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A More Efficient and Effective Objective Measure of Financial Disclosure Quality: Omissions of Seven Key Financial Statement Variables

Ying Zhang
Syracuse University

ABSTRACT

This dissertation research includes three Chapters. Chapter One proposes a new and simple measure of financial reporting quality. Chapter Two and Chapter Three apply this new measure to examine the association between financial reporting quality and firms' internal governance issues, such as internal control quality and a possible outcome of internal control weakness (ICW), financial restatements.

In Chapter One of the thesis, I propose a parsimonious, theory-based and empirically-supported measure of missing variables, REPORT. Chen et al. (2015) [1]proposes a measure of disclosure quality, DQ, based on missing financial statement variables. DQ includes hundreds of items and is complex to program. I propose a parsimonious, theory-based and empirically-supported measure of missing variables, REPORT, based on the seven variables found most value relevant by Lev and Thiagarajan (1993)[2]. To compare REPORT with DQ, I replicate Chen, et al (2015) and find results as originally reported. REPORT also is similarly associated with the measures used to validate DQ, forecast accuracy, analyst forecast dispersion, bid-ask spread, and cost of capital. With Vuong and Clarke tests I compare REPORT and DQ with these disclosure quality metrics and find that REPORT performs as well as, or better than, DQ in these tests. The comparative power of REPORT over DQ indicates that omission of the elements of a small set of highly value-relevant financial variables better indicates a firm's disclosure quality than omissions of a larger set of variables that also includes less value-relevant, or irrelevant, financial variables. REPORT, being theory-based, omits examination of many items likely unnecessary to

[1] Chen, S., B. Miao, and T. Shevlin. 2015. A new measure of disclosure quality: the level of disaggregation of accounting data in annual reports. Journal of Accounting Research. 53(5): 1017-1054.

2 Lev, B., and S. Thiagarajan. 1993. Fundamental information analysis. Journal of Accounting Research. 31(2): 190- 215.

firm valuation and is easily implemented, not only by trained researchers, but even by average investors, which opens many potential applications in both academic and practical areas.

Chapter Two examines the association between internal control weakness (ICW) and the two "missing data"-based measures, DQ and REPORT. Being able to identify traits of firms of ICWs before their public issuances would provide investors with more information to plan for their investment decisions. As an important aspect of internal control, financial statement preparation quality may reflect firms' internal control system. Poor internal control system may cause omissions of numbers reported on firms' financial statements. I examine whether reporting or omitting of financial statement variables can reflect firms' internal control quality; I also examine if omitting financial statement variable is informative in predicting issuance of an *ICW* in the next period. However, the results lack adequate statistical significance in drawing conclusions in terms of associations between *ICW*s and *DQ/REPORT*.

Chapter Three examines the association between misstatements and *DQ/REPORT*. Internal control weakness and restatements do not always coincide. Internal control weaknesses, alone, cannot fully reflect firms' risks of restatements. In this study, I examine whether *DQ* and *REPORT* provides with additional information, other than *ICW*s, in explaining likelihood of misstatements. I expect that firms with higher *DQ* and *REPORT* are less likely to restate their financial statements in subsequent periods. The results lack adequate evidence to draw conclusions on associations between restatements and *DQ/REPORT*, but the results have added further evidence to the literature on associations between *ICW*s and likelihood of misstatements.

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Three Essays

By

Ying Zhang

B.S. Jiangxi University of Finance and Economics, July 2012

M.S. Pace University, December 2014

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DEDICATION

To My Parents, Mr. Shuwu Zhang & Mrs. Fenge Zhang

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CHAPTER ONE: A MORE EFFICIENT AND EFFECTIVE OBJECTIVE MEASURE OF FINANCIAL DISCLOSURE QUALITY: OMISSIONS OF SEVEN KEY FINANCIAL STATEMENT VARIABLES

1. **Introduction**

In this study, I propose and investigate a new measure of financial disclosure quality, *REPORT*, based on the reporting or omitting of seven key financial statement variables, which is trivially simple for both researchers and average investors to use. These seven variables are shown in Lev and Thiagarajan (1993) to be firms' most-relevant information, and their value-relevance has been strongly supported by later studies, such as Abarbanell and Bushee (1997) and Abarbanell and Bushee (1998). Chen et al. (2015) develops a measure of disclosure quality, Disaggregation Quality (*DQ*), a measure of the "fineness" of firms' financial reports based on the reporting or omission of financial statement items from their Balance Sheet and Income Statements. *DQ* is the first measure of financial reporting quality based on financial statement missing information. This measure is objective and straightforward, and has been cited in studies published in premier research journals (e.g., Drake et al., 2016; Hoitash and Hoitash, 2018). However, *DQ* is quite complex to program[3], and likely includes considerable less value-relevant, or irrelevant information that only introduces noise into the *DQ* measure. The screening assumptions used in the computation of *DQ* likely fails to capture the "worst offenders"; firms intentionally failing to report specific financial statement by omitting them entirely. I build on the concept underlying Chen et al. (2015), that disclosure quality is a function of omitted data, and propose a much simpler and accurate measure based only on the reporting, or failing to

[3] In discussions with Dr. Shevlin, a co-author of the DQ study, at the 2019 Northeast Regional Accounting meeting he indicated that he and/or his co-authors had been contacted several times by researchers attempting, unsuccessfully, to replicate the programming and results of the DQ model.

report, a small number of the most value-relevant financial statement variables; a metric readily accessible to anyone, including relatively unsophisticated average investors. The empirical results show that, in general, *REPORT* as well as, or better than *DQ*. Thus, this study contributes to the literature of financial disclosure quality by showing that a small set of highly value-relevant variables is able to capture disclosure quality as well as or better than a more complete set. This study also builds upon the stream of literature concerning how fundamental accounting information is used in investment decision making by examining the importance of omitting key fundamental accounting data.

Measuring financial disclosure quality at a reasonable level is challenging. High financial reporting quality would provide analysts and investors more confidence in analysis and decision making procedures. On the contrary, a poor quality of financial reporting is more likely to distort investors' judgements about firms' financial health. Low quality financial information makes it more difficult for markets to access firms' information completely, and in this case managers have greater incentives to manipulate firms' financial reporting processes when firms are not performing well. When firms are in a good shape, however, managers are more willing to disclose financial information, making it easier for markets to fully react to positive news. Numerous studies have provided empirical evidence for the connections between financial reporting quality and managers' incentives (e.g. Bloomfield, 2002; Lang and Lundholm, 1993). As a result, evaluating financial reporting quality, especially differentiating between material information and "noise", is a valuable skill for financial analysts. [4] Without distinguishing high versus low quality financial reporting, a financial analyst would have less confidence in his or her financial analyses. One example of the devastating results of miss-recognizing financial

[4] "Evaluating Quality of Financial Reports", 2019 Curriculum, CFA Program Level II, CFA Institute.

disclosure quality is the Enron debacle; the primary violation of which was the omission of required data. In the Enron case, $591 million in undisclosed losses and $628 million in undisclosed liabilities were omitted from Enron's financial statements for having been "deemed immaterial" (Powers et al. 2002).

Regulators have focused on financial reporting and disclosure quality since the 1933 Securities Act. For example, the SEC issued disclosure guidelines in 1998 focusing on the language usage and formatting in public firms' prospectuses and noting that complicated prospectuses make it difficult for average investors to extract information. In 2019, the SEC Enforcement Division's Financial Reporting and Audit (FRAud) Group undertook efforts to more strongly pursue securities law violations related to financial reporting and audit failures. Though SEC enforcements and guidelines provide a framework for report formatting and ethical references for practitioners, financial statement preparers still retain considerable "freedom" as to reporting details, as long as their choices are broadly consistent with GAAP. As a result, financial disclosure quality remains subject to possible manipulation.

Existing studies have developed a number of measures of disclosure quality based on several dimensions, such as the magnitude of disclosed information (e.g., Miller, 2002; Loughran and McDonald, 2014) and linguistic features (e.g., Li, 2008; Bonsall et al., 2017). Existing measures of disclosure quality can be classified generally into two types: managers' voluntary disclosures, and overall disclosure indices. The first type consists primarily of measures sourced from managements' discussions in annual reports and, in some other but less common cases, conference calls. For example, Li (2008) uses the FOG index and the length of the annual report as two measures of "readability", which have been widely accepted as a descriptive disclosure quality in accounting research. These two methods have been applied by many reporting quality

studies afterwards. These concepts are based on the computational linguistics literature, which assumes that the numbers of syllables per word or words per sentence are negatively associated with readers' understanding the contents. However, textual analyses of financial reporting can only catch one side of reporting, i.e., language usage. Investors can obtain some information from the tone or the complexity of language usage, but in most cases managers' voluntarily disclosed information is limited. Managers are required to provide general evaluations and expectations regarding companies' risks, strategies, and material legal issues, such as filing for bankruptcy. They do not have to report company's financial positions in detail, except for when there's a "material" loss which demands more explanations to investors. In the SEC Financial Reporting Manual (December 1, 2017), the disclaimer contains the following sentences: "Because of its informal nature, the Manual does not necessarily contain a discussion of all material considerations necessary to reach an accounting or disclosure conclusion. Such conclusions about a particular transaction are very fact dependent and require careful analysis of the transaction and of the relevant authoritative accounting literature and Commission requirements. The information in this Manual is non-authoritative." [5] As such, financial reporting quality has been given various definitions in different research contexts. In addition to the textual method, based on language usage in the 10-K and management discussion and analysis, a second type of measure comprises researcher constructed scales used for particular study purposes.

Another stream of financial reporting research is based on accruals, which is a measure of earnings quality, and a proxy for financial reporting quality (e.g., Francis et al., 2005a). However, one cannot conclude that a firm with a good earnings quality also has a good disclosure quality, or vice versa. Whether a company has a good earnings quality or not, depends

[5] https://www.sec.gov/corpfin/cf-manual SEC Financial Reporting Manual

primarily depending on its operational side, which reflects the effectiveness of business strategies. Financial reporting quality, on the other hand, is more affected by a company's ethical choices about how to present the results of its operations. The amount of financial information managers want to disclose, the nature of the information (good or bad news), managers' expectations of investors' reactions, and a firm's level of transparency, are all elements that determine financial reporting quality.

In addition to accruals, researchers also have created indices for evaluating a firm's financial reporting quality. For example, Botosan (1997) uses DSCORE, based on giving points to each item in five voluntary information categories, yielding a weighted overall score, in her study examining the association between the cost of equity and financial reporting quality. Another example of an overall measure is the AIMR score, created by AIMR (now CFA Institute) analysts. Overall scores are useful in comparing firms' financial reporting quality, but a simple score without a benchmark is not straightforward to interpret. In addition, these scores are not easy to implement, and neither are they publicly available. These problems also cause huge reductions in the numbers of observations in studies based on them. In contrast, REPORT is a simple and relatively powerful measure that can be evaluated on its own.

DQ is not based on either the numerical values or linguistic features of financial reports. *DQ* captures the extent of details in firms' annual reports by counting the number of nonmissing COMPUSTAT line items while also taking the aggregation of accounting items into consideration. *DQ* uses all firms reported on COMPUSTAT regardless of whether they are missing data or not, which avoids losing very many observations. It is the first measure in the financial reporting literature that objectively evaluates the quality of disclosed data, which can

avoid the noise and errors caused by using manually set standards as benchmarks in measuring financial reporting quality.

Chen et al. (2015) contributes to the disclosure and financial reporting literature by introducing a new perspective on financial disclosure quality. In this case, not reporting information is taken to indicate lower disclosure quality. According to the information asymmetry theory of managers' choices, this definition of reporting quality is sensible and straightforward. However, like previous measures of financial reporting quality, *DQ* is not easy to implement and requires thousands of firm-year observations to compute. On Chen et al. (2015)'s online appendix is an eight-page matching table involving about 140 sub-level financial statement accounts and 32 "Parent" accounts, which also belong to top-level "Group" accounts. They evaluate whether a financial statement item is missing using two layers of screening mechanisms; the first level is "Parent" and "Group" account being recorded as missing by COMPUSTAT, and the second level is the sum of the sub-accounts not being equal to the associated parent level account. This screening mechanism is used to evaluate most Balance Sheet and Income Statement items, and produces a score by weighting the rate of missing by the magnitude of parent level assets. While the screening mechanism can avoid over-punishing firms that aggregate detailed information into fewer higher-level accounts, the assumptions the screening mechanism is based on may introduce other problems. In Chen et al. (2015), many items coded by COMPUSTAT as "missing" are not treated as missing for computing DQ. In particular, one issue is that higher level accounts coded by COMPUSTAT as missing are not treated as missing for *DQ*, but rather, assumed to relate to activities in which the firm is not engaged. Such observations are excluded from the testing samples in Chen et al. (2015). Another issue is that a missing sub-account is not treated as missing as long as the sum of the rest of the

non-missing sub-accounts in the same group agree with their group account balance. The problem with these assumptions is the simple fact that data completely omitted is not treated as problematic, even though firms abusing the materiality standard by intentionally failing to disclose negative information are likely the "worst offenders", such as Enron. The SEC is also aware of the widespread abuse of the materiality of standard and has put forward regulatory comments, such as SEC Staff Accounting Bulletin No. 99 - Materiality. Paraphrasing Levitt (1998), if a firm intentionally omits any information, then such information is most likely exactly what investors most want to know. For these reasons, the *DQ* screening mechanism may be less accurate and, at the same time, significantly more complex to compute. Further, though *DQ* is comprehensive, the inclusion of irrelevant with relevant information could decrease its power.

I propose a new measure of financial reporting quality based on this concept of "missing data"; a measure that addresses important issues such as computational complexity, loss of observations, the omission of the "worst offenders," and noisy information in the estimation by carefully selecting a subset of important items to consider. *DQ* weights all accounts by the amount of assets, but a larger amount does not necessarily mean greater importance. For example, R&D is not of comparable size to plant assets and land in dollar amounts, but R&D, in fact attracts more attention from investors than plant assets. These considerations raise the question: What are the useful and material financial statement items in evaluating disclosure quality? Logically, these items should be those most relevant to investor's evaluations of firms' performance, and therefore, most value relevant. Including irrelevant items only introduces noise.

To find a reduced set of financial statement variables that analysts and investors are most concerned with, I conduct an extensive literature review in fundamental investment strategy and

find Lev and Thiagarajan (1993) the most appropriate starting point for the variable selection process. Lev and Thiagarajan (1993) is considered the first important empirical study that evaluates value-relevant fundamental variables based on guided theories, practitioners' judgements, and empirical analyses.

Lev and Thiagarajan (1993) identifies a set of financial variables ("fundamentals") based on analysts' written pronouncements using a guided choice of candidate fundamentals and then empirically determines their value-relevance to earnings. They conclude that twelve signals that are relevant and useful in estimating earnings. These twelve signals include Inventory, Accounts receivables, Capital expenditure and R&D, Gross Margin, Sales and administrative expenses, Provision for doubtful receivables, Effective tax, Order backlog, Labor force, LIFO earnings, and Audit qualification. Later studies (e.g. Abarbanell and Bushee 1997, 1998) find additional empirical evidence of the importance of these fundamental signals for predicting future earnings and abnormal returns.

I use the seven COMPUSTAT variables needed to compute these signals to construct my measure. I define my measure, *REPORT*, as the proportion these variables reported in financial statements, and, therefore, the range of this measure is between zero and one. The details of *REPORT*'s construction are discussed in Section 3. Thus, *DQ* and *REPORT* diverge significantly in the extent of the data evaluated. *DQ* employs more than one hundred variables, and *REPORT* evaluates only seven highly value-relevant values. The expected incremental power of *REPORT* versus *DQ* lies on three observations, or assumptions. First, diminished disclosure quality due to omitted data is not a linear function of the number of items omitted – the importance of the data omitted matters more. Second, including irrelevant information in a measure does not improve the power of the measure; irrelevant information only introduces noise that reduces its power.

Third, a measure that is easier for all investors to compute and use is superior to a measure that demands overly complex computations and access to a vast dataset.

I examine the effectiveness of this new measure, *REPORT*, in two steps: validation and comparison. For validation, I follow Chen et al. (2015), and test the associations between four established disclosure-quality metrics and *REPORT*. These disclosure quality metrics are from three streams of literature and have been shown to be relevant to financial reporting quality: analyst forecast accuracy, analyst forecast dispersion, bid-ask spread, and cost of equity. I then examine the relative power of this measure compared to *DQ* with these metrics, using the same sample and control variables as used to validate *DQ*, originally. Results show that *REPORT*, like *DQ*, is associated with analyst forecast accuracy, dispersion, bid-ask spread, and cost of equity, as expected, and it preforms as well as, or better than *DQ* in Vuong and Clarke comparison tests. Thus, *REPORT* is a relatively powerful estimate of financial disclosure quality that is easy to implement by researchers and investors.

My study contributes to the disclosure literature and the investment profession by proposing and validating an effective and much more efficient measure of financial reporting quality. *REPORT*, being theory-based, omits examination of many items likely unnecessary to firm valuation and is easily implemented, not only by trained researchers, but even by average investors, which opens its use to many potential applications in both the academic and practitioner areas. The relative power of *REPORT* over *DQ* also provides evidence that firms' omissions of the elements of a small set of highly value-relevant financial variables can indicate a firm's financial disclosure quality as well as or better than omissions of a larger set of variables that also includes less value-relevant, or irrelevant, financial variables.

2. Literature Review and Hypothesis Development

2.1 Disclosure Quality Measures

Existing literature in disclosure quality has been applying measures aimed at different dimensions of firms' reporting. Voluntary disclosure measures employ information disclosed in managements' discussion and analysis (MD&A) section in firms' 10-Ks; other sources are less common, such as conference calls, firms' press releases, and news.

Miller (2002) examines the association between earnings performance and firms' disclosures; this measure of disclosure evaluates the magnitude of disclosure rather than its "quality", and the disclosure data varies from firms' press releases to news release such as Wall Street Journal dividend announcements, which provides firms' tickers and symbols. This disclosure measure counts the number of items relevant to six sub-categories including earnings announcements, earnings and sales forecasts, earnings preannouncements, information regarding operations, dividend-related information and miscellaneous disclosure. While dividing these disclosure items into six categories can facilitate a fuller understanding of disclosure choice, however, these items are all earnings relevant, making this measure relevant and useful only in particular studies and not necessarily representative if applied in other scenarios. In addition to disclosure measures that reflect the magnitudes of items belonging to a particular category, other measures are sourced from MD&A reports and apply textual analysis to analyze their linguistic features. Li (2008) contributes to the disclosure literature by examining the linguistic-feature oriented disclosure measure, FOG index, based on assumptions such as the number of syllables per word or words per sentence being negatively associated with readers understanding the contents. Bonsall et al. (2017) modifies FOG and introduces BOG Index, which is widely accepted in current disclosure studies. Loughran and McDonald (2014) defines "readability" as

the effectiveness of communication about valuation-relevant information, and criticizes the FOG index for its poor specification and its difficulty to measure in financial applications. In the same study, the authors propose a simpler readability proxy, 10-K document file size, and shows that file size is easier to implement and is more relevant to readability. Other recent studies contribute innovations to textual research, such as using the tone of the language as a measure of readability. However, these disclosure measures only pay attention to textual features of voluntary disclosure sections in most cases, but do not evaluate the content about firms' financial standings.

