An Empirical Study of XBRL's Impact on Analyst Forecast Behavior

Chunhui Liu
Department of Business and Administration
University of Winnipeg
Winnipeg, MB R3B 2E9, Canada
m.liu@uwinnipeg.ca

Tawei Wang
School of Accountancy
Shidler College of Business
University of Hawaii at Manoa
Honolulu, HI 96822, USA
twwang@hawaii.edu

Lee J. Yao*
J.A. Butt College of Business
Loyola University New Orleans
New Orleans, LA 70118, USA
yao@loyno.edu

*Corresponding author (Please contact corresponding author for data)
(Authors are in alpha order)

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Abstract

The Securities and Exchange Commission (SEC) has mandated a phase-in process for essential reporting with eXtensible Business Reporting Language (XBRL) by 2011. Despite high promises, such as improving data accuracy and information transparency, little is known about the actual impact of XBRL adoption on the information environment of capital markets. We investigate the impact of the XBRL mandate on the quantity and quality of the financial information environment, as reflected in analyst forecast behavior. An empirical examination of 1,430 firm years over 2005-2010 from firms listed in the U.S. reveals that the mandatory XBRL adoption has led to a significant improvement in both the quantity and quality of information, as measured by analyst following and forecast accuracy. In addition, our findings show that the impact of mandatory XBRL adoption increases as time passes. The implications of the findings for policy and research are drawn.

Keywords: eXtensible Business Reporting Language (XBRL); analyst forecast; information transparency

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I. Introduction

Information is critical to the functioning of a capital market (Saudagaran and Diga 1997) to increase the transparency of corporate affairs to stakeholders, to reduce uncertainty in investment decisions, and to facilitate efficient allocation of resources (Healy and Palepu, 2001). The advances in the quality of information technology (IT) has facilitated the dissemination of information and brought down boundaries to communication and collaboration (Debreceny et al. 2002; Rossignoli et al. 2009). However, IT is not without limitation. For example, Microsoft estimates that 90 percent of Internet transactions need to be re-keyed on the backend of e-Commerce operations (Matherne and Coffin 2001). To improve data re-usability and accuracy, eXtensible Business Reporting Language (XBRL), a standard XML reporting language, was recently developed to electronically communicate business information (Hodge et al. 2004; Yoon et al. 2011). XBRL has led to one of the most significant changes in the disclosure environment in the U.S. capital markets with the Securities and Exchange Commission's (SEC's) mandate for essential reporting by all U.S. public companies with XBRL by 2011 (Debreceny et al. 2010) and is expected to evolve into the global data standard for financial reporting (Chang and Jarvenpaa 2005).

This research investigates the impact of the XBRL mandate on the quantity and quality of financial information environments, as reflected in analyst forecast behavior. There are three major reasons for conducting this research. First, financial analysts are important and influential users of financial reports (Mikhail et al. 1999; Yu 2010) and play important roles as information intermediaries and economic agents whose actions affect security pricing (Rock et al. 2001). Since financial analysts in the capital market can be used as proxies for

informed traders, as well as signals of information asymmetry because of their superior information processing capabilities (e.g., Core 2001; Francis et al. 2002; Roulstone 2003), examining how the adoption of XBRL affects analyst forecast behavior can uncover the effectiveness in value realization from XBRL adoption. Second, a key objective of the SEC's program is to develop an ecosystem that supports the production, collection, and distribution of accurate data to information consumers (Cox 2008). As a proxy for the quality of financial information environments, analysts' forecast accuracy provides a critical measure of the effectiveness of the SEC's mandate. Third, implications from research on the value realization from XBRL adoption have immediate benefits for regulators, filers, information consumers, accountants and other stakeholders.

The XBRL filing information from EDGAR Really Simple Syndication (RSS) and analyst forecast behavior data from I/B/E/S database from the period between 2005 and 2010 were analyzed to find that mandatory adoption of XBRL is positively associated with the number of analysts following and analyst forecast accuracy. Furthermore, the magnitude of the association between the mandatory adoption of XBRL became larger in the first two years. We extend and enhance research conducted on early stages of XBRL implementation in the SEC setting (Debreceny et al. 2010) so that effective and efficient standards are put in place. This study also provides insights to investors and financial information users about changes in financial information environments resulting from the mandatory adoption of XBRL. The findings are relevant and important to the SEC, filers, the accounting community, and the XBRL community.

The remainder of this paper is organized as follows. In Section II, we present the theoretical framework and develop hypotheses. The research context and our research

methodology are given in Section III. In Section IV, we discuss our empirical findings. We conclude with policy implications in Section V.

