,292	7,316
14:00 to 14:59	0.335%	0.88%	4,154,829	23,716,551	2,296	6,563
15:00 to 15:59	0.455%	1.23%	7,097,845	39,514,819	2,409	5,740
16:00 to 16:59	0.350%	0.98%	2,032,985	16,795,432	83,574	358,225
17:00 to 17:59	0.028%	0.47%	112,621	2,314,369	30,334	481,831
18:00 to 18:59	0.009%	0.15%	31,949	1,294,724	10,436	335,252
19:00 to 19:59	0.007%	0.12%	7,959	347,279	3,178	81,670
20:00 to 20:59	--	--	--	--	--	--
21:00 to 21:59	--	--	--	--	--	--
22:00 to 22:59	--	--	--	--	--	--
23:00 to 23:59	--	--	--	--	--	--

This table presents summary statistics by hour for our primary measures of stale information acquisition (*StaleDisc*) and recent information acquisition (*RecentDisc*) (Panel A). It also presents summary statistics by hour for our measures of capital market activity (*AbsRet* and *Volume*) and measure of investor sophistication (*TradeSize*) (Panel B). *Volume* is presented in thousands of dollars and *TradeSize* is presented in raw dollars. TAQ does not report trading activity between 8pm and 4pm, so those values are omitted in Panel B. The measurement and source of all variables in Panel are described in Appendix A.

TABLE 3

Pearson (Above) and Spearman (Below) Correlations

	Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1	$StaleDisc_{t-1}$		0.56	0.28	0.24	0.04	0.33	0.05	0.02	0.06
2	$StaleDisc_{t-2}$	0.40		0.24	0.28	0.03	0.29	0.05	0.02	0.06
3	$RecentDisc_{t-1}$	0.32	0.23		0.44	0.04	0.20	0.03	0.03	0.05
4	$RecentDisc_{t-2}$	0.24	0.32	0.37		0.03	0.17	0.03	0.03	0.05
5	*AbsRet*	0.23	0.19	0.18	0.15		0.05	0.01	0.13	0.05
6	*Volume*	0.29	0.24	0.23	0.19	0.85		0.07	0.01	0.04
7	*TradeSize*	0.28	0.24	0.22	0.19	0.84	0.99		0.00	0.01
8	*PriorDay_AbsRet*	0.13	0.13	0.12	0.12	0.23	0.26	0.26		0.25
9	*PriorDay_Turnover*	0.25	0.26	0.21	0.21	0.31	0.37	0.36	0.66	

This table presents the univariate correlations between variables of interest. The Pearson correlations are presented above the diagonal and the Spearman correlations are presented below the diagonal. The measurement and source of all variables are described in Appendix A.

TABLE 4

The Association between Stale Disclosure Acquisition and Market Activity

	Panel A: All Disclosures		**Panel B: 10-Ks and 10-Qs**	
	(1)	(2)	(3)	(4)
Variables	$AbsRet_t$	$Volume_t$	$AbsRet_t$	$Volume_t$
$StaleDisc_{t-1}$	0.000061***	770.72***	0.000057**	1,198.34***
	(0.000019)	(34.24)	(0.000023)	(56.50)
$StaleDisc_{t-2}$	0.000013	547.76***	0.000009	815.80***
	(0.000015)	(30.39)	(0.000017)	(50.99)
$RecentDisc_{t-1}$	0.000155***	659.65***	0.000112***	657.34***
	(0.000023)	(73.09)	(0.000036)	(156.30)
$RecentDisc_{t-2}$	0.000005	324.29***	-0.000012	429.53***
	(0.000020)	(56.23)	(0.000036)	(111.31)
$AbsRet_{t-1}$	0.185277***	7,595.64**	0.185593***	9,196.42***
	(0.007113)	(2,919.29)	(0.007114)	(2,900.57)
$AbsRet_{t-2}$	0.086315***	-15.44	0.086671***	1,942.38
	(0.005027)	(2,410.02)	(0.005037)	(2,402.00)
$Volume_{t-1}$		0.79***		0.79***
		(0.02)		(0.02)
$Volume_{t-2}$		-0.07***		-0.07***
		(0.02)		(0.02)
RankMVE	-0.000573***	830.03***	-0.000540***	837.04***
	(0.000036)	(54.03)	(0.000036)	(57.70)
PriorDay_ AbsRet	0.012689***	-412.08*	0.012717***	-201.18
	(0.000715)	(236.58)	(0.000714)	(243.95)
PriorDay_ Turnover	0.002403***	1,815.30**	0.002500***	2,606.97***
	(0.000764)	(744.55)	(0.000787)	(929.06)
Controls for Market Closed	Yes	Yes	Yes	Yes
Hour Fixed Effects	Yes	Yes	Yes	Yes
Day Clustered SE	Yes	Yes	Yes	Yes
N	873,200	873,200	873,200	873,200
R-Squared	0.157	0.581	0.157	0.581

