The Impact of Investor Information Processing Costs on Firm Disclosure Choice: Evidence from the XBRL Mandate

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November 2011

Abstract

This paper examines the effect of investor information processing costs on firms' disclosure choice. Using the recent eXtensible Business Reporting Language (XBRL) regulation as an exogenous shock to investors' processing costs, but *not* to firms' disclosure requirements, I find that firms increase their quantitative footnote disclosures after adoption of XBRL detailed tagging requirements designed to reduce investor processing costs. These results hold in a difference-in-difference design using non-adopting firms as the control group. To reinforce my finding that the disclosure increase is prompted by reduced investor processing costs, I examine cross-sectional settings where investor processing costs are likely to vary, showing that the disclosure increase is greater for firms where detailed information is more pertinent than summary measures (those with operations in multiple industries, more volatile earnings, and more disperse analyst forecasts), and smaller for firms with sophisticated investors. These findings suggest that investor processing costs can be significant enough to impact firms' disclosure decisions.

I am grateful to my dissertation committee for their insightful comments and guidance: Gregory Miller (Chair), Raffi Indjejikian, Nejat Seyhun, Catherine Shakespeare, Jeffrey Smith, and Hal White. I thank Merle Ederhof, Reuven Lehavy, Feng Li, Michael Minnis, Venky Nagar, Chris Williams, Gwen Yu, and workshop participants at the University of Michigan for helpful feedback. I thank Feng Li for programming advice and Nemit Shroff for the many conversations we have had about the paper. Finally, I gratefully acknowledge financial support from the Paton Accounting Fellowship and the Deloitte Doctoral Fellowship. All errors are my own.

1. Introduction

Firm disclosures play a critical role in a well-functioning capital market. An important assumption of disclosure is that investors actually process the information disclosed. However, numerous studies show that information processing costs can reduce or impair investor processing of information.[1] This paper examines whether firms consider investors' information processing costs when choosing the amount of information to disclose. I predict and find that firms increase their disclosure when investor processing costs are reduced. Specifically, using a recent regulation that exogenously reduces investor processing costs for quantitative footnote disclosures, I find that firms increase these disclosures upon mandatory adoption of the regulation. I also show that the disclosure increase is *larger* for firms with information that is inherently more costly to process and *smaller* for firms with an investor base that has inherently lower processing costs. These findings are consistent with a reduction in investor processing costs increasing investor attention to disclosure, thus motivating firms to increase their disclosure.

I expect investor processing costs to affect firm disclosure because of their impact on firms' disclosure benefits. The accounting literature characterizes firm disclosure choice as a cost-benefit tradeoff, with disclosure benefits such as reduced information asymmetry and improved market liquidity (Beyer, Cohen, Lys, and Walther 2010). These disclosure benefits are realized through investor processing of and response to firm disclosure choice. Thus, when processing costs prevent investors from fully responding to disclosure, the extent of disclosure benefits could be muted. If the impact on disclosure benefits is significant, firm disclosure choice could also be affected by investor processing costs.

[1] Information processing can be separated into "information acquisition," or the task of finding/reading information, and "information integration," or the task of assessing the informational implications and arriving at a valuation decision (Maines and McDaniel 2000). Because XBRL has the potential to decrease both acquisition and integration costs (Hodge, Kennedy, and Maines 2004), I use the term "information processing costs" to refer to both information acquisition and integration costs. See Payne (1976), Casey (1980), Merton (1987), Bloomfield (2002), Hirshleifer and Teoh (2003), Plumlee (2003), You and Zhang (2009), Miller (2010), Bradshaw, Miller, and Serafeim (2011), and De Franco, Kothari, and Verdi (2011) for examples of studies that incorporate processing costs.

Although many studies examine the determinants of disclosure choice, the impact of investor processing costs on firm disclosure has not received much attention. This is perhaps because the two are jointly determined, making it difficult to infer causality, i.e. to separate the impact of investor processing costs on firm disclosure from disclosure's effect on processing costs. The recent eXtensible Business Reporting Language (XBRL) mandate provides a unique setting to overcome this identification issue by exogenously decreasing investors' processing costs without changing firms' disclosure requirements. Specifically, this mandate requires a subset of firms to "tag," or label, all quantitative disclosures in the financial statements and footnotes so the amounts are machine-readable, but the mandate does not require additional disclosure.[2] The Securities and Exchange Commission (SEC) argues that XBRL reduces investor processing costs by eliminating the need for manual search and compilation of financial amounts, enabling easier comparison across time and firms, and highlighting contextual information about data items. Therefore, I use a firm's mandatory adoption of XBRL as an exogenous reduction in investor processing costs for that firm.

To measure firm disclosure, I focus on quantitative disclosures in the notes to the financial statements (i.e. disclosures subject to XBRL's "detailed tagging" requirements) because these details are valuable but costly to process. Information disclosed in the footnotes can provide investors with a rich context for understanding the firm beyond that provided by summary statistics (De Franco, Wong, and Zhou 2011, Li, Ramesh, and Shen 2011). For example, calculating a firm's leverage ratio gives a sense of the financial structure of the firm, but examining the detailed listing of notes payable, interest rates, and maturity dates paints a much more nuanced picture of the firm's current and future health. Although footnotes contain important information for firm valuation, they also impose high processing costs on investors because they include numerous pieces of information in a wide variety of formats, often with text and numbers interspersed. These high processing costs

[2] An additional strength of the XBRL setting is a staggered implementation that provides a benchmark group of non-adopting firms for comparison, allowing for a difference-in-difference design that controls for firm-specific and time-specific effects.

impair investor processing of the detailed footnotes (Casey 1980, Hodge, Kennedy, and Maines 2004).[3]

To the extent investors process less footnote information, firms have lower disclosure benefits and thus less incentive to provide the detailed information. As investors' costs *decrease*, though, they are able to process more of the footnotes and increase their attention to detailed information. Anticipating increased investor processing of detailed information and therefore more benefits to disclosure, firms have a stronger incentive to provide detailed information.[4]

To better understand this increased attention, it can be helpful to think about (1) who is scrutinizing and (2) how they are doing so in this setting. First, although the primary reason for implementing XBRL is "to make financial information easier for *investors* to analyze (emphasis added)," the SEC highlights that the benefits of XBRL extend to all market participants analyzing firm disclosures, including the SEC (SEC 2009). Essentially, lower processing costs can increase attention from investors or from any group acting on behalf of investors, such as analysts, media, or regulators.[5] Second, a likely tool for increased scrutiny of firm disclosure is comparison to peer firm disclosures. Comparing disclosure across firms can lead to increased pressure on firms to provide information, as discussed in disclosure models and seen in practice (Milgrom and Roberts 1986, Dye and Sridhar 1995, Silverman 2002b). Peer firm disclosures are particularly relevant in the XBRL

[3] As evidence that the market finds it costly to fully impound footnote information into price, Li, Ramesh, and Shen (2011) find a market reaction to newswire filings alerts that contain highlights of footnote items, even though the SEC filings were available to investors prior to the alerts.

[4] Alternately, this could be described in terms of the cost of non-disclosure. Without processing costs, theory predicts that when firms provide incomplete disclosure (i.e. non-disclosure), investors assume the worst case scenario and react negatively, imposing costs on firms. If investors process less information, they are less aware of non-disclosure and thus less likely to impose these costs of non-disclosure. With lower costs of non-disclosure, firms again have less incentive to provide the detailed information. As investor processing costs decrease, though, firms' costs of non-disclosure increase, motivating them to provide more information. Effectively, investors (and other stakeholders) are less able to discipline firm disclosure choice when processing costs are high and more able to when costs are low.

[5] As Supreme Court Justice Louis D. Brandeis said, "Sunlight is said to be the best of disinfectants; electric light the most efficient policeman." (Paredes 2003). More recently, Congressman Darrell Issa used this analogy to highlight the significance of processing costs, saying, "Sunlight cannot serve as disinfectant if investors cannot easily understand or use the information they receive." (Minority Staff Report 2010, p.27).

setting because XBRL's standardized structure facilitates comparison across firms. This additional comparability increases the likelihood that stakeholders will use peer firm disclosures to set the expected level of disclosure and improve their disciplining of firm disclosure choice.

Accordingly, I predict that when firms adopt the detailed footnote tagging requirements of XBRL, they will increase the number of quantitative footnote disclosures in anticipation of increased investor attention to these disclosures. However, if firms do not believe XBRL will significantly impact investor processing costs or if they choose to delay adjusting disclosure until after investor attention increases, there would be no change in firm disclosure upon adoption of XBRL. In addition, firms may choose not to adjust their disclosure if the impact of investor processing costs on disclosure benefits is not significant. Thus, this is an interesting empirical question.

I find evidence supporting my prediction. In particular, I find that XBRL firms increase their quantitative footnote disclosures, consistent with firms anticipating increased investor processing of and demand for disclosures. I also find that the disclosure increase remains for XBRL firms after differencing out non-XBRL firms' change in disclosure. These results are robust to controls for the qualitative information content of the filings, the presence of information intermediaries, firm characteristics, and firm and year fixed effects.

To reinforce my finding that the disclosure increase is prompted by anticipated reductions in investor processing costs, I examine cross-sectional settings where processing costs are either more likely or less likely to be a binding constraint on firms' disclosure choice. First, I predict that the relation between investor processing costs and firm disclosure will be more pronounced for complicated firms, defined as those with information that is inherently more costly to process. Using firms operating in multiple industries, firms with volatile earnings, and firms with disperse analyst forecasts as proxies for complicated firms, I find that the disclosure increase for XBRL firms relative to non-XBRL firms is larger for complicated firms than for simple firms, consistent with the change in anticipated investor processing costs leading to a change in firm disclosure.

Second, I predict that the relation between investor processing costs and firm disclosure will be *less* pronounced for firms with more sophisticated stakeholders, i.e. those with inherently lower processing costs. Using the number of analysts and the percent of shares held by institutions as measures of the processing ability of the investor base, I find that the disclosure increase for XBRL firms relative to non-XBRL firms is smaller for firms with more sophisticated investors than for firms with less sophisticated investors. These results corroborate my hypothesis that investor processing costs affect firm disclosure.

My paper makes several contributions. First, I find empirical evidence of an important incentive that impacts firms' disclosure choices. The disclosure literature includes numerous studies examining disclosure incentives, but the effect of investor processing costs on disclosure choice has been relatively difficult to capture empirically. Because my setting consists of an exogenous shock to investor processing costs, it allows me to identify the effect of investor processing costs distinct from other drivers of disclosure, such as firm-specific characteristics or firms' incentives to signal the relevance of information. Several recent papers suggest that managers adjust their disclosure *style* based on investor processing costs (e.g. the complexity of annual reports (Li 2008) and the presentation of special items (Riedl and Srinivasan 2010)). I contribute to the literature by using a unique identification strategy to examine the impact of processing costs on firms' fundamental disclosure choice of *how much* information to provide.

Second, I contribute to the information processing costs literature. Many current studies examine the impact of investor processing costs on investor behavior in the markets (Casey 1980, Bloomfield 2002, Miller 2010). I extend the recent stream of literature that examines the impact of investor processing costs on *firm* behavior (Li 2008, Riedl and Srinivasan 2010) and provide evidence suggesting that firms increase disclosure when faced with anticipated reductions in investors' processing costs. These findings increase our knowledge of the potential impact of information processing costs on market participants.

