A Commitment to Quality: An examination of plant-level quality control failures and financial reporting weaknesses

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Abstract:

In this paper, we investigate the capital market implications of compliance deficiencies across multiple business functions. Specifically, we examine the association between error-related restatements and outcomes from the U.S. Food and Drug Administration's (FDA) plant inspections in the pharmaceutical and medical device industries. We use the inspection results to proxy for the degree of regulatory non-compliance in firms' operating and quality control processes. We find that the FDA inspection failures serve as a determinant of contemporaneous financial accounting restatements. We document a more negative stock market reaction to error-related accounting restatements in the presence of higher inspection scores (weaker quality control), indicating that the market imposes a higher cost on those firms with non-compliance across the organization. We also examine the change in audit fees following the error-related misstatement, and find that monitoring costs increase in the presence of multiple compliance deficiencies. Finally, we consider the potential impact on upper management if a firm does not seem to be cultivating a culture of compliance, and the "tone at the top" does not seem to be reducing compliance risks, and provide evidence of higher CEO turnover following an error-related restatement when the quality control process is weaker. This result is consistent with our argument that the stakeholders of the firm hold top management responsible for creating a culture of compliance.

1. Introduction

The number of accounting restatements has increased dramatically over the last decade, yet the majority of those restatements do not involve identifiable irregularities.[1] While the economic causes and consequences of restatements related to irregularities or intentional misreporting have been extensively studied, regulators, academics, and practitioners have questioned the information content of error-related restatements to financial statement users, especially after the passage of Sarbanes-Oxley Act in 2002. Restatements not associated with identified irregularities tend to involve limited cumulative impact on shareholder's equity and have less significant equity market reactions (Hennes et al. 2008).[2] Plumlee and Yohn (2010) document that restating firms attribute basic book and record errors and lack of clarity in the standards as the main reasons for 57% and 21% of the restatements, respectively. Their findings echo the point raised in the final report of the "Advisory Committee on Improvements to Financial Reporting" which proposes that the SEC and FASB work to reduce "avoidable complexity". Overall, empirical evidence on the causes and information content of error-related restatements is lacking.

Current accounting research examining financial restatement activity tends to focus on the restatement as a singular event that provides evidence of non-compliance with GAAP and/or SEC regulations. However, financial accounting errors and weaknesses may be occurring because of, or in conjunction with other compliance problems across multiple business functions. Bill Pollard, a Deloitte Financial Advisory Services partner in Chicago, argues that "Companies

[1] We follow Hennes, Leone, and Miller (2008) and use the term "irregularities" to refer to intentional misstatements and "errors" to refer to unintentional misstatements. Hennes et al. (2008) document that 73% of restatements are error based for a sample of restatements announced through 8-K filings from 2002 to 2006. Plumlee and Yohn (2020) document more than 95% of restatements are unrelated to intentional manipulations based on their classification scheme.

[2] In a report that documents trend of accounting restatement, Audit Analytics find over 30% of accounting restatements have no impact on income statement from 2002 to 2011.

often make the mistake of putting responsibility for various compliance matters into various separate "silos." Compliance should be "woven throughout the fabric of the organization…"(Blanton, 2011). The recent passage of both the Sarbanes-Oxley and Dodd-Frank Acts have subjected managers to increased scrutiny about compliance-related risks and decision making, and investors and regulators are expecting management to create a “culture of compliance” that will appropriately identify and mitigate those risks associated with non-compliance; namely the risk that a company will face legal or regulatory sanctions, leading to material financial loss or loss of reputation. A current whitepaper by the Thomson Reuters Accelus group contends that “The traditional approach to governance, risk and compliance relies on working in silos and using separate point solutions to address each assurance group’s requirements. This creates a fragmented approach that leads to inefficiencies, added costs and an inability to maintain compliance initiatives and make informed and accurate decisions” (Thomson Reuters, 2013).

In this paper, we investigate the capital market implications of compliance deficiencies through an examination of the association between error-related restatements and regulatory non-compliance within firms’ operating business functions. Specifically, for a sample of pharmaceutical and medical device companies, we use the outcomes from U.S. Food and Drug Administration’s (FDA) plant inspections in the pharmaceutical and medical device industries to proxy for the degree of non-compliance in firms’ operating and quality control processes. We then examine whether these inspection outcomes serve as a determinant of financial accounting restatements.

There are at least two related reasons that we expect accounting restatements to be positively associated with the FDA inspection results. First we conjecture that if there are

weaknesses and failures in any aspect of the operating function, then the information that is generated from the operating system is likely to suffer from errors, as well. This information is then incorporated into the financial information system and used to generate the external financial reports. We also contend that management sets the "tone at the top" with respect to identifying and mitigating compliance risks, and if those risks are not being appropriately handled by management, then the results will be a culture of non-compliance throughout the organization, across multiple business lines.

