What Do the Markets Say? Shareholder Wealth Effects of the XBRL Mandate

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The Economic Impact of the XBRL Mandate: Evidence from Market Reactions

ABSTRACT: We investigate the market reaction to legislative events pertaining to the eXtensible Business Reporting Language (XBRL) mandate. The SEC contends that requiring issuers to adopt XBRL for filing their financial statements would reduce information processing costs and improve market efficiency. In contrast, skeptics argue that the mandatory adoption of XBRL would impose substantial costs while providing few, if any, benefits to investors. Using stock returns from countries that did not mandate the adoption of XBRL to model normal U.S. returns, we provide evidence of a positive market reaction to legislative events related to the XBRL mandate. Moreover, we find that the abnormal returns to these events are increasing for firms with less accessible information, higher information asymmetry, greater information processing costs, and lower financial reporting transparency. Overall, our results suggest an expected net benefit to shareholders from the XBRL mandate.

Keywords: eXtensible Business Reporting Language (XBRL), economic impact, market reaction, event study

JEL Classification Codes: M41, K22

I. INTRODUCTION

In December 2008, the Securities and Exchange Commission (SEC) voted to adopt the mandatory use of the eXtensible Business Reporting Language (XBRL) for financial reporting (SEC 2009). The mandate represents one of the most significant changes to the disclosure environment for U.S. capital markets. Prior to 2009, firms primarily submitted their filings to the SEC in a static text document. After passage of the mandate, all public firms must file their financial statements using XBRL. Compliance with this mandate has required a major overhaul in the filing and distribution of financial reports. Along with firms directing resources and effort to comply with this new regulation, the SEC has spent over $54 million to upgrade their systems.[1] Given these substantial changes, there continues to be controversy about the merits of mandating the adoption of XBRL.[2] Proponents argue that the XBRL mandate improves information quality and accessibility, reduces information processing cost, and levels the playing field among investors (SEC 2009). However, critics have raised concerns over the cost of complying with the mandate and question the perceived benefits.[3] This study contributes to the debate by investigating the shareholder wealth effects of the mandate and determinants of such effects.

Ex ante, it is unclear how investors in U.S. firms would react to this change in financial reporting. Based on a traditional discounted cash flow framework, the valuation of a firm depends on both the expected future cash flow (the numerator effect) and on the cost of capital (the denominator effect) from XBRL adoption. Regarding the numerator effect, XBRL may

[1] See http://www.sec.gov/news/press/2006/2006-158.htm.
[2] For instance, on March 14, 2014, the House Financial Services Committee proposed a bill (H.R. 37) to exempt smaller public firms (firms with less than $250 million in annual revenue) from filing their financial statements with XBRL (Cohn 2014). The bill had been strongly criticized and was narrowly rejected in Congress (Savage 2015).
[3] For example, members of a U.S. advisory committee warned that, similar to the controversial Sarbanes-Oxley legislation, requiring firms to file their financial statements in XBRL format could cost millions of dollars.

either increase or decrease a firm's future cash flow. On the one hand, the adoption of this technology can involve both implementation and compliance costs (Debreceny et al. 2005). Implementation costs can include costs such as software purchases, employee training on XBRL, and information technology support while compliance costs include third party assurances on XBRL-formatted financial reports (Hannon 2006; Plumlee and Plumlee 2008).[4] These costs can reduce future cash flow. On the other hand, XBRL adoption may have a positive effect on a firm's future cash flow through the reduction of agency costs. Hodge, Kennedy, and Maines (2004) find that the application of XBRL can improve the quality of information available to the average investor. Furthermore, the use of XBRL can constrain opportunistic managerial behavior, such as earnings management (Kim, Kim, and Lim 2014). If XBRL can foster a more transparent disclosure environment and enhance investor monitoring, then investors' perception of a firm's future cash flow could increase due to the reduction of agency costs.

Regarding how XBRL may influence the denominator, the effect can again go in either direction. The SEC claims that XBRL can mitigate information asymmetry between market participants with heterogeneous levels of endowment and sophistication (SEC 2009). If XBRL can reduce information asymmetry as the SEC suggests, then the cost of capital would decrease. Li, Lin, and Ni (2012) provide evidence suggesting that the cost of equity capital declines subsequent to the XBRL mandate. Furthermore, Chen, Kim, Lim, and Zhou (2016) document a reduction in the cost of private debt following the mandate. However, Blankespoor, Miller, and White (2014a) argue that enactment of the mandate may enable sophisticated investors to process XBRL-formatted financial reports more efficiently and gain further information advantages. Their results suggest that XBRL adoption can increase the information gap among

[4] For example, SEC (2009) estimates that, on average, 125 man-hours are required for the first filing and 17 hours are required for each subsequent filing.

investors, drive away liquidity from unsophisticated traders, and adversely affect firm value through higher cost of capital.

Motivated by the ongoing debate, our paper investigates two research questions. First, we examine the impact of the mandate on shareholder wealth by studying the market reaction to twelve legislative events leading up to enactment of the XBRL mandate. Second, we investigate the mechanisms through which the mandate can impact shareholder wealth by examining firm characteristics associated with the market reaction to those events. Specifically, we examine whether firms with less accessible information, greater information asymmetry, higher information processing costs, and more opaque financial reports experience greater market reaction as investors of these firms are expected to benefit more from XBRL adoption.

To empirically test our research questions, we follow the methodology of Zhang (2007) and develop two international benchmark market indexes from countries with no XBRL mandate to model expected U.S. returns.[5] We find that the three-day cumulative abnormal returns of U.S. firms around all XBRL events and around two key events are positive and statistically significant.[6] The estimated cumulative abnormal returns across two key XBRL legislative events are 4.3 percent and 4.9 percent and across all events are 7.1 percent and 8.3 percent when using our first and second international benchmarks. These results suggest that the mandatory adoption of XBRL, on average, is expected to increase shareholder wealth.

[5] The first international benchmark consists of returns from the Australian, Canadian, and Swiss markets to capture expected U.S. market returns. The second benchmark is constructed using returns from just the Canadian market. The rationale and construction of these benchmarks are elaborated in Section IV, "Research Design" under "Overall Market Reaction".

[6] We define key events as those with significant market reactions across all of our measures of cumulative abnormal returns. The first key event is when the SEC announced plans to lay out a roadmap for the mandatory adoption of XBRL on 4/16/2008. The second key event is when the SEC voted to mandate the use of XBRL for public companies on 12/17/2008. Further details of all events can be found in Section II, under "The XBRL Mandate's Event History".

We further examine cross-sectional variation in the market reaction to the events leading up to passage of the mandate and provide several interesting results. We find a negative association between event-period returns and analyst coverage. This result is consistent with the view that investors expect XBRL to be more beneficial when fewer analysts follow a firm and thus less information is accessible. We also find increasing abnormal returns to firms with lower market depth and greater bid-ask spread, suggesting that investors of firms with greater information asymmetry expect XBRL adoption to be more beneficial. Additionally, we document a positive association between abnormal returns and a firm's business and financial reporting complexity, indicating that XBRL is expected to lower information processing costs for more complex companies. We further find a greater market reaction for firms with more opaque financial reports, suggesting that investors anticipate the adoption of XBRL to improve the information quality of these firms. Our results are robust after controlling for other covariates of the market reaction to the mandate events.

This study contributes to the literature in the following ways. First, we contribute to the growing number of academic studies on the economic consequences of XBRL adoption (e.g., Blankespoor et al. 2014a; Efendi, Park, and Smith 2014; Dong, Li, Lin, and Ni 2014), and answer recent calls for further research on XBRL (Baldwin, Brown, and Trinkle 2006; Kohlbeck, Krische, Mangold, and Ryan 2012; Vasarhelyi, Chan, and Krahel 2012; Perdana, Robb, and Rohde 2015). Our study, to the best of our knowledge, is the first to investigate the market reaction to events leading up to the XBRL mandate. To date, there is mixed evidence on whether the XBRL mandate has been beneficial or costly to firms. We add to the debate by providing direct evidence on the overall economic impact of the XBRL mandate on shareholder wealth.

Our study further sheds light on the mechanisms through which XBRL adoption impacts shareholder wealth. We show that firms with lower analyst coverage, lower market depth, greater bid-ask spread, greater business and financial reporting complexity, and greater opacity experience a more positive market reaction to legislative events leading to the mandatory adoption of XBRL. These results suggest that XBRL can potentially enhance information accessibility, reduce information asymmetry, lower information processing costs, and promote transparency.

Lastly, our study is linked to the broad literature that examines the impact of information search and dissemination technologies on end-users of accounting information. The SEC has long recognized "the vital role of the internet and electronic communications in modernizing the disclosure system under the federal securities laws and in promoting transparency, liquidity, and efficiency in our trading markets" (SEC 2008). Along this vein, Asthana and Balsam (2001) find that the introduction of EDGAR led to greater market reaction to 10-K filings. Blankespoor, Miller, and White (2014b) provide evidence suggesting that firms can improve market liquidity through the use of Twitter to disseminate disclosures. We contribute to this line of research by exploring the impact of interactive data in financial statements on investors.

