Responses of Small and Large Investors to XBRL disclosure to the SEC

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The Securities and Exchange Commission (SEC) mandated that financial reports of public companies be prepared in interactive format using the eXtensible Business Reporting Language (XBRL). This study examines the changing pattern in the responses of small and large investors to XBRL disclosure as evidenced by trading outcomes. Empirical results suggest that large investors and small investors respond to XBRL filings negatively in the first two years of the three-year phase-in, and respond positively in the third year, consistent with the improvement in the quality of XBRL filings, suggesting a significant learning curve.

INTRODUCTION

In December 2008, the SEC adopted a new rule requiring public companies to provide their financial statements to the SEC and on their corporate web sites in interactive data format using XBRL. As a result of the new disclosure requirements, the SEC expects that smaller investors will have greater access to financial data than before. Any investor with a computer and an internet connection will have the ability to acquire and download interactive financial data that have generally been available only to large institutional users. Thus, the XBRL disclosure will reduce informational barriers that separate smaller and less sophisticated investors from larger and more sophisticated investors, thereby reducing information asymmetry (SEC 2009a). In addition, prior research indicates that freely available machine-readable standardized XBRL data can enable wider access, leveling the playing field for smaller players (Debreceny et al. 2005). The financial statement users, especially nonprofessional users, can benefit by using search-facilitating technologies, such as XBRL (Hodge et al. 2004). Furthermore, Yoon et al. (2011) examine whether XBRL adoption reduces information asymmetry in the Korean stock market and find that a significant and negative association exists between XBRL adoption and information asymmetry, implying that the adoption of XBRL leads to the reduction of the information asymmetry in the Korean stock market. Also, the effect of XBRL adoption on reducing information asymmetry is stronger for large-sized companies than for medium-sized and small-sized companies.

However, the SEC also points out that larger investors are likely to gain significant benefits from the XBRL disclosure (SEC 2009a). If larger investors are able to use their superior ability and resources to leverage their playing field and gain greater benefits from the XBRL disclosure than smaller investors, information asymmetry is likely to increase.

Given the above discussion, it is not *ex ante* clear how XBRL disclosure impacts information asymmetry among investors. This study examines the responses of small and large investors to the XBRL disclosure as evidenced by trading outcomes. Following prior research, trading outcomes are measured by

trading volume and trading direction, and this study infers from the size of the trade whether the investor is small or large (Asthana et al. 2004).

This study calculates and compares changes in standardized abnormal trading volume and trading gain for small investors and large investors. Empirical results indicate that changes in standardized abnormal trading volume and trading gain are less negative for large investors than for small investors. This study also regresses changes in standardized abnormal trading volume and abnormal trading gain for small investors and for large investors on two dummy variables INITIAL (indicating whether or not a filer is an initial XBRL filer) and EXIST (indicating whether or not a filer filed financial reports in XBRL format in the prior fiscal period) and control variables. Empirical results suggest that large investors and small investors respond to XBRL filings negatively in the first two years of the three-year phase-in, and respond positively in the third year, consistent with the improvement in the quality of XBRL filings documented in prior literature (e.g., Du et al. 2012), suggesting a significant learning curve.

There is limited empirical evidence on the implications of XBRL for small and large investors. This study adds to the growing literature of XBRL disclosure by documenting the responses of small and large investors to the XBRL disclosure. The results from this study would potentially be of interest to the SEC which must assess the effectiveness of XBRL disclosure in a timely manner. This study also contributes to the literature on trading behavior of small and large investors (e.g., Cready and Mynatt 1991; Lee 1992; Bhattacharya et al. 2003; Asthana et al. 2004) and provides evidence about the impact of the XBRL disclosure on the trading behavior of small and large investors.

The rest of the study proceeds as follows. Section 2 describes hypothesis development. Section 3 describes the methods employed in this study, and data and sample are given in Section 4. Section 5 presents the empirical results. Summary and conclusion are in Section 6.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMNENT

Trading Behavior of Small and Large Investors in Pre- and Post-EDGAR Periods

The SEC has always been interested in reducing the amount of financial information that managers communicate only to "informed" investors by making information more accessible publicly to small investors. Asthana et al. (2004) examine whether the electronic filing of form 10-K on EDGAR differentially benefited small investors during the period when the SEC required electronic filings on EDGAR instead of paper form filings. To increase access to mandated corporate filings, electronic filings on EDGAR began in 1994 and were fully phased in by 1997. Prior to EDGAR, individuals interested in a company's financial reports had to request them from the company (shareholders automatically get annual reports, proxy statements, etc., but not 10-Ks for example), go to one of the SEC's offices, or purchase the report from an intermediary. By making corporate filings available via the Internet, electronic filings on EDGAR increased the speed and uniformity with which financial reports became available to investors while simultaneously lowering the cost of obtaining those reports. In addition, EDGAR and related online services have reduced the cost of analyzing that data. Theoretically, this should differentially benefit small traders who previously obtained the information with delay, if at all.

