THREE ESSAYS ON CONSEQUENCES OF EARNINGS INFORMATIVENESS

By

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A dissertation submitted to the

Graduate School- Newark

Rutgers, The State University of New Jersey

In partial fulfillment of the requirements

For the degree of

Doctor of Philosophy

Graduate Program in Management

Written under the direction of

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May 2018

ABSTRACT OF THE DISSERTATION

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The dissertation contains three essays that examine the market and audit consequences of earnings informativenss.

In the first essay, I develop a new measure of earnings complexity based on the option market reaction both before and after the announcement of earnings. Motivated by previous theoretical work by Kim and Verrecchia (1991, 1994) and empirical findings in Patell and Wolfson (1979, 1981), I expect my measure to provide insights into the underlying information environment faced by investors around the earnings announcement. I apply three sets of validity tests and the results of these tests show that firms with high disclosure score as per my measure experience improved market liquidity, less informed trading in stock and option market, less profitability earned by insiders, and a stronger response by analysts. These results indicate me measure does capture disclosure transparency from

perspective of uninformed traders. Overall, I construct a financial information measure that could be widely applied and shows that the ability to reduce uncertainty through financial reports plays a significant role in market trading.

The second essay investigates the effect of financial statement comparability on corporate bankruptcy risk. Based on three different comparability measures developed by De Franco et al. (2011) and Barth et al. (2012) and expected default risk (EDF) based on Merton (1974)'s model, I document that financial statement comparability is negatively related to EDF in current and future periods with the relationship being stronger in the near term. Cross-sectional tests reveal that the marginal effect of comparability on default risk is most pronounced for companies with less visibility, more investment, less monitoring, and for companies in high-tech industries, which is consistent companies with worse information environment and monitoring benefit more from comparable statements. Comparability could help to reduce default risk through improved information efficiency and more long-term oriented investors using path analysis. My results help to demonstrate that financial statement comparability might help both to explain and to reduce default risk.

In the third essay, I examine how principles-based accounting standards affect auditor's pricing decision and auditing efficiency. The debate over the effectiveness of principles-based and rules-based accounting in previous literature shows mixed evidence about the benefits for either policy. Using a firm-year level measure of the extent of principles-based accounting standards developed in earlier literature, I

find robust results showing that firms with more principle-based accounting-policy pay less auditing fees. Further evidence shows the different level of audit fees charged on firms that rely on more principle-based standards might be partially explained by decreased litigation risk, misstatement risk, and auditing effort. Finally, I identify some factors that reduce the gap about rules-based standards: the relative advantage of principle-based standards decreases when firms do not have good governance to constrain earnings manipulation by managers, and when auditors have expertise in areas of those complex standards.

ACKNOWLEDGMENTS

This dissertation would not have been possible without the help of my committee members and professors I have worked with. I would like to express my deepest gratitude to my dissertation chair and advisor Dr. Bharat Sarath, for his continuous support, trust, and guidance. You give me much confidence when I encountered difficulties in my dissertation study. I am also very thankful to Dr. Bikki Jaggi, for his insightful comments and help through out my Ph.D. program. As a productive and severe researcher, your academic spirits will always inspire me. I would like to thank Dr. Divya Anantharanam, for her valuable advice on research. You are my role model since the very early stage of my Ph.D. program and your severe attitude toward research will always influence me. I am also grateful for Dr. Feng Gao and Dr. Yiwei Dou for serving on my committee, being always nice to me, and providing me valuable suggestions. Finally, I would like to give special thanks to Dr. Jianming Ye and Dr. Suresh Govindaraj, for introducing me to the doctoral program, and to Dr. Leonard Goodman, for your continuous support and kindness to me.

I am indebted to my parents and friends for their love and support so that I can dedicate to my research. I could never accomplish this work without your encouragement and continuous support. The life as a Ph.D. student for these years is precious and unforgettable memories for me. Thank you for all the kind people I meet here.

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1. Introduction

In this essay, I develop a new measure enlightened from option market to investigate the information role of earnings announcement on uninformed traders. Motivated by previous theoretical work, information advantage arises for informed traders around earnings announcement either due to pre-event endowment or acquisition of private information (Glosten and Milgrom, 1985; Kim and Verrecchia,1991), and/or due to superior ability to interpret public disclosures (Kim and Verrecchia,1994). I am going to identify in which situation in general, that informed traders have least information advantage, either due to reduced pre-release of private information, or easy-to-interpret information contents in financial reports by taking advantage of the extended parameters in option market, the implied volatility, and validate my measure by three sets of tests.

My measure is conceptually different from previous disclosure quality measures. Previous measures usually examine one specific accounting attributes, such as financial statement comparability, earnings persistence for a company. Instead, my focus is to measure the quality of earnings announcement from the perspective of uninformed investors, who usually do not have neither private access to information before earnings announcements or do not have superior ability interpret complex reports. As different kinds of informed trading around earnings announcement are widely documented by tremendous literature (e.g., Jin et al, 2012; Cohen et al, 2012) in the past, the focus specifically on naïve investors

instead of informed traders could help liquidity traders better identify which firms have better information environment for them in the future investments. Further, this measure could be widely applied to firms as long as the company has options.

Specifically, I use deflated changes in implied volatilities (calculated using Black-Schole model of option market) around earnings announcement to indicate the resolved uncertainty about the firm's performance from publication of firms' financial reports. Implied volatility is used as measure ex ante market uncertainty (Rogers et al., 2009) and past studies found increased uncertainty before earnings announcement and decreased uncertainty after earnings announcement (Patell and Wolfson, 1979). Since my measure by construction compares the disagreement in pre-earnings announcement period with how financial reports help investors to reach consensus, it is likely to captures two parts of information advantage that informed traders have: when there are less private information pre-released (either due to a company's strict information policy or other reasons), informed traders, like naïve traders, have more doubts about the firm's real business operations and the information could not be incorporated in price immediately, therefore the market disagreement might increases and the demand for earnings disclosure increases; on the other hand, after financial reports are released, if company prepare financial information in a way that is easy to understand, investors might reach to consensus more quickly, resulting in quick reduction of uncertainty proxied by implied volatility. Therefore, when there is high pre-announcement disagreement and sharp decrease in post-announcement disagreement, I treat these firm-quarter earnings announcements as those most favorable to uninformed traders.

I validate whether my measure really captures the information advantage for uninformed traders in several ways. I start to look at the company-level and intertemporal determinants of my measure, and find in general, companies with more transparent environments (proxied by firm size, analyst following, and institutional ownership), higher profitability (proxied by ROA), and less complex information (proxied by negative standard deviation of return), and those quarters with less earnings surprise (proxied by absolute earnings surprise), and annual reports instead of quarterly reports, are more likely to have higher score based on my measure. Then, I conduct three sets of validation tests including (1) whether earnings announcement with high disclosure quality score based on my measure could enjoy more improvement in market conditions; (2) whether there are less informed trading in option and stock market, and informed trading from insiders documented by previous literature in the firm-quarter earnings announcement with high disclosure quality; (3) whether analysts update their information more quickly and accurately after those quarters with high disclosure scores. Among these validation tests, I think the second set of informed trading is most relevant to the construction of my measure. If my measure indeed captures the relative two sources of information advantages that informed traders have, I should observe decrease informed trading around earnings announcement in general.

One interesting finding for my measure is that when I examine the time-series pattern, I find the absolute value of my measure increases gradually from the beginning to the end of my sample period. Specifically, I find this measure arise sharply around year 2000-2005, which is in the same period those major regulation

changes related to financial reporting (e.g., Regulation FD, SOX) happen. And during period of financial crisis, my measure decreases and remain in a relative low level for a while, which might suggest the decreased trust in financial reports. And in recent year, it increases again.

After I finish all my validation tests, I conduct several robustness tests. These tests include: scale my measure by several earnings surprise and uncertainty proxies to measure for each unit amount of new information, how this quarter's earnings announcement help to solve the doubts in the market. Recalculate my measure based on different expiration dates of options, weight my measure by open interest, change the window around earnings announcements in my main tests. Overall, the results are similar.

My paper contributes to both accounting and finance literatures. First, I develop a new measure to quantify the ability of financial reporting to reduce overall market uncertainty based on ex ante measure derived from derivative market. My measure specifically captures when naïve investors have most information advantages. This construction makes my measure conceptually different than previous disclosure qualities. And the validity tests in general support my argument. Besides, the new measure is based on option market and is both widely applicable and easy to interpret, which might be used in the future research. Second, I apply my new measure to retest varying market conditions to earnings announcement and shows that financial information quality increases could help to reduce information asymmetry, increase market liquidity, decrease trading predictability and profits of several kinds of informed traders.

The following of the paper is structured as follows. Section 2 reviews the related literature and motivate my measure of disclosure quality. Section 3 describes construction of this new measure. Section 4 presents descriptive statistics. Section 5 presents validation tests robustness checks and section 6 conduct robustness check. Section 7 concludes the paper.

2. What does AQ capture?

2.1 Previous literature and theoretical model

Disclosure quality is an important topic in accounting and countless literatures in accounting have developed different kinds of quality measures (Dechow et al.2010; Ball and Brown,1968; Beaver, 1968; Amin and Lee,1997; Ni et al., 2008; Xing et al., 2009; Billings and Jennings,2011). The very initial papers have studied the market reaction on earnings announcement date to prove the general usefulness of financial. Later researches investigate several different dimensions of reporting quality based on financial reporting conceptual framework, including earnings persistence, smoothness, comparability, timely loss recognition, earnings management, financial statement comparability, financial statement complexity, fair value accounting, and so on. Existing literature find tremendous consequences of one specific reporting quality on either stock market, credit market, auditors, and other stakeholders.

How about the importance of financial reporting on uninformed and liquidity traders? Could I identify out a straight-forward measure that could capture when

the relative advantages of informed traders over uninformed traders are least significant?

Since uninformed traders are important market participants who provide liquidity to overall market and informed trading is widely documented in existing literature (e.g., Jin et al., 2012; Cohen et al., 2012), it is meaningful if I could construct a simple measure for when and what kind of companies in general provide uninformed traders most protections.

To identify when uninformed traders have relatively more information advantage, I borrow the theoretical work from Kim and Verrecchia (1991, 1994). In the first paper, they find that one important source of information advantage that sophisticated investors have is their ability to get private information before announcement date. And in the second paper, they show another source of information advantage comes from superior ability to interpret complex information disclosed. Therefore, if a measure could capture the uncertainty for sophisticated investors in pre-announcement period due to less access to private information, and the ability that a clear financial report to resolve overall doubts in the market, it by construction might capture both information advantages that informed traders have.

I choose information metrics in option market as a candidate to construct my disclosure quality measure. Empirically, option market has been studied for a long time in finance literature. In general, option traders are more likely to be sophisticated traders and option market information could help to predict earnings and market information (Amin and Lee,1997; Patell and Wolfson, 1979; Cremers

and Weinbaum, 2010; Jin et al., 2012; Cao and Han, 2013; Johnson and So, 2012). And introduction of option market on price discovery process and liquidity (Skinner,1990; Chakravarty et al., 2004). The popularity in studying option market in finance is not only because that it is a new market, but also option market has some attractive new features.

Among these features, implied volatility is most interesting and related to my paper. Implied volatility is widely used as a measure for ex ante uncertainty of the stock market. And papers specifically motivate my study are Patell and Wolfson(1979, 1981), which find the phenomenon that implied volatility gradually increases before earnings announcement and decrease right after earnings announcement date, which is consistent with the demand for information is highest just before financial reporting date and the supply of clear information could help to offset the demand.

Combined the theoretical work of Kim and Verrecchia (1991, 1994) with the empirical finding from Patell and Wolfson(1979, 1981), it is possible that I could construct a measure that captures both information advantage that informed traders have at the same time. Intuitively, if informed traders could not have enough access to private information beforehand, their demand for earnings announcement increases and the implied volatility might increase more right before earnings announcement date. On the other hand, if earnings announcement is clear and help uninformed traders to better understand the business nature, this proxy for uncertainty should drop sharply. Therefore, when a company has high pre-

announcement implied volatility and sharp drop in this figure, I might predict that this earnings announcement is most favorable to uninformed traders.

2.2 Predictions made based on my AQ measures

Based on my above argument, I develop three hypotheses as my validation tests afterwards.

2.2.1 Role of uncertainty reduction on general market conditions

If earnings announcement is more informative and could help overall market to reduce more uncertainty over the company, a natural prediction is that the market for such company after disclosure date should be more active. Specifically, with information disclosed with more certain information, market makers are likely not to protect themselves as much as in a world they think that other investor get more information than them. Besides, the price impact of large orders in the market should seem not contain much information if earnings announcements have already conveyed enough information the investors need. And the probability of informed trading should decrease since the likelihood of private information decreases.

Based on above argument, my second hypothesis is:

H1: Ceteris paribus, earnings announcement that help to reduce more uncertainty in the market will improve market condition by increasing market liquidity and depth, and decreasing probability of informed trading.

2.2.2 Role of uncertainty reduction on informed trading

The disclosure of new information will change relative information advantage between different participants in the market. Specifically, I have several different kind of traders: the inside trader-those mostly likely to have private information advantage before earnings announcement, the sophisticated traders in other market(such as option traders)-those generally considered to have more access to private information and have better information processing power(Kim and Verrechia, 1991), the sophisticated traders in stock market (big traders)-still may have more private information and processing ability, and the uninformed small investors.

The relative information advantages between insiders and outside traders, and that between outside sophisticated traders and naïve traders, should all change after earnings announcement with higher ability to reduce uncertainty in the market.

The prediction for the first relation should be relatively straightforward. I examine the uncertainty reduction role of earnings announcement on trading behavior of insiders and outside traders both before and after the disclosure date. Specifically, (1) the more uncertainty that earnings announcement help to reduce (usefulness of earnings announcement), the more likely that the private information is observed by sophisticated traders (otherwise they will arbitrage immediately before earnings announcement date), the less likely the trading pattern of sophisticated investors could help to predict information on earnings announcement date; (2) the more uncertainty is resolved for market outside traders during earnings announcement, the more likely that inside traders will trade profitably after earnings announcement

date (I do not consider trading behavior of insider trading before earnings announcement date because of "black window" regulation).

Based on above argument, my next hypothesis is:

H2a: Ceteris paribus, the predictability of informed trading before earnings announcement will be lower for firm-quarters with more uncertainty reduction.

H2b: Ceteris paribus, the profits of informed trading immediately after earnings announcement will be lower for firm-quarters with more uncertainty reduction.

2.2.3 Role of uncertainty reduction on information intermediary

The last thing I are going to examine is that whether firms with good accounting quality could affect the behavior of market information intermediary. Specifically, I argue that when facing financial reports that could reduce more uncertainty, analysts may use less time to analyze the information therefore could issue analyst forecast more quickly. The effect of the quality of uncertainty reduction on the number of analyst forecasts is ambiguous since it may reduce information need from market participants (demand) and information processing costs for analysts' reports (supply) at the same time. Besides, total number of forecasts depends on analyst coverage, which is relatively stable in a short time. Since the ability of uncertainty reduction of financial statements may vary from quarter to quarter, I do not expect it could affect analyst coverage (therefore total number of reports) to a large extent.

Based on above argument, I develop following hypothesis:

H3a: Ceteris paribus, firms with high ability to solve uncertainty concerns speed up analysts' forecast and analyst forecast revisions.

H3b: Ceteris paribus, firms with high ability to solve uncertainty concerns improve accuracy in analysts' forecast.

3. Construction of my disclosure quality measure

3.1 Basic AQ measure

My new measure of disclosure quality is based on decile ranking of scaled change in average implied volatility around earnings announcement date. Options with short time to expire (indicator in OptionMetrics: days to expiration equals to 30) are chosen since these securities are more sensitive to arrival of current new information (Rogers et al., 2009). I do not consider whether the option is in-the-money/at-the-money/out-of-money since the database has already removed those in/out of the money. I calculate as follows the mean implied volatility for the pair of call and put option to get average daily figure one day before (denoted as $\overline{IV}_{i,t,d-1}$) and one day after (denoted as $\overline{IV}_{i,t,d+1}$) reporting date and figure out the scaled change hereafter denoted as $CHIV_{i,t}$.

$$chiv_{i,t} = \overline{IV}_{i,t,d+1} - \overline{IV}_{i,t,d-1}$$

Intuitively, the more uncertainty has been resolved, the more valuable information is provided on earnings announcement; I hypothesize that more decrease in $CHIV_{i,t}$ should indicates higher disclosure quality. Therefore, I take negative value of

$CHIV_{i,t}$ and assign 1 to 10 based on the new decile data to construct my main accounting quality measure (hereafter denoted as $AQ_{i,t}$).

$$\text{Nchiv}_{i,t} = -\text{chiv}_{i,t} \qquad \text{AQ}_{i,t} = \text{Decile rank of Nchiv}_{i,t}$$

Based on my prior argument, the higher disagreement before public disclosure indicates the necessity for confirming information to be released (demand for new information, either due to business nature of the company or reduced private access to pre-released information), and the rapid decrease of uncertainty during earnings announcement reveals the usefulness of financial information to public investors (supply of confirmed information). Since my construction of $nchiv_{i,t}$ and $AQ_{i,t}$ themselves capture both pre-disclosure disagreement and the relative change in uncertainty, it might be helpful to measure the overall importance and usefulness of a company's financial reporting to investors.

3.2 Additional AQ measures scaled by available information

My construction of disclosure quality follows the theoretical model (Kim and Verrecchia., 1991,1994) and defines the overall usefulness of earnings announcements to investors as both the ex ante importance and the ex post relative informativeness of announcement contents. However, the informativeness of a specific earnings announcement depends both on the quantity and quality of information disclosed. To rule out the effect of the amount of information and keep only the quality part, I try to scale my nchivi,t measure by several "information quantity" measures. My first candidate for scaling is absolute analyst-adjusted earnings surprise (denoted as ABSSUE3i,t) and analysts' expectations is measured

as the median of latest individual analysts forecasts issued within the 90 days prior to the earnings announcement date. I denote the scaled measure as Nchiv_scale1i,t and I take year-quarter based decile ranking of Nchiv_scale1i,t as AQ_scale1i,t as follows to reduce noise in the estimates and to mitigate potential nonlinearity.

$$\text{Nchiv\_scale1}_{i,t} = \text{Nchiv}_{i,t}/ABS\text{SUE3}_{i,t} \qquad \text{AQ\_scale1}_{i,t} = \text{Decile rank of Nchiv\_scale1}_{i,t}$$

By construction, I assume Nchiv_scale1i,t captures for each unit of new information provided in earnings announcement, how much disagreement reduced.

I also use pre-announcement forecast dispersion (denoted as dispersioni,t) and pre-announcement call-put parity (denoted as spread_prei,t) as the second and third scaling variables as follows.

$$\text{Nchiv\_scale2}_{i,t} = \text{Nchiv}_{i,t}/Dispersion_{i,t} \qquad \text{AQ\_scale2}_{i,t} = \text{Decile rank of Nchiv\_scale2}_{i,t}$$

$$\text{Nchiv\_scale3}_{i,t} = \text{Nchiv}_{i,t}/\text{Spread\_pre}_{i,t} \qquad \text{AQ\_scale3}_{i,t} = \text{Decile rank of Nchiv\_scale3}_{i,t}$$

Nchiv_scale2i,t captures for each unit of forecast dispersion that analysts have before earnings announcement, how much disagreement is reduced after releasing of information. Nchiv_scale3i,t measures for each unit of potential private information that option traders have (Jin et al., 2012), how earnings announcement help to realize.

3.3 Using real option price database for robustness check

Previous literature shows open interest might be an indicator for the importance of one specific option within a company (Xing et al., 2010). Standardized option database does not provide open interest information. For robustness check, I construct the above four sets of Nchiv and AQ measures again based on open interests-weighted implied volatility in option daily price database in OptionMetrics. Specifically, I select at-the-money call and put options pairs with absolute delta value among 0.4 to 0.6. I calculate the average implied volatility for each available call-put option pair for a certain day as open interest-weighted implied volatility. For those firm-days with more than one at-the-money call-put option pairs, I then weight them by total open interest of the call-put option pairs.

4. Sample and descriptive statistics

4.1 Sample and Databases

I start to construct sample from Compustat firms with available announcement date of quarterly reports (item rdq in Compustat quarterly file) and match them with OptionMetrics standard options section dataset. Standardized options are constructed to be of constant maturity and at-the-money, which reduces measurement error that arises from using options that vary in duration and in the extent to which they are in the money (Dumas et al., 1998; Hentschel., 2003; Rogers et al., 2009). The total number of firm-quarter observations with available option data is 201,000 from year 1996 to 2015. I start in 1995 as 1995 is the first available year that OptionMetrics provide data for options. I then collect stock price and volume data from CRSP, company quarterly financial data from COMPUSTAT, analyst EPS forecasts from I/B/E/S, insider trading information

from Thomas Reuters, and intraday trading data from TAQ. Since I have multiple empirical tests with different data requirements, the final sample size varies depending on my specific empirical setting and I describe each sample in the respective tables.

4.2 The nature of my disclosure quality measure

My main descriptive statistics are documented in table 1 to table 3. Table 1 shows the time-series trend of my four disclosure quality measures over years as follows.

[Insert Table 1 about here]

From table 1 I could observe that all of the four nchiv measures increases gradually over the last two decades and the percent of increase is very large. For example, at the beginning year of my sample, nchiv is about 0.01, and in the last available sample year, this number increased to tenfold of original nchiv and reaches to around 0.1. This increase in nchiv might indicate that the relative ability to resolve disagreement by earnings announcement improves. This finding is consistent with evidence from Beaver et al. (2018), who use a nonparametric approach to investigate information content of EAD from 1971-2011, and find there is a dramatic increase in information content at earnings dates from 2001 onward. Further, if I closely examine the trends, I could observe some interesting patterns coinciding with some financial regulation and events. For example, the improvement in nchiv starts to increase around 2001 and reaches to 0.06 quickly from 2001 to 2005, which is the period coinciding with regulation FD and SOX. However, such increasing trend reverses after 2007 and stays around 0.07 for

several years from 2007 to 2011, which is the period for financial crisis. And in recent years, the nchiv increases again. I don't want to draw any inferences from the consistency among my measure and those specific periods, however, the consistency might in some way validate the usefulness of my measure.

Table 2 presents descriptive statistics of main dependent variables used from 1996 to 2015. The dispersion for my nchiv is 3 standard deviation, which is wide to explain my other variables.

[Insert Table 2 about here]

Correlation metrics of my main variables is presented in table 3. My disclosure quality measure is correlated with most of variables interested in the univariate analysis. For example, The negative correlation between nchiv and lncham (log change in Amihud illiquidity measure) indicates improved market liquidity after disclosing high quality financial reporting. The measure uv (unexpected volume) and car (cumulative abnormal return) are both positively related to nchiv, indicating more market reaction to firms with high nchiv. Absolute earnings surprise decreases the ability for earnings announcement to resolve disagreement. Insiders are less likely to purchase shares after earnings announcement with high nchiv measure and if they trade, the trading profitability is smaller. Analyst react more to firm-quarter with high nchiv as well (from WRf, Afa, and Reaction).

4.3 Determinants of my measure

I use regression analysis to examine the determinants of my measure in table 4. Several firm fundamentals and interporal variables are included as control variables

and I include two-digits sic dummy and quarter dummy for industry and quarter fixed effect.

[Insert Table 4 about here]

The results show that both firm-specific characteristics and information in quarterly announcement are related to my measure. Implied volatility in pre-earnings announcement period (pre_iv) positively affect my measure by construction. Absolute earnings surprise (abssue3) and loss indicator for current quarter negatively affect the ability for earnings announcement to resolve disagreements among investors, which is consistent with the notion that more doubts arise with unanticipated information and thus reduce the reliability of financial statement. Annual announcement (qtr4 indicator) shows higher disclosure quality. Companies with larger market cap(lnmv), more external monitoring by institutions(io) and analysts(ac), and higher profitability(roa) have higher disclosure quality in general. If the stock price is more volatile(stdret) and there are larger analyst dispersion(dispersion) before earnings announcement date, the decrease in uncertainty around earnings announcement is more significant.

4.4 Validation tests

I conduct three sets of validation tests. Firstly, I investigate whether my measure could predict improved market liquidity and decreased informed trading based prior general and popular market-based measures (e.g, change in Amihud illiquidity measure, change in stock price idiosyncratic risk, and probability of informed trading). Next, motivated by the overall improvement in market

conditions documented in the first set of tests, I examine the informed trading specifically in option market and stock market, as well as insiders' trading around earnings announcement date and check whether my measure could help to reduce informed trading that previously documented. Last, I relate my disclosure quality measure with market intermediaries, analysts, and try to see whether analysts could update their information more quickly and revise their prediction for future earnings more accordingly to earnings surprise of current quarter. In these validation tests, firm fundamentals and quarterly information are included as controls. I also include sic two-digits and quarters fixed effect and cluster standard errors by firms.

4.5 Does market improve with higher disclosure quality I defined?

I first examine the effect of my disclosure quality measure on market conditions. More disclosure quality should help to improve market liquidity and reduce probably informed trading in market. The following regression model is used to answer my question:

$$Change\ in\ liquidity\ or\ informed\ trading\ measures_{i,t} = a + B_1 pre\_iv_{i,t} + B_2 AQ_{i,t} + \Sigma fundamentals_{i,t} + \Sigma quarterly\ results_{i,t} + \Sigma ind\_FE_{i,t} + \Sigma quarter\_FE_{i,t} + \varepsilon_{i,t}$$

where (1)change in liquidity measures include log one plus change in average Amihud illiquidity measured from [-5,-2] to [2,5] trading days around earnings announcement date and log one plus change in bid-ask spread measured from [-5,-2] to [2,5] trading days around earnings announcement date; and (2)informed

trading measure include change in sigma around earnings announcement date, change in idiosyncratic risk around earnings announcement date, and probability of informed trading for current quarter. Sigma is logistic transformed (1-R2) from Fama-French four factors model is measure based on [-32,2] to [2,32] trading days around earnings announcement date, and Idiosyncratic risk is root-mean-square deviation of error from the same Fama-French four factors model. Detailed variable definitions are provided in appendix.

This test could help us to further distinguish whether my measure captures the disclosure quality or just absolute disclosure quantity. If my measure is more associated with the operating complexity and therefore captures the amount of disclosure, I might observe reduced liquidity since the large amount of complex disclosures might require market to digest the new information gradually, therefore temporarily increase the self-protection of uninformed traders who usually do not have superior information processing ability (Kim and Verrecchia, 1994). On the other hand, if my measure captures whether overall market could quickly understand the meaning of financial announcements, I should observe increased liquidity.