We propose that the regulatory non-compliance in a firm's financial reporting function (i.e. financial restatements) and operating function (FDA inspection deficiencies) may be associated and that the existence of pervasive errors across multiple business functions may be apparent to investors, and more costly to the firm and its managers than errors that happen in isolation. We believe this association can provide information to investors and regulators about a firm's information environment, as well as management's commitment to high quality business practices and a culture of compliance.

We examine the association between accounting restatements and FDA inspection scores and find that higher inspection scores, associated with quality control weaknesses during the manufacturing process, serve as a determinant of contemporaneous accounting restatements. We also consider whether firms manage earnings to overstate current poor financial performance caused by prior quality control weaknesses in the manufacturing process by examining whether the restatements for current periods are associated with past quality control weaknesses. We do not find a significant association between past inspection weaknesses and current restatement activity.

Given the relationship between financial reporting and operating compliance problems,

we examine how the capital market and the firm's stakeholders respond to these weaknesses. While prior research does not document a significant market reaction to those restatements classified as errors, we document a more negative stock market reaction to error-related accounting restatements in the presence of higher inspection scores, indicating that the equity market investors view regulatory non-compliance across multiple business functions as more serious and costly to fix. Next, we examine the change in audit fees following the error-related misstatement. We contend that the remediation of compliance problems that are found in multiple business functions will lead to increased monitoring costs. We document that there is a significant increase in audit fees for those restatements associated with quality control weaknesses, consistent with the idea that compliance problems that are more pervasive throughout a firm require increased levels of auditor scrutiny, and are thereby more costly to the firm. Finally, we consider the potential impact on upper management if a firm does not seem to be cultivating a culture of compliance, and the "tone at the top" does not seem to be reducing compliance risks. We provide evidence of higher CEO turnover following an error-related restatement when FDA inspection scores are higher, consistent with our argument that the stakeholders of the firm hold top management responsible for creating a culture of compliance.

We believe our research is of interest to academics, regulators and practitioners in several ways. First, we focus our attention on error-related restatements, and attempt to identify a cause that has been previously unexplored; regulatory compliance in the operations function of the firm. We believe this study is particularly relevant given the added responsibility for compliance imposed by recent regulation. By examining the intersection of financial reporting and operating non-compliance, we are able to improve our understanding of the costs imposed on the firm and its managers when compliance risks are not effectively managed. While we acknowledge that the

specific nature of the firms in our sample may make the application of our findings difficult in a broader setting, we also believe that our study will encourage researchers that are examining restatements in financial reporting to consider the role of other business functions and the managers that oversee those functions when trying to understand both the causes, and costs, of restatement activity.

The second section provides background information for our study and the related literature. We develop our hypotheses in section three and describe the research design in section four. Our results are reported in section five and we conclude in section six.

2. Background and Literature Review

2.1 Restatement Research

The body of academic research on accounting restatements is extensive. DeFond and Jiambalvo (1991) examine accounting errors for 41 firms that were revealed by prior period adjustments. The authors note that the definition of an error "encompasses both intentional and unintentional misrepresentation by management." DeFond and Jiambalvo (1991) focus on overstatement errors, as they are more prevalent during their sample period, and examine the determinants of those errors. They find that firms that report overstatement errors are smaller, less profitable, have slower growth, are more highly levered, and have weaker corporate governance mechanisms in place; findings that are consistent with overstatement errors being driven by the same economic incentives to manage earnings upward. Following from this work, researchers have primarily studied restatements as evidence of aggressive accounting choices, earnings management, or fraud. Several papers have focused on the determinants of the financial restatements. Burns and Kedia (2006) and Efendi et al (2007) examine executive compensation

and option pricing incentives associated with restatements, and find that firms with CEOs that have in the money options or options that are more sensitive to share price are more likely to misreport. Aier *et al* (2007) find that firms that issue restatements are more likely to have CFO's with fewer years of experience on the job, and without an MBA or a CPA. Other papers have focused on the disclosure choices made by firms that restate. Turner and Weirich (2006) examine restatements during 2005-2006 and find that "stealth" restatements seem to be increasing over that time period, resulting in restatements that were generated without amended filings or other public statements. Files et al. (2010) examine the "stealth" of restatement disclosures, and find that the prominence of the restatement disclosure is negatively associated with the market reaction to the restatement as well as the likelihood of a class action lawsuit.