The paper proceeds as follows. Section II provides a brief background and event history of the XBRL mandate in the United States. Section III reviews the related literature and develops the hypotheses. Section IV discusses the sample, research design, and empirical results. Section V presents sensitivity analyses. Section VI concludes.

II. BACKGROUND AND EVENT HISTORY

XBRL in the United States

The XBRL mandate was advocated by former SEC Chairman Christopher Cox and has become a key part of his legacy. By a vote of 4–1, the XBRL mandate was passed on December 17, 2008 (SEC 2009). All 10-Q, 10-K, 20-F, 40-F annual reports, and 8-K and 6-K filings that contain revised or updated financial statements are required to be tagged using XBRL. XBRL was developed to provide a standardized format for preparing, communicating, and exchanging financial statement data in an interactive manner. All financial statement items are identified using XBRL "tags", so that users can easily extract the data and organize it in a format useful for analysis. Static text filings, on the other hand, require users to rekey data before use. The set of XBRL tags standardized by the SEC under the United States' Generally Accepted Accounting Principles (U.S. GAAP) are referred to as being part of the standard taxonomy. Any item that the company wishes to disclose, but is not represented by these tags can be included as an extension. In these cases, the firm creates its own custom, extension tag to represent the item in the filing.

The XBRL Mandate's Event History

We compile a list of legislative events that led to the passage of the XBRL mandate by examining articles posted on the Washington Post, the Wall Street Journal, Reuters Newswires, and Dow Jones Newswires via Factiva and the SEC website. These outlets are considered to be influential and timely sources of news for investors. We do a keyword search for articles containing the terms "XBRL", "interactive disclosure", and "interactive data" from January 2006 through December 2008 and collect a set of events related to legislation on the XBRL mandate.

We choose this time period because this is the period when developments in the mandatory adoption of XBRL for financial reporting began to gain momentum.[7]

Our news search results in twelve events as shown in Table 1. The first event occurred on September 25, 2006. The SEC announced plans to overhaul EDGAR and move towards a system based on interactive data. As part of the move towards an interactive data system, the SEC also committed $5.5 million towards the completion of an XBRL taxonomy for financial reporting. The second event occurred on September 25, 2007. The SEC announced that they would decide whether to mandate XBRL-formatted filings sometime in the following year. In particular, SEC Chairman Christopher Cox announced that the development of a taxonomy for all data required under U.S. GAAP is a milestone in the technology to standardize corporate filings. On October 9, 2007, the SEC created the Office of Interactive Disclosure to help firms modernize their financial disclosure through the use of XBRL. These actions reflected the SEC's initiative to promote financial reporting with XBRL. On December 5, 2007, the SEC urged public comment on the U.S. GAAP XBRL tags developed for financial reporting. At the time, these tags were already supported by at least nine software companies and the SEC wanted both users and preparers of financial statements to see that interactive data was becoming a reality (SEC 2007). We assess that these events indicate an increased probability in the adoption of the XBRL mandate.

On February 15, 2008, the SEC continued its push for XBRL adoption by unveiling a website that enables investors to compare accounting information from a select group of firms

[7] Prior to 2006, the SEC primarily focused on testing through a voluntary filing program (Plumlee and Plumlee 2008). We exclude events related to the voluntary filing program (VFP) because the SEC initiated this program mostly to evaluate the technology and advised investors not to rely on submissions made through this program to make investment decisions (Reuters News 2005). This suggests that the VFP is more of an experiment than an indication of a future XBRL mandate. Furthermore, only six companies had agreed to participate in the VFP by February 13, 2006, and the SEC called for more participants (Dow Jones News Service 2006), indicating slow reaction of companies to the VFP. Given the small number of VFP participants, it would be difficult for investors to assess the usefulness of XBRL and react to VFP news accordingly.

that used XBRL-tagged financial statements. On February 26, 2008, the SEC Chairman Christopher Cox announced that the SEC would provide plans on XBRL adoption and develop a system of "mutual recognition" with regulators in foreign countries within the next month or so. Several weeks later, on April 16, 2008, the SEC announced plans to lay out a roadmap for XBRL by April 21, 2008. The roadmap would consist of both short- and long-term schedules on XBRL adoption. We also assess these events as indications of an increased likelihood of enactment of the mandate.

On April 18, 2008, the SEC deferred laying out its plan for XBRL adoption. The agency did not explain why it postponed the meeting saying only, "At times, changes in commission priorities require alterations in the scheduling of meeting items" (Reuters Newswires 2008). The announcement suggested that the SEC placed the XBRL mandate as a lower priority item on its agenda. We assess this event as decreasing the likelihood of adoption.

On May 2, 2008, the XBRL U.S. GAAP taxonomy was finalized and delivered to the SEC. The development of the taxonomy made it possible for firms to file financial reports using a standard XBRL template. On May 14, 2008, the SEC proposed that the largest public firms electronically tag financial data with XBRL for fiscal periods after December 15, 2008. The proposal also called for small firms and those using international accounting standards to file XBRL-formatted financial reports by late 2010. The SEC formally published their proposal on May 30, 2008 and sought public comments on the XBRL mandate. Finally, on December 17, 2008, the SEC voted to require 500 of the largest public firms to begin filing financial reports using XBRL by mid-2009. All of the other firms would be required to adopt XBRL over a phase-in period over the following two years. We assess these events as increasing the likelihood of adoption of the XBRL mandate.

III. RELATED LITERATURE AND HYPOTHESES DEVELOPMENT

In this section, we review related literature and develop our hypotheses. The first hypothesis focuses on the overall market reaction to the XBRL mandate. The second set of hypotheses predicts cross-sectional variation in the market reaction to the XBRL mandate.

H1: Overall U.S. Market Reaction to XBRL Legislative Events

As noted by Schwert (1981), Binder (1985), and many other event studies, the market's reaction to events that lead to the adoption of a new regulation is a joint function of both the change in the probability of the regulation's adoption and its expected impact on shareholder wealth. Therefore, when a pre-adoption event increases the likelihood of passage of the mandate, the market will react positively (negatively) if investors believe the regulation brings about a net benefit (cost). Prior research uses this market-based approach to assess investors' perceptions regarding specific accounting standards (e.g., Beatty, Chamberlain, and Magliolo 1996; Cornett, Rezaee, and Tehranian 1996; DeChow, Hutton, and Sloan 1996) or broad pieces of legislation (e.g., Jain and Rezaee 2006; Zhang 2007; Li, Pincus, and Rego 2008; Armstrong, Barth, Jagolinzer, and Riedl 2010). Analogous to the latter, this study infers investors' perceptions about XBRL adoption by examining the market reactions to events leading to the XBRL mandate.

Ex ante, market reaction to events related to the XBRL mandate is unclear. It is possible that investors would react positively to news about passage of the mandate. For example, the adoption of XBRL may lower information processing costs across all investors, reducing information risk and asymmetry about a firm's future cash flows, and thus, lower the cost of capital (Easley and O'Hara 2004; Sims 2003, 2006). Prior research provides evidence to support

this prediction. Using the XBRL mandate as an exogenous shock to information processing costs, Li et al. (2012) find that the cost of equity capital decreases subsequent to XBRL adoption. In particular, they find that the effect is stronger for firms with high growth, low analyst coverage, and illiquid stocks. Their results suggest that XBRL affects cost of equity capital through a reduction in information asymmetry.

Kim, Lim, and No (2012) and Efendi et al. (2014) examine the impact of the first phase of mandatory XBRL reporting on the information environment of investors. Kim et al. (2012) provide evidence that XBRL mitigates information risk, as evidenced by an increase in information efficiency, a decrease in event return volatility, and a reduction in the change in stock return volatility. In a related vein, Efendi et al. (2014) find a decline in the post-earnings announcement drift for firms with good news in the post-XBRL adoption period. Dong et al. (2014) find a decline in stock return synchronicity, a measure of firm-specific information in stock prices, subsequent to the mandate.

Investors might also expect that widespread adoption of XBRL can bring about a more transparent information environment because XBRL can help investors more easily acquire and integrate information from financial statements (SEC 2009; Hodge et al. 2004). Huang and Zhang (2012) argue that greater transparency discourages managers from expropriating corporate resources for their own personal utility. Thus, if the adoption of XBRL increases financial reporting transparency, this technology might allow market participants to more effectively monitor and scrutinize managerial behavior. Consistent with this argument, Kim et al. (2014) document that earnings management is reduced for firms in the post-mandate era. One

implication from these findings is that the XBRL mandate may benefit investors by constraining managerial rent extraction. [8]

On the other hand, it is possible that investors might react negatively to the mandatory adoption of XBRL. Firms would have to incur costs to comply with the mandate (SEC 2009). For instance, there can be implementation costs which can include purchasing software, training employees to file financial statements with XBRL, or outsourcing to external service providers (Hannon 2006). In addition, firms can incur costs in the form of higher audit fees to assure compliance with current XBRL specification and regulation requirements (Plumlee and Plumlee 2008). Firms may even face potential legal liabilities from errors in XBRL data tagging (Debreceny et al. 2005). A negative market reaction to events related to the XBRL mandate may arise if investors believe that the potential costs would exceed any benefits.