The results of this test are presented in table 5. The sample spans from 1996 to 2015 and include about 108,968 firm-quarter level of observations. I control for firm-fundamentals and information for quarterly earnings, sic two digits industry fixed effect and quarter fixed effect, and clustering standard errors on firm-level.

Table 5 Panel A presents the results for the effect whether my measure is associated with improved liquidity. I could observe announcements of companies with high

disclosure quality score significantly experience decrease in market illiquidity proxied by Amihud and bid-ask spread, indicating the improved market liquidity conditions. Panel B replace dependent variables for proxies for informed trading and private information. As I could observe, the overall effects show probability of informed trading is lower in quarter with higher disclosure quality score, and the private information in stock price decreases more quickly for firm-quarter that has high disclosure quality score. The results are consistent with my disclosure quality measure capturing more about the quality instead of quantity part of earnings announcement.

[Insert Table 5 about here]

The estimated coefficients of -0.008 (-0.009) in table 5 Panel A suggest one standard deviation of AQ of 2.87 is associated with 0.019 (0.025) decrease in Amihud illiquidity(bid-ask spread), representing about 3% (6%) standard deviation of Amihud illiquidity(bid-ask spread).The coefficients of -0.001(-0.011) in table 5 Panel B suggest one standard deviation of AQ of 2.87 is associated with 0.029 (0.032) decrease in sigma(idiosyncratic risk), representing about 39% (8%) standard deviation of sigma(idiosyncratic risk).

5. Consequences from behavior of informed trading

My second sets of tests examine whether my measure could help to predict reduced informed trading by different kinds of sophisticated investors documented in prior literatures (e.g., Jin et al., 2012; Cohen et al., 2012). If my measure could capture two sources of advantages, namely, access to private information and superior information processing ability (Kim and Verrecchia, 1991, 1994), that sophisticated

investors have over uninformed investors, I should observe reduced information gathering before earnings announcement and also reduced information advantage that sophisticated investors have over uninformed traders after earnings announcement. Specifically, I examine (1) whether option market lead stock market (according to Jin et al., 2012) less significantly if my disclosure score indicates less private information gathered before; (2) whether insiders' information advantage decreases more significantly if my disclosure score indicates it's easy to interpret financial information in this firm-quarter; and (3) whether predictive power of big and small stock trading to earnings surprise is less significant. I expect my measure could have an attenuating effect on those informed trading.

5.1 Informed trading from option traders

Theoretical work from Kim and Verrecchia(1991) identifies that one important source of information advantage that sophisticated investors have is their ability to get private information. Jin et al (2012) empirically test whether option price leads stock price because of the ability of private information gathering from option traders under the setting of earnings announcements. They find indeed option market has predictive power to stock market before scheduled quarterly announcements but not in unscheduled events, suggesting option traders do intentionally get private information before earnings announcement.

When my disclosure score is high, the underlying construction suggests that before earnings announcement, markets have high level of disagreement and doubts about current quarter's financial reports (since only those quarters with high pre_iv could

potentially have high AQ), which indicates that such firm might have the ability to retain most of their information and to disclose most of their results in earnings announcement laterwards immediately. So my measure by construction exclude the information advantage of private information gathering by sophisticated traders. If my measure does capture this reduced information advantage, I should observe reduced predictive power of option market to stock market prior to earnings announcement.

I follow research design of Jin et al (2012) and add my AQ measure as the interaction with all of their independent variables. Specifically, Jin et al (2012) use two popular measure for information embedded in option market, call-put parity and volatility skew, to see whether they have predictive power to information in earnings announcement date. Specifically, they construct $spread\_base_{i,t}$ ($skew\_base_{i,t}$) as weighted average of the difference in implied volatilities between matched call and put option pairs (difference in the implied volatility between OTM put options and ATM call options) within [-50,-11] days before earnings announcement, $spread\_pre_{i,t}$ ($skew\_pre_{i,t}$) as weighted average of the difference in implied volatilities (difference in the implied volatility between OTM put options and ATM call options) within [-10,-2] days before earnings announcement, and SUE3 as analyst-adjusted earnings surprise and predict that information in call-put parity (skewness) in option market before earnings announcement date should positively (negatively) predict CAR around earnings announcement date.

I estimate the following regression with my AQ measure interacted with measures constructed by Jin et al (2012) as follows:

$$CAR_{i,t} = a + B_1 SUE3_{i,t} + B_2 spread\_pre_{i,t} + B_3 spread\_base_{i,t} + B_4 SUE3_{i,t} * AQ_{i,t} + B_5 spread\_pre_{i,t} * AQ_{i,t} + B_6 spread\_base_{i,t} * AQ_{i,t} + \Sigma ind\_FE_{i,t} + \Sigma quarter\_FE_{i,t} + e_{i,t}$$

$$CAR_{i,t} = a + B_1 SUE3_{i,t} + B_2 skew\_pre_{i,t} + B_3 skew\_base_{i,t} + B_4 SUE3_{i,t} * AQ_{i,t} + B_5 skew\_pre_{i,t} * AQ_{i,t} + B_6 skew\_base_{i,t} * AQ_{i,t} + \Sigma ind\_FE_{i,t} + \Sigma quarter\_FE_{i,t} + e_{i,t}$$

Findings documented in Jin et al (2012) suggest that spread (skew) in option market positively (negatively) predict return in earnings announcement. If my measure could capture the decreased information access advantage for sophisticated option traders before earnings announcement date, I should observe in the first (second) regression model, B_4 and B_5 should be significantly negative (positive), indicating the reduced predicting power in option market. In addition, I expect the sign for B_6 should be positive in both models if my disclosure quality captures the information quality in earnings announcement (similar as ERC).

The sample for this test consists a maximum of 113,465 firm-quarter observations from 1996 to 2016. Table 6 shows the results for option traders' informed trading. Consistent with Jin et al (2012)'s finding, earnings surprise and option spread positively predict car, while spread negatively predict car. With interaction of my variable to earnings surprise, skew, and spread, I could find firm-quarter announcement with higher disclosure quality could help to significantly attenuate

predictiveness of option market to stock market, while at the same time enhance earnings response coefficient to earnings surprise.

[Insert Table 6 about here]

5.2 Informed trading from insiders

Kim and Verrecchia(1994) suggests that the second source of information advantage is that sophisticated investors have superior processing ability. If an earnings announcement could help investors to quickly understand the business operations and let them to reach consensus, I should observe the overall information advantage for public investors increases. Insiders, as those who have more private information and at the same time are more familiar with the business operations of their companies, should lose more information advantage and are less likely to engage in opportunistic trade after those informative announcements proxied by my measure.

Previous literatures suggest that insiders take a trade either due to liquidating their shares granted or due to opportunistic profits from their superior information. In general, insider purchase is more likely to be opportunistic trade and Cohen et al (2012) develop a well-known classification for opportunistic trade and routine trade. I follow their classification method and classify all insider trade happened right after earnings announcement date into opportunistic purchase, opportunistic sale, routine purchase, and routine sale. I use logit model to test the incidence of opportunistic insider trading after earnings announcement as follow:

$$Dummy\ if\ insider\ take\ a\ trade\ [3,12]_{i,t} = a + B_1 pre\_iv_{i,t} + B_2 AQ_{i,t} + \Sigma fundamentals_{i,t} + \Sigma quarterly\ results_{i,t} + \Sigma ind\_FE_{i,t} + \Sigma quarter\_FE_{i,t} + \varepsilon_{i,t}$$

Besides, insiders usually trade with abnormal profits ((e.g., Frankel and Li, 2004; Huddart and Ke, 2007; Jagolinzer et al., 2011; Gao et al., 2014). Following Gao et al (2014), I estimate trading profits using the 180-days following transaction-specific regression of daily returns on Fama-French four common factors model and get insider trading's alpha. I measure transaction-level trading profit as percentage of potential gains following purchases and potential losses avoided following sales, that is, it is equal to 100*α for purchases and -100*α for sales. Then, I aggregate the value-weighted average alpha for those trades taken by insiders within [3,12] days after earnings announcement date.

I use OLS regression to test the effect on insider trading's profits as follows:

$$Weighted\ average\ of\ insiders'\ alpha_{i,t} = a + B_1 pre\_iv_{i,t} + B_2 AQ_{i,t} + \Sigma fundamentals_{i,t} + \Sigma quarterly\ results_{i,t} + \Sigma ind\_FE_{i,t} + \Sigma quarter\_FE_{i,t} + \varepsilon_{i,t}$$

Control variables include those frequently used in prior literature for both models. I consider various controls of information asymmetry including R&D (Aboody and Lev, 2000), loss dummy (Huddart and Ke, 2007; Brochet, 2010), stock return volatility (Ravina and Sapienza, 2010), analyst coverage (Frankel and Li, 2004). I also include contrarian trading tendencies (e.g., Lakonishok et al., 1994; Rozeff and Zaman, 1998) proxied by the book-to-market ratio and stock return momentum. In

addition, I include several general control variables such as firm size, leverage, institutional ownership, earnings surprise, and indicator for the fourth quarter. I include industry and quarter fixed effect and cluster standard errors by firm-level.

Table 7 presents the results for insider trading's probability and profitability after earnings announcement date. The sample for this test consists a maximum about 116,397 firm-quarter observations. Panel A shows that my measure only has significant positive influence on probability of opportunistic insider purchase taken within [3,12] days after earnings announcement date, which is consistent with insiders might notice their relative advantage to firms are smaller therefore they opportunistically reduce their trading for this period. The coefficient is economic significant too, with one standard deviation of AQ decreases insider trading's opportunistic purchase by 13.5%. Panel B shows that on average, insider trading taken in this period experience a negative abnormal return, which suggests again my measure captures the relative ability that earnings announcement to reduce uncertainty to overall market related to informed traders.

[Insert Table 7 about here]

5.3 Informed trading from big vs small equity trades

The last test for informed trading takes a glimpse at the behavior of stock traders around earnings announcement. Previous literature find that stock market could predict earnings surprises and buy-and-sale imbalance is a common measure for information that traders in the stock market have. Intuitively, if there is more

buying pressure than selling pressure, it is more likely that stock market anticipates good earnings news, and vice versa.

I analyze big traders' behavior from intraday TAQ data. The measure for big/small trades is based on the daily buy-and-sell imbalance among investors before and after earnings announcement. Different from PIN measure, which uses maximum likelihood to estimate quarterly information asymmetry, this measure examines specifically how high-quality earnings announcement changes the behavior of different market participants on daily basis. Specifically, buy-and-sale imbalance of big (small) trades equals to total value of buy (follow Algorithm in Lee and Ready, 1991 to define big and small trades) minus total value of buy, scaled by average buy and sale value for a specific day.

The empirical testing is as follows,

$$\mathrm{IMB}_{\mathrm{big},[-2,-1,0,1,2]} = a + B_1 SUE3_{i,t} + B_2 AQ_{i,t} + B_3 SUE3_{i,t} * AQ_{i,t} + \Sigma fundamentals_{i,t} + \Sigma quarterly\ results_{i,t} + \Sigma firm\_FE_{i,t} + \varepsilon_{i,t}$$

$$\mathrm{IMB}_{\mathrm{smal},[-2,-1,0,1,2]} = a + B_1 SUE3_{i,t} + B_2 AQ_{i,t} + B_3 SUE3_{i,t} * AQ_{i,t} + \Sigma fundamentals_{i,t} + \Sigma quarterly\ results_{i,t} + \Sigma firm\_FE_{i,t} + \varepsilon_{i,t}$$

where dependent variable is imbalance of big/small traders[1] 2 days before, 1 day before, the same day, 1 day after, 2 days after the earnings announcement. B_3 in both models indicate the how these two groups of trades are affected by information contained in earnings announcement. Control variables include firm

[1] I define a trade as big trade if trading value is more than 50000 per trade, and a trade as small trade is trading value is less than 5000 per trade.

size, earnings surprise, standard deviation of return, book-to-market ratio, book leverage, loss indicator, analyst coverage and institutional ownership.

The results are presented in table 8. Panel A and Panel B shows the effect on big and small trades, respectively. It shows that generally, predictability of small trades and big trades before disclosure date are significantly lower (the negative coefficient for interaction of my quality measure and earnings surprise) for earnings announcement that reduce more uncertainty in the market, which support again that the information leakage is less severe for high disclosure quality for firm-quarter observation proxied by my measure. And after disclosure date, big investors seem respond to information quickly than small traders-the coefficient for interaction of my quality measure and earnings surprise after earnings announcement date for big traders is insignificant, while this coefficient for small traders is negative.

[Insert Table 8 about here]

I argue the both significant influences observed in the settings of big and small trades are not surprising, as informed investors often split their trades into smaller part to hide informed trading (Angel et al., 2010). The small trades also contain informed trading. And if my measure captures the decreased advantage of access to private information, I should also observe the decreased informed trading before earnings announcement dates.

5.4 Impact on information intermediary

My last set of tests turns to examine the effect of my measure on the well-known information intermediary, analysts, that produce second-hand information about a

company. If my measure captures how disclosure could help market participants to understand the business, instead of overall amount of information content, information intermediary should benefit as well. Specifically, for analysts that regularly trace information of certain firms, if they could get information that is clearer, it could cost them less time to prepare the reports to update such information (timeliness). And if they believe more in the new information provided, they should adjust their forecasts for further periods accordingly (response). It is also possible that their forecast is more accurate (analyst forecast revision) and there might be more forecast provided (number of forecasts).

I use an inverse-weighting scheme that assigns higher weights to more timely forecast after earnings announcement. The measure for analyst response timeliness is WRF (weighted ratio of forecasts). It is calculated as time-weighted number of forecast for next quarter divided by total number forecast within date [reporting date+2, next reporting date). The numerator is weighted by distance between forecast announcement date and financial statement announcement date plus 1 (t+1). Such weights could assign more value to forecasts right after earnings announcement than forecasts issued long time after. The denominator is total number of forecasts to control the different level of forecasts for different firms (scaling). In total, the more quickly analysts respond after earnings announcement, the higher the WRF.

$$\text{WRF} = \frac{\sum_{t=0}^{nrdq-rdq}[\frac{N_{rdq+t}}{t+1}]}{\sum_{t=0}^{nrdq-rdq} N_{rdq+t}}$$

For dependent variable, I also include (1)weighted number of forecasts (non-scaling version for WRf) to calculate the number of forecasts issued after earnings announcement date; (2) analyst forecast accuracy measured as zero minus time-weighted absolute forecast error scaled by total number of forecasts, for all forecasts issued within [2,40] days after earnings announcement date; and (3) analyst forecast response measured as zero minus absolute difference between ratio of forecast update for annual reports and the ratio of earnings surprise to current quarter, with closer ratio of annual update to quarterly earnings surprise indicating more strongly reaction to earnings surprise for the current quarter.

Based on above four kinds of measures, I set up my regression models as follows:

$$WRf_{i,j},\ WNf_{i,j},\ Afa_{i,j},\ \text{reaction} = a + B_1 pre\_iv_{i,t} + B_2 AQ_{i,t} + \Sigma fundamentals_{i,t} + \Sigma quarterly\ results_{i,t} + \Sigma ind\_FE_{i,t} + \Sigma quarter\_FE_{i,t} + \varepsilon_{i,t}$$

The control variables are generally used firm-level variable in previous literature, including analyst forecast accuracy 10days before earnings announcement date (Afa101m), earnings surprise (sue3), loss indicator (loss), institutional ownership (io), analyst coverage (ac), firm size, etc. The definitions for these variables could be referred in appendix. I include two digits sic code and quarter-fixed effect, and cluster standard error on firm-basis. I predict b_2 to be positive in all four regression models.

[Insert Table 9 about here]

Table 9 presents the result of my measure on analyst forecasts. Predictions for forecast timeliness (WRf) shows that analyst reports for the next quarter is more likely to happen right after earnings announcement date, with higher WRf meaning more reports prepared in the early days of the quarter. The effect of my AQ measure on these respond speed measure is significantly positive, which indicates the quick response of analyst to new earnings announcement information and support my hypothesis that information intermediary also benefits from earnings announcement date that help to reduce more uncertainty. Besides, there are more total number of forecasts issued, and improved accuracy after earnings announcement, and more strongly reactions by analysts according to the table, suggesting my measure captures those firm-quarter announcements with information not only easy to interpret (therefore increase the forecasts timeliness), but also help analysts to have more accurate estimate for future earnings.

5.5 Sensitivity analysis and robustness check

I include bunches of sensitivity analyses and robustness check to see whether my measure really capture the relative information advantage bought by certain earnings announcements to uninformed investors. As I indicate in section 3, I scale my raw nchiv measure again by earnings surprise, pre-announcement option spread, and pre-announcement forecast dispersion to see for each unit of new information/uncertainty, how much disagreement that this firm-quarter's earnings announcement helps to resolve. I reexamine all my tests in section 5, and find robust significant results with same direction as well. Besides, I construct my AQ measure again by using open-interest weighted implied volatility in daily file in

OptionMetrics and see similar results. I examine the relationship for my measure compared with options with longer-time to expire (e.g., instead of 30 days, I investigate 60 days, 90 days etc). And I replace the dependent variable examined in section 5 with randomly selected longer time horizon. For example, I calculate the change in Amihud and bid-ask spread based on 40-days window around earnings announcement, and change the window to calculate insider trading and forecast variables from 2 days on to from 0 days on. The results are similar, suggesting my measure is overall robust in these tests.

6. Conclusion

This paper develops a new measure based on the option market to address the information role of earnings announcement to uninformed traders. My measure is different from previously disclosure quality measures as I follow theoretical work from Kim and Verrecchia (1991,1994) and construct a measure specifically captures the situation when there is likely to be less private information gathering due to less pre-release of information (proxied by pre_iv) and when subsequently earnings announcement reduces more disagreement among traders (proxied by absolute decrease in implied volatility). By construction, my measure captures the two most important sources of information advantage that sophisticated traders have (private information gathering and processing ability) and identifies out the firm-quarter announcement that could help uninformed traders most.

I construct my measure by relative change in implied volatility around earnings announcement date. A higher pre-announcement disagreement and sharper

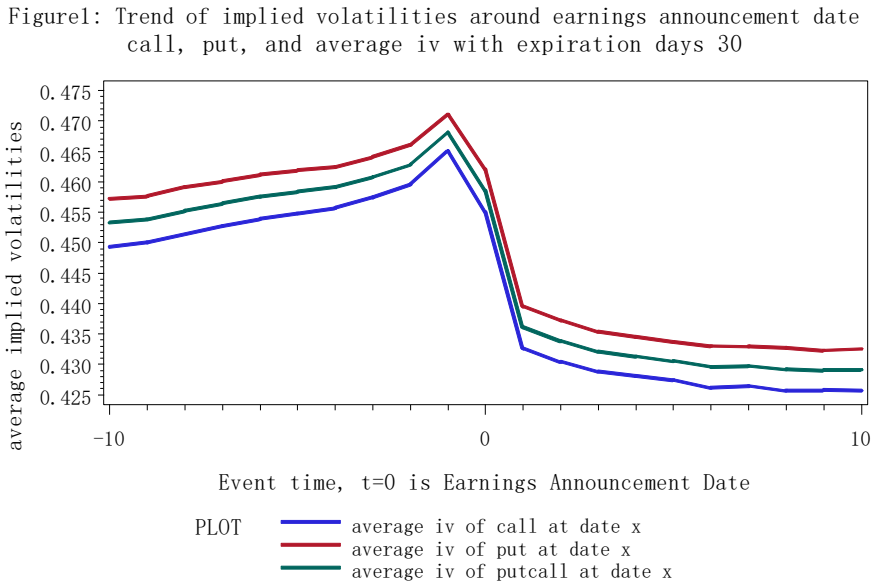
decrease in disagreement indicate higher disclosure quality in general, with the pre-announcement disagreement proxying for the importance of (demand for) information in earnings announcement, either due to business nature or due to less private information obtained before, and the post-announcement disagreement "slope" proxying for how clearly the earnings announcement explain to overall market. To rule out the effect of total amount of information and include only the quality for the information, I further scale my variable by different measures such as earnings surprise.

I examine the validity of my measure by showing that (1) for firms that experience more decrease in uncertainty during earnings announcement date, overall market conditions for the firm improve; (2) such firms enjoy decreased information asymmetry and informed trading both before and after earnings announcement in stock and option market; (3) this measure is positively related to firms' information environment. Taken all results together, I could find my measure do capture the quality of earnings announcement from the perspective of uninformed traders, as overall market protection decreases, previously-documented pattern of informed trading attenuates, and analyst produce forecast timelier and precisely.

This research could help to identify a new measure of earnings announcement quality from a different perspective-the benefits to uninformed traders. This measure is different than previous disclosure quality measure since it focusses specifically on benefits of earnings announcement on naïve investors. Furthermore, this is measure that can be easily constructed for the universe of companies with option data in recent two decades. I show such quality in earnings announcement is

informative and could help to track where informed trading is more likely to happen.

Figure 1.1 Trend of implied volatilities around EAD:



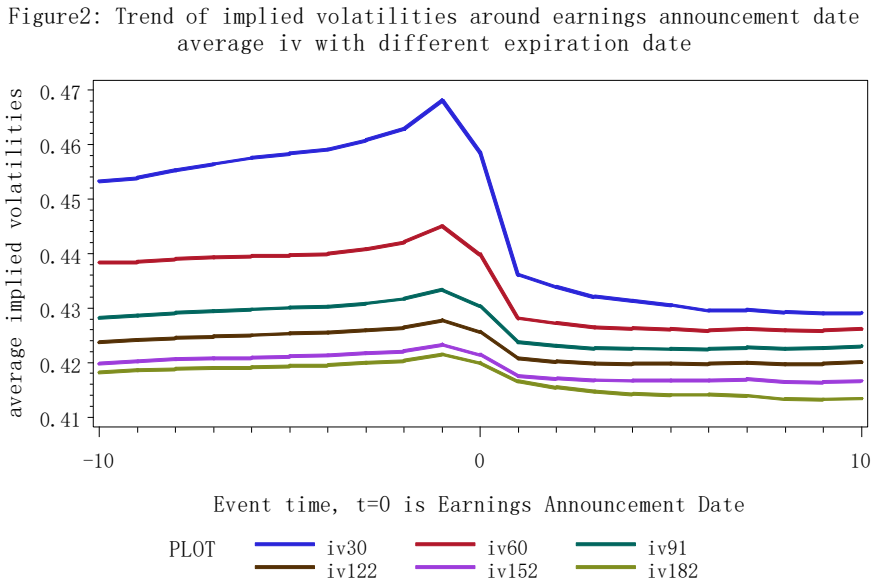


Table 1.1: Time-series statistic for nchiv

	Nchiv		Nchiv_scale1(by abssue)		Nchiv_scale2(by dispersion)		Nchiv_scale3(by volatility spread)	
year	Median	N	Median	N	Median	N	Median	N
1995	0.02	1,363	0.51	1,020	0.34	1,182	6.52	887
1996	0.01	7,071	0.38	5,264	0.33	5,980	8.43	4,471
1997	0.01	8,413	0.34	7,097	0.36	7,073	8.61	4,998
1998	0.01	9,479	0.30	7,922	0.33	7,912	8.11	5,132
1999	0.01	9,539	0.24	8,142	0.29	7,951	6.33	5,167
2000	0.01	8,658	0.23	7,861	0.27	7,121	8.29	4,377
2001	0.02	8,140	0.47	7,100	0.43	6,865	10.97	4,343
2002	0.02	8,176	0.55	6,962	0.57	7,055	10.59	4,637
2003	0.03	7,909	1.81	6,969	1.35	6,919	22.14	4,779
2004	0.04	8,725	2.83	7,795	1.61	7,718	31.83	5,302
2005	0.06	9,354	3.92	8,400	2.11	8,315	43.90	5,632
2006	0.09	10,004	6.23	9,181	2.72	8,909	67.58	5,865
2007	0.08	10,688	4.37	9,941	2.14	9,543	52.42	6,084
2008	0.07	10,505	2.24	9,711	1.44	9,444	29.75	6,257
2009	0.08	10,634	3.34	9,880	1.68	9,562	27.23	6,543
2010	0.07	11,263	3.17	10,307	1.67	10,035	33.80	6,605
2011	0.07	11,930	2.64	10,342	1.70	10,518	38.17	6,601
2012	0.09	12,105	4.41	9,905	2.25	10,444	56.61	6,501
2013	0.11	12,951	5.99	10,971	3.00	11,254	86.54	6,542
2014	0.11	13,454	4.27	11,622	2.75	11,725	87.04	6,529
2015	0.10	10,269	3.81	8,865	2.25	9,011	74.06	5,092
Total	0.05	201,000	1.98	175,000	1.41	175,000	31.69	112,000

Table 1 provides time-series feature of the raw nchiv measure and scaled nchiv masure. The sample period spans from 1996 to 2015 and contains about a maximum of 201,030 firm-quarter observations. All variables are defined in Appendix.

Table 1.2: Descriptive statistics
Panel A: Main dependent variables

variable	mean	p50	p25	p75	sd	N
nchiv	0.06	0.05	(0.01)	0.13	0.14	200,630
nchiv scale1	14.48	1.98	(0.11)	10.09	49.59	175,257
nchiv scale2	3.19	1.41	(0.13)	5.47	9.54	174,536
nchiv scale3	107.80	31.69	(0.15)	133.60	286.90	112,344
aq	5.50	6.00	3.00	8.00	2.87	200,630
lncham	(0.17)	(0.16)	(0.62)	0.28	0.70	200,499
lnchbas	0.05	0.04	(0.21)	0.30	0.40	200,560
pin	0.13	0.12	0.09	0.16	0.06	135,395
chsigma	0.00	0.00	(0.05)	0.05	0.07	200,536
chidrisk	0.05	(0.03)	(0.24)	0.24	0.42	200,431
uv	0.78	0.34	(0.12)	1.10	1.51	200,505
car	0.00	0.00	(0.04)	0.04	0.08	200,581
abssue3	0.00	0.00	0.00	0.00	0.01	127,222
Purchased	0.07	0.00	0.00	0.00	0.25	200,630
Saled	0.22	0.00	0.00	0.00	0.42	200,630
Wavg_profit s	0.00	(0.00)	(0.10)	0.10	0.25	57,143
Big_imb	0.05	0.05	(0.02)	0.12	0.14	172,064
Small_imb	0.04	0.02	(0.01)	0.07	0.08	171,885
WRf	0.32	0.30	0.18	0.45	0.19	176,509
WNf	3.59	2.50	1.02	5.07	3.50	179,609
Afa	(0.02)	(0.01)	(0.01)	(0.00)	0.06	143,483
reaction	(41.23)	(8.94)	(25.81)	(3.10)	112.20	116,674

Table 2 provides the summary statistics for the key variables in my primary tests. The sample period spans from 1996 to 2015 and contains about a maximum of 200,630 firm-quarter observations. All variables are defined in Appendix.