Another type of measure is manually constructed by researcher, for the particular purposes of their studies. A stream of financial reporting research uses accrual quality as a proxy for financial reporting quality (e.g., Francis et al.,2005a; Cohen, 2005; Hope et al. 2013). The validity of accrual quality as measures of financial reporting quality is based on the assumption that firms with good earnings quality also have good disclosure quality. Earnings quality and disclosure quality are associated in some cases, for example managers have stronger incentives to improve disclosure when the firm has good earnings, but this association is not straightforward. Earnings quality is determined by firms' operational success, however financial disclosure quality is more affected by managers' ethical choices, such as the amount, timing, and precision of financial information managers choose to disclose. Researchers also have created indices in evaluating a firm's financial reporting quality. For example, Botosan (1997) uses DSCORE by giving points to each item in five voluntary information categories and computing a weighted overall score. These items include both financial and non-financial information. Another example of an overall score is the AIMR score, created by AIMR (now CFA Institute) analysts (e.g. Healy et al., 1999; Heflin et al. 2005). However, studies using AIMR are subject to

small samples because of limited coverage. AIMR scores are available only for large firms with significant analyst following, and only before 1996 (Bhattacharya et al. 2013). These self-constructed scores are useful in comparing firms' financial reporting quality, but a simple score without a benchmark is not straightforward to be interpreted. These measures are either not easy to implement, or not publicly available.

Chen et al. (2015) proposes a new measure of financial disclosure quality, Disaggregation Quality (*DQ*), which requires only financial statement information that is objectively provided by firms. *DQ* defines the quality of reporting regarding how "fine" or complete financial statement data are; it captures the extent of details in firms' annual reports by counting nonmissing COMPUSTAT line items, based on the assumption that the aggregation of accounting items does not reduce the information's usefulness. Because *DQ* is constructed by counting the number of missing values for COMPUSTAT financial items, observations are not removed from samples due to missing values, as long as they are listed on COMPUSTAT. *DQ* is the first measure in the financial reporting literature that focuses on the completeness of disclosure data, which is objective and straightforward.

However, like previous measures of financial reporting quality, *DQ* is not easy to implement either. To compute *DQ*, researchers need to refer to the online appendix that includes an eight-page matching table describing the processing of about 140 sub-level financial statement accounts and 32 "Parent" accounts, which are classified into top-level "Group" accounts. Missing values are identified with two layers of a screening mechanism, the first level of which is an item being recorded as missing by COMPUSTAT, and the second is the sum of sub-accounts not being equal to the parent level account total. These screening mechanisms are applied to almost every item in the COMPUSTAT Fundamental Annual dataset and yields a

score by weighting the rate of missing data by the magnitude of parent-level assets. The assumption of value weighting is that the importance of a financial statement item to investors is determined by the weight of parent-level assets. This assumption is not necessarily true, however, because assets are determined by many factors such as business segments and firms' strategies that are not directly predictive of firms' performance. For valuation and projection purposes, investors do not necessarily pay attention to all of these financial statement items or their weights; simply including everything without differentiating them by empirical and theoretical evidence may only bring noise into a measure. In addition, constructing *DQ* demands complicated computations; and the matching mechanism, according to Chen et al. (2015), is also not perfectly accurate.

2.2 **Fundamental Accounting Data in Investment Decision Makings**

Ou and Penman (1989) is considered the first study that evaluates fundamental accounting information for investment decision making. This study proposes a summary measure, Pr, which combines a large set of fundamental statement ratios to predict the one-year-ahead direction of earnings changes. The authors develop a statistical model using the accounting information at year t-1 and profit or loss at year t to predict the probability of an increase of profits at year t+1 for each company. The result shows that the two-year holding period return to the long and short positions based on the measure is 12.5%. Ou and Penman (1989) provides empirical evidence for the usefulness of financial statement information in investment decision making. However, the measure, Pr, has been criticized by later studies. For example, Holthameen and Larcker (1992) finds that the measure does not predict stock returns very well after 1983. In addition, the accounting ratios that are included in computing Pr are not selected

based on any conceptual framework, and neither are they proved effective by investment practitioners (Abarbanell and Bushee ,1998; Bernard, Thomas and Wahlen 1997).

In the early 1990s, both theoretical and empirical research extensively examine the association between firms' accounting fundamentals and their values. For example, Feltham and Ohlson (1995) uses theoretical analysis to model the relation between value and book data of operating and financial activities to demonstrate that accounting conservatism can affect earnings and growth. Lev and Thiagarajan (1993) identifies fundamental signals used for investment decision making from the written pronouncements of financial analysts. Lev and Thiagarajan (1993) is seen as the first important empirical study to select value relevant fundamental variables based on guided theories and practitioners' judgements. The authors search for fundamentals guided by theory or by experts' comments, representing a very different searching method from a purely statistical search. This study examines the usefulness of these theory-based candidate fundamentals by testing their associations with firms' values and finds that the selected fundamentals are effective in capturing the permanent component of earnings. This study concludes that twelve important signals extensively mentioned in analysts' reports and comments are value relevant. These signals capture different aspects of firms' operations that can affect firms' future cash flows. For example, inventory increases are considered by analysts a negative signal because they suggest difficulties in generating sales. Analysts also negatively perceive decreases in capital expenditures and R&D expenses because these numbers are considered as reflecting managers' concerns regarding future cash flows. Eight financial statement items are necessary to construct these measures for valuation purposes. Because of the importance of Lev and Thiagarajan (1993) for the literature of value-relevant fundamental

analysis, I start this study by computing a measure, *REPORT*, with the variables that are necessary to compute the fundamental signals in Lev and Thiagarajan (1993).

Abarbanell and Bushee (1997) examines the relation between the twelve fundamental signals proposed by Lev and Thiagarajan (1993) and one-year-ahead earnings changes. The authors attempt to explain how financial statement information enter the decision-making process by market participants based on the association between fundamental signals and future earnings. Their results validate much of the economic intuition that links financial statement information to earnings changes. Abarbanell and Bushee (1998) provides more empirical evidence of the effectiveness of financial statement information in investment decision making by examining the association between the twelve fundamental signals and subsequent abnormal returns. They form portfolios using these fundamental signals and find that the strategy earns an average 12-month cumulative size-adjusted abnormal return of 13.2 percent.

Piotroski (2000) investigates the effectiveness of a simple accounting-based fundamental analysis strategy in realizing returns on a portfolio of high book-to-market firms. The author aggregates nine fundamental signals that measure firms' profitability, financial leverage, and operating efficiency into one summary signal measure, *F_SCORE*, to proxy for a firm's overall quality of operations. The author shows that a portfolio with long and short positions based on the summary fundamental signal yields significant returns, and that the effectiveness of this strategy is because of its ability to predict future firm performance and the market's lack of ability to fully capture these predictable patterns. These results provide additional empirical evidence that firms' financial statement information is useful in assessing firms' values.

Similarly, Beneish, Lee, and Tarpley (2001) find that accounting variables have predictive power for returns, and that the predictive powers of these variables differ across

extreme and non-extreme firms. Mohanram (2005) creates an index, *GSCORE*, by combining traditional fundamental signals and accounting measures capturing growth firms' characteristics. These accounting fundamental signals focus on the quality of operations, such as growth stability, intensity of R&D, and management of cash flows. The author finds that a long-short strategy based on *GSCORE* yields significant abnormal returns, showing that accounting information is informative in equity pricing. Penman and Zhang (2006) identifies sustainable earnings from financial statement information and builds a model of the P/E ratio with it. The authors find that accounting information is powerful in explaining firms' differences in P/E ratios. They also find empirical evidence that earnings related financial statement supplemental line items are effective in explaining the pricing of earnings. A more recent study that explores accounting informationbased investment strategy is Wahlen and Wieland (2010). The authors create a summary measure, predicted earnings increase score (*PEIS*), based on the financial statement information in prior studies such as Penman and Zhang (2006) and Wieland (2006). PEIS represents the probability of one-year-ahead earnings increases. The measure is developed using six fundamental signals, such as return on net operating assets; change in gross margin ratio; change in selling, general, and administrative expense ratio; change in asset turnover ratio; growth in net operating assets; and accruals. Wahlen and Wieland (2010) finds that a strategy based on ex ante PEIS outperforms analysts' consensus recommendations. This result shows that the financial statement contains information that is predictive for future earnings changes, but which is not fully impounded in stock prices or analysts' forecasts.

The literature mentioned above has established solid theoretical and empirical approaches for later studies further exploring fundamental analysis under specific scenarios. For example, Mohanram et al. (2018) examines the effectiveness of fundamental signals in predicting

performance of U.S. bank stocks. The authors construct a measure, *BSCORE*, and document its predictability on future profitability change and one-year-ahead stock returns. Ogneva et al. (2019) proposes an agnostic return predictor with accounting fundamentals and documents its effectiveness in capturing systematic risk of distress.

Because of the importance of Lev and Thiagarajan (1993) for fundamental analysis research, I define my measure, *REPORT*, based on the fundamental signals that Lev and Thiagarajan (1993) identifies. The authors conclude that twelve signals are relevant and useful in estimating earnings. These twelve signals include Inventory, Accounts receivables, Capital expenditure and R&D, Gross Margin, Sales and administrative expenses, Provision for doubtful receivables, Effective tax, Order backlog, Labor force, LIFO earnings, and Audit qualification. Based on the concept of "not reporting" introduced by Chen et al. (2015) and the empirical and theoretical evidence provided by Lev and Thiagarajan (1993), I pick the eight financial statement variables that are required to compute these twelve value relevant signals to construct my measure. I define my measure, *REPORT*, as the proportion of reported variables, and, therefore, the range of this measure is between zero and one. The details of measure construction will be discussed in Section 3.

2.3 Hypothesis Development

As stated above, *DQ* includes everything without differentiating them by empirical and theoretical evidence and may bring noise into a measure. Variables comprising *REPORT* are treated as missing whenever COMPUSTAT codes them as such; no screens are applied. The conceptual difference is that *REPORT* is based on the notion that anything not separately disclosed is not available for valuing the firm, whereas *DQ* is based on the notion that even if

something is buried in other accounts, it is equally accessible and that data items entirely excluded from the financial statement are immaterial.

DQ employs more than one hundred variables, and *REPORT* evaluates only seven highly value-relevant values. I expect that *REPORT* performs relatively better than *DQ* in evaluating financial disclosure quality, based on three assumptions. First, diminished disclosure quality due to omitted data is not a linear function of the number of items omitted – the importance of the data omitted matters more. Second, including irrelevant information in a measure does not improve the power of the measure; irrelevant information only introduces noise that reduces its power. Third, a measure that is easier for all investors to compute and use is superior to a measure that demands overly complex computations and access to a vast dataset. Thus, the hypothesis tested in this paper follows directly.

> *H1: Omission of the elements of a small set of highly value-relevant financial variables (REPORT) better indicates a firm's disclosure quality than omissions of a larger set of variables that also includes less value-relevant, or irrelevant, financial variables (DQ).*

3. Data and Measure Construct

I obtain sample data from COMPUSTAT, CRSP, Institutional Brokers' Estimate System (IBES) for analyst information, SDC Platinum for Merge and Acquisition deals, and Capital IQ for companies' business segments data. The sample period spans from 1976 to 2011, the period used in Chen et al. (2015). To make my tests comparable to Chen et al. (2015), the time period varies within this range for different tests. In addition to the control variables for each test (forecast quality, bid-ask spread, and cost of equity), as done in Chen et al. (2015), there are six common firm fundamentals applied through

all the tests. Because both *DQ* and *REPORT*, measure reporting quality by counting the numbers of non-missing financial statement variables, I do not delete any observations due to missing variables in this step. I do require that all observations have non-missing values for control variables, which vary with different disclosure quality validation metrics. For example, each firm in a given year must have a positive number of common shares outstanding to guarantee that a firm has a positive size and positive total assets. Following Chen et al. (2015), I exclude firms with a Standard Industrial Classification (SIC) code with the first two digits of 60-69 (financial service firms). If not stated specifically, I add industry fixed effects following Fama and French two-digit industry classification. I also require that a firm must be listed on COMPUSTAT and CRSP. The final sample before deleting any observations due to validation test requirements has 125,155 observations, from 1976 to 2011.

Following Lev and Thiagarajan (1993), I investigate companies' disclosure quality by focusing on eight financial statement items on COMPUSTAT Fundamental annual dataset: income before extraordinary items (COMPUSTAT item #18); current US federal tax expense (COMPUSTAT item #63); accounts receivable (COMPUSTAT item #2); inventory (COMPUSTAT item #3); capital expenditures (COMPUSTAT item #30); cost of goods sold (COMPUSTAT item #41); selling, general, and administrative expenses (COMPUSTAT item #189); and the number of employees (COMPUSTAT item #29). These eight variables are important and relevant for valuation purposes, and are selected according to real analysts' written comments. To be included in the sample, a firm must report income before extraordinary items. Because income before extraordinary is rarely missing for a listed firm, this step assures that all the observations

are listed firms, and other missing information should not be caused by delisting. Therefore, I exclude income before extraordinary items in computation of *REPORT*. The measure of disclosure quality, *REPORT*, is computed as the percentage of reported items of the seven financial statement variables, excluding income before extraordinary items. I compute *REPORT* using the following formula:

$$REPORT_{i,t} = \frac{Number\ of\ non\_missing\ variables_{i,t}}{7}$$

I follow Chen et. al (2015) to construct *DQ*. Per Chen et. al (2015), *DQ* is the average of disclosure quality of Balance Sheet items (*DQ_BS*) and disclosure quality of Income Statement items (*DQ_IS*). I replicate *DQ_BS* by value weighting disclosure rates by Balance Sheet groups using the following formula:

$$DQ\_BS_{i,t} = \sum_{k=1}^{11} \left\{ \left(\frac{\#\ Nonmissing\ Items}{\#\ Total\ Items} \right)_k \times \frac{\$Assets_k}{\$Total\ Assets} \right\} \div 2$$

where k indexes group accounts. The 93 Balance Sheet items can be classified into 11 groups, which link to 25 "Parent accounts". For each of the groups, the number of nonmissing items in the parent accounts are summed up and the percentages of nonmissing items for parent accounts are weighted by the corresponding weights of assets. The sum of the rates for the 11 groups is then divided by 2 to scale the number between zero and one. *DQ_IS* is computed in a similar way by measuring the percentage of nonmissing items in each group. Because Income Statement items do not belong to asset categories, these items are linked to only top-level groups but not linked to secondary level "parent accounts", and *DQ_IS* is only equal weighted by number of

groups. The summary measure is computed by the average *DQ_BS* and *DQ_IS*, called *DQ.*

4. Research Design

I follow Chen et al. (2015) to examine the validity of *REPORT* with the same settings; I also compare *REPORT* and *DQ* within the same samples using the same control variables to examine the association and difference between my new measure and the well-established existing measure, *DQ*. For validation, I conduct four tests based on *DQ*'s validation tests. Specifically, I examine the associations between my new measure, *REPORT*, and analyst forecast accuracy and dispersion, bid-ask spread, and cost of equity. Following Chen et al. (2015), all the coefficients in the following tests are multiplied by 100 for exposition purposes. For comparison, I use Vuong and Clark tests to find which is a better model, in the sense that "better" means "closer" to the true model per Vuong and Clark test assumptions.

4.1 Validation Tests

4.1.1 Analyst Forecasts

I conduct two sets of tests to examine the association between *REPORT* and analyst forecast quality. Disclosure quality literature has provided empirical evidence that firms with higher disclosure quality are more likely to have higher analyst forecast quality (e.g. Hope, 2003). Following previous literature, I examine two measures of analyst forecast quality, analyst forecast dispersion and analyst forecast error. I test the associations between forecast quality and disclosure quality based on the theory that a good information environment facilitates analysts' information collection and the quality of their evaluations and projections. Whether a firm has a good information environment depends on numerous factors. For example, how effectively the

information is spread by information media or users such as analysts and institutional owners, however the "finesse" of information is an outcome of managements' choices. In this test, I control for number of analysts following a firm to account for variations in the efficiency of information spread, and some other factors that have been found by previous studies to affect a firm's analyst forecast dispersion and errors. I conduct this test with the following equation:

$$Forecast_{i,t+1} = \alpha + \beta_1 Disclosure_{i,t} + \beta_2 Growth_{i,t} + \beta_3 Vol\_EPS_{i,t} + \beta_4 ROA_{i,t} + \beta_5 Log(AF)_{i,t} + \beta_6 Log(AT)_{i,t} + \sum Controls_{i,t} + \varepsilon, \quad (1)$$

where *Forecast* represents either analyst forecast dispersion (*DISP*) or the absolute value of analyst forecast errors (|*FE*|). Specifically, DISP is computed as the average of the standard deviations of analyst forecasts of year t+1 earnings per share sampled at each month over year t, and |*FE*| is the average of the mean absolute analyst forecast errors of year t+1 earnings per share sampled at each month of year t; $Disclosure$ represents either *DQ* or *REPORT*. *Growth* represents a firm's growth rate, computed as the average percentage growth in sales over year t-4 to year t; *Vol_EPS* is the decile ranks of earnings per share (*EPS*) volatility, which is measured as the standard deviation of *EPS* over year t-4 to year t deflated by share price at the end of year t; I also include *ROA* to capture variations of firms' operating performance, where *ROA* is computed as income before extraordinary items scaled by total assets; *AF* equals the number of analysts following for the current year, the data for analyst following is collected from IBES. *AT* is the total assets of firm. *Controls* are the six firm fundamental variables that can affect a firm's disclosure quality, such as complexity of operations and risks. The details of these fundamental variables will be discussed in preliminary results.

I conduct regressions of *DISP* and |*FE*| against both *REPORT* and *DQ* (Disclosure) using the same sample, with and without the firm fundamental control variables. I add industry and year fixed effects to control for possible cross-sectional and temporal systematic features. I expect that analyst forecast dispersion and forecast error are both negatively associated with *REPORT*, and that these associations should be consistent for *DQ*. Following Chen et al. (2015), I use the same period for the data, 1976 to 2011, to make my test comparable.