This table presents the results of estimating equation (1), in which the dependent variables measure capital market activity (*AbsRet* and *Volume*) in a given hour and the independent variables of interest are the number of investor requests for stale information in the previous two hours ($StaleDisc_{t-1}$ and $StaleDisc_{t-2}$). The measurement and source of all variables are described in Appendix A.

TABLE 5

The Impact of Earnings Announcements on the Association between Stale Disclosure Acquisition and Market Activity

	Panel A: All Disclosures		**Panel B: 10-Ks and 10-Qs**	
	(1)	(2)	(3)	(4)
Variables	$AbsRet_t$	$Volume_t$	$AbsRet_t$	$Volume_t$
$StaleDisc_{t-1}$	0.000140***	362.77***	0.000157***	465.21***
	(0.000023)	(20.46)	(0.000031)	(32.12)
$StaleDisc_{t-2}$	0.000065***	272.19***	0.000071***	348.95***
	(0.000020)	(19.39)	(0.000025)	(28.31)
$RecentDisc_{t-1}$	0.000229***	323.53***	0.000250***	351.02***
	(0.000030)	(45.46)	(0.000052)	(87.61)
$RecentDisc_{t-2}$	0.000047*	150.06***	0.000064	175.74***
	(0.000025)	(35.56)	(0.000051)	(59.91)
EarnAnnHour(-5,5)	0.001186***	649.16	0.001387***	652.14
	(0.000247)	(654.30)	(0.000212)	(533.13)
$StaleDisc_{t-1}$ *x EarnAnnHour(-5,5)*	0.000571**	1,465.10*	0.000542**	2,183.45**
	(0.000298)	(891.14)	(0.000273)	(1,138.57)
$StaleDisc_{t-2}$ *x EarnAnnHour(-5,5)*	0.000016	86.74	-0.000220	-38.32
	(0.000356)	(511.50)	(0.000342)	(586.18)
$RecentDisc_{t-1}$ *x EarnAnnHour(-5,5)*	-0.000066	-607.20	-0.001050*	-4,774.15
	(0.000282)	(723.69)	(0.000559)	(2,985.87)
$RecentDisc_{t-2}$ *x EarnAnnHour(-5,5)*	-0.000250	-447.54	0.000433	2,342.16
	(0.000269)	(301.05)	(0.000616)	(1,703.55)
RankMVE	-0.000386***	-84.35*	-0.000429***	172.87***
	(0.000033)	(48.11)	(0.000034)	(55.70)
StaleDisct-1 x RankMVE	-0.000366***	1,747.71***	-0.000404***	2,719.30***
	(0.000045)	(88.51)	(0.000059)	(132.20)
StaleDisct-2 x RankMVE	-0.000087*	745.15***	-0.000126**	1,354.09***
	(0.000045)	(64.70)	(0.000056)	(104.65)
RecentDisct-1 x RankMVE	-0.000392***	1,702.19***	-0.000541***	1,624.59***
	(0.000066)	(172.82)	(0.000129)	(385.16)
RecentDisct-2 x RankMVE	-0.000099*	478.01***	-0.000216**	667.16***
	(0.000056)	(125.91)	(0.000107)	(234.40)
$AbsRet_{t-1}$	0.184154***	11,344.93***	0.184822***	11,941.05***
	(0.007124)	(2,788.74)	(0.007121)	(2,769.57)