Table 1.3: Correlation matrix

	nchiv	lncham	uv	car	Abs sue
nchiv	1				
lncham	-0.045	1			
Uv	0.083	-0.089	1		
car	0.206	-0.133	-0.024	1	
abssue	-0.043	0	0.027	-0.001	1
purchased	-0.041	-0.007	0.018	-0.089	0.035
saled	0.133	-0.06	0.031	0.118	-0.1
Wavg_profits	-0.014	0.008	0	-0.03	0.038
big_imb	-0.026	-0.016	-0.012	0.019	-0.04
small_imb	-0.046	-0.035	-0.009	0.038	-0.075
WRf	0.173	-0.034	0.186	0.009	-0.019
Afa	0.032	-0.017	0.028	0.044	-0.288
Reaction	0.039	-0.004	-0.003	0.018	-0.429

Purchased	Saled	wavg profits	Big_imb	Small_imb	WRf	Afa
1						
-0.012	1					
0.061	-0.069	1				
-0.009	0.004	-0.005	1			
-0.014	-0.01	-0.007	0.215	1		
-0.006	0.102	-0.01	-0.041	-0.122	1	
0.011	0.075	-0.011	0.025	0.037	0.053	1
-0.018	0.062	-0.024	0.018	0.032	0.013	0.135

Table 3 provides the Pearson correlation for the key variables in my primary sample. Figures in bold indicates that two variables are significantly correlated at least at 0.1 level. All variables are defined in Appendix.

Table 1.4: The determinants of nchiv

	(1) nchiv	(2) nchiv_scale1	(3) nchiv_scale2	(4) nchiv_scale3
pre_iv	0.297***	31.112***	16.969***	334.487***
	(52.56)	(18.96)	(40.43)	(29.81)
abssue3	-0.994***	-113.756***	-51.000***	-6619.371***
	(-8.64)	(-3.29)	(-8.07)	(-26.93)
loss	-0.017***	-2.346***	-0.928***	-4.906
	(-11.39)	(-3.95)	(-8.87)	(-1.53)
qtr4	0.004***	0.347	0.115*	13.998***
	(4.39)	(0.78)	(1.71)	(5.98)
roa	0.222***	39.322***	14.739***	447.363***
	(10.83)	(4.78)	(8.95)	(7.02)
lnmv	0.013***	3.838***	0.826***	35.971***
	(20.38)	(16.27)	(16.20)	(20.00)
BLev	-0.002	-1.199	-1.403***	-17.081
	(-0.50)	(-0.79)	(-4.51)	(-1.64)
btm	-0.001	-0.158	-0.003	-3.263***
	(-1.45)	(-1.46)	(-0.12)	(-4.48)
io	0.032***	5.455***	1.156***	43.834***
	(9.59)	(4.82)	(4.65)	(5.63)
ac	0.002***	0.630***	0.026***	2.559***
	(13.76)	(13.73)	(2.67)	(7.73)
mom	0.017***	0.732	0.753***	2.233
	(9.11)	(1.00)	(5.35)	(0.53)
stdret	-2.537***	-376.169***	-139.128***	-2410.714***
	(-35.75)	(-18.01)	(-28.05)	(-17.88)
rd	-0.045	30.453**	2.348	-230.160**
	(-1.00)	(1.98)	(0.71)	(-2.18)
dispersion	0.015*	-2.773	-19.682***	-70.936***
	(1.73)	(-0.83)	(-28.31)	(-3.51)
constant	-0.163***	-42.608***	-8.797***	-346.977***
	(-11.13)	(-8.68)	(-8.48)	(-15.87)
Industry fixed	Yes	Yes	Yes	Yes
Quarter fixed	Yes	Yes	Yes	Yes
Observations	105989	96026	104442	93375
Adj Rsquare	0.229	0.080	0.158	0.160

Table 4 presents the effect of the determinants of firm and quarter-specific variables on four NCHIV measure. The sample spans the period 1996 to 2015 and contains about a maximum of 105,989firm-quarter observations. The dependent variable is negative change in implied volatility (nchiv in colume (1)), nchiv scaled by absolute earnings surprice (nchiv_scale2 in colume (2)), nchiv scaled by analyst forecast dispersion (nchiv_scale3 in colume (3)), nchiv scaled by volatility spread before (nchiv_scale3 in colume (4)) , respectively. All control variables are defined in Appendix. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively. All continuous variables are winsorized at the 1 percent and 99 percent levels. t-statistics are in parentheses, and are based on standard errors clustered on the firm level.

Table 1.5: The effect of my measure on market conditions
Panel A: Does AQ help to improve market liquidity?

	(1) lncham	(2) lnchbas
pre_iv	0.068***	-0.007
	(3.27)	(-0.56)
aq	**-0.008*** **	**-0.009*** **
	(-9.47)	**(-20.31)**
lnmv	0.028***	-0.018***
	(12.33)	(-14.31)
rd	-0.220	0.112
	(-1.24)	(1.19)
BLev	0.025*	0.012
	(1.79)	(1.52)
btm	0.000	-0.001
	(0.21)	(-0.86)
io	-0.050***	-0.005
	(-4.32)	(-0.71)
ac	0.000	0.000
	(0.51)	(1.20)
abssue3	-3.328***	2.280***
	(-6.66)	(7.98)
loss	0.056***	0.017***
	(7.85)	(4.43)
qtr4	0.001	0.007**
	(0.12)	(2.25)
mom	0.014	0.059***
	(1.27)	(9.49)
roa	-0.739***	0.080
	(-8.91)	(1.63)
stdret	0.013	-2.917***
	(0.04)	(-16.50)
constant	-0.295***	0.260***
	(-6.07)	(10.08)
Industry fixed	Yes	Yes
Quarter fixed	Yes	Yes
Observations	108968	108988
Adj Rsquare	0.024	0.068

Table 5 Panel A presents the effect of my measure on market liquidity improvement. The sample spans the period 1996 to 2015. The dependent variable is log (1 plus relative change in average Amihud illiquidity measure) from [-5, -2] to [2, 5] days around earnings announcement date (lncham in colume (1)), log (1 plus relative change in average bid-ask spread) from [-5, -2] to [2, 5] days around earnings announcement date (lnchbas in colume (2)). All control variables are defined in Appendix. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively. All continuous variables are winsorized at the 1 percent and 99 percent levels. t-statistics are in parentheses, and are based on standard errors clustered on the firm level.

Panel B: Does AQ help to reduce information asymmetry?

	(1) pin	(2) chsigma	(3) chidrisk
pre_iv	-0.018***	0.003	0.413***
	(-8.35)	(1.61)	(30.92)
aq	**-0.000*** **	**-0.001*** **	**-0.011*** **
	(-4.91)	**(-6.29)**	**(-24.10)**
lnmv	-0.018***	-0.000	-0.011***
	(-45.77)	(-0.81)	(-8.09)
rd	-0.130***	-0.007	0.388***
	(-5.32)	(-0.42)	(3.67)
BLev	0.011***	0.001	0.010
	(5.05)	(0.63)	(1.18)
btm	0.001***	0.000	0.004***
	(2.92)	(0.00)	(4.39)
io	-0.028***	-0.000	-0.019***
	(-14.47)	(-0.04)	(-2.75)
ac	-0.001***	-0.000***	0.000
	(-11.56)	(-2.92)	(0.12)
abssue3	0.528***	0.216***	3.530***
	(9.54)	(4.35)	(10.82)
loss	0.002**	-0.002***	0.032***
	(2.30)	(-3.32)	(7.55)
qtr4	0.001***	-0.005***	-0.012***
	(2.65)	(-8.24)	(-4.15)
mom	0.009***	-0.014***	0.012**
	(11.18)	(-12.08)	(1.98)
roa	-0.014	0.000	-0.032
	(-1.37)	(0.05)	(-0.63)
stdret	-0.604***	-0.060**	-12.125***
	(-22.86)	(-2.00)	(-63.84)
constant	0.362***	0.021***	0.361***
	(46.23)	(5.56)	(12.67)
Industry fixed	Yes	Yes	Yes
Quarter fixed	Yes	Yes	Yes
Observations	77959	108980	108958
Adj Rsquare	0.464	0.104	0.109

Table 5 Panel B presents the effect of my measure on change in informed trading around earnings announcement date. The sample spans the period 1996 to 2015 and contains about a maximum of 108,988 firm-quarter observations. The dependent variable is probability of informed trading in current quarter (pin in colume (1)), relative change in logistic transformed (1-R2) from Fama-French four factors model around earnings announcement date (chsigma in colume (2)), relative change in root-mean-square deviation of error from Fama-French four factor model around earnings announcement date (chidrisk in colume (3)), respectively. All control variables are defined in Appendix. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively. All continuous variables are winsorized at the 1 percent and 99 percent levels. t-statistics are in parentheses, and are based on standard errors clustered on the firm level.

Table 1.6: Is there reduced informed trading in option market before earnings announcement date?

	(1)	(2)		(3)	(4)
Model1	car	car	Model2	car	car
sue3	1.923***	1.935***	sue3	2.186***	2.212***
	(12.06)	(12.17)		(17.34)	(17.57)
skew_pre	-0.247***	-0.249***	spread_pre	0.049***	0.053***
	(-17.52)	(-17.51)		(4.05)	(4.40)
skew_base	-0.302***	-0.307***	spread_base	0.185***	0.185***
	(-16.79)	(-16.97)		(11.83)	(11.81)
sue3*aq	0.170***	0.173***	sue3*aq	0.110***	0.108***
	(6.37)	(6.46)		(5.05)	(4.93)
skew_pre*aq	**0.039*** **	**0.040*** **	**spread_pre*aq**	**-0.004** **	**-0.004** **
	(17.96)	**(18.07)**		**(-2.12)**	**(-2.17)**
skew_base*aq	**0.059*** **	**0.059*** **	**spread_base*aq**	**-0.041*** **	**-0.040*** **
	(20.82)	**(20.76)**		**(-15.41)**	**(-15.19)**
constant	0.001***	0.002	constant	0.002***	-0.000
	(3.06)	(0.27)		(8.68)	(-0.03)
Industry fixed	No	Yes	Industry fixed	No	Yes
Quarter fixed	No	Yes	Quarter fixed	No	Yes
Observations	89866	89866	Observations	113465	113465
Adj Rsquare	0.079	0.085	Adj Rsquare	0.054	0.059

Table 6 presents the effect of my measure on informed trading in option market before earnings announcement date. The sample spans the period 1996 to 2015 and contains about a maximum of 113,465 firm-quarter observations. The dependent variable cumulative abnormal return one day around earnings announcement date. Skew_pre, skew_base, spread_pre, spread_base follows Jin et al (2012). Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively. All continuous variables are winsorized at the 1 percent and 99 percent levels. t-statistics are in parentheses, and are based on standard errors clustered on the firm level.

Table 1.7: Is there reduced informed insider trading after earnings announcement date?

Panel A: The probability of insider trading happened right after earnings announcement date-further partition

	(1) opp_purchased	(2) opp_saled	(3) routine_purchased	(4) routine_saled
pre_iv	0.120	-0.632***	0.319	-0.403**
	(0.60)	(-5.07)	(1.01)	(-2.02)
aq	**-0.047*** **	**0.062*** **	**-0.020**	**0.068*** **
	(-4.62)	**(12.45)**	**(-1.22)**	**(8.72)**
lnmv	-0.014	0.150***	-0.008	0.140***
	(-0.43)	(7.03)	(-0.14)	(4.00)
rd	0.524	5.001***	-0.839	13.723***
	(0.24)	(3.69)	(-0.22)	(7.59)
BLev	0.756***	-0.471***	0.836**	-0.656**
	(3.83)	(-3.71)	(2.00)	(-2.47)
btm	-0.003	-0.162***	-0.043*	-0.288***
	(-0.23)	(-5.65)	(-1.66)	(-5.44)
io	-0.024	1.004***	-0.545*	1.095***
	(-0.13)	(8.83)	(-1.73)	(5.47)
ac	0.006	0.015***	-0.001	0.031***
	(1.09)	(4.24)	(-0.08)	(5.10)
sue3	-6.440	16.246***	-19.646***	0.231
	(-1.57)	(5.31)	(-2.92)	(0.05)
loss	0.127	-0.543***	0.126	-0.434***
	(1.47)	(-10.21)	(0.86)	(-4.81)
qtr4	0.277***	0.227***	0.405***	0.185***
	(4.50)	(8.61)	(4.15)	(5.30)
mom	-1.858***	1.446***	-0.987***	0.970***
	(-10.72)	(25.48)	(-3.63)	(12.27)
constant	-4.294***	-4.512***	-5.263***	-4.693***
	(-6.46)	(-10.24)	(-4.73)	(-10.40)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	116012	116397	112011	116397
Adj Rsquare	0.048	0.086	0.051	0.118

Table 7 Panel A presents the logit regression of my measure on probability of insider trading partitioned into opportunistic trades and routine trades within [3,13] days after earnings announcement date. The sample spans the period 1996 to 2015 and contains about a maximum of 116,397 firm-quarter observations. The dependent variable is opportunistic purchase dummy indicator(opp_purchased in colume (1)), opportunistic sales dummy indicator (opp_saled in colume (2)), routine purchase dummy indicator(routine_purchased in colume (3)), routine sales dummy indicator (routine_saled in colume (4)), respectively. All control variables are defined in Appendix. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively. All continuous variables are winsorized at the 1 percent and 99 percent levels. t-statistics are in parentheses, and are based on standard errors clustered on the firm level.

Panel B: Insider trading's profits after earnings announcement date

	(1)	(2)	(3)	(4)

	wavg_profits	wavg_profits	wavg_profits	wavg_profits
pre_iv	-0.012	-0.019*	-0.016	-0.008
	(-1.12)	(-1.68)	(-1.41)	(-0.70)
aq	**-0.001***			
	(-1.85)			
aq_scale1		**-0.001****		
		(-2.14)		
aq_scale2			**-0.000**	
			(-0.92)	
aq_scale3				**-0.001*****
				(-2.69)
lnmv	-0.004***	-0.004***	-0.004***	-0.004***
	(-3.11)	(-2.73)	(-3.23)	(-3.14)
rd	-0.443***	-0.427***	-0.460***	-0.445***
	(-3.81)	(-3.58)	(-3.89)	(-3.69)
BLev	0.012	0.010	0.010	0.014*
	(1.44)	(1.19)	(1.28)	(1.69)
btm	0.001**	0.001	0.001*	0.001*
	(2.01)	(1.00)	(1.88)	(1.76)
io	0.004	0.006	-0.000	0.000
	(0.53)	(0.80)	(-0.01)	(0.02)
ac	0.000	0.000	0.000	0.000**
	(1.59)	(1.13)	(1.36)	(2.11)
sue3	-0.412	-0.411	-0.434	-0.469
	(-1.35)	(-1.29)	(-1.40)	(-1.54)
loss	0.015***	0.016***	0.015***	0.013***
	(3.66)	(3.54)	(3.49)	(3.00)
qtr4	-0.002	-0.003	-0.002	-0.002
	(-1.04)	(-1.45)	(-0.92)	(-0.93)
mom	-0.049***	-0.050***	-0.049***	-0.044***
	(-6.31)	(-6.23)	(-6.34)	(-5.35)
constant	0.048*	0.053*	0.051*	0.045*
	(1.81)	(1.86)	(1.87)	(1.65)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	39143	35872	37919	34657
Adj Rsquare	0.016	0.017	0.017	0.017

Table 7 Panel B presents the OLS regression of my measure on value-weighted average insider trading's profits for all trades taken within [3,13] days after earnings announcement date. The sample spans the period 1996 to 2015 and contains about a maximum of 39,143 firm-quarter observations. All control variables are defined in Appendix. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively. All continuous variables are winsorized at the 1 percent and 99 percent levels. t-statistics are in parentheses, and are based on standard errors clustered on the firm level.

Table 1.8: Behavior of big/small trades in stock market around EAD with higher AQ

Panel A: Big trades

	(1) big_imb_day2m	(2) big_imb_day1m	(3) big_imb_day0	(4) big_imb_day1	(5) big_imb_day2
sue3	0.376**	0.044	0.189	0.168	0.190
	(2.16)	(0.27)	(1.39)	(1.22)	(1.20)
aq	-0.000	-0.001***	0.001***	0.001***	-0.000
	(-1.50)	(-3.47)	(5.46)	(5.10)	(-1.43)
sue3*aq	**-0.076*** **	**-0.016**	**-0.049** **	**-0.030**	**-0.031**
	(-2.60)	**(-0.58)**	**(-2.13)**	**(-1.31)**	**(-1.17)**
stdret	0.564***	0.443***	0.446***	0.470***	0.529***
	(12.75)	(10.79)	(12.83)	(13.33)	(13.16)
btm	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***
	(-12.21)	(-12.42)	(-14.50)	(-12.61)	(-11.74)
BLev	0.011**	0.008	0.008*	0.021***	0.004
	(2.11)	(1.63)	(1.90)	(4.99)	(0.86)
loss	0.001	0.001	0.001	0.001	0.001
	(0.35)	(0.97)	(0.79)	(0.93)	(0.94)
lnmv	-0.006***	-0.006***	-0.007***	-0.005***	-0.005***
	(-5.09)	(-6.09)	(-8.10)	(-5.13)	(-4.51)
ac	-0.001***	-0.001***	-0.001***	-0.001***	-0.000***
	(-6.01)	(-4.73)	(-5.76)	(-6.98)	(-3.53)
io	-0.055***	-0.056***	-0.061***	-0.047***	-0.057***
	(-13.91)	(-15.28)	(-19.89)	(-15.03)	(-15.97)
constant	0.142***	0.156***	0.152***	0.118***	0.125***
	(16.22)	(19.25)	(22.09)	(16.92)	(15.70)
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	104278	104292	104332	104336	104316
Adj Rsquare	0.009	0.009	0.013	0.010	0.009

Table 8 Panel A presents the OLS regression of my measure on big buy-and-sale imbalance from two trading days before earnings announcement to two trading days after earnings announcement (colume (1) to (5)), respectively. Big trade is defined as those with more than $50,000 for each trade. The sample spans the period 1996 to 2015 and contains about a maximum of 104,336 firm-quarter observations. All variables are defined in Appendix. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively. All continuous variables are winsorized at the 1 percent and 99 percent levels. t-statistics are in parentheses.

Panel B: Small trades

	(1) small_imb_day2m	(2) small_imb_day1m	(3) small_imb_day0	(4) small_imb_day1	(5) small_imb_day2
sue3	0.129	0.250***	0.218**	0.078	0.129
	(1.38)	(2.73)	(2.52)	(0.88)	(1.43)
aq	-0.000***	-0.000	0.001***	0.001***	-0.000***
	(-3.23)	(-0.89)	(11.03)	(5.28)	(-4.89)
sue3*aq	**-0.021**	**-0.044*** **	**-0.050*** **	**-0.041*** **	**-0.050*** **
	(-1.32)	**(-2.89)**	**(-3.42)**	**(-2.77)**	**(-3.33)**
stdret	0.647***	0.580***	0.541***	0.778***	0.593***
	(26.93)	(24.74)	(24.43)	(34.37)	(25.78)
btm	-0.005***	-0.006***	-0.006***	-0.007***	-0.005***
	(-21.84)	(-24.53)	(-26.00)	(-32.04)	(-22.06)
BLev	0.003	0.002	0.001	0.006**	0.001
	(1.19)	(0.66)	(0.35)	(2.13)	(0.41)
loss	-0.002*	-0.001*	-0.002***	-0.002**	-0.002**
	(-1.90)	(-1.70)	(-2.93)	(-2.30)	(-2.36)
lnmv	-0.007***	-0.007***	-0.007***	-0.009***	-0.006***
	(-11.50)	(-12.06)	(-12.42)	(-14.82)	(-9.39)
ac	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(-10.24)	(-11.00)	(-12.43)	(-15.46)	(-13.43)
io	-0.054***	-0.058***	-0.069***	-0.080***	-0.063***
	(-25.41)	(-27.73)	(-35.19)	(-39.60)	(-30.92)
mom	-0.003**				
	(-2.49)				
constant	0.128***	0.139***	0.147***	0.170***	0.130***
	(27.24)	(30.02)	(33.54)	(37.97)	(28.65)
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	103811	103988	103980	103952	103945
Adj Rsquare	0.031	0.033	0.042	0.061	0.037

Table 8 Panel B presents the OLS regression of my measure on small buy-and-sale imbalance from two trading days before earnings announcement to two trading days after earnings announcement (colume (1) to (5)), respectively. Big trade is defined as those with less than $5,000 for each trade. The sample spans the period 1996 to 2015 and contains about a maximum of 103,988firm-quarter observations. All variables are defined in Appendix. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively. All continuous variables are winsorized at the 1 percent and 99 percent levels. t-statistics are in parentheses.

Table 1.9: Does analysts update their information more strongly and more accurately under high AQ?

	(1) WRf	(2) WNf	(3) Afa240	(4) reaction
pre_iv	-0.050***	-0.188	-0.002	-24.518***
	(-6.79)	(-1.62)	(-1.18)	(-4.41)
aq	**0.005*** **	**0.053*** **	**0.000** **	**0.473** **
	(14.73)	**(10.53)**	**(2.37)**	**(2.18)**
lnmv	-0.007***	0.153***	-0.000	4.835***
	(-5.13)	(6.24)	(-0.05)	(7.17)
rd	0.256**	5.547***	0.030	3.539
	(2.33)	(3.19)	(1.60)	(0.05)
BLev	0.016*	0.404**	0.001	-4.864
	(1.69)	(2.21)	(1.18)	(-1.04)
btm	-0.004***	-0.042**	-0.001***	-1.350***
	(-4.79)	(-2.56)	(-3.40)	(-2.88)
io	0.032***	0.595***	0.001	7.426**
	(4.24)	(4.74)	(0.73)	(2.04)
ac	0.001***	0.368***	0.000***	0.298**
	(4.32)	(69.11)	(2.74)	(2.13)
sue3	-0.185	4.838**	0.209***	597.557**
	(-1.29)	(2.27)	(3.15)	(2.17)
loss	0.003	-0.045	-0.001	-54.590***
	(1.31)	(-1.00)	(-1.12)	(-17.62)
qtr4	0.006***	-0.073**	0.002***	-27.526
	(3.72)	(-2.47)	(5.10)	(-1.33)
mom	-0.002	-0.143**	0.000	1.790
	(-0.60)	(-2.54)	(0.52)	(0.48)
Afa101m	0.079***	-1.467***	0.469***	89.189***
	(5.69)	(-4.76)	(19.33)	(3.69)
dispersion	-0.167***	-0.584*	-0.028***	-112.198***
	(-9.77)	(-1.70)	(-4.18)	(-6.29)
constant	0.202***	-3.350***	0.004	-73.568
	(6.80)	(-8.78)	(1.11)	(-1.57)
Industry FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	44430	44524	40049	28886
Adj Rsquare	0.367	0.732	0.632	0.135

Table 9 presents the OLS regression of my measure on the speed of analyst response after earnings announcement, respectively. All variables are defined in Appendix. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively. All continuous variables are winsorized at the 1 percent and 99 percent levels. t-statistics are in parentheses.

Chatper 2: Financial statement comparability and expected default risk

1. Introduction

As one of the fundamental characteristics that distinguish useful financial information from information that is not useful, financial statement comparability allows financial statement users to identify and understand similarities and differences among several entities (FASB). Both FASB and IASB include comparability in their conceptual framework and advocate comparable financial statement among firms and across time.

In recent years, growing amount of empirical evidence shows that financial statement users could make better investing decision and monitor the firms more effectively if they can compare a company's financial information with similar information from another company in its industry, resulting in less information asymmetry (De Franco et al., 2011) and necessity of voluntary disclosures (Gong et al., 2013), and less perceived crash risk (Kim et al., 2016) and perceived credit risk (Kim et al., 2013). However, though the concept of comparability is important to policymakers, relatively limited studies exist (Kim et al,. 2013).

In this paper, I examine the effect of financial statement comparability on firms' default risk. Corporate default is a major event of catastrophe and could affects many stakeholders such as investors, debtholders, customers, suppliers, etc. Due to importance of a company's credit reputation and the destroying consequence of default event, multiple measures, and models such as credit rating, credit spread and structural models based on Merton (1974) are developed to measure the default risk. Among various measures used, expected default frequency provide continuous

and powerful predicting measure for true default (Bharath and Shumway, 2008). Previous literatures identify some factors that affect and predict default risk, including liquidity, firm size, debt level, stock volatilities, stock returns. With widely-available large data source, one could easily identify whether financial statement comparability could be one potential source of predictors. Besides, the improved model could help companies' stakeholders to better evaluate the firm's future financial health.

Financial statement comparability could affect default risk for several reasons. First, comparable financial statements facilitate better comparison among industry peers and might provide managers with more useful information to form their routine business decisions. As business risk is one of the most important factors to identify a firm's credit risk (Fabozzi textbook), with better understanding of their own firms and industry peers, and hence, more efficient business decision formed, less probability of default should happen. Consistent with this argument, prior literature shows financial statement comparability reduces information asymmetry and therefore could potentially improve information efficiency. Previous results also indicate that managers could incorporate information from market to form their investing decisions (Luo, 2005; Chen et al., 2007; Bakke and Whited, 2010). Therefore, the improved market environment induced by comparability might possibly provide managers with more useful information and make their mind clearer to form more effective investing and financing decisions (Chircop et al., 2016; Alhadi, 2017), resulting in increased financial health and firm value and decreased probability of default.

Second, improved information environment enables financial statement users to better assess firms' financial condition beforehand, therefore increasing their monitoring effectiveness (Defond et al., 2011). Specifically, when investors could better evaluate a company's financial statement with other firms in the same industries, it might attract more sophisticated and long-term oriented investors, who in return better monitor managers' operating and investing activities.

To test my hypothesis, I begin my test by employing three firm-quarter specific comparability measures from De Franco et al. (2011) and Barth et al. (2012) from 1990 to 2016. Firm-specific default risk is expected default frequency based on Merton (1974)'s structural model and simplified by Bharath and Shumway (2008). The baseline results show comparability reduces EDF for up to four quarters and such effect decreases monotonously over time. And the relation is both statistically and economically significant, for example, one standard deviation of comparability decreases current probability of default by 2.7% percent.

I further examine under what conditions such effect would be attenuated or exaggerated. Overall, I find the negative relation is more pronounced for firms that are less visible, for firms in high-tech industry, and for firms with less monitoring. The results are consistent with more marginal benefit of comparability on default risk exist in firms with serious information asymmetry problems.

Lastly, I study the channels through which that comparability might affect default risk. De Franco et al. (2011) shows comparability could help to improve information output and thus increase information efficiency. With improved information efficiency, managers could learn in return from the updated

information, improve their investing and financing decisions (Luo, 2005; Chen et al., 2007; Bakke and Whited, 2010), and better manage their cash flow and debt obligations (Brogaard et al. 2017). Using price autocorrelation for several months as a proxy for information efficiency, my test based on path analysis shows that comparability could help to reduce price delay which increases default risk.