II. Theoretical Framework and Hypothesis Development

XBRL has been highly expected for analyzing information faster (Hannon 2002), being vital for the democratization of markets (Debreceny et al. 2005), streamlining internal and external financial reporting, as well as reducing potential disparities between firms with regards to disclosure level and content (Premuroso and Bhattacharya 2008). Piechocki et al. (2009) also indicate that XBRL provides the possibility to build information systems that enhance comparison of financial reports of different companies within one or more sets of GAAP, that XBRL can enhance the quality of data transfer, automatic ratio, business metric analysis and cross-instance document analysis, and that the design of XBRL significantly improves the quality of the financial reporting value chain. In the same vein, many expect the development of standards like XBRL to improve data accuracy (Wigand et al. 2005) by reducing re-keying information for e-Commerce and diminishing errors in duplicated data entry. Some empirical studies found evidence of disclosure quality improvement (e.g., decreased information asymmetry and decreased information risk) resulting from XBRL adoption (Kim et al. 2011; Yoon et al. 2011).

Despite such high expectations and the supporting empirical evidence of XBRL adoption mentioned above, the implementation of XBRL entails uncertainties (Doolin and Troshani 2007). For example, Boritz and No (2008) found two-thirds of the XBRL instance documents in the SEC's Voluntary Filing Program contain validation exceptions, inconsistencies, and errors. Debreceny et al. (2010) uncovered an average of 1.8 errors per filing in a US XBRL filing sample, which has a median error of $9.1 million per filing with

the maximum exceeding $7 billion. In addition, Debreceny et al. (2005) also noted potential loss of comparability because of the flexibility for tagging extensions. Given such uncertainty factors, it is not *ex ante* clear whether early mandatory adoption of XBRL has led to the realization of the expected benefits.

Since financial analysts in the capital market can be used as proxies for informed traders, as well as signals of information asymmetry because of their superior information processing capabilities (e.g., Core 2001; Francis et al. 2002; Roulstone 2003), the examination of XBRL's affects on analyst forecast behavior can uncover the effectiveness in value realization from XBRL adoption. Prior research found that a higher level of analysts following leads to higher valuation (Lang et al. 2004), lower cost of capital (Bowen et al. 2008a), and higher market liquidity (Roulstone 2003). In addition, the accuracy of financial analysts' forecasts has a significant impact on stock prices, trading volume (Cooper et al. 2001), and security returns (Stickel 1992). Investigating the impact of the XBRL mandate on analysts following and forecast accuracy may provide insight into its benefit and market effect because the level of analyst following is often used as a proxy for the quantity or richness of the information environment, while analyst forecast accuracy is used to indicate the quality of the financial information environment (e.g., Herrmann et al. 2007; Roulstone 2003; Yu 2010).

Bhushan (1989) reveals that the number of analysts following a firm depends on both the supply and the demand of analyst services. The primary business case for XBRL is to alleviate the automated production and consumption of large volumes of business performance information with high degrees of data quality (Debreceny et al. 2010). Firms with better quality of disclosed information tend to attract more analyst following (e.g.,

Botosan and Harris 2000; Healy et al. 1999; Lang and Lundholm 1996). Since XBRL potentially reduces the costs of processing information (Hannon 2002), increases the transparency of a firm (Debreceny et al. 2005), and improves the quality of financial reporting (Kim et al. 2011; Yoon et al. 2011), it is expected that the mandatory adoption of XBRL will increase the supply of analyst services and thus increase the number of analyst following (e.g., Core 2001; Francis et al. 2002; Roulstone 2003). On the other hand, the high degree of change demanded by an innovative adoption and the difficulty in using a new technology create uncertainty and hinder its adoption (Doolin and Troshani 2007; Hwang 2005; Williamson and Masten 1995). According to the IT productivity paradox theory, it takes time for the general public to properly learn a new technology (Rai et al. 1997; Yao et al. 2010). Therefore, the demand for analyst service is not expected to decrease at the early stage of mandatory adoption. Based on Bhushan's theory on analysts following, we hypothesize that:

Hypothesis 1: Early mandatory adoption of XBRL in the U.S. is positively associated with the number of analysts following a firm.

Since analysts use the information from financial statements as an important source when determining their forecasts (Acker et al. 2002; Baker and Iman 2008; Chang and Most 1985; Peek 2005; Schipper 1991; Vergoossen 1993), financial statements of higher quality may lead to more accurate forecasts. Many studies reveal a positive association between the quality of disclosures and forecast accuracy (Acker et al. 2002; Baker and Iman 2008; Chang and Most 1985; Peek 2005; Schipper 1991; Vergoossen 1993). Lang and Lundholm (1996), for example, found increased disclosure levels to associate positively with analyst coverage and forecast accuracy. In addition to the expected improvement to data accuracy from XBRL

adoption resulting from the removal of duplicative data entries, the tags and taxonomy of XBRL provide a straightforward searching and analyzing capability and thus are expected to improve analyst forecasts (Plumlee 2003; Yoon et al. 2011). In addition, Hunton and McEwen (1997) reveal that directive information search strategy, enabled by XRBL, is associated with accurate analyst forecasts. Therefore, we hypothesize that:

Hypothesis 2: Early mandatory adoption of XBRL in the U.S. is positively associated with analyst forecast accuracy.

III. Research Methodology

XBRL Adoption in the U.S.

