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# The Effect of XBRL Adoption on Trading Behaviors of Foreign Investors: Evidence from Korea

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#### **Abstract**

This study tests a hypothesis that if information access to foreign investors expands after the adoption of eXtensible Business Reporting Language (XBRL) and the associated information is incorporated into their trading behaviors, then their trading turnover ratio would significantly increase. As expected, I find that the trading turnover ratio of foreign investors significantly increases after XBRL adoption compared to before XBRL adoption. Furthermore, this study examines the difference in foreign investors' trading behavior between small and large firms. I find that the increase in the foreign investor's turnover ratio in small firms is more pronounced and economically significant than that of large firms. Overall, this study presents evidence that XBRL adoption affects the trading behaviors of foreign investors.

**Keywords:** Financial Reporting, Foreign Investor, Turnover Ratio, XBRL

### 1. Introduction

The objective of this paper is to examine the effect of XBRL adoption on a foreign investor's trading turnover ratio. Several studies<sup>4,14</sup> show that investors can easily access financial information after XBRL adoption, thereby mitigating information asymmetry between managers and investors, and enhancing information transparency. This study extends these previous studies by investigating whether XBRL adoption affects the trading behavior of foreign investors.

Based on the internet language, XML (eXtensible Markup Language), the XBRL is a global standard language for filing a firm's financial statements. XBRL can facilitate comparability among firms, enhance information efficiency, and provide easy accessibility to financial information. For example, users, such as investors and financial analysts, can easily obtain and analyze financial data in a real time manner through the use of XBRL. The US Securities and Exchange Commission (SEC) and proponents of XBRL argue that the use of XBRL enhances a firm's financial reporting environment as well as improves information efficiency.

This study points out two important aspects of XBRL: 1. XBRL is a global standard language used to file a firm's financial statements, and 2. XBRL facilitates

access to financial information and enhance information efficiency. In general, investors are limited to acquiring and analyzing information on foreign firms. Thus, if XBRL enables foreign investors to easily access useful financial information due to its enhanced information searching capability, one can expect that the trading behavior of foreign investors is more pronounced than before. Therefore, the main hypothesis in this study is that the trading turnover ratio after XBRL adoption would increase compared to the before XBRL adoption. Furthermore, this study expects that a foreign investor's turnover ratio in a small firm significantly increases after XBRL adoption, compared to a large firm. This prediction is based on my argument that a small firm has relatively high information asymmetry in comparison to a large firm and thus the effect of XBRL adoption is stronger.

In October 2007, Korea required public firms listed on the Korean Exchange (KRX) to use XBRL for filing their financial statements. Using a sample of non-financial companies from 2005 to 2011, this study examines whether a foreign investor's trading turnover ratio increases during pre- and post-XBRL adoption. To do this, I run regression models using the trading turnover ratio as a dependent variable on a dummy variable, indicating whether a firm adopts XBRL as an explanatory variable. I control for stock return volatility, beta, firm size, dividend payout

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ratio, Return On Asset (ROA), Z-score, and Tobin's Q. I find that the XBRL dummy is significantly and positively related to a foreign investor's trading turnover ratio in the entire and all subsample periods. The results indicate that a foreign investor's trading turnover ratio significantly increases after XBRL adoption. In addition, based on the median of total assets of firms, I divide the entire sample into two subsamples of small and large firms. I found that the increase in the foreign investor's turnover ratio in a subsample of small firms is more pronounced and economically significant compared to a subsample of large firms. The result means that the effect of XBRL adoption on the foreign investor's trading turnover ratio in a small firm is significantly greater than that in a large firm.

The remainder of the paper is organized as follows: Section 2 reviews prior literature and develops a hypothesis, Section 3 discusses research methodology and data, Section 4 presents the results, and finally Section 5 concludes the paper by summarizing main results.

## 2. Hypothesis Development

XBRL can really play a vital role in accomplishing market democratization since it facilitates the flow of continuous information<sup>3</sup>. The introduction of XBRL has the potential to enhance the usefulness of financial data and improve the quality of financial reporting information<sup>4</sup>. XBRL can also enhance the financial disclosure environment in stock markets by providing high quality information to relevant investors, which implies that the higher level of corporate financial disclosure can lead to the decreases in the information asymmetry in capital markets<sup>7,10,12</sup>.