Moreover, it is controversial whether the XBRL mandate would reduce information asymmetry. Blankespoor et al. (2014a) find that the information asymmetry between more and less sophisticated investors increases significantly subsequent to XBRL adoption. Along this line, a survey by Harris and Morsfield (2012) reports that their participants have not taken advantage of data generated from XBRL financial reports. While limited by a small sample, their study finds that fewer than 10 percent of surveyed investors and analysts use XBRL-tagged data, and few have attempted to access XBRL filings from corporate websites.

Furthermore, because interactive data provide a standardized reporting format, this might affect a firm's ability to communicate any unique financial attributes to investors. Thus, the use of standardized XBRL elements could limit the reporting flexibility of firms (SEC 2010; XBRL US 2010). While it is possible for a firm to create extension tags to reflect unique financial

[8] Christopher Cox, former chairman of the SEC, also stated that the use of XBRL for financial reporting can help the Division of Enforcement catch illegal behavior in corporations that would have previously gone undetected. As such, XBRL standardization is likely to facilitate the role of the SEC as a market watchdog (Cox 2006).

information that is not covered by standard tags in an XBRL taxonomy, this information would not be easily aggregated across other firms.[9] In addition, Li and Nwaeze (2015) provide evidence suggesting that XBRL extensions appear to have a negative impact on the information environment of filers during the early phase of XBRL adoption. If the use of customized extensions becomes common, it could deteriorate the comparability of inter-company data.[10]

It is therefore an empirical question as to how investors perceive the impact of the mandatory adoption of XBRL in the United States.[11] To provide systematic evidence on this issue, we test the following hypothesis:

HYPOTHESIS 1. *If XBRL imposes net benefits (costs) on shareholders, firms' cumulative returns adjusted for the impact of contemporaneous economic news around XBRL legislative events should be positive (negative).*

H2: Cross-sectional Predictions

In this section, we provide cross-sectional predictions on events related to the XBRL mandate. The use of XBRL can make financial statements available to a wider group of market participants in a timelier manner and at a lower cost by increasing the speed, accuracy, transparency and usability of financial disclosures (SEC 2009). Therefore, in examining the cross-sectional variation of the abnormal returns to XBRL-related legislative events, we focus on four aspects: information accessibility, information asymmetry, information processing costs, and financial reporting transparency.

[9] For example, what a firm identifies as "operating revenues" in its traditional format financial statements may be associated with a tag that represents "net revenues". In this case, a firm would need to create a custom, extension tag called "operating revenues" when it labels that disclosure.

[10] According to XBRL US (2009), an analysis of more than 450 XBRL documents finds that, on average, firms include extensions for 7% of their financial statement items, with the fit rates ranging from 0 to 52%.

[11] We note that this study focuses on the ex-ante perceived net costs or benefits of XBRL. Whether the real effect of the XBRL mandate, post-adoption, is consistent with market expectations is an open question.

Information Accessibility

The SEC claims that interactive data reporting would potentially increase the accessibility of financial statement information to investors (SEC 2009). Many investors depend on analysts to aggregate and distill data contained in financial statements into usable information for trading purposes (Lang and Lundholm 1996). In addition, commercially available products that provide financial data to investors typically only track firms covered by analysts, possibly due to higher data collection costs (SEC 2009). Thus, investors might have difficulty obtaining information from firms that have little or no analyst following. Since XBRL formatted financial statements allow data to be automatically extracted and imported into a useable format, the use of XBRL may enable financial data providers and analysts to increase coverage and accessibility of company information. More information availability may result in a larger investor base and enhance firm value (Miller 1977).[12] Consequently, we should observe a greater reaction to events pertaining to the XBRL mandate among firms with less analyst coverage. In contrast, if the initial learning curve of extracting information from XBRL-formatted financial statements is too steep or availability of software to analyze XBRL-formatted financial reports is limited, investors may not be able to gain greater information access to such firms. Based on the discussions above, we put forth the following hypothesis (in null form):

HYPOTHESIS 2a. *The abnormal returns adjusted for the impact of contemporaneous economic news around XBRL legislative events are not statistically different for firms with less accessible information.*

Information Asymmetry

[12] Miller (1977) argues that stock prices reflect a more optimistic valuation when more investors are aware of the firm and trade with short-selling constraints. Prior studies provide supportive evidence that a broadened investor base enhances firm value (e.g., King and Segal 2009).

Diamond and Verrecchia (1991) argue that disclosure alleviates information asymmetry between informed and uninformed investors, enhances stock liquidity, and reduces the cost of capital. As suggested by the SEC, XBRL might benefit unsophisticated investors by reducing information asymmetry among market participants. If this view holds, firms with greater information asymmetry may experience a more positive market reaction from XBRL adoption. Consistent with this argument, Li et al. (2012) find that XBRL adoption significantly increases stock liquidity and lowers cost of capital. On the other hand, Blankespoor et al. (2014a) find higher abnormal bid-ask spreads and lower trading volume around 10-K filing dates for firms that adopt XBRL. They argue that unsophisticated investors may not have the ability to leverage the new technology as compared to sophisticated investors and that their evidence is consistent with increased concerns about adverse selection. Therefore, we hypothesize (in null form):

Hypothesis 2b. *The abnormal returns adjusted for the impact of contemporaneous economic news around XBRL legislative events are not statistically different for firms with greater information asymmetry.*

Information Processing Costs

The XBRL mandate can result in lower costs of gathering financial information. In recent years, there has been an increased concern about high investor processing costs associated with lengthy and complex financial reports (Li 2008; Miller 2010). In particular, You and Zhang (2009) and Cohen and Lou (2012) show that complexity in the business and information environment increases information processing costs, which in turn results in market under-reaction to new information. If interactive data lowers information acquisition costs, then we expect the benefits to be more pronounced for firms with information that is costlier to process. However, if more complex firms use more extension tags in their XBRL-formatted filings, then

investors may not see benefits from XBRL adoption for more complex firms or firms with more complex financial reporting. Therefore, we hypothesize (in null form):

HYPOTHESIS 2c. *The abnormal returns adjusted for the impact of contemporaneous economic news around XBRL legislative events are not statistically different for firms with information that is costlier to process.*

Financial Reporting Transparency

There are arguments that the mandatory adoption of XBRL would enhance transparency in financial reporting. The SEC states that the use of XBRL can help regulators, analysts, and investors detect financial reporting irregularities in company filings which they might have previously gone undetected (SEC 2009). In this aspect, the standardization of financial statements through XBRL can aid in monitoring public firms and constrain managerial opportunistic behavior. Kim et al. (2014) find that greater use of standardized official XBRL elements significantly reduces the level of discretionary accruals in the post-adoption period. Blankespoor (2016) provides evidence that firms increase their quantitative footnote disclosures following XBRL adoption. These studies suggest that XBRL can enhance the transparency of a firm's financial reporting. Furthermore, prior research suggests that greater transparency can facilitate shareholder monitoring and mitigate agency problems (Armstrong, Guay, and Weber 2010). If XBRL adoption can improve financial reporting transparency and mitigate agency problems, we would expect a greater market reaction to XBRL adoption for firms that have more opaque financial reports. Thus, we put forth the following prediction:

HYPOTHESIS 2d. *The abnormal returns adjusted for the impact of contemporaneous economic news around XBRL legislative events are greater for firms with more opaque financial reports.*

IV. EMPIRICAL TESTS AND RESULTS

Following prior literature, we infer investors' perceptions about the XBRL mandate by examining the market reaction to twelve legislative events related to mandatory adoption. First, we examine the overall U.S. market return to events leading up to the mandate. The returns of foreign markets unaffected by the mandatory adoption of XBRL for financial reporting are used to evaluate abnormal U.S. returns in the legislative period. Second, we focus our tests on determining whether particular firm characteristics explain cross-sectional variation in firms' market return reaction in a manner consistent with our predictions. Because the XBRL mandate resulted from a process that evolved over several years, we draw our inferences from an analysis of market reaction associated with the events taken together, rather than separately.

Our maintained assumption is that the stock price reflects all publicly available information at any given time. Hence, our tests rely on a degree of market efficiency that is sufficient to ensure that new information related to each XBRL legislative event is fully and quickly impounded into stock prices (Fama 1970). In particular, our analyses assume that stock prices reflect investors' expectations of the net benefits or costs of the XBRL mandate conditional on the available information. To the extent that stock prices may not fully incorporate all new information within the event window, our tests could lack statistical power (Hirshleifer 2001).

Overall Market Reaction

Research Design

To evaluate the overall market impact, we investigate changes in the U.S. market index returns around legislative events related to the XBRL mandate. However, changes in the U.S.

market index returns might capture the impact of other contemporary economic news. Therefore, it is necessary to control for the expected U.S. market return absent the impact of the XBRL mandate. Because the mandate affects all publicly listed U.S. firms, we use indexes of the Australian, Canadian, and Swiss markets to capture expected U.S. market returns. These foreign markets did not mandate the use of XBRL nor experienced events related to the mandatory adoption of XBRL over the legislative period in the United States, but were exposed to the same confounding global economic factors as the U.S. market (Deloitte 2012; Strassfield 2010; Zakaib and Trites 2013).[13] We obtain daily stock price data for U.S. and foreign firms from CRSP and Datastream, respectively.

