The Effect of Mandatory Disclosure Dissemination on Information Asymmetry: Evidence from the Implementation of the EDGAR System

Enrique A. Gomez
University of Georgia
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ABSTRACT

I study the effect of the implementation of the SEC's EDGAR system on two unique forms of information asymmetry: (1) asymmetry between managers and investors, and (2) asymmetry among different groups of investors. Information asymmetry theory suggests that firms' adoption of the EDGAR system can have two effects—one that benefits investors and one that is detrimental to at least some investors. I find that the implementation of EDGAR *lowered* information asymmetry between managers and investors but had the unintended consequence of *increasing* information asymmetry (i.e., widening the information gap) between more- and less-sophisticated investors. I also validate Kim and Verrecchia's (1997) measure of information asymmetry among investors. Taken together, my results suggest that while EDGAR was beneficial to investors, it also benefited some investors at the expense of others. Moreover, employing only traditional information asymmetry measures (e.g., bid-ask spreads) does not provide a complete picture of the consequences of disclosure.

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Contact information: gomez@uga.edu. Moore-Rooker Hall B317, 610 South Lumpkin Street, Athens, GA 30602.

1. Introduction

In this paper, I investigate the effect of the initial implementation of the SEC's Electronic Data Gathering, Analysis, and Retrieval System (EDGAR) on information asymmetry. The main goal of the EDGAR system was to "make corporate and financial information available to investors, the financial community, and others in a manner of minutes" by making filings available on the internet (SEC 1993). I examine the effect of the implementation of EDGAR on two unique forms of information asymmetry among market participants: information asymmetry *between managers and investors* and information asymmetry *among investor groups*. Based on information asymmetry theory (e.g., Kim and Verrecchia 1994), while the initial implementation of the EDGAR system can reduce information asymmetry between managers and investors, it can simultaneously increase information asymmetry among investor groups, and thus be detrimental to at least some investors.

The initial implementation of the EDGAR system is the most substantial change to the dissemination of mandatory accounting information to date. Prior to EDGAR, SEC filings were very costly to obtain and were publicly available only in three distinct libraries in Washington DC, New York, and Chicago. The SEC received 700,000 paper filings amounting to about 5 million pieces of paper every year, which made it extremely difficult for investors, journalists and financial research firms to search through filings (WSJ 1991). In fact, because maintaining millions of filings was a monumental task, some of the filings were often lost (Gao and Huang 2019). EDGAR changed the dissemination of financial accounting information profoundly on two dimensions. First, accounting information became available on a timely basis to a much wider base of investors and potential investors than ever before. Second, accounting information became available much faster for at least some investors. For example, John Penhollow, former SEC EDGAR development coordinator described the impact of the EDGAR implementation on the dissemination of SEC filings: "Filers should understand that within an hour of submitting a document on EDGAR, it could well be on an analyst's screen in Hong Kong, London, Frankfurt, Los Angeles or Chicago" (Star Tribune 1993).

Regulators, firms, and consumers of financial accounting information were generally pleased with the prospects of making mandatory information widely available through the EDGAR system, arguing it would lead to socially desirable benefits. The SEC expected EDGAR implementation to result in more investor participation and increases in the fairness and efficiency of the securities market (SEC 1993; Asthana and Balsam 2001). Consistent with the SEC's expectation, early surveys suggested the EDGAR implementation went smoother than many expected (Dow Jones 1993). In addition, some managers publicly acknowledged the benefits of the EDGAR system including speeding up the filing process and the time it takes to review and approve securities transactions. For example, Robert Folbigg, comptroller for GM's Acceptance Corp. described some of the benefits of EDGAR: "Things that would take three days we can now do in one day…because documents can be filed simply by pushing a button" (WSJ 1991).

I study the effect of EDGAR implementation on different forms of information asymmetry relying on the *disclosure processing costs* framework in Blankespoor et al. (2019). This framework splits disclosure processing costs into three categories: awareness costs, acquisition costs, and integration costs. Awareness costs are the costs necessary to improve the likelihood of knowing that a given disclosure exists. Acquisition costs are those necessary to extract and quantify a disclosure signal so it is ready for use in a valuation model. Finally, integration costs are those costs necessary to combine and refine information signals into valuation estimates or investment decisions. This framework is compatible with information asymmetry theory and thus helpful in distinguishing the effect EDGAR had on the two forms of information asymmetry through its effect on the *disclosure processing costs* of different investors. Prior research suggests that EDGAR reduced awareness and acquisition costs (Asthana and Balsam 2001; Asthana et al. 2004; Gao and Huang 2019).

The effect of increases in dissemination of mandatory accounting information —as in the case of the implementation of EDGAR— on the two forms of information asymmetry can be summarized in two scenarios. First, it is possible that making mandatory accounting information more easily accessible benefits, for the most part, less-sophisticated investors for whom information awareness and acquisition costs are higher (Diamond 1985; Easley and O'Hara 2004; Blankespoor et al. 2019). This scenario predicts that EDGAR's implementation leads to a decline in information asymmetry both (1) between managers and investors and (2) among investor groups since increases in the dissemination of mandatory accounting information can make information available to less-sophisticated investors that was previously known by managers and more-sophisticated investors (Amiram et al. 2016).[1]

Second, it is also possible that increases in the dissemination of mandatory accounting information incentivizes more-sophisticated investors to acquire additional private information (Kim and Verrecchia 1994). This second scenario (like the first scenario) predicts a decrease in information asymmetry between managers and investors because all investors benefit from EDGAR, even though more-sophisticated investors learn more about the firm than the less-sophisticated by processing SEC filings into private information.[2] Consequently, this scenario may also lead to an *increase* in information asymmetry among investor groups because less-sophisticated investors may not be able to keep up with the private information production of more-sophisticated investors. This second scenario illustrates how less-sophisticated investors may find EDGAR filings— particularly filings with complex information— too costly to process, consistent with the notion that even when awareness and acquisition costs are low, integration costs may be so high that they are left at an informational disadvantage relative to more-sophisticated investors.

Common information asymmetry proxies such as bid-ask spread and illiquidity capture the combination of information asymmetry between managers and investors and information asymmetry among investors, which I refer to as *total* information asymmetry. Thus, analyses of bid-ask spread and illiquidity do not allow me to separate the effects of the implementation of EDGAR on the two forms of information asymmetry. However, Kim and Verrecchia (1997), hereafter KV, provide a theoretically derived and empirically implementable measure of *one* of the two forms of information asymmetry—

[1] In this scenario, the increases in dissemination of accounting information allows less-sophisticated investors to 'catch up' informationally to both managers and more-sophisticated investors, which is why this scenario predicts decreases in *both* forms of information asymmetry.

[2] In this paper, 'more-sophisticated investors' refers to investors who spend time and resources to process public information into private information. There is a wide range of investor sophistication in financial markets. For example, individual investors and boutique firms are likely less sophisticated relative to small institutions, who are less sophisticated relative to larger institutions, etc.

among investors.[3] Therefore, I first test the effect of the EDGAR implementation on information asymmetry among investor groups using KV's measure. I then test the effect of the EDGAR implementation on total information asymmetry, proxied by bid-ask spread and illiquidity. If the two tests produce results in opposing directions, I can infer that EDGAR had opposite effects on information asymmetry between managers and investors versus information asymmetry among investors.[4]

My main results suggest the EDGAR implementation affected information asymmetry between managers and investors and among investor groups in opposite directions. Specifically, I find increases in KV's measure of information asymmetry among investor groups following firms' implementation of EDGAR. In contrast, I find evidence consistent with decreases in bid-ask spreads and illiquidity following firms' adoption of the EDGAR system. In combination, because my tests using the KV measure indicate that information asymmetry increased *among investors*, and my tests of bid-ask spread and illiquidity suggest that *total* information asymmetry decreased, I can infer that information asymmetry between managers and investors declined and the decline was large enough to more than offset the increase in information asymmetry among investor groups.

I conduct several additional tests that complement my main results. First, I provide a validation test of KV's measure. While prior studies have used KV's measure (e.g., Amhed et al. 2003; Hope et al. 2009; Barron et al. 2018), they have not specifically attempted to validate whether KV's measure captures information asymmetry among investors. In fact, in reviewing the trading volume literature, Bamber et al. (2011) suggest that "[researchers] would benefit from further research validating [KV's] proxy…because it reflects information asymmetry—an unequal information playing field—that is of particular concern to regulators" (p.458). Therefore, I validate KV's measure by employing a known exogenous shock to information asymmetry among investors. Relying on a difference-in-difference

[3] Specifically, KV's proxy is the coefficient of absolute price changes in a regression of trading volume during earnings announcements. The intuition behind KV's proxy is that while price reactions to information releases reflect the change in the aggregate market expectation of firm value, trading volume reflects belief revisions due to informational differences among firm outsiders. KV's evidence suggests that the portion of volume related to absolute price changes captures information asymmetries among investors prior to the earnings announcement.

[4] If the two tests produce results in the same direction, I will only be able to make a clear inference about information asymmetry among investors (because I will be unable to determine whether the among-investors effect is in the same direction as the between-managers-and-investors effect or if the among-investors effect is opposite to, but greater than the between-managers-and-investors effect).

approach, I find the slope coefficient from a regression of trading volume on absolute price changes during earnings announcements significantly increases for firms experiencing exogenous increases in information asymmetry among investors. This validation test provides convincing evidence that KV's measure captures information asymmetry among investor groups.

Second, if the increase in information asymmetry among investors following the EDGAR implementation is due to more-sophisticated investors' superior processing ability, then this effect should be stronger for firms with filings that are more difficult to process. Consistent with this prediction, I find that the increase in information asymmetry among investors is stronger for firms with less readable 10-K filings. Third, I examine changes in the probability of private information events as per Brown and Hillegeist (2007) and find that it increases after EDGAR, consistent with increases in private information production. Fourth, if EDGAR reduces information asymmetry between managers and investors, I expect insiders to be able to profit less from their private information. Indeed, I find the profitability of CEO, CFO, and COO trades decrease after EDGAR.

My analyses make three contributions. First, my study provides evidence relevant to the broader issue of the consequences of how accounting information is disseminated. Specifically, my paper directly answers the call in Blankespoor et al. (2019) for research "evaluating the benefits and costs of financial reporting technologies" and to "assess how technologies affect different investor groups." Indeed, my results are directly consistent with the conjecture in Blankespoor et al. (2019) that, "if increasingly sophisticated technologies reduce processing costs primarily for large institutions, increased asymmetries between investors could negatively affect liquidity and other market outcomes" (p.72). My results highlight the importance of empirically distinguishing between different forms of information asymmetry to obtain a more complete picture of the effects of disclosure. This investigation is especially important given regulators' interest in mitigating agency conflicts and protecting investors, including 'leveling the playing field'. I shed light on how a change in technology of dissemination (i.e., EDGAR) affected different investor groups and find that while EDGAR benefited investors, it also had the unintended consequence of widening the informational gap between investors.

Second, I contribute to the literature regarding the consequences of the EDGAR system. The implementation of EDGAR is perhaps the most substantial change in the dissemination of mandatory accounting information to the public since the Securities Acts of the 1930's, yet prior research does not identify the effects of the EDGAR implementation on information asymmetry and market liquidity. Prior studies find that EDGAR led to positive consequences such as increases in price and trading volume reactions to SEC filings and more informative individual investor trades (Asthana and Balsam 2001; Griffin 2003; Asthana et al. 2004; Gao and Huang 2019). However, these studies do not speak to the effect of EDGAR on the two forms of information asymmetry.[5] I contribute to this literature by providing evidence that the implementation of EDGAR provided a net benefit in terms of reducing overall information asymmetry, but also provided a mechanism by which some investors could benefit at the expense of others.

My third contribution is to the trading volume literature. KV's theory is important in many streams of literature (e.g., information content of accounting disclosures, information asymmetries between investor types, trading volume, price reactions, etc.) as reflected by the hundreds of citations in both the finance and accounting literatures.[6] Indeed, many concepts within KV's theory are fundamental to our understanding of how information flows in capital markets are related to volume and price changes. I contribute to the literature by providing a validation test of KV's theory suggesting that the portion of trading volume related to absolute price changes around the earnings announcement captures information asymmetry between more- and less-sophisticated investors.

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[5] Gao and Huang (2019) find that individual investor trades become more informative following the implementation of EDGAR, and that these results are driven by investors who have access to the internet, suggesting that some investors may have benefited more than others from EDGAR. However, their results do not speak to whether EDGAR, on average, led to a more- or less-leveled playing field because they rely on data from one brokerage house firm containing trading information of *only* individual investors, a majority of which were located in California (Barber and Odean 2000). Thus, it is not possible to infer from their analyses whether information asymmetry among increased or decreased.

[6] Kim and Verrecchia (1991) and Kim and Verrecchia (1994) model pre-disclosure and event-period information, respectively. Kim and Verrecchia (1997) provides a combined model of pre-disclosure and event-period information. Together, these three studies have over 3,000 Google Scholar citations.

2. Background

2.1 Forms of information asymmetry in capital markets

Information asymmetry is a pervasive phenomenon in capital markets that arises when market participants (including both insiders and outsiders) possess or gain access to information about a firm that other market participants do not have (Lev 1988). Information asymmetry is a fundamental topic in financial markets because it can affect costs of trading, the cost of capital (Easley and O'Hara 2004; Hughes et al. 2007), and corporate investment (Frank and Shen 2016). There are at least two types of information asymmetry in capital markets: (1) information asymmetry between firms' managers and investors, and (2) information asymmetry among investors.

Informational differences between managers and investors in capital markets arise because investors typically do not play an active role in management.[7] One solution to this information problem is regulation that requires the disclosure of managers' private information. The release of managers' private information can help investors make more precise firm valuations and better monitor managers' compliance with contractual agreements that mitigate agency conflicts (Healy and Palepu 2001). Also, in addition to mandated disclosure (e.g., SEC filings), managers may also voluntarily release other information to improve liquidity and lower the cost of capital (Easley and O'Hara 2004). Examples of disclosures that can reduce information asymmetry between managers and investors include management forecasts (Coller and Yohn 1997), earnings press releases (Lee et al. 1993), and conference calls (Brown et al. 2004).