Asthana et al. (2004) find that the change to electronic filings on EDGAR resulted in significant increases in the volume of small, but not large trades, during the five-day window (-1, 3) around the filing date and that the direction of those small trades is more likely (than in the pre-EDGAR period) to be buy (sell) when subsequent returns are positive (negative). They also find that even though small trades still appear to be less profitable than large ones, the difference in profitability is greatly reduced post-EDGAR. Their evidence suggests that small trades are more likely to be based on the information contained in the 10-K post-EDGAR. Electronic filings on EDGAR increased the information available (i.e., SEC filings) to small investors by increasing access to public filings and reduced the information advantage of large investors. In addition, small investors are able to assimilate that information and trade correctly.

Hypothesis Development

The use of XBRL in financial reporting is expected to be one of the most important changes in the disclosure environment (Debreceny et al. 2010). XBRL is an ongoing challenge for filers. Du et al. (2013) document more than 4,000 filing errors made by more than 1,000 filers in the in the first six quarters after initial phase-in. The SEC staff performs review of the Interactive Data Financial Statement submissions and provides guidance to registrants on the quality of XBRL filings. In the initial review, the SEC staff noted many instances of filers incorrectly entering amounts with negative values. Regarding tag selection, filers selected a standard tag when it appears a more appropriate standard tag exists; filers created a new element when it appears an appropriate standard element exists; filers selected a standard element when it appears a new element should have been created. In case that a standard element does not adequately capture all material information, filers should create a new element (SEC 2009b). Many occurrences of filers incorrectly entering negative values were continuously noted. Filers extended for an element where an existing US GAAP Taxonomy element is appropriate (SEC 2010b). While many times in the HTML filing numbers are presented as negative, they should almost always be tagged as positive numbers in the XBRL submission, but filers tagged data incorrectly as negative values. Filers created a new element when it appears an appropriate standard element exists. The rule of thumb is that do not extend when an existing US GAAP taxonomy element is available, use software to search for appropriate elements in the taxonomy and examples from existing submissions, and extend only when there is a material difference between the standard US GAAP element and the filer's financial statement line item (SEC 2011a). The SEC staff observed that the most common error filers make is to incorrectly enter an amount with a negative value (SEC 2011b). In addition, the tagging is inconsistent: five different companies might use five different tags for the exact same data or the same company could use different tags for the same item over multiple periods. In one striking case, only two filers out of the S&P 500 utilized the correct standard tag, and most created an extension unnecessarily. Yet, this was for an uncomplicated accounting concept, with very limited standard tags to choose from (White Paper Number Three 2012). Furthermore, filers use extensions unnecessarily. Debreceny et al. (2011) examine the monetary extensions made in filings by 67 large accelerated filers between April 15, 2009 and June 2010 and find that more than 40 percent of the extensions were unnecessary because appropriate elements already existed in the U.S. GAAP Taxonomy.

XBRL is an ongoing challenge for financial information users. To get the benefits from the XBRL disclosure, investors need to be able to automatically populate their analytical tools from EDGAR without the need for re-keying or human intervention. Basically, this requires investors to learn and understand the large and growing U.S. GAAP XBRL Taxonomy, to be able to use freely available software to extract the financial information from XBRL instance document on EDGAR, and be able to use computer-based tools to analyze it. In the first phase of the SEC's mandate, XBRL US published the foundation taxonomy (the U.S. GAAP Taxonomy) with more than 15,000 elements or discrete concepts that represent common practice and the disclosure requirements of the U.S. GAAP (XBRL U.S. 2009; Debreceny et al. 2011). Small investors likely process less information than do large investors since small investors generally have relatively fewer resources and less ability to do those tasks. Large and more sophisticated investors have superior resources and abilities to fully understand the meaning of the U.S. GAAP Taxonomy, to be able to use software to automatically extract the data, and to use computer-based tools to analyze it.

In addition, XBRL disclosure also poses other challenges for investors. The tagging is inconsistent: five different companies might use five different tags for the exact same data or the same company could use different tags for the same item over multiple periods (White Paper Number Three 2012). Inconsistent tagging not only creates a burden for investors to interpret the implication of each tag, but also creates confusion for investors, lowering the quality of XBRL disclosure.

Furthermore, filers not only use more than 15,000 elements or discrete concepts of the U.S. GAAP Taxonomy, but also extend the U.S. GAAP Taxonomy, creating extensions. It is a costly and essentially manual process to interpret each of the extensions, especially when there is unnecessary, excessive, and inconsistent use of extensions. Since large investors have more resources and superior abilities, they can handle these challenges better than small investors. This study expects the XBRL filing requirement

instituted by the SEC to have more positive (less negative) impact on large investors than on small investors as evidenced by the trading volume and trading direction. The preceding discussions motivate the following testable hypothesis:

H_1: Ceteris paribus, the XBRL disclosure has less negative impact on large investors than small investors as evidenced by the trading volume and trading direction.

The SEC staff provides guidance to registrants on the quality of XBRL filings and on how to improve them. The SEC staff noted the most common error filers make is to incorrectly enter an amount with a negative value. They also pointed out that while many times in the HTML filing numbers are presented as negative, they should almost always be tagged as positive numbers in the XBRL submission (SEC 2011b). The SEC staff noted that filers created new elements unnecessarily when appropriate elements exist in the U.S. GAAP Taxonomy. They also pointed out that that do not extend when an existing US GAAP taxonomy element is available, use software to search for appropriate elements in the taxonomy and examples from existing submissions, and extend only when there is a material difference between the standard US GAAP element and the filer's financial statement line item. The SEC staff noted sizable errors and issues and provided guidance how to fix them (SEC 2009b, 2010b, 2011a, 2001b).