Charles Hoffman, a CPA, initiated the conception of XBRL in 1998. A voluntary filer program started in 2005 to allow the assessment of XBRL interactive data benefits and potential. In 2006, the U.S. Securities and Exchange Commission (SEC) contracted with XBRL U.S. to develop the taxonomy necessary for financial reporting in interactive format consistent with U.S. Generally Accepted Accounting Principles (GAAP) and the SEC regulations. The SEC mandated a phase-in process for the Securities Act registration statements (e.g., quarterly statements, annual reports, or transition reports) with XBRL to begin for a fiscal period ending on or after June 15, 2009 for large accelerated U.S. filers that have a worldwide public float above $5 billion as of the last day of the second quarter, following the firm's most recent fiscal year end (SEC 2009). All other domestic and foreign large accelerated filers are required to comply with XBRL interactive data reporting requirements, commencing with their first quarterly report on Form 10-Q for a fiscal period ending on or after June 15, 2010. All remaining filers are required to comply with XBRL

interactive data reporting requirements, commencing with their first quarterly report on Form 10-Q for a fiscal period ending on or after June 15, 2011.

As per SEC (2009), filers are not required to involve third parties, such as auditors, in the creation of their interactive data filings. Amendments are made to exclude interactive data from the officer certification requirements of Rules 13a-14 and 15d-14, which requires officers to certify in periodic reports to matters related to internal control, disclosure control, and procedures. An interactive data file is subjected to modified liability treatment, as it is deemed furnished, but not filed and thus does not require auditor assurance.

Data Collection and Empirical Models

Our sample firms were first identified using the EDGAR Really Simple Syndication (RSS) feeds monthly archives as the firms submitted 10-Q and/or 10-K to the SEC from June 15, 2009 to December 31, 2009 in XBRL format, as per the SEC phase-one mandate. Firms that submitted such documents in XBRL before June 15, 2009, and firms that do not have above 5 billion world-wide float as of the second quarter of 2009 were removed from the sample to address self-selection bias in the sample. Based on our sample, we collected the analyst forecast data from I/B/E/S and other control variables in the period from 2005 to 2010.

Prior studies found that corporate governance is associated with a firm's decision to be an early and voluntary filer of financial information in XBRL format (Callaghan and Nehmer 2009; Premuroso and Bhattacharya 2008). Corporate governance is also found to interact with analyst forecast behavior (Bushman and Smith 2001; Kelton and Yang 2008). For example, Bhat et al. (2006) found a positive relationship between analyst forecast accuracy and governance transparency. Therefore, we incorporated the moderating effect of corporate

governance on the association between mandatory adoption of XBRL and analyst forecast behavior in our research models.

In particular, we used the following models noted in the literature to identify the impact of early mandatory XBRL adoption on analyst following (e.g., Bhushan 1989; Irani and Karamanou 2003) and analyst forecast accuracy (e.g., Alford and Berger 1999; Brown 1997; Frankel et al. 2006; Hope and Kang 2005; Kross et al. 1990; Richardson et al. 1999). For analyst following:

$$Analyst_{it} = \alpha_0 + \alpha_1 XBRL + \alpha_2 SIZE_{it} + \alpha_3 EPS_{it} + \alpha_4 LEV_{it} + \alpha_5 RETVAR_{it} + \alpha_6 GOVSCORE_{it} + \varepsilon_{it} \quad (1)$$

$$Analyst_{it} = \alpha_0 + \alpha_1 XBRL + \alpha_2 SIZE_{it} + \alpha_3 EPS_{it} + \alpha_4 LEV_{it} + \alpha_5 RETVAR_{it} + \alpha_6 GOVSCORE_{it} + \alpha_7 XBRL*GOVSCORE_{it} + \varepsilon_{it} \quad (2)$$

where $Analyst_{it}$ is the number of analyst following for firm *i* in year *t* (see Table 1 for variable definitions). *XBRL* is a dummy variable, which equals 1 if a firm-year observes mandatory adoption of XBRL and 0, otherwise. $SIZE_{it}$ is the logarithm of firm *i*'s total assets at the beginning of year *t* and has been shown to be the most important determinant of analyst following (e.g., Bhushan 1989; Lang and Lundholm 1996). EPS_{it} is firm *i*'s earnings per share in year *t*, respectively. LEV_{it} is the leverage ratio of firm *i* in year *t*, while $RETVAR_{it}$ is the return variability, which equals the annual standard deviation of monthly stock returns at the end of year *t*. $GOVSCORE_{it}$ is a corporate governance measure developed by Brown and Caylor (2006a, b) with the dataset from Institutional Shareholder Services (ISS), which is a broad summary measure of both internal and external firm corporate governance.