Panel A of Table 2 reports the distribution of our non-U.S.-traded foreign firm sample by country. The largest number of sampled foreign firms comes from Canada with 1,321 firms traded on the Toronto Stock Exchange (TSX). Our sample of Australian firms consists of 670 firms traded on the Australian Securities Exchange (ASX), and our Switzerland sample has 269 firms listed on the SIX Swiss Exchange (SIX). We compute a value-weighted index of the stocks traded on each of the foreign exchanges. Specifically, we construct daily foreign index returns by weighting each firm's return based on the firm's equity market value as of the previous trading day. Following prior literature (e.g., Zhang 2007), we eliminate firms with a trading price of less than one unit of the local currency at the start of a year to avoid the small price effect on returns

[13] While Canadian Securities Administrators (CSA) formally launched an XBRL voluntary filing program in May 2007, XBRL projects in Canada were in the initial phrase and the voluntary program progressed "with little take up" (CSA 2006). Switzerland had no voluntary or mandatory XBRL reporting program as of 2012 (XBRL Europe 2012; Enachi and Andone 2015). The Australia Securities and Investment Commission (ASIC) first launched a voluntary XBRL filing program in July 2010, but made no progress on mandating the adoption of XBRL as of the period of our events (ASIC 2015). While these three countries did not mandate XBRL adoption during our sample period, these foreign markets might still react to U.S. XBRL mandate news in anticipation of a future, domestic XBRL mandate. Thus, our measurement of abnormal market reaction may produce downward biased estimates, which would work against finding significant results.

(Blume and Stambough 1983). To examine the relation between U.S. and foreign returns, we estimate the following model:

$$US\_RET_t = \beta_0 + \beta_1 CAN\_RET_t + \beta_2 AUS\_RET_t + \beta_3 AUS\_RET_{t+1} + \beta_4 SWISS\_RET_t + \beta_5 SWISS\_RET_{t+1} + \epsilon_t \quad (1)$$

where US_RET_t represents the value-weighted returns of the U.S. market on day *t*, and CAN_RET_t represents the value-weighted returns of Canadian firms on day *t*. AUS_RET_t and AUS_RET_{t+1} denote the value-weighted returns of Australian firms on day *t* and day *t+1* local time, respectively. $SWISS\_RET_t$ and $SWISS\_RET_{t+1}$ denote value-weighted returns of Swiss firms on day *t* and day *t*+1 local time, respectively. Due to time zone differences among countries, we use a lead-lag structure to take into account differences in trading hours for countries outside of North America.[14]

Panel B of Table 2 reports the correlation among the value-weighted daily index returns across the four countries. As the panel shows, returns from the Canadian index exhibit the highest correlation with U.S. market returns. Thus, we estimate the following model as an alternative benchmark:

$$US\_RET_t = \beta_0 + \beta_1 CAN\_RET_t + \epsilon_t \quad (2)$$

Both Equations (1) and (2) are estimated by using daily returns across all trading days in the year before the first event. The estimation results are reported in Panel C of Table 2. The first column displays the coefficient estimates for Equation (1). With the exception of AUS_RET_t, the coefficients of all other variables are statistically significant at conventional levels and positively associated with US_RET_t. In our estimate of Equation (2), CAN_RET_t is positively associated with US_RET_t and is statistically significant at the 1 percent level. Overall, the results of Table 2 show that the returns for the foreign markets of Canada, Australia, and Switzerland are positive

[14] Since Canada is within North America, we do not include CAN_RET_{t+1} in equation (1).

and significantly associated with U.S. market returns and suggest that the returns from these foreign countries are suitable candidates for modeling expected U.S. returns.

For our tests of market reaction to the XBRL mandate events, we regress daily returns across all trading days in the year prior to the first XBRL event and the three days of the [-1, 1] event window for each event. The first event occurred on September 25, 2006. Thus, the sample consists of the three-day event period window and all trading days in 2005 (our benchmark period) for each event. The first model uses the U.S. market return over the benchmark period to capture expected U.S. returns absent XBRL mandate events. It is specified as:

$US\_RET_t = \beta_0 + \beta_1 EVENT_t + \epsilon_t$	(3)

where *EVENT* is an indicator set to one if the day falls in the [-1, 1] event window, and zero otherwise. The coefficient of the *EVENT* indicator variable (β_1) captures the average, daily abnormal return in the event window relative to the daily U.S. market return over the benchmark period.

The second and third models utilize foreign returns from the Australian, Canadian, and Swiss markets to control for expected U.S. returns absent XBRL mandate events. These models are specified as such:

$US\_RET_t = \beta_0 + \beta_1 EVENT_t + \beta_2 CAN\_RET_t + \beta_3 AUS\_RET_t + \beta_4 AUS\_RET_{t+1} + \beta_5 SWISS\_RET_t + \beta_6 SWISS\_RET_{t+1} + \epsilon_t$	(4)
$US\_RET_t = \beta_0 + \beta_1 EVENT_t + \beta_2 CAN\_RET_t + \epsilon_t$	(5)

where *EVENT* is an indicator set to one if the day falls in the [-1, 1] event window, and zero otherwise. The coefficient of the *EVENT* indicator variable (β_1) in Equation (4) and (5) is the average, daily abnormal return in the event window relative to the daily U.S. return over the benchmark period controlling for other non-XBRL macroeconomic news contained in foreign

returns. We multiply the coefficient, β_1, by three to obtain the three-day cumulative abnormal returns over the event window for each event. We use *USAR*, AR_1, and AR_2 to denote the cumulative abnormal returns based on the models specified in Equations (3), (4), and (5), respectively.

Results

Panel A of Table 3 reports the three-day cumulative abnormal returns around each of the events along with the corresponding t-statistics and p-values. Among the twelve XBRL mandate-related events, two of them generate a significant market reaction across all of the benchmark models. The first significant event occurred on 4/16/2008 (Event 7) when the SEC announced that they would lay out a roadmap on the future of XBRL adoption. Cumulative abnormal U.S. market return in the three-day period surrounding the event, measured by *USAR*, is 2.7 percent and is statistically significant at the 5 percent level. The cumulative three-day abnormal returns estimated controlling for foreign market returns, AR_1 and AR_2, are 1.6 percent and 1.9 percent respectively and these results are significant at the 10 percent level. The second event that generated a significant market reaction across all of the benchmarks occurred on 12/17/2008 (Event 12). On this date, the SEC voted to mandate the use of XBRL for filing financial statements across all public companies. The estimated three-day, cumulative abnormal market returns, *USAR*, AR_1, and AR_2, are 2.7 percent, 3.6 percent and 3 percent respectively and are statistically significant at the 5 percent and the 1 percent levels.[15]

[15] In addition, we further investigate why the results are opposite to the prediction for Event 5 (February 15, 2008). Although XBRL may be able to reduce data aggregation costs, it is not obvious that investors have the capabilities to process and utilize the new data. There can be some learning curve involved in understanding the XBRL taxonomies and utilizing software for incorporating XBRL data into investment analysis. We conjecture that this might be one reason why we observe a negative market reaction to Event 5 when the SEC unveiled a website that enables investors to work with data extracted from XBRL filings.

Panel B reports the cumulative abnormal returns on significant XBRL events and across all events.[16] We determine significant XBRL events as those with statistically significant event period returns across all three return measures. Based on the results of Panel A, Events 7 and 12, fit the criteria as being significant XBRL events. To compute the cumulative abnormal returns, we first multiply the returns associated with events that indicate a decreased likelihood of passage of the XBRL mandate by minus one. We then calculate the average event daily return across the events and multiply it by the total number of event days to obtain the cumulative returns. The cumulative abnormal return over all significant XBRL events is 5.55 percent for our first measure, *USAR*. This result is statistically significant at the 1 percent level. The cumulative abnormal returns controlling for foreign indexes, AR_1 and AR_2, over the significant events are 4.3 percent and 4.9 percent, respectively, and both are statistically significant at the 1 percent level. The cumulative returns for all events are 11.88 percent, 7.1 percent, and 8.3 percent for *USAR*, AR_1, and AR_2, and are statistically significant at the 5 percent, 10 percent, and 5 percent levels respectively. These results show that the overall market reacted positively to events pertaining to the XBRL mandate and suggest that investors perceive a net benefit from the adoption of the XBRL mandate.