The other type of information asymmetry is among investors, which arises when a group of investors (typically more-sophisticated) obtain an informational advantage over other investors. More-sophisticated investors can gain an informational advantage over less-sophisticated investors by (1)

[7] In addition to insiders (i.e., managers), a limited number of institutional owners with access to management may have access to insider information. Heflin and Shaw (2000) find that firms with greater blockholder ownership (either by managers or outside investors) have greater levels of information asymmetry as evidenced by higher quoted and effective spreads, higher adverse selection spread components, and smaller quoted depths. Their results are consistent with some more-sophisticated investors having access to private, value-relevant information via their access to management. Also, other studies suggest that some institutional owners specialize in monitoring and influencing managers rather than trading. For example, institutions may influence antitakeover amendments, investment decisions and even CEO compensation, suggesting they have access to management's information (e.g., Chen, Harford, and Li 2007). I label these limited number of institutional owners as insiders, as they do not represent the vast majority of more-sophisticated investors who do not possess direct access to managers' information.

processing public information in a more sophisticated way to derive private information or (2) more quickly producing superior assessments of firm performance (Kim and Verrecchia 1994). Lower processing costs can stimulate more-sophisticated investors to develop additional private information about the firm, resulting in higher information asymmetry among investors (Glosten and Milgrom 1985; Kyle 1989; Fu et al. 2012).[8]

2.2 The role of dissemination and information asymmetry

Prior evidence suggests that more widespread dissemination of accounting information can reduce awareness and acquisition costs, leading to improvements in liquidity. For example, Bushee et al. (2010) find that broader business press coverage is associated with lower bid-ask spreads and greater depth around earnings announcements. Also, Rogers et al. (2016) find that intraday prices and volume respond to the additional dissemination of insider trading news by Dow Jones, suggesting that there is a media dissemination effect beyond the initial release of information. Similarly, Blankespoor et al. (2018) document that algorithmic news coverage leads to increases in liquidity and trading volume, and that these effects are most likely driven by retail traders. In addition, prior studies also find evidence suggesting that financial information disseminated via social media can lead to positive capital market consequences. Blankespoor et al. (2013) examine the impact of using Twitter to disseminate earnings press releases. They document that additional dissemination via Twitter is associated with lower abnormal bid-ask spreads and greater abnormal depths, and that these results are concentrated in firms that are less visible. Lastly— and more specifically related to the EDGAR system— Rogers et al. (2017) find that many SEC

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[8] This argument is similar in spirit to the arguments in Barron et al. (2002), Blankespoor et al. (2014), and Bhattacharya et al. (2018). Barron et al. (2002) study the changes in the information set of analysts during earnings announcements. They find that the commonality of information among analysts that update their forecasts around earnings announcements decreases as per the Barron et al. (1998) measure. They interpret their results to be consistent with theory suggesting that accounting disclosures can lead to idiosyncratic private research activities. Blankespoor et al. 2014 (Bhattacharya et al. 2018) find that spreads go up (trading responsiveness increases are larger for smaller institutions than for larger institutions) around 10-K filings following XBRL adoption, suggesting that some investors can better process 10-Ks than other investors using XBRL tags. My paper differs from these three papers because I focus on the information dynamics among investors *and* between managers and investors as opposed to the dynamics between analysts that choose to update around earnings announcements (Barron et al.) or just between investors (Blankespoor et al, Bhattacharya et al). In addition, while the focus of these papers is around information events, i.e., earnings announcements and 10-K filings, where asymmetry effects may disappear in a matter of days (e.g., Blankespoor et al.), my focus is on overall levels of information asymmetry between managers and investors and among investors and distinguishing between the *simultaneous* effects of increased dissemination on the two information asymmetry types empirically.

Form 4 filings were available to paying subscribers of the SEC's public dissemination system before being available on the EDGAR website. They find that this timing advantage gave some investors a significant trading advantage over others, as evidenced by price, volume, and bid-ask spreads seconds before Form 4 filings were publically available to everyone on EDGAR.

While prior studies provide evidence regarding the effect of disseminating technologies on information asymmetry, they do not distinguish among information asymmetry between managers and investors and information asymmetry among investors empirically. My study differs from prior literature in that I focus on disentangling the effect disseminating technologies can have on different forms of information asymmetry. Distinguishing among different forms of information asymmetry empirically is important because they are fundamentally related to two concepts that are of much interest to researchers and regulators: (1) mitigating agency conflicts (i.e., information asymmetry between managers and investors), and (2) keeping a level playing field among investors in the stock market (i.e., information asymmetry among investors). Relatedly, my study takes into account that while increased dissemination of accounting information can decrease awareness and acquisition costs for all investors, integration costs may still impair less-sophisticated investors' use of widely disseminated information. This notion is consistent with prior studies suggesting information complexity is an important friction for less-sophisticated investors' use and interpretation of disclosure (e.g., Miller 2010; Bhattacharya et al. 2007). In this sense, I answer the call for research in Blankespoor et al. (2019), who suggest that "predictions can differ substantially when more than one of awareness, acquisition, and integration costs are considered together" and that the "interactive and substitution effects between types of processing costs are an important area for future research" (p.24).

2.3 Firms' adoption of the EDGAR system and prior evidence

As one of the most important SEC regulatory actions, EDGAR implementation resulted in the first widespread dissemination of SEC filings. Prior to the EDGAR implementation, SEC filings were very difficult to obtain. In fact, limited copies of each report were available only in three distinct libraries in Washington DC, New York, and Chicago, where filings were often difficult to find and sometimes lost (Gao and Huang 2019). The main goal of the EDGAR system was to "increase the efficiency and fairness of the securities market" by accelerating the receipt, acceptance, dissemination, and analysis of time-sensitive information filed with the SEC by making filings available electronically (Asthana and Balsam 2001). Whereas prior to EDGAR a limited number of individuals could view SEC filings at a time, reports became available to virtually everyone following the EDGAR implementation. Given the high cost of obtaining SEC filings prior to EDGAR, it is possible its implementation made material information in SEC filings available to a broad set of investors for the first time. For example, Form 10-K contains information far beyond the financial statements which is not provided by other sources such as earnings announcements (Griffin 2003; Li and Ramesh 2009).

The SEC implemented EDGAR in a specific phase-in schedule from April 1993 through May 1996 (SEC Release No. 33-6977). There were ten different implementation groups (each group composed of a different set of public firms) that were phased in at different times. For example, the first group of adopters was composed of 230 public companies that were required to start uploading filings to the EDGAR system by April 1993. The last group of adopters was composed of 2,106 public firms and was required to upload filings to the EDGAR system by May 1996. EDGAR's staggered implementation mitigates concerns that simultaneously-occurring economic events drive my results.

Prior studies provide evidence of some of the consequences of the initial implementation of EDGAR. Early evidence suggests that there was little to no price reaction to SEC filings prior to EDGAR, but meaningful price and volume reactions following EDGAR implementation (Easton and Zmijewski 1993; Asthana and Balsam 2001; Griffin 2003). Asthana and Balsam (2004) find greater volume and greater pricing consistency among small trades versus larger trades following EDGAR implementation, suggesting small investors may have benefited more from EDGAR than large investors. However, it is important to note that trade size is not necessarily a good indicator for whether a trade is by a more-sophisticated vs. less-sophisticated investor, given more-sophisticated investors may split their trades to preserve liquidity (Hirshleifer et al. 2008). Because sophisticated investors may split their trades, it is unclear from the results in Asthana and Balsam (2004) whether EDGAR leveled or unleveled the playing field among investors.

More recently, two studies shed light on the effect of EDGAR by exploiting its staggered implementation. Guo et al. (2019) find that EDGAR strengthened the ability of investors to monitor firms, leading to decreases in stock crash risk. In addition, Gao and Huang (2019) study the effect of the EDGAR implementation on the information production of analysts and small investors. Relying on the individual investor trading data used in Barber and Odean (2000), they find that small investor trades around earnings announcements become more informative about future returns following the implementation of EDGAR, and that these results are primarily driven by investors who have access to the internet. In addition, Gao and Huang find that market responses to analyst revisions become stronger, analyst accuracy improves, and pricing efficiency improves. While Gao and Huang's results are consistent with the notion that some individual investors (i.e., those with access to the internet) benefited more than others from EDGAR, their tests do not speak to whether, on average, EDGAR resulted in a more- or less-leveled playing field. This is because Gao and Huang rely on data from one brokerage house firm containing trading information of only individual investors, a quarter of which were located in California (Barber and Odean 2000).[9] While Gao and Huang's main goal is to provide evidence that EDGAR affected the information production of small investors, my analyses focus on distinguishing whether EDGAR provided a way for some investors to benefit at the expense others.[10]

In summary, with respect to research on the effects of EDGAR, my study differs from prior studies in the following ways. First, prior studies conclude EDGAR was beneficial to investors and implicitly assume that EDGAR was beneficial to all investors. My study considers the possibility and provides the first that some investors benefited to the detriment of other investors. Second, the research designs in prior studies cannot provide evidence about the differential processing costs and specifically integration costs faced by investors as a result of EDGAR changing the technology of information dissemination. Thus,

[9] This is because Gao and Huang's main focus is to provide evidence that small investors could benefit from EDGAR.
[10] Although they do not examine the initial implementation of EDGAR, Drake et al. (2019) find evidence suggesting that more-sophisticated (less-sophisticated) investors' EDGAR downloads contain (do not contain) information about future firm performance. Drake et al. (2019) interpret their results as indicating more-sophisticated investors possess superior information *prior to* seeking information in EDGAR, and their choice to download EDGAR filings of particular firms reveals their expectations about those firms. However, their results support the contention that some investors may, in part, rely on information in EDGAR filings to gain an informational advantage over others. I provide more direct evidence of this notion.

my study answers the call for such research in Blankespoor et al. (2019). Third, most prior studies focus on the effects of EDGAR on specific information releases such as earnings announcements and 10-K or 10-Q filings. My study provides evidence about overall consequences of EDGAR, specifically regarding information asymmetry.

3. Hypothesis development

3.1 Disclosure processing costs framework

I study the effect of increases in the dissemination of mandatory information on the two forms of information asymmetry relying on the *disclosure processing costs* framework in Blankespoor et al. (2019). This framework splits disclosure processing costs borne by investors into three categories: awareness costs, acquisition costs, and integration costs. Awareness costs are the costs necessary to improve the likelihood of knowing that a given disclosure exists. Acquisition costs are those necessary to extract and quantify a disclosure signal so it is ready to use in a valuation model. Finally, integration costs are those costs necessary to combine and assimilate information signals into valuation estimates or investment decisions. This framework is compatible with information asymmetry theory and thus helpful in distinguishing the effect increased dissemination of information has on the two forms of information asymmetry through its effect on the *disclosure processing costs* of different investors. Prior research suggests that EDGAR reduced awareness and acquisition costs (Asthana and Balsam 2001; Asthana et al. 2004; Gao and Huang 2019).

3.2 Increases in the dissemination of mandatory information and forms of information asymmetry

Theoretically, the effect of increases in the dissemination of mandatory accounting information on the two forms of information asymmetry can be summarized in two scenarios. First, it is possible that making mandatory accounting information more easily accessible benefits, for the most part, less-sophisticated investors for whom information awareness and acquisition costs are higher (Diamond 1985; Easley and O'Hara 2004; Blankespoor et al. 2019). This scenario predicts a decline in information asymmetry both (1) between managers and investors and (2) among investor groups since increases in the dissemination of mandatory accounting information can make information available to less-sophisticated investors that was previously known by managers and more-sophisticated investors (Welker 1995; Easley and O'Hara 2004; Amiram et al. 2016). Thus, in this scenario, the increases in the dissemination of accounting information allows less-sophisticated investors to 'catch up' informationally to both managers and more-sophisticated investors.

Second, it is also possible that increases in the dissemination of mandatory accounting information incentivizes more-sophisticated investors to acquire additional private information (Kim and Verrecchia 1994). This second scenario (like the first scenario) predicts *lower* information asymmetry between managers and investors because all investors benefit from more widespread information, even though more-sophisticated investors learn more about the firm than the less-sophisticated by processing public information into private information. Consequently, this scenario may also lead to an *increase* in information asymmetry among investor groups because less-sophisticated investors may not be able to keep up with the private information production of more-sophisticated investors. This logic would suggest that mandatory accounting information—particularly complex information —can be too costly for less-sophisticated investors to process. Thus, this second scenario is consistent with the notion that even when awareness and acquisition costs are low for all investors, integration costs may be so high for less-sophisticated investors that they are left at an informational disadvantage relative to more-sophisticated investors (Blankespoor et al. 2019).

To summarize, the effect of increases in the dissemination of mandatory accounting information on the two forms of information asymmetry will be consistent with one of two scenarios illustrated in Figure 1: (1) Increases in the dissemination of mandatory accounting information benefits, for the most part, less-sophisticated investors for whom awareness and acquisition costs are higher. This scenario predicts decreases in both types of information asymmetry. (2) Increases in the dissemination of mandatory accounting information incentivizes more-sophisticated investors to acquire additional private information, gaining an informational advantage over less-sophisticated investors. This scenario illustrates how the dynamics of the two information asymmetry types allow for the possibility that increases in the dissemination of mandatory accounting information can lead to decreases in information asymmetry between managers and investors and increases in information asymmetry between more- and less-sophisticated investors simultaneously.

Taken together, my expectations illustrated in Figure 1 suggest that information asymmetry among investors may decrease (Scenario 1) or increase (Scenario 2) as result of increases in the dissemination of mandatory financial information. This discussion leads to my first hypothesis:

H1: Increases in the dissemination of mandatory accounting information result in changes in information asymmetry among investors.

On the other hand, Figure 1 predicts decreases in information asymmetry between managers and investors as a result of mandatory increases in dissemination in both scenarios. This logic leads to my second hypothesis:

H2: Increases in the dissemination of mandatory accounting information result in decreases in information asymmetry between managers and investors.

4. Data and Sample Selection

4.1 Data

I obtain all firm-specific data from Compustat, and price and volume data from CRSP. Additionally, I rely on IBES for analyst coverage measures and for my validation test of KV's measure. I exclude utility and financial firms from my analyses, as well firms with price less than $1. Finally, I drop observations with Cook's D higher than 4/N for all my specifications to mitigate the potential effect of outliers. I provide detailed definitions of all variables in Appendix A.

I hand-collect firms' information for each of the ten EDGAR implementation groups from SEC Release No. 33-6977. This document contains a list of firms assigned a CIK identifier, a group identifier, and an implementation date. Panel A of Figure 2 illustrates the timeline for each of the ten EDGAR implementation groups. I am able to match 5,287 firms to Compustat based on CIK. After excluding firms with insufficient data to calculate all variables, I end with a sample of 3,272 unique firms and 70,501 firm quarters. Similar to Gao and Huang (2019), I define my sample period beginning two years before the implementation date of the first group of EDGAR filers (April 1991) to two years after the implementation date of the last group of filers (May 1998). Therefore, my sample includes quarterly data for all matched firms with sufficient data to calculate variables of interest and controls from April 1991 to May 1998. Panel B of Figure 1 presents the mean of each variable by implementation group. In addition, Panel A of Table 1 tabulates descriptive statistics for all observations with non-missing data to compute all variables for the EDGAR implementation analyses.