(Insert Table 1 about here)

For analyst forecast accuracy, we used the following models.

$$FACC_{it} = \alpha_0 + \alpha_1 \ XBRL + \alpha_2 \ SIZE_{it} + \alpha_3 \ AGE_{it} + \alpha_4 \ EPS_{it} + \alpha_5 \ LOSS_{it} + \alpha_6 \ GOVSCORE_{it} + \varepsilon_{it} \quad (3)$$

$$FACC_{it} = \alpha_0 + \alpha_1 \ XBRL + \alpha_2 \ SIZE_{it} + \alpha_3 \ AGE_{it} + \alpha_4 \ EPS_{it} + \alpha_5 \ LOSS_{it} + \alpha_6 \ GOVSCORE_{it} + \alpha_7 XBRL*GOVSCORE_{it} + \varepsilon_{it} \quad (4)$$

where $FACC_{it}$ is forecast accuracy for firm *i* in year *t*. $FACC_{it}$ is defined as the forecast error times -1 and normalized (Barniv 2009; Hope 2003; Hope and Kang 2005; Lang and Lundholm 1996). The forecast error is obtained by deflating the absolute difference between actual earnings per share (EPS) and the consensus forecast EPS by year-start stock price to facilitate comparisons across firms (Hope 2003). AGE_{it} is the logarithm of firm *i*'s age in year *t*. $Loss_{it}$ is a dummy variable that equals 1 if the reported EPS is negative and 0, otherwise. Hope (2003) found that firm-specific factors, like profits and losses, are the most important in explaining the characteristics of analyst forecast. $Loss_{it}$ can be negatively associated with forecast accuracy (Barniv 2009; Co ën et al. 2009; Hope and Kang 2005) because of analysts' well-known tendency toward optimism (Bradshaw et al. 2006; Brown 1993; Gu and Wu 2003; O'Brien 1988). EPS_{it} is the actual earnings found to have a positive relationship with forecast accuracy as a proxy for the magnitude of earnings (Barniv 2009).

All the related financial accounting information and stock information are obtained from Compustat databases. The *GOVSCORE* is available online at http://www.robinson.gsu.edu/accountancy/gov-score.html.

Descriptive Statistics

The resulting sample has 1,430 firm-year observations. The sample firms represent different industries: 41 percent in manufacturing, 18 percent in finance, insurance, and real estate, 14 percent in transportation, communication, and utilities, 11 percent in services, 8

percent in wholesale and retail trade, 7 percent in mining and construction, and 1 percent in public administration or are non-classifiable.

Table 2 summarizes the descriptive statistics about the sample. When variables are compared between the period before the XBRL mandate (Panel C) and the period after the mandate (Panel B), the mean of *ANALYST* ($p < 0.01$), *FACC* ($p < 0.01$), *Age* ($p < 0.05$), and *LOSS* ($p < 0.01$) are significantly larger after the mandate, while the mean of *SIZE* ($p < 0.10$), *EPS* ($p < 0.01$), *RETVAR* ($p < 0.01$), is significantly smaller after the mandate. Table 3 presents the correlation of the variables we used in our main analyses. As shown in Table 3, we did not identify any variables with a high correlation which might affect our regression results.

(Insert Table 2 and Table 3 about here)

IV. Empirical Results

Research Findings

Our results are given in Table 4 and Table 5. Table 4 shows the results for Hypothesis 1. Consistent with our expectation, the mandatory adoption of XBRL (variable *XBRL*) is significantly and positively associated with the number of analysts following a firm (coefficients are 4.134 and 4.188 respectively, both significant at 1% level). Furthermore, the size of the firm could attract more analysts while the leverage level is negatively associated with the number of following analysts. The index of corporate governance (*GOVSCORE*) is also positively correlated with the number of following analysts. However, the moderating effect of the governance index on mandate adoption of XBRL is not significant. The results

in Table 4 demonstrate the mandatory adoption of XBRL potentially makes the financial reports, which are the main source of analysts' forecasts, more accessible and usable for analysts. The transparency of the firms attracts more analysts after the adoption of XBRL, which confirms our univariate findings.

(Insert Table 4 about here)

Table 5 presents the results for the analyst forecast accuracy. Our findings demonstrate that, consistent with Hypothesis 2, the mandatory adoption of XBRL (*XBRL*) is positively and significantly associated with analyst forecast accuracy (coefficient 0.166 and 0.178, respectively $p < 0.05$). Consistent with prior literature, corporate governance could improve analyst forecast accuracy. Interestingly, corporate governance plays a negative moderating effect (-0.126, $p < 0.05$) on the association between the mandatory adoption of XBRL and analyst forecast accuracy. That is, though the mandatory adoption of XBRL is positively associated with analyst forecast accuracy, such impact decreases as the corporate governance function becomes stronger. As the corporate governance function becomes stronger, the role played by XBRL, in terms of increasing information transparency, is less important.