Another potential channel may come from increased monitoring efficiency (Defond et al 2011) from firms with more comparable financial statement. Again, I use path analysis in simultaneous regression and show comparability attract more institutional investors especially for those long-term one (dedicated and quasi-index investors), who have longer investment horizon and care for long-term sustainability of a firm (Bushee, 1998, 2001).

A paper related to but different than my research is Kim et al. (2013), who examine the impact of financial statement comparability on debtholders' estimate of adverse selection cost and their assessment exact assets value of the firm, which increases their self-protection through higher bid-ask spread. While both of our researches focus on credit issues within a company, I focus on the feedback effect of comparable financial statement on managers' information set and on the effect of improved accounting transparency on outside monitoring institutions, and Kim et al. (2013) pay more attention to agency story from debtholders' perceived risk on firm rooting in information asymmetry.

This paper could contribute to two strands of literatures. First, I contribute to the economic benefit of comparability. Previous papers largely examine the effect of comparability on information environment (De Franco et al., 2011) and market

confidence from the perspective of stock and debt investors (Kim et al., 2013, Kim et al., 2016). My results show comparability might have real effect on corporate default risk through improved information feedback to managers and close monitoring from sophisticated investors, rather than perceived risk just from investors' point of view.

Second, this paper contributes to factors that might affect default risk. Despite of previously identified factors that affect EDF in Brogaard et al. (2017) and Bharath and Shumway (2008), I find that comparability could also reduce EDF up to several periods, indicating a long-period effect from comparability exist in default risk.

The following of the paper is structured as follows. Section 2 reviews the related literature and develops the hypothesis. Section 3 describes my sample, empirical models, and main construction for my measurement. Section 4 presents the empirical results and robustness checks. Section 5 concludes the paper.

2. Literature review and hypothesis development

2.1 Financial statement comparability

As a fundamental quality factor for financial statement, there are several papers try to construct proxies for this quality measurement and try to identify the major source and potential outcomes of firms with high comparable statements with their industry peers. Among these attempts, De Franco et al. (2011) develops a measure for comparability and find it increases analyst coverage and decreases forecast dispersion in US data. Later papers identify one source for why some companies

are more comparable and find that those share same audit firms have more comparable financial statements (Francis et al., 2014; Cai et al.,). Despite of the measurement and determinants identified in prior papers, the focus in this area investigate the potential outcome of comparability and there are growing number of findings emerge in recent years. These researches find increased comparability increases evaluation efficiency in stock and credit market and decreases crash risk and credit spread (Kim et al., 2013; Kim et al., 2016), reduces information asymmetry (Francis et al., 2011; Neel 2016), have higher price impact on foreign investors (Wang 2014), reduce cost of capital and increases firm value (Imhof et al., 2017; Neel, 2016), affect managers' disclosure incentive (Gong et al., 2013) and insiders' trading profits (Brochet et al., 2013), increases investment efficiency (Alhadi, 2017), increases more favorable contracting for firms in syndicated market(Fang et al., 2016), attract mutual fund ownership (Defond et al., 2011) but also attract hedge fund activism (Cheng et al., 2017), lead acquirers make more profitable acquisition decisions when target firms' financial statements are more comparable (Chen et al., 2014), and captures restatement contagion effect(Campbell and Yeung, 2017). Last, several researches examine comparability in the context of mandatory International Financial Reporting Standards (IFRS) adoption (, Barth et al., 2012; Brochet et al., 2013; DeFond et al., 2011; DeFond et al., 2015; Wang, 2014; Yip and Young, 2012). For these existing finding, we could find that stakeholders use comparable information to better infer a company's financial position, which decreases the information asymmetry (Francis et al.,

2011; Neel, 2016) and in return attract more senior investors to be involved in transactions with these companies (Defond et al., 2011; Cheng et al., 2017).

2.2 Corporate default risk

Corporate have three major types of credit risk: default risk, downgrading risk, and credit spread risk. For the above risks, default risk is the most severe risk and once default events happen, not only debt investors, but also stock market investors, managers, customers, and suppliers will be affected. Due to the economic significance of default risk, different models and attempts by credit rating agencies evolve. Structural models based on Merton (1976) are widely applied. Bharath and Shumway (2008) develop a simplified version and show their estimate of "distance-to-default" have quiet strong prediction power for default events. Besides, this model offers a continuous estimate and monitoring of corporate default that allows timely investigation of default risk. Broggard et al. (2017) later contribute one additional factor that affect distance-to-default from market-stock liquidity.

2.3 The link between financial statement comparability and default risk

Financial statement comparability could affect a company's default risk in several ways.

To begin with, practitioners usually identifies factors including a company's business risk, financial risk, and investing risk in credit risk analysis (Fabozzi textbook) and anecdotal evidence shows overall increased valuation resulted from

better business decision of a company provide buffer for corporate debt (Esser's practitional research in Fabozzi's textbook). As those main fundamental decisions are made by managers, with improved information environment (Francis et al., 2011; Neel 2016) and monitoring (Defond et al., 2011) facilitated by financial statement comparability to make their business decisions (Luo, 2005; Chen et al., 2007 ; Bakke and Whited, 2010), managers will more likely to make effective and efficient business decisions (Chircop et al., 2016; Alhadi, 2017), improve overall financial health, and therefore reduce default risk.

However, anecdotal evidence shows that a reason that is often unsaid to contribute default risk is the bank or creditor being too optimistic about firms' financial conditions (Martin Healey on Quora). As previous literature shows that financial statement comparability increases confidence in both stock and debt market about a firm's financial condition and therefore reduce perceived risk (Kim et al., 2013; Kim et al., 2016) within this company, if such increased confidence just reflect overconfidence in equity and debt market instead of fair evaluation of a company's true financial position, the potential decreased monitoring from investors might adversely affect a firm's financial health, resulting in higher default risk.

Thus, whether financial statement comparability influences default risk is an empirical question. Based on above argument, I develop the first hypothesis as follow.

H1- The more comparable for a corporate's financial statement, the less/more default risk this company will have.

Default is more likely to happen if managers do not understand their business deeply and when there is lack of monitoring therefore managers involved in too risky investing and financing projects (citation?). Prior literatures show that comparability reduces information asymmetry (Francis et al 2011, Neel 2016) and increases market's understanding of a firm (Kim et al., 2013; Kim et al., 2016). Since managers also learn from market to make their decisions (Luo, 2005; Chen et al., 2007 ; Bakke and Whited, 2010), such increased information in market might in return increases the efficiency that managers learn from market, helping them use more updated information to make efficient decisions (Chircop et al., 2016; Alhadi, 2017).

In addition, comparability might attract sophisticated investors (Defond et al., 2011) who usually monitor firms with long-term horizon (Buhsee, 2001). The longer horizon might make these investors more cautious when contacting with managers and care about continuous operation of a firm(citation), which increases long-term development rather than short-term risk-taking (Buhsee,1998).

Based on above argument, I examine the following two channels, one from information perspective and another from corporate governance perspective:

H2a- Firm's comparability increases market efficiency and reduce information asymmetry, which in return increases feedback to managers and let them make better decisions.

H2b- Firm's comparability attract more sophisticated and long-term investors, which in return increases monitoring effect on the firm and reduce future default risk.

Lastly, the relative impact of comparability on default risk may vary with firm characteristics. Based on my information argument, I predict that firms with more information asymmetry, either from its business nature or visibility in the market, will benefit more from comparable statement. Based on my governance argument, I predict that firms with less monitoring also will benefit more from comparable statement.

H3- The negative relation between a firm's comparability and default risk is more pronounced in firms with less visibility, more complex, less monitored firms.

3. Research design

3.1 Database and sample construction

I form sample from year 1990 to year 2015, with widely available data from Compustat quarterly financial data and CRSP stock data to construct our main interested variables. The sample comprises a maximum 177,800 firm-quarter observations. And sample size varies with specific tests.

3.2 measurement of default risk

Default risk is calculated based on distance to default using the KMV-Merton model following Bharath and Shumway (2008) and Brogaard et al. (2017) as follows:

$$DD_{i,t} = \frac{\log\left(\frac{Equity_{i,t} + Debt_{i,t}}{Debt_{i,t}}\right) + \left(r_{i.t-1} - \frac{\sigma^2_{Vi,t}}{2}\right) \times T_{i,t}}{\sigma^2_{Vi,t} \times \sqrt{T_{i,t}}},$$

$$\sigma_{Vi,t} = \frac{Equity_{i,t}}{Equity_{i,t}+Debt_{i,t}} \times \sigma_{Ei,t} + \frac{Debt_{i,t}}{Equity_{i,t}+Debt_{i,t}} \times (0.05 + 0.25 \times \sigma_{Ei,t}),$$

and

$$EDF_{i,t} = N(-DD_{i,t})$$

where $Equity_{i,t}$ is the market value of equity (in millions of dollars) calculated as the product of the number of shares outstanding and stock price at the end of the year; $Debt_{i,t}$ is the face value of debt computed as the sum of debt in current liabilities (Compustat quarterly data #45) and one-half of long-term debt (Compustat quarterly data #51) at the end of the year; r_{it-1}, firm i's past annual return, is calculated from monthly stock returns over the previous year; σEi, t is the stock return volatility for firm iduring year t estimated using the monthly stock return from the previous year; $\sigma_{Vi,t}$, calculated from $\sigma_{Ei,t}$, is an approximation of the volatility of firm assets; and $T_{i,t}$ is set to one year. I construct $DD_{i,t}$ of all sample firms as of the last day of each year. N(.) is the cumulative standard normal distribution function.

3.3 measurement of financial statement comparability

I construct three separate financial statement comparability measures based on three models developed following De Franco et al. (2011) and Barth et al. (2012), as well as first principle component for these three measures as my primary proxies

for comparability. All of the measures follow similar algorithm that measure closeness between two firms′ accounting systems in mapping economic events into financial statements (De Franco et al., 2011). To calculate De Franco et al. (2011)'s measure, for each firm i in each quarter, I run time-series regression of firm i's previous 16 quarters of earnings (proxy for accounting measure) over returns (proxy for economic events),

$$\text{Earnings}_{i,t} = \alpha_i + \beta_i \text{Return}_{i,t} + \varepsilon_i$$

where earnings is earnings before extraordinary items deflated by market value of equity and return is quarterly stock return.

For each firm-quarter observation I get the expected coefficient $\hat{\alpha}$ and $\hat{\beta}$ which measures accounting function for this firm-quarter. To compare the closeness of the accounting function between two firms, I calculate expected earnings of firm i based on the expected coefficient in firm i and firm j in the same sic two digits industry, and return in firm i as follows,

$$\text{E(Earnings)}_{i,i,t} = \hat{\alpha}_i + \hat{\beta}_i \text{Return}_{i,t}$$

$$\text{E(Earnings)}_{i,j,t} = \hat{\alpha}_j + \hat{\beta}_j \text{Return}_{i,t}$$

And the comparability between firm i and j is measured by -1 multiplies the absolute difference between $\text{E(Earnings)}_{i,i,t}$ and $\text{E(Earnings)}_{i,j,t}$, averaged by previous 16 quarters:

$$\text{Compacct}_{i,j,t} = -\frac{1}{16} \times \sum_{t-15}^{t} |\text{E(Earnings)}_{i,i,t} - \text{E(Earnings)}_{i,j,t}|$$

Finally, to compute comparability measure for each firm i in one specific quarter, I take the average of highest four pairwise comparability measure during the quarter and denote it as $\mathrm{Compacct4}_{i,t}$.

Comparability measures based on Barth et al. (2012) are similar except I use different models. For the second comparability measure, denoted as $\mathrm{Compacct4\_barth1}_{i,t}$, I apply model $P_{i,t} = \alpha_i + \beta_{1i}BVE_{i,t} + \beta_{2i}NI_{i,t} + \varepsilon_i$ and for the third comparability measure, denoted as $\mathrm{Compacct4\_barth2}_{i,t}$, I apply model $RET_{i,t} = \alpha_i + \beta_{1i}[NI_{i,t}/P_{i,t}] + \beta_{2i}[\Delta NI_{i,t}/P_{i,t-1}] + \beta_{3i}LOSS_{i,t} + \beta_{4i}LOSS_{i,t} \times [NI_{i,t}/P_{i,t}] + \beta_{5i}LOSS_{i,t} \times [\Delta NI_{i,t}/P_{i,t-1}] + \varepsilon_i$ following the same algorithm above,

where P is the stock price, BVE is the book value of equity per share, NI is net income before extraordinary items per share, RET is quarterly stock returns, and LOSS is an indicator variable that equals one if NI is negative and zero otherwise (Kim et al., 2016).

I also standardize the above three measures and use principal component analysis to extract a combined measure from the first component of these three measures, denoted as $\mathrm{PCA1\_Compacct4}_{i,t}$

3.4 Empirical model

I use same control variables in Bharath and Shumway (2008). Ln(Equity) is the natural log of market value of equity at the end of the year. Ln(Debt) is the natural log of face value of debt. Reverse volatility is the inverse of the annualized stock return volatility. Excess Return is the difference between the stock's annual return

and the CRSP value-weighted return. Income/Assets is the ratio of net income to total asset.

Following Bharath and Shumway (2008) and Brogaard et al. (2017), I winsorize all variables, except EDF, at the 1st and 99th percentiles to mitigate the influences of outliers. And I include firm and quarter fixed effect in my models to rule out other potential omitted variables.

$$\begin{aligned}\mathrm{EDF}_{\mathrm{i,t\ or\ t+n}} = {} & \mathrm{comparability}_{\mathrm{t}} + \ln(\mathrm{equity})_{\mathrm{t}} + \mathrm{Ln(debt)}_{\mathrm{t}} + \mathrm{Reverse\ volatility}_{\mathrm{t}} \\ & + \mathrm{Excess\ return}_{\mathrm{t}} + \ \mathrm{Income/Assets}_{\mathrm{t}} + \mathrm{firm\ fixed} + \mathrm{quarter\ fixed} \\ & + \varepsilon\end{aligned}$$

For cross-sectional tests, I interact proxy for visibility (firm size), firm complexity (dummy for high tech industries), firms with more governance (long-term institutional ownership) for the above models. (For how I construct the interaction variables, please check appendix. May delete…)

$$\begin{aligned}\mathrm{EDF}_{\mathrm{i,t\ or\ t+n}} = {} & \mathrm{comparability}_{\mathrm{t}} + \mathrm{comparability}_{\mathrm{t}} \\ & * \mathrm{proxies\ for\ visibility, complexity, governance} + \ln(\mathrm{equity})_{\mathrm{t}} \\ & + \mathrm{Ln(debt)}_{\mathrm{t}} + \mathrm{Reverse\ volatility}_{\mathrm{t}} + \mathrm{Excess\ return}_{\mathrm{t}} \\ & + \ \mathrm{Income/Assets}_{\mathrm{t}} + \mathrm{firm\ fixed} + \mathrm{quarter\ fixed} + \varepsilon\end{aligned}$$

For potential channels that comparability might affect default risk, I apply following two-stage simultaneous models in the path regression to estimate the indirect effect of comparability on default risk through information efficiency and governance:

$$\begin{aligned}\mathrm{EDF}_{\mathrm{i,t\ or\ t+n}} &= \mathrm{comparability}_{\mathrm{t}} \\ &+ \text{price efficiency or long term institutional ownership}_{\mathrm{t}} \\ &+ \ln(\text{equity})_{\mathrm{t}} + \mathrm{Ln(debt)}_{\mathrm{t}} + \text{Reverse volatility}_{\mathrm{t}} + \text{Excess return}_{\mathrm{t}} \\ &+ \frac{\text{Income}}{\text{Assets}_{\mathrm{t}}} + \mathrm{Amihud}_{\mathrm{t}} + \varepsilon\end{aligned}$$

$$\begin{aligned}&\text{Price efficiency or long term institutional ownership}_{\mathrm{t}} \\ &= \mathrm{comparability}_{\mathrm{t}} + \ln(\text{equity})_{\mathrm{t}} + \mathrm{Ln(debt)}_{\mathrm{t}} + \text{Reverse volatility}_{\mathrm{t}} \\ &+ \text{Excess return}_{\mathrm{t}} + \frac{\text{Income}}{\text{Assets}_{\mathrm{t}}} + \mathrm{Amihud}_{\mathrm{t}} + \varepsilon\end{aligned}$$

I use absolute value of the first-order return autocorrelation of weekly returns as Broggard et al. (2017). As they mention, smaller number of absolute autocorrelation means that stock price is closer to random walk process and therefore indicate that the price is more efficient. I expect that financial statement could help to increase price efficiency (so have a negative impact on absolute autocorrelation of price) which might increase useful information to managers and market, therefore reduce the possibility for managers to make inefficient decisions and decrease the default risk from irrational decisions due to limited information available.

As for the corporate governance, I use long-term institutional investors which equals to the sum of percentage of quasi-index and dedicated institutional investors defined by Bushee (1998, 2001) because these investors are likely to hold stock for relatively long time and will have more incentive to monitor firms. I anticipate that these investors might help to monitor potential events that will increase default risk.

And previous literature indicate comparable financial statement attract ownership (Defond et al., 2011), so I expect that the effect of comparability on long-term institutions should be positive.

4. Empirical results

4.1 Descriptive statistics

Table 1 reports the descriptive statistics of major continuous variables in my research design. The distribution of comparability measures is in consistent with previous researches (De Franco et al.,2011; Barth et al., 2012). And the distribution of default risk and other control variables is also in consistent with previous research (Bharath and Shumway, 2008). Correlation table in table 2 shows all of my comparability measures are statistically negatively correlative to EDF.

4.2 Baseline regression

Following Broggard et al. (2017), I use OLS regression including firm- and quarter-fixed effect to exclude unobservable company- and time-variant characteristics in my baseline and cross-sectional tests. For my path analysis, I use two-step simultaneous models.

Table 3 presents baseline regression of corporate default risk over three financial statement comparability measures, with controls from Broggard et al. (2017) and firm- and quarter- fixed effects included. The first three columns use three comparability as main explanatory variable separately. And the last column reports

regression results by including all three comparability measures. The coefficients for control variables are generally consistent with previous findings. And the coefficients for three comparability measures are all statistically significant at 1% level, indicating the negative relation of financial statement comparability on default risk hold for all four regressions. As for economic significance, the interpretation of coefficient indicates that increasing in one standard deviation of comparability is associated with reduction of probability of default risk by 1.9% (0.0520*0.376) in column (1), 0.7%(7.038*0.001) in column (2), 1.7%(0.0640*0.262) in column (3). And regression with all comparability measures in column (4) shows that all three comparability measures could explain default risk separately. Therefore, in my cross-sectional tests later, I construct one measure based on the first principal component ($PCA1\_Compacct4_{i,t}$) of these three measures together to extract the most similar component within these three measures.

I try to use lag-lead regression and change analysis to rule out the possibility of simultaneous effects in table 4 and table 5. Table 4 shows the effect of comparability on default risk over current (column (1)) and the next several quarters (column (2) -(4)). The results are still statistically significant and the interpretation of coefficients shows that the increase in one standard deviation of comparability has a negative effect on default risk by 2.7% (1.1786*0.023) in current quarter (column (1)), 2.24% (1.1786*0.019) in the next quarter (column (2)), 1.5% (1.1786*0.013) two quarters later (column (3)), and 0.3% (1.1786*0.003) one year later (column (4)). The monotonical decrease of impact

over longer horizons might indicate the predicting power of financial statement comparability on default risk is most effective in the near term, as the most relevant financial statement in recent quarters could provide more comparable information to managers and stakeholders to make better operating or monitoring decisions immediately. As regard to change analysis, I take the difference of dependent variable and all independent variables as a complementary to fixed-effect analysis to rule out stationary omitted variables. And the results are similar as my main findings in table 3.

4.3 Potential channels

Table 6 presents simultaneous path regression results for potential channels discussed through information efficiency and monitoring channels. Specifically, panel A of table 6 examines how comparability affect expected default risk through improved price efficiency (where smaller absolute price autocorrelation indicate more price efficiency). The results show that both comparability and price efficiency have a significantly direct positive effect on EDF (-0.947 and 0.029 in model 2, respectively). Besides, the significantly negative coefficient of comparability on absolute return correlation (-0.018) in the first stage model also shows that financial statement comparability could have an indirect effect on default risk through improved information environment available to managers, which is consistent with findings in previous literature (Francis et al., 2011; Neel 2016; Luo, 2005; Chen et al., 2007; Bakke and Whited, 2010; Chircop et al., 2016; Alhadi, 2017; Broggard et al., 2017).

Panel B of table 6 investigates the indirect effect of financial statement comparability on default risk through increased monitoring from attracting more long-term oriented investors. Again, both comparability and long-term institutional investors proxied by sum of sophisticated and quasi-index investors has a 1% level significantly direct negative effect on corporate default risk in model 2. At the same time, firms with more comparable financial information itself could attract more long-term investors (coefficient 0.131 in the first-stage model), which is consistent with previous finding that comparability could improve monitoring efficiency (Defond et al., 2011). I also tried to examine the effect of comparability on default risk through transient and short-term investors (not reported since with no empirical support in previous literature...) which might be either more short-term oriented or without incentive and ability to monitor firms. And I find there are both fewer transient investors and retail investors in companies with more comparable financial statement, and retail investors have a negative effect on EDF.

4.4 Mitigating/magnifying factors in cross-sectional tests

Panel A to D in table 7 examine when comparability could help to reduce more default risk. The basic argument is that the marginal effect of comparable financial statements on default risk should be higher when companies have worse information environment, more opaque and complex operating structure, and less ex ante outside governance (proxied by institutional ownership). Consistent with my prediction, the results show that the effect of negative comparable financial statement on default risk is stronger when companies are small (proxied by market

cap in panel A), when companies are in high-tech industries and have more investment in capital expenditure and research & development activities (proxied by high-tech industry dummy and investing ratio in panel B and panel C), and when there are less outside monitoring (proxied by intuitional ownership in panel D). The results are all statistically significant and the effect persists over future several quarters, suggesting the marginal effects are not temporary.

4.5 Robustness check

To rule out other omitted variables, I incorporate firm-fixed and quarter-fixed effects in my regression to control for unspecified firm and time-variant attributes. The results are robust in simple OLS regression, industry fixed-effect regression, and firm and quarter fixed-effect regression. I also use change analysis to estimate the effect by constructing all variables based their change from year t-1 to year t. Besides, I check whether the results hold if I use lag independent variables.

In addition, I replace the main dependent variable expected default frequency with Ohlson's O-score and main explanatory variables by different comparability measures including De Franco et al. (2011) and Barth et al. (2012)'s measures and their principal component in my analysis. As Oscore was derived from the study of a pool of over 2000 companies, it still has strong power to capture the components of default risk. And Results in table 8 shows the main argument in this paper holds if I replace EDF with O-score.

5. Conclusions

In this research, I investigate the role of financial statement comparability on corporate real default risk based on Merton's model. The main results show that comparable statements could help to reduce expected default frequency both in current quarters and in longer horizons, while the effect of comparability is most effective in the near terms. I find this negative effect is more pronounced for firms with less visibility to market, with more investment in capital expenditures and R&D, with less outside monitoring, as well as those in high-tech industries. These results are consistent with that companies with less transparent information environment and monitoring could benefits more from comparable financial statements. Moreover, I use path regression to identify two channels that comparability may play roles. The first is that comparability could help to increase price efficiency, which in return might facilitate managers to learn from market, and to make better decisions, resulting in less operating risk and default risk. Another channel shows companies with comparable financial statement attract long-term investors, who usually have more incentives to monitor and could help to identify problems within firms timely.

My study contributes to the literature that examines the benefit of financial statement comparability. Specifically, my research shows comparability could help to increase information set available for managers and attract long-term investors, therefore might help stakeholders to identify potential business problems early and reduce default risk. Besides, this study adds to default risk model literature to show that comparability might also contributes to detect default risk. Last, this study help

regulators and practitioners to understand the importance of comparability from a new perspective. And investors might also use comparability as a new measure to help them to identify firms that potentially have less default risk.

Table 2.1 Descriptive statistics

variable	N	p10	p50	p90	sd	min	max
edf	191595	0	0	0.249	0.192	0	1
Oscore	260394	-2.881	-1.085	0.971	1.518	-4.032	3.646
compacct4	295267	-0.0190	-0.00100	0	0.0520	-0.418	0
compacct4_barth1	241302	-6.181	-0.662	-0.127	7.038	-51.19	-0.0440
compacct4_barth 2	241302	-0.0700	-0.00800	-0.00100	0.0640	-0.439	0
pca1_ comparability4	241302	-0.976	0.459	0.614	1.179	-11.98	0.651
excessret	193350	-0.218	0.0110	0.276	0.226	-0.607	0.867
inverse stdret	193289	16.88	41.14	84.27	27.04	7.716	135.7
Lnmv	191376	9.870	12.98	16.05	2.337	7.949	18.29
lndebt	193246	0.957	5.021	8.251	2.814	-2.781	10.58
niqdatq	193294	-0.0320	0.00600	0.0300	0.0480	-0.281	0.0780
hightech	295267	0	0	1	0.423	0	1
investing	232669	0.00200	0.0280	0.0990	0.0470	0	0.439
ior	186329	0.0590	0.473	0.845	0.291	0	1.053
absautocorrelation	188378	0.0220	0.118	0.292	0.106	0	0.485
ltio	141306	0.0550	0.424	0.783	0.269	0	1.183

Table 1 provides the summary statistics for the key variables in my primary sample. The sample period spans from 1990 to 2015 and contains about a maximum of 189,352 firm-quarter observations. All variables are defined in Appendix.

Table 2.2 Correlation matrix

	edf	Oscore	cmpt4	cmpt4 _barth1	cmpt4 _barth2	pca1 _cmpt4	Exce ssret	Inverse _stdret	lnmv	lndebt	Niq datq
edf	1				1						
Oscore	0.337	1			0.828	1					
compacct4	-0.361	-0.140	1		-0.092	-0.052	1				
compacct4_barth1	-0.004	-0.001	0.106	1	0.184	0.142	-0.110	1			
compacct4_barth2	-0.219	-0.161	0.282	0.349	0.144	0.063	-0.029	0.487	1		
pca1_compacct4	-0.246	-0.155	0.556	0.712	0.051	-0.014	-0.077	0.431	0.760	1	
excessret	0.001	0.036	-0.028	0.021	0.100	0.108	0.061	0.260	0.276	0.205	1
Inverse_stdret	-0.316	-0.215	0.090	-0.017							
lnmv	-0.284	-0.458	0.015	-0.112							
lndebt	0.022	-0.037	-0.078	-0.078							
niqdatq	-0.214	-0.334	0.096	0.001							

Table 2 provides the Pearson correlation for the key variables in my primary sample. All variables are defined in Appendix.