5. Research design

5.1 Proxies of different forms of information asymmetry

Common liquidity proxies such as bid-ask spread and illiquidity capture *total* information asymmetry (i.e., the combination of information asymmetry between managers and investors and information asymmetry among investors). The existence of firm-specific information that has not been publicly disclosed by the firm (or that only some investors possess) leads to an ongoing adverse selection problem between managers and investors and between more- and less-sophisticated investors, which can result in higher insider trading profits (Frankel and Li 2004), increases in the costs of trading, and promotes unwillingness to trade among investors. All of this contributes to higher bid-ask spreads and lower liquidity (Welker 1995). Amihud's (2002) illiquidity measure captures the overall price impact of trades, or the extent to which prices react to order flows. Willingness to trade, small bid-ask spreads, increased depth, and the ability to buy/sell small stock amounts immediately contribute to higher liquidity (Kyle 1985).

Because bid-ask spread and illiquidity capture total information asymmetry, analyses of these measures do not allow me to separate the effects of increases in dissemination on information asymmetry between managers and investors versus among investors. However, KV provide a theoretically-derived and empirically-implementable measure of one of the two types: information asymmetry among investors. Prior studies suggest that price reactions reflect the change in the aggregate market expectation of firm value and that trading occurs, in part, due to informational differences among investors (e.g., Beaver 1968; Karpoff 1997; Kim and Verrecchia 1991; Atiase and Bamber 1994; Verrecchia 2001). Relying on these arguments, KV suggest that informational differences among investors are detectible in a regression model involving trading volume and absolute price changes. Specifically, KV suggest that the coefficient from a regression of trading volume on absolute price changes at the earnings announcement is a proxy for pre-disclosure information asymmetry among investors resolved at the earnings announcement, or an unleveled playing field (Bamber et al. 2011, p. 458).[11]

The intuition behind KV's proxy is that because investors with more (less) precise information prior to the earnings release weigh earnings releases less (more) heavily, trading volume is not constant among investors during the earnings announcement window. In other words, the differential volume reactions among investors at the earnings announcement result in part due to pre-disclosure information asymmetry among investors.[12] Thus, earnings announcements resolve pre-disclosure information asymmetry among investors because more (less) informed investors weigh earnings announcements less (more) heavily to revise their expectations.

5.2 Empirical strategy

To disentangle the effect of the EDGAR implementation on the two information asymmetry types, I first test the effect of the EDGAR implementation on information asymmetry among investors per KV's measure. I then test the effect of the EDGAR implementation on total information asymmetry using bid-ask spread and illiquidity. If the two tests produce results in the opposite direction, I can deduce that the EDGAR implementation had opposite effects on information asymmetry between managers and investors versus information asymmetry among investors. If the two tests produce results in the same direction, I will only be able to make a clear inference about information asymmetry among investors (because I will be unable to determine whether the among investors effect is in the same direction as the between managers and investors effect or if the among investors effect is opposite to but greater than the between managers and investors effect).

[11] To illustrate, KV focuses on the following regression of trading volume ($Volume_{it}$) on the magnitude of absolute price changes ($Return_{it}$) around earnings announcements: $Volume_{it} = \beta_0 + \beta_1 Return_{it} + \epsilon_{i,d}$. KV's theory predicts that β_1 from this equation captures information asymmetry between more- and less-sophisticated investors resolved by earnings news and that the intercept β_0 (not a focus here) captures differential interpretations of earnings announcement information. Examples of prior studies that rely on this proxy include Ahmed et al. 2003; Ahmed and Schneible 2007; and Hope et al. 2009; and Barron et al. 2018.

[12] In this case, the phrase "predisclosure information asymmetry among investors" is equivalent to "differential informedness in the pre-announcement" period per KV. Both of these phrases refer to informational differences among investors, which lead investors to develop private beliefs with differing precision.

5.3 EDGAR and information asymmetry among investors per KV's proxy

To test the effect of EDGAR implementation on KV's measure of information asymmetry among investors, I rely on the following OLS regression:

$$AbnVolume_{it} = \beta_0 + \beta_1 EDGAR_{it} + \beta_2 Return_{it} + \boldsymbol{\beta_3 EDGAR_{it}} \times \boldsymbol{Return_{it}} + Controls_{it} + \epsilon_{it} \quad (1)$$

AbnVolume equals cumulative three-day share turnover around the earnings announcement date for firm *i* in quarter *t* less the median cumulative three-day share turnover of consecutive three-day periods during the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter t's earnings release date). *EDGAR* is an indicator equal to one for all earnings announcements following the EDGAR implementation. *Return* is the absolute value of the three-day cumulative return around the earnings announcement date. The coefficient of interest in Equation 1 is $\boldsymbol{\beta_3}$, for which a significantly positive (negative) coefficient would be consistent with increases (decreases) in information asymmetry among investors following the EDGAR implementation.

Following Barron et al. (2018), I include several control variables. I include *Price*, which is the firm's closing price two days prior to the earnings announcement to control for transaction costs and their effect on trading volume (Bamber et al. 1997). *MarketTurn* is median share turnover of the sample firms for the same time as the announcement period (three days around the earnings announcement) to control for market-wide trading volume. I also include *Size* as the natural logarithm of the firm's beginning-of-quarter market value to control for the level of prior information disclosure (Ahmed et al. 2003). Further, I include *ProgTrade* as the non-announcement period correlation between daily trading volume and daily absolute return for each firm to control for the effects of non-information-based program trade (Barron et al. 2018). I also include firm- and year quarter-fixed effects as controls. Finally, I cluster standard errors by firm to account for correlation in errors (Petersen 2009).

5.4 EDGAR and total information asymmetry per bid-ask spread and illiquidity

I estimate the following OLS regression to examine how proxies capturing total information asymmetry changed following the EDGAR implementation:

$$InfoAsy = \beta_0 + \boldsymbol{\beta_1 EDGAR_{it}} + Controls_{it} + \epsilon_{it} \quad (2)$$

Where *InfoAsy* equals either the mean of daily CRSP bid-ask spread scaled by the midpoint (*Spread*) for firm *i* during quarter *t*, or Amihud's (2002) illiquidity measure, which is the mean of the daily absolute value of stock returns divided by the dollar value of trading volume during the quarter (*Iliquidity*) for firm *i* during quarter *t*. I use a window of +5 trading days relative to the prior earnings announcement to -5 trading days relative to the current earnings announcement to calculate both *InfoAsy* measures.[13] *EDGAR* is an indicator variable equal to one for quarters following firms' adoption of EDGAR. A significantly negative (positive) coefficient on $\boldsymbol{\beta_1}$ would be consistent with overall decreases (increases) in total information asymmetry following the EDGAR implementation.

I include several controls that prior research finds are related to information asymmetry. I define *Size* as the natural logarithm of each firm's market value at the beginning of the quarter. I include this variable as a control because larger firms typically have stronger information environments and less of an information asymmetry problem and also to control for inventory risk (Heflin et al. 2005). In addition, I control for *Coverage*, defined as the log of one plus the number of analysts covering a firm during the quarter to control for the effect of information intermediaries. *InstOwn* is the percentage of firms' shares owned by institutions for the quarter. Prior research finds that there is less informed trading in firms with a higher proportion on institutional ownership (O'Neill and Swisher 2003). *PriceBeg* is the natural log of ending price at the beginning of the quarter to control for processing costs (Stoll 1978). I also include *Turnover* as the median daily turnover for each firm during the quarter to control for liquidity that affects inventory holding costs, and *Volatility* measured as the standard deviation of the firm's daily stock returns during the quarter as an additional control for inventory risk. Finally, I also include firm- and year quarter-fixed effects as controls and cluster standard errors by firm.

[13] I exclude earnings announcement days when calculating bid-ask spread and illiquidity to explore whether my results are not attributable to earnings announcement effects. Prior research finds that earnings announcements significantly reduce bid-ask spreads (e.g., Lee et al. 1993; Amiram et al. 2016). However, in untabulated analyses, I repeat my analyses using average spreads and illiquidity for the calendar quarter as my dependent variables. Inferences remain the same.

6. Results

6.1 Increased dissemination and asymmetries among investors

Table 2 presents results from estimating Equation 1, or tests of changes in KV's measure of information asymmetry among investors around the EDGAR implementation. If the EDGAR implementation resulted in increases (decreases) in information asymmetry among investors, I expect to observe increases (decreases) in KV's proxy following firms' adoption of EDGAR. The advantage of relying on KV's measure is that it captures only one type of information asymmetry (i.e., information asymmetry among investors), whereas other common liquidity proxies capture both types of information asymmetry. The first three columns of Table 2 present a baseline model with no controls and the fourth to sixth columns include controls. The first and fourth columns include firm fixed effects and cluster standard errors by firm. The second and fifth columns add quarter-fixed effects, and the third and sixth columns also include the interaction of a time index variable and an implementation group indicator to control for possible time trends. The coefficient on the *EDGAR×Return* interaction term is significantly positive for all columns, suggesting that the portion of volume related to absolute price changes around earnings announcements increases following the EDGAR implementation. Relative to the coefficient on *Return* for the whole sample (.095), the coefficient on *Return* in the EDGAR period (0.106) is 1.11 times higher. This evidence suggests that the EDGAR implementation resulted in higher levels of information asymmetry among investors. I repeat my analyses for each of the EDGAR implementation groups and present results in Table 3. Overall, results in Table 3 are largely consistent with Table 2. Specifically, the coefficient on the *EDGAR×Return* interaction term is significantly positive for eight out of ten implementation groups and insignificant for two groups.

6.2 Increased dissemination and asymmetries between managers and investors

Table 4 reports results from estimating Equation 2, or tests of changes in bid-ask spread and illiquidity around the EDGAR implementation. It is important to recall that bid-ask spread and illiquidity capture both information asymmetry between managers and investors and among investors, or total information asymmetry. The dependent variable equals *Spread* (*Illiquidity*) in Columns 1 to 3 (4 to 6).

The first and fourth columns include firm-fixed effects and cluster standard errors by firm. The second and fifth columns add quarter-fixed effects, and the third and sixth columns also include the interaction of a time index variable and an implementation group indicator to control for time trends. The coefficient on *EDGAR* is significantly negative at the 1% level in all columns, suggesting that firms' *total* information asymmetry decreased following the EDGAR implementation. Focusing on Columns 3 and 6, bid-ask spreads decreased 4.7% (.002/.0422), and illiquidity levels decreased 6.2% (.039/.6287) relative to the sample mean.

I also estimate Equation 2 for each of the EDGAR implementation groups individually and present results in Table 5. Panel A and Panel B tabulate regressions where the dependent variable equals *Spread* and *Illiquidity*, respectively. Overall, results in Table 5 are largely consistent with results in Table 4. In Panel A, the coefficient on *EDGAR* is significantly negative for seven out of ten implementation groups, significantly positive for one implementation group, and insignificant for two implementation groups. In Panel B, the coefficient on *EDGAR* is significantly negative for eight implementation groups and insignificant for two implementation groups.

Taken together, results in Tables 2 and 3 and Tables 4 and 5 suggest that the EDGAR implementation had opposite effects on information asymmetry between managers and investors versus among investors. On the one hand, the results in Table 2 are consistent with increases in information asymmetry among investors. In contrast, the results in Table 4 are consistent with declines in *total* information asymmetry. Because these tests produce results in opposite directions, I can infer that information asymmetry between managers and investors declined, and that the decline was large enough to more than offset the increase in information asymmetry among investors.[14]

To summarize, my results suggest that while the EDGAR implementation decreased information asymmetry between managers and investors, it had the unintended consequence of providing some investors with an informational advantage over others. This result is important given a major concern for

[14] These results also complement Gao and Huang's (2019) evidence suggesting that trades by individual investors become more informative after EDGAR implementation. Together, Gao and Huang's results, along with my analyses, suggest that while EDGAR helped individual investors better understand firm fundamentals, it also widened the information gap between the less- and more-sophisticated.

regulators is the welfare of less-sophisticated investors (Healy and Palepu 2001). While my main tests do not identify the specific mechanism through which the decreases (increases) in information asymmetry between managers and investors (investors) occur, they are consistent with theory suggesting that decreases in information acquisition costs can incentivize more-sophisticated investors to acquire additional private information, widening the informational gap among investors (e.g., Kim and Verrecchia 1994). These results also highlight the importance of distinguishing among information asymmetry types when studying the effects of disclosure on information asymmetry.

7. Additional analyses

7.1 Validation test of KV's measure

One potential issue with my empirical strategy is that while prior studies have used KV's measure (e.g., Amhed et al. 2003; Hope et al. 2009; Barron et al. 2018), prior research has not provided validating evidence that KV's measure captures information asymmetry among investors. In fact, in reviewing the volume literature, Bamber et al. (2011) suggest that "[researchers] would benefit from further research validating [KV's] proxy…because it reflects information asymmetry-an unequal information playing field- that is of particular concerns to regulators." (p.458). Given the importance of employing a reliable measure that captures only one of the two information asymmetry types in my empirical strategy, I provide evidence validating KV's measure using a known exogenous shock to information asymmetry among investors to construct a difference-in-differences test.

I rely on exogenous increases to information asymmetry among investors to validate KV's measure. Specifically, I exploit brokerage house mergers and closures that result in the loss of analyst coverage for affected firms. This setting has been used extensively in both the finance and accounting literatures (e.g., Kelly and Ljungqvist 2012; Hong and Kacperczyk 2010; Chen et al. 2018). Kelly and Ljungqvist (2012) provide evidence that the loss of analyst coverage due to brokerage house mergers and closures leads to exogenous increases in information asymmetry among investors.[15] These mergers and

[15] Kelly and Ljungqvist (2012) use measures that capture total information asymmetry (i.e., bid-ask spread and illiquidity) for their analyses. If KV's measure captures information asymmetry between more- and less-sophisticated investors, I should also observe increases in KV's measure following exogenous drops in analyst coverage.

closures result in exogenous increases in information asymmetry among investors (i.e., they do not affect information asymmetry between insiders and outsiders) because professional analysts provide information that is, for the most part, new to less-sophisticated investors and that more-sophisticated investors already possess (e.g., Amiram et al. 2016). I obtain a list of broker mergers and closures from Hong and Kacperczyk (2010) and Kelly and Ljungqvist (2012). I also obtain several additional mergers and closures from Chen et al. (2018). I use the IBES Translation File to link broker names to its respective IBES broker code. My final sample is composed of 37 closures and mergers from 1994 through 2013.