Based on voluntary XBRL filing data from 2005 to 2008, Efendi et al. (2011) find that the time lags between filing reports in XBRL format and the ending of the fiscal year and quarter decreased over the time period, suggesting that there is a learning curve with XBRL reporting that voluntary adopters experience. Du et al. (2013) examine the overall changing pattern of the errors to understand whether the large number of errors may hamper the transition to interactive data reporting. Using a sample of 4,532 filings that contain 4,260 errors from June 2009 to December 2010, they document a significant learning curve exhibited by the XBRL filers. Specifically, they find that the number of errors per filing is significantly decreasing when a company files more times, suggesting that the company filers or the filing agents many companies use learn from their experiences and therefore the future filings are improved. Their findings support the SEC's phase-in schedule, which allows the year two and later filers to benefit from the experience of year one filers. Also, the evidence of a significantly decreased number of errors provides helpful information to address users' concerns regarding the data quality of XBRL filings.

As the quality of the XBRL filing improves over time, and because of the learning curve of large investors and small investors, we expect that the large investors and small investors respond less negatively to the XBRL filings at later stage of XBRL three-year phase-in than respond to the XBRL filings at early stage of XBRL three-year phase-in. The preceding discussions motivate the following testable hypothesis:

H_2: Ceteris paribus, large investors and small investors respond less negatively to the XBRL filings at later stage of XBRL three-year phase-in than respond to the XBRL filings at early stage of XBRL three-year phase-in.

RESEARCH DESIGN

Trading Volume

Following prior research (Cready 1988; Lee 1992; Lee and Radhkrishna 2000; Asthana et al. 2004), this study infers from the size of the trade whether the investor is small or large. Additionally, this study uses the abnormal volume (AVOL) measure developed in the Asthana and Balsam (2001) to evaluate the impact of the financial reports in XBRL format.

$$AVOL = \frac{VOL - \mu(VOL)}{\sigma(VOL)} \quad (1)$$

where VOL is the daily trading volume, measured in shares, and μ(VOL) and σ(VOL) are the mean and standard deviation, respectively, during the non-filing period, which this study defines as the 45-day period beginning 49 days before and ending five days before the filing dates of financial reports in XBRL format. The test period is the five days beginning one day before and ending three days after the filing dates of financial reports in XBRL format. Table 1 presents the variable definitions.

TABLE 1
Variable Definition

Variables	Definition
Δ	denotes change
σ	denotes standard deviation
μ	denotes average
AFTEXD	the number of days later the financial report in XBRL format is filed in the current fiscal period than in the previous fiscal period
AFTEAD	the number of day after the preliminary earnings announcement date that the financial report in XBRL format is filed
AGAIN	Abnormal trading gain, defined as the difference between daily trading gain and average trading gain over standard deviation of trading gain
AVOL	Abnormal trading volume, defined as the difference between daily trading volume and average trading volume over standard deviation of trading volume
AVOL(LRG)	abnormal trading volume for large investors
AVOL(SML)	abnormal trading volume for small investors
EXIST	a dummy variable equal to 1 if the firm filed financial report in XBRL format in a previous period, and 0 otherwise
GAIN (LRG)	net gain for large trades, where net gain is equal to mean net buys (buys minus sales) during the event period (-1, 3) multiplied by the change in price for the five days subsequent to purchase, deflated by total trading volume (buys plus sales) during the same period
GAIN(SML)	net gain for small trades, where net gain is equal to mean net buys (buys minus sales) during the event period (-1, 3) multiplied by the change in price for the five days subsequent to purchase, deflated by total trading volume (buys plus sales) during the same period
INITIAL	a dummy variable equal to 1 if the current report in XBRL format is the first filed, and 0 otherwise
MB	the market to book ratio, calculated as the market capitalization divided by total shareholders' equity at the end of the fiscal period
RET	share returns during the event period (-1, 3)
SIZE	the size of the firm, measured as the log of market capitalization at the end of the fiscal period
VOL	daily trading volume

ΔAVOL is the incremental AVOL defined as AVOL in fiscal period t minus AVOL in fiscal period t-1. If the average market response to the filings does not change across two consecutive fiscal periods, then ΔAVOL will be zero. A negative value, on the other hand, implies decreased market activity. This study examines the trading volume to test if small or large investors increase (decrease) their trading activity when firms filed their first and subsequent financial reports in XBRL format. This study defines small and large traders as in Bhattacharya (2001) which assumes that when the dollar amount of the trade is less than or equal to $5,000, the trade is made by a small investor; when the dollar amount of the trade is greater than or equal to $50,000, the trade is made by a large investor. A problem with this formulation is that if the share price exceeds $50, and investors only trade in round lots of 100 shares or more, then for those firms there will be no small trades. Hence, following Asthana et al. (2004) and Bhattacharya (2001), this study modifies this formulation so that for firms with a share price greater than $50 per share, this study defines small trades as those less than or equal to 100 times the share price. This study defines AVOL(SML) as abnormal volume for small investors and AVOL(LRG) as abnormal volume for large

investors. Since this study expects that XBRL disclosure has more positive (less negative) impact on large investors, the change in abnormal volume associated with the first XBRL filing would be greater for large investor than for small investors, i.e., ΔAVOL(SML) < ΔAVOL(LRG).