AbsRet$_{t-2}$	0.085072***	4,739.46**	0.085804***	4,949.41**
	(0.005029)	(2,390.68)	(0.005043)	(2,394.88)
Volume$_{t-1}$		0.78***		0.78***
		(0.02)		(0.02)
Volume$_{t-2}$		-0.08***		-0.08***
		(0.02)		(0.02)
PriorDay_ AbsRet	0.012688***	11,344.93***	0.012720***	11,941.05***
	(0.000720)	(2,788.74)	(0.000714)	(2,769.57)
PriorDay_ Turnover	0.002137***	4,739.46**	0.002506***	4,949.41**
	(0.000730)	(2,390.68)	(0.000798)	(2,394.88)
Controls for Market Closed	Yes	Yes	Yes	Yes
Hour Fixed Effects	Yes	Yes	Yes	Yes
Day Clustered SE	Yes	Yes	Yes	Yes
N	873,200	873,200	873,200	873,200
R-Squared	0.158	0.583	0.158	0.583

TABLE 6

The Impact of Recent Disclosure Acquisition on the Association between Stale Disclosure Acquisition and Market Activity

	Panel A: All Disclosures		**Panel B: 10-Ks and 10-Qs**	
	(1)	(2)	(3)	(4)
Variables	$AbsRet_t$	$Volume_t$	$AbsRet_t$	$Volume_t$
$StaleDisc_{t-1}$	0.000130***	18.48	0.000169***	371.29***
	(0.000024)	(46.02)	(0.000031)	(49.72)
$StaleDisc_{t-2}$	0.000063***	159.10***	0.000070***	291.71***
	(0.000020)	(31.66)	(0.000025)	(30.32)
$RecentDisc_{t-1}$	0.000204***	-364.02***	0.000239***	-161.20
	(0.000032)	(59.06)	(0.000054)	(99.58)
$RecentDisc_{t-2}$	0.000042	-92.17**	0.000065	-54.11
	(0.000027)	(41.19)	(0.000054)	(73.86)
$StaleDisc_{t-1}$ x $RecentDisc_{t-1}$	0.000035**	744.12***	-0.000005	746.99**
	(0.000014)	(96.09)	(0.000020)	(290.62)
$StaleDisc_{t-2}$ x $RecentDisc_{t-2}$	0.000006	251.17***	0.000008	386.89**
	(0.000010)	(64.63)	(0.000019)	(184.34)
RankMVE	-0.000368***	330.00***	-0.000428***	332.84***
	(0.000032)	(37.90)	(0.000034)	(35.68)
StaleDisct-1 x RankMVE	-0.000380***	1,562.12***	-0.000407***	2,650.50***
	(0.000046)	(86.83)	(0.000059)	(129.06)
StaleDisct-2 x RankMVE	-0.000094**	669.80***	-0.000129**	1,339.39***
	(0.000045)	(64.46)	(0.000056)	(99.05)
RecentDisct-1 x RankMVE	-0.000435***	864.76***	-0.000530***	974.87***
	(0.000070)	(99.65)	(0.000132)	(161.40)
RecentDisct-2 x RankMVE	-0.000114**	83.33	-0.000240**	86.44
	(0.000057)	(87.97)	(0.000106)	(150.86)
$AbsRet_{t-1}$	0.184424***	11,169.74***	0.185083***	12,180.00***
	(0.007115)	(2,857.05)	(0.007112)	(2,852.46)
$AbsRet_{t-2}$	0.085289***	4,555.54*	0.086085***	5,456.68**
	(0.005020)	(2,351.52)	(0.005031)	(2,354.43)
$TradeValue_{t-1}$		0.78***		0.78***
		(0.02)		(0.02)
$TradeValue_{t-2}$		-0.09***		-0.09***
		(0.02)		(0.02)