Table 2.3: The effect of fs comparability on default risk, current quarter

	(1) edf Coef./std. errors	(2) edf Coef./std. errors	(3) edf Coef./std. errors	(4) edf Coef./std. errors
compacct4	-0.376*** (0.009)			-0.360*** (0.010)
compacct4_barth1		-0.001*** (0.000)		-0.001*** (0.000)
compacct4_barth2			-0.262*** (0.007)	-0.220*** (0.007)
lnmv	-0.097*** (0.001)	-0.100*** (0.001)	-0.095*** (0.001)	-0.094*** (0.001)
lndebt	0.026*** (0.000)	0.025*** (0.000)	0.025*** (0.000)	0.025*** (0.000)
niqdatq	-0.194*** (0.009)	-0.242*** (0.009)	-0.218*** (0.009)	-0.184*** (0.009)
excessret	0.010*** (0.001)	0.014*** (0.001)	0.006*** (0.001)	0.004*** (0.001)
inverse_stdret	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Constant	1.156*** (0.007)	1.192*** (0.007)	1.131*** (0.007)	1.115*** (0.007)
Firm-fixed	Yes	Yes	Yes	Yes
Quarter-fixed	Yes	Yes	Yes	Yes
R-Squared	0.595	0.585	0.587	0.591
No. of Obs.	189352	177800	177800	177800

Table 3 presents evidence on the effect of financial statement comparability on concurrent expected default risk. The sample of financial statement comparability spans the period 1990 to 2015 and contains about a maximum of 189,354 firm-quarter observations. The main dependent variable is expected default frequency based on Bharath and Shumway (2008). The main explanatory variable is financial statement comparability based on De Franco et al. (2011) and Barth et al. (2012). All control variables are defined in Appendix. All variables except EDF are winsorized to 99% level. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Table 2.4: The effect of fs comparability on default risk, different horizons

	(1) edf Coef./std.errors	(2) edf_3mlead Coef./std.errors	(3) edf_6mlead Coef./std.errors	(4) edf_1ylead Coef./std.errors
pca1_compacct4	-0.023***	-0.019***	-0.013***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.001)
lnmv	-0.096***	-0.082***	-0.063***	-0.027***
	(0.001)	(0.001)	(0.001)	(0.001)
lndebt	0.025***	0.024***	0.023***	0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
niqdatq	-0.195***	-0.375***	-0.397***	-0.312***
	(0.009)	(0.009)	(0.010)	(0.011)
excessret	0.005***	-0.052***	-0.061***	-0.064***
	(0.001)	(0.001)	(0.002)	(0.002)
inverse_stdret	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.149***	0.987***	0.760***	0.320***
	(0.007)	(0.007)	(0.008)	(0.008)
Firm-fixed	Yes	Yes	Yes	Yes
Quarter-fixed	Yes	Yes	Yes	Yes
R-Squared	0.591	0.578	0.544	0.492
No. of Obs.	177800	168761	164080	158946

Table 4 presents evidence on the effect of financial statement comparability on expected default risk in future quarters. The sample of financial statement comparability spans the period 1990 to 20015 and contains about a maximum of 177,800 firm-quarter observations. The main dependent variable is expected default frequency based on Bharath and Shumway (2008). The main explanatory variable is the first principal component of standardized financial statement comparability based on De Franco et al. (2011) and Barth et al. (2012). All control variables are defined in Appendix. All variables except EDF are winsorized to 99% level. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Table 2.5: Change analysis

	(1) ch_edf Coef./std.errors	(2) ch_edf Coef./std.errors	(3) ch_edf Coef./std.errors	(4) ch_edf Coef./std.errors
ch_Compacct4	-0.044***			-0.023***
	(0.007)			(0.008)
ch_Compacct4_barth1		-0.000***		-0.000***
		(0.000)		(0.000)
ch_Compacct4_barth2			-0.032***	-0.030***
			(0.004)	(0.004)
ch_lnmv	-0.160***	-0.160***	-0.159***	-0.159***
	(0.001)	(0.001)	(0.001)	(0.001)
ch_lndebt	0.014***	0.014***	0.014***	0.014***
	(0.000)	(0.000)	(0.000)	(0.000)
ch_niqdatq	-0.010**	-0.018***	-0.017***	-0.015***
	(0.005)	(0.005)	(0.005)	(0.005)
ch_excessret	0.048***	0.048***	0.047***	0.047***
	(0.001)	(0.001)	(0.001)	(0.001)
ch_inverse_stdret	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.017***	0.018***	0.017***	0.018***
	(0.003)	(0.003)	(0.003)	(0.003)
Firm-fixed	Yes	Yes	Yes	Yes
Quarter-fixed	Yes	Yes	Yes	Yes
No. of Obs.	178322	167924	167924	167924
R-Squared	0.213	0.219	0.219	0.219

Table 5 presents evidence on the effect of financial statement comparability on expected default risk in change analysis. The sample of financial statement comparability spans the period 1990 to 20015 and contains about a maximum of 178,322firm-quarter observations. The main dependent variable is change in expected default frequency based on Bharath and Shumway (2008). The main explanatory variable is change in the first principal component of standardized financial statement comparability based on De Franco et al. (2011) and Barth et al. (2012). All control variables are defined in Appendix. All variables except EDF are winsorized to 99% level. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Table 2.6: Path analysis in simultaneous regression
Panel A: How does comparability affect EDF through improved price efficiency?

	(1) absautocorrelation Coef./std.errors	(2) edf Coef./std.errors
absautocorrelation		0.029***
		(0.003)
compacct4	-0.018***	-0.947***
	(0.000)	(0.007)
lnmv	-0.008***	-0.042***
	(0.000)	(0.000)
lndebt	0.001***	0.035***
	(0.000)	(0.000)
niqdatq	0.013**	-0.307***
	(0.021)	(0.008)
excessret	0.005***	-0.001
	(0.000)	(0.002)
inverse_stdret	0.000***	-0.002***
	(0.000)	(0.000)
Constant	0.237	0.511***
	(0.000)	(0.003)
R-Squared	0.022	0.337
No. of Obs.	184268	184268

Panel B: How does comparability affect EDF through more long-term investors?

	(1) Ltio Coef./std.errors	(2) edf Coef./std.errors
ltio		-0.009***
		(0.002)
compacct4	0.131***	-0.883***
	(0.000)	(0.008)
lnmv	0.079***	-0.032***
	(0.000)	(0.000)
lndebt	-0.005***	0.032***
	(0.000)	(0.000)
niqdatq	0. 344***	-0.324***
	(0.000)	(0.010)
excessret	-0. 017***	-0.023***
	(0.000)	(0.002)
inverse_stdret	-0.001***	-0.002***
	(0.000)	(0.000)
amihud	-0.001***	0.003***
	(0.000)	(0.000)
Constant	-0. 513***	0.393***
	(0.000)	(0.003)
R-Squared	0.396	0.371
No. of Obs.	138367	138367

Table 5 presents evidence on the effect of financial statement comparability on expected default through improved price efficiency (proxy by inverse of abscorrelation) and increased monitoring (proxy by long-term institutional ownership) in 2-stage simultaneous path regression. The sample of financial statement comparability spans the period 1990 to 20015. The main dependent variable in the first stage (column (1)) is absolute value of price autocorrelation in Panel A and long-term institutional ownership in Panel B. The dependent variable in the second stage (column (2)) is expected default frequency based on Bharath and Shumway (2008). The main explanatory variable in the second stage (column (2)) is change in the first principal component of standardized financial statement comparability based on De Franco et al. (2011) and Barth et al. (2012), abscorrelation in Panel A, and ltio in Panel B. All control variables are defined in Appendix. All variables except EDF are winsorized to 99% level. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Table 2.7: Cross-sectional effect of comparability on EDF
Panel A: When firms with less visibility to the market

	(1) edf Coef./std.errors	(2) edf_3mlead Coef./std.errors	(3) edf_6mlead Coef./std.errors	(4) edf_9mlead Coef./std.errors
pca1_compacct4	-0.100***	-0.088***	-0.065***	-0.046***
	(0.002)	(0.002)	(0.002)	(0.003)
pca1_compacct4*lnmv	0.006***	0.006***	0.004***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
lnmv	-0.093***	-0.081***	-0.062***	-0.044***
	(0.001)	(0.001)	(0.001)	(0.001)
lndebt	0.025***	0.023***	0.023***	0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
niqdatq	-0.178***	-0.362***	-0.389***	-0.351***
	(0.009)	(0.009)	(0.010)	(0.010)
excessret	0.003*	-0.054***	-0.063***	-0.077***
	(0.001)	(0.001)	(0.002)	(0.002)
inverse_stdret	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.122***	0.966***	0.746***	0.518***
	(0.007)	(0.007)	(0.008)	(0.008)
Firm-fixed	Yes	Yes	Yes	Yes
Quarter-fixed	Yes	Yes	Yes	Yes
R-Squared	0.594	0.581	0.546	0.520
No. of Obs.	177800	168761	164080	159901

Panel A presents evidence on cross-sectional variation of financial statement comparability on expected default risk when firms with less visibility to the market. The sample of financial statement comparability spans the period 1990 to 20015 and contains about a maximum of 177,800 firm-quarter observations. The main dependent variable is expected default frequency based on Bharath and Shumway (2008). The main explanatory variable is the interaction of companies' market cap with first principal component of standardized financial statement comparability based on De Franco et al. (2011) and Barth et al. (2012). All variables are defined in Appendix. All variables except EDF are winsorized to 99% level. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel B:When firms are in high-tech industries

	(1) edf Coef./std.errors	(2) edf_3mlead Coef./std.errors	(3) edf_6mlead Coef./std.errors	(4) edf_9mlead Coef./std.errors
pca1_compacct4	-0.022***	-0.018***	-0.013***	-0.008***
	(0.000)	(0.000)	(0.001)	(0.001)
pca1_compacct4*hightech	-0.008***	-0.004***	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
hightech	-0.003	-0.005**	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.002)
lnmv	-0.096***	-0.082***	-0.063***	-0.045***
	(0.001)	(0.001)	(0.001)	(0.001)
lndebt	0.025***	0.024***	0.023***	0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
niqdatq	-0.194***	-0.374***	-0.397***	-0.356***
	(0.009)	(0.009)	(0.010)	(0.010)
excessret	0.005***	-0.052***	-0.061***	-0.076***
	(0.001)	(0.001)	(0.002)	(0.002)
inverse_stdret	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.152***	0.990***	0.763***	0.529***
	(0.007)	(0.007)	(0.008)	(0.008)
Firm-fixed	Yes	Yes	Yes	Yes
Quarter-fixed	Yes	Yes	Yes	Yes
R-Squared	0.591	0.578	0.545	0.519
No. of Obs.	177800	168761	164080	159901

Panel B presents evidence on cross-sectional variation of financial statement comparability on expected default risk when firms are in high-tech industries. The sample of financial statement comparability spans the period 1990 to 20015 and contains about a maximum of 177,800 firm-quarter observations. The main dependent variable is expected default frequency based on Bharath and Shumway (2008). The main explanatory variable is the interaction of high-tech industry dummy with first principal component of standardized financial statement comparability based on De Franco et al. (2011) and Barth et al. (2012). All variables are defined in Appendix. All variables except EDF are winsorized to 99% level. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel C: When firms invest more in capital expenditures and R&D

	(1) edf Coef./std.errors	(2) edf_3mlead Coef./std.errors	(3) edf_6mlead Coef./std.errors	(4) edf_9mlead Coef./std.errors
pca1_compacct4	-0.025***	-0.020***	-0.014***	-0.008***
	(0.001)	(0.001)	(0.001)	(0.001)
pca1_compacct4*investing	0.061***	0.040***	0.028***	0.019**
	(0.007)	(0.007)	(0.007)	(0.008)
investing	-0.106***	-0.076***	-0.037***	-0.026**
	(0.010)	(0.011)	(0.011)	(0.012)
lnmv	-0.095***	-0.081***	-0.062***	-0.043***
	(0.001)	(0.001)	(0.001)	(0.001)
lndebt	0.024***	0.023***	0.022***	0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
niqdatq	-0.205***	-0.384***	-0.404***	-0.360***
	(0.009)	(0.009)	(0.010)	(0.011)
excessret	0.005***	-0.051***	-0.060***	-0.075***
	(0.001)	(0.001)	(0.002)	(0.002)
inverse_stdret	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.131***	0.987***	0.792***	0.605***
	(0.007)	(0.008)	(0.008)	(0.008)
Firm-fixed	Yes	Yes	Yes	Yes
Quarter-fixed	Yes	Yes	Yes	Yes
R-Squared	0.341	0.311	0.252	0.209
No. of Obs.	163169	154695	150322	146406

Panel C presents evidence on cross-sectional variation of financial statement comparability on expected default risk when firms invest more in capital expenditures and R&D. The sample of financial statement comparability spans the period 1990 to 20015 and contains about a maximum of 163,169 firm-quarter observations. The main dependent variable is expected default frequency based on Bharath and Shumway (2008). The main explanatory variable is the interaction of investing percentage in capital expenditure and R&D with first principal component of standardized financial statement comparability based on De Franco et al. (2011) and Barth et al. (2012). All variables are defined in Appendix. All variables except EDF are winsorized to 99% level. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel D: When firms have more outside monitoring

	(1) edf Coef./std.errors	(2) edf_3mlead Coef./std.errors	(3) edf_6mlead Coef./std.errors	(4) edf_9mlead Coef./std.errors
pca1_compacct4	-0.032***	-0.029***	-0.023***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.001)
pca1_compacct4 *ior	0.027***	0.027***	0.025***	0.021***
	(0.001)	(0.001)	(0.001)	(0.001)
ior	-0.054***	-0.081***	-0.126***	-0.148***
	(0.003)	(0.003)	(0.003)	(0.003)
lnmv	-0.086***	-0.074***	-0.054***	-0.037***
	(0.001)	(0.001)	(0.001)	(0.001)
lndebt	0.024***	0.023***	0.022***	0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
niqdatq	-0.164***	-0.345***	-0.376***	-0.340***
	(0.009)	(0.009)	(0.010)	(0.010)
excessret	0.002*	-0.054***	-0.062***	-0.077***
	(0.001)	(0.001)	(0.001)	(0.002)
inverse_stdret	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.059***	0.913***	0.700***	0.483***
	(0.007)	(0.007)	(0.008)	(0.008)
Firm-fixed	Yes	Yes	Yes	Yes
Quarter-fixed	Yes	Yes	Yes	Yes
R-Squared	0.567	0.567	0.544	0.524
No. of Obs.	171287	165071	162349	159302

Panel D presents evidence on cross-sectional variation of financial statement comparability on expected default risk when firms have more outside monitoring. The sample of financial statement comparability spans the period 1990 to 20015 and contains about a maximum of 171,287 firm-quarter observations. The main dependent variable is expected default frequency based on Bharath and Shumway (2008). The main explanatory variable is the interaction of institutional ownership in capital expenditure and R&D with first principal component of standardized financial statement comparability based on De Franco et al. (2011) and Barth et al. (2012). All variables are defined in Appendix. All variables except EDF are winsorized to 99% level. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Table 2.8: Robustness check-replace main dependent variable with O-score

	(1) Oscore Coef./std.errors	(2) F.Oscore Coef./std.errors	(3) F2.Oscore Coef./std.errors	(4) F3.Oscore Coef./std.errors
pca1_compacct4	-0.012***	-0.021***	-0.015***	-0.017**
	(0.003)	(0.003)	(0.004)	(0.007)
lnmv	-0.579***	-0.638***	-0.588***	-0.540***
	(0.003)	(0.004)	(0.005)	(0.008)
lndebt	0.329***	0.318***	0.291***	0.268***
	(0.002)	(0.002)	(0.003)	(0.005)
niqdatq	-5.565***	-0.534***	-2.893***	-3.264***
	(0.050)	(0.069)	(0.092)	(0.147)
excessret	0.445***	0.270***	0.216***	0.108***
	(0.008)	(0.011)	(0.014)	(0.021)
inverse_stdret	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	5.121***	5.900***	5.471***	5.016***
	(0.042)	(0.052)	(0.064)	(0.092)
Firm-fixed	Yes	Yes	Yes	Yes
Quarter-fixed	Yes	Yes	Yes	Yes
R-Squared	0.392	0.307	0.291	0.261
No. of Obs.	147317	106890	68611	33441

Table 8 replace main dependent variable with Ohlson's O-score as one robustness check. The sample of financial statement comparability spans the period 1990 to 20015 and contains about a maximum of 147,317firm-quarter observations The main explanatory variable is financial statement comparability based on De Franco et al. (2011) and Barth et al. (2012). All control variables are defined in Appendix. All variables except EDF are winsorized to 99% level. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Chapter 3: Principle-based accounting and audit pricing

1. Introduction

Practitioners and researchers argue that principle-based standards increase predictive power of earnings by facilitating managers' latitude to capture the underlying economics of transactions and events in their financial reporting and, therefore, increase earnings quality. However, hot debate over this issue also provides evidence that principle-based accounting might allow incentivized managers to apply standards in opportunistic ways and increases litigation risk. Existing literature, for example, find opportunistic earnings management increases more for firms rely on more principle-based accounting standards (Folsom et al. 2017) and plaintiffs in class action lawsuit were more likely to cite principles-based areas of GAAP (Donelson et al. 2012).

With limited and inconclusive empirical evidence provided in previous studies to support the benefits and costs of principle-based accounting standards from different angles, there is no answer to the net benefits (or net costs) of principle-based accounting standards in equilibrium. One reason for the lack of evidence is that previously there is no variant proxies for whether the standards applied by companies are more principle-based or more rule-based. Though there are several inferences from international studies from IFRS adoption, it is not easy to detangle the effect of short-period change in policies from the attributes of the standards (principle-based or standard-based) themselves. Besides, since there are different aspects of earnings quality and risks that might originated from principle-base

standards, the nature of standards might have both positive and negative effects under different research settings (Folsom et al. 2017).

In this paper, I take advantages of a newly-developed variable by Folsom et al. (2017) that measures the extent to which firms' financial reporting is affected by principles-based standards. In their study, Folsom et al. (2017) innovate a new firm-year-level measure of accounting attributes. They crawled out the standards applied by each firm in its 10-K and aggregated scores of all standards that this firm use based on whether each standard is more rule-based or principle-based[1]. The newly-developed variable for the exposure of a company to principle-based standards enables me to examine the benefits/costs of principle-based standards.

I start my investigation by examining incremental benefits (or costs) of principle-based accounting attributes (donated as Pscore, similar as Folsom et al. (2017)) from auditors' perspective. Audit fee is selected as main explained variable as it measures the overall risks and costs to audit the financial report of a company (e.g. DeFond et al. 2016; Doogar et al. 2013; Hribar et al. 2014). By examining the effect of the reliance on principle-based standards of a company, I could provide a general picture how auditors, as the main gatekeeper for the assurance of disclosure quality of companies, view the marginal benefits and costs rooted from principle-based (or rule-based) standards. Based on 27,454 firm-year observations from 2000 to 2006, I find Pscore is negatively related with total audit fees, which is consistent with that auditors in US generally see companies with more principle-based

[1] The detail of rule-based score (RBC1) for each standard in US GAAP is developed and illustrated in Donelson et al. (2012).

accounting less risky. This relation is also economically significant, with increase in one standard deviation of Pscore associated a 21% reduction in total audit fees, after including previous control variables documented before as well as industry and year fixed effect.

Since the companies' exposures to principle-based standards are related to their industry and firm characteristics, it is necessary to eliminate endogenous problem. Therefore, after establishing the general correlation in my OLS regression, I try the following ways to eliminate the endogenous concern: (1) I include firm-fixed and inter-temporal change analysis to reduce concern of firm-level stable omitted variables concern; (2) I adopt propensity score matching method to match firms with similar characteristics but different levels of Pscore (high vs low); (3) I exploit an exogenous accounting standard event, the shift from APB 17 to more rule-based SFAS 142 (Fang et al. 2018), to examine the change in audit fees after this events; (4) I examine the effect of Pscore on non-audit-services fees, which seems not directly related to Pscore but likely to be affected by firm-level complexity, to see whether my model specification could control as much transaction complexity as possible to mitigate the concern about measurement error. All above tests help to reinforce causal relation in my initial OLS regression.

After documenting the general negative relation between Pscore and audit fees, I try to answer why firms that depends on more principle-based standards have lower audit fees. Previous theory and empirical evidences for whether principle-based standard is riskier or costlier are mixed, as principle-based standards could either increase or decrease auditor litigation risk though providing "safe harbor" or "road

map" (Donelson et al., 2012), could decrease misstatement risk by reducing future restatements (Fang et al., 2018), and might affect auditors' effort. Based on previous risk-based and effort-based model for audit fees, I partition firms according to high/low ex ante litigation risk from Shu's (2000) score, ex ante misstatement risk (DeFond et al. 2016), and expected effort level. I find generally, auditors seem to treat principle-based standards less risky as they charge significantly higher fees for firms that depends on more rule-based standards with ex ante high litigation risk, misstatement risk, and effort level. Additional tests from path analysis and tests also support the basic finding. The indirect effect of principle-based standards on total audit fees through these two types of audit risks count for 2% of the total effects of principle-base standards. In addition, I test the effects of principle-based standards on auditors' total efforts spent on a company (proxied by days between fiscal year end and the date auditors sign their names) and find the principle-based standards reduce the total efforts spent and likelihood that a company report internal control weaknesses, which might also indicate the reason that auditors charge less premium when their clients follow more principle-based standards.

Though the general findings support that auditors might deem principle-based standards less risky and charge lower fees, the double swords of principle-based standards might facilitate more manipulations (Folsom et al., 2017) under certain situations. I identify several circumstances under which managers are less constrained or have higher pressures to manipulate earnings. And I find in general, when managers have both the flexibility (through principle-based standards) and

ability/pressure (through weaker governance and internal control system) in accounting discretion, they tend to manipulate earnings and auditors charge higher fees for those companies.

I also identify another situation when relative "advantages" of principle-based standards are lower. Due to the overwhelming details and scope exceptions that rule-based standards contain, it might increase difficulty for accountant and auditors to become familiar with the standards. But when accounting firms are specialized in the areas that the companies operate, the cost of understanding the complex rules decreases. Based on this argument, I find principle-based standards become less attractive when auditors are industry expertise since they could spend less time in the standards they are familiar.

In total, all findings support that auditors view principle-based standards as less costly in US, which is not surprising since there are critiques for the overwhelming burden from rule-based standards. But the principle-based standards are not always good in auditors' eyes.

This paper contributes to current literatures in several ways. First, despite of the long-time argument about benefits and costs of principle-based vs rule-based standards in practice, there are few empirical evidence on this topic due to lack of measurement[2]. Only after the innovative construction of proxies that measure whether an accounting standard is more principle-based (Donelson et al. 2012) and whether a company rely on more principle-based standards (Folsom et al. 2017),

[2] Early researches like Schipper (2003) discuss pro and cons of principle-based accounting standards in narrative comments. Other studies are concentrated in experimental settings.

studies on consequences of principle-based vs rule-based standards in US emerge (Fang et al. 2018). The limited researches till now examine the consequences of principle-based standards on litigation outcome, earnings attributes, and accounting restatement. To the best of my knowledge, this paper is the first research that examine incremental benefits (or costs) of principle-based standards from auditors' perspective. With the accounting regulation becoming increasingly rule-based in recent years in US, auditors, however, seems to treat principle-based standards as either less risky or less costly, perhaps because that the overwhelming burdens from rules-based standards in US increase the costs over benefits in equilibrium. This result might be interesting to regulators that consider converging US GAAP to IFRS, with latter one generally considered more principle-based.

Second, this article extends the literature of determinants of audit fees. The effects of several manager's characteristics, auditor characteristics, and accounting quality on audit fees have been examined before. Those papers on the effect of specific accounting attributes on audit fees examine the effect from the perspective such as conservatism (DeFond et al. 2016) and comparability (Zhang et al. 2018). As one important part in accounting framework, the different effect of principle-based standards or rules-based standards on audit fees has never been examined before. My research builds this gap by adding one more incremental determinants to audit pricing.

Third, my results show though overall auditor charge lower fees for firms exposed to more principle-based standards, when their clients do not have effective governance and internal accounting system, principle-based standards become less

attractive. This finding indicates the potential costs of principle-based standards and might have implication for regulators. When regulators in US are considering converging to more principle-based standards, it is necessary to pay more attention to those companies with less effective corporate governance or internal control system to avoid the potential costly consequence from converging to more principle-based regime.

My study is subject to some caveats. As Folsom et al. (2017) indicate, the firm-level measure of reliance on principle-based standards might be driven by industry specific accounting standards and complexity. I try to alleviate this problem by following their way to control plenty of firm-level complexity as well as use industry and firm fixed effect to exclude industry and firm-specific accounting characteristics, and I also try to use propensity score matching and exogenous shock of standards changes as robustness tests.

The following of the paper is structured as follows. Section 2 introduces the background and reviews the related literature. Section 3 develops the hypothesis. Section 4 describes my sample, empirical models, main construction for my measurement and presents the empirical results. Section 4 concludes the paper.

2. Background and literature review

2.1 Distinction between principle-based and rule-based standards

Despite of the significant debate over the principle-based standards and rule-based standards, previously there is no well-defined and exact definition of the distinction

(Hail et al. 2010). In recent years, emerging researches (e.g., Mergenthaler, 2010; Donelson et al., 2012) begin to summarize the basic characteristics that distinct these two standards, and try to quantify the differences. Specifically, Mergenthaler (2010) comes up with four distinct features of rules-based standards based on several sources such as 2003 SEC report and accounting industry report. In his study, Mergenthaler (2010) explains in detail about these four features, including (1) existence of bright-line thresholds, which is well agreed among regulators and previous literature (e.g., Kadous and Mercer, 2012); (2) scope and legacy exceptions, which provides lengthy list of transactions that a standard does not apply, or exceptions that exempt certain industries from complying the standard ; (3) large volumes of implementation guidance, such as numeric examples; and (4) a high level of detail with lengthy words to explain the standard. This classification is consistent with previous literature, as rule-based standards appears to be detailed and complex, with numerous rules applied (Schipper, 2003).

Compared with IFRS, US accounting standards usually begins with simple principle, but are finally viewed to have rule-based characteristics, probably since its widely use of scope exceptions, treatment exceptions, and the presence of detailed implementation guidance (Schipper, 2003). This increasing rule-based feature in US accounting standard is also supported by empirical evidence, with Donelson et al. (2016)’s finding about the increase in rules-based characteristics

over time in US standards and Folsom et al. (2017)'s finding about the increased reliance on rule-based standards by US companies[3].