Following Asthana et al. (2004), this study controls for other firm and market factors that may influence trading behavior. Prior research indicates that, relative to large firms' announcements, small firms' earning announcements convey more "unexpected" information and are associated with more intense and sustained market adjustments (Atiase 1985; Bamber 1987; Freeman 1987). Prior research also indicates that large firms' reactions to common information lead those of small firms (Lo and MacKinlay 1990; Brennan et al. 1993). Ensuring that the results in this study are not driven by firm size is especially important since the SEC's three-year phase-in program to XBRL filing on EDGAR was size based. However, the incremental measures described above (ΔAVOL(SML) and ΔAVOL(LRG)), where this study takes the value for the financial report in XBRL format was filed and subtracts the prior fiscal period's value, not only control for size, they also control for other firm specific factors.

The multivariate regression analysis allows this study to examine the impact of multiple factors, such as the effect of XBRL filing and the difference between the initial and subsequent XBRL filings, on change in trading volume for small and large investors. Two dummy variables are defined to examine the impact of XBRL filing on the market reaction. INITIAL is a dummy variable equal to 1 if the current report in XBRL format is the first filed, and 0 otherwise; whereas EXIST is a dummy variable equal to 1 if the firm filed financial report in XBRL format in a previous period, and 0 otherwise.

In addition, this study controls for the impacts of firm characteristics on ΔAVOL(SML) and ΔAVOL(LRG). Atiase (1985) and Bamber (1987) find that firm size affects the information environment and, hence, the price and volume reactions to information events. This study thus includes firm size (SIZE) as a control variable, measured as the log of the market value of equity at the end of current fiscal period. To control for the impact of share returns on trading volume (Bamber and Cheon 1995; Bamber et al. 1997), this study includes share returns (RET) during the event period as a control variable. This study includes market value to book value of equity (MB) at the end of current fiscal period to control for the effect of future growth opportunities on volume.

Furthermore, this study also controls for the effect of the timing of the filing on the change in trading activity. To do this, the study includes the following variables in the analysis: the number of days later the financial report in XBRL format is filed in the current fiscal period than in the previous fiscal period (AFTEXD), implicitly assuming the previous fiscal period's filing date is the expectation for the current fiscal period's filing date; the number of day after the preliminary earnings announcement date that the financial report in XBRL format is filed (AFTEAD). AFTEXD is included because evidence exists that the timing of information disclosure is related to the quality of that information, i.e., firms delay releasing bad news (Kross and Schroeder 1984), consequently, the market reaction is related to the timeliness of that release (Chambers and Penman 1984). AFTEAD is included to control for disclosure of earnings information prior to the financial report. To be consistent with dependent variables, which are defined in the change form, this study defines all of the independent variables, as the value for fiscal period t minus the value for fiscal period t-1.

To isolate the effect of XBRL disclosure on trading volume of small and large investors, this study estimates the following regressions for full sample, 2009 sample, 2010 sample and 2011 sample:

$$\Delta AVOL(LRG)_i = \alpha_0 + \alpha_1 INITIAL_i + \alpha_2 EXIST_i + + \alpha_3 \Delta SIZE_i + \alpha_4 \Delta RET_i + \alpha_5 \Delta MB_i + \alpha_6 \Delta AFTEXD_i + \alpha_7 \Delta AFTEAD_i + \varepsilon_i \quad (2)$$

$$\Delta AVOL(SML)_i = \beta_0 + \beta_1 INITIAL_i + \beta_2 EXIST_i + + \beta_3 \Delta SIZE_i + \beta_4 \Delta RET_i + \beta_5 \Delta MB_i + \beta_6 \Delta AFTEXD_i + \beta_7 \Delta AFTEAD_i + \varepsilon_i \quad (3)$$

The regressions are estimated separately for small and large investors. The regressions examine the change in net trading volumes for small and large investors after controlling for various firm characteristics and the timing of the XBRL disclosure. The estimated coefficients α_0, $\alpha_0 + \alpha_1$, and $\alpha_0 + \alpha_3$, and β_0, $\beta_0 + \beta_1$, and $\beta_0 + \beta_3$, capture the average change in net trading volumes to traditional, initial, and existing XBRL filers for large and small investors, respectively.

Trading Direction

This study uses the measure of Asthana et al. (2004) to evaluate the impact of XBRL filings on the relative trading profitability of small and large investors. GAIN(SML) is net gain for small trades, where net gain is equal to mean net buys (buys minus sales) during the event period (-1, 3) multiplied by the change in price for the five days subsequent to purchase, deflated by total trading volume (buys plus sales) during the same period. GAIN (LRG) is similarly defined for large trades. As with trading volume, this study standardizes GAIN by subtracting the mean daily GAIN during the 45 days beginning on day -49 and ending on day -5 relative to the filing in the XBRL format, and deflates the difference by the standard deviation of GAIN during the 45-day window. This study refers to this abnormal profitability measure as AGAIN. This study uses the standard Lee and Ready (1991) algorithm to classify trades as buy or sell, i.e., if the trade is above (below) the bid/ask midpoint, then the trade is deemed a buy (sell).

This study then examines if the abnormal gains differ between small and large investors, both in the pre- and post-XBRL filing periods. Given that AGAIN controls for profitability of small and large investors in the pre-filing period, this study does not *ex ante* expect that it will differ from zero. However, if large investors or small investors trade differently during the XBRL filing period than during the non-XBRL filing period, then AGAIN could differ from zero.