4.1.2 Bid-Ask Spread

Per the information asymmetry literature, a portion of bid-ask spread arises due to information asymmetry. (e.g. Amiram et al., 2013). A less efficient information environment widens spreads. According to this association between bid-ask spread and information asymmetry, I conduct my second validation test: bid-ask spread and disclosure quality. Following previous literature, I control for the trading volume of stock to rule out the effect of liquidity on bid-ask spread; I also control for market making costs by adding stock price to the model. Similar to the first validation test above, I test *REPORT* and *DQ* with the same sample. I expect that my new measure, *REPORT*, is associated with bid-ask spreads in the same way as *DQ* is; I also expect that both *REPORT* and *DQ* are negatively associated with bid-ask spread, indicating the effectiveness of *REPORT* as a proxy for information asymmetry in this setting. Specifically, I conduct this test with the following model:

$$BAS_{i,t+1} = \alpha + \beta_1 Disclosure_{i,t} + \beta_2 Log(VOL)_{i,t} + \beta_3 Log(PRICE)_{i,t} + \beta_4 BTM_{i,t} + \beta_5 Log(AT)_{i,t} + \sum Control_{i,t} + \varepsilon, \quad (2)$$

where *BAS* represents the average daily bid-ask spread over the twelve-month period beginning four months after the end of the current fiscal year; *VOL* is the average daily trading volume over

year t; *PRICE* equals the average daily closing price over year t; *BTM* is the ratio of book value and the market value of a firm's equity; and *AT* represents the total assets. Trading volume, stock price, and size (total assets) are taken to be logarithm values. Chen et al. (2015) uses TAQ data to construct bid-ask spread. Due to my lack of access to TAQ data, I follow the approach proposed by Abdi and Ranaldo (2017), and use CRSP stock daily data to compute bid-ask spreads. This method is easy to implement because it does not require microstructure data; it is widely accepted in finance literature, and has been implemented by many finance studies. Specifically, the log bid-ask spread, c_t, is computed as:

$$c_t = \sqrt{4E\left[\left(p_t - \frac{l_t + h_t}{2}\right)\left(p_t - \frac{l_{t+1} + h_{t+1}}{2}\right)\right]} \quad (3)$$

where *pt, lt,* and *ht* are, respectively, the close, low, and high log-prices at time t. This computation provides estimates of the daily bid-ask spread. Following Chen et al. (2015), I compute the dependent variable in equation (2), *BAS*, as the average daily bid-ask spread over the twelve-month period beginning four months after the end of current fiscal year. To be consistent with Chen et al. (2015), my sample period is from 1991 to 2011, excluding firms with SIC code starting with 60-69.

4.1.3 Cost of Capital

Unlike analyst forecast quality or bid-ask spread, cost of capital is not directly associated with disclosure quality in a way that is supported by any theory, but studies in accounting and finance have shown some evidence for the existence of associations between disclosure quality and cost of equity. Specifically, some studies have found that reporting quality and cost of equity have a negative relation; for example, Kelly and Ljunqvist (2012) and Daske et al. (2013). My third set of validation tests are based on this

stream of literature, and examine the association between *REPORT* and the cost of equity. Per Chen et al. (2015), *DQ* is negatively associated with the cost of equity. I expect that firms with high financial reporting quality, indicated by a larger *REPORT*, are associated with a lower cost of equity. Specifically, I test this hypothesis with the following regression:

$$Cost_{Equity}{}_{i,t+1} = \alpha + \beta_1 Disclosure_{i,t} + \beta_2 Beta_{i,t} + \beta_3 BTM_{i,t} + \beta_4 Log(MV)_{i,t} + \sum Controls_{i,t} + \varepsilon \quad (4)$$

where Cost of equity (*CostEquity*) is computed as the average of three implied cost of equity measures developed by previous studies, as per Chen et al. (2015). Specifically, these three approaches of computing implied cost of equity are MPEG, GM, and Claus and Thomas (2001) reviewed and evaluated by Easton and Monahan (2005); *Beta* is computed as the CAPM beta estimated using the Scholes-Williams method (Scholes and Williams, 1977) over the most recent calendar year ending before the current fiscal year end; and *MV* equals the market value of equity at the end of year *t*. All the three models of Cost of equity requires earnings per share as a parameter. Following Chen et al. (2005), I computed all forecasted earnings per share with the method proposed in Li and Mohanram (2014), rather than IBES census forecast as applied in Easton and Monahan (2005). I compute forecasted earnings per share eps_{t+n} with the following equation:

$$eps_{t+n} = \alpha + \beta_1 NegE_t + \beta_2 eps_t + \beta_3 NegE \times eps_t + \beta_4 B_t + \beta_5 TACC_t + \varepsilon \quad (5)$$

where $NegE_t$ is an indicator variable equal to one if a firm has negative earnings for fiscal year *t*, *epst* is the earnings per share for fiscal year *t*, *Bt* is the book value per share, and

TACCt is total accruals. Appendix A describes the measure constructs in detail. Equation (5) describes the computation of the MPEG cost of equity:

$$P_{i,t} = \frac{eps_{i,t+2} + r_{MPEG} \times dps_{i,t} - eps_{i,t+1}}{{r_{MPEG}}^2} \quad (6)$$

where $P_{i,t}$ is the stock closing price for fiscal year t (COMPUSTAT item 199), $dps_{i,t}$ is dividends per share for year *t* (COMPUSTAT item 26), and $eps_{i,t+n}$ is computed with Equation (5). The implied rate of equity, r_{MPEG}, is computed by solving equation (6). Equation (7) shows the computations of GM cost of equity:

$$P_{i,t} = \frac{eps_{i,t+1}}{r_{GM}} + \frac{eps_{i,t+2} + r_{GM} \times dps_{i,t} - (1 + r_{GM}) \times eps_{i,t+1}}{r_{GM} \times (r_{GM} - \Delta_{agr})} \quad (7)$$

where Δagr is the contemporaneous yield on a ten-year government bond less 3 percent; and Equation (8) shows the computations of CT cost of equity:

$$P_{i,t} = bps_{i,t} + \sum_{n=1}^{4} \frac{(ROE_{i,t+n} - r_{CT}) \times bps_{i,t+n-1}}{(1 + r_{CT})^n} + \frac{(ROE_{i,t+5} - r_{CT}) \times bps_{i,t+4} \times (1 + \gamma)}{(r_{CT} - \gamma) \times (1 + r_{CT})^4} \quad (8)$$

Constructs of variables for *ROE* and *bps* are shown in Appendix A. Similarly, I also test for the association between Cost of equity and *DQ* to add comparability between the two disclosure measures, *REPORT* and *DQ*. I conduct the tests both with and without firm fundamental control variables, and all the regressions are controlled with industry and year fixed effects.

4.2 Vuong and Clarke Tests

If test results in Section 4.1 are as hypothesized, that *REPORT* is a valid measure of financial reporting quality because it is associated with the validation metrics like *DQ* is, then I would like to compare *REPORT* and *DQ* regarding the relative strength of their associations with

the three sets of validation test variables and the goodness of their model fitting. For this purpose, I compare the two models, one for each of the two disclosure measures, with the same control variables and samples, using Vuong and Clarke closeness tests. Vuong and Clarke tests are two widely accepted model selection methods based on maximum likelihood-ratios. They both test the null hypotheses that two models with the same response values have the same distance from the "true" model. The selection is based on the Kullback-Leibler information criteria (KLIC), a measure of "distance" between a model and the "true" model. Specifically, the hypotheses are stated as:

H0: Two models are equally close to the true model;

Ha: One of the models is closer to the true model.

I conduct four sets of comparisons, one for each of the validation test metrics, with *REPORT* and *DQ*, and compare the "distances" of the two models from the true model. I particularly pay attention to the comparison results for the first two tests, Analyst Forecast Dispersion and Analyst Forecast Error; which receive more attention than bid-ask spread and cost of equity tests because the association between analyst forecast quality and disclosure quality is supported by the most solid theoretical background.

5. Results

5.1 Disclosure Quality Measures

I replicate Chen et al. (2015) and obtain simple statistics similar to those originally reported. Table 1, Panel A shows the descriptive statistics for *DQ* and *REPORT*.

[Insert Table I-1 here]

Firms report 0.931 of the seven financial statement items on average, with a standard deviation of 0.089. In other words, firms report 6.5 items on average. Because the seven variables are important variables for valuation purposes, most firms report all of them, the median and Q3 firms both report 100%. The mean of *DQ* is 0.589, indicating on average that firms report 60% of all COMPUSTAT fundamental variables. The change of *DQ* from Q1 to Q3 is about 0.14, and the standard deviation is 0.106. This suggests that the sample is subject to extreme observations, implying that firms vary widely on financial reporting. The descriptive statistics of *DQ* are extremely close to those reported in Chen et. al (2015), where the mean and standard deviation are 0.583 and 0.113, respectively, indicating that my replication is successful and providing validation of the following tests. I also follow Chen et. al (2015) to test the associations between disclosure quality and industries. Industries are classified following Fama and French 12 industry classifications. I also conduct regression analyses of the temporal variation of *DQ* and *REPORT* by regressing the mean value of disclosure quality each year, t, against the average ratio of intangible assets over total assets in year *t (INT)*, the average magnitude of special items over total assets in year *t (SPI)*, the percentage of firms that report losses in year *t (LOSS)*, and the natural log of the average number of business segments in year *t (NSEG)*. Chen et. al (2015) also includes the number of words in all FASB standards issued from 1973 to year t-1 in the temporal test. However, because so far I do not have access to FASB standards for the 1970s, and because this test as a first glance of sample features is relatively less important, I exclude this variable from this test. The regression analysis of variation by industry and the regression analysis of temporal variation are shown in Table 1, Panel B and Panel C. Both Panels B and C show that *REPORT* has similar patterns with *DQ* regarding their associations with industry and time. For example, in Panel B, *DQ* and *REPORT* are both

positively correlated with Business equipment, Chemicals and allied products, Manufacturing, Wholesale, retail, and some services, and Consumer durables, and negatively correlated with Others; Oil, gas, and coal extraction and products; and Telephone and television transmission. The adjusted Rsquares are close, 3.01% and 3.52% for DQ and REPORT respectively. Panel C tells some different stories, *REPORT* and *DQ* shows different associations with the average values of intangibles assets, special items, number of loss firms, and number of business segments. However, the adjusted R-squares are similar, 0.810 for *DQ* and 0.748 for *REPORT*. These statistics are also close to Chen et. al (2015).

Using the number of non-missing items from financial statements as a measure of disclosure quality is very different from measures used in previous literature. Technically, this new measure is not comparable with many of the previous measures regarding the context of their usage. For example, the *FOG* index examines the readability of the MD&A section of the10K, which is not directly relevant to the contents of financial statements. However, examining the correlations between nonmissing-variable-based measures and readability can still provide some insight about disclosure quality methods. Table 2 shows Pearson (Upper triangle) and Spearman (Lower triangle) correlations between REPORT, DQ, DQ_BS, DQ_IS, FOG, and #WORDS.[6]

[Insert Table I-2 here]

REPORT is positively correlated with *DQ*, *DQ_BS*, and *DQ_IS* at the 1% level, both Pearson and Spearman correlation coefficients are above 0.2. Positive association with *DQ* is in line with the common feature of these two measures; how "frank" a firm is in its financial reporting. In

[6] FOG and #WORDS are readability measures from Li (2008). These data are obtained from Feng Li's website: http://Ibmeer.bme.umich.edu/feng.

contrast, *REPORT* has a significantly negative association with *FOG* and *#WORDS*. Because *FOG* and *#WORDS* are readability scores for which higher numbers represent less readable and more complex information, and *REPORT* captures the rate of non-missing reporting for which the higher the better, the negative associations indicate that both *REPORT* and *FOG/#WORDS* are telling the same story regarding disclosure quality. *DQ*, however, is negatively but not significantly associated with *FOG*. In addition, *DQ* is positively correlated with *#WORDS* at the 1% significance level. Next, I will examine the association between *DQ* and *REPORT* with empirical models, and I will examine their associations with four dependent variables that have been found related with financial reporting qualities; the validation metrics used validate *DQ* in Chen et al. (2015).

5.2 Firm fundamental factors that may cause cross-sectional variation in disclosure qualities

Firms' disclosure qualities could be affected by many factors in addition to managers' subjective intentions. Firms' fundamental characteristics sometimes determine how complex the reporting is, such as features that vary by industries, asset structures, complexity of business operations, and extraordinary events. To facilitate the validation tests, I include these fundamental factors to control for systematic components of disclosure quality that are not attributable to managerial choices. My measure of disclosure quality is intended to evaluate the "fineness" of data that firms choose to disclose in their financial reports. Following Chen et al. (2015), I include the following six variables as control variables in the validation tests: Restructure captures any changes of firms' asset structures, set to equal to one (zero) if Restructuring Costs Pretax is nonzero (zero); *M&A* is an indicator variable equal to one if a firm in fiscal year *t* is engaged in any merger and acquisition deals recorded on SDC Platinum,

otherwise zero; *SI* represents special items, which is equal to the absolute value of special items divided by total assets; *Vol_Ret* is the volatility of a firm's stock return, computed as the standard deviation of monthly return, over year *t; AT* is a firm's total assets, here I take to be the logarithm of assets to reduce the potential effect of skewness on the fitting results; and *NSEG* represents the number of business segments, and, similarly, I include the logarithm of *NSEG*, *Log(NSEG),* to capture the complexity of a firm's business.

I add these variables to the validation models as control variables, therefore my purpose is not to examine their associations with disclosure quality or to interpret their intuitions. These variables could be positively or negatively correlated with disclosure quality for a variety of reasons. For example, a firm engaged in restructuring or mergers and acquisitions could have improved or more transparent disclosures because of forces from outsiders, however it could have worse disclosure quality because the complexity of the deals makes it easier to hide information from investors. Similarly, larger firms (with larger *AT*) are more likely to be public firms that have better information environments such as a larger number of analysts following or a greater rate of institutional holdings; in general, larger firms are thought to have more transparent financial reporting. However, on the other side, larger firms are more likely to have complex operations. For example, they could be engaged in more industries or have more foreign subsidiaries, making it harder for investors and regulators to capture details that are not reported voluntarily. Even though interpreting these connections is not this study's purpose, I am interested in the question of whether these factors explain, to some extent, disclosure quality; in other words, whether these variables affect the validation tests. Table 3 presents the associations between disclosure quality measures, *REPORT* and *DQ*, and the six firm fundamentals. Panel A shows the Pearson and Spearman correlation coefficients in the upper and lower triangles,

respectively. Similar to what Table 2 shows, *REPORT* and *DQ* are significantly positively correlated, with a Pearson correlation coefficient of 0.185 and a Spearman coefficient of 0.172. *REPORT* and *DQ* have similar associations with the majority of the fundamental variables, two exceptions are *Log(AT)* and *Log(NSEG),* with which *DQ* has positive Pearson correlations (0.220 and 0.385, Spearman correlation coefficients are similar), while *REPORT* is negatively associated with *Log(AT)* and *Log(NSEG),* with Pearson correlation coefficients of -0.066 and -0.013, respectively. Both *DQ* and *REPORT* are positively correlated with *Restructure*, *M&A*, and *SI*, and negatively correlated with *Vol_Ret*. Panel B shows the results of regressing *REPORT* and *DQ* on the six firm fundamental variables, controlling for industry and year fixed effects. All the fundamental variables have the same signs in both regressions, and are significant at the 1% level in most cases. Therefore, I include the six firm fundamentals in the following tests.

5.3 Validation Test Results

5.3.1 Analyst Forecasts

Like *DQ*, *REPORT* is negatively associated with Analyst Forecast Dispersion and Analyst Forecast Error. Table 4 shows the result for analyst forecast tests.

[Insert Table I-4 here]

As hypothesized, the coefficients of *REPORT*, in all the four models, with or without fundamental controls, are negative and significant at conventional levels. These associations are similar for *DQ*, indicating that *REPORT* and *DQ* have consistent associations with analyst forecast quality. Because the purpose of this study is to examine the statistical usefulness of measures, I do not emphasize the economic outcome of analyst forecast dispersion and forecast errors in this study. The coefficients for *REPORT* are -4.764 and -6.168 in column 3 and column 4, indicating that a one standard deviation increase in *REPORT*, 0.103, is associated with a

decrease in *DISP* of 0.005 and a decrease in |*FE*| of 0.006. Similarly, the corresponding coefficients for *DQ*, when including firm fundamental controls, are -6.566 and -9.646. The magnitudes of the coefficients for *REPORT* and *DQ* are higher when not controlled for firm fundamental variables. In Column 5 to Column 8, the coefficients are -5.919 and -8.772 for *REPORT*, and -8.375 and -14.027 for *DQ*. The coefficients for the rest of the variables in the model are also significant at conventional levels, and consistent with theory. For example, as the volatility of *EPS* in the past fiscal years increases, it is more difficult for analysts to reach agreement, increasing both dispersion and forecast errors. As firms perform better, indicated by higher *ROA*, managers have stronger incentives to support a better information environment, both *DISP* and |*FE*| are decreased. These results are similar to those originally in Chen et al. (2015).

5.3.2 Bid-Ask Spread

Consistent with Chen et al. (2015), disclosure quality measures are negatively associated with *BAS* at conventional significance levels. Table 5 presents the results.

[Insert Table I-5 here]

The coefficient of *REPORT* is -0.431 when including firm fundamental variables, and -0.566 when not. Similarly, the coefficients of *DQ* are also significantly negative with firm fundamental variables (-0.764) and without (-0.884). Because the average stock price in my sample is $18, one standard deviation increase in *REPORT* (0.103) is associated with a roughly one cent decrease in the average bid-ask spread, and a one standard deviation increase in *DQ* (0.109) is associated with a roughly 1.5 cents decrease in average bid-ask spread. These incremental changes in bid-ask spread represent a substantial economic outcome considering the sensitivity of market, particularly with high frequency trading, in response to quote strategies. In addition,

the coefficients of the rest of the variables have consistent signs for *REPORT* and *DQ*, and are consistent with finance theories, except that there is mixed evidence for the association between information asymmetry and trading volume, especially in a market with intensive high frequency trading, for which, to date, there is not a consensus about its effect on information efficiency. The validation test for the association between bid-ask spread and disclosure quality adds further evidence that *REPORT* is valid in capturing disclosure quality.

5.3.3 Cost of equity

Consistent with Chen et al. (2015), the coefficient of *REPORT* is negative and significant at conventional levels. Table 6 shows the result.

[Insert Table I-6 here]

The coefficients for *REPORT* are -4.951 and -6.119, with and without firm fundamental control variables, respectively. Given that the standard deviation of *REPORT* is 0.103, these two coefficients indicate that a one standard deviation increase in financial reporting quality (*REPORT*) is associated with a 0.5% to 0.6% decrease in the cost of capital; results that are close to results in Chen et al. (2015). Considering the large amount of funds a public firm might borrow, a 0.5 to 0.6 percent change in the cost of capital represents a nontrivial economic outcome. The coefficient for *DQ* is -5.241 when controlled for firm fundamental variables, representing 0.6% decrease in cost of capital when reporting quality, *DQ*, increases by one standard error (0.109); when not controlled for firm fundamental, however, both the magnitude and significance of the coefficient for *DQ* decrease; the coefficient is -1.997 and it is significant at the 10% level. The coefficients for the balance of the variables are also as expected and consistent with the results in Chen et al. (2015). Beta is negatively associated with the cost of equity when controlled for firm fundamentals, and the sign turns positive when not controlled for

firm fundamentals; *BTM* is positively associated with the cost of equity in all the four regressions; the coefficients of the *Log (MV)* are significantly negative in all four tests, indicating that large firms have more credibility than firms with small capitalization, from investors and creditors' points of view.