Another large body of research examines the capital market and corporate governance consequences of restatement activity. Palmrose et al. (2004) document significant negative market reactions to restatement announcements, with the most negative returns associated with fraud restatements, restatements that involve multiple transactions, restatements that decrease income, and restatements that are initiated by the firm's management or auditor. Hribar and Jenkins (2004) document an increased cost of equity capital for restating firms in the period immediately following the restatement, and also find decreases in expected future earnings for those firms. With respect to governance consequences, Desai et al (2006) document a significant increase in CEO turnover for restating firms relative to a non-restating control sample over the 1995-1996 period, while Land (2010) documents the same finding for the 1996-1999 period, while also noting that firms with CEO turnover are also more likely to receive an SEC Accounting and Auditing Enforcement Release in the years following the restatement. Burks (2010) finds that CEO turnover declines for restating firms after the passage of SOX, but that

bonuses are reduced for CEOs at restating firms in the post-SOX period. However, both Burks (2010) and Collins et al (2009) find an increase in CFO turnover for restating firms, with stronger findings during the post-SOX period. Srinivasan (2005) looks at the effect of restatement activity on outside directors, and finds that director turnover is significantly higher for firms that restate earnings downward.

Hennes et al (2008) and Plumlee and Yohn (2010) study the distinction between restatements that are the result of "aggressive accounting" and those that are related to errors or complex accounting standards. Hennes et al (2008) engage a classification scheme that distinguishes between "errors" and "irregularities" and provide evidence that market reactions to restatement announcements are more negative for their irregularity sample, and that firms with irregularities are more likely than firms with errors in their financial statements to experience CEO/CFO turnover. Plumlee and Yohn (2010) investigate the underlying reasons for restatements provided by company disclosures, and document that the most common explanation provided by firms is that of basic internal company errors. They also document that when restatements are attributed to particular accounting standards, most firms attribute the restatement to "a lack of clarity in applying the standard." This explanation appears to be a special case of the error causes that are most widely given.

Evidence from these studies indicates that appropriate classification of restatements as errors or irregularities is important because the costs associated with irregularities are much higher (more negative stock price reaction, higher CEO/CFO turnover, etc…) and errors appear to have a more benign impact on the firm. The hypotheses and research designs associated with these prior studies focus on the accounting/finance business function and do not explicitly consider the interaction of the accounting/finance function with other operating business

functions. We contribute to the body of restatement research by viewing restatement activity through the lens of compliance, and considering how stakeholders respond to compliance weaknesses across multiple business functions.

2.2 "Tone at the Top" and the Role of Management in Regulatory Compliance

The concept of "tone at the top" is often mentioned as the most critical component of a successful internal control system, and the commitment to an effective system of control should be consistent with regulatory compliance with financial accounting and reporting standards. Hunton *et al* (2011) note that "Measurement of tone at the top is elusive. It often has been explained indirectly by providing case examples of what can happen when tone at the top is weak." One way that researchers have tried to quantify the role of management in setting tone or corporate culture is through the study of "manager fixed-effects." Bertrand and Schoar (2002) construct a data set that allows them to track managers through time, and find that management style is significantly related to manager fixed effects in performance. Building on this research method, Graham, Li and Qiu (2011) decompose the variation in executive compensation and find that time invariant firm and manager fixed effects explain a majority of the variation in executive pay. With respect to financial reporting choices, Bamber *et al* (2011) find top executives exert unique and economically significant influence (manager-specific fixed effects) on their firms' voluntary disclosures, incremental to those of known economic determinants of disclosure, and firm- and time-specific effects. Demerjian *et al* (2009) develop a measure of managerial ability, based on managers' efficiency in generating revenues. They conclude their measure is strongly associated with manager fixed effects, and that the stock price reactions to CEO turnovers are positive (negative) when they assess the outgoing CEO as low (high) ability. Taken together, the results of these papers suggest that managers have significant influence over many aspects of

corporate culture. We extend this body of research to consider the culture of compliance, and how stakeholders impose costs on managers that are not effectively managing their compliance risks.

2.3 The relationship between the operating function and financial reporting

Gordon and Miller (1976) study the dynamics of a firm's accounting information system (AIS). They contend that "it seems possible for a custom-designed AIS to improve poorly functioning organizations by providing information most relevant to the key organizational problems and opportunities." The AIS is able to serve the organization in this manner because of the aggregation of data from the other service lines and functions of the firm. Consequently, the information that is generated from the operating activity is used to generate both internal management reports, as well as external financial statements. The data provided by operating activity, and used to generate financial reports, all contribute to the information environment of the firm. As noted in Feng et al (2012), the same policies and personnel that contribute to operating functions are responsible for generating financial data. Feng et al (2012) provide evidence of this relationship with respect to inventory management, and document that firms with ineffective internal controls over the financial reporting of inventory have systematically lower inventory turnover. In concurrent work, Goh and Kim (2013) use frontier analysis to measure operating efficiency, and document that firms disclosing material weaknesses in financial reporting are less operationally efficient.