Cross-sectional Analysis

Research Design

Our evidence on the overall market reaction to the XBRL mandate focuses on the cumulative abnormal event returns for a value-weighted portfolio of U.S. stocks. The results provide initial evidence suggesting that the XBRL mandate enhances shareholder value. While

[16] Following the prior literature, we assume that the portfolio returns are uncorrelated across the different events for these market reaction tests (Fama and MacBeth 1973).

the use of foreign market indexes for computing abnormal returns helps to mitigate concerns about the results being driven by other contemporaneous phenomena, we further test whether certain firm-level characteristics explain cross-sectional variation in the market reaction to the XBRL mandate. Investors of firms with particular characteristics are predicted to benefit more from the mandate. If these firms experience a greater market reaction to events pertaining to the mandate, we can be more certain that no other contemporaneous phenomena are driving the results. In addition, the cross-sectional tests can shed light on the mechanisms through which XBRL is expected to impact shareholder wealth. We estimate the following regression model for our cross-sectional tests:

$$\begin{aligned} CAR_{m,i,t} = {} & \beta_0 + \beta_1 Numanalysts_{i,t} + \beta_2 Depth_{i,t} + \beta_3 Bidask_{i,t} + \beta_4 Numseg_{i,t} \\ & + \beta_5 Size10k_{i,t} + \beta_6 Opaque_{i,t} + \beta_7 Comparability_{i,t} + \beta_8 Size_{i,t} \\ & + \beta_9 MTB_{i,t} + \beta_{10} Momentum_{i,t} + \beta_{11} Press_{i,t} + d_j + d_t + \varepsilon_{i,t} \end{aligned} \quad (6)$$

where *m* indicates the method used for determining benchmark returns, *i* denotes the firm, *j* indicates the industry and *t* denotes the year. Industry and year fixed effects are denoted by d_j and d_t, respectively.

CAR_m is the three-day cumulative abnormal return and is estimated using one of three methods. To compute our first measure of cumulative abnormal returns, CAR_1, we first run the following regression for each firm over the 100 trading days prior to the first event on September 25, 2006 to determine the prediction model coefficients for computing the normal returns for each event.[17]

$$\begin{aligned} RET_{i,\tau} = {} & \beta_0 + \beta_1 CAN\_RET_\tau + \beta_2 AUS\_RET_\tau + \beta_3 AUS\_RET_{\tau+1} \\ & + \beta_4 SWISS\_RET_\tau + \beta_5 SWISS\_RET_{\tau+1} + \epsilon_\tau \end{aligned} \quad (7)$$

$RET_{i,\tau}$ is firm *i*'s return on day τ during the estimation window. CAN_RET_τ, AUS_RET_τ, and $SWISS\_RET_\tau$ are the value-weighted Canadian, Australian, and Swiss market returns on day τ.

[17] We use the period before the first XBRL event so that estimation of the coefficients for determining normal returns are not impacted by the returns generated from the XBRL adoption events or the Financial Crisis.

The coefficient estimates from this regression are used to compute the expected returns for firm *i* on event day *t* as:

$$\mathrm{E}[RET_{i,t}] = \hat{\beta}_0 + \hat{\beta}_1 CAN\_RET_t + \hat{\beta}_2 AUS\_RET_t + \hat{\beta}_3 AUS\_RET_{t+1} + \hat{\beta}_4 SWISS\_RET_t + \hat{\beta}_5 SWISS\_RET_{t+1} \quad (8)$$

where $\hat{\beta}_0$ - $\hat{\beta}_5$ are the coefficients estimated from Equation (7). We compute abnormal returns for firm *i* on event day *t* ($ARET_{i,t}$) as:

$$ARET_{i,t} = RET_{i,t} - \mathrm{E}[RET_{i,t}] \quad (9)$$

CAR_1 is then computed as the cumulative returns of $ARET_{i,t}$ over the three-day event window for each firm.

Calculations of CAR_2 and CAR_3 follow a similar procedure as above, except that equation (7) is replaced with the following models for CAR_2 and CAR_3, respectively:

$$RET_{i,\tau} = \beta_0 + \beta_1 CAN\_RET_\tau + \epsilon_t \quad (10)$$

$$RET_{i,\tau} = \beta_0 + \beta_1 US\_RET_\tau + \epsilon_t \quad (11)$$

where US_RET_τ is the value-weighted U.S. market return on day τ of the estimation window. The other variables are defined the same as in Equation (7).

To examine Hypothesis 2a, we use analyst following (*Numanalysts*) as a measure of information accessibility to investors. We measure *Numanalysts* as the number of analysts who provide at least one forecast over the prior year. As discussed earlier, greater analyst following can attract greater coverage from financial data providers and disseminate more information to investors. Therefore, higher levels of *Numanalysts* indicate lower levels of information accessibility.

To test Hypothesis 2b, we use two variables to represent the firm's pre-adoption information asymmetry. The first variable is market depth (*Depth*), measured as the average magnitude of daily stock returns divided by the dollar trading volume over the prior year

(Amihud 2002). The second variable is the bid-ask spread (*Bidask*), measured as the annual average of daily ask minus bid prices divided by the closing price (Jayaraman 2008) over the prior year. Lower market depth (*Depth*) and higher bid-ask spread (*Bidask*) indicate greater information asymmetry.

To test Hypothesis 2c, we first define firms with complex business environments as those operating in multiple-segment industries (Cohen and Lou 2012). We measure business complexity as the number of business segments that a firm has in different 3-digit SIC code industries (*Numseg*). When a firm's operations are diversified in different industries, it is more difficult to analyze and evaluate the information of such a firm. Thus, higher values of *Numseg* correspond to greater information processing costs. Second, we measure the financial reporting complexity as the file size of its annual report (*Size10k*). Loughran and McDonald (2014) suggest that larger annual report file size indicates more business complexity and less readability of its financial report. Thus, larger annual report file sizes (*Size10k*) suggest higher information processing costs for investors.

To test Hypothesis 2d, we use discretionary accruals (*Opaque*) to capture financial reporting transparency. Discretionary accruals have been widely used to measure earnings management (e.g., Francis, LaFond, Olsson, and Schipper 2005; Balakrishnan, Blouin, and Guay 2012) and has a positive association with financial report opacity (e.g., Schipper 1989; Healy and Wahlen 1999; Ronen and Yaari 2008). *Opaque* is measured as the 3-year moving sum of the absolute value of annual discretionary accruals from the modified Jones model (Dechow, Sloan, and Sweeney 1995). Higher values of *Opaque* indicate lower levels of transparency.

Accounting comparability, firm size, market-to-book ratio, stock return momentum, and business press coverage are included in the regression as controls that may be correlated with

event period returns. We include accounting comparability as XBRL may improve comparability across filings (SEC 2009). Our measure of accounting comparability (*Comparability*) follows De Franco Kothari, and Verdi (2011).[18] Firm size (*Size*) is measured as the natural logarithm of the market value of equity. Market-to-book ratio (*MTB*) is measured as the market value of equity over the book value of equity. We further scale *MTB* by 1,000 to facilitate interpretation of the regression coefficient. Both *Size* and *MTB* are measured as of the most recent fiscal year prior to the event. Stock return momentum (*Momentum*) is measured as the market-adjusted cumulative returns for the firm over the 6-month period prior to an event. We control for the number of business press articles that mention the firm over the prior year (*Press*) because the number of sources that report on the firm can influence stock returns.[19] As with *MTB*, we scale *Press* by 1,000. We further include industry and year fixed effects to control for any unobservable industry and macroeconomic shocks that could affect stock returns and our variables of interest. Industries are defined based on the Fama-French 48 industry classification.

Sample Selection and Descriptive Statistics

To be included in the sample for the cross-sectional tests, we require that firms have return data in CRSP, accounting data in Compustat, and non-missing values for all other control variables. These requirements result in a sample size of 1,118 firms. Panel A of Table 4 summarizes the sample selection procedures.

[18] Specifically, we estimate the following equation using the 16 previous quarters of data for each firm-year:

$$Earnings_{it} = \alpha_i + \beta_i Return_{it} + \varepsilon_{it}$$

where *Earnings* is the ratio of quarterly net income before extraordinary items to the market value of equity at the beginning of the quarter, and *Return* is the stock price return during the quarter. The coefficient estimates, $\hat{\alpha}_i$ and $\hat{\beta}_i$, represent the accounting function for firm *i*. *Comparability* is then measured as the distance between the estimated accounting functions of two firms. We compute *Comparability* as the average value of the four firms *j* with the highest comparability score to firm *i*.

[19] We thank an anonymous reviewer for this suggestion.

Panel B of Table 4 presents descriptive statistics for the variables used in the cross-sectional test. On average, the cumulative abnormal returns are positive. The average values of CAR_1, CAR_2, and CAR_3 are 0.005, 0.006, and 0.003 respectively. The average number of analysts providing at least one forecast (*Numanalyst*) is 8.399, which suggests that our sample may be biased towards larger firms. However, the standard deviation of 8.328 indicates substantial heterogeneity in analyst coverage in our sample. Market depth has a mean of 0.49 with a standard deviation of 3.059. Mean (median) bid-ask spread is 0.033 (0.031). Looking at the number of business segments (*Numseg*) and the annual financial report sizes (*Size10k*), firms in our sample have an average of 2.133 business segments and a 10-K file size of 2.060 megabytes. Opaque has a mean (median) value of 2.867 (0.869). The mean (median) value for accounting comparability (*Comparability*) is -0.400 (-0.170) and is consistent with the univariate statistic for this measure in De Franco et al. (2011). The mean size of the firms in our sample (*Size*) is 13.379 with a standard deviation of 1.998, again suggesting that our sample firms are large. The mean (median) value of the scaled market-to-book ratio (*MTB*) is 0.005 (0.003). The six-month cumulative market-adjusted return prior to an XBRL legislative event (*Momentum*) is negative with a mean value of -0.042. Furthermore, the mean number of business press articles that mention the firm over the previous year (*Press*) is 393.