Korean public companies adopted XBRL for filing their financial statements in October 2007. Due to the use of XBRL, investors can be expected to acquire financial information on firms in real time. This means that XBRL adoption can mitigate information asymmetry that exists between firms and investors. In particular, I expect that XBRL adoption would positively affect the investment decision of foreign investors with high asymmetric information in the Korean market. Therefore, I hypothesize that if information access to foreign investors expands after the adoption of XBRL and the associated information is incorporated into their trading behaviors, their trading turnover ratio would significantly increase. This is the central hypothesis in my study.

Furthermore, this study argues that, after XBRL adoption, a foreign investor's trading turnover ratio in a small firm is greater than in a large firm. The argument

that there is a difference between small and large firms due to XBRL adoption is based on the inference that the investment obstacle for a foreign investor exists due to asymmetric information in terms of a firm's size. In other words, even though an explicit barrier, such as legal and institutional investment barriers, is lifted from an investment of a foreign investor, there is still an implicit barrier due to relatively insufficient information on small firms compared to large firms. The rationale for the argument is supported by survey results analyzed by<sup>2</sup>. He emphasizes that the limited information is one of the main obstacle factors in determining the investment decision of a foreign investor. Reference<sup>1,9</sup> also shows that a foreign investor prefers to invest in the stocks of large firms. Thus, I expect the adoption of XBRL would be effective in mitigating limited access of foreign investors on smaller firms and, as a result, the trading turnover ratio in those firms would significantly increase after XBRL adoption relative to larger firms.

## 3. Research Design

#### 3.1 Model Specification and Variables

In this study, I examine the impact of XBRL adoption on the trading turnover ratio of foreign investors. The regression equation is given by

Trunover \_ Foreign<sub>ii</sub> =  $f(XBRL\_Dummy_{ii}, Controls_{ii}) + \epsilon_{ii}$ . I calculate trading turnover ratio of foreign investors as the minimum of buying and selling, i.e., min (buy, sell), divided by the average market value of equity. The trading turnover ratio increases as foreign investors actively sell their stocks relative to the average market value of equity of their holdings. Thus, a high trading turnover ratio reflects much information about the stocks traded by foreign investors. The XBRL dummy is a main variable and is assigned the value one for post-XBRL adoption (e.g. after the fiscal year 2007) and zero otherwise. If my hypothesis holds, then the coefficient on the XBRL dummy will be expected to be significantly positive.

On the other hand, I control for variables that may affect the portfolio decision of foreign investors. To do this, I include stock return volatility and beta related to an investor's risk management. Investors with high-risk stocks tend to hold their stocks for a short period in order to manage the level of risk. As a result, the trading turnover ratio for the investors will become higher. Thus, I predict a positive relationship between stock return volatility and beta, and trading turnover ratio. I measure stock return volatility as the annualized standard deviation of the

stock return during the fiscal year. The beta is calculated using the Capital Asset Pricing Model (CAPM).

Next, I control for firm characteristics that can affect stock return. Following<sup>5</sup>, I include firm size and market-to-book ratio in the equation. In general, foreign investors in larger firms are more likely to hold stocks for a longer period than that in smaller firms since they can easily obtain firm information and the larger firms' stock volatility is relatively less. Thus, a foreign investor's trading turnover ratio would increase as firm size becomes larger. I calculate firm size as the logarithm of total assets. It is well known that foreign investors tend to invest in blue chip stocks relative to Korean investors. Thus, foreign investors would hold value stocks with low market-tobook ratio for a long time. I predict a positive relationship between the market-to-book ratio and trading turnover ratio of foreign investors. The market-to-book ratio is calculated as the sum of the market value of equity and the book value of total liabilities, divided by the book value of total assets.

Foreign investors are likely to invest in stocks with high profitability and level of dividend as their long-term investment relative to Korean investors. According to 6,8,11 the level of dividend is positively related to a firm's profitability. This is because firms with high profitability can pay more dividends due to its large available earnings. Likewise, the Z-score for those firms is large due to their high level of financial stability.