Figure 3 illustrates the timeline I use to construct a sample of firms affected by broker mergers and closures. Consistent with Hong and Kacperczyk (2010), I define month zero as the month of the brokerage house closure or merger. I define a 'pre-period' as months -3 through -15 relative to the event month, and a 'post period' as months +3 through +15 relative to the event month (Figure 3). I assume that a brokerage house covers a firm in the pre- (post-) period if there is at least one forecast about the firm in the pre- (post) period. In terms of treatment firms retained from brokerage house mergers, I require firms to be covered by analysts from both the bidder and target in the pre-period, and that only one analyst from the merged entity continues to cover the firm in the post-period. This requirement assures the loss of one signal. In terms of treatment firms retained from brokerage house closures, I require the brokerage house to provide at least one forecast about the firm in the pre-period and retain those firms affected by the closure.

Moreover, to avoid retaining firms suffering from possibly endogenous coverage reductions, I exclude firms for which coverage is stopped before (i.e., any time in the pre-period) the merger/closure as per the IBES stop file. Finally, I exclude 'serially-affected' firms by requiring that my treatment firms are not affected more than once in a period of four quarters. This process yields a sample of 2,404 firms with all available data to compute variables of interest and controls.

I also construct a control sample composed of the universe of Compustat firms (excluding firms affected by broker closures and mergers) with non-missing data to calculate all variables matched two quarters preceding the event for each brokerage house merger and closure. I apply entropy balancing on the first, second, and third moments of all control variables to minimize all fundamental differences among my control and treatment samples both in the pre- and post- periods. Entropy balancing is a reweighting process that searches for a set of weights that satisfies specified balance conditions while retaining valuable information in the preprocessed data (Hainmueller 2012). This process means that both the treatment and control groups satisfy specified balance conditions and the first three moments of my control variables are exactly adjusted.

I retain up to four pre- and post-earnings-announcement observations for each of my treatment and control firms.[16] Panel B of Table 1 tabulates the descriptive statistics for both treatment and control groups. Treatment firms seem to differ from control firms with respect to many of the control variables. These differences highlight the importance of implementing entropy balancing to minimize differences in variables across treatment and control samples.

I employ a difference-in-difference design around broker mergers and closures for my validation test of KV's proxy of information asymmetry among investors. I estimate the following OLS regression using quarterly data:

$$AbnVolume_{it} = \beta_0 + \beta_1 Treat_{it} + \beta_2 Post_{it} + \beta_3 Return_{it} + \beta_4 Treat_{it} \times Return_{it} + \beta_5 Post_{it} \times Return_{it} + \beta_6 Post_{it} \times Treat_{it} + \boldsymbol{\beta_7 Treat_{it}} \times \boldsymbol{Post_{it}} \times \boldsymbol{Return_{it}} + Controls_{it} + \epsilon_{it} \quad (3)$$

AbnVolume equals cumulative three-day share turnover around the earnings announcement date for firm *i* in quarter *t* less the median cumulative three-day share turnover of consecutive three-day periods during the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter t's earnings release date). *Treat* equals one for firms affected by brokerage house mergers and closures, and zero for control firms. *Post* is an indicator variable equal to one for earnings announcements up to four quarters after the event. *Return* is the absolute value of the three-day cumulative return around the earnings announcement date. The coefficient of interest in Equation 3 is $\boldsymbol{\beta_7}$, which is the difference-in-differences estimator of the portion of absolute price changes related to volume after brokerage house mergers and closures for treatment firms. A significantly positive

[16] I require every firm to have at least one pre and post observation. In addition, my results hold when requiring every observation to have exactly four pre and post observations and when extending the pre and post windows to eight quarters.

$\boldsymbol{\beta_7}$ would be consistent with increases in information asymmetry among investors as per KV's proxy. The controls for Equation 3 are equal to those in Equation 1.

Table 6 reports results from estimating Equation 3. Column 1 of Table 6 tabulates a baseline model and Column 2 presents a model including control variables.[17] The coefficient on the *Post*×*Treat*×*Return* interaction term is significantly positive in both columns. Relative to the coefficient for *Return* of the whole treatment sample (.259), the coefficient on *Return* of treatment firms in the post period (.267) is 1.03 times higher.[18] Increases in the correlation between trading volume and absolute price changes around earnings announcements for a sample of treatment firms relative to control firms is consistent with KV's measure effectively capturing information asymmetry among investors. To my knowledge, this is the first empirical validation of KV's proxy.

7.2 Cross-sectional test on filing complexity

My results thus far suggest that the EDGAR implementation resulted in increases in information asymmetry among investors. One explanation for this result is that more-sophisticated investors gained an informational advantage over less-sophisticated investors by better processing information in SEC filings, exacerbating informational differences among investor types. If this explanation holds, I expect increases in information asymmetry among investors to be stronger for firms with SEC filings that are more complex or difficult to process. The intuition is that more-sophisticated investors are better equipped to process more complex information than less-sophisticated investors, who may struggle to fully process complex filings. I rely on the readability of 10-K filings per the Bog Index data in Bonsall et al. (2017) as a proxy for filing complexity. Filings with higher (lower) Bog Index values are less (more) readable and thus more (less) difficult to process. I expect increases in information asymmetry among investors to be concentrated in firms with less readable filings, or higher values of the Bog Index.

I split my sample based on Bog Index values of 10-K filings and repeat the analysis in Table 2. Specifically, I first calculate the average Bog Index of 10-K filings for each firm across my sample period.

[17] The coefficient on *Post*×*Treat*×*Return* remains significantly positive if I include the interaction between *Post* and *controls*. However, the mean VIF increases to 21.52 versus 9.40 without the interactions.
[18] This percentage increase is similar to Kelly and Ljungqvist's (2012) results suggesting that bid-ask spreads increased on average by 1.8% to 2.1% following brokerage mergers and closures.

I then rank the average Bog Index values across all firms. I estimate Equation 1 for firms with higher and lower readability where the "higher" ("lower") sample includes all firms in the first (fourth) quartile of the Bog Index based on my rankings.[19] Table 7 presents the results of this analysis where Column 1 (2) tabulates the regression for firms with higher (lower) readability. Consistent with expectations, the coefficient on the *EDGAR×Return* interaction term is larger for firms with less readable filings. The difference between coefficients on the *EDGAR×Return* interaction term in both columns is significant at the 5% level.

7.3 Probability of private information events and insider trading profits

In this section, I examine the effect of EDGAR on the probability of private information events and insider trading profits to provide supporting evidence regarding my primary inferences. If more-sophisticated investors were able to process information on the EDGAR system into private information, I should observe increases in the probability of private information events as calculated by Brown and Hillegeist (2007). In addition, if EDGAR reduces information asymmetry between management and investors, I expect insiders to be able to profit less from their inside information (Kyle 1985; Baiman and Verrecchia 1996; Frankel and Li 2004). The intuition is that insiders' profitability of trades is a function of the informational advantage they possess over investors. Thus, my results in Table 2 (Table 4) suggest that I should observe increases (decreases) in the probability of private information events (the profitability of insider trades) following the EDGAR implementation.

I obtain quarterly data for the probability of private information events for 1993 to 1998 from Stephen Brown's website. I obtain insider trading data for the years 1991 to 1998 from Thomson Reuters. To test the effect of the EDGAR implementation on the probability of private information events (*Alpha*) and insider trading profits (*InsiderProfits*), I rely on the following OLS regressions:

$$Alpha_{it} = \beta_0 + \boldsymbol{\beta_1 EDGAR_{it}} + Controls_{it} + \epsilon_{it} \quad (5)$$

$$InsiderProfits_{it} = \beta_0 + \boldsymbol{\beta_1 EDGAR_{it}} + Controls_{it} + \epsilon_{it} \quad (6)$$

[19] I obtain the same results when comparing the bottom and upper 10%, 25%, and 50% of the observations.

In Equation 5, I define *Alpha* as the probability of a private information event for quarter *t* of firm *i*. This variable is one of the components of the probability of informed trading model used in Brown and Hillegeist (2007), and captures the percentage of days in the quarter that a private information event occurs.[20] Equation 5 includes the same controls as Equation 2: *Size, Coverage, InstOwn, PriceBeg, Turnover* and *Volatility*. If the EDGAR implementation allowed for more private information events, I should observe increases in *Alpha*, or a positive coefficient on $\boldsymbol{\beta_1}$.

In Equation 6, *InsiderProfits* is the average buy-and-hold return of insiders' trades (CEOs, CFOs, or COOs) for a given quarter. I use two return windows, i.e., 30-day and 180-day to calculate the buy-and-hold returns taking the position of each insider trade.[21] I include *Size* and *Coverage* as controls, which I defined as in Equation 2. In addition, I include firms' market-to-book ratio during the quarter (*MB*), return on assets (*ROA*), and the log of the average transaction amount in dollars (*TransactionPrice*).

Table 8 presents results from estimating Equation 5. Column 1 includes quarter-fixed effects and Column 2 includes quarter- and firm-fixed effects, allowing me to examine whether my results hold within firm and to explore whether the results are sensitive to these design choices. The coefficient on *EDGAR* is significantly positive in both columns, suggesting the probability of private information events increased following the EDGAR implementation.[22]

Table 9 presents results from estimating Equation 6. *InsiderProfits* over a 30-day (180-day) window is the dependent variable in Columns 1 and 2 (3 and 4). The coefficient on *EDGAR* is significantly negative in Columns 1, 3, and 4, and insignificant in Column 2. These results are generally consistent with the profitability of insider trades decreasing following the EDGAR implementation, or decreases in information asymmetry between managers and investors. Overall, the results in Tables 8 and 9 are consistent with my main results in Tables 2 and 4, suggesting that information asymmetry between managers and investors (among investors) decreased (increased) following the EDGAR implementation.

[20] Brown and Hillegeist (2007) calculate the probability of informed trading (PIN) and its components, including *Alpha* based on the Venter and de Jongh (2004) extension of the Easley, Kiefer, and O'Hara (1997) model. This data can be found in Stephen Brown's website at http://scholar.rhsmith.umd.edu/sbrown/pin-data. Last accessed October 2019.

[21] I examine share purchases and sells together. However, in untabulated analyses, my inferences are similar if I split my sample between purchases and sells.

[22] In untabulated analyses, I repeat my tests from Tables 2 and 4 after dropping observations that are missing *Alpha* data. All inferences remain the same.

7.4 Bid –ask spread analysis around 10-K filings

My results are also consistent with EDGAR implementation providing a way for more-sophisticated investors to acquire additional private information. Because more-sophisticated investors are better able to process public information into private information than less-sophisticated investors, this processing advantage results in increases in information asymmetry among investors. Prior research and theory suggest there are detectible increases in bid-ask spread upon the release of information that is new to all investors, and that these increases are due to more-sophisticated investors' superior processing ability (e.g., Kim and Verrecchia 1994; Amiram, et al. 2016).[23] The logic behind this notion is that during the short window around the 10-K filing date, increases information asymmetry among investors should be large enough to more than offset decreases in information asymmetry between managers and investors, therefore I should observe increases in bid-ask spread around those dates.

I examine daily spread levels around 10-K filings through the following OLS regression:

$$Spread_{id} = \beta_0 + \boldsymbol{\beta_1 DAY0_{id}} + \boldsymbol{\beta_2 DAYp1_{id}} + \boldsymbol{\beta_3 DAYp2_{id}} + \boldsymbol{\beta_4 DAYp3_{id}} + \boldsymbol{\beta_5 DAYp4_{id}} + \boldsymbol{\beta_6 DAYp5_{id}} + Controls + \epsilon_{id} \quad (4)$$

I focus on 10-K filings because prior research finds these filings move prices and contain important information not provided by other means such as earnings announcements (Griffin 2003). *Spread* equals bid-ask spread from CRSP scaled by the midpoint of firm *i* on day *d*. *DAY0* is an indicator variable equal to one for the release date of the 10-K filing in the EDGAR system. Likewise, *DAYp1, DAYp2, DAYp3, DAYp4,* and *DAYp5* are indicator variables equal to one for days one, two, three, four, and five after the publication of the SEC filing on EDGAR, respectively. I include several control variables around filing dates, such as *Price,* defined as firm *i*'s stock price on day *d*, *Volume* defined as firm *i*'s trading share volume on day *d*, and *CAR* which is the cumulative abnormal three-day return around the filing date to control for differential news content. I also include *InstOwn, Turnover,* and *Size,* which I define as in prior tests. I include seven daily observations per filing date, or days minus one through plus five around the

[23] I contrast, if an information release contains information that is new only to less-sophisticated investors and that more-sophisticated investors already possess, then this information release would lead to immediate decreases in bid-ask spread around the information release dates (Amiram et al. 2016).

filing date.[24] Finally, I also include a combination of year-, quarter-, and firm-fixed effects and cluster standard errors by firm. A significantly positive coefficient on any of the daily indicator variables would suggest higher spreads following the 10-K filing date on EDGAR relative to the day prior to the filing date, which the intercept reflects.

Table 10 presents estimations of Equation 4. Column 1 includes year-fixed effects and Column 2 includes quarter- and firm-fixed effects, allowing me to examine whether my results hold within firm. Overall, results in Table 8 provide evidence consistent with increases in bid-ask spread around 10-K filing dates. Specifically, both columns indicate a significantly positive coefficient on most indicator variables starting with *DAYp1*, indicative of higher information asymmetry around 10-K filing dates. These results are consistent with prior research suggesting that prices tend to move the day of, and on the first or two days immediately following the upload date.[25] Overall, the evidence in Table 10 is consistent with EDGAR filings significantly affecting the informedness of *both* more- and less-sophisticated investors, and more-sophisticated investors obtaining an informational advantage over less-sophisticated investors by integrating information in SEC filings.

7.5 Robustness Tests

7.5.1 Tests of bid-ask spread and analyst coverage around brokerage house mergers and closures

Part of my analyses rely on the assumption that brokerage house mergers and closures resulted in declines in analyst coverage and increases in information asymmetry among investors for affected firms. Next, I examine changes in bid-ask spread and analyst coverage around my sample of brokerage house mergers and closures to validate my setting. I estimate the following difference-in-differences regression around brokerage house closures and mergers with *Spread* as the dependent variable:

$$Spread_{it} = \beta_0 + \beta_1 Treat_{it} + \beta_2 Post_{it} + \boldsymbol{\beta_3 Treat_{it}} \times \boldsymbol{Post_{it}} + Controls + \epsilon_{it} \qquad (7)$$

Where I define *Spread* and *Controls* as in Table 4. *Treat* is an indicator variable equal to one for firms affected by brokerage house closures and mergers and zero otherwise. *Post* is an indicator variable

[24] Since prior research finds evidence of increases in spreads around earnings announcements (Lee et al. 1993; Amiram et al. 2016), I exclude filings that are uploaded within 10 days of an earnings announcement to avoid confounding effects.
[25] The up to two-day delay for spread and price reactions is likely due to the 24 hours the SEC required to process and make available the filings on the EDGAR system during my sample period (Griffin 2003).

equal to one (zero) for quarters prior (following) the event. I include firm-fixed effects and cluster standard errors by firm. I expect a significantly positive coefficient on *Treat*×*Post,* consistent with increases in bid-ask spreads for firms experiencing exogenous decreases in coverage relative to a control group.