Third, I show unintended consequences of the XBRL regulation that are potentially favorable toward investors. The goal of the SEC is to reduce processing costs for those analyzing financial reports, not to alter disclosure; they specifically state in the XBRL mandate that disclosure requirements are not being changed. However, the results of my tests show that the anticipated decrease in investor processing costs spurs firms to provide more disclosure in the footnotes, resulting in a potentially beneficial unintended consequence of the XBRL regulation.

The paper proceeds as follows. The next section discusses the motivation and setting. Section 3 describes the sample and variable definitions, and Section 4 provides the research design and main empirical findings. Section 5 discusses results from additional tests and sensitivity analyses, and Section 6 concludes.

2. Motivation and Setting

2.1 Disclosure Choice and Investor Information Processing Costs

To model firms' disclosure choice, classic theories rely on the assumption of investor response to disclosure and non-disclosure. In a simple disclosure model, a firm weighs the costs and benefits of disclosure when choosing the amount of information to provide, where the benefits can include reduced information asymmetry and thus increased liquidity and decreased cost of capital. These disclosure benefits arise, however, when investors process and incorporate the information into their trading behaviors (Diamond 1985, Diamond and Verrecchia 1991). GE spokesman David Frail describes the disclosure choice as a negotiation between management and investors, alluding to the importance of investors actually acquiring and using the information: "[Disclosure] is a process, and we'll be listening to everybody. But we have to measure the sheer volume of work against the value to investors of the information." (Silverman 2002b).[6]

[6] Disclosure choice can also be described in terms of the costs of non-disclosure. In a simple disclosure model, if firms do not disclose information, investors assume the worst case scenario and adjust price accordingly (Grossman 1981, Milgrom 1981). Anticipating this reaction from investors, firms choose to disclose the information, as long as the cost of investors' negative reaction (i.e. cost of non-disclosure) outweighs the firm's cost of disclosure. Thus, investor response is a critical assumption of these models as well.

Essentially, before firms can receive the benefit of disclosure, market participants must respond to the release of information. For investors to respond, though, they must acquire and process the information, and their ability to do so is limited by the extent of processing costs they face. In various contexts, numerous papers highlight that investors can face considerable processing costs that impair their ability to assimilate information in public disclosures (Casey 1980, Grossman and Stiglitz 1980, Merton 1987, Indjejikian 1991, Bloomfield 2002, Hirshleifer and Teoh 2003).

In recent years, there has been concern about high investor processing costs due to the length and complexity of financial reports (Paredes 2003, Li 2008, Miller 2010). More complexity in the information environment impacts market behavior through reduced investor trading (Miller 2010) and delayed impounding of information into price (You and Zhang 2009, Cohen and Lou 2010). In addition, when investors have extra information demands on them (e.g., busy earnings announcement days, Fridays), they do not completely process information (Hirshleifer, Lim, and Teoh 2009, DellaVigna and Pollet 2009). These studies provide evidence that investors rationally weigh the benefits of obtaining firm information against the costs of processing that information when deciding how much to process disclosures; the higher the processing costs, the less investor processing of firms' disclosures.[7]

Although detailed financial information is costly to process, it is potentially very helpful for investors' decision-making. For example, De Franco, Wong, and Zhou (2011) show that investors use information in financial statement footnotes to adjust their beliefs about firm value. Similarly, mosaic theory describes how the joint analysis of many individual information items can provide

[7] Payne (1976) provides a specific example of how individuals may decrease their information processing. In his experiment, individuals were given information about various apartments (e.g. rent, noise level, room size, etc.) and asked to choose one apartment. When he varied the number of apartments and pieces of information available for each, he found that participants changed their processing approach. For settings with few apartments and information dimensions, individuals looked at all the available information before deciding. As the number of apartments and information dimensions increased, however, individuals looked at only a subset of the information to make their decision. Following this logic, investors processing detailed and voluminous financial information are more likely to use an approach involving heuristics or summary statistics (i.e. ignore some information) because of the high costs of analyzing the detailed information.

valuable information (Pozen 2005). Individuals with access to detailed information and appropriate tools can use the information to make more informed decisions, as long as the processing costs do not outweigh the benefits of acquiring the information. Therefore, if investors' costs of processing detailed information are reduced, they are more likely to demand and process detailed information.

The amount of investor processing impacts investor response to disclosure, and thus affects firms' benefits of disclosure (and costs of non-disclosure), altering firms' disclosure incentives. Essentially, if processing costs are high, investors will process less disclosure. With less information processing, investors have a muted response to disclosure (Bloomfield 2002) and are less able to identify non-disclosure. Conversely, lower processing costs imply more investor attention to disclosure, and thus higher benefits of disclosure and costs of non-disclosure for firms (Hirshleifer, Lim, and Teoh 2004). If the impact on disclosure benefit and non-disclosure cost is significant, firms are motivated to increase their disclosure in response.

Increased Attention – Who and How

This increased attention to disclosure (and pressure on firms) can come from investors or from any group *acting on behalf of* investors, such as media, analysts, or regulators. Examples of investor pressure include companies increasing their annual report disclosures in response to investors calling for more openness and transparency in their communications (Bulkeley 2002, Silverman 2002a). However, analysts, media, and regulators also evaluate and monitor firm disclosure (e.g. Lang and Lundholm 1993, Miller 2006). In the XBRL setting, the SEC specifically highlights the cost-savings XBRL could bring to investors, analysts, and even the SEC itself for analysis of firms' financial filings (SEC 2009).[8] If firms anticipate increased scrutiny of their disclosures by any monitoring

[8] Also see http://raasconsulting.blogspot.com/2011/01/why-did-sec-mandate-xbrl.html for an article hypothesizing that the cost-savings for the SEC were a significant motivation for mandating XBRL.

group, they are more likely to increase disclosure in order to avoid the costs of more visible disclosure deficiencies and to receive the increased benefits of disclosure.[9]

Whether the monitoring parties are investors, analysts, media, or regulators, the disclosure of peer firms can be helpful in identifying incomplete or unusual firm disclosure. In Milgrom and Roberts' (1986) model of too much relevant information, investors make a fully informed decision by investigating competitors' disclosures and inferring the worst case scenario for any one firm's missing information. Comparison to peers is also a way to motivate firms to provide more information. For example, after GE increased the detail of its 10-K footnote disclosures, analysts expressed appreciation and challenged other firms to follow suit: "GE has definitely raised the bar for all corporate reporting." (Silverman 2002b).[10] Peer firm disclosures are particularly relevant in the XBRL setting because XBRL's standardized structure facilitates comparison across firms. If XBRL reduces the costs of comparing detailed disclosures across firms, investors are more likely to use peer firm disclosures to set expectations for the information firms should disclose. Thus, a reduction in processing costs is likely to lead to additional disciplining of firms and increased firm disclosure.

Current Literature

Current studies examine the effect of investor processing costs on market behavior (as discussed above) or the effect of disclosure choice on investor processing costs, whether the choice is the writing style and amount of disclosures (Li 2008, You and Zhang 2009, Miller 2010), the placement of disclosures within financial statements or footnotes (Hopkins 1996, Hirst and Hopkins 1998, Davis-Friday, Folami, Liu, and Mittelstaedt 1999), or the timing of disclosures (DellaVigna and Pollet 2009, Hirshleifer, Lim, and Teoh 2009). Several papers have alluded to the fact that firms can

[9] Some practical examples of costs of non-disclosure include the loss of market value due to negative investor assumptions about missing information, loss of reputation for honesty or transparency, or even legal sanctions for newly discovered (real or perceived) deficiencies in disclosure. Examples of the benefits of increased disclosure include improved reputation for transparent disclosure, reduced information asymmetry, increased liquidity, and decreased cost of capital.

[10] Dye and Sridhar (1995) also include peer firm disclosures in their disclosure choice model and provide several examples of herding or cascading disclosure choices among firms.

choose the complexity or presentation of disclosure with investor processing costs in mind. Li (2008) examines whether poorly-performing firms have more complex 10-K's, and Riedl and Srinivasan (2010) examine firms' decision of where to disclose special items (financial statements versus footnotes), using both information processing costs and signaling of information relevance as potential drivers of firm disclosure behavior.

However, papers have not directly examined the effect of investor processing costs on the *amount of disclosure* firms choose to provide, perhaps because it is difficult to disentangle whether investor processing costs altered the amount of disclosure, or the amount of disclosure altered the investor processing costs. To overcome this difficulty, I turn to the implementation of XBRL, which creates a unique setting of an exogenous shock to investor processing costs without changing the amount of required disclosure, providing the opportunity to identify the effect of anticipated investor processing costs on the amount of firm disclosure.

2.2 XBRL Background

XBRL is a language used to encode financial information in a format that makes it easier for computer software to automatically acquire, classify, compare, and represent the information. Essentially, companies use XBRL to identify data items within a financial statement, provide information about each one (such as its name, relevant time period, and currency; e.g. Total Liabilities, 12/31/2010, USD), and highlight relations between items (e.g. Total Liabilities = Current Liabilities + Non-Current Liabilities). Because each data item is "tagged" with this additional information, computer software can process XBRL filings with less human intervention. The information can then be organized in any format useful for analysis, such as across-time comparisons, across-firm comparisons, or detailed disaggregation of an account.

The SEC has long been interested in XBRL and interactive data formats, with the goal of using these technologies to help investors "capture and analyze [financial] information more quickly and at less cost" (SEC 2009). In April 2009, the SEC mandated that all public companies subject to filing

requirements in the United States provide XBRL versions of their quarterly and annual financial reports in addition to the standard text or html filing.[11] The rule outlines a three-year implementation in phases. Large accelerated filers with a public common equity float over $5 billion (hereafter Tier 1 filers) begin the first phase of XBRL with filings for fiscal periods ending on or after June 15, 2009. In the second phase, all other large accelerated filers (i.e. public common equity float over $700 million, hereafter Tier 2 filers) begin providing XBRL filings for fiscal periods ending on or after June 15, 2010, and for the third phase, all remaining filers (hereafter Tier 3 filers) provide XBRL filings for fiscal periods ending on or after June 15, 2011. In addition to the size-based phase-in, the mandate allows firms two years to fully adopt the mandate once they start filing XBRL documents. For a company's first year of XBRL filings, the rule only requires tags for quantitative items on the face of the financial statements and tags for each footnote in its entirety ("block tagging"). In the second and subsequent filing years, firms must individually tag all quantitative amounts in the footnotes as well ("detailed tagging").

2.3 XBRL and Investor Information Processing Costs

XBRL data filings can help reduce processing costs for investors by providing information in machine-readable format, facilitating comparison across firms and time, and highlighting contextual information and relations between data items.