This study then conducts regressions separately for large and small investors for full sample, 2009 sample, 2010 sample and 2011 sample:

$$\Delta AGAIN(LRG)_i = \lambda_0 + \lambda_1 INITIAL_i + \lambda_2 EXIST_i + \lambda_3 \Delta SIZE_i + \lambda_4 \Delta RET_i + \lambda_5 \Delta MB_i + \lambda_6 \Delta AFTEXD_i + \lambda_7 \Delta AFTEAD_i + \varepsilon_i \quad (4)$$

$$\Delta AGAIN(SML)_i = \sigma_0 + \sigma_1 INITIAL_i + \sigma_2 EXIST_i + \sigma_3 \Delta SIZE_i + \sigma_4 \Delta RET_i + \sigma_5 \Delta MB_i + \sigma_6 \Delta AFTEXD_i + \sigma_7 \Delta AFTEAD_i + \varepsilon_i \quad (5)$$

The regression examines the change in net trading gains for small and large investors after controlling for various firm characteristics and the timing of the XBRL filing. The estimated coefficients λ_0, $\lambda_0 + \lambda_1$, and $\lambda_0 + \lambda_3$, and σ_0, $\sigma_0 + \sigma_1$, and $\sigma_0 + \sigma_3$ capture the average change in net trading gains to traditional, initial, and existing XBRL filers for large and small investors, respectively.

DATA AND SAMPLE

According to the SEC's three-year phase-in program, large companies who file using U.S. GAAP with a public float above $5 billion are required to provide interactive data reports starting with their first quarterly report for fiscal periods ending on or after June 15, 2009. All other large accelerated filers using U.S. GAAP must comply with the XBRL requirements beginning with the first fiscal period ending on or after June 15, 2010. All remaining filers must comply with the XBRL requirements beginning with the first fiscal period ending on or after June 15, 2011 (SEC 2009a).

This study obtains a sample of 30,637 interactive data submitted to the SEC by phase I, phase II, and phase III filers between June 15, 2009, and December 31, 2011, using the EDGAR RSS (Really Simple Syndication) feed's monthly archives (available at: http://www.sec.gov/Archives/edgar/monthly/). Further information about each interactive data submission is collected (e.g., company name, filing date, filing type, and CIK (Central Index Key)). Observations that are not 10-Q filings are removed. This brings the sample down to 22,324. The extension rate is the ratio of number of extension reporting concepts used and the number of the U.S. GAAP Taxonomy reporting concepts used. The stock trading and quote data are from TAQ, financial data are from COMPUSTAT, and stock price data are from CRSP. Observations with no financial data, TAQ data or CRSP data are removed. Final sample is 14,841 observations. Table 2 shows the sample selection process.

TABLE 2
Sample Selection Process

	Number of Observations
Data from EDGAR RSS (Really Simple Syndication) feed's monthly archives	24,626
Less:	
Non 10-Q filings	6,635
Less	
No financial data, TAQ data or CRSP data	5,324
Final Sample	12,667

In calculating volume and net buys, each day's opening trade is excluded from the calculations because such trades often include batched or multiple trades, and can create noise (Lee and Ready 1991; Lee 1992; Bhattacharya 2001).

EMPIRICAL RESULTS

Summary Statistics

Table 3 presents the summary statistics for large and small investors. The mean of change in abnormal volume (ΔAVOL) for small investors is -0.1916, and for large investors is -0.0720. T-test of those two means of change in abnormal volume indicates that those two means are significantly different from each other, indicating that small investors and large investors trade differently after the XBRL adoption, particularly, large investors respond less negatively to XBRL adoption in term of change in abnormal trading volume. The mean of change in abnormal trading gain (ΔAGAIN) for small investors is -0.0030, and for large investors is -0.0023. T-test of those two means of change in abnormal trading gain indicates that those two means are significantly different from each other, indicating that small investors and large investors trade differently after the XBRL adoption, particularly, large trades appear suffer less losses than small trades, supporting hypothesis H_1.

TABLE 3
Summary Statistics for Small and Large Investors

Panel A:
Summary Statistics for Small Investors

Variables	Mean	Std Dev	Minimum	Maximum
ΔAVOL	-0.1916	1.8270	-8.5661	8.8612
ΔAGAIN	-0.0030	0.0785	-0.3978	0.3994
ΔSIZE	0.0095	0.1012	-0.6785	0.8311
ΔRET	0.0004	0.0346	-0.8039	0.6977
ΔMB	-0.0027	0.5455	-7.0976	7.7361
ΔAFTEXD	-3.1015	21.4310	-92.0000	129.0000
ΔAFTEAD	-2.4131	18.7415	-91.0000	88.0000

Panel B:
Summary Statistics for Large Investors

Variables	Mean	Std Dev	Minimum	Maximum
ΔAVOL	-0.0720	1.3537	-9.1315	8.7742
ΔAGAIN	-0.0023	0.0682	-0.3910	0.3986
ΔSIZE	0.1226	0.1036	-0.6742	0.8786
ΔRET	0.0004	0.0376	-1.0150	0.9092
ΔMB	0.0034	0.5710	-7.2750	7.9192
ΔAFTEXD	-3.1291	20.6612	-92.0000	127.0000
ΔAFTEAD	-2.4719	17.8004	-91.0000	84.0000