2.2 The general consequences of principle-based and rule-based standards literature

The findings in the general consequences of the two types of standards on earnings quality from previous findings are mixed. Principle-based standards contain less bright lines and allows more professional judgement, increasing relevance of accounting results by allowing managers using latitude to capture underlying economics of transactions in financial reporting, while at the same time reducing reliability by providing more room for earnings management when managers have incentives to boost their compensation. When firms' accounting policies are more principle-based, it increases both the risks of earnings management and rewards of better reflecting of economic substances (Folsom et al. 2017). On the other hand, rule-based standards include lengthy and complex descriptions, reducing the effects of differences in professional judgment and increasing comparability (Schipper, 2003), while at the same time making standards complex and difficult to apply (FASB Report 2002).

Despite of the above direct impact of standards attributes on financial reporting, anecdotal evidence and previous literatures also find other consequences, either beneficial or costly ones, from these two different standards.

[3] These two studies focus on principle-based and rule-based standard from different perspectives. The former research in Donelson et al. (2016)'s studies examines standard-level measure, which they donate as RBC2. The latter research in Folsom et al. (2017) studies the consequence of principle-base standard from firm-year level, which they donate as PSCORE.

Proponents of principle-based standards argues that rules-based accounting allows, and perhaps even encourages, the structuring of transactions to achieve specific accounting results4 (Lim and Cheng 2016). Besides, both survey results and empirical evidence from lease accounting show move from rules-based standards toward principles-based standards results in less aggressive reporting, perhaps for fear of litigation (Agoglia et al. 2011; Peytcheva and Wright 2013; Collins et al. 2012). Kadous and Mercer (2012) found that mock juries in an experiment return fewer verdicts against auditors in a principles-based regime. Finally, companies may be less likely to report aggressively under principle-based reporting, and auditors may be more likely to constrain aggressive reporting, resulting in fewer accounting disputes.

Though there are numerous supports for principle-based standards, U.S accounting standards are generally considered as rule-based standards and become even increasingly rule-based in recent years. Donelson et al. (2012) found that standards violated in major frauds change to become more rules-based after major frauds occur. Besides, empirical evidence that support rule-based accounting shows that plaintiffs were more likely to cite principles-based areas of GAAP, perhaps in part because rules-based standards can provide defendants with an "innocent mistake" defense (Donelson et al. 2012). And international evidence shows that mandatory IFRS adoption, which is more principle-based, resulted in reduced earnings quality (Ahmed et al. 2013; Donelson et al. 2012). These arguments support that regulator

[4]e.g. Enron's use of special purpose vehicles and Lehman Brothers' use of "Repo 105" repurchase transactions.

deems rule-based standards as one way to prevent fraud, and might be more useful for U.S companies.

2.3 Literatures for the determinants of audit pricing

Audit pricing literatures generally argue auditors charge higher prices from their clients to compensate greater engagement risk that they face and to put more effort in their engagements (e.g., DeFond et al., 2016). From this risk-based model, previous literature shows when any element that may affect the litigation and business risk, auditor charge fees accordingly. These elements include but not limited to business complexity, litigation risk (e.g., Badertscher et al., 2014), managerial incentives (Chen et al., 2015), auditor expertise (Bills et al., 2015), auditor experience (Cahan and Sun, 2014), earnings management (Abbott et al., 2006), conservatism (DeFond et al., 2016), and comparability (Zhang, 2018). The R-square for the model that explain the audit pricing is around 80%, while the remaining 20% could either be a combination of noise and auditor rents, or a combination of noise and unobserved audit costs, with the latter more likely to be the case (Doogar et al. 2015).

While existing literature examines a wide range of determinants on auditing price and several consequences of principle-based standards, there is no evidence about the net effect of principle-based standards or rule-based standards on audit contracting. As principle-based standards or rule-based standards is an important attribute of accounting standards, it is likely to affect comparability, verifiability, opportunities of earnings management, and litigation (Schipper 2003), which might

alter auditors' judgement about their engagement risk and increased effort thereby. And Schipper (2003)'s argument is evidenced by increasing experimental and empirical findings, which document that the two kinds of standards are likely to affect litigation likelihood (Donelson et al., 2012), litigation outcome (Kadous and Mercer, 2012), and earnings quality which might affect misstatement risk (Folsom et al. 2017; Fang et al., 2018). Since principle-based standards might affect risks perceived by auditors and effort demanded, it is likely auditors will charge different level of audit price.

3. Hypothesis development

3.1 The effect of principle-based standards on audit pricing

The principle-based standards and rule-based standards are very different in their characteristics. Though not formally defined, rule-based standards are well-known for its bright-line thresholds, scope and treatment exceptions, excessive detail, and voluminous interpretative guidance (Donelson et al., 2012), and these characteristics are deemed by critics to make US GAAP overly complex (Donelson et al., 2016).

The different features between principle-based standards and rule-based standards are likely to affect audit pricing decision. When auditors are involved in an engagement with their client, they consider both engagement risks and effort in their pricing decision. Whether a client' financial reporting depends more on principle-based standards or rule-based standards is likely to affect engagement risks perceived by auditors. The first risk comes from misstatement risk. As shown

by Folsom et al (2017), principle-based standards leave more flexibility for managers to convey their own information, which affect misstatement risk perceived by auditors through both increased earnings persistence and increased earnings management. The second risk comes from changed litigation risk that auditors face. Existing theories shows rule-based standards could either increase auditors' litigation risk by providing a "roadmap" with violation to detailed rules to plaintiff, or shield firms from litigation (Donelson et al., 2012). Though empirical evidence from Donelson et al. (2012) suggests class action lawsuits are more likely to cite principle-based standards, evidence from Kadous and Mercer (2012) shows that mock juries in an experiment return fewer verdicts against auditors in a principles-based regime. Therefore, the extent that companies depend on principle-based standards or rule-based standards is also likely to affect litigation risk that auditors would take into their consideration. Finally, auditors might exert different levels of effort when they audit transactions with rule-based and principle-based standards. On the one hand, rule-based standards usually include many interpretative guidance with excessive detail, and the underlying transaction complexity increases the likelihood for a standard to become rule-based (Donelson et al., 2016), which increases the difficulty in auditing. On the other hand, however, behavioral research by Peytcheva et al. (2014) shows the other possibility: principles-based accounting standards might increase auditors' process accountability and therefore the increased demand for audit evidence. Despite of the direction of the effect, the affected audit efforts level should finally be considered in audit pricing decision.

The above argument suggests that it is possible that the extent that a company depends on principle-based standards or rule-based standards will affect audit pricing. But due to the potential different effect on risks and audit effort, the sign of the effect is not clear. Ultimately the effect of principle-based standards on audit fees is an empirical question. Therefore, I make the null assumption as follows.

H1: The extent to which clients' accounting depends on principle-based standards or rule-based standards does not affect audit pricing of a company.

3.2 Why do auditors charge different fees for clients that depends on more principle-based standards

Despite of the multiple consequences of principle-based standards and rule-based standards found in previous literature, how auditors evaluate the benefits and costs of accounting standards applied by their clients and consider the resulting audit fee to be charged, depends on both engagement risks related and expected audit efforts needed (DeFond et al. 2016).

Principle-based accounting standards is likely to affect auditors' engagement risk. First, principle-based accounting might affect client's inherent risk. On one hand, by better conveying the economic substance of underlying transactions and events to auditors and investors, the flexibility to apply judgement makes earnings more value-relevant and more useful. On the other hand, principle-based standards are likely to leave more spaces for earnings manipulation which is likely to increase inherent risk. Therefore, it is not clear whether auditors, as professional accountants, will detect such manipulation and limit it to a tolerable range.

H2a: The clients' exposure to principle-base standards affects audit pricing differently with different level of ex ante misstatement risk.

Second, principle-based accounting standards might affect auditor's litigation risk. There are two theories related to the relation between the attributes of standards and litigation risk (Donelson et al. 2012). The protection theory predicts that rules-based standards shield firms from litigation since the rules provide a "safe harbor" by stating companies followed the detailed guidance of rules-based standards or offers an "innocent misstatement" defense to deter litigation. Compared with the "safe harbor" provided by rule-based standards, the principle-based standards might increase litigation risk by increasing ex ante chances to manage earnings and increase firms' exposure to litigation (Schipper 2003). However, the second theory - roadmap theory, argues that the detail and objectivity of rules-based standards help to establish intent for managers by plaintiff, since there is a clear guidance provided by rule-based standards, while principle-based standards provide more "vague" guidance for managers and make it hard to argue the violation of standards. Based on the above argument, the principle-based standards could also affect audit fees through the impact on litigation risk.

H2b: The clients' exposure to principle-base standards affects audit pricing differently with different level of ex ante litigation risk.

Third, whether a company depends more on principle-based accounting standards or rule-based standards might affect the level of effort that auditors exert. The attributes of standards might affect litigation risk and misstatement risk. And auditors adjust their efforts according to increased risks they face. Besides, since

rule-based standards usually contain complex details and complex transactions that requires detailed implementation of accounting standards, the underlying complexity might require auditors to spend additional time to conduct their engagements.

H2c: Difference in fees across the two methods increases if more auditing effort is mandated.

When auditors examine the overall risks of a company and total efforts they need to exert, the above costs and benefits tradeoff will affect the effect of principle-based accounting on audit fees. It is possible that principle-based standards in US currently are riskier, or more flexible from auditors' perspective. However, we are not sure whether the benefits will overweigh costs or not. Therefore, it is an empirical question that whether the extent to which clients' existing accounting systems rely on more principle-based standards will affect auditors' perceived risk of the company.

3.3 When does relative advantages of principle-based standards decreases?

Principle-based accounting facilitates managers to communicate their own private information more effectively, but at the same time it also provides more flexibility for managers to manipulate earnings (Folsom et al. 2016), especially when managers are less constrained. The increased tendency to conceal bad news by managers (e.g. Bergstresser and Philippon, 2006; Burns and Kedia, 2006; Armstrong et al. 2013; Chen et al., 2015) is more likely to happen when managers have both flexibilities and ability to do so, which is likely to increase earnings

management and misstatement risk perceived by auditors. When a company has weaker internal accounting system or stronger outside pressure, the cost of principle-based standards intensified.

Transient investors are a potential candidate for the outside pressure. It is well documented that transient institutional investors focus on near-term earnings and such outside pressure increase managerial myopic behavior (e.g. Bushee, 1998; Bushee, 2001). Since the existence of more principle-based accounting facilitate managers to manage earnings conveniently, it is likely that when the client has more transient investors covered, the costs of auditors' perceived risk of their clients' earnings will be higher.

The lack of conservative accounting is also likely to be a bad signal for auditors about the litigation and misstatement risk, especially when managers could flexibly manipulate earnings through less-guided principle-based standards. Conservative accounting is generally considered as an effective mechanism to keeps auditors better informed about their clients' adverse circumstances and constrains managers' capability to hide bad news (Kim and Zhang, 2014; DeFond et al. 2016), especially in those in those areas that managers have more spaces and discretion to manipulate earnings. Several evidences in previous research also support the notion that accounting conservatism helps to constrain earnings management and mitigate bankruptcy risk (e.g. Garcia Lara et al. 2012; Gao 2013; Biddle et al 2012). Without conservative accounting in a company, the managers' tendency to boost earnings to get higher pay through earnings management is less likely to be constrained, thus increasing audit pricing for the increased misstatement risk.

Similarly, the existence of internal control weakness is generally associated with less earnings quality (Doyle et al. 2007), and higher audit fees (Munsif et al. 2011). The lack of effective internal control system is likely to intensify managers' flexibility to manipulate earnings under principle-based standards, therefore auditors might charge higher fees for their client that follows more principle-based standards and lack effective internal control system.

The last element to exaggerate managers' manipulation behavior is the lack of effective corporate governance system (Cheng et al., 2016). The decreased information quality by decreased monitoring by effective governance system intensifies the managers' manipulation problem under principle-based standards.

Since transactions following more principle-based accounting requires more managerial judgements, the costs of increased potential manipulation should be exaggerated when companies have less effective governance and accounting system. Therefore, I expect that:

H3a: The auditors charge their clients more when companies exposed to more principle-based standards have weaker governance and accounting system.

Rule-based standards are inherently more likely to be standards for those complex transactions, as the underlying economics require additional detail and implementation guidance (Donelson et al., 2012). Besides, the increased requirement for scope exception, treatment exceptions and detailed implementation makes the rule-based standard itself to be considered as too complex. For auditors who are not an expertise in those rule-based intensive area, it might cost them

additional efforts to complete these engagements with complex treatment, thus increasing the audit fees to compensate their effort.

When auditors specialize in certain areas and industries, such specialization leads to product differentiation, which is cost-efficient for auditors (e.g., Goodwin and Wu 2014). The incremental benefits from investment in auditor expertise is likely to be higher for those areas with standards that are ex ante more difficult/costly to audit, say, the area with complex accounting treatment. Therefore, when auditors are expertise industries with more rule-based standards, the incremental benefits of expertise will be higher, which makes audit processing more efficient and reduce audit effort therefore.

Based on the above argument, I make the following hypothesis.

H3b: When auditors are industry expertise, they charge the engagement with clients exposed to more rule-based standards in the industry lower fees, compares with those clients exposed to more principle-based standards.

4. Sample and measurement

4.1 Data and sample

My sample start with Folsom et al. (2017)'s construction of firm-specific principle-based standards tendency measures with 52,777 firm-year observations from 1994-2006. Due to most audit fees are public available after year 2000, I lose 25,323 observations when combining with audit analytic data. I then select financial measures from Compustat, stock price information from CRSP, and institutional

ownership information from Thomas Reuters. The remaining 27,454 observations constitute my maximum sample. And sample size varies with different tests.

4.2 Measurement for main variables

4.2.1 Auditors' perceived risks and additional effort

I select total audit fees as a proxy for perceived risks by auditors. When facing greater risks in their client, auditors might charge higher audit fees and spend more efforts. The increased fee premiums thus compensate auditors for these additional risks and efforts (Doogar et al. 2015).

4.2.2 The extent of principle-based standards that a company apply

While the audit outcome variable, audit fees, is not an unfamiliar measure in audit studies, the main explanatory variable, which measures to what extent that the company's financial reports depends on principle-based accounting, is new from Folsom et al. (2017). Those authors provide a diligent discussion about constructing this variable, for briefness, the specific construct and validity test could be inferred in their work directly. Here I just list the intuition and general steps for the construction of the measure.

The first step for them is to create a keyword list for each US GAAP standard, and count the number of times each firm mentions the associated keywords in its annual 10-K report as the extent that the standard affects the company's financial results. Then, they use the standardized count for the keywords in each standard for each firm as the relative importance about firms' reliance upon a standard. The next step is to combine the relative importance with Donelson et al. (2012)'s instrument that

measures the extent to which each standard is principles-based or rules-based to construct the firm's dependence on principle-based accounting[5]. This measure for firm-year-specific principle-based accounting is proven to be a useful proxy for firm's reliance on principle-based standards in their validity tests, as it shows that firms' earnings are more informative and persistent, and have a larger positive association with future cash flows, on average, when firms' standards are more principles-based (Folsom et al. 2017). And when managers have high incentives or pressures, they could use the added discretion provided by principles-based standards to manage earnings.

I take advantage of the availability of this measure to examine whether the extent that the company's financial reports depends on principle-based accounting will affect auditing outcome. As stated in Folsom et al. (2017), there are some caveats of this measure such as it might be hard to distinguish whether this measure captures the underlying business transaction complexity or it captures the attributes of the accounting standards. To reduce this concern as much as possible, in all my following tests, I follow their way to control for other business complexity variables and include industry-fixed effect as well.

5. Research design and empirical results

5.1 Univariate analysis

[5] Donelson et al. (2012) construct a variable to measure whether a specific accounting standard is more rule-based or principle-based according to four criteria: existence of bright-line thresholds, scope and legacy exceptions, large volumes of implementation guidance and a high level of detail. They donate their measure as rule-based score (RBC) which is four when all four criteria are met.

Table 1 shows the basic descriptive statistics and correlation matrix. All continuous variables are winsorized at 1%.

[INSERT Table 1 HERE]

Table 1 Panel A shows the descriptive statistics. The value for pscore range from -46.89 to -1.27, which has a high standard deviation about 8.36. And the value for log audit fees range from 10.5 to 16.49, which is comparable to previous research. Table 1 Panel B shows the correlation matrix. The univariate analysis shows that pscore is negatively related to audit fees significantly at 0.01 level. And firms with bigger size, higher leverage, more segments, and volatile earnings are likely to depend more on rule-based standards, which is consistent with larger and complex firms are likely to be involved in some complex transactions that requires detailed implementation of accounting standards.

Figure 1 reports the mean residual audit fees based on regression results on previous documented determinants defined in equation (1) (except Pscore). Residual audit fees are considered as a combination of noise and audit costs (Doogar et al. 2015), with higher residuals indicating higher risks perceived by auditors or more efforts exerted in auditing process.

[INSERT Figure 1 HERE]

I plot the mean residual logarithm of audit fee according to decile rank of Pscore. The figure shows strong linear relationship between pscore and residual audit fees, with the companies depends most on principle-based standards enjoying the most negative residual audit fees and the companies

apply most rule-based standards pay extreme high premium in their auditing engagement. This initial relation might indicate that there should be some link between principle-based accounting and auditors' perceived risks of the company.

5.2 Multivariate analysis for H1

5.2.1 Baseline regression

The empirical test for my first hypothesis examines how firms' reliance on principles-based standards affect auditor perceived risks and efforts. I follow previous literature in audit fees (e.g., Hribar et al. 2014) to develop my empirical specifications as follows:

$$\text{lnauditfee}_{i,t} = \beta_0 + \beta_1 Pscore_{i,t} + \beta_{2-10} firm\ controls_{i,t} + \beta_{2-10} auditor\ controls_{i,t} + industry\ dummies + year\ dummies + \varepsilon_{i,t} \quad (1)$$

Subscript i is firm and t is the fiscal year. My main firm-level control variables for total audit fees follows Hribar et al. (2014) and Folsom et al. (2017). The first set of variables are firm-level measures of complexity as proxy for the complexity of the audit and the resources required to perform the audit. Besides, as Folsom et al. (2017) state that the main caveats for their measure of Pscore is that this measure (PSCORE) likely captures not only reliance on principles-based standards but also certain characteristics of the underlying transactions, it is necessary to follow their method to control for other firm characteristics that might be correlated with the types of

transactions in which a firm engages. Specifically, these variables include the number of business segments(busseg), the number of geographic segments(n_geo), the percentage of foreign sale to total revenues(fgn), standard deviation of returns(stdret) and standard deviation of income(stdib), firm size(lnat), scaled inventory(inv), scaled receivables(rec), current ratio(cr), book-to-market ratio(mtb), book leverage(lev), Square root of the number of employees(empls), merger and acquisition indicator (ma), and December-fiscal-year-end dummy (dec_ye). The second set of variables are ROA and LOSS which are likely to increase inherent risk and lead to more audit effort, but not a necessary indicator for poor audit quality. Ex ante litigation risk(litrisk) based on industry in Francis et al. (1994) is used to control auditor's premium charge for litigation risk. Client importance(client), big four indicator(big4), audit opinion (audop) are used control auditor characteristics. For all my main tests, I also include industry fixed effect and year fixed effect. Standard errors are clustered at firm-level to control for serial correlation.

Table 2 Panel A shows the regression results.

[INSERT TABLE 2 HERE]

Column (1) to (3) shows regression result without pscore, with pscore, and with additional governance controls. It could be observed that when I include Pscore as an additional explanatory variable, the R2 increases about 1%, which is not a small part as existing control variable could already explain 80% of the total audit fees. The coefficients on Pscore in column (2) and (3) exhibits a significant

positive relation between Pscore and total audit fees. This result is also economically significant. For example, the coefficient of -0.023 on Pscore column (2) implies that increase in one unit of Pscore is associated with 2.3% ($e^{0.023*1}$ -1=2.3%) reduction in total audit fees, or increase in one standard deviation of Pscore is associated with 21% ($e^{0.023*8.36}$-1=21.2%) reduction in total audit fees. To rule out firm-specific unobserved variables, I include firm-fixed effect in column (4) and the relation between Pscore and audit fees does not change.

The above result indicates that auditors charge their clients less when the companies rely more on principle-based standards in US. And this is consistent with that on average, auditors either view client companies less risky and(or) they take less efforts to audit these companies when their clients' accounting system is more principle-based. The finding is in contrary to the findings in researches in international setting, where they find mandatory adoption in IFRS standards lead to more audit fees.

5.2.2 Endogeneity issues

5.2.2.1 Change analysis

To address potential endogeneity issues, I also conduct change analysis and propensity score match, and include firm-fixed effect to see whether the negative effect of principle-based standards on auditing fees holds. The models and controls included are same as model (1). And the two instrumental variables I use is lagged Pscore and industry-median Pscore. The results are listed in panel A, B, C, D separately in table 2 Panel B.

The results for change analysis are presented in Panel B in table3.

[INSERT TABLE 2 Panel B HERE]

In table 2 Panel B, we could observe that the coefficient on ch_pscore is significantly negative. This intertemporal regression excludes the possibility of some omitted stable variables.

5.2.2.2 PSM method

In table 3, I apply propensity score matching method to match firms with high Pscore to firms with low Pscore to reduce the bias due to confounding variables. Particularly, I first run the following logit regression model to check the propensity score for the firms with Pscore higher than sample median (treat group) with firms with Pscore lower than sample median (control group). Propensity score matching is with replacement. Control variables are common firm characteristics and audit characteristics that are used to equation (1).

$$\text{Logit(high\_Pscore}_{i,t}) = \beta_0 + \beta_{2-10} firm\ controls_{i,t} +$$

$$\beta_{2-10} auditor\ controls_{i,t} + industry\ dummies + year\ dummies + \varepsilon_{i,t}$$

[INSERT TABLE 3 HERE]

Table 3 Panel A shows the results for the first stage logit model. Based on the above model, control firms then are identified by radius matching with the closest propensity score. I use a caliper of 0.05 times the standard deviation of the estimated propensity scores. This step generates 9,712 matched pairs. Table 3 Panel B tabulate the result for firm characteristics before and after matching between treatment group and control group. Treated and control observations are

comparable in most determinants after I apply the matching method. Then, I run a multivariate regression of log audit fees on high_Pscore (or raw Pscore) and all control variables in equation (1). Panel C of table 3 shows the regression result. The coefficient of high_Pscore is -0.27 in column (1) and the coefficient for raw Pscore is -.03 in column (2). Both are statistically significant at 1% level. The PSM results confirm my finding under OLS regressions, with firms depends on more principle-based standards pay lower audit fees.

5.2.2.3 DID test based on policy changes in SFAS 142

In this part, I rely on exogenous shift in accounting standards as a quasi-natural experiment to further examine whether more principle-based (rule-based) standards will result in lower (higher) perceived risks from auditors. During my sample period, FASB makes a substantial change of impairment for goodwill and other intangible assets from APB 17 to SFAS 142 in year 2001, which result in material change in rule-based score for goodwill impairment standard. SFAS 142, "Goodwill and Other Intangible Assets", was issued by FASB in June 2001 to replace previous APB 17. This new standard requires firms with goodwill and intangible assets to do annual impairment tests, instead of annual amortization in previous APB 17. Compared with APB17, SFAS 142 has more detailed guidance and scope or legacy exceptions (Fang et al. 2018), which transforms rule-based score from 1 to 3(Donelson et al. 2012). This policy change provides a good chance to examine the effect of shift to more rule-based standards on those firms that are likely to be affected by this rule.

To obtain a sample of firms likely to be affected by the change in SFAS 142, I follow Beatty and Weber (2006) to identify firms with goodwill balance at fiscal year end 2000 (one year before the rule change). I define two dummy variables: gdwl_d, for those firms with positive goodwill balance, and gdwl_impair_like_d, for those firms with goodwill balance more than the difference between market value and book value of equity. This process generates 875 firms with positive goodwill balance and 125 firms with positive gdwl_impair_like_d in fiscal year 2000 in my original sample. Then I use propensity score matching method to match firms that are likely to be affected by SFAS 142 to those are not likely to be affected by the rule change. Specifically, I first run the following logit model for all firms in my sample in 2000. I include common firm characteristics and industry dummies as follows and list the result in panel A of table 5.

$$\text{Logit(gdwl\_d}_{i,t} \text{ or gdwl\_impair\_like\_d}_{i,t}) = \beta_0 + \beta_1 lnat_{i,t} + \beta_2 btm_{i,t} + \beta_2 lev_{i,t} + \beta_3 \text{empls}_{i,t} + \beta_4 roa_{i,t} + \beta_5 loss_{i,t} + \beta_6 busseg_{i,t} + \beta_7 n\_geo_{i,t} + industry\ dummies + year\ dummies + \varepsilon_{i,t}$$

After estimating the propensity score, I use 1:2 radius matching to match treated firms with control firms with replacement. I use a caliper of 0.05 times the standard deviation of the estimated propensity scores. The matched treated and control firms are deemed as my initial firm sample in 2000. Then I merge the initial sample in 2000 with observations for the same firms in 2002 to 2004[6]. As shown in panel B

[6] I do not use the observations in fiscal year 2001, when the new standard was first implemented.

of table 5, after the matching process, the treatment and control firms are comparable.

[INSERT TABLE 4 HERE]

Then, I run a multivariate regression of log audit fees on post_treated and all other control variables specified in equation (1). The coefficient on post_treated, which is the interaction between post dummy (with fiscal year 2002 to 2004 as 1, and fiscal year 2000 as 0) and treated dummy (either gdwl_d or gdwl_impair_like_d), is what we are interested. The regression results are tabulated in panel C of table 5. The column (1) shows the different effect of accounting rule change on audit fees for firms with positive goodwill balance ex ante compared with firms with no goodwill. And column (2) redefines treatment group as those firms with ex ante goodwill balance higher than the difference between its market value and book value of equity (Beatty and Weber, 2006). Both specifications show for the treated firms (those firms are more likely to be affected by the change in accounting rule from APB 17 to SFAS 142) experienced significant increase in audit fees after the goodwill standard shift to more rule-based one. This results further reinforce my baseline conclusion-when firms adopt more rule-based standards, auditors may view the auditing process riskier or costlier.

5.2.2.3 Additional test to rule out measurement error concern

Though I include several controls for firm-level complexity, the overall negative relation between Pscore and audit fees might still be explained by unobserved transaction complexity captured by Pscore. To reinforce my results and rule out the possibility of measurement error, I replace dependent variable with several other

audit outcome variables that are likely to be affected by firm-level complexity, such as non-audit-service fees, to see whether such negative relation hold in several specifications. The ideal proxy for to which extent that a company rely principle-based standards should not be related to other non-audit related services, as these services are not directly related to US GAAP. If my model specification could control these unobserved complexities as much as possible, the relation between Pscore and NAS fee should not be significant.