(Insert Table 5 about here)

Additional Analyses

A 2007 survey by the CFA institute (CFA Institute 2008), regarding the perspectives of analysts toward XBRL, revealed about 60% of the respondents were concerned about not

being familiar with XBRL and 90% expressed a preference for limiting extensions. The respondents also had concerns regarding the consistency and reliability of XBRL formatted information. However, three years after the adoption of XBRL, our results suggest that people are gradually learning to leverage the tool, as per the IT productivity paradox theory. In order to further validate this argument, we re-performed our analyses by investigating the association between mandatory adoption of XBRL and analyst forecast behavior as time passes. In particular, we compared this association based on observation before the first year of adoption (2009) and the second year of adoption (2010) (which is in Tables 4 and 5). The results before the first year of adoption (2009) are given in Tables 6 and 7. The results in Tables 6 and 7 are qualitatively similar to those in Tables 4 and 5. Specifically, the mandatory adoption of XBRL is positively related to the quality and the quantity of the information environment. In addition, governance would positively affect analyst forecast behavior and has a negative moderating influence on the association between mandatory adoption of XBRL and analyst forecast behavior. However, the coefficients for the variable *XBRL* in Tables 6 and 7 are significantly smaller than those in Tables 4 and 5 (2.429 vs. 4.134 for Equation (1), 2.484 vs. 4.188 for Equation (2), 0.082 vs. 0.166 for Equation (3), and 0.089 vs. 0.178 for Equation (4)). Specifically, the impact of mandatory adoption of XBRL on analyst forecast behavior becomes larger as time passes, which is consistent with our argument discussed earlier.

(Insert Table 6 and Table 7 about here)

We further validated our results by using only the phase two firms with the same model. Our results showed that, again, the mandatory adoption of XBRL is significantly and positively associated with analyst following (0.149 and 0.147, $p < 0.01$ for the model without and with interaction terms respectively). However, the mandatory adoption of XBRL is not significantly associated with analyst forecast accuracy. This additional test partially supports our main results.

V. Conclusions and Discussion

This study examined the impact of the early adoption of a new online business reporting technology on analyst forecast behavior with empirical data from US firms. As per Bhushan's theory on analysts following, the capacity of automated production and consumption of large volumes of information enabled by XBRL increases the supply of analyst service and thus increases the quantity of information in the capital market. On the other hand, as the theory of IT productivity paradox indicates, the uncertainty related to the unproven technology, such as information errors, hinders the realization of expected benefits in improved quality of information from XBRL adoption as time passes.

Our findings have policy implications as detailed below. First, on the one hand, quality and reliability of information in the XBRL format are expected to be better after the transition period, as our findings suggest. In the 3-year phase-in period, the SEC rule sets a lower liability for XBRL filings than its HTML or text counterpart. After the liability provision expires, the quality and reliability of XBRL formatted information should be better. On the other hand, the quality and reliability can be improved with stricter policy on quality assurance. Currently, firms can obtain voluntary third-party assurance or engage in agreed-upon procedures for XBRL formatted information. It seems that, without the mandate

assurance service, the information that is instantly available and re-usable in an automated manner appears to be less controllable, which hinders the value of XBRL adoption. Second, the usefulness of XBRL formatted information needs to be improved. The current practice of extensive use of extensions has significantly reduced the comparability of XBRL reports. If the XBRL community can generate a taxonomy covering most common extensions, and limit the flexibility in creating taxonomy extensions, document comparability will increase to improve the quality of data analysis and usage. That is, as our results demonstrate, the benefits will gradually be seen to be valuable. Furthermore, firms now rely on service providers and the automated review steps to validate the XBRL formatted information. Though these service providers might be XBRL experts, it is still the firm's responsibility to evaluate and to disseminate such information to the stakeholders. Such internal "quality control" would further ensure the usefulness of XBRL formatted information. Last, the user community should be further educated on issues, such as causes of errors and techniques to prevent and detect errors in the adoption process. As our findings suggest, effective promotion and the curriculum design will definitely help users understand XBRL.

The following limitations should be considered when using the research findings. First, data are from firms commencing XBRL data furnishing as per the phase-one mandate that has existing corporate governance scores and thus limits the generalizability of the research findings. Future studies may use self-developed corporate governance measures to investigate a wider pool of firms. Second, data availability is limited because of the recency of the XBRL mandate. Analyst forecasts for 1 year are used. Future studies may include analyst forecasts for more than one year. Third, XBRL is being continuously developed and improved. The results uncovered by this study only reflect the situation before year 2011.

Future studies may investigate any change in the impact of XBRL adoption on the analyst forecast accuracy with more recent data. And further studies are necessary to discover ways to fine-tune the technology with respect to accuracy and ease of use.

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Table1. Variable Definitions

Variables	Definition	Data Source
ANALYST	The number of analyst following for firm *i* in year *t*.	I/B/E/S
FACC	Forecast accuracy for firm *i* in year *t*, which is the forecast error times -1 and normalized. The forecast error is obtained through deflating the absolute difference between actual earnings per share (EPS) and consensus forecast EPS by year-start stock price.	I/B/E/S
SIZE	Logarithm of firm *i*'s total assets at the beginning of year *t*.	Compustat
AGE	Logarithm of firm *i*'s age in year *t*.	Compustat
LEV	The leverage ratio of firm *i* in year *t*.	Compustat
RETVAR	The return variability, which equals the annual standard deviation of monthly stock returns at the end of year *t*.	Compustat
EPS	Firm *i*'s earnings per share in year *t*.	Compustat
GOVSCORE	A corporate governance measure developed by Brown and Caylor. Please see http://robinson.gsu.edu/accountancy/gov_score.html for detail information. For our analysis, we normalize this measure.	
Dummy Variables		
XBRL	A dummy variable, which equals 1 if a firm-year observes mandatory adoption of XBRL and 0, otherwise.	EDGAR
LOSS	A dummy variable that equals 1 if the reported EPS is negative and 0, otherwise.	Compustat