The results of the validation tests show that *REPORT* is a valid proxy for financial reporting quality. Like the associations between *DQ* and the four validation metrics, *REPORT* is similarly negatively associated with analyst forecast dispersion, analyst forecast error, bid-ask spread, and the cost of equity. In all the validation tests, *REPORT* and *DQ* have similar features. The magnitudes and t-statistics of the coefficients for the two disclosure measures are close, and they have similar economic implications; the adjusted R-squares of the models are also close. These results provide evidence that *REPORT* performs similar to *DQ* in representing financial disclosure quality.

5.3.4 Vuong and Clarke Test Results

I compare the power of *DQ* and *REPORT* with Vuong and Clarke Tests using the same sample and method. Table 7 shows the result for Vuong and Clarke Tests.

[Insert Table I-7 here]

I conduct four tests with analyst forecast dispersion, forecast error, bid-ask spread, and cost of equity as response variables, and test the hypothesis that models including *REPORT* or *DQ* are equally close to the true model. I test with both Vuong Test (Column 1) and Clarke Test (Column 2). Because the amount of KLIC alone, in a comparison setting, is not intuitive to interpret, I focus only on the p-values for each comparison, which are shown in parentheses. In general, models including *REPORT* are preferred over *DQ*. For analyst forecast, the model with

REPORT is preferred at the 10% and 1% significance levels for the Vuong and Clarke tests, respectively. For analyst forecast error, *DQ* is preferred in Vuong Test, but not at a conventionally accepted significance level, indicating that the null hypothesis that the two models are equally close to the true model cannot be rejected; for the Clarke test, however, the model with *REPORT* is preferred, at a significance level less than 0.1%. Thus, for analyst forecast quality, *REPORT* is preferred over *DQ*. For Bid-Ask Spread, *DQ* is preferred in both the Vuong test and Clarke tests, with p-values smaller than 0.01%. But, for Cost of Equity, *REPORT* is preferred in both of the tests with p-values less than 0.01%. The results of the Vuong and Clarke Tests show that *REPORT* and *DQ* fit different validation models better; REPORT is more appropriate in fitting the model for analyst forecast quality.

Given that *DQ* and *REPORT* differ significantly in the extent of the data evaluated, the result that *REPORT* performs as well as or better than *DQ* provides evidence that the value-relevance of omitted variables, and but not just the number of them, drives the power of the measure. That is, these results suggest that omissions of the elements of a small set of highly value-relevant financial variables better indicates a firm's financial disclosure quality than omissions of a much larger set of variables that also includes less value-relevant, or irrelevant, financial variables.

5.3.5 Additional Analysis on Seven Variables

The seven variables included in *REPORT* are amongst the most important variables to investors. Selection of the seven variables is conducted based on a thorough literature review on fundamental information in decision making, and it is not a random process. The seven variables are fundamental in the sense that all public firms, regardless of their industries and operations, should report based on U.S. GAAP guidelines. Table 8 presents the distribution of the seven

variables and a comparison between the firms reporting all seven variables (*ALL7*) and firms missing one or more of the seven variables.

[Insert Table I-8 here]

One may argue that non-retailing firms do not report Accounts receivable, Inventory, or Cost of goods sold, because these firms do not have certain types of activities. Surprisingly, Accounts receivables (*RECT*), Inventory (*INVT*), and Cost of good sold (*COGS*) are the least likely to be omitted by reporting firms among all the seven variables. Panel A outlines the frequency of omissions for the seven variables. Only 1.5% of the firms omit Accounts receivables, and less than 1% of the firms omit Inventory on their financial statements. Only 60 firm-year observations (out of 261,742 observations) omit Cost of goods sold. The variables that are most often omitted are U.S. federal tax expense (21.05%), number of employees (12.82%), and SG&A expenses (11.68%), essential variables that are unlikely omitted by any firm in any industry. Panel B adds further evidence that reporting all seven variables or not is not affected by industry. In general, the pattern of distribution by industry for the two subsamples, firms reporting all seven variables (*ALL7*=1) and firms missing one or more of the variables (*ALL7*=0), are consistent. For example, Business equipment firms account for a significant proportion in both subsamples (23.63% and 16.51%); firms in Telephone and television transmission industry and consumer durables industry account for less than 4% of the sample for both *ALL7*=1 and *ALL7*=0 subsamples. Reporting or omitting of the seven variables is not driven by industry characteristics, however, firms that report all seven variables and those that miss one or more of the variables differ significantly in terms of their firm fundamental characteristics. Panel C presents some of the firm fundamentals, such as firm size, complexity, risks, stock performance, and operational efficiencies, on firms reporting all seven variables and firms missing one of more

of the seven variables. In general, the two groups differ significantly on most of the fundamental characteristics. For example, firms that miss one or more of the seven variables have lower complexity of operations. The mean values of *Restructure*, *M&A*, and *No. Segments* for *ALL7*=0 firms are significantly lower than those for *ALL7*=1 firms. Firm missing one or more of the seven variables also have lower P/E ratio (9.583 v.s. 11.103), gross profit margin (-3.004 v.s. 0.312), and ROA (0.065 v.s. 0.100) than firms reporting all the seven variables. In addition to their lower efficiency, *ALL7*=0 firms are also associated with higher level of risks, such as higher volatility of returns (0.157 v.s. 0.147) and higher leverage (0.498 v.s. 0.479). However, I do not attempt to examine the mechanism of how firms' choice in reporting or omitting the seven variables are affected by firms' operational strategies in this study. The results in Table 8 can partly address some of the comments I have received in terms of the effectiveness and fairness of variable selection processes.

6. Conclusion

I propose a parsimonious, theory-based and empirically-supported measure of disclosure quality, *REPORT*, based on the reporting (or non-reporting) of the seven variables found most value relevant in Lev and Thiagarajan (1993). I create *REPORT* based on the concept introduced in Chen et. al (2015), that disclosure quality is a function of the completeness of reported financial data. Chen et al. (2015) evaluates hundreds of COMPUSTAT items with a complex screening mechanism. I follow the authors' concept of estimating financial disclosure quality by counting missing variables, and address the problems of *DQ* by considering only the empirically supported most value-relevant variables in the measure. To compare *REPORT* with *DQ*, I first replicate Chen, et al (2015) with a current sample and find results as originally reported. Second, I find that *REPORT* also is similarly associated with the validation metrics used to validate *DQ*:

analyst forecast accuracy, analyst forecast dispersion, bid-ask spread, and the cost of capital, controlling for industry and year fixed effects. Finally, with Vuong and Clarke tests I compare the power of *REPORT* and *DQ* to explain these disclosure quality metrics and find that *REPORT* performs as well as, or better than, *DQ*. These results indicate that omissions of the elements of a small set of highly value-relevant financial variables better indicates a firm's financial disclosure quality than omissions of a larger set of variables that also includes less value-relevant, or irrelevant, financial variables. *REPORT* is relatively powerful for being theory-based and excluding many noisy items that are not value relevant. The relative strength of *REPORT* indicates that the screening mechanism of *DQ*, which is complex and may fail to reflect the "worst offenders", is not necessary when only a small number of value-relevant variables are included in the measure. Thus, *REPORT* is both valid as a proxy for disclosure quality, and easily implemented, not only by trained researchers, but even by average investors, which opens its use to many potential applications in both academic and practical areas.

CHAPTER TWO: IS FINANCIAL REPORTING QUALITY INDICATIVE OF INTERNAL CONTROL QUALITY?

1. Introduction

Internal control quality within a firm is crucial to all interested parties, such as shareholders and creditors. However, it is difficult for investors to observe or quantify internal control quality. The failures of Enron amongst other large, troubled companies in the early 2000s are examples of the consequences of poor internal control and dysfunctional corporate governance. The Enron debacle caused the failure of Arthur Anderson, one of the world's largest public accounting firms, and triggered extensive and strict regulation of both auditors' roles as independent inspectors and firms' internal governance. The Sarbanes Oxley Act of 2002 set new and expanded requirements for all U.S. public companies, and the requirements cover boards of directors, management, and public accounting firms. SOX 302 requires the management of public firms to be responsible for internal assessments of the effectiveness of internal control over financial reporting. Managements are required to provide their internal control evaluations in the 10K and in other relevant financial reports. SOX 404 requires managements' internal control assessments to be evaluated by a public accounting firm auditor. External auditors are required to issue opinions regarding firms' internal control over financial reporting. The primary goal of SOX 302 and SOX 404 is to protect investors by improving the accuracy and reliability of firms' public financial disclosures. Assessments of internal control quality must cover three primary sections of financial reports, such as financial statement consolidation & adjustments, financial statement notes preparation, and the preparation of supplemental SEC filings. Managements and auditors need to report an "Internal Control weakness" (ICW) if internal control effectiveness does not meet these requirements.

The financial effects of ICWs on firms are extensive and material. For example, Kim et al. (2011) finds that the loan spreads are higher for ICW firms than for non-ICW firms, and that firms with more severe, company-level ICWs pay significantly higher loan rates than those with less severe, account-level, ICWs. Also, SOX 404 ICW firms tend to have higher stock price crash risks (Kim et al. 2019). Not only SOX 404 ICW firms (i.e., firms receiving ICW from auditors) are more likely to have financing problems, but SOX 302 firms (by managements' self-assessments) also tend to be negatively affected by ICW announcements. Beneish et al. (2008) finds that SOX 302 disclosures are associated with negative announcement abnormal returns of -1.8 percent, and that firms experience an abnormal increase in the equity cost of capital of 68 basis points.

Outsider investors have limited resources with which to assess firms' governance effectiveness. However, the consequences of poor internal control could include errors in firms' financial statements, which are accessible to investors. Per information asymmetry theory, managers have incentives to hide bad information (e.g. Kothari et al. 2009, Dehaan et al. 2015). Prior research also finds that firms with poor corporate governance are more likely to engage in unethical practices, such as earnings management (Cornett et al. 2009) and fraudulent financial reporting (Baigent et al. 2009). Thus, it is reasonable to believe that managements of firms with deficient internal controls are more likely to manipulate their financial statements, causing poor financial reporting quality. In addition, managers who, though inattention or deceit, produce deficient financial disclosures also act similarly with respect to their control of their firm's accounting functions. However this question could have another side; poor governance could be caused by irresponsible managements, managements lacking an adequate sense of responsibility,

but who are not attempting to hide financial information. Whether financial reporting quality is able to indicate internal control quality is still an open question.

This study investigates whether firms with different key financial statement items reporting patterns, measured with *DQ* and *REPORT*, also show different levels of effectiveness in their accounting information collection and reporting systems, proxied for with the chance of internal control weaknesses (ICWs). In addition to contemporaneous relationship between financial statement items reporting rate and ICWs, predictability of a measure is also of significant interest to researchers and practitioners. In additional test, I also examine if a firm's financial reporting quality at year t can predict issuance of an ICW in the next period.

However, results do not show associations between financial reporting quality and firms' likelihood of receiving ICWs. Specifically, neither *DQ* nor *REPORT* is positively associated with ICWs at conventional significance levels. Without controlling for lagged value of ICW, the results do not show evidence on contemporaneous or predictive association between *DQ/REPORT* and ICWs. Controlled with lagged effect of ICW, the association between one-year ahead ICW and current *DQ* is significant at 5% level, but there is no such evidence on *REPORT*. Though there is no empirical evidence found in terms of association between internal control quality and omitting financial statement items at this stage, this study provides foundation for my further research in exploring indicators that can possibly facility investors in detecting firms' internal control weaknesses before evaluations are publicly issued.

2. Background and Research Questions

2.1 Financial reporting measures based on "Missing data"

As discussed in Chapter One of the essay, Chen et al. (2015) proposes a new measure of disclosure quality, Disaggregation Quality (*DQ*), which requires only financial statement information and which does not need any linguistic information such as MD&A reports. *DQ* is the first measure in financial reporting literature that defines the quality of reporting as how "fine" financial statement data are. This "missing data"-based measure is objective and straightforward in the sense that only financial statements prepared based on the U.S. GAAP guidelines are examined, and that only reporting or omitting of numbers is examined.

However, *DQ* is not easy to implement due to the large number of financial items being used and its complex screening mechanism. Including both necessary and noisy information into a measure reduces the power of the measure, as shown by the results in Chapter One. By including the seven key financial statement variables of which value-relevance has been tested by previous literature, I propose *REPORT*, a new measure that is easy to implement and superior to *DQ* in terms of explanatory power. Both as effective financial reporting measures, *DQ* and *REPORT* could serve as alternative tools for researchers and professionals in examining certain topics and research questions.

2.2 Internal Control Weaknesses

As a reaction to the Enron debacle and failure of Arthur Anderson, the Sarbanes Oxley Act of 2002 set new and expanded requirements on internal control system over financial reporting for all U.S. public companies, and the requirements cover boards of directors, management, and public accounting firms. SOX 302 requires the management of public firms to be responsible for internal assessments of the effectiveness of internal control over financial reporting. Managements are required to provide their internal control evaluations in the 10K and

in other relevant financial reports. SOX 404 requires managements' internal control assessments to be evaluated by a public accounting firm auditor. SOX 302 and SOX 404 focus on accuracy and reliability of firms' public financial reporting, in particular, financial statement consolidation & adjustments, financial statement notes preparation, and the preparation of supplemental SEC filing. A material internal control weakness must be issued when managements (per SOX 302) or auditors (per SOX 404) believe there exists "a significant deficiency, or combination of significant deficiencies, that result in more than a remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected" (PCAOB 2004).

Previous studies have documented evidence that ICWs are associated with negative impact on firms' market values and accounting problems, such as firm complexity and management turnovers. (Ashbaugh-Skaife et al. 2009; Doyle et al. 2007; Dechow et al. 2010). Beneish et al. (2008) documents that SOX 302 ICW disclosures are associated with significant negative announcement abnormal returns and a significant increase in cost of equity. Hammersley et al. (2008) finds that ICWs' severity and auditability are associated with magnitude of stock price reactions to their disclosure. ICWs may also impose extra borrowing costs. For example, Kim et al. (2011) examines various features of the loan contracts of ICW firms compared to non-ICW firms. They find that lenders impose more restrictive terms and greater loan spread on ICW firms. Studies also find ICWs can be mitigated. The relation between financial reporting complexity and negative reporting outcomes, as reflected by firms' likelihood of ICWs, can be mitigated by accounting expertise of board and accounting committee (Chychyla et al. 2019).

In addition to consequences of ICWs, prior literature has been examining various characteristics of firms with internal control deficiencies. Doyle et al. (2007a) finds that firms

with internal control problems are associated with low earnings quality, as reflected by poorly estimated accruals that more often are not realized as cash flows. Doyle et al. (2007b) documents that firms' sizes, ages, and financial constrains are associated with serious company-level control problems. Studies also examine causes of ICWs. For example, Ge and McVay (2005) finds that incurrences of internal control weaknesses are associated with insufficient investment of resources for accounting controls. Krishnan (2005) examines the association between audit committee quality and firms' internal control quality, and finds that audit committees with more independence and greater financial expertise are associated with higher internal control quality. Krishnan and Visvanathan (2007) provides additional evidence that audit committees and auditors play important roles in the reporting of internal control deficiencies after passage of SOX. Studies also find other factors that are associated with firms' internal control quality, such as complexity of operations and financial soundness (Ashbaugh-Sakife et al. 2007), non-audit fees and external capital needs (Rice and Weber 2012), and audit committee expertise (Lisic et al. 2019).

Though studies have found various firm characteristics and consequences associated with internal control problems, a single signal or indicator that may give a brief insight of a firm's internal control quality has not been found. As an important aspect of internal control procedures, financial statement preparation quality may be affected by firms' internal control system. Clerical errors, incompliance with accounting principles, and financial fraudulent behaviors are all likely to cause omissions of financial statement numbers. In Chapter Two of this thesis, I examine whether financial reporting quality, specifically, reporting or omitting of financial statement variables, can reflect firms' internal control quality. In addition to their contemporaneous relationship, I also test if current financial reporting quality is informative in

predicting issuance of an ICW in the next period. Specifically, the research questions are stated as:

H1: Does a firm's financial reporting quality reflect internal control quality?

H2: Is a firm's financial reporting quality able to predict issuance of internal control weakness?

3. Data and Research Design

3.1 Sample Selection

I obtain firms' fundamental financial information from COMPUSTAT and stock prices and trading volumes from CRSP. Data on SOX 302 and SOX 404 ICWs are obtained from AuditAnalytics. I also obtain boards' and directors' data from ISS, which restricts the sample to S&P 1500 firms. To create the sample, I start with all firms in AuditAnalytics's SOX 302 and SOX 404 database. Specifically, a firm-year observation is defined as having an ICW if their 10-Q or 10-K discloses an ineffective control per SOX 302, or if managements' ICW disclosures in 10-K are attested by public accounting firms per SOX404. The ISS database covers the period from 2007, so the final sample, after merging with corporate governance variables, begins in 2007. I drop observations with missing control variables and I also require firms to have a positive number of common shares and positive total assets and capitalization. I also exclude firms with Standard Industrial Classification (SIC) codes with the first two digits of 60-69 (financial service firms). After merging this data with *DQ* and *REPORT*, the sample comprises 8,091 observations and the sample period is from 2007 to 2018. Continuous variables are winsorized at their first and ninety-ninth percentiles. Table 1 shows the variables' descriptive statistics, and Table 2 shows their Pearson correlation coefficients.

3.2 Tests

3.2.1 Associations between ICWs and financial reporting quality

I first examine whether firms with higher financial reporting quality, as reflected by greater *DQ* and *REPORT*, are less likely to report internal control weaknesses. I examine this question with the following logistic equation:

$$\begin{aligned} ICW_{it} = {} & \beta_0 + \beta_1 Reporting_{it} + \beta_2 HighBoardRatioAcc_{it} + \beta_3 HighACRatioAcc_{it} + \beta_4 MarketCap_{it} \\ & + \beta_5 FirmAge_{it} + \beta_6 Loss_{it} + \beta_7 BankruptcyRisk_{it} + \beta_8 NumBus_{it} + \beta_9 NumGeo_{it} \\ & + \beta_{10} Foreign_{it} + \beta_{11} Acquisition_{it} + \beta_{12} Growth_{it} + \beta_{13} RestructCharge_{it} \\ & + \varepsilon_{it}, \end{aligned} \quad (1)$$

where *ICW* equals one if firm *i* disclosed an material internal control weakness or significant deficiency, under either SOX 302 or SOX 404, in year *t*, else zero; *Reporting* takes on *DQ* or *REPORT* in different specifications. I follow prior studies and control for the known determinants of firms' internal control quality, such as in Doyle et al. (2007a), Doyle et al. (2007b) and Chychyla (2019). Specifically, I control for firms' fundamental and operational characteristics such as size (*MarketCap*), firms' experience (*FirmAge*), profitability (*Loss*), and financial distress risk (*BankruptcyRisk*), defined as decile ranking of Altman's Z. I also control for firms' operational complexity with numbers of business segments (*NumBus*) and geographic segments (*NumGeo*), the existence of foreign transactions (*Foreign)*, and mergers and acquisitions (*Acquisition*). To control for the impact of firms' rapid growth on their internal control quality, I also control for firms' sale growth (*Growth*) and restructure expenditures (*RestructCharge*) in the model. Prior research also finds associations between internal control quality and firms' governance and audit committee characteristics (e.g. Balsam, Krishnan, and

Yang, 2003; Reichelt and Wang, 2010). Following these studies, I control for the financial expertise of board members (*HighBoardRatioAcc*) and audit committee members (*HighACRatioAcc*). All variable definitions are presented in the Appendix. I include industry and year fixed effects for all tests based on a two-digit industry classification and cluster standard errors by firm and year. Table 3 shows the results of estimating Equation (1).