First, with XBRL, less time, money, and effort is necessary to acquire financial information in an electronic format, ready for manipulation into statistics. Currently, investors must either hand-collect information from various parts of the filings (i.e. spend time and effort) or pay someone else to do this work (i.e. pay and wait for information from data aggregators). Each incremental piece of information is costly to collect, and much of the footnote information is not available via data aggregators. With XBRL filings, the information is already in electronic format, ready for transfer

[11] Specifically, XBRL is required for domestic and foreign public companies preparing financial statements in accordance with U.S. GAAP and foreign private issuers preparing financial statements in accordance with IFRS.

into spreadsheets or valuation software. Investors receive more information at a lower cost, with the saved time and resources available for additional processing and integration of the information.

Second, XBRL facilitates comparison of data across time and across firms because of its uniquely identified, standardized data tags. The FASB is responsible for maintaining an XBRL taxonomy (or dictionary of tags) for U.S. GAAP, and firms are strongly encouraged to use tags from within this taxonomy whenever possible, making it easier to compare financial information across time and firms.[12] This increased comparability decreases investors' costs of acquiring the information as well as the costs of integrating the information to arrive at a final decision.

Third, information within the tags such as the item's organizational or mathematical relation to other data items, descriptions of the amount being captured, or references to relevant accounting standards, can provide investors with contextual information that would have required additional searching and studying of non-XBRL filings. This contextual information can lower the processing costs of making in-depth evaluations of financial information.

An important assumption of this study is that firms believe XBRL will reduce investor processing costs. Both prior literature and SEC statements provide support for this assumption. Consistent with the expected benefits listed above, Hodge, Kennedy, and Maines (2004) find experimentally that investors provided with an XBRL-enhanced search engine are better able to both acquire and integrate information.[13] The SEC has spent significant resources to promote the use of XBRL and interactive data because it believes in the benefits for investors.[14] In addition, the SEC has highlighted the cost savings its own staff would realize in reviewing disclosures (XBRL 2009). Thus, I expect firms to anticipate a reduction in processing costs for market participants because of XBRL.

[12] Firms are also allowed to create their own tags (called "extensions") when the standard tags are not appropriate.
[13] Also, Blankespoor, Miller, and White (2011) examine the market impact of XBRL adoption in the first year of basic tagging and find results suggesting at least the perception that some investors are using and benefitting from XBRL. In their study, they look at the way *non-XBRL-using investors* respond to the perception that a subset of investors are using XBRL, and this study examines the way *managers* respond to that same perception.
[14] E.g. http://www.sec.gov/news/press/2008/2008-179.htm

2.4 XBRL and Disclosure Choice: Predictions

Main Prediction

Based on disclosure theory, my hypothesis is that firms will increase disclosure when investor processing costs decrease. Consistent with this hypothesis, I predict that when firms adopt XBRL, they will respond to the expected reduction in investor processing costs by increasing their disclosure, or specifically, the quantitative disclosures in the footnotes.[15]

Prediction 1: The number of quantitative footnote disclosures increases upon firms' adoption of XBRL detailed tagging requirements.

I choose to focus on quantitative footnote disclosures and XBRL implementation of "detailed tagging" in the second year of firms' adoption (fiscal year 2010 for Tier 1 firms) for several reasons. First, although items in the footnotes are relevant for understanding firm performance, they are more likely to impose high processing costs on investors and thus receive less investor attention. DeFranco, Wong, and Zhou (2011) show evidence of investors using footnotes to make accounting adjustments when valuing the firm, and many papers show the value relevance of footnote amounts (e.g. Barth, Beaver, and Landsman 1992, Ely 1995). However, the disclosure versus recognition literature suggests that investors do not fully incorporate items disclosed in the footnotes, potentially because of higher processing costs (Harper, Mister, and Strawser 1987, Davis-Friday, et al. 1999, Schipper 2007). Supporting the assertion that footnote disclosures are difficult to process but still relevant for valuation, Li, Ramesh, and Shen (2011) find a market reaction to newswire filing alerts containing highlighted footnote items, even though the SEC filings were already publicly available.

Second, the inherent benefits of XBRL – ease of obtaining multiple data items, standardization of data structure, and increased ability to compare across firms – are helpful in processing detailed

[15] An alternative is that firms respond to the adoption of XBRL by *decreasing* their disclosure, because they want (1) to avoid the increased investor attention or (2) to reduce the costs of tagging. However, for reason (1), it is not clear why these firms were voluntarily disclosing information they didn't want investors to process. For reason (2), the fixed costs of implementing XBRL tagging are larger than the variable costs of adding one more tag, making it unlikely that the costs of tagging would cause an average decrease in disclosure.

footnote disclosures. In promoting the use of XBRL, the SEC has focused on the increased ease of pulling facts out of text (i.e., numbers out of footnotes). Per former-SEC Chairman Cox, "The result … is that investors, using standard software, will be able immediately to pull up the information the way they want it, without having to slog through pages and pages of dry text" (SEC 2007).

Finally, the level of discretion available to firms is arguably higher for footnote disclosures than for amounts on the face of the financial statements. This flexibility exists to allow firms to tailor their communication to their investors. The SEC Advisory Committee on Improvements to Financial Reporting alluded to the disclosure of additional information by stating that "disclosure guidance generally establishes a 'floor' for communication between companies and investors, rather than a 'ceiling'." (SEC 2008). A result of this flexibility, though, is that there can be inconsistencies in disclosures across firms. For example, in a study of firms' securitization disclosures, the FASB found a wide variety in the amount and level of detail provided (FASB 2001). More recently, the Investors Technical Advisory Committee (ITAC) asked the FASB to create a disclosure framework, saying that current "disclosures are (unfortunately) inconsistent and incomplete" (ITAC 2007). The combination of inherently higher investor processing costs, footnote-specific benefits of XBRL, and more flexibility in footnote disclosure choices results in the "detailed tagging" of footnotes being a strong setting to examine the relation between investor processing costs and firm disclosure choice.[16]

Cross-Sectional Predictions: Variations in Information Processing Costs

If the increase in firm disclosure upon implementation of XBRL detailed tagging is driven by an anticipated reduction in investor processing costs (rather than an alternate story), I should see the

[16] Although I focus on footnote disclosures, the change in investor processing costs could affect firm disclosure beyond the footnotes. If investors can more easily assess the relevant information available to management, firms might increase *all* their disclosure (e.g. press releases, earnings forecasts). However, the most likely disclosure change would be to the quantitative footnote disclosures because of the nature of XBRL. First, XBRL reduces investor processing costs only for a very specific type of disclosure (quantitative financial statements and footnotes). Although investors' overall understanding of the firm improves with XBRL, their comparative advantage is in understanding the quantitative information disclosed in financial statements and footnotes. Second, because XBRL-tagged footnotes have lower processing costs, investors are more likely to demand new information in the same format. Intuitively, investors comparing tagged footnote disclosures across firms will be less satisfied by a firm that provides one of the disclosure items in a press release, rather than in the XBRL format conducive to comparison.

increase in disclosure vary in settings where investor processing costs are either more likely or less likely to be a binding constraint on firms' disclosure choice. Therefore, I examine several cross-sectional settings where firm or investor characteristics cause variation in investor processing costs.

In the first cross-sectional test, I examine firms with information that is inherently more costly to process. Following Cohen and Lou (2010), I call these firms "complicated" to capture the idea that they have more detailed information environments with many factors driving performance, making summary statistics such as earnings less helpful for decision-making and detailed information more pertinent. Specifically, I identify complicated firms as those operating in multiple industries, those with more volatile earnings, and those with more disperse analyst earning forecasts. I choose the multiple industries measure because a greater amount and variety of detailed information is necessary to evaluate firms operating in multiple industries. Prior literature supports this assertion, showing that firms operating in multiple industries impose higher processing costs on investors (Cohen and Lou 2010). I choose the earnings-related measures because detailed information is again more helpful in valuing firms with more volatile or uncertain earnings. Consistent with this statement, prior literature shows that firms with less informative earnings are more likely to provide additional information to investors by including balance sheet information and pro forma amounts in earnings announcement press releases (Chen, DeFond, and Park 2002, Lougee and Marquardt 2004) or voluntarily holding conference calls (Tasker 1998).

For complicated firms, detailed information is more helpful in assessing firm value, but this detailed information is costly to process. If the cost of processing detailed information declines, investors are more likely to increase their processing of detailed disclosures for the firms for which detailed information is more pertinent, i.e. complicated firms. Therefore, complicated firms are more likely to increase their disclosure in response to a reduction in investor processing costs. Specifically, I predict the following:

Prediction 2: The increase in quantitative footnote disclosures upon adoption of XBRL detailed tagging requirements is larger for firms with information that is inherently more costly to process.

In the second cross-sectional test, I turn to characteristics of a firm's investor base. Some investors or stakeholders have more expertise, resources, and/or ability, enabling them to process disclosures at a lower cost than other investors. Firms with a higher proportion of these sophisticated investors already face increased investor attention and processing of disclosures (Dye 1998, Fishman and Hagerty 2003). Consistent with this theory, several papers show that analysts and institutions are associated with (and at least partially motivate firms to provide) better disclosure (Lang and Lundholm 1996, Healy, Hutton, and Palepu 1999, Ajinkya, Bhojraj, and Sengupta 2005, Hollander, Pronk, and Roelofsen 2010). Firms followed by more sophisticated investors are more likely to already be held accountable for their disclosure and are thus less likely to respond to changing investor processing costs.

In addition, one of the SEC's goals in implementing XBRL is to level the playing field by reducing the costs for non-professional investors relative to professional investors. If the reduction in costs is not proportional across investors, professional investors could see a smaller reduction in their processing costs and thus would not increase demands for disclosure as much. In either case, a decrease in investor processing costs is less likely to motivate a change in disclosure for firms with more sophisticated investors. Therefore, I predict the following:

Prediction 3: The increase in quantitative footnote disclosures upon adoption of XBRL detailed tagging requirements is smaller for firms with an investor base that has inherently lower processing costs.

3. Sample Selection, and Variable Definitions

3.1 Sample Selection

In my tests, I compare pre- and post-XBRL detail filings for Tier 1 firms, the first group required to file detailed XBRL documents (i.e. tag all quantitative amounts in the financial statements and

footnotes). I then obtain a control group of filings – statements from Tier 2 and Tier 3 firms that have *not* yet adopted detailed XBRL requirements, filed over the same time periods as the Tier 1 firms – to estimate a baseline non-XBRL-related change in disclosure. Using these two groups, I am able to implement a difference-in-difference design to isolate the effect of XBRL on disclosure.

To create my sample of firms, I download all 10-K documents filed with the SEC for fiscal years 2006 through 2010 (i.e. fiscal periods between June 15, 2006 and April 30, 2011).[17] Matching the filings to Compustat and requiring firm-level data yields a sample of 18,721 10-K filings for 4,877 firms over the five years. Using Perl, I separate out the financial statement footnote section and count the numbers, or quantitative disclosures, within the footnotes. Since there is variation in the structure and section titles in filings, the Perl code is not able to identify the footnote section for all filings. Requiring valid output from the parsing procedure further reduces the sample to 13,969 10-K filings for 4,427 firms. Tier 1 firms' first detailed XBRL filings began for fiscal periods on or after June 15, 2010. Of the original 397 detailed XBRL 10-K reports filed, I am able to obtain the necessary Compustat and tag PERL output for 323 filings. Table 1 Panel A provides details of the sample selection. As Panel B of Table 1 shows, the observations are fairly evenly distributed over the years.