Table 2. Descriptive Statistics

Panel A. All observations

	N	Mean	Std. Dev.	Percentiles		
				25	50	75
ANALYST	1386	17.310	6.9293	13.000	17.000	21.000
FACC	1386	-0.014	0.9672	-0.086	-0.033	-0.010
SIZE	1411	9.017	2.4983	8.423	9.488	10.469
AGE	1109	1.539	0.2733	1.398	1.663	1.748
LEV	1412	0.602	0.2082	0.464	0.600	0.751
RETVAR	1415	6.935	5.1621	3.809	6.213	9.396
EPS	1413	3.032	3.1803	1.474	2.590	4.077
GOVSCORE	1430	0.109	0.9482	0.151	0.441	0.659
Dummy Variables						
XBRL	1430	0.333	0.4714			
LOSS	1413	0.067	0.2493			

ANALYST is the number of analyst following for firm *i* in year *t*. *FACC* is forecast accuracy for firm *i* in year *t*, which is the forecast error times -1 and normalized. The forecast error is obtained through deflating the absolute difference between actual earnings per share (EPS) and consensus forecast EPS by year-start stock price. *SIZE* is the logarithm of firm *i*'s total assets at the beginning of year *t*. *AGE* is the logarithm of firm *i*'s age in year *t*. *LEV* is the leverage ratio of firm *i* in year *t*. *RETVAR* is the return variability, which equals the annual standard deviation of monthly stock returns at the end of year *t*. *EPS* is firm *i*'s earnings per share in year *t*. *GOVSCORE* is a corporate governance measure developed by Brown and Caylor. Please see http://robinson.gsu.edu/accountancy/gov_score.html for detail information. For our analysis, we normalize this measure. *XBRL* is a dummy variable, which equals 1 if a firm-year observes mandatory adoption of XBRL and 0, otherwise. *LOSS* is a dummy variable that equals 1 if the reported EPS is negative and 0, otherwise.

Panel B. *XBRL* = 1

	N	Mean	Std. Dev.	Percentiles		
				25	50	75
ANALYST	432	19.324	7.2112	15.000	19.000	24.000
FACC	432	0.309	1.3244	-0.048	-0.006	0.179
SIZE	457	7.168	3.2169	4.008	8.185	10.002
AGE	374	1.566	0.2616	1.398	1.681	1.771
LEV	458	0.602	0.2034	0.470	0.597	0.739
RETVAR	461	5.934	6.8603	0.311	5.045	9.909
EPS	458	2.577	2.7989	1.281	2.323	3.690
GOVSCORE	476	0.106	0.9508	0.151	0.441	0.659
Dummy Variables						
LOSS	459	0.098	0.2977			

ANALYST is the number of analyst following for firm *i* in year *t*. *FACC* is forecast accuracy for firm *i* in year *t*, which is the forecast error times -1 and normalized. The forecast error is obtained through deflating the absolute difference between actual earnings per share (EPS) and consensus forecast EPS by year-start stock price. *SIZE* is the logarithm of firm *i*'s total assets at the beginning of year *t*. *AGE* is the logarithm of firm *i*'s age in year *t*. *LEV* is the leverage ratio of firm *i* in year *t*. *RETVAR* is the return variability, which equals the annual standard deviation of monthly stock returns at the end of

year *t*. *EPS* is firm *i*'s earnings per share in year *t*. *GOVSCORE* is a corporate governance measure developed by Brown and Caylor. Please see http://robinson.gsu.edu/accountancy/gov_score.html for detail information. For our analysis, we normalize this measure. *LOSS* is a dummy variable that equals 1 if the reported EPS is negative and 0, otherwise

Panel C. *XBRL* = 0

	N	Mean	Std. Dev.	Percentiles		
				25	50	75
ANALYST	954	16.398	6.6024	12.000	16.000	21.000
FACC	954	-0.160	0.7054	-0.103	-0.042	-0.019
SIZE	954	9.903	1.3630	8.920	9.808	10.627
AGE	735	1.525	0.2782	1.362	1.653	1.748
LEV	954	0.602	0.2105	0.461	0.601	0.757
RETVAR	954	7.418	4.0128	4.628	6.348	9.190
EPS	954	3.250	3.3277	1.553	2.686	4.381
GOVSCORE	954	0.111	0.9474	0.151	0.441	0.659
Dummy Variables						
LOSS	954	0.051	0.2209			