Thus, I expect that dividend payout ratio, return on assets and Z-scores are negatively associated with a foreign investor's trading turnover ratio. The ROA as a proxy for profitability is measured as the ratio of Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) to total assets. The dividend payout ratio is computed as the net income divided by cash dividend. I also calculate the z-score as follows:  $1.2 \times$  (working capital/total assets) +  $1.4 \times$  (retained earnings/total assets) +  $3.3 \times$  (earnings before interest and taxes/total assets) +  $0.6 \times$  (market value of equity/book value of total debt) +  $1.0 \times$  (sales/total assets).

Institutional investors tend to invest in specific industry, which implies that trading turnover ratio may vary across the industry. Thus, to control for this situation, I include industry dummies in the regression model.

## 3.2 Data and Descriptive Statistics

I obtain annual financial data from KIS-value database provided by the Korea Investors Service (KIS, http://www.

kisrating.com/) from 2005 to 2011. I limit the sample to all non-financial companies that are listed on the Korea Exchange (KRX) and whose fiscal year ends in December. To acquire reliable estimates of the regression coefficients, I delete companies that have impaired capital, supervised issues and qualified audit opinions, or are involved in Mergers and Acquisitions (M&A). I also remove firm-years with missing data for any of the variables. The final sample consists of 3,719 firm-year observations and represents 580 companies for the period of 2005 to 2011.

Table 1 presents the descriptive statistics for the sample. As shown in the table, the average trading turnover ratio of foreign investors is about 15.6, which indicates that they annually trade 15.6 percent of their stock holdings. Table 2 shows the mean difference between pre- and post-XBRL adoption. Average annual trading turnover ratio has increased from 10.2 percent to 19.3 percent during pre- and post-XBRL adoption. The null hypothesis that the difference of the means of two samples between preand post-XBRL adoption is rejected (t statistics = -6.46). The average trading turnover ratio is 15.6 percent, but its median is 1.6 percent, indicating that the distribution of trading turnover ratio is skewed to the right. Thus, it seems that one take the logarithm of trading turnover ratio for the analysis. This study does not use the logarithm of trading turnover ratio for the convenient interpretation of an estimated coefficient on the variable. Furthermore, the results for both variables are not qualitatively different. Lastly, the control variables, such as firm size, dividend, ROA, volatility, Z-scores, beta and Tobin's Q, are evenly distributed between the top and bottom of the 5 percent, centered at the mean, which indicates that those variables have statistically no problem

 Table 1.
 Descriptive statistics

Variables	Mean	Std. Dev.	5%	Median	95%
Turnover_For-	15.62	42.60	0.03	1.60	102.77
eign (%)					
XBRL	0.59	0.49	0.00	1.00	1.00
Volatility	25.63	13.65	7.58	23.52	51.28
Beta	0.81	0.36	0.23	0.79	1.44
Firm size (billion	1,650	6,020	46	257	7,140
won)					
Dividend	0.23	0.31	0.00	0.14	1.00
ROA	0.07	0.07	-0.03	0.07	0.20
Z-Score	2.88	2.15	0.59	2.40	6.75
Tobin's Q	1.05	0.52	0.54	0.91	2.09

**Table 2.** Test of differences in mean between pre and post-XBRL periods

Variables	before XBRL	after	Diff. Mean	
	adoption	XBRL	(t-statistics)	
		adoption		
Turnover Ratio of	10.20	19.33	-6.46***	
Foreign Investors				
Volatility	26.73	24.88	4.08***	
Beta	0.84	0.79	3.81***	
Firm size(billion	1,150	1,590	-3.60***	
won)				
Dividend	0.25	0.21	3.96***	
ROA	0.08	0.07	2.66***	
Z-Score	2.98	2.81	2.40**	
Tobin's Q	1.13	0.99	8.03***	

<sup>\*\*\*, \*\*</sup> indicate statistical significance at the 0.01 and 0.05 level, respectively.

Table 3 presents Pearson correlations between the trading turnover ratio and each explanatory variable. I calculate a Pearson correlations among variables for the entire sample period and the two subsample periods due to the comparison of trading turnover ratio of foreign investors between pre and post-XBRL adoption. This study uses two subsamples of pre and post-XBRL adoption as well as the entire sample. I exclude samples from the year 2008 since the investment decision of foreign investors can be affected by the global financial crisis for that period. The correlation between the trading turnover ratio and the XBRL dummy is significantly positive in all three sample periods. This correlation indicates that after XBRL adoption, the stock trading has increased. Due to the limitation of the univariate analysis, this study further investigates the association between the XBRL dummy and the trading turnover ratio, after controlling for previously identified determinants affecting the trading decisions of foreign investors.