PriorDay_ AbsRet	0.012678***	-331.94	0.012711***	-136.99
	(0.000719)	(247.06)	(0.000713)	(236.53)
PriorDay_ Turnover	0.002115***	3,038.95***	0.002510***	2,796.93***
	(0.000727)	(860.62)	(0.000801)	(868.45)
Controls for Market Closed	Yes	Yes	Yes	Yes
Hour Fixed Effects	Yes	Yes	Yes	Yes
Day Clustered SE	Yes	Yes	Yes	Yes
N	873,200	873,200	873,200	873,200
R-Squared	0.158	0.584	0.157	0.583

This table presents the results of estimating equation (5), in which the dependent variables measure capital market activity (*AbsRet* and *Volume*) in a given hour and the independent variables of interest are the interactions between the number of investor requests for stale information in the previous two hours ($StaleDisc_{t-1}$ and $StaleDisc_{t-2}$) and the number of investor requests for recent information in the previous two hours ($RecentDisc_{t-1}$ and $RecentDisc_{t-2}$). The measurement and source of all variables are described in Appendix A.

TABLE 7

The Impact of Information Uncertainty on the Association between Stale Disclosure Acquisition and Market Activity

	Panel A: All Disclosures		**Panel B: 10-Ks and 10-Qs**	
	(1)	(2)	(3)	(4)
Variables	$AbsRet_t$	$Volume_t$	$AbsRet_t$	$Volume_t$
$StaleDisc_{t-1}$	0.000104***	283.99***	0.000040	342.10***
	(0.000038)	(21.17)	(0.000046)	(32.97)
$StaleDisc_{t-2}$	-0.000016	310.54***	-0.000027	347.59***
	(0.000035)	(22.28)	(0.000043)	(31.72)
$RecentDisc_{t-1}$	0.000142***	306.51***	0.000200**	264.09***
	(0.000054)	(40.99)	(0.000094)	(76.08)
$RecentDisc_{t-2}$	0.000066	226.97***	0.000057	287.68***
	(0.000048)	(36.05)	(0.000095)	(57.60)
InfoUncertain	-0.000539	1,352.35***	-0.000044	1,274.87***
	(0.000509)	(195.02)	(0.000474)	(179.48)
$StaleDisc_{t-1}$ *x InfoUncertain*	0.000646	4,591.04***	0.002322**	6,429.75***
	(0.000819)	(449.35)	(0.000983)	(663.87)
$StaleDisc_{t-2}$ *x InfoUncertain*	0.001965**	1,674.17***	0.002353**	2,728.88***
	(0.000817)	(378.25)	(0.000929)	(573.91)
$RecentDisc_{t-1}$ *x InfoUncertain*	0.003132**	2,431.14***	0.002808	2,343.97*
	(0.001230)	(775.71)	(0.002117)	(1,381.07)
$RecentDisc_{t-2}$ *x InfoUncertain*	-0.000171	-646.45	0.000844	-669.00
	(0.001004)	(664.58)	(0.001850)	(911.14)
RankMVE	-0.000644***	-584.35***	-0.000682***	-258.13***
	(0.000061)	(71.58)	(0.000061)	(77.55)
StaleDisct-1 x RankMVE	-0.000386***	2,183.15***	-0.000314***	3,319.36***
	(0.000061)	(117.63)	(0.000076)	(177.99)
StaleDisct-2 x RankMVE	0.000001	1,063.58***	-0.000025	1,757.18***
	(0.000056)	(91.40)	(0.000074)	(140.18)
RecentDisct-1 x RankMVE	-0.000363***	2,116.96***	-0.000612***	2,056.70***
	(0.000091)	(234.82)	(0.000177)	(489.60)
RecentDisct-2 x RankMVE	-0.000150*	586.44***	-0.000293*	738.29**
	(0.000083)	(175.80)	(0.000156)	(304.01)
$AbsRet_{t-1}$	0.178787***	7,577.01**	0.179620***	8,081.83**
	(0.009459)	(3,415.90)	(0.009439)	(3,425.96)