ANALYST is the number of analyst following for firm *i* in year *t*. *FACC* is forecast accuracy for firm *i* in year *t*, which is the forecast error times -1 and normalized. The forecast error is obtained through deflating the absolute difference between actual earnings per share (EPS) and consensus forecast EPS by year-start stock price. *SIZE* is the logarithm of firm *i*'s total assets at the beginning of year *t*. *AGE* is the logarithm of firm *i*'s age in year *t*. *LEV* is the leverage ratio of firm *i* in year *t*. *RETVAR* is the return variability, which equals the annual standard deviation of monthly stock returns at the end of year *t*. *EPS* is firm *i*'s earnings per share in year *t*. *GOVSCORE* is a corporate governance measure developed by Brown and Caylor. Please see http://robinson.gsu.edu/accountancy/gov_score.html for detail information. For our analysis, we normalize this measure. *LOSS* is a dummy variable that equals 1 if the reported EPS is negative and 0, otherwise.

Table 3. Pearson Correlation

	ANALYST	*FACC*	*SIZE*	*AGE*	*LEV*	*RETVAR*	*EPS*	*GOVSCORE*	*LOSS*
ANALYST	1.000								
FACC	**0.136*****	1.000							
SIZE	-0.035	**-0.298*****	1.000						
AGE	**-0.057***	0.013	-0.015	1.000					
LEV	**-0.241*****	0.022	**0.232*****	-0.021	1.000				
RETVAR	**0.045***	**-0.175*****	**0.486*****	**-0.108*****	0.012	1.000			
EPS	-0.040	-0.040	**0.064****	-0.031	**0.058****	**-0.146*****	1.000		
GOVSCORE	0.043	0.025	0.001	**0.079*****	**0.074*****	**-0.070*****	**0.070*****	1.000	
LOSS	0.022	**0.080*****	0.019	**-0.063****	**0.245*****	**0.245*****	**-0.448*****	**-0.078*****	1.000

* significant at 10%, ** significant at 5%, *** significant at 1%

ANALYST is the number of analyst following for firm *i* in year *t*. *FACC* is forecast accuracy for firm *i* in year *t*, which is the forecast error times -1 and normalized. The forecast error is obtained through deflating the absolute difference between actual earnings per share (EPS) and consensus forecast EPS by year-start stock price. *SIZE* is the logarithm of firm *i*'s total assets at the beginning of year *t*. *AGE* is the logarithm of firm *i*'s age in year *t*. *LEV* is the leverage ratio of firm *i* in year *t*. *RETVAR* is the return variability, which equals the annual standard deviation of monthly stock returns at the end of year *t*. *EPS* is firm *i*'s earnings per share in year *t*. *GOVSCORE* is a corporate governance measure developed by Brown and Caylor. Please see http://robinson.gsu.edu/accountancy/gov_score.html for detail information. For our analysis, we normalize this measure. *LOSS* is a dummy variable that equals 1 if the reported EPS is negative and 0, otherwise.

Table 4. Results for the Number of Analyst Following

Dependent Variable: Number of Analyst Following (*Analyst*)

Variables	Model (1)	Model (2)
Intercept	**17.309*** (18.994)**	**17.311*** (18.999)**
XBRL	**4.134*** (9.314)**	**4.188*** (9.386)**
SIZE	**0.491*** (4.956)**	**0.490*** (4.945)**
EPS	-0.024 (-0.426)	-0.025 (-0.449)
LEV	**-9.579*** (-10.846)**	**-9.580*** (-10.848)**
RETVAR	0.002 (0.051)	0.002 (0.043)
GOVSCORE	**0.480*** (2.570)**	**0.624*** (2.791)**
*XBRL*GOVSCORE*		-0.471 (-1.172)
N	1383	1383
Adj. R^2	0.12	0.12

* significant at 10%, ** significant at 5%, *** significant at 1%, *t*-statistics are in parentheses.

ANALYST is the number of analyst following for firm *i* in year *t*. *XBRL* is a dummy variable, which equals 1 if a firm-year observes mandatory adoption of XBRL and 0, otherwise. In this table, when the firm-year is 2009 and 2010, *XBRL* equals one, zero otherwise. *SIZE* is the logarithm of firm *i*'s total assets at the beginning of year *t*. *EPS* is firm *i*'s earnings per share in year *t*. *LEV* is the leverage ratio of firm *i* in year *t*. *RETVAR* is the return variability, which equals the annual standard deviation of monthly stock returns at the end of year *t*. *GOVSCORE* is a corporate governance measure developed by Brown and Caylor. Please see http://robinson.gsu.edu/accountancy/gov_score.html for detail information. For our analysis, we normalize this measure.

Table 5. Results for the Analyst Forecast Accuracy

Dependent Variable: Analyst Forecast Accuracy (*FACC*)

Variables	Model (3)	Model (4)
Intercept	**0.918*** (4.243)**	**0.925*** (4.280)**
XBRL	**0.166** (2.260)**	**0.178** (2.425)**
SIZE	**-0.116*** (-8.406)**	**-0.116*** (-8.454)**
AGE	0.034 (0.313)	0.033 (0.303)
EPS	0.003 (0.340)	0.003 (0.264)
Loss	**0.377*** (2.846)**	**0.370*** (2.797)**
GOVSCORE	0.026 (0.876)	**0.064* (1.844)**
*XBRL*GOVSCORE*		**-0.126** (-2.018)**
N	1084	1084
Adj. R^2	0.11	0.11

* significant at 10%, ** significant at 5%, *** significant at 1%, *t*-statistics are in parentheses.