3.2 Variable Definition

Disclosure Measure

To measure the amount of firm disclosure, I focus on the detailed, quantitative footnote disclosures, or the numbers in the footnotes. The number of quantitative disclosures in the footnotes is available post-XBRL for Tier 1 firms as the number of footnote XBRL tags. However, by definition, the XBRL information is not available for Tier 1 firms prior to XBRL implementation, or for my control group (Tier 2 and 3 firms) at any point during the time period. Therefore, I estimate

[17] 2006 was the first fiscal year that non-accelerated filers as well as accelerated filers were required to comply with Sarbanes Oxley disclosure requirements (http://www.sec.gov/news/press/2005-25.htm). Thus, I use 2006 through 2010 filings to maximize the number of observations available to model disclosure choice while still maintaining a level of comparability across firms.

the number of quantitative disclosures, *Tags_Notes*, for all filings using Perl to count the numbers in the footnotes.[18] Similar to previous disclosure measures such as the number of press releases or the average number of words in press releases, *Tags_Notes* captures the quantity of disclosure, which may or may not equate to the quality of disclosure. Just as more words can obfuscate the meaning of disclosure, more numbers can increase the noise that investors are required to sift through. Still, to the extent that each quantitative disclosure provides investors with another piece of information, *Tags_Notes* captures an aspect of the depth and quality of a firm's disclosure in a way unique from prior disclosure literature.

Control Variables

To model firms' disclosure choice and ensure my results are not driven by other firm characteristics, I include several control variables, including the qualitative information content of the filing, firm performance, the presence of information intermediaries, and additional firm characteristics associated with the level of disclosure. I discuss below the motivation for including each control variable, and I provide detailed variable definitions in Appendix B.

Following Li (2008) and Miller (2011), I capture the log of the number of words in the footnotes (*LnWords_Notes*) and the footnotes' fog score (*Fog_Notes*) as measures of the qualitative information and disclosure readability, respectively.[19] In general, firms with longer reports are likely to have more information to provide and thus more quantitative disclosures as well. Since prior literature shows performance to be positively related to disclosure (Lang and Lundholm 1993, Miller 2002), I include the firm's return on assets for the fiscal period (*ROA*) and the market-adjusted return over the twelve months ending in the filing's fiscal period (*PyAbnRet*). I include the log of one plus the number of analysts covering the firm (*LnAnalyst*), the percent of shares outstanding held by

[18] See Appendix A for details of process of identifying the footnotes and counting the numbers.
[19] I choose to use the log value for those control variables that are skewed or are likely to have a nonlinear relation with disclosure, based on prior literature. As robustness, I rerun my main results using quartile indicator variables for the number of words in the footnotes (instead of the log), and inferences remain unchanged.

institutions (*InstHoldings*), and the log of the number of shareholders (*LnNumShareholders)* to control for the effect of information intermediaries and differences in shareholders' demands for disclosure quality on firms' disclosure choices (Bushee, Matsumoto, and Miller 2003, Lehavy, Li, and Merkley 2011). Finally, I control for several firm characteristics that have historically been related to disclosure. I use the log of the firm's market value (*LnMV*) and the log of the number of business segments (*LnSegments*) to control for firm size (Lang and Lundholm 1993, Li 2008), and I include the firm's market-to-book equity ratio (*Mtb*) to control for the firm's investment opportunities and growth potential. I control for the volatility of the firm's operations using the standard deviation of the change in split-adjusted earnings per share over the previous five years (*EarnVol*) and the log of the standard deviation of the firm's daily stock returns over the twelve months ending in the filing's fiscal period (*LnRetVol*) (Waymire 1985, Bushee and Noe 2000). Also, I winsorize all variables at 1% and 99% to reduce the effect of outliers.

3.3 Descriptive Statistics

Table 2 provides descriptive statistics for the 10-K filing sample. As shown in Panel A, the mean number of quantitative disclosures in the footnotes is 1,102, as compared to the 315 average items on the face of the financial statement. The footnotes contain 11,749 words on average and have a Fog score of 19.7, which is similar to Li (2008). The mean (median) firm has market float (per the 10-K disclosure) of $2.7 billion ($345 million), assets of $4.9 billion ($539 million), analyst following of seven (five), and institutional holdings of 57% (64%). Table 2 Panel B provides the Pearson and Spearman correlations between variables, with Spearman above the diagonal and Pearson below. The number of quantitative disclosures and the (log of the) number of words in the footnotes are highly correlated (0.71 Pearson), which is not surprising since they capture different aspects of disclosure within the footnotes. The number of quantitative disclosures is also positively correlated with firm size, number of analysts, institutional holdings, the number of shareholders, and firm performance.

Table 3 Panel A compares the XBRL and non-XBRL samples. Since the largest firms were required to adopt XBRL first, the XBRL sample is larger than the non-XBRL sample, with an average market float of $18.9 billion for XBRL versus $1 billion for non-XBRL. The average amount of footnote disclosure is larger for XBRL firms, with the mean XBRL firm having 1,825 numbers and 17,787 words in the footnotes and the mean non-XBRL firm having 1,024 numbers and 11,100 words. Since XBRL firms are larger on average than non-XBRL firms and size has historically been associated with more disclosure, this difference in disclosure amount is understandable. The complexity of the footnotes are similar, though, with a fog score for the footnotes of 19.6 and 19.7 for XBRL and non-XBRL, respectively.[20]

Table 3 Panel B (C) examines the mean (median) change in the number of numbers in the footnotes for XBRL and non-XBRL firms in the pre- and post-XBRL periods. As shown, XBRL firms significantly increase their quantitative footnote disclosures from the pre- to the post-XBRL period, while the increase for non-XBRL firms is not significant. When I compare the two groups, the increase for XBRL firms is significantly larger than for non-XBRL firms, implying that XBRL firms respond to the anticipated reduction in investor processing costs by increasing their quantitative disclosures. However, these comparisons are univariate. To ensure there are not other changes in firms' information environments driving the disclosure choice, I turn next to multivariate tests.

4. Research Design and Results

4.1 Investor Information Costs and Firm Disclosure

Main Research Design

To examine the effect of adoption of XBRL detailed tagging requirements on firm disclosure choice, I first estimate the following OLS regression using XBRL firms only:

$$TagsNotes_{i,t} = \beta_0 + \beta_1 Post_t + \beta_i \sum \text{ControlVariables}_{i,t} + \text{Firm FE}_i + \varepsilon \quad (1)$$

[20] To ensure that any difference between the change in disclosure for XBRL firms versus non-XBRL firms is due to XBRL adoption rather than systematic differences in firm characteristics, I include firm fixed effects as well as numerous determinants of disclosure in my analyses. I also perform a robustness test using a subsample of more similarly sized XBRL and non-XBRL firms and find similar (although weaker) results. See section 5.2 for details.

TagsNotes and the control variables are as defined in section 3. *Post* is an indicator variable equal to one if the filing's fiscal period is June 15, 2010 or later (fiscal year 2010). A positive coefficient on *Post* (β_1) indicates an increase in XBRL firms' quantitative footnote disclosures in the year of detailed XBRL tagging of quantitative footnote disclosures. In addition, I control for fixed idiosyncratic firm disclosure choices by including firm fixed effects, and I cluster standard errors by firm to control for transitory shocks that are correlated across time for a given firm.[21]

In the second model, I utilize the staggered adoption of XBRL by examining filings of non-adopting firms for the same time periods and using these firms to control for any systematic changes other than XBRL that affected firms' disclosures. Specifically, I estimate the following OLS regression using all available firm-year observations:

$$TagsNotes_{i,t} = \beta_0 + \beta_1 Post*XBRL_{i,t} + \beta_i \sum \text{ControlVariables}_{i,t} + \text{Firm FE}_i + \text{Year FE}_t + \varepsilon \qquad (2)$$

TagsNotes and the control variables are as defined above. In addition to firm fixed effects and firm-clustered standard errors, I control for time-related effects by including year fixed effects. *Post*XBRL* is the interaction of *Post* (an indicator variable for the post-adoption year, 2010) and *XBRL* (an indicator variable for firms that adopt XBRL detailed tagging requirements). I do not include the main effects of *Post* and *XBRL* in model 2 because the year and firm fixed effects encompass the variation in *Post* and *XBRL*, respectively, preventing estimation of their coefficients. However, I also report results from a variant of model 2 that does not include fixed effects and thus does include *Post* and *XBRL*. For either specification, the coefficient on *Post*XBRL* (β_1) captures the difference between the change in XBRL firms' disclosure and the change in non-XBRL firms' disclosure before and after implementation of XBRL, or the difference-in-difference impact of detailed tagging adoption on the amount of disclosure, controlling for other firm and time effects.

[21] Note that I do not include time fixed effects in this model because they would encompass the variation in the variable of interest (*Post*). Also, I do not cluster standard errors by time (to create two-way clustered standard errors) because there are five years in my sample, and to create consistent estimates of standard errors, at least 10-50 clusters (i.e. years, in this case) are recommended (Petersen 2009, Gow, Ormazabal, and Taylor 2010).

Main Results

Table 4 provides the multivariate regression results for the effects of XBRL detailed tagging on the amount of quantitative disclosure in 10-K filings. Model 1 shows a positive coefficient for *Post* significant at the 1% level, confirming the main prediction of increased disclosure for XBRL firms upon adoption of detailed tagging. In addition, the magnitude of the effect appears to be economically significant; the coefficient for *Post* of 135 implies an average increase of 135 footnote numbers, or approximately 7% of the mean XBRL firm's quantitative footnote disclosures. Model 2, which includes both XBRL and non-XBRL firms, shows a positive coefficient for *Post*XBRL* significant at the 1% level, confirming that the increase in XBRL firms' disclosure is significantly greater than any change in non-XBRL firm disclosure. I also report a third model that removes the firm and year fixed effects from model 2, allowing estimation of coefficients for *Post* and *XBRL.* The coefficient for *Post*XBRL* remains positive and significant at the 1% level. The coefficient for *XBRL* is positive and significant, consistent with univariate statistics in Table 3. The coefficient for *Post* is negative and significant, rather than insignificant as shown in Table 3, but it does not seem to drive the main difference-in-difference results, given the much smaller magnitude (18.9 versus 125.1).

The coefficient estimates for the control variables show that the number of quantitative footnote disclosures increases with the number of words in the footnotes (*LnWords_Notes*), the market value (*LnMV*), the number of segments (*LnSegments*), the number of shareholders (*LnNumShareholders*), and the firm's return on assets (*ROA*), consistent with prior findings that disclosure increases with firm size and performance (Lang and Lundholm 1993, Miller 2002). Surprisingly, disclosure is negatively related to the firm's prior year stock performance (*PyAbnRet*) and number of analysts (*LnAnalysts*).[22] Volatility of earnings and price is positively associated with quantitative disclosure,

[22] The negative coefficient on *LnAnalysts* (and insignificant coefficient on *Inst_Hold)* is surprising because prior literature shows that analysts and institutions are associated with more disclosure (e.g. Lang and Lundholm 1996, Ajinkya, Bhojraj, and Sengupta 2005). To provide additional comfort that analysts and institutions do help discipline

rather than negative as might be expected given Waymire's (1985) finding that firms with more volatile earnings are less likely to provide earnings forecasts. However, detailed footnote disclosure has a different context and purpose than summary earnings guidance (Merkley 2011). If volatile firms find earnings measures to be less helpful for investors, they would be likely to provide more detailed footnote disclosures and fewer earnings forecasts.