Similarly, I follow Chen et al. (2018) and estimate the following difference-in-differences regression with analyst coverage as the dependent variable:

$$Coverage_{it} = \beta_0 + \beta_1 Treat_{it} + \beta_2 Post_{it} + \boldsymbol{\beta_3 Treat_{it}} \times \boldsymbol{Post_{it}} + \epsilon_{it} \tag{8}$$

For Equation 8, *Coverage* is the number of analysts reporting a yearly EPS forecast for a given firm. *Treat* is an indicator variable equal to one for affected firms and zero for control firms.[26] *Post* is an indicator variable equal to one (zero) for the year prior (following) the event. In addition, I cluster standard errors by event.

Table 11 presents results of both Equations 7 and 8. Panel A presents the results of Equation 7, where Column 1 presents a baseline regression model and Column 2 includes controls (omitted for brevity). I find significantly positive coefficients for the difference-in-differences estimator (the *Post*×*Treat* interaction term), suggesting that relative to control firms, firms experiencing exogenous decreases in analyst coverage experience increases in bid-ask spread.

Panel B of Table 11 tabulates the results of Equation 8. The difference-in-differences estimator *Treat*×*Post* is significantly negative at the 1% level. This result suggests that from the pre to the post window, analyst coverage decreases for treatment firms relative to control firms.

7.5.2 Entropy balancing and exclusion of early adopters

To mitigate concerns about nonrandom assignment of groups, I repeat my analyses in Tables 2 and 4 using entropy balancing. In addition, I also repeat these analyses excluding the first implementation group, which is composed of some voluntary early adopters. I tabulate the results of these two analyses in Table 12. My inferences are unchanged.

[26] In terms of my control sample, I follow a similar methodology as in my tests of KV's measure around drops in analyst coverage. That is, I employ entropy balance matching on all of my control variables in both Equations 7 and 8.

7.5.3 Other robustness tests

Though untabulated, I perform several other sensitivity analyses. First, recall that I exclude observations with Cook's D values higher than 4/N in all my tests. I also employ alternate methods to mitigate the influence of outliers in all my tests, which include winsorizing all variables at the 99th and 1st percentiles, using robust regression, and excluding observations with studentized residuals greater than 1, 2, and 3. All inferences remain the same. Second, following the advice regarding empirical measures of volume in Bamber et al. (2011), I repeat my analyses in Table 5 replacing the dependent variable *AbnVolume* with an unadjusted measure of volume and with unlogged values of *AbnVolume* (see Section 3 of Bamber et al., 2011 for more detail). All my results hold. Third, I employ an alternate matching method to construct a control sample for my validation test of KV's measure. Specifically, I match on two-digit SIC and calendar quarter and again use entropy balancing on all controls. Results also hold. Finally, given decreases in tick size starting in 1997 that affected the size of bid-ask spreads (Goldstein and Kavajecz 2002), I examine whether main results are robust to excluding observations from 1997 and later years. Again, all inferences remain the same.

8. Conclusion

I study the effect the implementation of the EDGAR system on two information asymmetry types, i.e., (1) between firms' managers and investors, and (2) among investors. My results suggest that the EDGAR implementation resulted in decreases in information asymmetry between managers and investors, as per analysis of bid-ask spreads and Amihud's (2002) measure of illiquidity. However, I also find that the EDGAR implementation resulted in increases in information asymmetry among investors, as per KV's volume-based proxy for information asymmetry among investors. Together, my results suggest that while the EDGAR implementation decreased total information asymmetry, it also had the unintentional consequence of widening the informational gap among investors.

My analyses make three contributions. First, my study provides evidence relevant to the broader issue of the consequences of how accounting information is disseminated. Specifically, my paper directly answers the call in Blankespoor et al. (2019) for research "evaluating the benefits and costs of financial reporting technologies" and to "assess how technologies affect different investor groups." Indeed, my results are directly consistent with the conjecture in Blankespoor et al. (2019) that, "if increasingly sophisticated technologies reduce processing costs primarily for large institutions, increased asymmetries among investors could negatively affect liquidity and other market outcomes" (p.72). These results highlight the importance of examining the effect disclosure technologies can have on different investors. This evidence should be of interest not only to academics, but also to regulators such as the SEC, who frequently express concern about information disparities among investors.

Second, I contribute to the literature related to the consequences of the EDGAR system. The implementation of EDGAR is perhaps one of the most substantial changes in the provision of financial information to the public since the Securities Acts of the 1930's, yet there is very little research on the effects of its initial implementation. Prior research does not identify the effects of the EDGAR implementation of information asymmetry and market liquidity. I find evidence suggesting that the EDGAR implementation provided a net benefit in terms of reducing overall information asymmetry, but also provided a mechanism by which some investors could benefit at the expense of others. Future research may examine whether this disproportionate influence on different investor groups is an unavoidable cost associated with making more financial information available.

Finally, I contribute to the volume literature by providing an explicit, exogenous test of KV's theory suggesting that the portion of trading volume related to absolute price changes around the earnings announcement information asymmetry among investors. While prior studies rely on KV's measure (e.g., Amhed et al. 2003; Hope et al. 2009; Barron et al. 2018), this is the first study to date to test the relation between KV's proxy for belief revisions and its true theoretical construct- information asymmetry among investors. Providing this evidence is important given the prominence of trading volume studies since Beaver's (1968) seminal study, which rely on volume theory to assess how investors utilize information in anticipation of, and in conjunction with information releases.

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APPENDIX A

Variable Definitions

Variable	**Definition**
AbnVolume	The log of cumulative three-day share turnover around the EA date (shares traded as a percentage of shares outstanding at the time of the EA) less the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter *t*'s earnings release date).
Alpha	The percentage of days in which a private information event occurs as defined in Brown and Hillegeist (2007). This variable is an input for the probability of informed trading based on the Venter and de Jongh (2004) extension of the Easley, Kiefer, and O'Hara (1997) model.
BogIndex	The bog readability index of Form 10-K filings as defined as in Bonsall et al. (2017).
CAR	The cumulative abnormal three-day return around the 10-K filing date.
Coverage	The log of one plus the number of analysts covering a firm during the quarter. In Panel B of Table 9, *Coverage* is defined as the number of analysts reporting a yearly EPS forecasts for a given firm.
*DAY**	*DAY0* is an indicator variable equal to 1 for the day the EDGAR filing is released, and zero otherwise. *DAYp1* is an indicator variable equal to one for the day immediately after the release of the 10-K filing, and zero otherwise. Likewise *DAYp2* is an indicator for the second day after the release of the 10-K filing, etc.
EDGAR	An indicator variable equal to one for quarters following EDGAR implementation and zero otherwise.
Illiquidity	The average of daily illiquidity during the non-announcement period where daily illiquidity is calculated as the absolute value of stock returns divided by the dollar value of trading volume.
InsiderProfits (30-day)	The average 30-day buy-and-hold return of insider trades from CEOs, CFOs, and COOs for a given quarter.
InsiderProfits (180-day)	The average 180-day buy-and-hold return of insider trades from CEOs, CFOs, and COOs for a given quarter.
InstOwn	The percentage of firms' shares owned by institutions.
MarketTurn	Median share turnover of the sample firms for the same time as the announcement period (three days around the earnings announcement).

MB	The market-to-book ratio at the beginning of the quarter.
Post	An indicator variable equal to one (zero) for four quarters following (prior) brokerage house mergers/closures.
Price	Natural log of ending price two days before the earnings announcement.
Price (10K analysis)	Firm's *i* stock price on day *d*, relative to the release of the 10-K report on the EDGAR system.
PriceBeg	Natural log of ending price at the beginning of the quarter.
ProgTrade	Non-announcement period correlation between daily trading volume and daily absolute return. The non-announcement period is defined as all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter *t*'s earnings release date.
Return	Absolute value of the three-day cumulative return around the earnings announcement date.
ROA	Net income divided by total assets at the beginning of the quarter.
Size	The natural logarithm of firm *i*'s market value at the beginning of the period.
Spread	The average bid-ask spread during the non-announcement period, where bid-ask spread is firm's *i* bid-ask spread on trading day *d* from CRSP scaled by the midpoint and multiplied by 1000.
TransactionPrice	The log of the average transaction amount of insider trades in dollars for the quarter.
Treat	An indicator variable equal to one for firms affected by brokerage house mergers and/or closures and zero otherwise.
Turnover	Median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter *t*'s earnings release date) times 1000.
Volatility	The standard deviation of the firm's daily stock returns during the quarter.
Volume	Firm *i*'s trading share volume on day *d*.

FIGURE 1

Effect of Increases in the Dissemination of Mandatory Information on Information Asymmetry Types

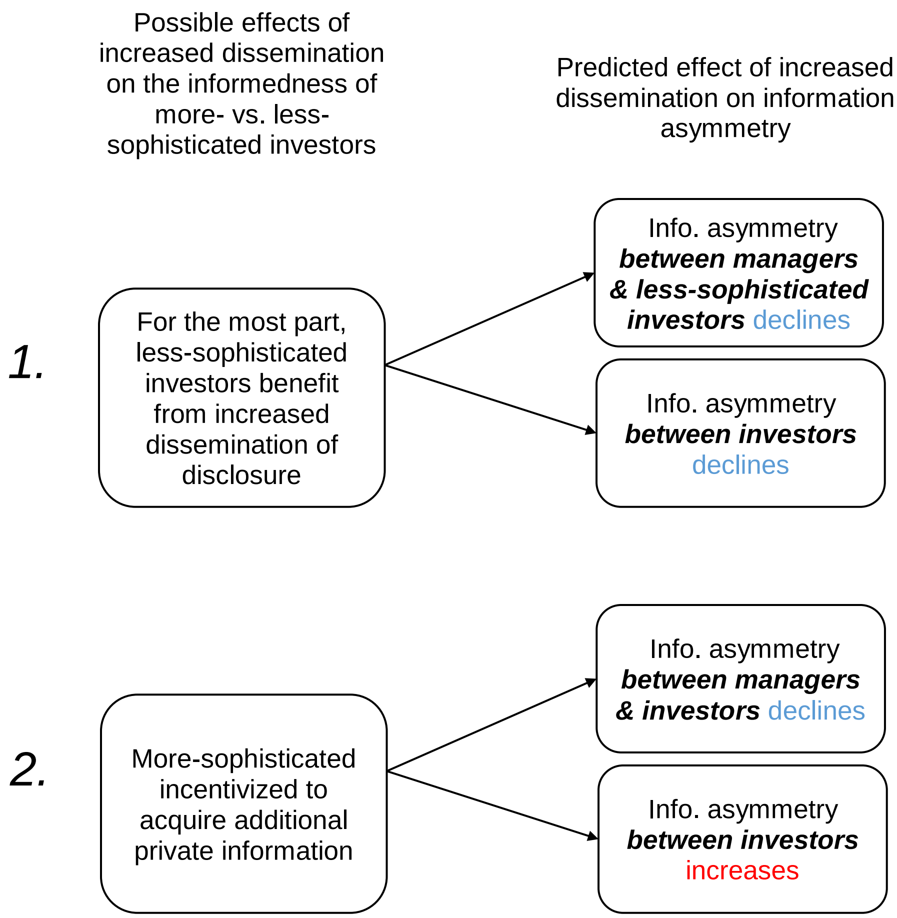


FIGURE 2

Panel A: Timeline of the SEC's EDGAR Implementation

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10
Date of Implementation:	***Apr '93***	***Jul '93***	***Oct '93***	***Dec '93***	***Aug '94***	***Nov '94***	***May '95***	***Aug '95***	***Nov '95***	***May '96***
# of Firms:	*230*	*729*	*689*	*898*	*1,404*	*1,381*	*1,370*	*1,322*	*1,256*	*2,106*

This panel plots the timeline of the SEC's EDGAR system implementation. Firms adopted EDGAR in 10 groups, the first of which adopted the system in April of 1993 and the last in May of 1996. See SEC Release 33-6977 on February 23, 1993 for more details.

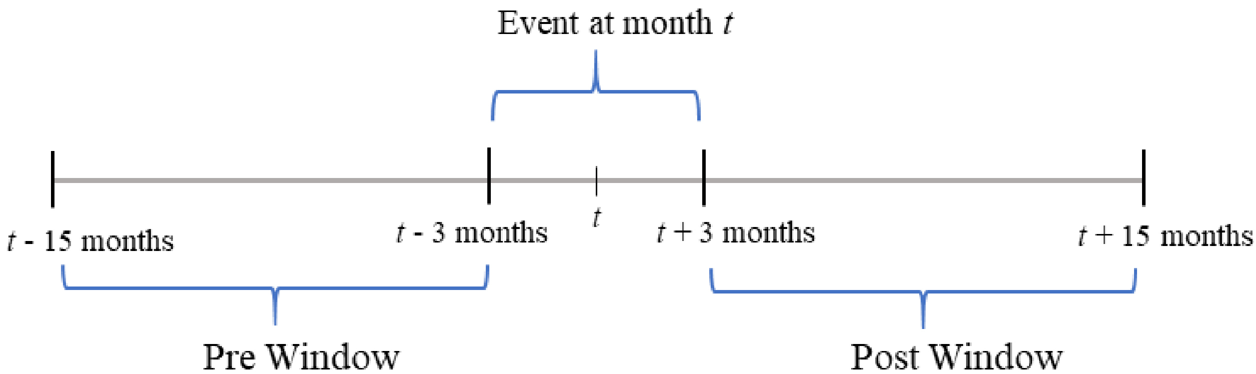
Panel B: Mean Descriptive Statistics by Implementation Group