3.2.2 Predictive power of financial reporting quality on ICWs

Investors pay attention to traits that indicate firms' future negative outcomes, such as issuances of *ICW*s. In this test, I examine if financial reporting quality, in particular, reporting or omitting of financial statement variables, is informative in predicting firms' *ICW*s in the next period. I examine predictive power of *DQ/REPORT* with Equation (2):

$$\begin{aligned} ICW_{it+1} = {} & \beta_0 + \beta_1 Reporting_{it} + \beta_2 HighBoardRatioAcc_{it} + \beta_3 HighACRatioAcc_{it} \\ & + \beta_4 MarketCap_{it} + \beta_5 FirmAge_{it} + \beta_6 Loss_{it} + \beta_7 BankruptcyRisk_{it} \\ & + \beta_8 NumBus_{it} + \beta_9 NumGeo_{it} + \beta_{10} Foreign_{it} + \beta_{11} Acquisition_{it} + \beta_{12} Growth_{it} \\ & + \beta_{13} RestructCharge_{it} + \varepsilon_{it}, \end{aligned} \quad (2)$$

where dependent variable takes on one-year-ahead *ICW*s, and variable of interest, *Reporting*, takes on current-year *DQ/REPORT*. All the other variables are the same as explained in Section 3.2.1. I control for year and industry fixed effects, and standard errors are clustered by firm and year. Table 4 shows the results of estimating equation (2).

3.2.3 Lag effect of ICW

Firms' internal control over financial reporting partly reflects firms' investment in accounting resources. Firms' culture and governance traditions are formed gradually and can be consistent over consecutive years. I examine lag effect of *ICW* with the following equations:

$$ICW_{it} = \beta_0 + \beta_1 Reporting_{it} + \beta_2 ICW_{it-1} + \beta_3 HighBoardRatioAcc_{it} + \beta_4 HighBoardRatioAcc_{it} + \beta_5 HighACRatioAcc_{it} + \beta_6 MarketCap_{it} + \beta_7 FirmAge_{it} + \beta_8 Loss_{it} + \beta_9 BankruptcyRisk_{it} + \beta_{10} NumBus_{it} + \beta_{11} NumGeo_{it} + \beta_{12} Foreign_{it} + \beta_{13} Acquisition_{it} + \beta_{14} Growth_{it} + \beta_{15} RestructCharge_{it} + \varepsilon_{it}, \quad (3)$$

$$ICW_{it+1} = \beta_0 + \beta_1 Reporting_{it} + \beta_2 ICW_{it-1} + \beta_3 ICW_{it} + \beta_4 HighBoardRatioAcc_{it} + \beta_5 HighBoardRatioAcc_{it} + \beta_6 HighACRatioAcc_{it} + \beta_7 MarketCap_{it} + \beta_8 FirmAge_{it} + \beta_9 Loss_{it} + \beta_{10} BankruptcyRisk_{it} + \beta_{11} NumBus_{it} + \beta_{12} NumGeo_{it} + \beta_{13} Foreign_{it} + \beta_{14} Acquisition_{it} + \beta_{15} Growth_{it} + \beta_{16} RestructCharge_{it} + \varepsilon_{it}, \quad (4)$$

Table 5 shows the results of estimating equation (3) and (4).

4. Results

Table 1 shows the descriptive statistics for the sample in testing association between *ICW* and financial reporting quality.

[Insert Table II-1 here]

Panel A presents the descriptive statistics for *ICW*, *DQ/REPORT*, and all control variables in the model. The mean value of *DQ* is 0.76, representing firms report 76% of the financial statement variables on average. *DQ* shows relatively small variance across the sample, of 1.26 standard deviations (0.058) between the 25th percentile (0.726) and the 75th percentile (0.799). As mentioned in Chapter I, *REPORT* includes only seven key financial statement items that are empirically and theoretically most relevant to firm values. Firms that are fully in compliant with U.S. GAAP guidelines are likely to report all of the seven variables, and this

leaves out little variance of *REPORT* across the sample in this test. This is shown by the large mean value (0.986) and the 25th percentile value (1.000). Less than 30% of firm-years report *ICW*s. Specifically, the mean values of ICW_{t-1}, ICW_t, and ICW_{t+1} are 0.274, 0.284, and 0.306 respectively. The frequency of lagged *ICW* and ICW_t are close, supporting the notion that firms show persistent patterns in terms of their internal control over financial functions. The other control variables are generally in compliant with prior literature. The mean value of *FirmAge* is 3.176, representing the average age of the sample firms is 24 years. On average, 43.9% of the sample firms conduct foreign operations (*Foreign*), and 36.9% of the firms are involved in M&A deals (*Acquisition*). Panel B presents the percentage of firms with *ICW*=1 across years. In general, firms report fewer *ICW*s before 2010, with percentage of about 20%. The percentage of reported *ICW*s increased from 0.217 to 0.316 over five years from 2010 to 2015, and the level of *ICW*s maintains above 0.32 after 2015.

Table 2 shows the Pearson correlations between pairs of the variables.

[Table II-2]

Most of the control variables, except *Loss* and *FirmAge* are significantly associated with *ICW*, indicating the testing model is well controlled. Variables of interests, *DQ* and *REPORT*, are significantly associated with each other, however, they do not show strong associations with *ICW*. Small magnitude of correlation coefficients, 0.057 (*DQ*) and 0.004 (*REPORT*), is not informative in drawing inferences on association between *ICW*s and financial reporting quality.

Table 3 presents the results of Equation (1), testing contemporaneous associations between *ICW*s and financial reporting quality.

[Insert Table II-3]

Column (1) shows associations between *ICW*s and *DQ*, and Column (2) shows associations between *ICW*s and *REPORT*. In general, the results do not show evidence that financial reporting quality (*DQ/REPORT*) reflects likelihood of *ICW*s. The coefficients of *DQ* and *REPORT* are 0.553 and -0.356, but they are not significant at conventional significance levels. The sign of *REPORT* in negative, consistent with the notion that firms with higher financial reporting quality are less likely to have internal control problems over financial reporting. However, due to lack of statistical significance, the result in this test is not sufficient to draw that conclusion.

Table 4 shows the testing results of Equation (2).

[Insert Table II-4]

Column (1) and (2) present the results of regressing one-year-ahead *ICWs* (*ICW t+1*) on *DQ* and *REPORT*, respectively. Like the results in Table 3, the coefficients of *DQ* (-0.740) and *REPORT* (0.035) are not statistically significant.

Table 5 presents the results of Equation (3) and (4), adding lagged value of *ICW*s into the key models.

[Insert Table II-5]

Column (1) and (2) present contemporaneous associations between *ICW t* and *DQ / REPORT*, controlled with *ICW t-1*. The results show strong evidence that *ICW*s are persistent across time; lagged value of *ICW*s have significant predictive power for the next period, with coefficient of 1.726 for both specifications. However, *DQ* or *REPORT* alone, does not have explanatory power on *ICW*s. Column (3) and Column (4) present predictive associations between ICW_{t+1} and *DQ / REPORT*, controlling for ICW_t and ICW_{t-1}. Column (4), like previous

specifications, does not show significant association between ICW_{t+1} and *REPORT*; in Column (3), however, the coefficient of *DQ* is -1.183, and it is significant at 5% significance level. The two lagged variables, ICW_t and ICW_{t-1}, are both positively associated with ICW_{t+1} at 1% significance level. This specification shows some evidence that firms with higher financial reporting quality are less likely to have *ICW*s in the next period, however, given that all the other specifications in this test are not significant, the evidence shown in Column (3) alone does not serve as significant evidence either.

5. Conclusion

Numerous studies have documented significant economic consequences of internal control weaknesses of firms. Studies also found various fundamental characteristics of firms with internal control problems. Being able to identify traits of firms with ICWs before their public issuances would provide investors with more information to plan for their investment decisions, however, a single signal or indicator that may give a brief insight of a firm's internal control quality has not been found. As an important aspect of internal control procedures, financial statement preparation quality may reflect firms' internal control system. Poor internal control system may cause omissions of numbers reported from firms' financial statements. In Chapter Two of this study, I examine whether reporting or omitting of financial statement variables can reflect firms' internal control quality, using the two financial reporting quality measures I examine and proposal in Chapter I, *DQ* and *REPORT*. I also examine if *DQ* and *REPORT* in current period is informative in predicting issuance of an *ICW* in the next period. However, the results lack adequate statistical significance in drawing conclusions in terms of associations between *ICW*s and *DQ/REPORT*. Though the results do not support effectiveness of *DQ/REPORT* in detecting or predicting *ICW*s, this study provides foundation for my further

research in exploring indicators that can possibly facility investors in detecting firms' internal control deficiencies before official evaluations on internal control quality are publicly issued.

CHAPTER III: DO "MISSING DATA" – BASED FINANCIAL REPORTING QUALITY MEASURES REFLECT THE LIKELIHOOD OF MISSTATEMENTS?

1. Introduction

A financial restatement occurs when a firm revise one or more of its previous financial statements. Reasons for restatements include, but are not limited to, changes in accounting rules, book errors, and frauds. Per Audit Analytics, there were about 400 public companies that amended their annual reports in 2018, though only 30 amended 10-Ks were due to financial restatements. However, different from most other types of amendments, a restatement is a red flag that raises suspicions among investors because of its significant economic consequences. For example, Palmrose et al. (2004) examines market reactions to financial restatements and documents an average abnormal return of about -9 percent over a 2-day announcement window.

Causes of financial restatements include but are not limited to corporate governance factors, auditor specialization, financial expertise of boards, and personality of directors. (Beasley 1996, Farber 2005, Krishnan and Visvanathan 2008, Romanus et al. 2008, Cao et al. 2011, Ham et al. 2017). Internal control weaknesses have been found as another reason for restatements. For example, Wang (2013) explains that restatement results from internal control problems because internal controls are the first line of defense for financial statement quality; the author also finds that restatement severity increases in the degree of internal control deficiency. However, internal control weakness and restatements do not always coincide. Absence of misstatements cannot be interpreted as high financial reporting quality. A lack of detection and disclosure of errors and irregularities can also result in a low level of restatement rates (Srinivasan et al. 2015). Unmeasurable and unobservable factors other than internal control

quality may also affect likelihood of misstatements, such as corporation culture and degree of integrity of the CEOs.

Because investors could incur very substantial losses from financial restatements, and because internal control weaknesses alone cannot fully reflect firms' risks of restatements, I am interested to learn whether "missing data"- based financial reporting quality measures, *DQ* and *REPORT*, are effective in detecting likelihood of misstatements. Specifically, I expect that firms with higher *DQ* and *REPORT* are less likely to be required to restate their financial statements. However, the results at this stage are not adequate to draw conclusions on associations between likelihood of misstatements and reporting or missing of financial statement variables. Though not showing strong evidence in terms of associations between misstatements and *DQ/REPORT*, this study adds evidence to the literature on associations between internal control quality and misstatements.

2. Background and Research Questions

A financial restatement occurs when a firm revise one or more of its previous financial statements. The company, the SEC, or an independent auditor can identify the need for a restatement. Restatements can be reported in press releases, Form 8-Ks, or Form 10-Ks. Reasons for restatements include, but are not limited to, changes in accounting rules, book errors, and frauds. A restatement is a red flag that raises suspicions among investors.

SEC and financial statement users view restatements as audit failures (Liu et al. 2009). Existing literatures have extensively focused on financial restatements, examining their consequences. Numerous studies have documented significant market reactions to financial restatements (e.g., Dechow et al. 1996, Turner et al. 2001). Wilson (2008) documents a short-term decline in investor confidence regarding financial reporting following restatements.

Palmrose et al. (2004) examines market reactions to financial restatements and documents an average abnormal return of about -9 percent over a 2-day announcement window. The authors also find that more negative returns are associated with restatements involving fraud. In addition to immediate market reactions, other forms of consequences of financial restatements are observed. For example, Palmrose and Scholz (2004) documents a positive association between financial restatements and litigation risks.

Existing studies have also documented causes of misstatements of financial reporting. For example, numerous studies have found associations between inaccuracies on financial statements and firms' corporate governance factors, such as numbers of outside board members, number of audit committee meetings, and financial experts on the audit committee. (Beasley 1996, Farber 2005, Krishnan and Visvanathan 2008). Romanus et al. (2008) finds that auditor industry specialization is negatively associated with the likelihood of accounting restatement. Cao et al. (2011) documents associations between company reputation and financial restatements. Eshleman and Guo (2014) finds that clients of Big4 audit firms are less likely to subsequently issue an accounting restatement. Ham et al. (2017) documents a positive association between CFO narcissism and likelihood of restatements. Dechow et al. (2011) examines the causes of managers misstating their financial statements and concludes with an F-Score that is effective in detecting firms' material accounting misstatements.

Existing studies have also partly explained the association between internal control quality and financial restatements. For example, Wang (2013) explains that restatement results from internal control problems because internal controls are the first line of defense for financial statement quality; the author also finds that restatement severity increases in the degree of internal control deficiency. However, internal control weakness and restatements do not always

coincide. Internal control weakness is one of several causes of restatements, and not all firms with internal control weaknesses end up with financial restatements. Srinivasan et al (2015) find that only U.S. firms and foreign firms from strong rule of law countries show a positive association between restatement frequency and internal control weaknesses. The authors also document that firms from weak rule of law countries show no significant association between internal control weaknesses and restatements. Restating firms need not always acknowledge the existence of internal control weaknesses. Rice and Weber (2011) examines the determinants of internal control reporting decisions of restating firms after the passage of SOX 404, and finds that only a minority of firms with internal control weaknesses acknowledge their existing control problems during their misstatement periods, and the proportion declines over time.

Misstatement is a consequence of poor internal control over financial reporting, however, absence of misstatements cannot be interpreted as high financial reporting quality. Lower rate of restatements can be associated with an absence of errors, it can also be related with a lack of detection and disclosure of errors and irregularities. (Srinivasan et al. 2015). In addition to internal control quality, other unmeasurable and unobservable factors may affect likelihood of misstatements, such as corporation culture, decisions by board of directors on investments in accounting resources, and degree of integrity of the board of directors and the CEO. Because investors could incur very substantial losses from financial restatements, and because internal control weaknesses alone cannot fully reflect firms' risks of restatements, I am interested to learn whether "missing data"- based financial reporting quality measures, DQ and REPORT, are associated with likelihood of misstatements. Specifically, I expect that firms with higher financial reporting quality, as represented by higher DQ and REPORT, are less likely to be required to restate their financial statements. I examine both contemporaneous explanatory

power and predictive power of DQ/REPORT on misstatements. The hypotheses are stated as follows:

> *H1: Firms with higher rate of reported financial statement items (higher DQ/REPORT) are less likely to restate their current financial statements in subsequent periods.*
>
> *H2: Firms with higher rate of reported financial statement items (higher DQ/REPORT) are less likely to restate their one-year-ahead financial statements in subsequent periods.*

3. Data and Research Design

3.1 Sample Selection

I obtain firms' fundamental financial information from COMPUSTAT and stock prices and trading volumes from CRSP. Data on financial misstatements (*MIS*) are obtained from AuditAnalytics. I also obtain boards' and directors' data from ISS, which restricts the sample to S&P 1500 firms. To create the sample, I start with all firms in AuditAnalytics's financial restatement database. A firm-year observation is defined as having misstatement if the firm appears in the AuditAnalytics restatement dataset and the fiscal year falls in the range of restatement beginning date and ending date. This test controls for impact of internal control weakness on the likelihood of misstatement. A firm-year observations is defined as having an ICW if their 10-Q or 10-K discloses an ineffective control per SOX302, or if managements' ICW disclosures in 10-K are attested by public auditors per SOX404. The ISS database covers the period from 2007. I drop observations with missing control variables, and I also require firms to have a positive number of common shares and positive total assets and capitalization. I also exclude firms with Standard Industrial Classification (SIC) codes with the first two digits of 60-69 (financial service firms). The financial sample comprises 7,479 observations over the period

from 2007 to 2018. Continuous variables are winsorized at their first and ninety-ninth percentiles. Table 1 shows the variables' descriptive statistics, and Table 2 shows their Pearson correlation coefficients.

3.2 Tests

3.2.1 Associations between MISs and financial reporting quality

I first examine associations between misstatements and financial reporting quality. Specifically, I examine whether firms with greater DQ or REPORT are less likely to restate their 10-Ks with the following logistic equation:

$$\begin{aligned} MIS_{it} = {} & \beta_0 + \beta_1 Reporting_{it} + \beta_2 ICW_{it} + \beta_3 Fscore + \beta_4 HighBoardRatioAcc_{it} \\ & + \beta_5 HighBoardRatioAcc_{it} + \beta_6 HighACRatioAcc_{it} + \beta_7 MarketCap_{it} \\ & + \beta_8 FirmAge_{it} + \beta_9 Loss_{it} + \beta_{10} BankruptcyRisk_{it} + \beta_{11} NumBus_{it} \\ & + \beta_{12} NumGeo_{it} + \beta_{13} Foreign_{it} + \beta_{14} Acquisition_{it} + \beta_{15} Growth_{it} \\ & + \beta_{16} RestructCharge_{it} + \varepsilon_{it}, \end{aligned} \quad (1)$$

where *MIS* equals one if firm *i*'s 10-K in fiscal year t was later restated, else zero; *ICW* equals one if firm *i* disclosed an ICW, under either SOX 302 or SOX 404, in year *t*, else zero. *Reporting* takes on *DQ* or *REPORT*. I follow Dechow et al. (2011) to control for accounting misstatement risk (*Fscore*). Following Chapter Two and prior studies, I also control for firms' fundamental and operational characteristics such as size (*MarketCap*), firms' experience (*FirmAge*), profitability (*Loss*), and financial distress risk (*BankruptcyRisk*), defined as decile ranking of Altman's Z. To control for firms' operational complexity, I include numbers of business segments (*NumBus*) and geographic segments (*NumGeo*), the existence of foreign transactions (*Foreign)*, and mergers and acquisitions (*Acquisition*) in the model. I also control for firms' sale

growth (*Growth*), restructure expenditures (*RestructCharge*), firms' governance and accounting committee, such as financial expertise of board members (*HighBoardRatioAcc*) and audit committee members (*HighACRatioAcc*). All variable definitions are presented in the Appendix. I control for industry and year fixed effects for all specifications on a two-digit industry classification and cluster standard errors by firm and year. Table 3 shows the results of estimating Equation (1).