Panel C of Table 4 presents the correlations among variables in our cross-sectional test. The correlations that are statistically significant at the 5 percent level are bolded in the panel. As expected, *Size* is positively correlated with analyst following (*Numanalyst*), number of business segments in different industries (*Numseg*), annual report file size (*Size10K*), accounting comparability (*Comparability*), market-to-book ratio (*MTB*), return momentum (*Momentum*), and press coverage (*Press*). *Size* is negatively correlated with market depth (*Depth*), average bid-

ask spread (*BidAsk*), and earnings opacity (*Opaque*). All of the other statistically significant correlations confirm with ex-ante expectations.

Results

Table 5 presents the regression results from Equation (6) with the U.S. firms' three-day cumulative abnormal returns around XBRL mandate events as the dependent variable. To address potential cross-sectional and serial dependence in the data, we report *t*-statistics that are based on robust standard errors clustered by firm and year (Petersen 2009).

Panel A of Table 5 presents our main cross-sectional results based on all XBRL legislative events. *Numanalyst* is statistically significant and negatively associated with market reaction to XBRL mandate events across all three regressions. This result is consistent with the prediction that firms with less accessibility to information will experience a positive reaction to events related to the XBRL mandate (Hypothesis 2a). Firms' cumulative abnormal returns decrease with *Depth* and increase with *Bidask*, consistent with investors perceiving greater benefits from the XBRL mandate for firms with greater information asymmetry (Hypothesis 2b).

Our measures for business and financial reporting complexity (*Numseg* and *Size10k*) are also both positive and statistically significant across all three regressions. These results support Hypothesis 2c and suggest that investors expect greater benefits from the mandate for firms with higher information processing costs. Lastly, *Opaque* is positive and statistically significant across all columns, consistent with Hypothesis 2d. The result suggests that investors anticipate greater benefits from the XBRL mandate for firms with more opaque financial reports.

Among our control variables, the coefficients for *Size* and *MTB* are positive and statistically significant across all of the regressions.[20] *Press* has a negative and statistically significant coefficient in columns 1 and 2. The coefficient of *Comparability* is not significantly different from zero across all three measures of abnormal returns. The coefficient of *Momentum* is positive, but not statistically significant.

Panel B of Table 5 presents the cross-sectional results of examining the market reaction to significant XBRL adoption events, Event 7 and Event 12. For brevity of presentation, only the results of CAR_1 estimated based on the Australian, Canadian, and Swiss markets are presented. The other two benchmark models based on the Canadian and U.S. market indexes generate qualitatively similar results.

The event-by-event analysis does not always reject the null hypothesis for each of our predictions, which could be attributed to a lack of statistical power. *Numanalysts* is of the predicted direction for both Events 7 and 12 but is only statistically significant for Event 7. A similar result holds for *Opaque*. The coefficient for *Depth* is negative and significant only for Event 12. Both *BidAsk* and *Size10k* are insignificant across both events. The coefficient for *Numseg* is positive, but not significant. Among our control variables, *Comparability* only has a statistically significant result for Event 12. The coefficient for *Size* is significant across both events whereas the coefficients for *MTB* and *Momentum* are only significant for Event 7.

Overall, Table 5 provides support for our cross-sectional hypotheses that the market reaction to the XBRL mandate is greater for firms with poorer information accessibility, higher

[20] The positive and statistically significant coefficient for *Size* also suggests that the net benefit from XBRL adoption may be less for smaller firms. However, we are cautious to interpret our result as having implications to validate arguments for exempting small companies from XBRL adoption because prior studies suggest that firm size can aggregate many other firm characteristics such as agency problems (Denis, Denis, and Sarin 1997) or quality of a firm's information environment (Beyer, Cohen, Lys, and Walther 2010).

information asymmetry, greater information processing costs, and more opaque financial reporting.

V. SENSITIVITY ANALYSIS

Confounding Events

Although the returns of foreign firms are used to filter out the impact of global economic news, the documented U.S. cumulative abnormal returns can potentially reflect market reaction to some other phenomena occurring simultaneously with the regulatory events we study. Therefore, the findings that we document might not be attributable to the XBRL mandate *per se*, but to some other contemporaneous, confounding macroeconomic phenomena. We view our cross-sectional analysis as a potential way to address this concern. If the market reaction reflects news unrelated to the XBRL mandate, then the cumulative abnormal returns should not exhibit any predictable cross-sectional variation.

Nevertheless, in an attempt to further alleviate this concern, we follow Larcker, Ormazabal, and Taylor (2011) and search for confounding events on the day of each event. Specifically, we examine the Business & Finance section of the *Wall Street Journal* to find some other potential contemporaneous phenomena whose events may coincide with all of the events pertaining to the passage of the XBRL mandate. This section of the newspaper reports the aggregate market activity from the prior trading day (in our case, the event day). It also contains a short commentary speculating on the cause of that activity. This information can potentially reveal what pundits believe was driving stock returns on the day of each event. For example, the section reports that on October 9, 2007, the day of event 3, "The Fed's decision to cut rates last month was based on worries that credit-market turmoil could reinforce slower growth at a time of 'particularly high uncertainty'. The disclosure helped the Dow industrials and the S&P 500

rally to records (WSJ 2007). Blue chips gained 120.80 points to 14,164.53." In general, there does not appear to be some other contemporaneous phenomena that systematically coincide with all of the events leading up to passage of the XBRL mandate.

Alternative Test of Overall Market Reaction

As a robustness test, we model the normal U.S. market returns using non-event day, U.S. returns following the methodology in Li et al. (2008). Specifically, we estimate the following model on daily value-weighted U.S. market returns (*US_RET*) from 2006-2008, the time period of the XBRL mandate events:

$$US\_RET_t = \beta_0 + \sum_{i=1}^{12} \beta_i E_i + \epsilon_t \quad (12)$$

where E_i is an indicator set to one in the three-day window for event *i* and zero otherwise. The event coefficient estimates, β_i, captures the daily abnormal returns of event *i* relative to the other trading days in 2006-2008. β_i is then multiplied by three to determine the cumulative abnormal return over the [-1, 1] window for event *i*.

Table 6 presents the results. The cumulative abnormal return to all XBRL mandate events is 14.9 percent and is statistically significant at the 10 percent level, suggesting that investors expect net benefits from the mandatory adoption of XBRL. While these results estimated using the Li et al. (2008) methodology provide some support for the main results in Table 3 using the Zhang (2007) methodology, we add a caveat to these findings. As acknowledged in Li et al. (2008), their methodology may not be sufficient to factor out the impact of confounding macroeconomic news. Namely, the use of U.S. returns on non-XBRL event days for modeling normal returns may not effectively control for confounding macroeconomic news, such as news related to the Financial Crisis of 2007-2008, that coincide with XBRL adoption events. The methodology of Zhang (2007), used in our main analyses, tackles this issue in a more rigorous

fashion. Macroeconomic events, such as news pertaining to the Financial Crisis, that coincide with XBRL adoption events would have impact on both foreign and U.S. returns. Using contemporaneous foreign returns for modeling normal U.S. returns, the Zhang (2007) methodology can better isolate and control for the effects of confounding macroeconomic news on U.S. returns and more precisely measure the market reaction to XBRL adoption news. Therefore, we use the Li et al. (2008) methodology only as a robustness check.[21]

VI. CONCLUSION

This study investigates the market reaction to events leading to the mandatory adoption of XBRL in the U.S. These events have led investors to assess the implications of potential changes to the information environment of publicly-traded companies caused by the XBRL mandate. Thus, market reaction to these events provides an opportunity to assess investors' expectations about the net benefits or costs of the XBRL mandate.

We find that the cumulative abnormal returns of U.S. firms around all XBRL mandate events and two key events are positive and statistically significant. This evidence is consistent with increased shareholder wealth from the mandated adoption of XBRL for financial reporting. We further find that firms with less accessible information, higher information asymmetry, greater information processing costs, and lower financial reporting transparency experience a more positive reaction to these events. This study contributes to the debate on whether the

[21] In light of the discussion on limitations of the Li et al. (2008) methodology, it is perhaps not surprising to see that the event-level results following the Li et al. (2008) methodology can differ from the main results. For instance, the market reaction to Event 6 on February 25, 2008 is positive and significant when using the Li et al. (2008) method, but is insignificant when using the Zhang (2007) approach. A news search through Factiva shows that the overall positive U.S. market return in the three-day window around Feb 25, 2008 was driven by increased investor confidence from the Standard & Poor's decision to maintain its top ratings for Ambac Financial Group and MBIA, which guarantee the payment of bonds including securities backed by subprime mortgages (WSJ 2008). When using U.S. market returns on non-XBRL event days as the benchmark, the positive CAR around February 25, 2008 may be driven by news related to subprime mortgages. On the other hand, the Canadian, Swiss, and Australian markets all responded positively to such news around the event window. Thus, modeling normal U.S. returns using contemporaneous, foreign market indexes can better control for confounding news unrelated to the XBRL-mandate.

mandate is beneficial to shareholders and suggests that the SEC's efforts to require XBRL in the filing of financial statements may have merit. We further shed light on the channels through which shareholders can benefit from the XBRL mandate.