Variable	*Group 1*	*Group 2*	*Group 3*	*Group 4*	*Group 5*	*Group 6*	*Group 7*	*Group 8*	*Group 9*	*Group 10*
AbnVolume	0.0074	0.0064	0.0076	0.0100	0.0124	0.0132	0.0125	0.0122	0.0110	0.0156
Alpha	0.5904	0.5910	0.6341	0.6530	0.6668	0.6741	0.6782	0.6674	0.6499	0.6367
BogIndex	77.390	76.168	76.908	77.323	77.859	79.632	79.744	79.603	76.399	81.273
Coverage	7.9014	8.4130	4.4226	2.9281	1.7918	1.0857	0.6613	0.5922	1.2153	2.2191
EDGAR	0.7008	0.6793	0.6463	0.6068	0.5210	0.4952	0.4481	0.4686	0.5024	0.3461
Illiquidity	0.1281	0.0381	0.1573	0.3191	0.7622	1.1161	1.3655	1.2475	0.8785	0.6258
InsiderProfits30	0.0492	0.0333	0.0341	0.0556	0.0692	0.0783	0.1047	0.0640	0.0150	0.0572
InsiderProfits180	0.1482	0.0770	0.0596	0.1557	0.2067	0.2355	0.3746	0.3666	0.2753	0.1407
InstOwn	0.4871	0.5316	0.4801	0.4099	0.3196	0.2115	0.1206	0.0973	0.2001	0.3000
MarketTurn	5.5317	5.4830	5.4617	5.4322	5.4423	5.4607	5.5139	5.6609	5.8331	5.7444
MB	3.3009	2.1969	2.6007	2.2379	2.5411	2.8521	4.1036	4.4068	3.6289	2.5268
PriceBeg	3.3566	3.4101	2.9478	2.6617	2.2912	1.8445	1.4134	1.3257	1.6583	2.1905
Price	3.3855	3.4336	2.9658	2.6847	2.3210	1.8768	1.4474	1.3467	1.6831	2.1807
ProgTrade	0.3062	0.3098	0.2865	0.2852	0.2808	0.2868	0.2934	0.3065	0.2885	0.2940
Return	0.0390	0.0362	0.0407	0.0468	0.0586	0.0701	0.0758	0.0779	0.0652	0.0644
ROA	0.0108	0.0110	0.0104	0.0096	0.0078	-0.0001	-0.0069	-0.0225	-0.0051	-0.0113
Size	7.6909	7.8525	6.2338	5.3503	4.3988	3.6593	3.1662	3.2062	4.0556	4.5296
Spread	0.0195	0.0171	0.0256	0.0309	0.0445	0.0577	0.0720	0.0703	0.0587	0.0478
TransactionPrice	12.083	12.259	11.318	11.196	11.005	10.614	10.481	10.144	10.550	10.931
Turnover	7.7405	8.2244	8.0186	8.6544	9.4562	10.0837	9.6654	11.0689	10.6394	13.7395
Volatility	0.0205	0.0189	0.0229	0.0268	0.0353	0.0445	0.0513	0.0539	0.0477	0.0420

This panel reports descriptive statistics by implementation group for all firm-quarter observations in my sample. Specifically, I define my sample period from two years before the starting date of the first group of EDGAR filers (April 1991) to two years after the group of the last filers (May 1998). Therefore, my sample includes all earnings announcements for all matched firms from April 1991 to May 1998. Table 1a presents descriptive statistics for my full sample consisting of 70,501 quarterly observations. ***AbnVolume*** is the natural logarithm of cumulative three-day share turnover around the EA date (shares traded as a percentage of shares outstanding at the time of the EA) less the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter *t*'s earnings release date). ***Alpha*** is the percentage of days in which a private information event occurs as defined in Brown and Hillegeist (2007). ***BogIndex*** is the bog readability index of Form 10-K filings as defined in Bonsall et al. 2017. ***Coverage*** is the log of number of analysts covering a firm during the quarter. In Table 8, *Coverage* is defined as the number of analysts reporting a yearly EPS forecasts for a given firm. ***EDGAR*** is an indicator variable equal to one for quarters following EDGAR implementation and zero otherwise. ***InsiderProfits30 (180)*** is the average 30-day (180-day) buy-and-hold return of trades from CEOs, CFOs, and COOs for a given quarter. ***Illiquidity*** is the average of daily illiquidity during the non-announcement period where daily illiquidity is calculated as the absolute value of stock returns divided by the dollar value of trading volume. ***InstOwn*** is the percentage of firms' shares owned by institutions. ***MarketTurn*** is the median share turnover of the sample firms for the same time as the announcement period (three days around the earnings announcement. ***MB*** is the market-to-book ratio at the beginning of the quarter. ***Price*** is the natural log of ending price two days before the earnings announcement. ***PriceBeg*** is the natural log of ending price at the beginning of the quarter. ***ProgTrade*** is the non-announcement period correlation between daily trading volume and daily absolute return. ***Return*** is the absolute value of the three-day cumulative return around the earnings announcement date. ***ROA*** is net income divided by total assets at the beginning of the quarter. ***Size*** is the natural logarithm of firm *i*'s market value at the beginning of the period. ***Spread*** is the average daily bid-ask spread during the non-announcement period, where daily bid-ask spread is firm's *i* bid-ask spread on trading day *d* from CRSP scaled by the midpoint and multiplied by 1000. ***TransactionPrice*** is the log of the average transaction amount of insider trades in dollars for the quarter. ***Turnover*** is the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter t's earnings release date) times 1000. ***Volatility*** is the standard deviation of the firm's daily stock returns during the quarter. Appendix A contains all variable definitions.

FIGURE 3

Timeline of Broker Disappearances



This figure plots the timeline I use to identify which firms lose analyst coverage due to brokerage mergers and closures. If a brokerage firm ceases to operate in month *t*, I assume that a given brokerage house covered a firm if there is at least one forecast about the firm during months *t*-15 to *t*-3. For brokerage mergers, I require that both the bidder and target provide at least one forecast about the firm in the pre window, and that the combined entity provides at least one forecast following the merger in the post window. For brokerage closures, I require that each brokerage house provide at least one forecast about the firm in the pre window.

TABLE 1

Panel A: *Descriptive Statistics for the EDGAR Implementation Sample*

Variable	*N*	*Mean*	*Std Dev*	*Q1*	*Median*	*Q3*
AbnVolume	70,501	0.0112	0.0273	-0.0001	0.0032	0.0119
Alpha	51,419	0.6483	0.3005	0.4148	0.6186	1.0000
BogIndex	70,501	78.375	8.034	73.000	78.000	83.666
Coverage	70,501	2.9619	4.6072	0.0000	1.0000	4.0000
EDGAR	70,501	0.5360	0.4987	0.0000	1.0000	1.0000
Illiquidity	70,501	0.6287	1.0022	0.0125	0.1203	0.8276
InsiderProfits30	4,431	0.0586	0.1744	-0.0382	0.0361	0.1256
InsiderProfits180	4,431	0.1695	0.6140	-0.1403	0.0612	0.3279
InstOwn	70,501	0.3363	0.2422	0.1171	0.3139	0.5316
MarketTurn	70,501	5.5097	1.3683	4.5285	5.4421	6.5133
MB	70,501	2.7348	41.0541	1.2078	1.9707	3.2842
PriceBeg	70,501	2.3852	1.0927	1.7047	2.5157	3.1987
Price	70,501	2.4070	1.0915	1.7047	2.5357	3.2189
ProgTrade	70,501	0.2905	0.2219	0.1278	0.2837	0.4467
Return	70,501	0.0563	0.0714	0.0154	0.0370	0.0745
ROA	70,501	0.0028	0.0667	0.0001	0.0116	0.0240
Size	70,501	4.9840	1.9611	3.5688	4.7968	6.2517
Spread	70,501	0.0422	0.0387	0.0168	0.0298	0.0531
TransactionPrice	4,431	11.1429	1.9099	9.7700	11.1544	12.4780
Turnover	70,501	9.7259	12.7483	2.7869	5.8848	11.3930
Volatility	70,501	0.0347	0.0232	0.0190	0.0290	0.0432

Panel A of Table 1 presents descriptive statistics for my full sample consisting of 70,501 quarterly observations. I define my sample period from two years before the starting date of the first group of EDGAR filers (April 1991) to two years after the group of the last filers (May 1998). Therefore, my samples include all earnings announcements for matched firms from April 1991 to May 1998. ***AbnVolume*** is the natural logarithm of cumulative three-day share turnover around the EA date (shares traded as a percentage of shares outstanding at the time of the EA) less the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter *t*'s earnings release date). ***Alpha*** is the percentage of days in which a private information event occurs as defined in Brown and Hillegeist (2007). ***BogIndex*** is the bog readability index of Form 10-K filings as defined in Bonsall et al. 2017. ***Coverage*** is the log of number of analysts covering a firm during the quarter. In Table 8, *Coverage* is defined as the number of analysts reporting a yearly EPS forecasts for a given firm. ***EDGAR*** is an indicator variable equal to one for quarters following EDGAR implementation and zero otherwise. ***InsiderProfits30 (180)*** is the average 30-day (180-day) buy-and-hold return of trades from CEOs, CFOs, and COOs for a given quarter. ***Illiquidity*** is the average of daily illiquidity during the non-announcement period where daily illiquidity is calculated as the absolute value of stock returns divided by the dollar value of trading volume. ***InstOwn*** is the percentage of firms' shares owned by institutions. ***MarketTurn*** is the median share turnover of the sample firms for the same time as the announcement period (three days around the earnings announcement. ***MB*** is the market-to-book ratio at the beginning of the quarter. ***Price*** is the natural log of ending price two days before the earnings announcement. ***PriceBeg*** is the natural log of ending price at the beginning of the quarter. ***ProgTrade*** is the non-announcement period correlation between daily trading volume and daily absolute return. ***Return*** is the absolute value of the three-day cumulative return around the earnings announcement date. ***ROA*** is net income divided by total assets at the beginning of the quarter. ***Size*** is the natural logarithm of firm *i*'s market value at the beginning of the period. ***Spread*** is the average daily bid-ask spread during the non-announcement period, where daily bid-ask spread is firm's *i* bid-ask spread on trading day *d* from CRSP scaled by the midpoint and multiplied by 1000. ***TransactionPrice*** is the log of the average transaction amount of insider trades in dollars for the quarter. ***Turnover*** is the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter t's earnings release date) times 1000. ***Volatility*** is the standard deviation of the firm's daily stock returns during the quarter. Appendix A contains all variable definitions.

Panel B: *Descriptive Statistics for Brokerage House Mergers and Closures Sample*

Treatment Sample

Variable	***N***	***Mean***	***Std Dev***	***Q1***	***Median***	***Q3***
AbnVolume	18,960	0.0295	0.0504	0.0031	0.0140	0.0375
Coverage	18,960	12.0094	7.6015	6.0000	11.0000	17.0000
InstOwn	18,960	0.6575	0.2491	0.5149	0.6996	0.8469
MarketTurn	18,960	10.8730	4.6583	6.7910	10.3923	14.2791
Post	18,960	0.4978	0.5000	0.0000	0.0000	1.0000
PriceBeg	18,960	3.1904	0.9149	2.7007	3.3232	3.8188
Price	18,960	3.1637	0.9282	2.6603	3.3071	3.8039
ProgTrade	18,960	0.3875	0.2067	0.2465	0.3892	0.5276
Return	18,960	0.0659	0.0711	0.0196	0.0449	0.0872
Size	18,960	7.8409	1.7652	6.6115	7.7595	9.0506
Spread	18,960	0.0072	0.0108	0.0009	0.0024	0.0094
Turnover	18,960	29.266	32.535	10.748	20.560	37.084
Volatility	18,960	0.0297	0.0185	0.0171	0.0247	0.0367

Control Sample

Variable	***N***	***Mean***	***Std Dev***	***Q1***	***Median***	***Q3***
AbnVolume	895,301	0.0185	0.0467	0.0002	0.0055	0.0205
Coverage	895,301	4.1198	5.2063	1.0000	2.0000	6.0000
InstOwn	895,301	0.4316	0.3081	0.1477	0.4056	0.6970
MarketTurn	895,301	10.2343	4.4956	6.6566	8.4063	13.6054
Post	895,301	0.4892	0.4999	0.0000	0.0000	1.0000
PriceBeg	895,301	2.4131	1.0991	1.6341	2.4901	3.2379
Price	895,301	2.3899	1.0976	1.5841	2.4604	3.2214
ProgTrade	895,301	0.3364	0.2267	0.1716	0.3297	0.4946
Return	895,301	0.0712	0.0840	0.0198	0.0470	0.0945
Size	895,301	5.6342	1.9433	4.2158	5.5328	6.8715
Spread	895,301	0.0207	0.0264	0.0026	0.0113	0.0287
Turnover	895,301	17.065	25.105	4.238	10.208	21.454
Volatility	895,301	0.0379	0.0256	0.0212	0.0315	0.0476

Panel B of Table 1 presents descriptive statistics the sample of firms affected by brokerage house closures and mergers and its control sample. ***AbnVolume*** is the natural logarithm of cumulative three-day share turnover around the EA date (shares traded as a percentage of shares outstanding at the time of the EA) less the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter *t*'s earnings release date. ***Coverage*** is the log of number of analysts covering a firm during the quarter. In Table 8, ***Coverage*** is defined as the number of analysts reporting a yearly EPS forecasts for a given firm. ***InstOwn*** is the percentage of firms' shares owned by institutions. ***MarketTurn*** is the median share turnover of the sample firms for the same time as the announcement period (three days around the earnings announcement). ***Price*** is the natural log of ending price two days before the earnings announcement. ***PriceBeg*** is the natural log of ending price at the beginning of the quarter. ***ProgTrade*** is the non-announcement period correlation between daily trading volume and daily absolute return. ***Return*** is the absolute value of the three-day cumulative return around the earnings announcement date. ***Size*** is the natural logarithm of firm *i*'s market value at the beginning of the period. ***Spread*** is the average daily bid-ask spread during the non-announcement period, where daily bid-ask spread is firm's *i* bid-ask spread on trading day *d* from CRSP scaled by the midpoint. ***Turnover*** is the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter t's earnings release date) times 1000. ***Volatility*** is the standard deviation of the firm's daily stock returns during the quarter. Appendix A contains all variable definitions.