ΔAVOL = change in abnormal trading volume. Abnormal trading volume is defined as the difference between daily trading volume and average trading volume over standard deviation of trading volume.
ΔAGAIN = change in abnormal trading gain. Abnormal trading gain is defined as the difference between daily trading gain and average trading gain over standard deviation of trading gain.
ΔSIZE = change in size of the firm. The size of the firm is measured as the log of market capitalization at the end of the fiscal period.
ΔRET = change in stock return. Stock return is the return during the event period (-1, 3) from the day prior and three days after the financial report in XBRL format is filed.
ΔMB = change in market to book ratio. The market to book ratio, calculated as the market capitalization divided by total shareholders' equity at the end of the fiscal period.
ΔAFTEXD = change in AFTEXD. AFTEXD is the number of days later the financial report in XBRL format is filed in the current fiscal period than in the previous fiscal period.
ΔAFTEAD = change in AFTEAD. AFTEAD is the number of day after the preliminary earnings announcement date that the financial report in XBRL format is filed.

Regression Results for Change in Abnormal Volume and Change in Abnormal Gain

Table 4 presents the regression results for change in abnormal volume for large investors for full sample, 2009 sample, 2010 sample and 2011 sample. For full sample and 2009 sample, the coefficients of INITIAL and EXIST on change in abnormal volume are both negative and significant. On the other hand, for the 2010 sample, the coefficient of EXIST on change in abnormal volume is negative and significant, but the coefficient of EXIST is negative but not significant. For 2011 sample, the coefficients of INITIAL and EXIST become positive and significant. Altogether, results suggest a learning curve for large investors.

TABLE 4
Regression Results for Change in Abnormal Volume for Large Investors

$$\Delta AVOL_i = \lambda_0 + \lambda_1 INITIAL_i + \lambda_2 EXIST_i + \lambda_3 \Delta SIZE_i + \lambda_4 \Delta RET_i + \lambda_5 \Delta MB_i + \lambda_6 \Delta AFTEXD_i + \lambda_7 \Delta AFTEAD_i + \varepsilon_i$$

Mean coefficients and *p*-values (in parentheses) are based on quarterly regressions

Variables	Coefficients			
	Full Sample	2009 Sample	2010 Sample	2011 Sample
Intercept	-0.0559	-0.0126	0.1589	0.0624
	(0.46)	(0.58)	(0.91)	(0.77)
INITIAL	-0.145	-0.1005	-0.0399	0.0669
	(0.05)**	(0.01)***	(0.01)***	(0.02)**
EXIST	-0.0204	-0.0994	-0.1395	0.0533
	(0.57)	(0.02)**	(0.83)	(0.01)***
ΔSIZE	-0.1030	-0.1668	-0.2494	-0.1814
	(0.01)***	(0.01)***	(0.64)	(0.05)**
ΔRET	0.2299	0.3581	-0.0732	0.1456
	(0.01)***	(0.01)**	(0.01)***	(0.02)**
ΔMB	-0.0017	0.0683	0.1812	0.3524
	(0.69)	(0.06)*	(0.01)***	(0.67)
ΔAFTEXD	-0.0019	0.0094	-0.0147	-0.0238
	(0.01)***	(0.04)**	(0.18)	(0.62)
ΔAFTEAD	0.0013	0.0088	-0.0318	0.0315
	(0.01)***	(0.12)	(0.01)***	(0.51)
Adj. R^2	0.04	0.03	0.03	0.06

ΔAVOL = change in abnormal trading volume. Abnormal trading volume is defined as the difference between daily trading volume and average trading volume over standard deviation of trading volume.
INITIAL = a dummy variable equal to 1 if the current report in XBRL format is the first filed, and 0 otherwise.

EXIST = a dummy variable equal to 1 if the firm filed financial report in XBRL format in a previous period, and 0 otherwise.
ΔSIZE = change in size of the firm. The size of the firm is measured as the log of market capitalization at the end of the fiscal period.
ΔRET = change in stock return. Stock return is the return during the event period (-1, 3) from the day prior and three days after the financial report in XBRL format is filed.
ΔMB = change in market to book ratio. The market to book ratio, calculated as the market capitalization divided by total shareholders' equity at the end of the fiscal period.
ΔAFTEXD = change in AFTEXD. AFTEXD is the number of days later the financial report in XBRL format is filed in the current fiscal period than in the previous fiscal period.
ΔAFTEAD = change in AFTEAD. AFTEAD is the number of day after the preliminary earnings announcement date that the financial report in XBRL format is filed.
*Significant at 0.10 probability.
**Significant at 0.05 probability.
***Significant at 0.01 probability.

Table 5 presents the regression results for change in abnormal volume for small investors for full sample, 2009 sample, 2010 sample, and 2011 sample. For full sample, 2009 sample and 2010 sample, the coefficients of INITIAL and EXIST on change in abnormal volume are both negative and significant. On the other hand, for 2011 sample, the coefficient of INITIAL on change in abnormal volume is positive but not significant; the coefficient of EXIST on change in abnormal volume is negative and significant, suggesting that small investors also experience a learning curve.