Our findings are subject to several caveats. First, similar to any event study of major legislation (e.g., the Sarbanes-Oxley Act), the implicit assumption is that stock prices accurately capture the expected costs and benefits of the mandate to shareholders. Second, while our results suggest that XBRL is beneficial to shareholders, we cannot completely rule out an alternative explanation that our results are driven by the events of some other contemporaneous phenomena with events that coincide with all XBRL legislative events. However, we are reasonably comfortable with our conclusions because the use of foreign market returns for modeling benchmark returns helps to mitigate the effects of contemporaneous, macroeconomic events on our results. Furthermore, the cross-sectional results are supportive of our main conjectures and thus, some other contemporaneous phenomena would have to also explain these systematic patterns to invalidate our conclusions. Third, our study only focuses on XBRL's potential impact to shareholder wealth. One avenue for future work may be to examine the impact of XBRL on other stakeholders. In addition, it may be interesting to explore the heterogeneous impact of XBRL on different groups of shareholders and on firm ownership structure. Finally, the results documented in our paper only reflect perceived net benefits or costs prior to passage of the mandate and are, at best, suggestive of the benefits of XBRL to share-holders ex-ante. Future studies can further examine the ex-post impact of XBRL on shareholder wealth subsequent to its adoption.

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Appendix 1

Variable Definitions

Variables	*Definitions*
AR_1	Cumulative abnormal return for the overall market estimated based on Canadian, Australian, and Swiss market returns in Equation (4).
AR_2	Cumulative abnormal return for the overall market estimated based on Canadian market returns in Equation (5).
AUS_RET	Daily value-weighted return of Australian stocks.
Bidask	Annual average of daily ask minus bid price divided by closing price measured over the prior fiscal year as in Jayaraman (2008).
CAN_RET	Daily value-weighted return of Canadian stocks.
CAR_1	Three-day cumulative abnormal return at the firm level estimated based on Canadian, Australian, and Swiss market returns in Equation (7).
CAR_2	Three-day cumulative abnormal return at the firm level estimated based on Canadian market returns in Equation (10).
CAR_3	Three-day cumulative abnormal return at the firm level estimated based on U.S. market returns in Equation (11).
Comparability	Average comparability score among the four most comparable peers for each firm as defined in De Franco et al. (2011).
Depth	Average daily magnitude of stock returns divided by dollar trading volume measured over the prior fiscal year as defined in Amihud (2002).
Momentum	Market-adjusted return over the six months prior to the event.
MTB	Market-to-book ratio, measured as the market value of equity divided by the book value of equity as of the most recent fiscal year scaled by 1,000.
Numanalysts	Number of analysts who provide at least one forecast over the prior year.
Numseg	Number of business segments in different industries by 3-digit SIC code.
Opaque	3-year moving sum of the absolute value of annual discretionary accruals from the Jones model as modified by Dechow et al. (1995).
Press	Number of business press articles that mention the firm over the previous year scaled by 1,000.
RET	U.S. firm daily return.
Size	Market capitalization as of the end of the most recent fiscal year.
Size10k	10-K document file size (in megabytes) for the prior fiscal year following Loughran and McDonald (2014).
SWISS_RET	Daily value-weighted return of Swiss stocks.
US_RET	Daily value-weighted return of U.S. stocks.
USAR	Cumulative abnormal return for the overall market estimated based on benchmark period U.S. market returns in Equation (3).

TABLE 1
Events and predicted effects on the likelihood of mandatory XBRL adoption in the U.S.

Event	Event Date	Description	Assessed Effect on Likelihood of passage of the XBRL Mandate	Predicted Market Reaction if $XBRL_{benefits} > XBRL_{costs}$ $(XBRL_{benefits} < XBRL_{costs})$
1	9/25/2006	SEC announces plans to overhaul EDGAR and move towards a system based on interactive data. (Dow Jones Newswire)	Increase	+ (-)
2	9/25/2007	The SEC announces plans to decide on the mandatory adoption of XBRL in the following year. (Dow Jones Newswire, Reuters Newswire)	Increase	+ (-)
3	10/9/2007	The SEC creates unit to help firms with questions on XBRL. (Reuters Newswires)	Increase	+ (-)
4	12/5/2007	SEC's Office of Interactive Disclosure urges public comment as interactive data moves closer to reality. (SEC 2007)	Increase	+ (-)
5	2/15/2008	The SEC unveils a website that enables investors to work with data derived from XBRL. (Dow Jones Newswires, Reuters Newswires)	Increase	+ (-)
6	2/26/2008	SEC Chairman Christopher Cox expects that the SEC will announce plans on the XBRL adoption schedule within the next month or so. (Dow Jones Newswires)	Increase	+ (-)
7	4/16/2008	The SEC is expected to lay out an XBRL roadmap (both a short- and long-term schedule) on April 21. (Reuters Newswires)	Increase	+ (-)

TABLE 1 (continued)

8	4/18/2008	The SEC postpones laying out XBRL roadmap. (Reuters Newswires)	Decrease	- (+)
9	5/2/2008	XBRL data tags are finalized. (Reuters Newswires)	Increase	+ (-)
10	5/14/ 2008	SEC proposes XBRL data-tagging plan for the 500 largest firms. (Dow Jones Newswires)	Increase	+ (-)
11	5/30/2008	The SEC requests public comments on the XBRL mandate. (SEC 2009)	Increase	+ (-)
12	12/17/2008	The SEC votes to mandate the use of XBRL for public firms. (Dow Jones Newswires, Reuters Newswires)	Increase	+ (-)

TABLE 2
Association between the U.S. market return and foreign (non-XBRL) market return

Panel A: Distribution of foreign-traded firms by home country

	Foreign-traded firms	
	# of firms	% of Total
Canada	1,321	58.45%
Australia	670	29.65%
Switzerland	269	11.90%
Total	2,260	100.00%

Panel B: Correlation between the returns of U.S. and foreign-traded firms. Estimates that are significant at the 5 percent level or lower (two-tailed) are bolded. All variables are defined in Appendix 1.

	US_RET	*CAN_RET*$_t$	*AUS_RET*$_t$	*AUS_RET*$_{t+1}$	*SWISS_RET*$_t$
CAN_RET$_t$	**0.6622**				
AUS_RET$_t$	0.1032	0.1076			
AUS_RET$_{t+1}$	**0.2467**	**0.1899**	-0.0701		
SWISS_RET$_t$	**0.5460**	**0.4400**	**0.1323**	**0.1317**	
SWISS_RET$_{t+1}$	**0.2019**	0.1061	-0.0150	**0.1248**	-0.0643

Panel C: Regressions of the U.S. market returns (*US_RET*$_t$) on foreign market returns specified in Model (1) and (2). ***, **, and * represent two-tailed, *p*-value significance levels of 0.01, 0.05, and 0.1 respectively. All variables are defined in Appendix 1.

	Model (1)		Model (2)	
	coef.	*t*-stat	coef.	*t*-stat
CAN_RET$_t$	0.3255***	9.90	0.4489***	13.94
AUS_RET$_t$	0.0069	0.39		
AUS_RET$_{t+1}$	0.0382**	2.12		
SWISS_RET$_t$	0.2897***	6.87		
SWISS_RET$_{t+1}$	0.1400***	3.70		
Intercept	0.0006**	2.02	0.0009***	2.79
R^2	55.6%		43.9%	

TABLE 3
Market reaction to events leading to the XBRL mandate
This table reports the market reaction to events leading to the XBRL mandate. *USAR*, AR_1, and AR_2 are the cumulative abnormal return for the overall market estimated based on Equations (3), (4), and (5). ***, **, and * represent two-tailed, *p*-value significance levels of 0.01, 0.05, and 0.1 respectively.

Panel A: Cumulative abnormal U.S. market returns around individual events

Event	Date	Description	Predict	*USAR*	*t*-stat	*p*-value	AR_1	*t*-stat	*p*-value	AR_2	*t*-stat	*p*-value
1	9/25/2006	SEC announces plans to overhaul EDGAR and move towards a system based on interactive data.	+	0.010	0.93	0.354	0.011	1.22	0.224	0.015	1.55	0.121
2	9/25/2007	The SEC announces plans to decide on the mandatory adoption of XBRL in the following year.	+	0.000	-0.03	0.979	0.002	0.21	0.833	-0.001	-0.13	0.895
3	10/9/2007	The SEC creates unit to help firms with questions on XBRL.	+	0.004	0.35	0.730	-0.001	-0.17	0.868	0.004	0.42	0.677
4	12/5/2007	SEC's Office of Interactive Disclosure urges public comment as interactive data moves closer to reality	+	0.022*	1.93	0.055	0.008	0.88	0.378	0.014	1.41	0.161
5	2/15/2008	The SEC unveils a website that enables investors to work with data derived from XBRL.	+	-0.014	-1.23	0.219	-0.011	-1.25	0.214	-0.019**	-2.00	0.047