4.2 Variations in Information Costs

To further determine whether the increase in disclosure is related to anticipated decreases in investor information processing costs, I examine two cross-sectional settings where the level of investor processing costs vary based on firm or investor characteristics.

Complicated Firms

To test whether complicated firms have a greater increase in disclosure as investor processing costs decrease (P2), I estimate the following OLS regression, including year and firm fixed effects and firm-clustered standard errors:

$$TagsNotes_{i,t} = \beta_0 + \beta_1 Post*XBRL_{i,t} + \beta_2 Post*XBRL*ComplicatedFirms_{i,t} + \beta_3 ComplicatedFirms_{i,t} + \beta_4 Post*ComplicatedFirms_{i,t} + \beta_5 XBRL*ComplicatedFirms_{i,t} + \beta_i \sum ControlVariables_{i,t} + Firm\ FE_i + Year\ FE_t + \varepsilon \quad (3)$$

TagsNotes, *Post*, *XBRL*, and the control variables are as defined earlier. *ComplicatedFirms* represents firms with a complicated information environment, based on three measures: *MultipleIndustries*, *EarningsVolatility*, and *AnalystDispersion*. *MultipleIndustries* is an indicator variable equal to one if the firm has operating segments in different industries, using Compustat's Segment data and defining industries using 3-digit SICs, and zero otherwise. *EarningsVolatility* is an indicator variable equal to one if the firm has above median earnings volatility, where earnings volatility is defined as the

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firm disclosure of quantitative footnote disclosures, I examine the relation between changes in analysts and changes in quantitative footnote disclosures, lag changes in analysts and changes in disclosure, changes in institutional holding and changes in disclosure, and lag changes in institutional holding and changes in disclosure. In all cases, I find a positive relation, consistent with findings in prior literature.

standard deviation of the change in split-adjusted earnings per share over the previous five years (including the current year) (Waymire 1985).[23] *AnalystDispersion* is an indicator variable equal to one for firms that have an above-median level of analyst dispersion and zero otherwise, where analyst dispersion is the median monthly standard deviation of analyst earnings forecasts for the fiscal period during the 12 months prior to the fiscal period end, scaled by the mean analyst estimate (Roulstone 2003).

For all three measures, if the decrease in investor processing costs affects complicated firms relatively more and thus has a larger impact on the disclosure choice of firms, the coefficient for *Post*XBRL*ComplicatedFirms* (β_2) should be positive. Table 5 reports the results of Model 3 for all measures of complicated firms, showing that although the average non-complicated XBRL firm increases their disclosure, the increase is even greater for complicated XBRL firms, significant at the 5% level or better. Specifically, the disclosure increase is twice as large for complicated firms, or 160 versus 80 footnote numbers. The larger impact of XBRL adoption on complicated firms' disclosure is consistent with the reduction in investor processing costs driving the increase in firm disclosure.

Sophisticated Investors

To test whether firms with more sophisticated investors or stakeholders (i.e. those with inherently lower processing costs) have a smaller increase in disclosure as investor processing costs decrease (P3), I estimate the following regression with year and firm fixed effects and firm-clustered standard errors:

$$TagsNotes_{i,t} = \beta_0 + \beta_1 Post*XBRL_{i,t} + \beta_2 Post*XBRL*SophisticatedInv_{i,t} + \beta_3\ SophisticatedInv_{i,t} + \beta_4 Post*SophisticatedInv_{i,t} + \beta_5 XBRL*SophisticatedInv_{i,t} + \beta_i \sum ControlVariables_{i,t} + Firm\ FE_i + Year\ FE_t + \varepsilon \quad (4)$$

[23] To be clear, I calculate the median value for the XBRL and non-XBRL groups separately and assign the indicator variable value using the median value for the group which the observation belongs to. I choose this method for all cross-sectional indicator variables to ensure each group has a comparable number of high versus low observations.

TagsNotes, *Post*, *XBRL*, and the control variables are as defined earlier. *SophisticatedInv* is an indicator variable equal to one if the firm has investors with better processing ability and zero otherwise, based on two definitions: *Analysts* and *Institutions*.

Analysts is an indicator variable equal to one if the number of analysts covering the firm is above the median and zero otherwise, and *Institutions* is an indicator variable equal to one if the percent of shares owned by institutions is above the median and zero otherwise.[24] If the decrease in investor processing costs helps sophisticated investors relatively less and thus has a smaller impact on the disclosure pressure for the firms they follow, the coefficient for *Post*XBRL*SophisticatedInv* (β_2) should be negative.

Table 6 provides the results of the sophisticated investor model for both *Analysts* and *Institutions*. The coefficient for *Post*XBRL*SophisticatedInv* is negative and significant at the 10% level or better in both regressions. In addition, the coefficient for *Post*XBRL* is positive and significant at the 1% level, and the sum of these two coefficients is positive and significant at the 1% level for both regressions. These results combined indicate that firms with more sophisticated investors still increase quantitative footnote disclosure upon adoption of XBRL detailed tagging, but the increase is significantly less than that for firms with less sophisticated investors. Specifically, firms with sophisticated investors increase quantitative footnote disclosures approximately half as much as firms with less sophisticated investors (approximately 90 versus 180 numbers in the footnotes). The impact of XBRL on disclosure varies based on the inherent processing costs of firms' investors, providing additional support for the increase in firm disclosure being driven by an anticipated reduction in investor processing costs.

[24] For all cross-sectional indicator variables (*EarningsVolatility, AnalystDispersion, Analysts,* and *Institutions*), I choose to separate observations into two groups (High and Low) because it simplifies interpretation. However, inferences are unchanged if the cross-sectional variables are separated into quartiles or deciles.

5. Additional Tests and Robustness Analyses

5.1 Additional Tests

I perform two additional tests to better understand the quantitative disclosure measure and to confirm that the results are not bring driven by non-discretionary or non-informative disclosures.

Financial Instruments and Derivatives

To control for changes in disclosure requirements during my period, I include year fixed effects. However, this assumes that the altered disclosure requirement affects all firms equally. If a change in disclosure requirements systematically affects XBRL firms differently from non-XBRL firms, it could affect the difference-in-difference coefficient. To provide some comfort that my results are not being driven by disclosure requirement changes, I focus on two of the largest disclosure changes during my period: financial instruments and derivatives. SFAS 157 increases the amount of disclosure required related to fair values of financial instruments, and it went into effect for fiscal 2008 (periods beginning after November 15, 2007). SFAS 161 increases the amount of disclosure required related to derivatives and hedges, starting in fiscal 2009 (periods beginning after November 15, 2008). I measure the extent of each firm-year's disclosure related to financial instruments and to derivatives by counting the number of times the words financial instrument and derivative appear in the footnotes, respectively (*NumWords_FinInstr* and *NumWords_DerivHedge*).[25]

To confirm that these count variables capture the impact of changes in financial instrument and derivative disclosure requirements, I examine their movement over time. For firms with financial instruments (i.e. firm-filings with at least one mention of financial instruments in their footnotes), the number of financial instrument-related words increases over the period, with the largest increase happening the year SFAS 157 went into effect (fiscal 2008). For firms with derivatives, the number of derivative-related words also increases over the period, with the largest increase happening the

[25] Specifically, I count the number of derivative-related words (i.e. derivative, derivatives, hedge, hedges, hedging, hedged) and financial instrument-related words (i.e. financial instrument, financial instruments).

year SFAS 161 went into effect (fiscal 2009). Given these movement patterns, the two count variables appear to capture the impact of mandatory disclosure changes. Note, however, that firms could also have chosen to voluntarily provide more quantitative information related to financial instruments and derivatives. By controlling for these count variables, I remove both mandatory *and* voluntary disclosure related to financial instruments and derivatives, thus biasing against finding an XBRL-related disclosure increase.

Table 7 Panels A, B, and C provide the main results including *NumWords_FinInstr* and *NumWords_DerivHedge*. As shown, the impact of XBRL is smaller but still significant. In the main difference-in-difference test, XBRL firms increase their quantitative footnote disclosure by 111.9 more numbers than non-XBRL firms. Complicated XBRL firms increase their disclosure more than simple XBRL firms, and XBRL firms followed by sophisticated investors increase their disclosure by a smaller amount. All coefficients are significant at the 10% level or better, except for the *Analysts* cross-sectional cut, which has a p-value of 0.112.

Non-Zero Quantitative Filings

Firms adopting XBRL may choose to restructure the formatting of their footnotes to reduce the cost of tagging going forward. Specifically, organizing quantitative disclosures into tables and ensuring that every year has a value – even if that value is zero – makes it easier to automatically roll forward tags in subsequent years. This paper's primary measure of disclosure – *Notes_tags* – counts all numbers provided in the footnotes, including zeroes. I choose to include zeroes in the count because disclosures of the absence of a financial item can be informative for investors. However, if the zero is simply a result of firms adjusting their formatting and "filling in" empty blanks, it could be less informative. To ensure that the increase in zeroes is not driving my results, I rerun my main analyses using *non-zero* quantitative footnote disclosures as the dependent variable. As Table 8 Panels A, B, and C show, the impact of XBRL is slightly smaller but still significant. In the main difference-in-difference test, XBRL firms increase their quantitative footnote disclosure by 124.8

more numbers than non-XBRL firms. Complicated XBRL firms increase their disclosure more than simple XBRL firms, and XBRL firms followed by sophisticated investors increase their disclosure by a smaller amount. All coefficients are significant at the 10% level or better.

5.2 Robustness Analyses

I also conduct several robustness tests. First, I repeat my main analyses using a subset of the observations to attempt to compare XBRL and non-XBRL firms more similar in size. Since the XBRL adoption requirements are based on firms' market float, XBRL firms are by definition much larger than non-XBRL firms. I address this in my main tests by including numerous control variables – including the log of market value – that have historically been related to disclosure choice, as well as firm fixed effects. With these controls in place, differences between the XBRL and non-XBRL firms should be accounted for. However, as an alternate approach, I restrict my sample to the smallest 50% of XBRL observations and largest 50% of non-XBRL observations, in terms of market float. The advantage of using this subset of observations is that the comparability of firms increases, with the mean market float of XBRL firms being $6.6 billion and non-XBRL $1.9 billion, rather than the $18.9 billion and $1 billion for XBRL and non-XBRL firms in the full sample. However, the disadvantage is that I lose half the observations and am now estimating the effect of XBRL for just those firms in the range of $260 million to $11.4 billion, rather than all firms, which changes the generalizability of the inferences. Using this subsample, the results are similar but weaker, with one coefficient becoming marginally insignificant (*Post*XBRL*Analysts* with a p-value of 0.127) and *Post*XBRL*Institutions* becoming insignificantly different from zero. Overall, the results are still consistent with firms increasing disclosure upon adoption of XBRL in anticipation of reduced investor processing costs.