TABLE 5
Regression Results for Change in Abnormal Volume for Small Investors

$$\Delta AVOL_i = \lambda_0 + \lambda_1 INITIAL_i + \lambda_2 EXIST_i + \lambda_3 \Delta SIZE_i + \lambda_4 \Delta RET_i + \lambda_5 \Delta MB_i + \lambda_6 \Delta AFTEXD_i + \lambda_7 \Delta AFTEAD_i + \varepsilon_i$$

Mean coefficients and *p*-values (in parentheses) are based on quarterly regressions

Variables	Coefficients			
	Full Sample	2009 Sample	2010 Sample	2011 Sample
Intercept	-0.0722 (0.25)	0.1216 (0.31)	-0.0239 (0.62)	0.0789 (0.29)
INITIAL	-0.4834 (0.01)***	-0.2469 (0.02)**	-0.0608 (0.01)***	0.0929 (0.62)
EXIST	-0.0649 (0.09)*	-0.1094 (0.07)*	-0.0938 (0.01)***	0.1628 (0.04)**
ΔSIZE	-0.0664 (0.01)***	-0.1721 (0.01)***	0.1528 (0.01)***	0.3050 (0.09)*
ΔRET	0.3266 (0.01)***	0.1973 (0.01)***	-0.0584 (0.95)	-0.1128 (0.01)***
ΔMB	0.0021 (0.62)	0.0175 (0.65)	0.0804 (0.21)	-0.0485 (0.10)*
ΔAFTEXD	-0.0012 (0.01)***	-0.0143 (0.01)***	-0.0283 (0.01)***	-0.0091 (0.01)***
ΔAFTEAD	0.0003 (0.47)	0.0114 (0.01)***	0.0044 (0.95)	0.0046 (0.19)
Adj. R^2	0.03	0.05	0.03	0.07

ΔAVOL = change in abnormal trading volume. Abnormal trading volume is defined as the difference between daily trading volume and average trading volume over standard deviation of trading volume.
INITIAL = a dummy variable equal to 1 if the current report in XBRL format is the first filed, and 0 otherwise.
EXIST = a dummy variable equal to 1 if the firm filed financial report in XBRL format in a previous period, and 0 otherwise.
ΔSIZE = change in size of the firm. The size of the firm is measured as the log of market capitalization at the end of the fiscal period.
ΔRET = change in stock return. Stock return is the return during the event period (-1, 3) from the day prior and three days after the financial report in XBRL format is filed.
ΔMB = change in market to book ratio. The market to book ratio, calculated as the market capitalization divided by total shareholders' equity at the end of the fiscal period.

ΔAFTEXD = change in AFTEXD. AFTEXD is the number of days later the financial report in XBRL format is filed in the current fiscal period than in the previous fiscal period.
ΔAFTEAD = change in AFTEAD. AFTEAD is the number of day after the preliminary earnings announcement date that the financial report in XBRL format is filed.
*Significant at 0.10 probability.
**Significant at 0.05 probability.
***Significant at 0.01 probability.

Table 6 presents the regression results for change in abnormal gain for large investors for full sample, 2009 sample, 2010 sample and 2011 sample. For full sample, 2009 sample and 2010 sample, the coefficients of INITIAL and EXIST on change in abnormal gain are both negative and significant. On the other hand, for 2011 sample, the coefficients of INITIAL and EXIST become positive and significant. Altogether, results suggest a learning curve for large investors.

TABLE 6
Regression Results for Change in Abnormal Gain for Large Investors

$$\Delta AGAIN_i = \lambda_0 + \lambda_1 INITIAL_i + \lambda_2 EXIST_i + \lambda_3 \Delta SIZE_i + \lambda_4 \Delta RET_i + \lambda_5 \Delta MB_i + \lambda_6 \Delta AFTEXD_i + \lambda_7 \Delta AFTEAD_i + \varepsilon_i$$

Mean coefficients and *p*-values (in parentheses) are based on quarterly regressions

Variables	Coefficients			
	Full Sample	2009 Sample	2010 Sample	2011 Sample
Intercept	-0.0033 -0.25	0.1719 (0.19)	0.3451 (0.68)	-0.0302 (0.47)
INITIAL	-0.0071 (0.03)**	-0.0325 (0.01)***	-0.2319 (0.04)**	0.1372 (0.01)***
EXIST	-0.0013 (0.01)***	-0.0358 (0.01)***	-0.3647 (0.06)*	0.2027 (0.05)**
ΔSIZE	-0.0059 (0.01)***	0.0935 (0.01)***	0.4096 (0.21)	-0.1348 (0.35)
ΔRET	0.0064 (0.01)***	-0.1395 (0.01)***	0.3012 (0.31)	0.1062 (0.06)*
ΔMB	0.0031 (0.09)*	0.0529 (0.14)	0.1201 (0.02)*	0.0291 (0.31)
ΔAFTEXD	-0.0054 (0.01)***	-0.0098 (0.01)***	-0.1529 (0.01)***	-0.0025 (0.39)
ΔAFTEAD	0.0059 (0.01)***	0.0069 (0.15)	0.0104 (0.09)*	0.0063 (0.09)*
Adj. R^2	0.03	0.06	0.04	0.04

ΔAGAIN = change in abnormal trading gain. Abnormal trading gain is defined as the difference between daily trading gain and average trading gain over standard deviation of trading gain.
INITIAL = a dummy variable equal to 1 if the current report in XBRL format is the first filed, and 0 otherwise.