TABLE 2

Effect of EDGAR on Information Asymmetry between Investors

	Dependent Variable: *AbnVolume*					
	[1]	[2]	[3]	[4]	[5]	[6]
EDGAR	0.000	-0.001***	-0.001***	0.001*	-0.001	-0.002**
	(0.53)	(-3.72)	(-3.75)	(1.67)	(-0.79)	(-2.44)
Return	0.079***	0.078***	0.079***	0.082***	0.082***	0.082***
	(41.69)	(41.72)	(41.73)	(44.34)	(44.18)	(44.30)
EDGAR×Return	**0.028*** **	**0.029*** **	**0.028*** **	**0.027*** **	**0.027*** **	**0.027*** **
	(10.20)	**(10.59)**	**(10.39)**	**(9.92)**	**(10.10)**	**(9.94)**
Size				-0.001***	-0.001***	-0.001***
				(-5.88)	(-4.28)	(-5.40)
ProgTrade				0.001***	0.001***	0.001***
				(3.98)	(3.97)	(3.99)
MarketTurn				0.001***	0.002***	0.002***
				(18.52)	(13.72)	(13.48)
Price				0.005***	0.005***	0.005***
				(23.03)	(22.78)	(23.46)
EDGAR×Size				0.000**	0.000***	0.001***
				(2.32)	(3.33)	(5.01)
EDGAR×ProgTrade				0.001	0.001**	0.001*
				(1.57)	(1.99)	(1.66)
EDGAR×MarketTurn				-0.001***	-0.000*	-0.000
				(-7.33)	(-1.77)	(-1.33)
EDGAR×Price				-0.000	-0.000**	-0.000***
				(-1.54)	(-2.41)	(-2.74)
Constant	0.007***	0.008***	0.011***	0.009***	0.008***	0.009***
	(103.93)	(64.94)	(6.70)	(90.62)	(59.42)	(5.88)
Observations	67,849	67,849	67,849	67,849	67,849	67,849
Fixed Effects	Firm	Firm/Qtr	Firm/Qtr	Firm	Firm/Qtr	Firm/Qtr
Cluster	Firm	Firm	Firm	Firm	Firm	Firm
Time Index × Group	No	No	Yes	No	No	Yes
Adjusted R-squared	0.263	0.272	0.272	0.290	0.297	0.298

Table 2 presents coefficients (t-statistics) from estimating Equation (1): $AbnVolume_{it} = \beta_0 + \beta_1 EDGAR_{it} + \beta_2 Return_{it} + \boldsymbol{\beta_3 EDGAR_{it} \times Return_{it}} + Controls_{it} + \epsilon_{it}$, or tests of the effect of EDGAR implementation on Kim and Verrecchia's (1997) measure of information asymmetry between investors. *AbnVolume* is the natural logarithm of cumulative three-day share turnover around the earnings announcement date less the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period. *EDGAR* is an indicator variable equal to 1 for quarters following firms' adoption of the EDGAR system and zero otherwise. *Return* is the absolute value of the three-day cumulative return around the earnings announcement date. *Controls* include the following variables: *Size* as the natural logarithm of firm *i*'s market value at the beginning of the period, *ProgTrade* which is the non-announcement period correlation between daily trading volume and daily absolute return, *MarketTurn* as the median share turnover of the sample firms for the same time as the announcement period (three days around the earnings announcement), and *Price* as the natural log of ending price two days before the earnings announcement. *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10) level. Appendix A contains all variable definitions.

TABLE 3

Effect of EDGAR on Information Asymmetry between Investors by Implementation Group

	Dependent Variable: *AbnVolume*									
	Group [1]	Group [2]	Group [3]	Group [4]	Group [5]	Group [6]	Group [7]	Group [8]	Group [9]	Group [10]
Post×Return	**0.036****	**0.015**	**0.019****	**0.017****	**0.031*****	**0.026*****	**0.028*****	**0.020**	**0.055****	**0.033*****
	(2.49)	**(1.31)**	**(2.35)**	**(2.27)**	**(5.39)**	**(3.93)**	**(3.04)**	**(1.52)**	**(2.41)**	**(4.19)**
Observations	2,009	7,244	8,217	10,315	13,530	9,397	5,325	2,481	602	8,729
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
EDGAR×Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.378	0.380	0.323	0.322	0.297	0.254	0.256	0.223	0.186	0.259

Table 3 presents coefficients (t-statistics) from estimating Equation (1): $AbnVolume_{it} = \beta_0 + \beta_1 EDGAR_{it} + \beta_2 Return_{it} + \boldsymbol{\beta_3 EDGAR_{it} * Return_{it}} + Controls_{it} + \epsilon_{it}$, or tests of the effect of EDGAR implementation on Kim and Verrecchia's (1997) measure of information asymmetry between investors by implementation group. *AbnVolume* is the natural logarithm of cumulative three-day share turnover around the earnings announcement date less the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period. *EDGAR* is an indicator variable equal to 1 for quarters following firms' adoption of the EDGAR system and zero otherwise. *Return* is the absolute value of the three-day cumulative return around the earnings announcement date. Controls (omitted for parsimony) include the following variables: *Size* as the natural logarithm of firm *i*'s market value at the beginning of the period, *ProgTrade* which is the non-announcement period correlation between daily trading volume and daily absolute return, *MarketTurn* as the median share turnover of the sample firms for the same time as the announcement period (three days around the earnings announcement), and *Price* as the natural log of ending price two days before the earnings announcement. The interactions for *EDGAR*Controls* are not tabulated for parsimony. *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10

TABLE 4

Effect of EDGAR on Measures Capturing Total Information Asymmetry

Dependent Variable:		*Spread*			*Illiquidity*	
	[1]	[2]	[3]	[4]	[5]	[6]
EDGAR	**-0.001*****	**-0.003*****	**-0.002*****	**-0.036*****	**-0.052*****	**-0.039*****
	(-3.70)	**(-9.66)**	**(-9.24)**	**(-5.78)**	**(-6.54)**	**(-4.94)**
Size	-0.005***	-0.005***	-0.005***	-0.155***	-0.158***	-0.152***
	(-14.91)	(-12.99)	(-12.91)	(-14.29)	(-13.30)	(-12.85)
Coverage	-0.000**	-0.000	0.000	-0.019***	-0.016***	-0.014***
	(-2.19)	(-0.75)	(0.24)	(-5.01)	(-3.89)	(-3.47)
InstOwn	0.000	-0.000	0.001	0.287***	0.279***	0.257***
	(0.54)	(-0.12)	(0.82)	(11.48)	(11.03)	(10.41)
PriceBeg	-0.003***	-0.004***	-0.004***	-0.098***	-0.099***	-0.099***
	(-8.71)	(-8.91)	(-9.68)	(-7.96)	(-7.58)	(-7.71)
Turnover	-0.001***	-0.001***	-0.001***	-0.019***	-0.019***	-0.019***
	(-47.61)	(-47.48)	(-47.61)	(-35.06)	(-34.12)	(-34.27)
Volatility	0.902***	0.906***	0.903***	18.203***	18.338***	18.213***
	(93.50)	(94.31)	(94.25)	(64.36)	(65.01)	(64.85)
Constant	0.024***	0.025***	0.013***	0.306***	0.305***	0.013
	(23.74)	(24.73)	(3.41)	(9.09)	(8.90)	(0.12)
Observations	67,063	67,063	67,063	66,131	66,131	66,131
Fixed Effects	Firm	Firm/Qtr	Firm/Qtr	Firm	Firm/Qtr	Firm/Qtr
Cluster	Firm	Firm	Firm	Firm	Firm	Firm
Time Index × Group	No	No	Yes	No	No	Yes
Adjusted R-squared	0.849	0.855	0.855	0.817	0.820	0.820

Table 4 presents coefficients (t-statistics) from estimating Equation (2): $InfoAsy = \beta_0 + \boldsymbol{\beta_1 EDGAR_{it}} + Controls_{it} + \epsilon_{i,d}$, or tests of the effect of EDGAR implementation on common measures that capture total information asymmetry. The dependent variable is *Spread* for columns [1], [2], and [3], and *Illiquidity* for columns [4], [5], and [6]. *Spread* is the average daily bid-ask spread during the non-announcement period, where daily bid-ask spread is firm's *i* bid-ask spread on trading day *d* from CRSP scaled by the midpoint and multiplied by 1000. *Illiquidity* is the average of daily illiquidity during the non-announcement period where daily illiquidity is the absolute value of stock returns divided by the dollar value of trading volume. *EDGAR* is an indicator variable equal to one for quarters following EDGAR implementation and zero otherwise. *Size* is defined as the natural logarithm of firm *i*'s market value at the beginning of the period. *Coverage* is the log of number of analysts covering a firm during the quarter. *InstOwn* is the percentage of firms' shares owned by institutions. *PriceBeg* is the natural log of ending price at the beginning of the quarter. *Turnover* is the median daily turnover for firm *i* during the quarter. *Volatility* is the standard deviation of the firm's daily stock returns during the quarter**.** *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10) level. Appendix A contains all variable definitions.

TABLE 5

Effect of EDGAR on Measures Capturing Total Information Asymmetry by Implementation Group

Panel A: *Spread* as the dependent variable

	Group [1]	Group [2]	Group [3]	Group [4]	Group [5]	Group [6]	Group [7]	Group [8]	Group [9]	Group [10]
EDGAR	**-0.005*****	**-0.005*****	**-0.000**	**0.002*****	**0.001**	**-0.003*****	**-0.006*****	**-0.006*****	**-0.006*****	**-0.008*****
	(-5.84)	**(-10.28)**	**(-0.55)**	**(3.83)**	**(1.56)**	**(-5.31)**	**(-6.15)**	**(-5.41)**	**(-2.83)**	**(-14.70)**
Observations	2,058	7,291	8,214	10,314	13,418	9,104	4,945	2,326	571	8,822
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Controls	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adjusted R-squared	0.853	0.805	0.820	0.789	0.800	0.811	0.800	0.827	0.861	0.841

Panel B: *Illiquidity* as the dependent variable

	Group [1]	Group [2]	Group [3]	Group [4]	Group [5]	Group [6]	Group [7]	Group [8]	Group [9]	Group [10]
EDGAR	**-0.001**	**0.003**	**-0.026*****	**-0.075*****	**-0.131*****	**-0.151*****	**-0.143*****	**-0.122*****	**-0.153****	**-0.110*****
	(-0.08)	**(0.46)**	**(-2.79)**	**(-6.89)**	**(-10.05)**	**(-7.96)**	**(-5.28)**	**(-2.86)**	**(-2.24)**	**(-6.19)**
Observations	2,002	7,234	8,154	10,265	13,254	8,851	4,802	2,275	545	8,749
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Controls	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adjusted R-squared	0.783	0.612	0.787	0.777	0.787	0.786	0.780	0.791	0.857	0.795

Table 5 presents coefficients (t-statistics) from estimating Equation (2): $InfoAsy = \beta_0 + \boldsymbol{\beta_1 EDGAR_{it}} + Controls_{it} + \epsilon_{i,d}$, or tests of the effect of EDGAR implementation on common measures that capture total information asymmetry by implementation group. The dependent variable is *Spread* for all columns in Panel A and *Illiquidity* for all columns in Panel B. *Spread* is the average daily bid-ask spread during the non-announcement period, where daily bid-ask spread is firm's *i* bid-ask spread on trading day *d* from CRSP scaled by the midpoint and multiplied by 1000. *Illiquidity* is the average of daily illiquidity during the non-announcement period where daily illiquidity is the absolute value of stock returns divided by the dollar value of trading volume. *EDGAR* is an indicator variable equal to one for quarters following EDGAR implementation and zero otherwise. Though excluded for parsimony, both panels include the following controls: *Size* defined as the natural logarithm of firm *i*'s market value at the beginning of the period. *Coverage* as the log of number of analysts covering a firm during the quarter. *InstOwn* as the percentage of firms' shares owned by institutions. *PriceBeg* as the natural log of ending price at the beginning of the quarter. *Turnover* is the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter t's earnings release date) times 1000. Lastly, *Volatility* as the standard deviation of the firm's daily stock returns during the quarter**.** *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10) level. Appendix A contains all variable definitions.

TABLE 6

Validation of KV's Measure of Information Asymmetry between Investors

Dependent Variable: *AbnVolume*

	[1]	[2]
Post	0.001***	0.001***
	(4.59)	(3.71)
Treat	-0.005***	-0.004***
	(-12.05)	(-11.72)
Return	0.188***	0.187***
	(66.56)	(66.90)
Treat×Return	0.053***	0.052***
	(7.66)	(8.21)
Post×Return	-0.012***	-0.006**
	(-4.52)	(-2.39)
Post×Treat	-0.001***	-0.001***
	(-3.66)	(-3.43)
Post×Treat×Return	**0.026*** **	**0.026*** **
	(3.17)	**(3.43)**
Size		-0.001***
		(-3.33)
ProgTrade		0.009***
		(25.57)
MarketTurn		0.001***
		(21.75)
Price		0.006***
		(19.33)
Constant	0.010***	-0.017***
	(55.87)	(-8.44)
Observations	882,964	882,964
Fixed Effects	Firm/Qtr	Firm/Qtr
Cluster	Firm	Firm
Adjusted R-squared	0.486	0.508

Table 6 presents coefficients (t-statistics) from estimating Equation (3): $AbnVolume_{it} = \beta_0 + \beta_1 Treat_{it} + \beta_2 Post_{it} + \beta_3 Return_{it} + \boldsymbol{\beta_4 Treat_{it}} \times \boldsymbol{Post_{it}} \times \boldsymbol{Return_{it}} + Controls_{it} + \epsilon_{it}$, or tests of changes in Kim and Verrecchia's (1997) measure of information asymmetry between investors following exogenous increases to information asymmetry due to brokerage house closures/mergers. *AbnVolume* is the natural logarithm of cumulative three-day share turnover around the earnings announcement date less the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period. *Treat* is an indicator variable equal to one for firms affected by broker closures/mergers, and zero otherwise. *Post* is an indicator variable equal to one (zero) for four quarters following (prior) brokerage house mergers/closures. *Return* is the absolute value of the three-day cumulative return around the earnings announcement date. *Size* is the natural logarithm of firm i's market value at the beginning of the period. *ProgTrade* is the non-announcement period correlation between daily trading volume and daily absolute return. *MarketTurn* is the median share turnover of the sample firms for the same time as the announcement period (three days around the earnings announcement). *Price* is the natural log of ending price two days before the earnings announcement. *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10) level. Appendix A contains all variable definitions.

TABLE 7

Effect of EDGAR on Information Asymmetry Between Investors
High vs. Low 10-K Filing Readability

Dependent Variable: *AbnVolume*

	Higher Readability	Lower Readability	Difference
	[1]	[2]	[2] - [1]
EDGAR	0.001	-0.000	
	(0.45)	(-0.11)	
Return	0.088***	0.090***	
	(21.56)	(21.32)	
EDGAR×Return	**0.021*** **	**0.041*** **	**0.020** **
	(3.28)	**(6.31)**	**(2.33)**
Size	-0.001***	0.001	
	(-1.45)	(2.72)	
ProgTrade	0.003***	0.009***	
	(4.06)	(9.54)	
MarketTurn	0.001***	0.002***	
	(4.70)	(6.63)	
Price	0.008***	0.011***	
	(13.32)	(15.42)	
EDGAR×Size	0.000***	-0.000	
	(3.09)	(-0.20)	
EDGAR×ProgTrade	0.001	0.001	
	(1.29)	(0.72)	
EDGAR×MarketTurn	-0.000	-0.000	
	(-1.63)	(-0.81)	
EDGAR×Price	0.000	0.001	
	(0.67)	(1.06)	
Observations	18,018	16,944	
Fixed Effects	Firm/Qtr	Firm/Qtr	
Cluster	Firm	Firm	
Adjusted R-squared	0.485	0.539	

Table 7 presents coefficients (t-statistics) from estimating Equation (1): $AbnVolume_{it} = \beta_0 + \beta_1 EDGAR_{it} + \beta_2 Return_{it} + \boldsymbol{\beta_3 EDGAR_{it} \times Return_{it}} + Controls_{it} + \epsilon_{it}$, or tests of the effect of EDGAR implementation on Kim and Verrecchia's (1997) measure of information asymmetry between investors conditional on the readability of 10-K reports. The "low" ("high") column includes all firms in the first (fourth) quartile of Form 10-K readability as per the Bog Index from Bonsall et al. (2017). *AbnVolume* is the natural logarithm of cumulative three-day share turnover around the earnings announcement date less the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period. *EDGAR* is an indicator variable equal to 1 for quarters following firms' adoption of the EDGAR system and zero otherwise. *Return* is the absolute value of the three-day cumulative return around the earnings announcement date. Controls include the following variables: *Size* as the natural logarithm of firm *i*'s market value at the beginning of the period, *ProgTrade* which is the non-announcement period correlation between daily trading volume and daily absolute return, *MarketTurn* as the median share turnover of the sample firms for the same time as the announcement period (three days around the earnings announcement), and *Price* as the natural log of ending price two days before the earnings announcement. *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10) level. Appendix A contains all variable definitions.