Table 3 present the results for NAS fees.

[INSERT TABLE 3 HERE]

The OLS regressions based on raw sample and propensity-score-matched sample shows that, though Pscore is significantly related to several proxies for non-audit-service fees (total other fees, IT fees, tax fees) in univariate correlations, the negative relationship can't hold after I include additional controls variables. This insignificant relation means whether a company rely on more principle-based standards or rule-based standards does not affect auditors' decision to charge higher premium in other non-assurance services, which is consistent with the general intuition that GAAP standards are not related to IT services and tax filing that follows different instructions under IRS. This result suggests that, though Pscore itself might not rule out all possibility of measurement error (Donelson et al., 2012; Folsom et al., 2017; Fang et al., 2018) for complexity viewed by auditors, it is likely to be effective to include enough controls in model specifications to address such endogeneity issue.

5.3 Empirical analysis for H2

After establishing the significant negative relation between Pscore and total audit fees, the next step is to answer why auditors charge lower fees for firms that depend more on principle-based standards. As argued in hypothesis development section, auditors charge higher fees for their client mainly due to higher risks they face and the increased efforts they exert. And principle-based standards and rule-based standards may have different implications for the litigation risks, misstatement risk, and audit efforts. Therefore, in this part, I partition firms with high vs low ex ante litigation risk, firms with high vs low ex ante misstatement risk, and firms in period that exogenously requires auditors to exert more effort, to examine whether auditors charge a risk premium or effort premium for principle-based/rule-based standards.

Table 5 shows the regression results based on partition sample.

[INSERT TABLE 5 HERE]

In column (1) and (2) in table 5, firms are partitioned based on those in industries that have high litigious risk[7]. The coefficients for pscore in both high litigious sample and low litigious sample are negatively significant with total audit fees. However, the impact is significantly different. The coefficient for pscore for those firms rely on more principle-based standards with low(high) litigious risk is -0.021 (-0.027) in column (1) (column (2)). The difference in coefficients on Pscore in two

[7] Those industries are classified by SIC 4-digit code as previous literature (biotech: 2833<=sich<=2836 or 8731<=sich<=8734; computers: 3570<=sich<=3577 or 7370<=sich<=7374; electronics: 3600<=sich<=3674; retailing: 5200<=sich<=5961).

regressions is economically significant. Increase in one standard deviation of Pscore for firms with high litigious risk result in 19.2% ($e^{0.021*8.36}$-1=19.2%) reduction in audit fees, while the increase in one standard deviation of Pscore for firms with low litigious risk result in 25.3% ($e^{0.027*8.36}$-1=25.3%) reduction in audit fees. The difference of 6.1% indicates about $26,190 relative to the mean ($e^{12.97}$=$429,339). The Chi-square test for the difference in coefficients for Pscore in two regressions is significant at 0.01 level, rejecting the null hypothesis that litigation risk does not affect auditors' pricing decision. The result shows that overall, auditors charge firms that rely on more principle-based standards less fees compared with firms that rely on more rule-based standards, and the relative advantage of principle-based standards becomes even more when the litigation risk increases. The result is consistent with roadmap theory for litigation risk, which argues that a high level of detail could provide a roadmap to be used in litigation.

In untabulated analysis, I partition the firms based on Shu's (2000) score that is used in previous research as another measure for ex ante litigation risk (e.g., DeFond et al., 2016). I get similar results in the robustness check.

In column (3) and (4) in table 5, I repeat similar analysis for firms with different ex ante misstatement risk. Follow Defond et al. (2016), I construct measure for expected misstatement risk group, which is based on the annual rank of Dechow et al.'s (2011) F-score, Beneish's (1999) Mscore, and Dechow and Dichev's (2002) accrual quality. The coefficient for pscore for those firms rely on more principle-based standards with low(high) misstatement risk is -0.022 (-0.025) in column (1) (column (2)). Increase in one standard deviation of Pscore for firms with high

misstatement risk result in 20.2% ($e^{0.022*8.36}$-1=20.2%) reduction in audit fees, while the increase in one standard deviation of Pscore for firms with low misstatement risk result in 23.2% ($e^{0.025*8.36}$-1=23.2%) reduction in audit fees. The difference of 3% indicates about $12,880 relative to the mean ($e^{12.97}$=$429,339). And chi square test shows the difference is significant at 0.1 level. This difference suggests that the relative advantage of principle-based standards becomes even more when the misstatement risk increases. The result is consistent with the argument that overall, auditors might consider rule-based standards riskier since it might motivate managers to structure transactions based on several high-profile accounting scandals (e.g., Enron, worldcom).

In column (5) and (6) in table 5, I examine the different effect of Pscore on audit fees based on proxy for increased effort. I partition firms before and after SOX period since previous literature shows SOX significantly changed auditing process. Specifically, auditors will need to obtain significantly greater evidence about the operating effectiveness of controls in performing integrated audits (McConnell and Banks, 2003). The coefficient for pscore for those firms rely on more principle-based standards with before (after) SOX is -0.018 (-0.025) in column (1) (column (2)). Increase in one standard deviation of Pscore for firms in pre-SOX period result in 16.2% ($e^{0.018*8.36}$-1=16.2%) reduction in audit fees, while the increase in one standard deviation of Pscore for firms in post-SOX period result in 23.2% ($e^{0.025*8.36}$-1=23.2%) reduction in audit fees. The difference of 7% indicates about $30,054 relative to the mean ($e^{12.97}$=$429,339). Chi-square test shows the difference is significant at 0.1 level. The difference indicates that, after

implementation of SOX, auditors seems to charge firms that rely on rule-based standards even more. The result is consistent with that after exogenous shock of increased auditing efforts, the relative advantage of principle-based standards increases, probably due to its simple implementation.

5.4 Empirical analysis for H3

The finding in audit pricing for principle-based standards generally shows that auditors charge less for firms that depends more on principle-based standards, because of lower risks and audit effort. The last set of my analysis tries to identify whether under some circumstances, the costs of principle-based standards increases over rule-based standards.

My empirical specification for cross-sectional tests is as follows:

$$\text{lnauditfee}_{i,t} = \beta_0 + \beta_1 Pscore_{i,t} + \beta_2 Pscore_{i,t} * agency\ costs\ or\ information\ benefits\ proxy_{i,t} + \beta_3 agency\ costs\ or\ information\ benefits\ proxy_{i,t} + \beta_{4-n} firm\ controls_{i,t} + \beta_{n+1-m+1} auditor\ controls_{i,t} + industry\ dummies + year\ dummies + \varepsilon_{i,t} \quad (2)$$

. All regression models include SIC two-digits industry indicator and year indicator, and robustly cluster error at firm level.

The first situation that I examine is when companies do not have good governance and control system. Firms whose accounting systems rely more on principle-based standards is generally considered beneficial to convey managers' private information. However, when there is no good governance or when firms lack

effective internal control and accounting system to monitor/constrain managers' behavior, principle-based standards might facilitate more opportunistic earnings manipulation (and therefore increase auditor's perceived risks of restatements or accounting fraud).

I use four proxies for the lack of good monitoring, including pressures from investors with short-term horizons, overwhelming power on hand for managers, existence of internal control weakness and lack of conservative accounting. All four situations increase managers' opportunity to manipulate earnings.

Table 6 panel A shows the cross-sectional results.

[INSERT TABLE 6 panel A HERE]

The first proxy is the conservative accounting as a mechanism that helps to constrain the opportunistic behavior of managers, especially when managers have more flexibility to manipulate earnings. Conservative accounting is viewed as sticky and changes slowly (García Lara et al. 2016) and previous literature found that conservatism proxies are stable over time (Khan and Watts 2009; Callen et al. 2010). Therefore, firm-year-level conservatism is likely to be a stable measure for one potential constraining mechanism. Specifically, I use Cscore from Khan and Watts (2009) estimated annually as the proxy for accounting conservatism and interact this measure with Pscore to see its moderating effect on total audit fees. The result is shown in column (1) table 6. The coefficient on Cscore is negative and the result is consistent with Lee et al. (2015), and the coefficient on the interaction of Cscore and Pscore is significantly negative, which indicate that when companies

commit to more conservative accounting, the agency problem exaggerated by principle-based accounting is mitigated and thus results in less risks and audit fees. The second proxy is the existence of internal control weakness. When there is existence of internal control weakness, managers could take advantage of the system weakness and the flexibility to manipulate earnings easily. The coefficient for the interaction of internal control weakness and pscore shows auditors charge increasing fees, which is consistent with increased misstatement risk perceived by auditors. The third proxy is from pressures from outside short-term investors. Previous literature shows transient investors increase the managers incentive to manipulate earnings (e.g. Bushee 1998). I interact the transient ownership of the company with Pscore and the result in column (3) table 6 shows that both the coefficients on transient ownership and interaction item, Pscore_TRAp, are significantly positive. This result indicates that though principle-based standards are viewed less risky from auditors' perspective in U.S, the pressures from investors with short-term horizon exaggerate the opportunistic behavior of managers, which increases auditors' perceived risk of their engagement. The last proxy is GIndex, which is a widely-used proxy for corporate governance index developed by Gompers et al. (2003). The result in column (4) table 6 shows that both the coefficients on high_Gindex and interaction item, Pscore_highG, are significantly positive. The result again support that the benefits of principle-based standards decreases when managers have higher power to make their own decision, including earnings manipulation.

The second situation that the relative advantage of principle-based standards over rule-based standards decreases is when auditors are expert for the complex rule-based standards. I use three proxies for expert auditor. The first two are industry expert defined by Reichelt and Wang (2009). Specifically, the first auditor industry expertise proxy is based on auditor dominance. An audit is defined as an industry specialist if in a year the auditor has the largest market share in a two-digit SIC category and if its market share is at least 10% points greater than the second largest industry leader in a national audit market. The second auditor industry expertise proxy is based on auditor market share. An audit is defined as an industry specialist if in a year the auditor has a market share greater than 30% in a two-digit SIC category. And the third proxy is indicator variable for big 4 auditors.

[INSERT TABLE 6 panel B HERE]

TABLE 6 panel B shows the regression result. The coefficients for industry expertise and big4 indicator are all positive, consistent with that auditors charge higher fees for improved audit quality. The coefficients for the interaction of auditor expert and Pscore are all significantly positive. The results support that as auditors are expertise in industries with more rule-based standards, the incremental benefits of expertise will be higher since rule-based standards are ex ante more complex with detailed implementation. Experience in specific industry makes audit processing more efficient and reduce audit effort.

5.5 Additional support for H2 and H3

DeFond et al. (2016) propose risk-based path regression to analyze the direct and indirect effect of an element on audit fees through litigation risk and engagement risk. I follow their method to use the structural equation to answer how the source variable, principle-based accounting, affect the outcome variable-audit fees either directly or indirectly through engagement and litigation risks. The empirical specification is as follows:

$$\text{lnauditfee}_{\text{i,t}} = \beta_0 + \beta_1 Pscore_{i,t} + \beta_2 litrisk\_shu_{i,t} \text{ or } Misstate\_Risk_{\text{i,t}} + \beta_{3-n} firm\ controls_{i,t} + \beta_{n+1-m} auditor\ controls_{i,t} + \varepsilon_{i,t} \quad \text{(3A)}$$

$$litrisk\_shu_{\text{i,t}} \text{ or } Misstate\_Risk_{\text{i,t}} = \beta_0 + \beta_1 Pscore_{i,t} + \beta_{4-n} firm\ controls_{i,t} + \beta_{n+1-m} auditor\ controls_{i,t} + \varepsilon_{i,t} \quad \text{(3B)}$$

where litigation risk (litrisk_shu) is annual decile rank of expected auditor litigation risk from Shu's (2000) score, and expected misstatement risk(misstate_risk) is the average annual decile rank of Dechow et al.'s (2011) F-score, Beneish's (1999) Mscore, and Dechow and Dichev's (2002) accrual quality.

[INSERT TABLE 7 HERE]

As is shown in column (1) to (4) in table 7 Panel A, Pscore has indirect effect on litigation risk (-0.015) and direct effect on total audit fees (-0.023). And the effect of litigation risk on total audit fees is significantly positive (0.026). Through path analysis, it could be seen that the effect of Pscore on total audit

fees indirectly through litigation risk count for 1.7% (0.015*0.026/ (0.015*0.026+0.023)) of the total effect that Pscore has on audit fees. In table 7 Panel B, Pscore still has both indirect effect on misstatement risk (-0.008) and direct effect on total audit fees (-0.024). And the effect of misstatement risk on total audit fees is significantly positive (0.008). The result indicates that the effect of Pscore on total audit fees through misstatement risk count for 0.3% (0.008*0.008/ (0.008*0.008+0.024)). It could be seen that the effect of principle-based standards on total audit fees works mainly in reducing litigation risk.

When there is higher risk for manipulation, auditors strategically increase their effort, resulting higher audit fees charged. I regress auditor efforts over pscore and all control variables defined in the first audit fee regression part to see whether auditors that examine earnings of firms depends more on the principle-based standards will likely to reduce their efforts or not. The definition of auditor efforts follows Zhang (2018), which equals to the number of days between the day that auditors sign their opinion and the fiscal year end.

$$\text{Audit duration}_{\text{i,t}} = \beta_0 + \beta_1 Pscore_{i,t} + \beta_2 litrisk\_shu_{i,t} \text{ or } Misstate\_Risk_{\text{i,t}} + \beta_{3-n} firm\ controls_{i,t} + \beta_{n+1-m} auditor\ controls_{i,t} + industry\ dummies + year\ dummies + \varepsilon_{i,t} \quad (4)$$

The column (5) in table 7 Panel A, Pscore is significantly negatively related to ex post audit duration, which suggests auditor might lower efforts when they face

firms that depend on more principle-based standards. This result might add one more evidence to support why auditors charge lower fees.

6. Conclusions

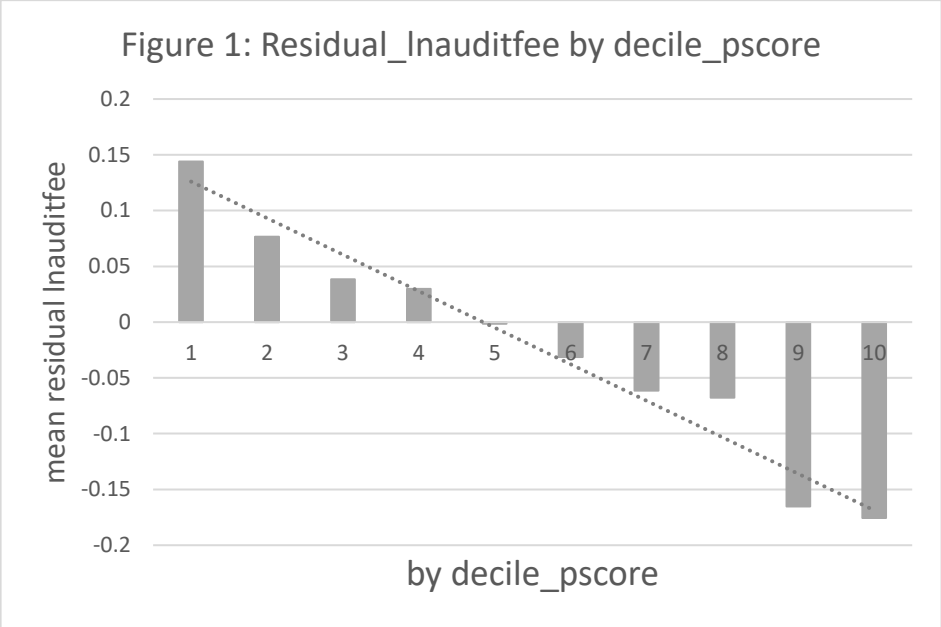
Whether to make standard more principle-based or rule-based is a fundamental question for standard setters. Anecdotal evidence and previous researches show supports to both standard designs. I try to answer this question from auditors' angle, as auditors who regularly review financial reports of companies are those experts in touch with GAAP accounting standards frequently.

In this research, I investigate the effect of principle-based standards on audit pricing in US companies from risk-based and effort-based perspective. I document robust evidence that auditors charge price premium for firms that rely more on rule-based standards, especially when auditors face higher expected litigation risk, expected misstatement risk, and increased effort caused by implementation of SOX. The findings may support current debate of moving US GAAP to more principle-based standards, and extend the literature of determinants of audit pricing.

Though the general results show auditors charge principle-based standards less due to lower perceived risk and efforts, my empirical finding also show under certain conditions it is not the case. Principle-based standards contain fewer bright lines and fewer detailed implementations, and allow managers to convey private information. When a company does not have good governance or internal control system, managers might take advantage of principle-based standards to manipulate earnings, thus increasing the perceived the risk of

auditors. Besides, though rule-based standards usually stem from more complex transactions and contains more details to consider, once the auditors become experts in those specific areas, the increased efficiency reduce the cost of rule-based standards. These finding have implications for regulator who think about moving US GAAP to more principle-based regime: they need to consider the increased potential cost. Especially, if corporations do not have good internal governance and accounting system, investors should pay more attention to those areas applying principle-based standards.

Figure 3.1 The impact of Pscore on unexplained audit fees



Each bar in the figure represents the mean residual (unexplained) audit fees based decile of Pscore. The unexplained audit fees are estimated from OLS regression in panel data from model, $\text{lnauditfee}_{i,t} = \beta_0 + \beta_{1-n} all\ firm\ and\ audit\ controls_{i,t} + industry\ dummies + year\ dummies + \varepsilon_{i,t}$, with all controls defined in Equation (1). This regression has 18,955 observations with corresponding to 4365 companies between 2000 and 2006.

Table 3.1 Descriptive statistics

Panel A: Descriptive statistics

variable	mean	sd	min	p50	max	N
lnauditfee	12.97	1.320	10.50	12.84	16.49	27454
pscore	-15.68	8.360	-46.89	-14.02	-1.270	52668
big4	0.750	0.430	0	1	1	27454
lnat	6.110	2.020	1.920	6.080	11.39	27454
inv	0.120	0.150	0	0.0600	0.750	22943
rec	0.170	0.150	0	0.140	0.800	21778
cr	3.010	2.910	0.410	2.080	18.07	20974
btm	0.600	0.550	-0.310	0.470	3.220	21825
lev	0.240	0.260	0	0.170	1.330	26939
empls	1.650	1.990	0	0.910	11.22	27054
dec ye	0.730	0.450	0	1	1	27454
roa	0.0200	0.230	-1.120	0.0700	0.540	21889
loss	0.600	0.490	0	1	1	27454
audop	0.560	0.500	0	1	1	27454
client	2.620	1.190	1	2.450	5.660	24930
litrisk	0.290	0.450	0	0	1	27454
busseg	1.400	0.470	1	1	2.650	22469
n geo	2.080	1.580	0	2	22	46297
fgn	0.0500	0.160	0	0	0.960	27454
stdret	0.0300	0.0200	0	0.0300	1.050	52482
stdib	74.22	785.8	0	8.760	110000	52748
ma	0.320	0.470	0	0	1	52777

Note: Panel A reports the descriptive statistics for all variables. See Appendix A for the definitions of variables.*** p<0.01, ** p<0.05, * p<0.1

Panel B Correlation matrix

	lnauditfee	pscore	litrisk_shu	Misstate_Risk
lnauditfee		-0.55***	0.66***	-0.07***
pscore	-0.55***		-0.44***	0.09***
litrisk_shu	0.53***	-0.36***		0.13***
Misstate_Risk	-0.09***	0.10***	0.13***	
auditing_duration	-0.21***	0.04***	-0.17***	0.06***
lnat	0.70***	-0.52***	0.70***	-0.18***
lev	0.15***	-0.24***	0.22***	-0.06***
btm	-0.16***	0.01	-0.15***	-0.08***
busseg	0.35***	-0.31***	0.24***	-0.02**

Auditing_duration	lnat	lev	btm	busseg
-0.46***	0.77***	0.23***	-0.15***	0.30***
0.16***	-0.52***	-0.26***	0.03***	-0.27***
-0.34***	0.71***	0.31***	-0.16***	0.23***
0.10***	-0.16***	-0.08***	-0.10***	-0.01
	-0.44***	-0.06***	0.20***	-0.11***
-0.26***		0.38***	-0.04***	0.31***
-0.00	0.24***		0.07***	0.21***
0.11***	-0.03***	-0.02**		0.09***
-0.06***	0.35***	0.09***	0.05***	

Note: This Panel reports correlation Matrix for selected variables. Lower-triangular cells report Pearson's correlation coefficients, upper-triangular cells are Spearman's rank correlation. See Appendix A for the definitions of variables. *** p<0.01, ** p<0.05, * p<0.1

Table 3.2 Baseline regression
Panel A: OLS regression

	(1) lnauditfee Coef./t value	(2) lnauditfee Coef./t value	(3) lnauditfee Coef./t value	(4) lnauditfee Coef./t value
pscore		-0.023***	-0.019***	-0.019***
		(-21.977)	(-12.863)	(-21.468)
big4	0.286***	0.283***	0.042	0.283***
	(13.384)	(13.639)	(0.714)	(14.703)
lnat	0.442***	0.378***	0.407***	0.353***
	(56.194)	(46.227)	(23.368)	(43.721)
inv	0.052	0.115**	0.301**	-0.016
	(0.928)	(2.140)	(2.566)	(-0.332)
rec	0.247***	0.281***	0.638***	-0.049
	(4.610)	(5.397)	(5.136)	(-1.091)
cr	-0.039***	-0.033***	-0.042***	-0.031***
	(-16.323)	(-14.561)	(-8.722)	(-16.102)
btm	-0.064***	-0.059***	-0.055**	0.000
	(-5.254)	(-5.072)	(-2.185)	(0.049)
lev	-0.103***	-0.140***	-0.116**	-0.059***
	(-3.520)	(-5.080)	(-2.394)	(-2.731)
empls	0.057***	0.072***	0.070***	0.091***
	(7.794)	(10.040)	(7.010)	(12.420)
dec_ye	0.082***	0.073***	0.086***	0.084***
	(5.100)	(4.781)	(3.387)	(5.416)
roa	-0.247***	-0.199***	-0.306***	-0.064**
	(-7.963)	(-6.632)	(-3.335)	(-2.276)
loss	0.177***	0.115***	0.110***	0.082***
	(12.320)	(8.288)	(5.043)	(7.657)
audop	-0.124***	-0.074***	-0.058***	-0.036***
	(-11.198)	(-6.898)	(-3.584)	(-4.748)
client	-0.003	0.009	0.015*	0.008
	(-0.566)	(1.597)	(1.903)	(1.547)
litrisk	0.037*	0.018	-0.009	0.033
	(1.754)	(0.883)	(-0.259)	(1.632)
busseg	0.172***	0.113***	0.157***	0.094***
	(10.288)	(7.026)	(6.551)	(6.524)
n_geo	0.057***	0.047***	0.041***	0.039***
	(13.776)	(11.629)	(6.661)	(11.385)
fgn	0.197***	0.155***	0.127***	0.082***
	(5.798)	(4.735)	(2.800)	(3.300)
stdret	1.535***	0.602*	1.693**	0.036
	(4.371)	(1.748)	(1.997)	(0.123)
stdib	0.000	0.000	0.000*	0.000
	(1.612)	(1.071)	(1.740)	(1.130)
ma	0.056***	0.037***	0.019	0.006

	(4.661)	(3.197)	(1.087)	(0.755)
icw			0.305***	
			(8.847)	
E_Index			0.003	
			(0.331)	
ac			-0.002	
			(-1.618)	
Constant	8.842***	9.144***	8.691***	9.187***
	(58.981)	(57.399)	(34.463)	(66.705)
Industry dummy	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES
Firm FE	NO	NO	NO	YES
R-Squared	0.820	0.832	0.809	0.827
Observations	18959	18944	7193	18944

Table 2 Panel A presents OLS regression on the effect of principle-based standards on total audit fees. The sample spans the period 2000 to 2006 and contains about a maximum of 18,959firm-quarter observations. The main dependent variable is total audit fees. The main explanatory variable is firm-year measure for principle-based standards from Folsom et al (2017). All control variables are defined in Appendix. All continuous variables are winsorized to 99% level. T-statistics are based on robust clustered standard error using firm clusters. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel B: Change analysis

Dep. Var.=	ch_lnauditfee
	(1)
ch_pscore	-0.014***
	(-11.212)
ch_big4	0.137***
	(5.034)
ch_lnat	0.358***
	(21.734)
ch_inv	-0.020
	(-0.222)
ch_rec	-0.173***
	(-2.600)
ch_cr	-0.024***
	(-8.543)
ch_btm	-0.046***
	(-3.813)
ch_lev	-0.045
	(-1.540)
ch_empls	0.100***
	(5.075)
ch_dec_ye	0.006
	(0.103)

ch_roa	0.013
	(0.344)
ch_loss	0.047***
	(3.564)
ch_audop	-0.074***
	(-8.652)
ch_client	0.032***
	(4.338)
ch_litrisk	0.074
	(1.609)
ch_busseg	0.108***
	(4.071)
ch_fgn	0.140***
	(4.229)
ch_ma	0.004
	(0.416)
Constant	0.273***
	(4.011)
Industry dummy	YES
Year dummy	YES
R-Squared	0.387
Observations	15384

Table 2 Panel B presents OLS regression on the effect of change of principle-based standards on change of total audit fees. The sample spans the period 2000 to 2006 and contains about a maximum of 15,384firm-quarter observations. The main dependent variable is change in total audit fees. The main explanatory variable is change in firm-year measure for principle-based standards from Folsom et al (2017). All control variables are defined in Appendix. All continuous variables are winsorized to 99% level. T-statistics are based on robust clustered standard error using firm clusters. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Table 3.3 Regression based on PSM method
Panel A: Logit model for Propensity Score Matching

	(1) pscore_high Coef./t value
big4	-0.104*
	(-1.790)
lnat	-0.835***
	(-37.503)
inv	1.044***
	(6.048)
rec	0.571***
	(3.556)
cr	0.087***
	(11.579)
btm	0.066*
	(1.827)
lev	-0.468***
	(-5.805)
empls	0.236***
	(13.842)
dec_ye	-0.111***
	(-2.729)
roa	0.705***
	(7.157)
loss	-0.848***
	(-18.050)
audop	0.603***
	(14.448)
client	0.173***
	(10.218)
litrisk	-0.313***
	(-5.653)
busseg	-0.661***
	(-15.058)
n_geo	-0.156***
	(-14.672)
fgn	-0.414***
	(-3.946)
stdret	-12.285***
	(-9.694)
stdib	-0.000
	(-1.401)
ma	-0.423***
	(-10.665)
Constant	8.545***

	(4.688)
Ind dummy	YES
Year dummy	YES
Pseudo R2	0.257
Observations	18937

Panel B: Comparison of Sample and Matched Firms

	Before (After) Match		
Variable	Treated	Control	Difference (P value)
lnat	4.92 (4.93)	6.44 (4.97)	0.00 (0.11)
btm	0.6 (0.6)	0.57 (0.6)	0.00 (0.71)
lev	0.18 (0.19)	0.26 (0.18)	0.00 (0.44)
roa	0.01 (0.01)	0.03 (0.01)	0.11 (0.34)
stdret	0.04 (0.04)	0.04 (0.04)	0.00 (0.85)
busseg	1.30 (1.3)	1.48 (1.31)	0.00 (0.08)
inv	0.14 (0.14)	0.11 (0.12)	0.00 (0.00)
rec	0.17 (0.17)	0.15 (0.17)	0.00 (0.00)
cr	3.5 (3.45)	2.66 (3.61)	0.00 (0.00)

The table reports the average of firm characteristics between the sample firms, i.e., those have high Pscore and their propensity matched firms with low pscore, before and after match. The last column reports the difference between the two groups with the p value.