3.2.2 Predictability of financial reporting quality on MISs

Misstatements are usually detected several years after original 10-Ks were issued. Significant negative reactions to financial restatements in the market are also documented. (e.g. Palmrose et al. 2004) Investors would have a chance to avoid losses caused by restatements if they were able to predict risk of misstatements in the next period. I examine whether *DQ/REPORT* can predict risk of misstatements with Equation (2):

$$\begin{aligned} MIS_{it+1} = {} & \beta_0 + \beta_1 Reporting_{it} + \beta_2 ICW_{it} + \beta_3 Fscore + \beta_4 HighBoardRatioAcc_{it} \\ & + \beta_5 HighBoardRatioAcc_{it} + \beta_6 HighACRatioAcc_{it} + \beta_7 MarketCap_{it} \\ & + \beta_8 FirmAge_{it} + \beta_9 Loss_{it} + \beta_{10} BankruptcyRisk_{it} + \beta_{11} NumBus_{it} \\ & + \beta_{12} NumGeo_{it} + \beta_{13} Foreign_{it} + \beta_{14} Acquisition_{it} + \beta_{15} Growth_{it} \\ & + \beta_{16} RestructCharge_{it} + \varepsilon_{it}, \end{aligned} \quad (2)$$

3.2.3 Lag effect of MIS

Firms' misstatements could incur in consecutive years, especially when the misstated issues involve financial accounts estimated based on going-concern basis, such as Balance Sheet items. To control for effect of past misstatements on current year's risk of misstatements, I include lagged value of *MIS* in the model. Because detection of internal control weakness is one

of the causes of misstatements, I also include lagged value *ICW* in the model. I examine lag effect of *MIS* on both *MIS* in year t and year t+1 with the following equations:

$$MIS_{it} = \beta_0 + \beta_1 Reporting_{it} + \beta_2 ICW_{it} + \beta_3 MIS_{it-1} + \beta_4 ICW_{it-1} + \beta_5 Fscore + \beta_6 HighBoardRatioAcc_{it} + \beta_7 HighACRatioAcc_{it} + \beta_8 MarketCap_{it} + \beta_9 FirmAge_{it} + \beta_{10} Loss_{it} + \beta_{11} BankruptcyRisk_{it} + \beta_{12} NumBus_{it} + \beta_{13} NumGeo_{it} + \beta_{14} Foreign_{it} + \beta_{15} Acquisition_{it} + \beta_{16} Growth_{it} + \beta_{17} RestructCharge_{it} + \varepsilon_{it}, \quad (3)$$

$$MIS_{it+1} = \beta_0 + \beta_1 Reporting_{it} + \beta_2 ICW_{it} + \beta_3 MIS_{it-1} + \beta_4 ICW_{it-1} + \beta_5 Fscore + \beta_6 HighBoardRatioAcc_{it} + \beta_7 HighACRatioAcc_{it} + \beta_8 MarketCap_{it} + \beta_9 FirmAge_{it} + \beta_{10} Loss_{it} + \beta_{11} BankruptcyRisk_{it} + \beta_{12} NumBus_{it} + \beta_{13} NumGeo_{it} + \beta_{14} Foreign_{it} + \beta_{15} Acquisition_{it} + \beta_{16} Growth_{it} + \beta_{17} RestructCharge_{it} + \varepsilon_{it}, \quad (4)$$

Table 5 shows the results of estimating equation (3) and (4).

4. Results

Table 1 shows the descriptive statistics for the sample.

[Insert Table III-1]

The mean value of DQ is 0.761, representing firms report 76% of the financial statement variables on average. DQ shows relatively small variance across the sample, of 1.26 standard deviations (0.058) between the 25th percentile (0.726) and the 75th percentile (0.799). Most firms are fully compliant and are likely to report all of the seven variables, causing small variance of

REPORT across the sample in this test. The mean value and 25th percentile value of *REPORT* are 0.986 and 1.000, respectively. Most firms are in compliant with accounting rules; only 13.3% of observations in the sample restate 10-Ks for that fiscal year, and 26.9% of sample observations have *ICWs*. As discussed in Section 3.2.3, *MIS* and *ICW* are likely to show persistent patterns; this hypothesis is evidenced by the mean value of MIS_{t+1} (0.126), MIS_{t-1} (0.139), and ICW_{t-1} (0.267), which are close to the mean value of MIS_t and ICW_t. The other control variables are generally in compliant with prior literature. The mean value of *Fscore*, 1.083, indicates that a company is 108 % more likely, on average, to be a fraudulent reporter than a randomly selected company.

Table 2 shows the Pearson correlations between pairs of the variables.

[Insert Table III-2]

MIS presents strong persistence over time, where MIS_t is significantly associated with both MIS_{t+1} (0.569) and MIS_{t-1} (0.581). MIS_t is also statistically significantly associated with ICW_t, *Fscore*, *MarketCap*, *Loss*, *BankruptcyRisk*, *NumBus*, *Acquisition*, and *Growth*. Variables of interests, *DQ* and *REPORT*, are significantly associated with each other, with correlation coefficient of 0.155; however, their correlation coefficients with MIS_t are small (0.030 and 0.008), which is not adequate to interpret associations between financial reporting quality and likelihood of misstatements.

Table 3 presents the results of Equation (1), testing contemporaneous associations between *MIS*s and financial reporting quality.

[Insert Table III-3]

Column (1) and Column (2) show associations between *MIS*s and financial reporting quality, without controlling for contemporaneous *ICW*s. Column (3) and (4) control for effect of *ICW*s on risk of restatements. In general, the results do not show evidence that financial reporting quality (*DQ/REPORT*) is associated with likelihood of *MIS*s. The coefficients of *DQ* and *REPORT* are 0.476 and 0.723 when not controlled with *ICW*; and 0.408 and 0.760 when controlled with *ICW*. Coefficients of the variables of interest are not significant at conventional significance levels. *Fscore*, when not controlled with *ICW*, is significantly associated with likelihood of misstatements. However, ICW_t dominates *Fscore* in explaining *MIS*, with coefficients 0.725 and 0.726 in specification (3) and (4). Because neither *DQ n*or *REPORT* is significantly associated with *MIS*, the result in this test is not sufficient to draw any conclusion in terms of associations between reporting/omitting of financial statement variables and likelihood of misstatements.

Table 4 shows the testing results of Equation (2).

[Insert Table III-4]

Column (1) and (2) present the results of regressing one-year-ahead *MISs* (MIS_{t+1}) on *DQ* and *REPORT* without controlling for ICW_t, and Column (3) and (4) present the results when controlled with ICW_t. The coefficients of *DQ* are -0.204 and -0.244 in specification (1) and (3), consistent with the notion that firms with higher financial reporting quality are less likely to restate their 10-Ks, however the results are not statistically significant. In general, the results do not provide strong statistical evidence in terms of *DQ/REPORT'*s predictive power on one-year-ahead likelihood of misstatements. *Fscore* and ICW_t both have explanatory powers on MIS_{t+1}. Unlike the result in Table 3, *Fscore* maintains its explanatory power in predicting MIS_{t+1}, and the result is consistent when controlled with ICW_t. The coefficients of *Fscore* are 1.112, 1.100,

0.917, and 0.902 respectively in specification (1), (2), (3), and (4), all of which are significant at 5% level.

Table 5 presents the results of Equation (3) and (4).

[Insert Table III-5]

This test controls for lagged value of *MIS*s and *ICW*s. However, controlling for lagged effect of *MIS* and *ICW* does not improve *DQ/REPORT*'s explanatory power. The coefficients of *DQ* and *REPORT* are 0.032 (-0.516) and 1.128 (1.130) in testing their associations with MIS_t, (MIS_{t+1}). The results present strong evidence of associations between *MIS*s and *ICW*s; they also present strong persistent patterns of *MIS*s. For example, in specification (3), MIS_{t+1} is significantly associated with both ICW_t and MIS_{t-1}, with coefficients of 0.276 and 2.183. However, a firm with *ICW* in year *t-1* is less likely to have misstatement in year *t+1*, as evidenced by the negative coefficient of ICW_{t-1}, -0.207. This result may indicate firms' efforts in mitigating possible impact of internal control problem on future restatements, but without testing on the theoretical mechanisms, I do not discuss further on this mechanism in this study.

5. Conclusion

A financial restatement occurs when a firm revise one or more of its previous financial statements. Reasons for restatements include, but are not limited to, changes in accounting rules, book errors, and frauds. A restatement is a red flag that raises suspicions among investors because of its significant economic consequences. Restatements could be associated with internal control weaknesses over financial reporting because internal controls are the first line of defense for financial statement quality. However, internal control weakness and restatements do not

always coincide. Absence of misstatements could be caused by a lack of detection and disclosure of errors and irregularities, and other unobservable factors.

Investors could incur very substantial losses from financial restatements. Internal control weaknesses, alone, cannot fully reflect firms' risks of restatements. In this study, I examine whether "missing data"- based financial reporting quality measures, *DQ* and *REPORT*, as described in Chapter One of the thesis, are effective in detecting likelihood of misstatements. I expect that firms with higher *DQ* and *REPORT* are less likely to be required to restate their financial statements in subsequent periods. The results lack adequate evidence to draw conclusions on associations between likelihood of misstatements and omissions of financial statement variables. However, the results have added further evidence to the literature on associations between internal control quality and likelihood of restatements.

Table I-1 Descriptive Statistics on Disclosure Quality Measures

Panel A: Descriptive statistics on disclosure quality measures

	Mean	Std Dev	Q1	Median	Q3
DQ	0.596	0.109	0.521	0.592	0.667
DQ_BS	0.719	0.148	0.620	0.724	0.816
DQ_IS	0.473	0.131	0.373	0.460	0.538
REPORT	0.930	0.103	0.857	1.000	1.000

Panel B: Regression analyses of variation by industry

	Parameter Estimates			
Industry	DQ	DQ_BS	DQ_IS	REPORT
Business equipment	0.035***	0.045***	0.024***	0.006***
Chemicals and allied products	0.011***	0.013***	0.009***	0.000
Others	-0.001	0.005***	-0.007***	-0.038***
Oil, gas, and coal extraction and products	-0.032***	-0.050***	-0.013***	-0.028***
Healthcare, medical equipment, and drugs	0.032***	0.063***	0.008***	-0.018***
Manufacturing	0.004***	0.008***	0.000	0.003**
Consumer nondurables	-0.002	-0.002	-0.002	-0.002
Wholesale, retail, and some services	0.005***	0.013***	-0.002	0.001
Telephone and television transmission	0.001	0.003*	-0.002	-0.052***
Consumer durables (Intercept)	0.587***	0.704***	0.470***	0.942***
Ajusted-R^2	2.96%	3.44%	0.8%	3.33%

Panel C: Regression analyses of temporal variation

$$\overline{Disclosure_t} = \alpha + \beta_1 INT_t + \beta_2 SI_{avg,t} + \beta_3 LOSS_t + \beta_4 NSEG_{avg,t} + \varepsilon$$

	Intercept	*INT*	*SI*	*LOSS*	*NSEG*	*Adj. R-square*
DQ	0.502***	1.285***	0.001	0.057	-0.020	0.848
	(16.55)	(4.38)***	(1.06)	(0.82)	(-0.87)	
DQ_BS	0.567***	1.095***	0.001	0.456***	-0.063***	0.910
	(21.42)	(4.27)	(0.53)	(7.55)	(-3.21)	
DQ_IS	0.437***	1.475***	0.002	-0.342***	0.024	0.716
	(10.34)	(3.61)	(1.18)	(-3.55)	(0.76)	
REPORT	0.960***	0.040	0.000	-0.068***	0.003	0.732
	(252.19)	(1.08)	(0.36)	(-7.79)	(1.23)	

This table presents the descriptive statistics for disclosure quality measures. This sample consists of 261,742 observations from 1973 to 2011. Panel A reports the distribution of the full sample. Panel B reports the regression analysis of variation by industry. Industry classification is based on the Fama and French 12 Industry classification. Financial services companies are excluded. Panel C reports the regression analyses of temporal variation, consisting of 33 years from 1976 to 2008. All variables are taken to be the yearly average. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

Table I-2 Correlations between REPORT, DQ, and Other Disclosure Measures

(Pearson Upper Triangle, Spearman Lower Triangle)

	DQ	*DQ_BS*	*DQ_IS*	***REPORT***	*FOG*	*#WORDS*
DQ	-	**0.724**	**0.814**	**0.214**	-0.007	**0.020**
DQ_BS	**0.713**	-	**0.189**	**0.094**	-0.001	-0.005
DQ_IS	**0.819**	**0.224**	-	**0.226**	**-0.009**	**0.032**
REPORT	**0.201**	**0.069**	**0.228**	-	**-0.010**	**-0.030**
FOG	**0.079**	**0.042**	**0.079**	**-0.013**	-	**0.251**
#WORDS	**0.066**	**0.020**	**0.084**	**-0.023**	**0.302**	-

This table presents the correlations between REPORT, DQ, and other disclosure measures from previous studies. The sample has 55,520 observations from 1993 to 2011. Financial services companies are excluded from the sample. Pearson and Spearman correlations are shown in the upper and lower triangles, respectively based on a two-tailed test. Numbers in bold indicate significance at 5% significance level based on a two-tailed test.

Table I-3 Disclosure Quality Measures and Firm-Fundamentals

Panel A: Correlation matrix between *REPORT / DQ* and firm fundamentals (Pearson Upper Triangle, Spearman Lower Triangle)

	DQ	***REPORT***	*Restructure*	*M&A*	*SI*	*Vol_Ret*	*Log(AT)*	*Log(NSEG)*
DQ	-	**0.185**	**0.369**	**0.145**	**0.006**	**-0.027**	**0.220**	**0.385**
REPORT	**0.172**	-	**0.034**	**0.073**	0.001	**-0.014**	**-0.066**	**-0.013**
Restructure	**0.345**	**0.034**	-	**0.081**	0.004	**0.007**	**0.268**	**0.376**
M&A	**0.146**	**0.071**	**0.081**	-	-0.002	**-0.063**	**0.239**	**0.103**
SI	**0.241**	**0.012**	**0.318**	**0.107**	-	**0.012**	**-0.019**	**-0.002**
Vol_Ret	**-0.018**	**-0.017**	**-0.007**	**-0.082**	**0.114**	-	**-0.302**	**-0.044**
Log(AT)	**0.217**	**-0.040**	**0.259**	**0.245**	**0.156**	**-0.368**	-	
Log(NSEG)	**0.330**	**-0.007**	**0.328**	**0.099**	**0.198**	**-0.082**	**0.485**	-

Panel B: Regression of *REPORT / DQ* on firm fundamentals

$$Disclosure_{i,t} = \alpha + \beta_1 Restructure_{i,t} + \beta_2 M\&A_{i,t} + \beta_3 SI_{i,t} + \beta_4 Vol\_Ret_{i,t} + \beta_5 Log(AT)_{i,t} + \beta_6 Log(NSEG)_{i,t} + \varepsilon$$

	Restructure	*M&A*	*SI*	*Vol_Ret*	*Log(AT)*	*Log(NSEG)*	*Constant*	*Adj. R^2*
Report	1.210***	1.638***	0.012***	-1.629***	-0.336***	0.088	96.610***	0.099
	(11.71)	(24.25)	(3.21)	(-4.75)	(-15.19)***	(0.91)	(678.72)	
DQ	3.238***	0.711***	0.023***	-2.717***	-0.188***	0.120	61.151***	0.576
	(33.01)	(12.26)	(2.95)	(-10.71)	(-10.72)	(1.57)	(406.48)	
NOBS	125,155							
Industry FE	YES							
Year FE	YES							

This table presents the association between Report (DQ) and firm-fundamentals. The sample consists of 125,155 observations from 1976 to 2011. Panel A shows the Pearson (upper triangle) and Spearman (lower triangle) correlation coefficients. Panel B reports the regression results, controlling for industry and year fixed effects. Coefficients in Panel B are multiplied by 100 for exposition purposes. Standard errors are clustered by industry and year. T-stats are shown in parentheses. Numbers in bold indicate significance at 5% level based on a two-tailed test.

Table I-4 Disclosure Quality Measures and Analyst Forecast Properties

	DISP (1)	*|FE|* (2)	*DISP* (3)	*|FE|* (4)	*DISP* (5)	*|FE|* (6)	*DISP* (7)	*|FE* (8)|
Report			-4.764***	-6.168**			-5.919***	-8.772***
			(-4.31)	(-1.98)			(-5.20)	(-2.79)
DQ	-6.566***	-9.646***			-8.375***	-14.027***		
	(-5.66)	(-2.60)			(-7.15)	(-3.80)		
Vol_EPS	0.834***	2.928***	0.837***	2.931***	0.875***	3.010***	0.876***	3.011***
	(26.52)	(31.05)	(26.55)	(31.05)	(26.08)	(31.04)	(26.06)	(31.05)
Growth	0.418**	-1.607***	0.448***	-1.560***	0.815***	-0.666	0.865***	-0.578
	(2.44)	(-3.09)	(2.62)	(-2.98)	(4.70)	(-1.28)	(4.97)	(-1.10)
ROA	-16.25***	-62.999***	-16.43***	-63.283***	-17.589***	-70.820***	-17.695***	-71.029***
	(-11.71)	(-13.36)	(-14.62)	(-13.40)	(-15.80)	(-14.51)	(-15.82)	(-14.53)
Log(AF)	-1.806***	-6.373***	-1.810***	-6.393***	-1.808***	-6.197***	-1.812***	-6.222***
	(-11.71)	(-12.29)	(-11.57)	(-12.36)	(-11.51)	(-11.96)	(-11.31)	(-12.04)
Log(AT)	2.254***	5.279***	2.261***	5.296***	1.892***	4.411***	1.895***	4.425***
	(23.19)	(18.99)	(22.35)	(18.88)	(21.07)	(19.01)	(20.23)	(18.95)
Constant	2.113*	-2.106	1.813	-3.365	4.580***	5.530*	4.042***	3.501
	(1.93)	(-0.66)	(1.24)	(-0.94)	(4.43)	(1.89)	(2.79)	(1.00)
Fundamental Controls	YES	YES	YES	YES	NO	NO	NO	NO
Ind and Year FE	YES	YES	YES	YES	YES	YES	YES	YES
NOBS	37,517	37,517	37,517	37,517	37,517	37,517	37,517	37,517
Adj. R^2	0.277	0.218	0.277	0.218	0.268	0.210	0.267	0.210

This table presents the associations between Disclosure quality measures (Report / DQ) and two analysts forecast properties, forecast dispersion and forecast error. The sample consists of 31,517 firm-year observations with at least three analyst forecasts of firms' annual earnings per share from 1976 to 2011. Following Chen et al. (2015), DISP, |FE|, ROA, and Growth are winsorized at 1% and 99%. Standard errors are clustered by industry and year, t-stats are presented in parentheses. All coefficients are multiplied by 100 for exposition purposes. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