Table 3. Correlations

	Entire sample period (2005- 2011)		Sub sample period (2005-2008)		Sub sample period (2007, 2009)	
					n Investo	
XBRL	0.11	***	0.04	*	0.09	***
Volatility	0.25	***	0.28	***	0.29	***
Beta	0.03	*	0.06	**	-0.01	
Firm size	-0.31	***	-0.28	***	-0.33	***
Dividend	-0.12	***	-0.13	***	-0.14	***
ROA	-0.16	***	-0.17	***	-0.15	***
Z-Score	-0.11	***	-0.10	***	-0.10	***
Tobin's Q	0.04	**	0.08	***	0.02	

 $<sup>^{&</sup>quot;},^{"},^{"}$  indicate statistical significance at the 0.01, 0.05 and 0.10 level, respectively.

## 4. Empirical Results

In this section, I investigate the impact of XBRL adoption on the trading turnover ratio of foreign investors. I winsorize all the continuous variables at the 1 percent and 99 percent levels to reduce the effect of extreme outliers in the regression models. For the analysis, I use robust-standard errors to calculate test statistics for the statistical significance of regression coefficients<sup>13</sup>.

**Table 4.** Effect of XBRL adoption on turnover ratio of foreign investors

	Dependent variable = Turnover Ratio of					
	Foreign Investors					
Independent	Entire sample	tire sample Sub sample Sub				
variables	period (2005-	period (2005-	period			
	2011)	2008)	(2007, 2009)			
XBRL	12.75***	3.08 <sup>*</sup>	12.73***			
	(9.91)	(1.81)	(4.52)			
Volatility	0.73***	0.63***	1.08***			
	(8.04)	(5.93)	(5.35)			
Beta	8.49***	6.11**	$9.40^{*}$			
	(3.49)	(2.50)	(1.68)			
Firm size	-8.27***	-5.57***	-9.99***			
	(-15.90)	(-10.83)	(-8.93)			
Dividend	-7.64***	-6.71***	-8.36**			
	(-3.80)	(-3.79)	(-2.08)			
ROA	-29.29**	-22.93*	-22.33			
	(-2.43)	(-1.77)	(-0.86)			
<b>Z-Score</b>	-3.79***	-3.57***	-4.21***			
	(-9.52)	(-7.43)	(-5.19)			
Tobin's Q	6.06***	5.86***	2.73			
	(3.78)	(3.02)	(0.89)			
Industry effect	Yes	Yes	Yes			
Adjusted R <sup>2</sup>	0.21	0.20	0.23			
N	3,719	2,044	1,062			

<sup>&</sup>quot;", ", indicate statistical significance at the 0.01, 0.05 and 0.10 level, respectively. Numbers in parentheses are t-value based on reference<sup>13</sup> standard errors.

Table 4 presents the results of the pooled Ordinary Least Squares (OLS) regressions with a dependent variable, the trading turnover ratio. The estimated signs of control variables are fairly consistent with previously expected signs, indicating that this regression model is well specified. The results show a significantly positive relationship between trading turnover ratio and the XBRL dummy for the entire period and the two subsample periods, respectively. For the entire period, the estimated coefficient on the XBRL dummy is 12.8, which indicates that the trading turnover ratio, on average, increases by 12.8 percent during the post-XBRL adoption period

compared to the during the pre-XBRL-adoption period. This finding of the increase in trading turnover ratio supports my main hypothesis that XBRL enables foreign investors to easily obtain a firm's financial information and consequently facilitates liquidity.