TABLE 8

Effect of EDGAR on the Probability of Private Information Events

Dependent Variable:	*Alpha*	
	[1]	[2]
EDGAR	**0.020*** **	**0.011** **
	(3.98)	**(2.05)**
Size	-0.016***	-0.037***
	(-8.26)	(-6.25)
Coverage	-0.015***	-0.003
	(-5.53)	(-1.07)
InstOwn	0.010	0.002
	(1.05)	(0.11)
PriceBeg	-0.015***	-0.003
	(-4.19)	(-0.42)
Turnover	-0.003***	-0.002***
	(-21.53)	(-9.70)
Volatility	-0.977***	-0.481***
	(-6.97)	(-3.11)
Constant	0.732***	0.680***
	(57.92)	(38.92)
Observations	40,721	40,721
Fixed Effects	Qtr	Firm/Qtr
Cluster	Firm	Firm
Adjusted R-squared	0.0498	0.0962

Table 8 presents coefficients (t-statistics) from estimating Equation (5): $Alpha = \beta_0 + \boldsymbol{\beta_1 EDGAR_{it}} + Controls_{it} + \epsilon_{i,d}$, or tests of the effect of EDGAR implementation on the probability of private information events. The dependent variable is *Alpha*, a component of the probability of informed trading capturing the percentage of days in which a private information occurs. *EDGAR* is an indicator variable equal to one for quarters following EDGAR implementation and zero otherwise. *Size* is defined as the natural logarithm of firm *i*'s market value at the beginning of the period. *Coverage* is the log of number of analysts covering a firm during the quarter. *InstOwn* is the percentage of firms' shares owned by institutions. *PriceBeg* is the natural log of ending price at the beginning of the quarter *Turnover* is the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter t's earnings release date) times 1000. *Volatility* is the standard deviation of the firm's daily stock returns during the quarter**.** *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10) level. Appendix A contains all variable definitions.

TABLE 9
Effect of EDGAR on the Profitability of Insider Trades

Dependent Variable: *InsiderProfits*

	[1] 30 days	[2] 30 days	[3] 180 days	[4] 180 days
EDGAR	**-0.013***** **(-2.61)**	**0.007** **(0.93)**	**-0.088***** **(-4.86)**	**-0.076***** **(-3.19)**
Size	-0.012*** (-7.20)	-0.037*** (-5.98)	-0.024*** (-4.33)	-0.089*** (-4.16)
Coverage	0.007** (2.25)	0.000 (0.03)	-0.013 (-1.15)	-0.050*** (-3.99)
MB	0.000 (1.63)	0.000 (1.36)	0.004*** (2.84)	0.005*** (3.06)
ROA	0.226*** (4.86)	0.189*** (2.95)	1.399*** (8.27)	0.867*** (4.11)
TransactionPrice	0.015*** (11.46)	0.011*** (6.47)	0.045*** (11.13)	0.037*** (7.51)
Constant	-0.108*** (-7.73)	-0.051** (-2.56)	-0.317*** (-6.81)	-0.120** (-2.16)
Observations	4,294	3,910	4,305	3,916
Fixed Effects	No	Firm	No	Firm
Cluster	Firm	Firm	Firm	Firm
Adjusted R-squared	0.0452	0.113	0.0757	0.276

Table 9 presents coefficients (t-statistics) from estimating Equation (6): $InsiderProfits = \beta_0 + \boldsymbol{\beta_1 EDGAR_{it}} + Controls_{it} + \epsilon_{i,d}$, or tests of the effect of EDGAR implementation on the profitability of insider trades. The dependent variable is *InsiderProfits,* defined as the average buy-and-hold return of insider trades from CEOs, CFOs, and COOs for a given quarter calculated over a 30-day window for columns [1], [2], and a 180-day window for columns [3] and [4]. *EDGAR* is an indicator variable equal to one for quarters following EDGAR implementation and zero otherwise. *Size* is defined as the natural logarithm of firm *i*'s market value at the beginning of the period. *MB* is the market-to-books ratio at the beginning of the quarter. *ROA* is net income divided by total assets at the beginning of the quarter. *TransactioPrice* is the log of the average transaction amount of insider trades in dollars for the quarter. *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10) level. Appendix A contains all variable definitions.

TABLE 10
Spread Analysis Around 10-K Filing Dates

	Dependent Variable: *Spread*	
	[1]	[2]
DAY0	-0.0002	-0.0001
	(-1.09)	(-0.78)
DAYp1	**0.0004****	**0.0005*****
	(2.69)	**(3.21)**
DAYp2	**0.0003***	**0.0003****
	(1.97)	**(2.49)**
DAYp3	**0.0005*****	**0.0005*****
	(3.56)	**(4.16)**
DAYp4	**0.0006*****	**0.0006*****
	(2.90)	**(3.00)**
DAYp5	0.0003	**0.0004***
	(1.61)	**(2.06)**
CAR	0.0097***	0.0141***
	(3.28)	(3.00)
InstOwn	-0.0015**	-0.0025*
	(-2.73)	(-1.86)
Size	-0.0041***	-0.0029***
	(-13.70)	(-5.83)
Price	-0.0001***	-0.0001***
	(-4.02)	(-6.75)
Turnover	-0.0005***	-0.0003***
	(-18.42)	(-13.43)
Volatility	0.3745***	0.3245***
	(11.16)	(15.08)
Volume	0.0000***	0.0000
	(9.04)	(1.36)
Constant	0.0439***	0.0381***
	(38.83)	(13.11)
Observations	64,116	64,116
Fixed Effects	Year	Firm/Qtr
Cluster	Firm	Firm
Adjusted R-squared	0.464	0.637

Table 10 presents coefficients (t-statistics) from estimating Equation (4): $Spread = \beta_0 + \boldsymbol{\beta_1 DAY0_{id}} + \boldsymbol{\beta_2 DAYp1_{id}} + \boldsymbol{\beta_3 DAYp2_{id}} + \boldsymbol{\beta_4 DAYp3_{id}} + \boldsymbol{\beta_5 DAYp4_{id}} + \boldsymbol{\beta_6 DAYp5_{id}} + Controls + \epsilon_{id}$, or tests of bid-ask spread around 10-K filing dates. The dependent variable is *Spread* for all columns. In this table, *Spread* is a daily variable, i.e., firm's *i* bid-ask spread on trading day *d* from CRSP scaled by the midpoint. *DAY0* is an indicator variable equal to 1 for the day the EDGAR filing is released, and zero otherwise. *DAYm1* (*DAYp1*) is an indicator variable equal to one for the day immediately before (after) the release of the 10-K filings, and zero otherwise. *CAR* is the cumulative abnormal three-day return around the filing date to control for differential news content. *InstOwn* is the percentage of firms' shares owned by institutions. *Size* is defined as the natural logarithm of firm *i*'s market value at the beginning of the period. *Coverage* is the log of number of analysts covering a firm during the quarter. *Price* is firm's *i* stock price on day *d*. *Turnover* is the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter t's earnings release date) times 1000. *Volatility* is the standard deviation of the firm's daily stock returns during the quarter**.** *Volume* is firm *i*'s trading share volume on day *d*. All regressions include daily observations for days -2 through +1 relative to the filing date. *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10) level. Appendix A contains all variable definitions.

TABLE 11

Robustness Tests- Brokerage House Closures and Mergers

Panel A: Bid-ask Spread Analysis Around Brokerage House Mergers and Closures

Dependent Variable: *Spread*	[1]	[2]
Post	-0.020	-0.259***
	(-0.48)	(-7.25)
Treat	-0.939***	-0.778***
	(-8.54)	(-8.01)
Post×Treat	**0.368*** **	**0.413*** **
	(4.48)	**(5.80)**
Observations	875,541	875,541
Controls	No	Yes
Fixed Effects	Firm/Qtr	Firm/Qtr
Cluster	Firm	Firm
Adjusted R-squared	0.680	0.743

Panel B: Analyst Coverage Analysis Around Brokerage House Mergers and Closures

Dependent Variable: *Coverage*	[1]
Treat	9.108***
	(14.43)
Post	-0.211***
	(-3.64)
Treat×Post	**-0.538*** **
	(-3.41)
Observations	308,402
Cluster	Event
Adjusted R-squared	0.0932

Panel A of Table 11 presents coefficients (t-statistics) from estimating Equation (7): $Spread_{it} = \beta_0 + \beta_1 Treat_{it} + \beta_2 Post_{it} + \boldsymbol{\beta_3 Treat_{it} \times Post_{it}} + Controls + \epsilon_{it}$, or tests of changes in bid-ask spread following exogenous brokerage house closures/mergers. Panel B presents coefficients (t-statistics) from estimating Equation (8): $Coverage_{it} = \beta_0 + \beta_1 Treat_{it} + \beta_2 Post_{it} + \boldsymbol{\beta_3 Treat_{it} \times Post_{it}} + \epsilon_{it}$, or tests of changes in analyst coverage following exogenous brokerage house closures/mergers. For both panels, *Treat* is an indicator variable equal to one for firms affected by broker closures/mergers, and zero otherwise. For Panel A, *Post* is an indicator variable equal to one (zero) for four quarters following (prior) brokerage house mergers/closures, and the dependent variable *Spread* is the average daily bid-ask spread during the non-announcement period, where daily bid-ask spread is firm's *i* bid-ask spread on trading day *d* from CRSP scaled by the midpoint and multiplied by 1000. Controls in Panel A are not tabulated for parsimony. These controls include: *Size* is defined as the natural logarithm of firm *i*'s market value at the beginning of the period. *Coverage* is the log of number of analysts covering a firm during the quarter. *InstOwn* is the percentage of firms' shares owned by institutions. *PriceBeg* is the natural log of ending price at the beginning of the quarter. *Turnover* is the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter t's earnings release date) times 1000. *Volatility* is the standard deviation of the firm's daily stock returns during the quarter. For Panel B, *Post* is an indicator variable equal to one (zero) for the year following (prior) brokerage house mergers/closures, and the dependent variable *Coverage* is the number of analysts reporting a yearly EPS forecast for a given firm. *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10) level. Appendix A contains all variable definitions.

TABLE 12

Robustness Tests - Entropy Balancing and Removing Transitional Filers

Dependent Variable:	*Spread*		*Illiquidity*		*AbnVolume*	
	[1]	[2]	[3]	[4]	[5]	[6]
EDGAR	**-0.002*****	**-0.002*****	**-0.035*****	**-0.053*****	-0.004***	-0.001
	(-9.62)	**(-8.94)**	**(-5.08)**	**(-6.62)**	(-2.99)	(-0.78)
Return					0.098***	0.082***
					(24.78)	(43.90)
EDGAR×Return					**0.011****	**0.027*****
					(2.46)	**(9.90)**
Observations	67,063	65,005	66,131	64,129	67,849	65,840
Fixed Effects	Firm/Qtr	Firm/Qtr	Firm/Qtr	Firm/Qtr	Firm/Qtr	Firm/Qtr
Cluster	Firm	Firm	Firm	Firm	Firm	Firm
Entropy Balancing	Yes	No	Yes	No	Yes	No
Exclude First Group	No	Yes	No	Yes	No	Yes
Adjusted R-squared	0.848	0.853	0.815	0.820	0.412	0.295

Table 12 presents coefficients (t-statistics) from estimating robustness tests for Equation (2): $InfoAsy = \beta_0 + \boldsymbol{\beta_1 EDGAR_{it}} + Controls_{it} + \epsilon_{i,d}$ (Columns 1 to 4), and Equation (3): $AbnVolume_{it} = \beta_0 + \beta_1 EDGAR_{it} + \beta_2 Return_{it} + \boldsymbol{\beta_3 EDGAR_{it} \times Return_{it}} + Controls_{it} + \epsilon_{it}$ (Columns 5 and 6). The dependent variable is *Spread* for columns [1] and [2], *Illiquidity* for columns [3] and [4], and *AbnVolume* for columns [5] and [6]. *Spread* is the average daily bid-ask spread during the non-announcement period, where daily bid-ask spread is firm's *i* bid-ask spread on trading day *d* from CRSP scaled by the midpoint and multiplied by 1000. *Illiquidity* is the average of daily illiquidity during the non-announcement period where daily illiquidity is the absolute value of stock returns divided by the dollar value of trading volume. *AbnVolume* is the natural logarithm of cumulative three-day share turnover around the earnings announcement date less the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period. *EDGAR* is an indicator variable equal to 1 for quarters following firms' adoption of the EDGAR system and zero otherwise. *Return* is the absolute value of the three-day cumulative return around the earnings announcement date. Controls (omitted for parsimony) include the following variables in columns [1] to [4]: *Size* as the natural logarithm of firm *i*'s market value at the beginning of the period, *Coverage* as the log of number of analysts covering a firm during the quarter, *InstOwn* as the percentage of firms' shares owned by institutions, *PriceBeg* as the natural log of ending price at the beginning of the quarter, *Turnover* as the median cumulative three-day share turnover of consecutive three-day periods in the non-announcement period (all dates between five trading days after the release date of quarter t-1 earnings and five days prior to quarter t's earnings release date) times 1000, and *Volatility* as the standard deviation of the firm's daily stock returns during the quarter. Controls in columns [5] and [6] include *Size* as previously defined, *ProgTrade* which is the non-announcement period correlation between daily trading volume and daily absolute return, *MarketTurn* as the median share turnover of the sample firms for the same time as the announcement period (three days around the earnings announcement), and *Price* as the natural log of ending price two days before the earnings announcement. *** (**, *) denotes two-tailed significance at the p<0.01 (p<0.05, p<0.10) level. Appendix A contains all variable definitions.