Second, I separately identify firms that voluntarily adopted XBRL's detailed tagging requirements. Of the 323 XBRL firms that filed detailed requirements for fiscal 2010, 25 of them could be considered voluntary detail filers, either because they began filing (quarterly) XBRL

statements before the adoption date or because they were below the $5 billion market float requirement for fiscal year end 2010. Since they voluntarily chose to provide XBRL statements, their disclosure incentives could be different from mandatory adopters. If they started filing before the mandatory date, they could have altered their disclosure in the pre-adoption period as part of their overall early approach, biasing against finding results of increased disclosure from the pre- to post-adoption period. If they provided the detailed XBRL filings even though they were below the $5 billion cutoff, these firms could be more responsive to investor needs and thus be driving the overall results. Therefore, I rerun my main analyses and include *Vol* and *Post*Vol* variables in the main regression, as well as an interaction term *Post*Vol*Cross-SectionalVariable* for each of the cross-sectional tests. For all tests, the inferences on the main variables remain the same, reducing any concerns that the voluntary filers are driving the results. Consistent with these findings, when I examine more closely the firms identified as voluntary, 20 of the 25 are "threshold crossers," or firms that dropped below the $5 billion threshold after initial adoption of basic XBRL requirements but continued to file XBRL statements as Tier 1 filers. Because these firms were effectively mandatory adopters, I would expect their behavior to be similar to mandatory XBRL firms and thus not inappropriately biasing the results.

Third, I rerun my main analyses in a non-XBRL adoption year as a pseudo-adoption year. If the change in disclosure is related to the adoption of XBRL detailed tagging requirements and not other factors, I should not find a change in disclosure for XBRL firms in a non-adoption year. I drop fiscal years after the SEC's announcement of XBRL requirements (fiscal years 2009 and 2010), and I set fiscal year 2008 as the pseudo post-adoption year. Using fiscal years 2006 and 2007 as the pseudo pre-adoption years, I do not find a difference in quantitative footnote disclosures for XBRL firms in the pseudo post-adoption year relative to non-XBRL firms, providing additional evidence that the change in quantitative footnote disclosure for XBRL firms is related to the regulatory change.

6. Conclusion

I examine the impact of investor information processing costs on firms' disclosure choice. Using the adoption of XBRL detailed tagging requirements as an exogenous shock to anticipated investor information processing costs, I find that firms increase their quantitative footnote disclosures upon adoption of XBRL detailed tagging requirements. I use non-adopting firms as a benchmark to control for marketwide changes in disclosure, and I find that the results of increased disclosure hold in this difference-in-difference design. Furthermore, I examine several firm and investor characteristics that cause variation in investor information costs, and I show that the increase in XBRL firms' disclosure is *greater* for firms with information that is inherently more costly to process: firms operating in multiple industries, firms with more volatile earnings, and firms with more disperse analyst forecasts. I also show that the increase in XBRL firms' disclosure is *smaller* for firms with a more sophisticated investor base that has inherently lower processing costs (i.e. more analyst following and greater institutional holdings). Together, these results provide evidence that firms increase their detailed, quantitative disclosure in response to anticipated reductions in investor information processing costs.

I make three main contributions to the literature. First, I contribute to the disclosure choice literature by providing empirical evidence of managers adjusting the amount of disclosure they choose to provide because of an anticipated decrease in investor processing costs and thus change in investor response to disclosure. Second, I contribute to the information processing costs literature by showing how *investor* information processing costs can impact a fundamental disclosure choice of *firms*. Third, I provide evidence for regulators of an unintended consequence of cost-decreasing regulation.

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Appendix A – PERL parsing of SEC Filings and Counting of Numbers

This appendix explains the details of obtaining the SEC filings, cleaning the file, extracting the various sections of the report, and counting the number of "numbers" within each section. I begin by downloading the 10-K reports from SEC's EDGAR website and performing cleaning techniques similar to those of Li (2008). In particular, I remove the heading information found between <SEC-HEADER> and </SEC-HEADER>, eliminate any file portions that are not html or text (i.e. images, etc.), and convert the file to text only by removing the html tags and codes.[26] I then identify and extract the financial statements and the footnotes (separately) using regular expressions that include variations of the relevant section titles for each and make use of the typical ordering of the section. For example, to find the footnotes within 10-K's, I first look for the financial statements using various versions of financial statement titles such as "Item 8 Index to Consolidated Financial Statements" or "Consolidated Balance Sheet", and I then look for variations of "Notes Accompanying the Consolidated Financial Statements" once the financial statement section has been found. I identify the end of the footnotes using either variants of the next section titles (Items 9 or 10) or the start of the report's exhibits. Note that there are still some filings that cannot be separated into their components using the automatic code because they include non-standard headings or firm-specific information within the section titles. As a result, I am not able to include these observations in my final sample, as shown in Table 1.

Once the various sections of the annual or quarterly report have been found, I then use regular expressions in Perl to identify and count numbers. Since numbers can vary in format, I use several rules to identify "true" numbers. First, I exclude years or dates by not counting 4-digit numbers without a comma (e.g. 2009) and not counting numbers in a date format (e.g. 1/1/08, January 1,

[26] I perform additional cleaning procedures before estimating the number of words or the fog score of the sections. Specifically, I follow Li (2008) in removing paragraphs with more than 50% non-alpha characters and those with less than 80 characters, as well as removing standard sentences at the beginning of the filing.

2008). I allow numbers to include commas or decimals, and I count fractions or ratios as one number. I exclude numbers that are part of references to notes or sections (e.g. Note 7, Item 9, Section 2, Notes 5 and 6, 10-K, etc.) and numbers that are part of descriptions (e.g. Under 1 year, From 1 to 3 years, Over 12 months, Level 1/2/3, etc.). I eliminate numbered lists or footnote labeling in the formats of 1), (1), or 1. However, there is still some noise in the number measurement. For example, there is no effective way to remove page numbers, which often appear as individual numbers just like numbers in tables. For the remaining measurement error, it is probable that the error is random or has a firm-fixed component which is eliminated by the firm fixed effects and difference-in-difference test design. I use *Tags_Notes* for the tests because the number of quantitative XBRL tags is only available for filings of XBRL firms after adoption, eliminating the ability to compare post-adoption disclosure to pre-adoption disclosure or to Non-XBRL firm disclosure. However, I can use the number of XBRL tags where available to test the validity of *Tags_Notes*. Specifically, I examine the correlation between my measure (*Tags_Notes*) and a count of the quantitative XBRL tags for the subset of detailed XBRL filings, and I find a Pearson (Spearman) correlation of 0.804 (0.846), supporting the reasonableness of *Tags_Notes*.

Appendix B – Variable Definitions

Analyst, LnAnalyst	Number of analysts following the firm (or Log(1+Number of Analysts)), measured as the maximum number of analysts providing a forecast in I/B/E/S for the firm over the fiscal year.
Assets	Total assets as of the fiscal period end, in millions, from Compustat.
EarnVol	Standard Deviation of the change in split-adjusted earnings per share over the five prior fiscal years, including the current one.
Fog_Notes	Fog score for the words in the footnote section of the financial statements, using the Fathom package in Perl.
InstHoldings	Percent of share value held by institutions as of the end of the fiscal year, as measured by Thomson Reuter's Institutional Holdings database.
Market Float	Market Float for the firm as of the end of the second quarter of the fiscal year, as provided in the 10-K Filing, in millions.
Market Value, LnMV	Value of shares outstanding (or Log of share value) as of the fiscal year end, per Compustat, in millions.
Mtb	Market-to-book value, or market value of shares outstanding scaled by the book value of equity, as of the fiscal year end, per Compustat.
NumSegments, LnSegments	Number of business or operating segments (or Log of number of segments) reported for the fiscal year, per Compustat Segments file. Firms with no segments are assigned a value of one.
NumShareholders, LnNumShareholders	Number of shareholders (or Log of the number of shareholders) as of the fiscal year end, per Compustat, in thousands.
Post	Indicator Variable equal to one for post-adoption of XBRL (fiscal 2010) and zero otherwise
*Post * XBRL*	Indicator Variable equal to one for post-adoption (fiscal 2010) XBRL firm-years
PyAbnRet	Market-adjusted return for the firm over the fiscal year.
RetVol, LnRetVol	Standard Deviation of daily returns (or the Log of the standard deviation of daily returns) for the firm over the fiscal year.
ROA	Net income before extraordinary items scaled by assets.
Tags_FS	Number of "numbers" in the financial statements within the SEC annual filing, captured as described in Appendix A.

Tags_Notes	Number of "numbers" in the footnotes within the SEC annual filing, captured as described in Appendix A.
Words_Notes, LnWords_Notes	Number of words in the footnotes within the SEC annual filing (or Log of the number of words)
XBRL	Indicator variable equal to one for firms that adopted XBRL detailed tagging requirements during the first implementation phase, or Tier1 firms.

Table 1
Sample Selection

Panel A - Sample Selection

	Filings	Firms
SEC Filings for Compustat Firms for Fiscal Years 2006 through 2010	28,603	7,449
Less filings that don't have required Compustat and CRSP information	(9,882)	(2,572)
Less filings without quantitative footnote count from Perl output	(4,752)	(450)
Total Observations	13,969	4,427
Detail XBRL Filings for Periods Ending June 15, 2010 to April 30, 2011	397	397
Less filings that don't have required Compustat and CRSP information	(15)	(15)
Less filings without quantitative footnote count from Perl output	(59)	(59)
Total Detail XBRL Observations	323	323

Panel B - Distribution of Sample Over Fiscal Years

Fiscal Year	Filings
2006	2,796
2007	2,456
2008	3,006
2009	3,032
2010	2,679
Total	13,969

This table provides details of the selection of the 10-K filing sample for fiscal years 2006 through 2010. Panel A provides the sample selection, and Panel B provides the distribution of the sample over fiscal years.

Table 2
Descriptive Statistics and Correlations

Panel A - Sample Descriptives

	Mean	P25	Median	P75	Std Dev	N
Tags_Notes	1,102 ***	642	917	1,358	682	13,969
Tags_FS	315 ***	259	313	364	127	13,969
Tag_Ratio_Notes	37% ***	30%	37%	43%	10%	13,969
Tag_Ratio_FS	12% ***	9%	12%	16%	5%	13,969
Words_Notes	11,749 ***	7,638	10,388	14,103	6,747	13,969
Fog_Notes	19.7 ***	18.7	19.6	20.6	1.4	13,969
Market Float	2,734 ***	75	345	1,518	8,211	13,969
Market Value	3,068 ***	105	453	1,874	8,771	13,969
Assets	4,880 ***	118	539	2,340	16,715	13,969
Analyst	7.11 ***	1.00	5.00	11.00	6.96	13,969
InstHoldings	0.57 ***	0.28	0.64	0.86	0.33	13,969
NumShareholders	19.88 ***	0.24	1.00	4.98	492.68	13,969
NumSegments	2.15 ***	1.00	1.00	3.00	1.57	13,969
ROA	-0.05 ***	-0.04	0.03	0.07	0.29	13,969
PyAbnRet	0.03 ***	-0.27	-0.04	0.22	0.52	13,969
EarnVol	2.24 ***	0.31	0.70	1.71	5.64	13,969
RetVol	0.04 ***	0.02	0.03	0.05	0.02	13,969
Mtb	2.57 ***	1.05	1.79	3.10	4.17	13,969

This table provides descriptive statistics (Panel A) and correlations (Panel B) for the sample of 13,969 10-K filings. The variables are as defined in Appendix B, and all variables are winsorized at 1% and 99%. In Panel A, ***, **, * signify significantly different from zero at the 1%, 5%, and 10% level or better, respectively. In Panel B, Spearman (Pearson) correlations are provided above (below) the diagonal, and correlations significant at the 10% level or better are bolded.