AbsRet$_{t-2}$	0.078930***	4,439.48	0.079966***	4,721.60
	(0.006339)	(3,009.52)	(0.006343)	(3,020.00)
TradeValue$_{t-1}$		0.78***		0.78***
		(0.02)		(0.02)
TradeValue$_{t-2}$		-0.09***		-0.09***
		(0.02)		(0.02)
PriorDay_ AbsRet	0.010002***	-1,619.63***	0.010175***	-1,702.63***
	(0.000842)	(362.65)	(0.000830)	(330.62)
PriorDay_ Turnover	0.002397**	4,529.00***	0.002249**	5,767.28***
	(0.001082)	(1,349.01)	(0.001069)	(1,321.60)
Controls for Market Closed	Yes	Yes	Yes	Yes
Hour Fixed Effects	Yes	Yes	Yes	Yes
Day Clustered SE	Yes	Yes	Yes	Yes
N	602,508	602,508	602,508	602,508
R-Squared	0.165	0.587	0.165	0.586

This table presents the results of estimating equation (4), in which the dependent variables measure capital market activity (*AbsRet* and *Volume*) in a given hour and the independent variables of interest are the interactions between the number of investor requests for stale information in the previous two hours (*StaleDisc*$_{t-1}$ and *StaleDisc*$_{t-2}$) and a proxy for the level of prior information uncertainty (*InfoUncertain*). The measurement and source of all variables are described in Appendix A.

TABLE 8

The Association between Stale Disclosure Acquisition and Average Trade Sizes

	All Disclosures	**Periodic Accounting Disclosures**
	(1)	(2)
Variables	$TradeSize_t$	$TradeSize_t$
$StaleDisc_{t-1}$	6,431.19***	7,769.01***
	(802.16)	(829.32)
$StaleDisc_{t-2}$	6,876.71***	10,543.32***
	(766.46)	(1,056.02)
$RecentDisc_{t-1}$	3,974.74***	5,872.97***
	(928.88)	(1,294.83)
$RecentDisc_{t-2}$	4,211.39***	3,926.17***
	(1,102.52)	(1,150.86)
$AbsRet_{t-1}$	-145,205.16***	-129,882.56***
	(25,310.91)	(25,218.73)
$AbsRet_{t-2}$	-91,520.52***	-73,295.43***
	(21,843.94)	(21,637.53)
$TradeValue_{t-1}$	0.02***	0.02***
	(0.01)	(0.01)
$TradeValue_{t-2}$	0.01	0.01
	(0.00)	(0.00)
RankMVE	16,164.40***	16,497.06***
	(1,349.29)	(1,372.09)
PriorDay_ AbsRet	-13,341.64***	-11,812.52**
	(4,772.53)	(4,752.68)
PriorDay_ Turnover	8,972.63*	16,005.36**
	(4,986.46)	(6,178.22)
Controls for Market Closed	Yes	Yes
Hour Fixed Effects	Yes	Yes
Day Clustered SE	Yes	Yes
N	873,200	873,200
R-Squared	0.013	0.012

This table presents the results of estimating equation (2), in which the dependent variable is a proxy for investor sophistication (*TradeSize*) in a given hour and the independent variables of interest are the number of investor requests for stale information in the previous two hours ($StaleDisc_{t-1}$ and $StaleDisc_{t-2}$). The measurement and source of all variables are described in Appendix A.