**Table 5.** Relation between XBRL adoption and turnover ratio of foreign investors with respect to firm size

	Entire s	Entire sample Sub sample peri-		Sub sample		
	period	(2005-	od (2005-2008)		period (2007,	
	201	1)			2009)	
	Small	Large	Small	Large	Small	Large
XBRL	23.62***	1.33***	6.95**	0.11	19.71***	0.58
	(10.16)	(3.25)	(2.29)	(0.25)	(4.11)	(0.41)
Volatility	0.83***	0.02	0.71***	$0.03^{*}$	1.18***	$1.01^{***}$
	(6.17)	(0.67)	(4.89)	(1.91)	(4.83)	(4.15)
Beta	17.21***	3.19***	13.65***	1.66*	11.98	-3.31
	(3.90)	(4.82)	(3.26)	(1.79)	(1.60)	(-0.76)
Firm	-16.79***	-1.35***	-12.79***	-0.60***	-9.47***	-5.02***
size	(-7.04)	(-5.08)	(-6.02)	(-3.77)	(-6.77)	(-6.49)
Divi-	-8.28**	-2.12***	-6.55**	-1.54***	-8.92*	-2.74
dend	(-2.18)	(-4.18)	(-2.06)	(-2.92)	(-1.72)	(-0.73)
ROA	-4.53	-5.63*	-3.09	-2.01	-3.83	-29.83
	(-0.23)	(-1.80)	(-0.16)	(-0.58)	(-0.11)	(-1.49)
Z-Score	-5.19***	-0.34***	-4.59***	-0.27**	-5.07***	-2.90***
	(-6.80)	(-4.56)	(-5.74)	(-2.36)	(-4.63)	(-4.12)
Tobin's	$5.72^{*}$	0.68***	7.76**	0.17	1.33	2.20
Q	(1.72)	(3.04)	(2.02)	(0.56)	(0.31)	(0.96)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
effect						
Adjusted	0.20	0.03	0.21	0.03	0.24	0.22
$R^2$						
Number	1,859	1,860	1,108	936	774	802
of obs.						
Diff.	90.24***		5.09**		15.60***	
$test(x^2)$						

", ", indicate statistical significance at the 0.01, 0.05 and 0.10 level, respectively. Numbers in parentheses are t-value based on White standard errors

Furthermore, this study tests a hypothesis that the trading turnover ratio of foreign investors can vary in terms of a firm's size. To do this, I categorize firms into large and small based on their median of total assets. Specifically, if a firm's asset size is greater than the median, I denote it as a large firm. Similarly, if a firm's asset size is less than the median, I label it as a small firm. Table 5 shows the results of the pooled OLS regressions. For the entire sample, the estimated coefficients on the XBRL dummy for small and large firms are positive and statistically significant. Interestingly, the magnitude of

coefficient on the XBRL dummy in small firms is 23.6, while the magnitude in large firms is 1.3. These results indicate that the foreign investor's turnover ratio in small firms has significantly increased compared to that of large firms. The null hypothesis that the coefficient of XBRL dummy between small and large firms is rejected at the 1% level ( $x^2 = 90.24$ ). This pattern is consistent in other sub sample periods. In the subsample period of 2005 to 2008, the estimated coefficients on the XBRL dummy in small firms is positive and statistically significant, but the coefficient in large firms is insignificant. Likewise, for each subsample period of 2007 and 2009, the estimated coefficients on the XBRL dummy are significantly positive in small firms, but the coefficients in large firms are insignificant. These findings indicate that, after XBRL adoption, the increase in the foreign investor's turnover ratio is more pronounced in small firms.

#### 5. Conclusion

Extending previous studies that XBRL facilitates access to a firm's financial information and reduce information asymmetry, this study examines whether XBRL adoption affects the trading behavior of foreign investors. More specifically, I hypothesize that if information access to foreign investors expands after the adoption of XBRL and the associated information is incorporated into their trading behaviors, their trading turnover ratio would significantly increase. This study shows that the trading turnover ratio has significantly increased after XBRL adoption compared to before XBRL adoption. This finding provides evidence that as XBRL enables foreign investors to easily obtain a firm's financial information and consequently mitigates asymmetry. Furthermore, the associated information is incorporated into trading behavior of foreign investors and, as a result, their trading turnover ratio has increased.

This study also hypothesizes that a small firm has a higher tradingturnoverratiothandoalargefirm. I find that the increase in the foreign investor's turnover ratio in a subsample of small firms is more pronounced and economically significant compared to a subsample of large firms. To my knowledge, this is the first study to document that XBRL, as a web-based reporting technology, can affect trading behaviors of foreign investors. Therefore, this study contributes to the relevant literature by providing

evidence that XBRL adoption affects the trading behavior of foreign investors.

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