EXIST = a dummy variable equal to 1 if the firm filed financial report in XBRL format in a previous period, and 0 otherwise.
ΔSIZE = change in size of the firm. The size of the firm is measured as the log of market capitalization at the end of the fiscal period.
ΔRET = change in stock return. Stock return is the return during the event period (-1, 3) from the day prior and three days after the financial report in XBRL format is filed.
ΔMB = change in market to book ratio. The market to book ratio, calculated as the market capitalization divided by total shareholders' equity at the end of the fiscal period.
ΔAFTEXD = change in AFTEXD. AFTEXD is the number of days later the financial report in XBRL format is filed in the current fiscal period than in the previous fiscal period.
ΔAFTEAD = change in AFTEAD. AFTEAD is the number of day after the preliminary earnings announcement date that the financial report in XBRL format is filed.
*Significant at 0.10 probability.
**Significant at 0.05 probability.
***Significant at 0.01 probability.

Table 7 presents the regression results for change in abnormal gain for small investors for full sample, 2009 sample, 2010 sample and 2011 sample. For full sample, 2009 sample and 2010 sample, the coefficients of INITIAL and EXIST on change in abnormal gain are both negative and significant. On the other hand, for 2011 sample, the coefficient of INITIAL on change in abnormal gain is positive and significant; the coefficient of EXIST on change in abnormal gain is negative but not significant, suggesting that small investors also experience a learning curve. Empirical results are in line with hypothesis H_2.

TABLE 7
Regression Results for Change in Abnormal Gain for Small Investors

$$\Delta AGAIN_i = \lambda_0 + \lambda_1 INITIAL_i + \lambda_2 EXIST_i + \lambda_3 \Delta SIZE_i + \lambda_4 \Delta RET_i + \lambda_5 \Delta MB_i + \lambda_6 \Delta AFTEXD_i + \lambda_7 \Delta AFTEAD_i + \varepsilon_i$$

Mean coefficients and *p*-values (in parentheses) are based on quarterly regressions

Variables	Coefficients			
	Full Sample	2009 Sample	2010 Sample	2011 Sample
Intercept	-0.0062 (0.17)	0.2804 (0.69)	-0.3781 (0.46)	-0.0365 (0.32)
INITIAL	-0.0027 (0.01)***	-0.0682 (0.01)***	-0.2123 (0.03)**	0.0507 (0.08)*
EXIST	-0.0026 (0.09)*	-0.0452 (0.01)***	-0.0803 (0.07)*	0.0379 (0.82)
ΔSIZE	-0.0041 (0.01)***	-0.0851 (0.01)***	0.0471 (0.12)	0.1701 (0.31)
ΔRET	0.2540 (0.01)***	-0.1874 (0.01)***	0.3098 (0.06)*	0.1985 (0.03)**

ΔMB	0.0020	-0.0084	0.1098	-0.0322
	(0.91)	(0.01)***	(0.03)*	(0.24)
ΔAFTEXD	-0.0044	-0.0064	-0.0178	0.0187
	(0.01)***	(0.02)**	(0.01)	(0.94)
ΔAFTEAD	0.039	0.0067	0.0093	0.0293
	(0.05)**	(0.07)*	(0.09)*	(0.93)
Adj. R^2	0.04	0.03	0.03	0.05

ΔAGAIN = change in abnormal trading gain. Abnormal trading gain is defined as the difference between daily trading gain and average trading gain over standard deviation of trading gain.
INITIAL = a dummy variable equal to 1 if the current report in XBRL format is the first filed, and 0 otherwise.
EXIST = a dummy variable equal to 1 if the firm filed financial report in XBRL format in a previous period, and 0 otherwise.
ΔSIZE = change in size of the firm. The size of the firm is measured as the log of market capitalization at the end of the fiscal period.
ΔRET = change in stock return. Stock return is the return during the event period (-1, 3) from the day prior and three days after the financial report in XBRL format is filed.
ΔMB = change in market to book ratio. The market to book ratio, calculated as the market capitalization divided by total shareholders' equity at the end of the fiscal period.
ΔAFTEXD = change in AFTEXD. AFTEXD is the number of days later the financial report in XBRL format is filed in the current fiscal period than in the previous fiscal period.
ΔAFTEAD = change in AFTEAD. AFTEAD is the number of day after the preliminary earnings announcement date that the financial report in XBRL format is filed.
*Significant at 0.10 probability.
**Significant at 0.05 probability.
***Significant at 0.01 probability.

SUMMARY AND CONCLUSION

Using intra-day trading data, this study examines the responses of small and large investors to XBRL disclosure as evidenced by trading outcomes. Following prior research, trading outcomes are measured by trading volume and trading direction. Algorithms from extant research are utilized to determine if the trader is small or large (Asthana et al. 2004). Empirical results suggest that large investors respond less negatively to XBRL disclosure than small investors do. In addition, large investors and small investors respond to XBRL filings negatively in the first two years of the three-year phase-in, and respond positively in the third year, consistent with the improvement in the quality of XBRL filings documented in prior literature (e.g., Du et al. 2012), suggesting a significant learning curve. Evidence provided by this study could potentially assist the SEC in its effort to assess the impact of XBRL disclosure on investors.

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