Table 2 Continued

Panel B - Spearman and Pearson Correlations

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Tags_Notes	(1)	1	**0.78**	**-0.08**	**0.57**	**0.40**	**0.32**	**0.35**	**0.45**	**0.06**	**0.06**	**0.25**	**-0.27**	**-0.08**
LnWords_Notes	(2)	**0.71**	1	0.00	**0.44**	**0.36**	**0.22**	**0.23**	**0.30**	**-0.09**	0.01	**0.31**	**-0.09**	**-0.09**
Fog_Notes	(3)	-0.01	**0.03**	1	**-0.17**	**-0.15**	**-0.19**	**-0.07**	**-0.03**	**-0.12**	**-0.04**	**0.05**	**0.12**	**-0.05**
LnMV	(4)	**0.52**	**0.43**	**-0.15**	1	**0.77**	**0.58**	**0.42**	**0.35**	**0.41**	**0.30**	**-0.05**	**-0.58**	**0.34**
LnAnalyst	(5)	**0.33**	**0.37**	**-0.15**	**0.76**	1	**0.57**	**0.26**	**0.20**	**0.24**	**0.08**	**-0.06**	**-0.35**	**0.23**
InstHoldings	(6)	**0.24**	**0.23**	**-0.19**	**0.59**	**0.61**	1	**0.12**	**0.19**	**0.34**	**0.10**	**-0.09**	**-0.36**	**0.15**
LnNumShareholders	(7)	**0.35**	**0.23**	**-0.07**	**0.42**	**0.26**	**0.12**	1	**0.26**	**0.14**	0.00	**-0.03**	**-0.26**	0.01
LnSegments	(8)	**0.40**	**0.30**	**-0.03**	**0.35**	**0.20**	**0.19**	**0.26**	1	**0.18**	0.01	**0.04**	**-0.22**	**-0.05**
ROA	(9)	**0.14**	0.00	**-0.09**	**0.41**	**0.24**	**0.34**	**0.14**	**0.18**	1	**0.21**	**-0.13**	**-0.43**	0.00
PyAbnRet	(10)	0.00	-0.01	**-0.01**	**0.20**	**0.02**	**0.10**	0.00	0.01	**0.21**	1	**-0.04**	-0.01	**0.15**
EarnVol	(11)	**0.12**	**0.15**	**0.05**	**-0.05**	**-0.06**	**-0.09**	**-0.03**	**0.04**	**-0.13**	**-0.04**	1	**0.13**	**-0.06**
LnRetVol	(12)	**-0.22**	**-0.09**	**0.11**	**-0.60**	**-0.35**	**-0.36**	**-0.26**	**-0.22**	**-0.43**	-0.01	**0.13**	1	**-0.09**
Mtb	(13)	**-0.08**	**-0.07**	-0.01	**0.14**	**0.07**	**0.03**	0.01	**-0.05**	0.00	**0.15**	**-0.06**	**-0.09**	1

Table 3
Univariate XBRL and Non-XBRL Comparisons

Panel A - Comparing Mean XBRL and Non-XBRL Firms in the 10-K Filing Sample

	XBRL	Non-XBRL	Difference	
Tags_Notes	1,825	1,024	801	***
Tags_FS	369	309	60	***
Tag_Ratio_Notes	40.4%	36.5%	3.8%	***
Tag_Ratio_FS	9.3%	12.5%	-3.3%	***
Words_Notes	17,787	11,100	6,688	***
Fog_Notes	19.6	19.7	-0.1	**
Market Float	18,899	995	17,904	***
Market Value	20,490	1,193	19,297	***
Assets	31,297	2,038	29,260	***
Analyst	19	6	13	***
InstHoldings	0.74	0.55	0.19	***
NumShareholders	90.3	12.3	78.0	***
NumSegments	3.3	2.0	1.3	***
ROA	0.07	-0.07	0.14	***
PyAbnRet	0.06	0.03	0.03	**
EarnVol	1.82	2.29	-0.47	***
RetVol	0.03	0.04	-0.01	***
Mtb	3.40	2.49	0.91	***

Panel B - Mean Numbers in Footnotes for XBRL and Non-XBRL Firms, Pre and Post

	Pre	Post	Difference		
XBRL	1,787.2	1,944.0	156.8	8.8%	***
Non-XBRL	1,020.2	1,040.4	20.2	2.0%	
Difference-in-Difference			136.7	6.8%	***

Panel C - Median Numbers in Footnotes for XBRL and Non-XBRL Firms, Pre and Post

	Pre	Post	Difference		
XBRL	1,567	1,680	113	7.2%	**
Non-XBRL	864	864	0	0.0%	
Difference-in-Difference			113	7.2%	***

This table provides univariate comparisons of the XBRL and Non-XBRL 10-K filing samples. For XBRL firms, there are 1,357 filings – 1,034 pre-adoption and 323 post-adoption. For Non-XBRL firms, there are 12,612 filings – 10,256 pre-adoption and 2,356 post-adoption. Panel A provides descriptive statistics for each sample, along with the results of t-tests for the difference between samples. Panel B (C) provides the mean (median) number of quantitative footnote disclosures (i.e. number of numbers) for the XBRL and Non-XBRL samples, pre-adoption and post-adoption, along with the results of t-tests (Wilcoxon rank sum tests) for the difference between samples and p-values from a regression (quantile regression) for the difference in difference. The variables are as defined in Appendix B, and all variables are winsorized at 1% and 99%. ***, **, * Significantly different from zero at the 1%, 5%, and 10% level or better, respectively.

Table 4
Impact of XBRL on the Number of Quantitative Footnote Disclosures in 10-K Filings

	Predicted Sign	(1) XBRL Only	(2) All Firms	(3) All Firms
*Post * XBRL*	+		136.71***	125.05***
			(0.000)	(0.000)
Post	+	135.40***		-18.85**
		(0.000)		(0.015)
XBRL				59.80
				(0.114)
LnWords_Notes		1095.05***	704.99***	788.01***
		(0.000)	(0.000)	(0.000)
Fog_Notes		-5.50	3.71	0.15
		(0.770)	(0.527)	(0.973)
LnAnalyst		-25.34	5.10	-113.58***
		(0.483)	(0.495)	(0.000)
InstHoldings		-32.72	-39.67	-16.50
		(0.593)	(0.126)	(0.545)
LnNumShareholders		83.40*	10.94*	26.67***
		(0.064)	(0.089)	(0.000)
LnMV		54.12	34.17***	107.59***
		(0.182)	(0.000)	(0.000)
LnSegments		-3.61	50.92***	130.30***
		(0.946)	(0.000)	(0.000)
ROA		225.34	34.66***	82.02***
		(0.328)	(0.005)	(0.000)
PyAbnRet		43.34	-16.80***	-64.67***
		(0.133)	(0.002)	(0.000)
EarnVol		7.57	3.85***	4.49***
		(0.173)	(0.005)	(0.001)
LnRetVol		58.10**	5.47	23.14*
		(0.042)	(0.607)	(0.084)
Mtb		-1.21	-0.14	-9.89***
		(0.481)	(0.836)	(0.000)
Firm Fixed Effects		Yes	Yes	No
Year Fixed Effects		No	Yes	No
N		1,357	13,969	13,969
Adj. R-squared		0.5251	0.3491	0.6100

This table provides the results of regressing the number of quantitative footnote disclosures on an indicator variable for post-XBRL filings (i.e. fiscal 2010, *Post*), an indicator variable for firms that adopted XBRL's detailed tagging requirements *(XBRL)*, the interaction between the two (*Post * XBRL*), and control variables. Coefficients are provided with p-values in parentheses below. Column 1 (2&3) uses the 1,357 XBRL (13,969 XBRL and non-XBRL) firm 10-K filings for fiscal 2006 to 2010. All three models have firm-clustered, robust standard errors. Variables are as defined in Appendix B and are winsorized at 1% and 99%. The reported R-squared is from "within" estimation (i.e. does not include the effect of firm fixed effects). ***, **, * Significantly different from zero at the 1%, 5%, and 10% level or better, respectively.

Table 5
Differential Impact of XBRL on the Quantitative Footnote Disclosures of Complicated Firms

	Predicted Sign	**Multiple Industries**	**Earnings Volatility**	**Analyst Dispersion**
*Post * XBRL*	+	87.82***	83.94***	74.47***
		(0.001)	(0.003)	(0.008)
*Post * XBRL * ComplicatedFirm*	+	87.00**	81.39**	84.39**
		(0.044)	(0.035)	(0.041)
ComplicatedFirm		-15.43	0.50	-0.28
		(0.350)	(0.956)	(0.974)
*Post * ComplicatedFirm*		32.12**	9.57	-7.79
		(0.035)	(0.367)	(0.566)
*XBRL * ComplicatedFirm*		22.45	62.76	75.12***
		(0.767)	(0.105)	(0.008)
Control Variables		Yes	Yes	Yes
Firm Fixed Effects		Yes	Yes	Yes
Year Fixed Effects		Yes	Yes	Yes
N		13,969	13,969	10,415
Adj. R-squared		0.3508	0.3508	0.3658

This table provides the results of regressing the number of quantitative footnote disclosures in the 10-K filings on the *Post * XBRL* interaction variable that identifies XBRL firms' post-adoption filings, the *Post * XBRL * ComplicatedFirm* interaction variable that identifies complicated XBRL firms' post-adoption filings, the *ComplicatedFirm* indicator variable, the *Post * ComplicatedFirm* interaction variable identifying complicated firms' post-adoption filings (i.e. fiscal year 2010), the *XBRL * ComplicatedFirm* interaction variable identifying complicated XBRL firms' filings, and control variables. *Post* and *XBRL* indicator variables are not displayed because their variation is encompassed by the year and firm fixed effects used in the models. *ComplicatedFirm* is defined using one of three measures: *MultipleIndustries, EarningsVolatility*, and *AnalystDispersion*. *MultipleIndustries* is an indicator variable equal to one for firm-years that have operating segments in multiple industries (3-digit SIC) and zero otherwise. *EarningsVolatility* is an indicator variable equal to one for firm-years that have an above-median value for the standard deviation of the change in split-adjusted earnings per share over the prior five years and zero otherwise. *AnalystDispersion* is an indicator variable equal to one for firm-years that have an above-median level of analyst dispersion and zero otherwise, where analyst dispersion is the median monthly standard deviation of analyst earnings forecasts, scaled by the mean analyst estimate. The analyst model has slightly fewer observations because of data requirements (at least two analyst forecasts). Coefficients are provided with p-values in parentheses below. All three models have firm-clustered robust standard errors. The reported R-squared is from "within" estimation (i.e. does not include the effect of firm fixed effects). Variables are as defined in Appendix B and are winsorized at 1% & 99%
***, **, * Significantly different from zero at the 1%, 5%, and 10% level or better, respectively.