Panel C: regression based on PSM sample (H1)

Dep. Var.=	lnauditfee	ln_nonaudit_fees	ln_it_fees	ln_tax_fees
	(1)	(2)	(3)	(4)
pscore	**-0.018*** **	**-0.013***	**-0.021**	**-0.021**
	(-8.083)	**(-1.871)**	**(-1.325)**	**(-1.234)**
big4	0.124**	1.144***	-0.243	0.975*
	(2.081)	(2.627)	(-1.610)	(1.684)
lnat	0.375***	0.585***	-0.084	0.689***
	(15.100)	(6.490)	(-1.050)	(3.355)
inv	0.263*	0.967	-0.151	2.134
	(1.657)	(1.477)	(-0.274)	(1.556)
rec	0.864***	0.088	0.024	0.312
	(4.892)	(0.137)	(0.031)	(0.204)
cr	-0.034***	-0.050*	-0.020	0.041
	(-6.361)	(-1.826)	(-1.316)	(0.773)
btm	-0.031	-0.112	0.010	-0.096
	(-0.981)	(-0.827)	(0.065)	(-0.325)
lev	-0.157**	0.056	-0.287	-1.048*
	(-2.092)	(0.237)	(-1.026)	(-1.766)
empls	0.056***	0.056	0.101*	-0.014
	(3.995)	(1.334)	(1.700)	(-0.122)
dec_ye	0.072**	-0.187	-0.042	0.669**

	(2.174)	(-1.561)	(-0.427)	(2.390)
roa	-0.412***	0.622	0.070	0.451
	(-3.700)	(1.185)	(0.156)	(0.412)
loss	0.107***	-0.020	-0.041	-0.281
	(3.074)	(-0.147)	(-0.392)	(-0.813)
audop	-0.054**	-0.075	0.163	0.107
	(-2.118)	(-0.689)	(1.642)	(0.408)
client	0.024**	0.202***	0.085*	0.401***
	(2.073)	(4.783)	(1.648)	(4.148)
litrisk	0.010	0.140	-0.024	-0.373
	(0.221)	(0.896)	(-0.203)	(-0.939)
busseg	0.166***	0.086	-0.107	0.330
	(4.452)	(0.679)	(-0.655)	(1.156)
n_geo	0.057***	0.114***	0.010	0.245***
	(6.083)	(3.563)	(0.464)	(3.289)
fgn	0.100	-0.268	-0.128	0.695
	(1.321)	(-0.858)	(-0.909)	(0.913)
stdret	0.554	6.117	-8.297	20.997*
	(0.445)	(1.279)	(-1.621)	(1.660)
stdib	0.000***	0.000*	0.000	0.001
	(4.965)	(1.960)	(0.369)	(1.416)
ma	0.023	0.101	0.093	0.219
	(0.838)	(1.009)	(0.816)	(0.858)
icw	0.266***	-0.096	-0.020	0.341
	(5.160)	(-0.318)	(-0.247)	(0.635)
E_Index	0.007	0.006	-0.008	0.032
	(0.659)	(0.132)	(-0.214)	(0.318)
ac	-0.001	-0.003	0.007	-0.009
	(-0.479)	(-0.554)	(0.888)	(-0.667)
Constant	8.450***	6.122***	1.795**	-7.901***
	(47.940)	(8.088)	(2.116)	(-5.325)
Industry dummy	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES
R-Squared	0.770	0.272	0.119	0.368
Observations	5024	4006	4006	4006

Table 3 presents regression result on the effect of principle-based standards on total audit fees and other related fees based on propensity-score-match sample. I use a caliper of 0.05 times the standard deviation of the estimated propensity scores. The sample spans the period 2000 to 2006 and contains about a maximum of 5,024 firm-quarter observations. The main dependent variable is total audit fees, total nonaudit fees, total IT fees, and total tax fees. The main explanatory variable is firm-year measure for principle-based standards from Folsom et al (2017). All control variables are defined in Appendix. All continuous variables are winsorized to 99% level. T-statistics are based on robust clustered standard error using firm clusters. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Table 3.4 The effect of SFAS 131 on audit fees

	(1) lnauditfee Coef./t value	(2) lnauditfee Coef./t value
Post*treated	0.068**	0.118*
	(2.098)	(1.805)
big4	0.179***	0.409***
	(3.894)	(4.880)
lnat	0.452***	0.478***
	(29.394)	(11.025)
inv	0.034	-0.035
	(0.255)	(-0.172)
rec	0.234**	0.034
	(2.166)	(0.217)
cr	-0.050***	-0.003
	(-9.865)	(-0.266)
btm	-0.060***	-0.041
	(-3.357)	(-0.642)
lev	-0.102*	0.066
	(-1.909)	(0.497)
empls	0.060***	0.090***
	(4.960)	(2.704)
dec_ye	0.018	0.031
	(0.506)	(0.442)
roa	-0.253***	0.017
	(-3.550)	(0.096)
loss	0.125***	0.141**
	(4.372)	(2.560)
audop	-0.133***	-0.060
	(-6.033)	(-1.216)
client	0.004	-0.023
	(0.361)	(-1.056)
litrisk	0.084**	-0.061
	(2.135)	(-0.644)
busseg	0.143***	0.213**
	(4.797)	(2.481)
n_geo	0.044***	0.064***
	(6.157)	(3.805)
fgn	0.296***	0.309*
	(4.329)	(1.724)
stdret	1.474**	7.936***
	(2.042)	(4.653)
stdib	0.000*	0.000
	(1.875)	(0.048)
ma	0.040	0.008
	(1.638)	(0.117)

Constant	9.036***	6.927***
	(75.325)	(25.663)
Industry dummy	YES	YES
Year dummy	YES	YES
R-Squared	0.840	0.894
Observations	4498	548

Table 4 presents regression result on the effect of exogenous shock of SFAS 131 in fiscal year 2001 based on propensity-score-matched sample. I use a caliper of 0.05 times the standard deviation of the estimated propensity scores. The sample spans the period 2000 to 2004 and contains about a maximum of 4,498 firm-quarter observations. The main dependent variable is total audit fees. The main explanatory variable is indicator variable for those firms that are likely to be affected by the change of accounting regulation past 2002. All variables are defined in Appendix. All continuous variables are winsorized to 99% level. T-statistics are based on robust clustered standard error using firm clusters. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Table 3.5: How does different risk level and effort level affect audit pricing of Pscore

	(1) lnauditfee Low Litrisk	(2) lnauditfee High Litrisk	(3) lnauditfee Low Misrisk	(4) lnauditfee High Misrisk	(5) lnauditfee Before SOX	(6) lnauditfee After SOX
pscore	-0.021***	-0.027***	-0.022***	-0.025***	-0.018***	-0.025***
	(-15.088)	(-15.606)	(-22.765)	(-24.478)	(-12.662)	(-21.063)
Constant	8.946***	9.283***	8.780***	8.956***	9.548***	9.048***
	(39.834)	(81.231)	(26.918)	(14.100)	(53.496)	(139.395)
Difference test in coefficient of Pscore:						
Difference (Chi-square)	Low lit -high lit	0.006*** (20.68)	Low mis -high mis	0.003* (3.43)	Bef SOX -aft SOX	0.007*** (26.54)
Controls	YES	YES	YES	YES	YES	YES
Ind dummy	YES	YES	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES	YES	YES
R-Squared	0.844	0.817	0.850	0.827	0.791	0.828
Observations	11584	7360	7498	8111	5042	13902

Table 5 presents regression result on the effect of principle-based standards on total audit fees based on different levels of litigation risk, misstatement risk, and expected effort. The sample spans the period 2000 to 2006 and contains about a maximum of 11,584 firm-quarter observations. The main dependent variable is total audit fees. All variables are defined in Appendix. All continuous variables are winsorized to 99% level. T-statistics are based on robust clustered standard error using firm clusters. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Table 3.6 Cross-sectional tests
Panel A: the impact of governance on the association between Pscore and lnauditfee (H3)

	(1) lnauditfee Coef./t value	(2) lnauditfee Coef./t value	(3) lnauditfee Coef./t value	(4) lnauditfee Coef./t value
pscore	-0.021***	-0.023***	-0.025***	-0.021***
	(-15.216)	(-21.528)	(-15.912)	(-13.466)
cscore	-0.102			
	(-0.719)			
Pscore*cscore	-0.012*			
	(-1.786)			
Icw		0.566***		
		(9.895)		
Pscore*icw		0.006**		
		(2.222)		
TRAp			0.668***	
			(4.594)	
Pscore*TRA			0.017**	
			(2.332)	
HighGindex				0.197***
				(2.663)
Pscore*highG				0.007**
				(2.258)
Constant	10.048***	10.108***	10.059***	10.365***
	(153.476)	(185.709)	(162.490)	(66.350)
Controls	YES	YES	YES	YES
Ind dummy	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES
R-Squared	0.832	0.837	0.837	0.805
Observations	16560	18944	15635	7164

Table 6 Panel A presents regression result on the effect of principle-based standards on total audit fees when a company does not have good governance or internal control system. The sample spans the period 2000 to 2006 and contains about a maximum of 18,944 firm-quarter observations. The main dependent variable is total audit fees. All variables are defined in Appendix. All continuous variables are winsorized to 99% level. T-statistics are based on robust clustered standard error using firm clusters. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel B: the impact of auditor expertise on the association between Pscore and lnauditfee

	(1) lnauditfee Coef./t value	(2) lnauditfee Coef./t value	(3) lnauditfee Coef./t value
pscore	-0.024*** (-21.239)	-0.024*** (-20.484)	-0.038*** (-13.938)
Indexp1	0.093*** (2.676)		
Pscore*indexp1	0.003* (1.717)		
Indexp2		0.092*** (3.121)	
Pscore*indexp2		0.003** (2.066)	
big4	0.276*** (13.217)	0.271*** (12.865)	0.490*** (12.483)
Pscore*big4			0.016*** (5.732)
Constant	10.111*** (182.824)	10.105*** (183.028)	9.967*** (165.122)
Controls	YES	YES	YES
Ind dummy	YES	YES	YES
Year dummy	YES	YES	YES
R-Squared	0.833	0.833	0.833
Observations	18944	18944	18944

Table 6 Panel B presents regression result on the effect of principle-based standards on total audit fees when auditors are industry expertise or big 4 accounting firms. The sample spans the period 2000 to 2006 and contains about a maximum of 18,944 firm-quarter observations. The main dependent variable is total audit fees. All variables are defined in Appendix. All continuous variables are winsorized to 99% level. T-statistics are based on robust clustered standard error using firm clusters. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Table 3.7 Additional tests

Panel A: Additional support for the direct and indirect effect of Pscore on lnauditfee through litigation risk, misstatement risk, and audit duration (for H2)

	(1) litrisk_shu Coef./t value	(2) lnauditfee Coef./t value	(3) MisRisk Coef./t value	(4) lnauditfee Coef./t value	(5) Duration Coef./t value
pscore	-0.015***	-0.023***	-0.008***	-0.024***	-0.316***
	(-7.800)	(-29.306)	(-4.407)	(-28.275)	(-9.076)
litrisk_shu		0.026***			
		(8.933)			
MisRisk				0.008**	
				(2.184)	
high_duration					
Constant	-5.127***	10.612***	3.280***	10.452***	88.848***
	(-59.608)	(280.324)	(38.452)	(256.839)	(57.388)
Controls	YES	YES	YES	YES	YES
Ind dummy	YES	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES	YES
R-Squared	0.667	0.729	0.358	0.740	0.144
Observations	18784	18784	15611	15611	18781

Table 7 Panel A presents path analysis for the effect of principle-based standards on total audit fees through litigation risk and misstatement risk in column (1) to (4), and the effect of principle-based standards on audit durations. The sample spans the period 2000 to 2006 and contains about a maximum of 18,784 firm-quarter observations. The main dependent variable is total audit fees. All variables are defined in Appendix. All continuous variables are winsorized to 99% level. T-statistics are based on robust clustered standard error using firm clusters. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel B: the impact of governance on the association between Pscore and discretionary accruals (for H3)

	(1) std_res_dd Coef./t value	(2) std_res_dd Coef./t value	(3) std_res_dd Coef./t value	(4) std_res_dd Coef./t value
pscore	-0.076**	-0.107***	-0.185***	-0.035
	(-2.134)	(-3.479)	(-4.091)	(-0.904)
cscore	-13.699***			
	(-2.905)			
Pscore*cscore	-0.258			
	(-1.427)			
Icw		3.262*		
		(1.789)		
Pscore*icw		0.156**		
		(2.066)		
TRA			15.471***	
			(2.993)	
Pscore*TRA			0.485**	
			(1.961)	
HighGindex				-0.354
				(-0.221)
Pscore*HighG				0.002
				(0.027)
Constant	0.030***	0.028***	0.026***	0.027***
	(13.613)	(14.582)	(12.180)	(6.806)
Controls	YES	YES	YES	YES
Ind dummy	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES
R-Squared	0.314	0.322	0.327	0.313
Observations	13843	15627	12963	6168

Table 7 Panel B presents evidence for the joint effect of principle-based standards and lack of good governance or internal control systems on earnings management. The sample spans the period 2000 to 2006 and contains about a maximum of 15,627 firm-quarter observations. The main dependent variable is standard deviation of residual accrual model in Dechow and Dechiv (2002) multiply 1000. All variables are defined in Appendix. All continuous variables are winsorized to 99% level. T-statistics are based on robust clustered standard error using firm clusters. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

Panel C: the impact of auditor expertise on the association between Pscore and discretionary accruals (for H3)

	(1) auditing_duration Coef./t value	(2) auditing_duration Coef./t value	(3) auditing_duration Coef./t value
pscore	-0.319***	-0.344***	-0.430***
	(-8.754)	(-8.512)	(-3.709)
Indexp1	0.558		
	(0.543)		
Pscore*indexp1	0.020		
	(0.337)		
indexp2		1.543*	
		(1.772)	
Pscore*indexp2		0.085*	
		(1.754)	
big4	-4.751***	-4.814***	-3.042**
	(-8.499)	(-8.497)	(-2.082)
Pscore*big4			0.125
			(1.090)
Constant	88.804***	88.489***	87.637***
	(57.573)	(57.411)	(47.638)
Controls	YES	YES	YES
Ind dummy	YES	YES	YES
Year dummy	YES	YES	YES
R-Squared	0.144	0.144	0.144
Observations	18781	18781	18781

Table 7 Panel C presents evidence for the joint effect of principle-based standards and auditor industry expertise on auditing duration. The sample spans the period 2000 to 2006 and contains about a maximum of 15,627 firm-quarter observations. The main dependent variable is number of days between audit file date and fiscal year end. All variables are defined in Appendix. All continuous variables are winsorized to 99% level. T-statistics are based on robust clustered standard error using firm clusters. Statistical significance (two-sided) at the 10%, 5%, and 1% level is denoted by *, **, and ***, respectively.

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APPENDICES

Appendix A: Variable definitions for chapter one

Main explanatory variables	
nchiv	zero minus change of average implied volatility from one trading day before earnings announcement date to one trading day after earnings announcement date scaled by implied voliatility one day before. The average implied volatility for a certain day is calculated as average of implied volatility in one call-put pair, then weighted by total open interest by pairs of call-put options. It measures how quickly that uncertainty resolved during earnings announcement period.
nchiv_scale1	Nchiv scaled by call-put spread_pre. It measures for each unit of information that option traders know, how much uncertainty that this quarter's earnings announcement could help to resolve.
nchiv_scale2	Nchiv scaled by analyst dispersion within 90 days before earnings announcement date. It measures for each unit of disagreement among analysts ex ante, how much uncertainty that this quarter's earnings announcement could help to resolve.
nchiv_scale3	Nchiv scaled by analyst-based earnings surprise. It measures for each unit of surprise, how much uncertainty that this quarter's earnings announcement could help to resolve.
aq, aq_scale1, aq_scale2, aq_scale3	Decile rank of nchiv,nchiv_scale2, nchiv_scale3, nchiv_scale4, for each year-quarter.

Main dependent variables	
lncham	Log one plus change in amihud liquidity measure around earnings announcement date scaled by pre-announcement amihud measure. Amihud equals 1000000*abs(ret)/abs(vol*prc)
lnchbas	Log one plus change in bid-ask spread around earnings announcement date scaled by pre-announcement bid-ask spread. bid-ask spread equals to (askhi-bidlo)/bidlo
PIN	probability of informed trading for current quarter. Data obtained from professor Stephen Brown's website

chidrisk	Change in idiosyncratic risk around earnings announcement date. Idiosyncratic risk is root-mean-square deviation of error from Fama-French four factor model.
chsigma	Change in sigma around earnings announcement date. Sigma is logistic transformed (1-R2) from Fama-French four factor model.
spread_base spread_pre	weighted average of the difference in implied volatilities between matched call and put option pairs. Use open interest to weight. And select only options with 10 to 60 days to expire and with non-zero open interest. Follows Jin et al (2012).
skew_base skew_pre	Average of difference in the implied volatility between OTM put options (delta in the range of [–0.45, –0.15], and choose the one closest to –0.3) and ATM call options (delta in the range of [0.4, 0.7] and closets to 0.5). Select only options with 10 to 60 days to expire. Follows Jin et al (2012).
opp_purchased	Indicator variable equals one if there is any purchase by oppotunistic traders after earnings announcement date. Definition of opportunistic trader follows Cohen et al (2012).
opp_saled	Indicator variable equals one if there is any sale by oppotunistic traders after earnings announcement date. Definition of opportunistic trader follows Cohen et al (2012).
routine_purchased	Indicator variable equals one if there is any purchase by routine traders after earnings announcement date. Definition of routine trader follows Cohen et al (2012).
routine_saled	Indicator variable equals one if there is any sale by routine traders after earnings announcement date. Definition of routine trader follows Cohen et al (2012).
wavg_profits	Weighted average alpha for insider trading taken during [3,12] days following earnings announcement date. Weighted by daily trading value. Alpha is intercept from Fama-French four factor model following [0,180] days for the insider trading multiplies 100. If there is net sale in one specific day, multiply alpha by -1.
imb_big	buy-and-sale imbalance for big trader(defined as those with more than 50000 trading value). Imb_big equals to (big_buy-big_sell)/((big_buy+big_sell)).
imb_small	buy-and-sale imbalance for small trader(defined as those with less than 5000 trading value). Imb_small equals to (small_buy-small_sell)/((small_buy+small_sell)).
WNf	Weighted #forecast within [2,40] days after earnings announcement. The forcast is weighted by the distance

	between forecast announcement date and earnings announcement date.
WRf	Weighted ratio of forecast scaled by total forecasts within [2,40] days after earnings announcement. The forcast is weighted by the distance between forecast announcement date and earnings announcement date.
Afa	analyst forecast accuracy after earnings announcement date. Equals to sum(0-abs(actual-value)/(lenghth to earnings announcement date+1))/total number of forecasts.
reaction	The relative update of analyst annual forecasts according to current quarters' earnings surprise.

Control variable	
lnmv	log marekt value.
blev	Book leverage. Calculated as (dlttq+dlcq)/atq.
btm	Total assets devided by market value. Calculated as atq/(prccq*cshoq).
io	institutional ownership.
ac	#analysts following the firm for current period.
sue3	Analyst-adjusted earnings surprise.
loss	Indicator variable equals 1 if net income for current quarter is smaller than 0.
qtr4	Indicator variable for fourth fiscal quarter.
mom	Momentum, measured as buy-and-hold raw return [-90,-2] calendar days before earnings announcement date.
rd	R&D expense scaled by average total assets. Calculated as xrdq/((atq+lag_atq)/2). For missing R&D, set it as 0.
stdret	Standard deviation of return before earnings announcement date.
roa	Return on assets. Calculated as oibdpq/lag_atq.
dispersion	Standard deviation of quarterly analyst forecast within 90 days before earnings announcement date.
avevol	Average dolloar trading volume before earnings announcement date.

Appendix B: Variable definitions for chapter two

Main dependent variables	
EDF	expected default frequency based on Bharath and Shumway (2008);

Oscore	Olhson (1980)'s O-score based on quarterly financial reports. Oscore=-1.32-0.407*log(atq)+6.03*(ltq/atq)-1.43*(actq-lctq)/atq+0.076*lctq/actq-1.72*(ltq-atq>0)-0.521*(niq-lniq)/(abs(niq)+abs(lniq)); Since I use quarterly statement, any income statement items are multiplied by 4.
Main explanatory variables	
compacct4	Comparability measure based on De Franco et al. (2011).
compacct4_barth1	Comparability measure based on the first model in Barth et al. (2012).
compacct4_barth2	Comparability measure based on the second model in Barth et al. (2012).
pca1_compacct4	First principal component of standardized three comparability measure above.
control variables	
lnmv	The natural log of market value of equity at the end of the year
lndebt	The natural log of face value of debt
niqdatq	The ratio of net income to total asset
excessret	The difference between the stock's annual return and the CRSP value-weighted return
inverse_stdret	The inverse of the annualized stock return volatility
hightech	Dummy variable for firms in two-digit Standard Industrial Classification (SIC) codes of 28 (chemicals, biotech, and drugs), 35 (computer hardware and machinery), 36 (electrical and electronics), 37 (transportation equipment), 38 (instruments), and 73 (software and data services) based on Gu and Li (2007).
investing	Firms total investment in capital expenditure and R&D scaled by assets. I replace R&D with missing values as 0 as previous literatures.
ior	Total institutional ownership based on 13F filings.
absautocorrelation	The absolute value of the first-order return autocorrelation of weekly returns for one year.

ltio	Sum of percentage of dedicated institutional ownership plus quasi-index institutional ownership.

Appendix C: Variable definitions for chapter three

Variable	Definition
Dependent and testing variable	
pscore	Firm-year specific variable that measures the extent to which firms' financial reporting is affected by principles-based standards. Data is available from Richard Mergenthaler's website.
lnauditfee	Natural logarithm of total audit fees. Data is available from Audit Analytics.
auditing_duration	Number of days between audit file date and fiscal year end.
ln_nonaudit_fees	Natural logarithm of total non audit fees. Data is available from Audit Analytics.
ln_it_fees	Natural logarithm of total IT fees. Data is available from Audit Analytics.
ln_tax_fees	Natural logarithm of total tax-related audit fees. Data is available from Audit Analytics.
indexp_cntr1	Indicator variable for auditor industry expertise-first definition by auditor dominance. An audit is defined as a national industry specialist if in a particular year the auditor has the largest market share in a two-digit SIC category and if its market share is at least 10% points greater than the second largest industry leader in a national audit market.
indexp_cntr2	Indicator variable for auditor industry expertise-first definition by auditor market share. An audit is defined as a national industry specialist if in a particular year the auditor has a market share greater than 30% in a two-digit SIC category.
cscore(cscore_high)	Firm-year conservatism score (high/low indicator by fiscal year).
litrisk_shu_decile	Annual decile rank of Shu's (2000) score. Shu' (2000) score equals to -10.049+0.276*lnat+1.153*inv+2.075*rec+1.251*roa+(-0.088)*cratio+1.501*blev+0.301*sgrowth+(-0.371)*stkret+(-2.309)*stdret+0.235*beta+1.464*turnover+1.060*delist+0.928*tech+0.463*going_concern.
Misstate_Risk	Expected misstatement risk, equaling to average annual decile rank of Dechow et al.'s (2011) F-score, Beneish's

	(1999) Mscore, and Dechow and Dichev's (2002) accrual quality
nseg	total number of geographic and business segments.
High Gindex	Indicator variable that equals one if Gindex for a company-year is in top quartile. Data is available from Andrew Metrick's website.
Transient	Ownership from transient investors. Ownership data is constructed from Thomas Reuters' database and Brian Bushee's website.
gdwl_d	Indicator variable for the existence of goodwill (gdwl>0) in a company in 2000. Data is available from Compustat.
gdwl_impair_like_d	Indicator variable for the company that is more likely to be affected by SFAS 142 (gdwl>(csho*prcc_f-(at-lt))). Data is available from Compustat.
postSOX	Indicator variable that equals one if firm-year observations are in fiscal year after 2002.
std_res_dd	standard deviation of residual accrual model in Dechow and Dechiv (2002) multiply 1000.
control variable	
big4	Indicator for big four auditor (au in (1:8) in audit analytic database)
lnat	Natural logarithm of total assets.
inv	Total inventory scaled by lagged total assets.
rec	Total receivable scaled by lagged total assets.
cr	Current ratio-total current assets divided by total current liabilities.
btm	Book-to-market ratio measured as book equity divided by year-end market value.
lev	Book leverage measured as (debt in current liabilities+ long-term debt) divided by total assets.
empls	Square root of total employees.
dec_ye	Indicator variable equals to one if the firm's fiscal year end is in December.
roa	Return on assets measured as operating income after depreciation divided by lagged total assets.
loss	Loss indicator if the firm has negative income in current or past two years. Income is measured as net income minus extraordinary items and discontinued operations.
audop	Audit opinion indicator variable. Audop is equal to one if auop in compustat equals to one.
client	Square root of audit tenure.

litrisk	Indicator variable for firms in high litigation risk industries (biotech: 2833<=sich<=2836 or 8731<=sich<=8734; computers: 3570<=sich<=3577 or 7370<=sich<=7374; electronics: 3600<=sich<=3674; retailing: 5200<=sich<=5961).
fgn	Percentage of sales to foreign countries. Foreign sale is computed from compustat segment files.
stdret	Control for complexity-annual standard deviation of return.
stdib	Control for complexity-annual standard deviation of income before tax for the past 6 years [-5,0].
busseg	Control for complexity-number of business segments. Data is from compustat segment files.
n_geo	Control for complexity-number of geographic segments. Data is from compustat segment files.
ma	Merger and acquisition indicator variable, which equals to 1 if there is positive "aqc" in current year. Data is from compustat annual items.