TABLE I-5 Disclosure Quality Measures and Bid-Ask Spread

	BAS	*BAS*	*BAS*	*BAS*
REPORT		-0.431***		-0.566***
		(-5.82)		(-7.81)
DQ	-0.764***		-0.884***	
	(-8.17)		(-9.18)	
Log(VOL)	0.197***	0.197***	0.239***	0.239***
	(22.25)	(22.21)	(25.29)	(25.40)
Log(PRICE)	-0.296***	-0.296***	-0.337***	-0.336***
	(-25.96)	(-26.03)	(-28.78)	(-28.71)
BTM	0.266***	0.262***	0.273***	0.270***
	(14.42)	(14.27)	(14.88)	(14.72)
LOG(AT)	-0.279***	-0.279***	-0.316***	-0.318***
	(-31.22)	(-31.24)	(-32.91)	(-33.56)
Constant	1.320***	1.186***	1.537***	1.440***
	(14.60)	(11.74)	(17.80)	(13.59)
Fundamental Controls	YES	YES	NO	NO
Ind and Year FE	YES	YES	YES	YES
NOBS	76,373	76,373	76,373	76,373
Adj. R^2	0.358	0.357	0.345	0.344

This table presents the associations between Report/DQ and bid-ask spread. The sample consists of 76,373 firm-year observations from 1993 to 2011. Following Chen et al. (2015), we winsorize BTM at 1% and 99%. All coefficients are multiplied by 100 for exposition purposes. Standard errors are clustered by year and industry. Clustered T-stats are shown in parentheses. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

Table I-6 Disclosure Quality Measure and Cost of Equity

	Cost_equity	*Cost_equity*	*Cost_equity*	*Cost_equity*
REPORT		-4.951***		-6.119***
		(-5.39)		(-6.48)
DQ	-5.241***		-1.997*	
	(-4.71)		(-1.70)	
BETA	-0.305**	-0.294**	0.329**	0.346**
	(-2.05)	(-1.98)	(2.19)**	(2.29)
BTM	0.445*	0.443*	3.459***	3.433***
	(1.77)	(1.77)	(17.64)	(17.53)
LOG(MV)	-6.025***	-6.033***	-2.839***	-2.857***
	(-37.82)	(-37.90)	(-38.44)	(-39.08)
Constant	26.440***	27.485***	27.588***	32.117***
	(24.33)	(23.64)	(26.59)	(29.79)
Fundamental Controls	YES	YES	NO	NO
Ind and Year FE	YES	YES	YES	YES
NOBS	29,584	29,584	29,584	29,584
Adj. R^2	0.430	0.430	0.359	0.361

This table presents the results of regressing Cost of equity onto Disclosure quality measures, Report and DQ. The sample consists of 29,584 firm-year observations from 1976 to 2011. All coefficients are multiplied by 100 for exposition purposes. Standard errors are clustered by year and industry. T-stats are shown in parentheses. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

Table I-7 Vuong Test and Clarke Test between Disclosure Quality Measures

Ho: Models are equally close to the true model
Ha: one of the models is closer to the true model

Test (Dep. Var)	*Preferred Model: Vuong* (1)	*Preferred Model: Clarke* (2)
DISP	REPORT	REPORT
	(0.09)*	(< 0.0001)***
|***FE***|	DQ	REPORT
	(0.129)	(< 0.001)***
Bid-Ask Spread	DQ	DQ
	(< 0.0001)***	(< 0.0001)***
Cost of Equity	REPORT	REPORT
	(< 0.0001)***	(< 0.0001)***

This table presents the results of the Vuong and Clarke Tests between Report and DQ. For these tests, we use the same samples as in Table 4, 5, and 6. The Vuong and Clarke tests examine the null hypotheses that Models are equally close to the true model. P-values are shown in the parentheses. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

Table I-8 Seven Variables and Firm Features

Panel A: Frequency of omitting and descriptive statistics of the 7 variables

	Frequency of Omissions	**% (N=261,742)**	**Mean**	**STD**
Current US federal tax expense (TXFED)	55,084	21.05%	14.58	111.57
Number of employees (EMP)	33,552	12.82%	7.32	32.09
SG&A expenses (XSGA)	30,567	11.68%	220.96	1299.89
Accounts receivable (RECT)	3,912	1.50%	224.40	3034.68
Capital expenditures (CAPXV)	2,574	0.98%	103.70	745.38
Inventory (INVT)	2,201	0.84%	129.56	748.00
Cost of goods sold (COGS)	60	0.02%	890.62	5943.80

Panel B: Distributions of sample by industry (All 7 v.s. Miss one or more)

	ALL 7 =1 (N=69,919)		ALL 7 = 0 (N=19,141)	
	N	%	N	%
Business equipment	16519	23.63%	3160	16.51%
Chemicals and allied products	2388	3.42%	553	2.89%
Others	8303	11.88%	4582	23.94%
Oil, gas, and coal extraction and products	3150	4.51%	1284	6.71%
healthcare, medical equipment, and drugs	6018	8.61%	2998	15.66%
Manufacturing	13002	18.60%	2390	12.49%
Consumer nondurables	6019	8.61%	1122	5.86%
Wholesale, retail and some services	10244	14.65%	1863	9.73%
Telephone and television transmission	1379	1.97%	693	3.62%
Consumer durables	2897	4.14%	496	2.59%

(Continued on next page)

Table I-8 (continued)

Panel C: Firm fundamentals on firms reporting all 7 vars V.S. missing one or more of 7 vars						
	All 7 = 0 (N=19,141)		**All 7 = 1 (69,919)**		**Diff (0-1)**	
Variable	Mean	SD	Mean	SD	Diff (0-1)	t-Stat
Total assets	1251.2	11107.0	1217.6	9506.4	33.6	0.38
Restructure	0.053	0.223	0.092	0.289	-0.039	-20.20***
M&A	0.353	0.478	0.385	0.497	-0.032	-8.10***
SI	0.156	0.001	0.184	0.001	-0.028	-0.02
Vol_ret	0.157	0.105	0.147	0.097	0.010	11.42***
No. Segments	6.021	5.935	7.014	6.810	-0.993	-19.84***
Book-to-market	0.833	1.057	0.823	1.349	0.010	1.12
P/E ratio	9.583	60.937	11.103	62.874	-1.520	-2.87***
Gross profit margin	-3.004	91.385	0.312	1.945	-3.316	-5.00***
ROA	0.065	0.254	0.100	0.198	-0.035	-17.45***
Capitalization Ratio	0.284	1.786	0.292	9.517	-0.008	-0.21
Operating CF/Current liabilities	-0.0001	2.781	-0.244	2.616	-0.244	-10.68***
Total Debt/Total assets	0.498	0.299	0.479	0.258	0.020	8.25***
Cash conversion (Days)	211.4	4477.8	121.2	796.5	90.245	2.51**
Current Ratio	3.571	7.650	3.002	7.795	0.569	8.87***
Asset Turnover	1.159	0.930	1.407	0.942	-0.249	-32.46***

This table presents the distribution of the 7 financial statement variables and firm features for subsamples that report all 7 variables versus subsamples that miss one or more of the 7 variables. Panel A presents frequency of omissions for the 7 variables and descriptive statistics for the reported values. Panel B presents the distribution of sample by industry, comparing subsample that report all 7 variables with subsample that misses one or more of the 7 variables. Panel C presents firm fundamentals on firms reporting all 7 variables versus firms miss one or more of the 7 variables. Sample in Panel A is the same sample in Table 1; sample used in Panel B and Panel C is created by merging sample in Table 1 with firm fundamental ratio dataset obtained from COMPUSTAT. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

TABLE II-1 Descriptive Statistics on ICW Model

Panel A: Descriptive Statistics

Variables	Mean	SD	P25	P50	P75
DQ	0.760	0.058	0.726	0.765	0.799
REPORT	0.986	0.043	1.000	1.000	1.000
ICW t	0.284	0.451	0.000	0.000	1.000
ICW t+1	0.306	0.461	0.000	0.000	1.000
ICW t-1	0.274	0.446	0.000	0.000	1.00
HighBoardRatioAcc	0.345	0.475	0.000	0.000	1.000
HighACRatioAcc	0.391	0.488	0.000	0.000	1.000
MarketCap	21.734	1.548	20.638	21.552	22.748
FirmAge	3.176	0.646	2.757	3.161	3.683
Loss	0.066	0.247	0.000	0.000	0.000
BankruptcyRisk	4.942	2.579	3.000	5.000	7.000
NumBus	1.933	0.635	1.386	1.946	2.565
NumGeo	2.145	0.658	1.609	2.197	2.565
Foreign	0.439	0.496	0.000	0.000	1.000
Acquisition	0.369	0.483	0.000	0.000	1.000
Growth	0.071	0.203	-0.012	0.059	0.138
RestructCharge	-1.832	4.872	-1.081	-0.099	0.000
No. Obs	8.091				

Panel B: ICW by Year

Year	No. of Obs	% ICW =1
2007	537	0.257
2008	678	0.215
2009	686	0.194
2010	686	0.217
2011	723	0.263
2012	716	0.250
2013	712	0.254
2014	689	0.299
2015	677	0.316
2016	683	0.351
2017	710	0.327
2018	594	0.492

This table presents the descriptive statistics on all variables in ICW testing model. This sample consists of 8,091 observations from 2007 to 2018. Panel A presents the simple statistics. Panel B presents the distribution of ICWs by year.

TABLE II-2 Pearson Correlation Matrix for ICW Testing Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 *DQ*	-															
2 *REPORT*	**0.156**	-														
3 ICW *t*	**0.057**	0.004	-													
4 *ICW t+1*	0.021	0.011	**0.421**	-												
5 *ICW t-1*	**0.060**	0.007	**0.408**	**0.275**	-											
6 *HighBoardRatioAcc*	-0.004	-0.002	**0.038**	**0.041**	**0.033**	-										
7 *HighACRatioAcc*	0.008	0.009	**0.052**	**0.047**	**0.043**	**0.755**	-									
8 *MarketCap*	**-0.038**	**-0.034**	**-0.022**	-0.013	**-0.032**	0.008	**0.040**	-								
9 *FirmAge*	-0.014	**0.033**	0.013	0.015	-0.0001	**0.040**	0.017	**0.272**	-							
10 *Loss*	-0.012	-0.006	0.009	-0.010	**0.041**	0.001	-0.002	**-0.203**	**-0.040**	-						
11 *BankruptcyRisk*	**-0.113**	**0.025**	**-0.024**	0.016	-0.010	0.005	0.017	**0.251**	**0.094**	**-0.113**	-					
12 *NumBus*	**0.024**	-0.008	**0.051**	**0.023**	**0.054**	0.006	-0.002	**0.121**	**0.239**	**-0.039**	**0.049**	-				
13 *NumGeo*	0.018	0.014	**0.039**	**0.023**	**0.054**	0.014	0.002	**0.141**	**0.151**	-0.011	**0.092**	**0.322**	-			
14 *Foreign*	**-0.026**	-0.018	**0.065**	**0.064**	**0.066**	-0.017	-0.012	**0.057**	0.009	0.015	**0.048**	**0.066**	**0.375**	-		
15 *Acquisition*	**0.208**	0.015	**0.247**	**0.187**	**0.142**	**0.067**	**0.092**	**0.099**	0.014	-0.008	0.012	**0.044**	**0.061**	**0.076**	-	
16 *Growth*	**-0.039**	-0.0002	**0.092**	**0.039**	**0.033**	**-0.023**	-0.017	**0.077**	**-0.117**	**-0.108**	**0.049**	**-0.082**	**-0.054**	0.006	**0.123**	-
17 *RestructCharge*	**-0.069**	**0.031**	**-0.030**	**-0.025**	**-0.053**	-0.014	**-0.035**	**-0.425**	**-0.246**	-0.016	**-0.037**	**-0.121**	**-0.138**	**-0.043**	**-0.102**	**0.100**

This table presents the Pearson correlation coefficients between each pair of variables in ICW testing model. This sample consists of 8,091 observations from 2007 to 2018. Number in bold represents significance at 5% level.

TABLE II-3 ICW and Financial Reporting Quality – Contemporaneous Association

Dependent Variable:	(1) ICW (t)		(2) ICW (t)	
	Coefficient	t-statistic	Coefficient	t-statistic
DQ	**0.553**	**1.04**		
REPORT			**-0.356**	**-0.55**
HighBoardRatioAcc	-0.066	-0.79	-0.067	-0.79
HighACRatioAcc	0.218***	2.64	0.218***	2.64
MarketCap	-0.165***	-7.12	-0.165***	-7.13
FirmAge	0.005	0.10	0.006	0.12
Loss	0.026	0.23	0.024	0.21
BankruptcyRisk	-0.017	-1.60	-0.018*	-1.71
NumBus	0.319***	6.23	0.317***	6.20
NumGeo	0.155***	2.74	0.152***	2.69
Foreign	0.093	1.55	0.090	1.50
Acquisition	0.946***	15.87	0.958***	16.33
Growth	0.959***	6.69	0.952***	6.65
RestructCharge	-0.014**	-2.31	-0.015**	-2.35
Intercept	1.280	1.32	-13.016***	-5.68
No. of Observations, total	8,091		8,091	
No. of Observations, ICW=1	2,300		2,300	
Pseudo R-squared	0.104		0.104	
Industry & Year Fixed Effects	YES		YES	
SE Clustered by Firm and Year	YES		YES	

This table presents the results of regressing internal control weaknesses in year t (ICW_t) onto financial reporting quality measures, *DQ* and *REPORT*. The sample consists of 8,091 firm-year observations from 2007 to 2018. Standard errors are clustered by year and industry. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

TABLE II-4 ICW and Financial Reporting Quality – Predictive Association

Dependent Variable:	(1) ICW(t+1)		(2) ICW(t+1)	
	Coefficient	t-statistic	Coefficient	t-statistic
DQ	**-0.740**	**-1.45**		
REPORT			**0.035**	**0.05**
HighBoardRatioAcc	-0.005	-0.06	-0.006	-0.07
HighACRatioAcc	0.094	1.18	0.096	1.20
MarketCap	-0.151***	-6.75	-0.151***	-6.74
FirmAge	-0.034	-0.74	-0.035	-0.75
Loss	-0.189*	-1.68	-0.187*	-1.66
BankruptcyRisk	0.021**	2.01	0.023**	2.17
NumBus	0.242***	2.86	0.243***	4.87
NumGeo	0.145***	2.63	0.148***	2.68
Foreign	0.057	0.99	0.061	1.05
Acquisition	0.606***	10.47	0.590***	10.38
Growth	0.249*	1.84	0.257*	1.90
RestructCharge	-0.012*	-1.90	-0.011*	-1.83
Intercept	2.298**	2.26	1.687	1.50
No. of Observations, total	8,091		8,091	
No. of Observations, ICW=1	2,300		2,300	
Pseudo R-squared	0.088		0.087	
Industry & Year Fixed Effects	YES		YES	
SE Clustered by Firm and Year	YES		YES	

This table presents the results of regressing internal control weaknesses in one-year ahead (ICW_{t+1}) onto current-year financial reporting quality measures, *DQ* and *REPORT*. The sample consists of 8,091 firm-year observations from 2007 to 2018. Standard errors are clustered by year and industry. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

TABLE II-5 ICW and Financial Reporting Quality – Lagged Effect

Dependent Variable:	(1) ICW (t)		(2) ICW (t)		(3) ICW (t+1)		(4) ICW (t+1)	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
DQ	**0.090**	**0.16**			**-1.183****	**-2.12**		
REPORT			**-0.426**	**-0.60**			**0.179**	**0.26**
ICW t-1	**1.726*****	**28.51**	**1.726*****	**28.53**	**0.561*****	**8.87**	**0.556*****	**8.81**
ICW t					**1.544*****	**24.66**	**1.543*****	**24.67**
HighBoardRatioAcc	-0.073	-0.79	-0.074	-0.80	0.018	0.20	0.017	0.19
HighACRatioAcc	0.177**	1.96	0.178**	1.97	0.013	0.15	0.016	0.19
MarketCap	-0.121***	-4.92	-0.121***	-4.93	-0.094***	-3.97	-0.094***	-3.96
FirmAge	0.030	0.60	0.031	0.62	-0.034	-0.69	-0.036	-0.72
Loss	-0.090	-0.73	-0.090	-0.73	-0.259**	-2.12	-0.255**	-2.09
BankruptcyRisk	-0.022*	-1.84	-0.022*	-1.85	0.030***	2.57	0.033***	2.81
NumBus	0.255***	4.69	0.253***	4.65	0.136**	2.53	0.138***	2.57
NumGeo	0.119*	1.93	0.118*	1.92	0.098	1.63	0.103*	1.71
Foreign	0.052	0.81	0.051	0.79	0.018	0.29	0.024	0.38
Acquisition	0.900***	13.85	0.902***	14.12	0.296***	4.57	0.271***	4.27
Growth	0.856***	5.61	0.855***	5.60	-0.135	-0.93	-0.123	-0.85
RestructCharge	-0.003	-0.48	-0.003	-0.47	-0.005	-0.73	-0.004	-0.64
Intercept	0.342	0.31	0.843	0.68	1.067	0.96	-0.032	-0.03
No. of Observations, total	8,091		8,091		8,091		8,091	
No. of Observations, ICW=1	2,300		2,300		2,300		2,300	
Pseudo R-squared	0.197		0.197		0.188		0.188	
Industry & Year Fixed Effects	YES		YES		YES		YES	
SE Clustered by Firm and Year	YES		YES		YES		YES	

This table presents the results of regressing internal control weaknesses onto reporting quality measures, *DQ* and *REPORT*, controlled with lagged value of *ICW*s, for both contemporaneous and predictive associations. The sample consists of 8,091 firm-year observations from 2007 to 2018. Standard errors are clustered by year and industry. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

TABLE III-1 Descriptive Statistics on Misstatement (MIS) Model

Panel A: Descriptive Statistics

Variables	Mean	SD	P25	P50	P75
DQ	0.761	0.058	0.726	0.765	0.799
REPORT	0.986	0.043	1.000	1.000	1.000
MIS t	0.133	0.340	0.000	0.000	0.000
ICW t-1	0.269	0.443	0.000	0.000	1.000
MIS t+1	0.126	0.332	0.000	0.000	0.000
MIS t-1	0.139	0.346	0.000	0.000	0.000
ICW t-1	0.267	0.442	0.000	0.000	1.000
Fscore	1.083	0.110	1.034	1.101	1.154
HighBoardRatioAcc	0.339	0.473	0.000	0.000	1.000
HighACRatioAcc	0.384	0.486	0.000	0.000	1.000
MarketCap	21.723	1.535	20.624	21.542	22.731
FirmAge	3.173	0.641	2.757	3.153	3.678
Loss	0.064	0.245	0.000	0.000	0.000
BankruptcyRisk	4.961	2.585	3.000	5.000	7.000
NumBus	1.988	0.613	1.386	2.079	2.565
NumGeo	2.200	0.636	1.792	2.303	2.639
Foreign	0.435	0.496	0.000	0.000	1.000
Acquisition	0.359	0.480	0.000	0.000	1.000
Growth	0.065	0.175	-0.015	0.057	0.136
RestructCharge	-1.814	4.855	-1.044	-0.088	0.000
No. Obs	7,479				

Panel B: MIS by Year

Year	No. of Obs	% ICW =1
2007	530	0.109
2008	665	0.123
2009	677	0.129
2010	680	0.146
2011	715	0.172
2012	707	0.191
2013	708	0.169
2014	684	0.140
2015	671	0.118
2016	676	0.093
2017	704	0.068
2018	62	0.048

This table presents the descriptive statistics on all variables in Misstatement (MIS) testing model. This sample consists of 7,479 observations from 2007 to 2018. Panel A presents the simple statistics. Panel B presents the distribution of MISs by year.