FACC is forecast accuracy for firm *i* in year *t*, which is the forecast error times -1 and normalized. The forecast error is obtained through deflating the absolute difference between actual earnings per share (EPS) and consensus forecast EPS by year-start stock price. *XBRL* is a dummy variable, which equals 1 if a firm-year observes mandatory adoption of XBRL and 0, otherwise. In this table, when the firm-year is 2009 and 2010, *XBRL* equals one, zero otherwise. *SIZE* is the logarithm of firm *i*'s total assets at the beginning of year *t*. *AGE* is the logarithm of firm *i*'s age in year *t*. *LEV* is the leverage ratio of firm *i* in year *t*. *EPS* is firm *i*'s earnings per share in year *t*. *LOSS* is a dummy variable that equals 1 if the reported EPS is negative and 0, otherwise. *GOVSCORE* is a corporate governance measure developed by Brown and Caylor. Please see http://robinson.gsu.edu/accountancy/gov_score.html for detail information. For our analysis, we normalize this measure.

Table 6. Results for the Number of Analyst Following before 2009

Dependent Variable: Number of Analyst Following (*Analyst*)

Variables	Model (1)	Model (2)
Intercept	**9.405*** (6.780)**	**9.400*** (6.776)**
XBRL	**2.429*** (5.013)**	**2.484*** (5.095)**
SIZE	**1.382*** (9.103)**	**1.383*** (9.109)**
EPS	-0.044 (-0.773)	-0.045 (-0.791)
LEV	**-12.492*** (-12.809)**	**-12.499*** (-12.816)**
RETVAR	**0.120*** (0.004)**	**0.119*** (2.849)**
GOVSCORE	**0.630*** (3.237)**	**0.729*** (3.353)**
*XBRL*GOVSCORE*		-0.490 (-1.019)
N	1192	1192
Adj. R^2	0.16	0.16

* significant at 10%, ** significant at 5%, *** significant at 1%, *t*-statistics are in parentheses.

ANALYST is the number of analyst following for firm *i* in year *t*. *XBRL* is a dummy variable, which equals 1 if a firm-year observes mandatory adoption of XBRL and 0, otherwise. In this table, when the firm-year is 2009, *XBRL* equals one, zero otherwise. *SIZE* is the logarithm of firm *i*'s total assets at the beginning of year *t*. *EPS* is firm *i*'s earnings per share in year *t*. *LEV* is the leverage ratio of firm *i* in year *t*. *RETVAR* is the return variability, which equals the annual standard deviation of monthly stock returns at the end of year *t*. *GOVSCORE* is a corporate governance measure developed by Brown and Caylor. Please see http://robinson.gsu.edu/accountancy/gov_score.html for detail information. For our analysis, we normalize this measure.

Table 7. Results for the Analyst Forecast Accuracy before 2009

Dependent Variable: Analyst Forecast Accuracy (*FACC*)

Variables	Model (3)	Model (4)
Intercept	**0.373**** **(2.078)**	**0.372**** **(2.072)**
XBRL	**0.082*** **(1.640)**	**0.089*** **(1.781)**
SIZE	**-0.048***** **(-3.143)**	**-0.048***** **(-3.137)**
AGE	-0.021 (-0.291)	-0.021 (-0.294)
EPS	-0.004 (-0.603)	-0.004 (-0.643)
LOSS	**-0.200**** **(-2.191)**	**-0.201**** **(-2.204)**
GOVSCORE	**0.045**** **(2.296)**	**0.063***** **(2.855)**
*XBRL*GOVSCORE*		**-0.087*** **(-1.789)**
N	922	922
Adj. R^2	0.02	0.02

* significant at 10%, ** significant at 5%, *** significant at 1%, *t*-statistics are in parentheses.

FACC is forecast accuracy for firm *i* in year *t*, which is the forecast error times -1 and normalized. The forecast error is obtained through deflating the absolute difference between actual earnings per share (EPS) and consensus forecast EPS by year-start stock price. *XBRL* is a dummy variable, which equals 1 if a firm-year observes mandatory adoption of XBRL and 0, otherwise. In this table, when the firm-year is 2009, *XBRL* equals one, zero otherwise. *SIZE* is the logarithm of firm *i*'s total assets at the beginning of year *t*. *AGE* is the logarithm of firm *i*'s age in year *t*. *EPS* is firm *i*'s earnings per share in year *t*. *LOSS* is a dummy variable that equals 1 if the reported EPS is negative and 0, otherwise. *GOVSCORE* is a corporate governance measure developed by Brown and Caylor. Please see http://robinson.gsu.edu/accountancy /gov_score.html for detail information. For our analysis, we normalize this measure.