6	2/26/2008	SEC Chairman Christopher Cox expects that the SEC will announce plans on the future of XBRL within the next month or so.	+	0.022*	1.91	0.057	0.012	1.35	0.177	0.016	1.62	0.107
7	4/16/2008	The SEC is expected to lay out an XBRL roadmap (both a short- and long-term schedule) on April 21.	+	0.027**	2.37	0.019	0.016*	1.80	0.073	0.019*	1.93	0.054
8	4/18/2008	The SEC postpones laying out XBRL roadmap.	-	0.014	1.22	0.223	0.009	0.95	0.343	0.007	0.76	0.448
9	5/2/2008	XBRL data tags are finalized	+	0.014	1.26	0.210	0.006	0.65	0.517	0.004	0.37	0.709
10	5/14/2008	The SEC proposes XBRL data-tagging plan for the 500 largest firms.	+	0.014	1.25	0.214	0.008	0.86	0.390	0.014	1.44	0.152
11	5/30/2008	The SEC requests public comments on the XBRL mandate.	+	-0.002	-0.20	0.841	-0.008	-0.87	0.383	-0.003	-0.35	0.725
12	12/17/2008	The SEC votes to mandate the use of XBRL for public firms.	+	0.027**	2.09	0.038	0.036***	3.61	0.000	0.030***	2.92	0.004

Panel B: Cumulative abnormal returns surrounding significant events (Events 7 and 12) and surrounding all events pertaining to the XBRL mandate

	USAR	*t*-stat	*p*-value	AR_1	*t*-stat	*p*-value	AR_2	*t*-stat	*p*-value
Cumulated over all significant events	0.0555***	2.94	0.004	0.043***	3.00	0.003	0.049***	3.26	0.001
Cumulated over all events	0.1188**	2.25	0.004	0.071*	1.90	0.059	0.083**	2.08	0.038

TABLE 4
Sample selection and descriptive statistics for the cross-sectional tests

Panel A: Sample selection procedures	Firms
Number of firms with return data from CRSP across all years from 2006-2008	8,450
With data from Compustat	4,790
With non-missing data for other control variables	1,118

Panel B: Descriptive statistics

Variable	Obs.	Mean	Median	25%	75%	Std.
CAR_1	13,416	0.005	0.002	-0.023	0.028	0.062
CAR_2	13,416	0.006	0.003	-0.021	0.028	0.061
CAR_3	13,416	0.003	0.000	-0.023	0.024	0.061
Numanalyst	13,416	8.399	6.000	2.000	12.000	8.328
Depth	13,416	0.490	0.003	0.001	0.041	3.059
Bidask	13,416	0.033	0.031	0.024	0.040	0.013
Numseg	13,416	2.133	2.000	1.000	3.000	1.312
Size10k	13,416	2.060	1.591	1.081	2.311	2.430
Opaque	13,416	2.867	0.869	0.261	3.634	4.876
Comparability	13,416	-0.400	-0.170	-0.380	-0.090	0.767
Size	13,416	13.379	13.349	11.935	14.698	1.998
MTB	13,416	0.005	0.003	0.002	0.004	0.052
Momentum	13,416	-0.042	-0.055	-0.224	0.105	0.295
Press	13,416	0.393	0.000	0.000	0.310	1.831

Panel C: Pearson Correlation. Estimates that are significant at the 5 percent level or lower (two-tailed) are bolded. All variables are defined in Appendix 1.

		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*
(1)	*Size*	1.000										
(2)	*Numanalyst*	**0.712**	1.000									
(3)	*Depth*	**-0.257**	**-0.156**	1.000								
(4)	*Bidask*	**-0.521**	**-0.342**	**0.197**	1.000							
(5)	*Opaque*	**-0.038**	0.006	**0.049**	**0.103**	1.000						
(6)	*Numseg*	**0.326**	**0.103**	**-0.051**	**-0.276**	**-0.062**	1.000					
(7)	*Size10k*	**0.164**	**0.075**	**-0.048**	**-0.066**	**-0.043**	**0.128**	1.000				
(8)	*Comparability*	**0.156**	**0.140**	**-0.118**	**-0.197**	0.005	-0.007	**0.042**	1.000			
(9)	*MTB*	**0.030**	0.007	-0.008	**0.034**	-0.011	**-0.019**	-0.007	0.008	1.000		
(10)	*Momentum*	**0.232**	**0.055**	-0.011	**-0.150**	**-0.022**	**0.060**	**0.046**	**0.080**	0.014	1.000	
(11)	*Press*	**0.264**	**0.237**	**-0.031**	**-0.095**	0.002	**0.106**	**0.044**	**0.041**	-0.004	-0.005	1.000

TABLE 5
Cross-sectional test of the market reaction to the XBRL mandate

This table reports the cross-sectional variation in the market reaction to events leading to the XBRL mandate. The dependent variables are the three-day abnormal returns around the XBRL legislative events detailed in Table 1. CAR_1 is the three-day cumulative abnormal return at the firm level estimated based on Canadian, Australian, and Swiss market returns in Equation (7). CAR_2 is the three-day cumulative abnormal return at the firm level estimated based on Canadian market returns in Equation (10). CAR_3 is the three-day cumulative abnormal return at the firm level estimated based on U.S. market returns in Equation (11). Panel A presents the cross-sectional results using all events. There are 13,416 observations across all of the regressions corresponding to 1,118 unique firms. Industry and year fixed effects are included. Panel B reports the results for individual significant events (Event 7 and 12). In Panel B, there are 1,118 observations for each event. Industry fixed effects are included. Industry fixed effects are based on the Fama-French 48 industry classification. The *t*-statistics, in parenthesis, are based on standard errors clustered at the firm and year level. ***, **, and * represent two-tailed, *p*-value significance levels of 0.01, 0.05, and 0.1 respectively. All variables are defined in Appendix 1.

Panel A: Cross-sectional test of market reaction to the XBRL mandate (all events)

Variable	Predict	(1) CAR_1		(2) CAR_2		(3) CAR_3	
		Coefficient	*t*-stat	Coefficient	*t*-stat	Coefficient	*t*-stat
Numanalysts	-	-0.0002**	-2.09	-0.0002*	-1.70	-0.0004***	-4.51
Depth	-	-0.0008***	-5.56	-0.0008***	-5.35	-0.0007***	-3.98
Bidask	+	0.0390***	4.24	0.0356***	4.11	0.0296***	3.28
Numseg	+	0.0010**	2.02	0.0010*	1.85	0.0013**	2.34
Size10k	+	0.0004***	4.27	0.0004***	5.60	0.0004***	6.23
Opaque	+	0.0002***	3.95	0.0002***	5.31	0.0002***	3.96
Comparability	-	-0.0000	-0.05	-0.0002	-0.46	0.0001	0.20
Size	?	0.0018***	5.11	0.0019***	6.16	0.0019***	4.74
MTB	?	0.0110***	5.39	0.0093***	4.08	0.0086***	3.62
Momentum	?	0.0013	0.27	0.0021	0.41	0.0036	0.67
Press	?	-0.0005**	-2.40	-0.0004**	-2.36	-0.0002	-1.63
Intercept	?	-0.0407***	-3.06	-0.0354***	-2.69	-0.0374***	-3.11
R^2		1.55%		1.45%		1.91%	

TABLE 5 (cont.)

Panel B: Cross-sectional test of the market reaction to the XBRL mandate (significant events)

	Prediction	Event 7		Event 12	
		Coefficient	*t*-stat	Coefficient	*t*-stat
Numanalyst	-	-0.0014***	-4.46	-0.0003	-0.39
Depth	-	0.0001	0.18	-0.0013*	-1.79
Bidask	+	0.0988	1.21	-0.0453	-0.27
Numseg	+	0.0012	0.86	0.0031	1.08
Size10k	+	0.0006	0.99	0.0014	1.12
Opaque	+	0.0010**	2.30	-0.0007	-0.83
Comparability	-	0.0007	0.29	-0.0091**	-2.19
Size	?	0.0063***	4.25	0.0060**	2.08
MTB	?	0.0472*	1.92	0.0019	0.04
Momentum	?	0.0120**	1.97	-0.0112	-1.22
Press	?	0.0007	0.90	-0.0037	-1.06
Intercept	?	0.0560	1.07	0.0900	0.83
R^2		15.71%		11.30%	

TABLE 6
Alternative test for market reaction to events leading to the XBRL mandate

This table reports the market reaction to events leading to the XBRL mandate following the methodology of Li et al. (2008). Market CAR is the cumulative abnormal market return for the overall market estimated based on Equations (12). Year fixed effects are included. The *t*-statistics, in parenthesis, are based on heteroscedasticity robust standard errors. ***, **, and * represent two-tailed, *p*-value significance levels of 0.01, 0.05, and 0.1 respectively.

Event	Date	Market CAR	
1	9/25/2006	0.010	(1.05)
2	9/25/2007	-0.000	(-0.01)
3	10/9/2007	0.004	(0.49)
4	12/5/2007	0.022	(1.20)
5	2/15/2008	-0.007	(-0.54)
6	2/26/2008	0.029**	(2.33)
7	4/16/2008	0.031	(1.39)
8	4/18/2008	0.011	(0.52)
9	5/2/2008	0.022	(1.60)
10	5/14/ 2008	0.021**	(2.29)
11	5/30/2008	0.005	(0.43)
12	12/17/2008	0.034	(0.61)
All		0.149*	(1.69)