TABLE III-2 Pearson Correlation Matrix for MIS testing variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 *DQ*	-																		
2 *REPORT*	**0.155**	-																	
3 *MIS*	**0.030**	0.008	-																
4 *ICW t*	**0.066**	0.009	**0.121**	-															
5 *MIS t+1*	0.020	0.012	**0.569**	**0.075**	-														
6 *MIS t-1*	**0.028**	0.001	**0.581**	**0.121**	**0.376**	-													
7 ICW t-1	**0.060**	0.008	0.083	**0.413**	**0.037**	**0.137**	-												
8 *Fscore*	**0.112**	**0.072**	**0.027**	**0.167**	**0.037**	0.009	**0.122**	-											
9 *HighBoardRatioAcc*	0.002	-0.005	0.013	**0.037**	-0.007	-0.004	**0.031**	0.003											
10 HighACRatioAcc	0.012	0.007	0.008	**0.051**	-0.002	-0.003	**0.043**	**0.031**	**0.757**										
11 *MarketCap*	**-0.036**	**-0.027**	**-0.094**	**-0.026**	**-0.081**	**-0.101**	**-0.029**	**0.077**	0.003	**0.041**	-								
12 *FirmAge*	-0.015	**0.028**	-0.006	0.010	-0.011	-0.010	0.001	**0.052**	**0.035**	0.015	**0.276**	-							
13 *Loss*	-0.013	-0.008	**0.046**	0.014	0.011	**0.063**	**0.047**	**-0.121**	0.006	-0.002	**-0.190**	**-0.035**	-						
14 *BankruptcyRisk*	**-0.115**	**0.029**	**-0.045**	-0.019	**-0.026**	**-0.049**	-0.009	**0.089**	0.008	0.021	**0.255**	**0.094**	**-0.111**	-					
15 *NumBus*	0.022	-0.011	**0.055**	**0.088**	**0.054**	**0.040**	**0.069**	**0.178**	0.016	0.012	**0.135**	**0.263**	**-0.034**	**0.042**	-				
16 *NumGeo*	0.010	0.011	0.021	**0.074**	**0.030**	0.010	**0.066**	**0.111**	**0.023**	0.016	**0.156**	**0.166**	-0.007	**0.087**	**0.254**	-			
17 *Foreign*	**-0.025**	-0.016	0.017	**0.064**	0.016	**0.024**	**0.063**	**0.067**	-0.015	-0.008	**0.052**	0.007	0.017	**0.049**	**0.076**	**0.398**	-		
18 *Acquisition*	**0.215**	0.017	**0.027**	**0.235**	**0.023**	0.016	**0.135**	**0.239**	**0.065**	**0.089**	**0.097**	0.100	-0.012	0.016	**0.068**	**0.085**	**0.073**	-	
19 *Growth*	-0.019	0.010	**-0.024**	**0.089**	-0.001	**-0.048**	**0.033**	**0.121**	**-0.029**	-0.020	**0.082**	**-0.125**	**-0.122**	**0.063**	**-0.077**	**-0.041**	0.100	**0.138**	-
20 *RestructCharge*	**-0.071**	**0.028**	0.008	**-0.033**	0.015	0.008	**-0.057**	**-0.072**	-0.008	**-0.033**	**-0.439**	**-0.242**	-0.022	**-0.039**	**-0.130**	**-0.149**	**-0.042**	**-0.101**	**0.114**

This table presents the Pearson correlation coefficients between each pair of variables in MIS testing model. This sample consists of 7,479 observations from 2007 to 2018. Number in bold represents significance at 5% level.

TABLE III-3 MIS and Financial Reporting Quality – Contemporaneous Association

Dependent Variable:	(1) MIS (t)		(2) MIS (t)		(3) MIS (t)		(4) MIS (t)	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
DQ	**0.476**	**0.66**			**0.408**	**0.56**		
REPORT			**0.723**	**0.77**			**0.760**	**0.80**
ICW t					**0.725*** **	**9.07**	**0.726*** **	**9.08**
Fscore	**0.933****	**2.27**	**0.949****	**2.30**	**0.636**	**1.57**	**0.648**	**1.60**
HighBoardRatioAcc	0.146	1.28	0.150	1.31	0.147	1.26	0.151	1.30
HighACRatioAcc	-0.038	-0.34	-0.041	-0.37	-0.065	-0.58	-0.068	-0.60
MarketCap	-0.213***	-6.75	-0.212***	-6.74	-0.193***	-6.10	-0.193***	-6.09
FirmAge	-0.004	-0.06	-0.004	-0.06	-0.008	-0.12	-0.008	-0.12
Loss	0.394***	2.79	0.392***	2.78	0.387***	2.75	0.385***	2.73
BankruptcyRisk	-0.021	-1.45	-0.023	-1.57	-0.019	-1.24	-0.020	-1.36
NumBus	0.277***	4.14	0.279***	4.16	0.249***	3.68	0.251***	3.70
NumGeo	0.032	0.40	0.031	0.39	0.010	0.12	0.009	0.12
Foreign	0.092	1.13	0.092	1.13	0.083	1.01	0.083	1.02
Acquisition	0.137*	1.66	0.147*	1.81	0.006	0.06	0.014	0.17
Growth	-0.095	-0.39	-0.103	-0.43	-0.261	-1.08	-0.269	-1.11
RestructCharge	-0.020**	-2.27	-0.020**	-2.30	-0.017*	-1.91	-0.017*	-1.93
Intercept	0.590	0.47	0.199	0.13	0.480	0.38	0.003	0.00
No. of Observations, total	7,479		7,479		7,479		7,479	
No. of Observations, ICW=1	993		993		993		993	
Pseudo R-squared	0.066		0.066		0.080		0.080	
Industry & Year Fixed Effects	YES		YES		YES		YES	
SE Clustered by Firm and Year	YES		YES		YES		YES	

This table presents the results of regressing misstatements in year t (MIS_t) onto financial reporting quality measures, *DQ* and *REPORT*. The sample consists of 7,479 firm-year observations from 2007 to 2018. Standard errors are clustered by year and industry. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

TABLE III-4 MIS and Financial Reporting Quality – Predictive Association

Dependent Variable:	(1) MIS (t+1)		(2) MIS (t+1)		(3) MIS (t+1)		(4) MIS (t+1)	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
DQ	**-0.204**	**-0.28**			**-0.244**	**-0.33**		
REPORT			**0.964**	**0.96**			**0.999**	**0.99**
ICW t					**0.442*** **	**5.40**	**0.442*** **	**5.41**
Fscore	**1.112****	**2.54**	**1.100****	**2.53**	**0.917****	**2.11**	**0.902****	**2.09**
HighBoardRatioAcc	0.003	0.02	0.004	0.03	0.002	0.02	0.003	0.02
HighACRatioAcc	0.038	0.33	0.039	0.34	0.022	0.18	0.023	0.19
MarketCap	-0.166***	-5.25	-0.166***	-5.24	-0.154***	-4.86	-0.153***	-4.85
FirmAge	-0.002	-0.02	-0.003	-0.04	-0.003	-0.04	-0.004	-0.06
Loss	0.131	0.84	0.130	0.84	0.125	0.81	0.124	0.80
BankruptcyRisk	-0.011	-0.70	-0.011	-0.72	-0.008	-0.55	-0.008	-0.56
NumBus	0.229***	3.28	0.232***	3.33	0.211***	3.01	0.214***	3.06
NumGeo	0.087	1.07	0.089	1.10	0.074	0.90	0.076	0.94
Foreign	0.065	0.78	0.066	0.79	0.059	0.70	0.060	0.72
Acquisition	0.210**	2.48	0.206**	2.46	0.136	1.58	0.131	1.55
Growth	0.020	0.08	0.020	0.09	-0.079	-0.33	-0.079	-0.33
RestructCharge	-0.009	-1.02	-0.009	-1.02	-0.007	-0.76	-0.007	-0.76
Intercept	-0.972	-0.65	-2.091	-1.19	-1.023	-0.69	-2.207	-1.26
No. of Observations, total	7,479		7,479		7,479		7,479	
No. of Observations, ICW=1	993		993		993		993	
Pseudo R-squared	0.074		0.074		0.079		0.079	
Industry & Year Fixed Effects	YES		YES		YES		YES	
SE Clustered by Firm and Year	YES		YES		YES		YES	

This table presents the results of regressing misstatements in one-year ahead (MIS_{t+1}) onto current-year financial reporting quality measures, *DQ* and *REPORT*. The sample consists of 7,479 firm-year observations from 2007 to 2018. Standard errors are clustered by year and industry. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed test.

TABLE III-5 MIS and Financial Reporting Quality – Lagged Effect

Dependent Variable:	(1) MIS (t)		(2) MIS (t)		(3) MIS (t+1)		(4) MIS (t+1)	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
DQ	**0.032**	**0.04**			**-0.516**	**-0.66**		
REPORT			**1.128**	**1.06**			**1.130**	**1.09**
ICW t	**0.530*** **	**4.90**	**0.532*** **	**4.91**	**0.276*** **	**2.82**	**0.278*** **	**2.85**
MIS t-1	**3.309*** **	**35.65**	**3.310*** **	**35.66**	**2.183*** **	**24.57**	**2.183*** **	**24.56**
ICW t-1	**-0.176**	**-1.57**	**-0.177**	**-1.57**	**-0.207** **	**-2.05**	**-0.209** **	**-2.07**
Fscore	**0.878***	**1.72**	**0.872***	**1.72**	**1.021** **	**2.13**	**0.994** **	**2.10**
HighBoardRatioAcc	0.209	1.45	0.214	1.49	-0.014	-0.11	-0.011	-0.08
HighACRatioAcc	-0.080	-0.56	-0.084	-0.60	0.043	0.34	0.042	0.33
MarketCap	-0.105***	-2.73	-0.105***	-2.72	-0.085**	-2.47	-0.085**	-2.46
FirmAge	-0.013	-0.16	-0.014	-0.18	-0.003	-0.05	-0.006	-0.08
Loss	0.238	1.33	0.239	1.33	-0.005	-0.03	-0.006	-0.03
BankruptcyRisk	-0.010	-0.57	-0.011	-0.62	-0.0003	-0.02	0.001	0.04
NumBus	0.178**	2.10	0.181**	2.13	0.139*	1.81	0.143*	1.86
NumGeo	0.061	0.64	0.062	0.65	0.103	1.19	0.108	1.25
Foreign	-0.017	-0.17	-0.014	-0.14	0.002	0.03	0.006	0.06
Acquisition	0.071	0.67	0.073	0.70	0.196**	2.11	0.186**	2.03
Growth	0.103	0.34	0.093	0.31	0.127	0.49	0.128	0.49
RestructCharge	-0.009	-0.92	-0.009	-0.93	0.002	0.17	0.002	0.17
Intercept	-1.508	-1.09	-2.634	-1.59	-2.348	-1.54	-3.874**	-2.15
No. of Observations, total	7,479		7,479		7,479		7,479	
No. of Observations, ICW=1	993		993		993		993	
Pseudo R-squared	0.341		0.341		0.192		0.192	
Industry & Year Fixed Effects	YES		YES		YES		YES	
SE Clustered by Firm and Year	YES		YES		YES		YES	

This table presents the results of regressing misstatements onto reporting quality measures, *DQ* and *REPORT*, controlled with lagged value of *MIS* and *ICW*, for both contemporaneous and predictive associations. The sample consists of 7,479 firm-year observations from 2007 to 2018. Standard errors are clustered by year and industry. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively based on a two-tailed tes

APPENDICES

Appendix A: Construction of cost of Equity Measures

Cost_equity = average of implied cost of equity computed with MPEG, GM, and CT models (r_{MPEG}, r_{GM}, r_{CT})

$$P_{i,t} = \frac{eps_{i,t+2} + r_{MPEG} \times dps_{i,t} - eps_{i,t+1}}{{r_{MPEG}}^2}$$

$$P_{i,t} = \frac{eps_{i,t+1}}{r_{GM}} + \frac{eps_{i,t+2} + r_{GM} \times dps_{i,t} - (1 + r_{GM}) \times eps_{i,t+1}}{r_{GM} \times (r_{GM} - \Delta_{agr})}$$

$$P_{i,t} = bps_{i,t} + \sum_{n=1}^{4} \frac{(ROE_{i,t+n} - r_{CT}) \times bps_{i,t+n-1}}{(1 + r_{CT})^n} + \frac{(ROE_{i,t+5} - r_{CT}) \times bps_{i,t+4} \times (1 + \gamma)}{(r_{CT} - \gamma) \times (1 + r_{CT})^4}$$

Following Chen et al. (2015), we construct *eps* in the three models with

$$eps_{t+n} = \alpha + \beta_1 NegE_t + \beta_2 eps_t + \beta_3 NegE_t \times eps_t + \beta_4 B_t + \beta_5 TACC_t + \varepsilon,$$

where $NegE_t$ is an indicator that equals one if a firm has negative earnings for fiscal year t, eps_t is the earnings per share for fiscal year t, B_t is the book value per share, and $TACC_t$ is total accruals. *TACC* is the sum of the change in *WC*, the change in *NCO*, and the change in *FIN*, divided by the number of shares outstanding. *WC*, *NCO*, and *FIN* are computated as

$$WC = (act - che) - (lct - dlc)$$

$$NCO = (at - act - ivao) - (lt - lct - dltt)$$

$$FIN = (ivst + ivao) - (dltt + dlc + pstk),$$

Other variables in the three implied cost of equity models are computed or defined as:

Δ_{agr} is the contemporaneous yield on a ten-year government bond less 3 percent.

$ROE_{i,t+\tau} = eps_{i,t+\tau}/bps_{i,t+\tau-1}$. $eps_{i,t+\tau} = eps_{i,t+2} \times (1 + ltg_i)^{\tau-2}\ \forall\ \tau > 2$. ltg_i is the IBES consensus forecast of the growth rate in earnings per share.

$bps_{i,t+\tau} = bps_{i,t+\tau-1} + eps_{i,t+\tau} \times (1 - K)$.

For profitable firms, $K = \max(0, \min(dps_{i,t}/eps_{i,t}, 1))$;

For loss firms, $K = \max(0, \min(dps_{i,t}/(0.06 \times bps_{i,t}, 1))$.

Γ is the contemporaneous yield on a ten-year government bond less 3 percent.

P is the closing share price for fiscal year t (Compustat # 199); *dps* is dividends per share for year t (Compustat #26), and *bps* is equity book value at end of the fiscal year (Compustat #60).

Appendix B: Variable definitions

Chapter I:

Reporting quality:

DQ_BS	Value-weighted disclosure quality score of balance sheet items
DQ_IS	Equally-weighted disclosure quality score of income statement items
DQ	Simple average of *DQ_BS* and *DQ_IS*
REPORT	Number of non-missing variables / 7 Vars

Dependent variables:

DISP	Analyst forecast dispersion: the average of the standard deviations of analyst forecasts of year t+1 earnings per share sampled at each month over year t
|*FE*|	Analyst forecast error: the average of the mean absolute forecast errors of year t+1 earnings per share each month of year t
BAS	The average daily bid-ask spread over the 12-month period beginning 4 months after the end of each fiscal year. The daily proportional bid-ask spread, c_t, is estimated as: $c_t = \sqrt{4E\left[\left(p_t - \frac{l_t+h_t}{2}\right)\left(p_t - \frac{l_{t+1}+h_{t+1}}{2}\right)\right]}$, where p_t, l_t, and h_t are, respectively, the close, the low, and the high log-prices at day t
Cost_equity	The average of implied cost of equity computed with MPEG, GM, and CT models. See Appendix A for details

Firm fundamentals:

Restructure	An indicator variable for asset restructuring, which equals one if Restructuring Costs Pretax (RCP) is nonzero, and zero otherwise
M&A	An indicator variable for merger and acquisitions which equals one if the firm is engaged in mergers and/or acquisitions during each fiscal year, and zero otherwise

SI	The absolute value of special items (SPI) divided by total assets (AT)
Vol_Ret	The standard deviation of monthly return over year t
Log(AT)	Logarithm of total assets (AT)
Log(NSEG)	Logarithm of the number of business segments

Other control variables:

Vol_EPS	The decile ranks of EPS volatility, measured as the standard deviation of EPS over years t-4 to t, deflated by share price at the end of year t
Growth	Average percentage growth in sales (SALE) over years t-4 to t
ROA	Income before extraordinary items (IB) divided by total assets (AT)
Log(AF)	Logarithm of the number of analysts following for the year t
Log(VOL)	Logarithm of the average daily trading volume over year t
Log(PRICE)	Logarithm of the average daily closing price over year t
BTM	The ratio of book value and market value of firm's equity
BETA	CAPM beta estimated using the Scholes-Williams method over the most recent calendar year ending before each fiscal year end
Log(MV)	Logarithm of the market value of equity at the end of year t

Chapter II & III

Dependent variables:

ICW	Dummy variable which equals one if a deficiency or material weakness was reported under SOX 404 or 302, zero otherwise.
MIS	Dummy variable which equals one if a firm' 10-K in fiscal year t was later restated, zero otherwise.

Control variables:

Fscore	Risk of restatement. F-Score is constructed following Dechow et al. (2011) and estimated with sample over the period 2004 – 2018.
HighBoardRatioAcc	Dummy variable which equals one indicating third tercile of ratio of financial experts on board of directors
HighACRatioAcc	Dummy variable which equals one indicating third tercile of ratio of financial experts on audit committee
MarketCap	The natural logarithm of market capitalization at the end of fiscal year (PRCC_F*CSHO)
FirmAge	The natural logarithm of one plus the number of years a company has been listed on CRSP
Loss	Dummy variable which equals one if a company experienced a loss in either the current or previous year
BankruptcyRisk	The decile rank of bankruptcy risk estimated with Altman's Z score as in (Altman, 1968). Higher values (close to 10) indicate firm observations that are likely to be financially distressed.
NumBus	The natural logarithm of one plus the number of business segments a company operates in.
NumGeo	The natural logarithm of one plus the number of geographical segments a company operates in.
Foreign	Dummy variable which equals one if the company has foreign operations, and zero otherwise.
Acquisition	Dummy variable which equals one if the company has merger and acquisition activities, and zero otherwise.
Growth	Relative change in total sales compared to the previous year. Defined as this year's total sales divided by the previous year's total sales minus one.
RestructCharge	The sum of the current and previous years' restructuring charges scaled by firms' market capitalizations.

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VITA

Ying Zhang was born in Shaanxi, China, on July 17, 1990. She attended Jiangxi University of Finance and Economics in September 2008 and in July 2012 received the degree of Bachelor of Science in Economics, with major of Finance. In October 2011, she studied at Hochschule für Technik und Wirtschaft Berlin as exchange student. She entered Pace University in New York City in January 2013 and received a Master of Science Degree in Investment Management in December 2014. She entered Syracuse University for a Doctor of Philosophy degree in July 2016.