Table 6
Differential Impact of XBRL on the Quantitative Footnote Disclosures of
Firms with Sophisticated Investors

	Predicted Sign	**Analysts**	**Institutions**
*Post * XBRL*	+	183.11***	185.62***
		(0.000)	(0.000)
*Post * XBRL * SophisticatedInv*	–	-84.00*	-94.93**
		(0.056)	(0.026)
SophisticatedInv		-29.53***	-12.72
		(0.005)	(0.271)
*Post * SophisticatedInv*		59.01***	36.36***
		(0.000)	(0.000)
*XBRL * SophisticatedInv*		9.84	31.55
		(0.821)	(0.288)
Control Variables		Yes	Yes
Firm Fixed Effects		Yes	Yes
Year Fixed Effects		Yes	Yes
N		13,969	13,969
Adj. R-squared		0.3514	0.3501

This table provides the results of regressing the number of quantitative footnote disclosures in the 10-K filing on the *Post * XBRL* interaction variable that identifies XBRL firms' post-adoption filings, the *Post * XBRL * SophisticatedInv* interaction variable that identifies the post-adoption filings of XBRL firms with more sophisticated stakeholders, the *SophisticatedInv* indicator variable, the *Post * SophisticatedInv* interaction variable identifying the post-adoption filings of firms with more sophisticated stakeholders (i.e. fiscal year 2010), the *XBRL * SophisticatedInv* interaction variable identifying filings of XBRL firms with more sophisticated stakeholders, and control variables. *Post* and *XBRL* indicator variables are not displayed because their variation is encompassed by the year and firm fixed effects used in both models. *SophisticatedInv* is defined using one of two measures: *Analysts* and *Institutions*. *Analysts* is an indicator variable equal to one for firm-years that have an above-median number of analysts following them and zero otherwise. *Institutions* is an indicator variable equal to one for firm-years that have an above-median percent of share value held by institutions and zero otherwise. Coefficients are provided first, with p-values in parentheses below. Both models have firm-clustered robust standard errors. The reported R-squared is from "within" estimation (i.e. does not include the effect of firm fixed effects). Variables are as defined in Appendix B and are winsorized at 1% and 99%.
***, **, * Significantly different from zero at the 1%, 5%, and 10% level or better, respectively.

Table 7

Impact of XBRL on the Number of Quantitative Footnote Disclosures in 10-K filings, Controlling for Financial Instrument and Derivative-Related Disclosure

Panel A - Impact of XBRL on Quantitative Footnote Disclosure in 10-K Filings, Controlling for Financial Instrument- and Derivative-Related Disclosures

	Predicted Sign	(1) XBRL Only	(2) All Firms	(3) All Firms
*Post * XBRL*	+		111.87***	94.14***
			(0.000)	(0.000)
Post	+	80.49***		-32.69***
		(0.000)		(0.000)
XBRL				34.62
				(0.329)
NumWords_DerivHedge		3.51***	2.48***	3.00***
		(0.000)	(0.000)	(0.000)
NumWords_FinInstr		1.70	2.62	10.49***
		(0.747)	(0.171)	(0.000)
Remaining Control Variables		Yes	Yes	Yes
Firm Fixed Effects		Yes	Yes	No
Year Fixed Effects		No	Yes	No
N		1,357	13,969	13,969
Adj. R-squared		0.5622	0.3699	0.6368

Table 7 continued

Panel B - Differential Impact of XBRL on Quantitative Footnote Disclosures for Complicated Firms, Controlling for Financial Instrument and Derivative-Related Disclosure

	Predicted Sign	**Multiple Industries**	**Earnings Volatility**	**Analyst Dispersion**
*Post * XBRL*	+	72.31***	57.39**	60.66**
		(0.005)	(0.034)	(0.022)
*Post * XBRL * ComplicatedFirm*	+	73.34*	88.12**	73.39*
		(0.070)	(0.014)	(0.062)
ComplicatedFirm		-10.88	0.46	0.31
		(0.512)	(0.958)	(0.971)
*Post * ComplicatedFirm*		22.15	4.56	0.40
		(0.142)	(0.664)	(0.977)
*XBRL * ComplicatedFirm*		25.10	44.28	65.80**
		(0.742)	(0.226)	(0.016)
NumWords_DerivHedge		2.44***	2.45***	2.35***
		(0.000)	(0.000)	(0.000)
NumWords_FinInstr		2.60	2.60	0.19
		(0.173)	(0.175)	(0.916)
Remaining Control Variables		Yes	Yes	Yes
Firm Fixed Effects		Yes	Yes	Yes
Year Fixed Effects		Yes	Yes	Yes
N		13,969	13,969	10,415
Adj. R-squared		0.3709	0.3712	0.3843

Table 7 continued

Panel C - Differential Impact of XBRL on Quantitative Footnote Disclosures for Firms with Sophisticated Investors, Controlling for Financial Instrument and Derivative-Related Disclosure

	Predicted Sign	**Analysts**	**Institutions**
*Post * XBRL*	+	146.88***	151.52***
		(0.000)	(0.000)
*Post * XBRL * SophisticatedInv*	–	-65.53	-76.57*
		(0.112)	(0.055)
SophisticatedInv		-28.72***	-10.80
		(0.006)	(0.343)
*Post * SophisticatedInv*		48.01***	29.28***
		(0.000)	(0.005)
*XBRL * SophisticatedInv*		20.89	24.07
		(0.612)	(0.401)
NumWords_DerivHedge		2.43***	2.45***
		(0.000)	(0.000)
NumWords_FinInstr		2.62	2.62
		(0.170)	(0.169)
Remaining Control Variables		Yes	Yes
Firm Fixed Effects		Yes	Yes
Year Fixed Effects		Yes	Yes
N		13,969	13,969
Adj. R-squared		0.3715	0.3705

This table provides the results of the tests in Tables 4-6, controlling for financial instrument and derivative-related disclosure. Panel A displays the results of regressing the number of quantitative footnote disclosures in 10-K filings on an indicator variable for post-XBRL filings (*Post*), an indicator variable for firms that adopted XBRL's detailed tagging requirements *(XBRL*), the interaction between the two (*Post * XBRL*), and control variables. Coefficients are provided first, with p-values in parentheses below. Column 1 uses the 1,357 XBRL firm 10-K filings for fiscal 2006 to 2010, while columns 2 and 3 use the 13,969 XBRL and non-XBRL 10-K filings for fiscal 2006 through 2010. Column 1(2) includes firm (firm and year) fixed effects, and all three models have firm-clustered robust standard errors. Variables are as defined in Appendix B and are winsorized at 1% and 99%. Panels B and C provide the differential impact of XBRL on quantitative footnote disclosures for complicated firms and for firms with more sophisticated investors, respectively. See Tables 5 and 6 for details on the variable cuts. All models in Panels B and C include firm and year fixed effects, as well as firm-clustered robust standard errors. The reported R-squared is from "within" estimation (i.e. does not include the effect of firm fixed effects).

***, **, * Significantly different from zero at the 1%, 5%, and 10% level or better, respectively.

Table 8

Impact of XBRL on the Number of Non-Zero Quantitative Footnote Disclosures in 10-K filings

Panel A - Impact of XBRL on Non-Zero Quantitative Footnote Disclosure in 10-K Filings

	Predicted Sign	(1) XBRL Only	(2) All Firms	(3) All Firms
*Post * XBRL*	+		124.78***	112.39***
			(0.000)	(0.000)
Post	+	118.27***		-22.27***
		(0.000)		(0.003)
XBRL				61.86
				(0.100)
Control Variables		Yes	Yes	Yes
Firm Fixed Effects		Yes	Yes	No
Year Fixed Effects		No	Yes	No
N		1,357	13,969	13,969
Adj. R-squared		0.5277	0.3511	0.6122

Panel B - Differential Impact of XBRL on Non-Zero Quantitative Footnote Disclosures for Complicated Firms

	Predicted Sign	**Multiple Industries**	**Earnings Volatility**	**Analyst Dispersion**
*Post * XBRL*	+	81.66***	80.44***	70.49**
		(0.002)	(0.003)	(0.010)
*Post * XBRL * ComplicatedFirm*	+	77.90*	67.45*	71.30*
		(0.063)	(0.071)	(0.070)
ComplicatedFirm		-17.13	1.78	-1.23
		(0.295)	(0.840)	(0.886)
*Post * ComplicatedFirm*		25.64*	8.63	-4.70
		(0.078)	(0.406)	(0.721)
*XBRL * ComplicatedFirm*		12.28	57.81	77.20***
		(0.856)	(0.129)	(0.006)
Control Variables		Yes	Yes	Yes
Firm Fixed Effects		Yes	Yes	Yes
Year Fixed Effects		Yes	Yes	Yes
N		13,969	13,969	10,415
Adj. R-squared		0.3524	0.3525	0.3681

Table 8 continued

Panel C - Differential Impact of XBRL on Non-Zero Quantitative Footnote Disclosures for Firms with Sophisticated Investors

	Predicted Sign	**Analysts**	**Institutions**
*Post * XBRL*	+	165.24***	172.28***
		(0.000)	(0.000)
*Post * XBRL * SophisticatedInv*	–	-74.80*	-92.24**
		(0.075)	(0.024)
SophisticatedInv		-28.29***	-11.95
		(0.007)	(0.295)
*Post * SophisticatedInv*		54.83***	34.58***
		(0.000)	(0.001)
*XBRL * SophisticatedInv*		14.27	33.86
		(0.739)	(0.253)
Control Variables		Yes	Yes
Firm Fixed Effects		Yes	Yes
Year Fixed Effects		Yes	Yes
N		13,969	13,969
Adj. R-squared		0.3532	0.3521

This table provides the results of the tests in Tables 4-6, using *non-zero* quantitative footnote disclosures as the dependent variable. Panel A displays the results of regressing the number of quantitative footnote disclosures in 10-K filings on an indicator variable for post-XBRL filings (*Post*), an indicator variable for firms that adopted XBRL's detailed tagging requirements *(XBRL*), the interaction between the two (*Post * XBRL*), and control variables. Coefficients are provided first, with p-values in parentheses below. Column 1 uses the 1,357 XBRL firm 10-K filings for fiscal 2006 to 2010, while columns 2 and 3 use the 13,969 XBRL and non-XBRL 10-K filings for fiscal 2006 through 2010. Column 1(2) includes firm (firm and year) fixed effects, and all three models have firm-clustered robust standard errors. Variables are as defined in Appendix B and are winsorized at 1% and 99%. Panels B and C provide the differential impact of XBRL on quantitative footnote disclosures for complicated firms and for firms with more sophisticated investors, respectively. See Tables 5 and 6 for details on the variable cuts. All models in Panels B and C include firm and year fixed effects, as well as firm-clustered robust standard errors. The reported R-squared is from "within" estimation (i.e. does not include the effect of firm fixed effects).

***, **, * Significantly different from zero at the 1%, 5%, and 10% level or better, respectively.