Based on the evidence sited above, we conjecture that if there are weaknesses and failures in the operating functions, then the information that is generated from the operating system is likely to suffer from errors, as well. While prior studies have examined the relationship between internal controls and certain aspects of operating activity, we choose to focus on

financial accounting restatements. As our primary research question examines the economic impact of pervasive errors related to non-compliance with regulations, we believe that a financial restatement is an activity that has been well documented as causing a significant negative impact to a restating firm. We contend that a restatement is an outcome associated with financial reporting failure, and is analogous to a failed FDA inspection serving as an outcome of operating weaknesses and failure. The restatement setting allows us to examine the incremental impact on the firm associated with errors that are generated by non-compliance in the operating process, in addition to the accounting and finance function.

2.4 Operating Failures – FDA inspections

Prior research has examined the relationship between financial accounting weaknesses and failures, and real operating activity. The majority of these studies focus on internal control failures. Several studies [Beneish et al (2008), Costello and Wittenburg-Moerman (2011), and Ashbaugh-Skaife et al (2009)] examine the implications of internal control weaknesses on access to the capital market. Feng et al (2012) document a relationship between internal control weaknesses and inventory turnover. They also document that inventory turnover improves once a control problem has been remediated. Goh and Kim (2013) develop a proxy to measure the overall operating efficiency of a firm, and find that efficiency and internal control effectiveness are positively correlated, and that efficiency improves after internal control remediation. With respect to restatements, our action of interest, Desai et al (2006) document increased management turnover following restatement activity.[3] With respect to contemporaneous operating activity, Kedia and Philippon (2005) document higher growth rates in PP&E and employment for restating firms relative to matched firms prior to a restatement, and declining

[3] Desai et al (2006) do not make a distinction between those restatements related to fraud and irregularities, and those attributable to error.

rates in the period following the restatement. However, these actions are not necessarily attributed to errors or weaknesses in the operating environment. To address our research question related to the impact of pervasive errors and non-compliance, we engage a setting where we are able to identify specific instances of operating weakness and failure.

Our operating weaknesses are drawn from the U.S. Food and Drug Administration (FDA) inspection data. As documented in Gray et al (2011), "Manufacturing facilities in U.S.-regulated industries are subject to inspection by governmental organizations. In the case of FDA-regulated industries (e.g., drugs, food, and medical devices), inspectors provide expert judgments of a manufacturing facility's compliance with regulations, specifically, 'Good Manufacturing Practices' [GMPs]. These regulations are explicitly designed to assess the level of quality risk." Gray et al (2011) also document that "Inspections are thorough and designed to be largely consistent across plants. The average inspection…entails about 100 effort-hours. Inspections usually involve spot checks of records, conversations with random employees, and tours of the manufacturing facilities." We use the results of these inspections, and the related required action to be taken by the firm, as evidence of the presence of operating weakness and failure. The results of these inspections are important to a firm. In March, 2011 the FDA issued a warning to Impax pharmaceuticals citing "significant violations of Good Manufacturing Practice." A follow-up inspection in 2013 documented 9 additional problems, and three problems from the prior inspection that had not been fixed. The company was forced to delay the release of a new product as a result of these inspection results, and Impax is currently facing a shareholder lawsuit as a result of the product delay. While this is certainly anecdotal evidence, we believe it helps to illustrate why we contend that these FDA inspection failures serve as powerful evidence of operating failures.

3. Hypotheses Development

Lambert et al (2007) and Frankel and Li (2004) document that a weaker information environment imposes greater costs of capital on the firm. If errors are occurring more pervasively throughout the firm, the costs associated with these errors have the potential to be higher as a series of mistakes can signal a lower quality information environment for the firm. Pervasive errors can also be indicative of weakness in the management team. As previously noted, not only are the same policies and personnel that contribute to operating functions responsible for generating financial data, but the management team that sets the "tone at the top" is responsible for setting policies and supervising personnel across all of the business functions.

Additionally, errors or mistakes in operating business functions may place pressure on the accounting personnel to issue misleading financial statements to attempt to hide operating weaknesses from investors or to achieve earnings targets when operating weaknesses reduce supply or generate cost overruns. In June, 2013 while provide an explanation for their "hold" recommendation for Novaris Pharmaceuticals, Zack's Equity Research discussed a Warning Letter that Novaris had received subsequent to an October, 2012 FDA inspection. In the research memo, Zack's states that "We remind investors that one of the key objectives for Novartis' management in 2012 was to strengthen quality control." Lower analysts' recommendations are just one example of the pressures faced by the firm that might lead to the release of misleading financial statements. Therefore, we propose:

H1*: There is a positive association between operating weakness, as proxied by FDA compliance audit scores, and accounting restatements.*

Financial restatements that occur in conjunction with weaknesses in the operating environment may signal to the market that managers are facing pervasive errors and non-compliance problems throughout the organization of the firm. These problems may indicate that

the information environment is of low quality, or that management is distracted and unable to build a culture of compliance. Consequently, we anticipate that the market penalty for an accounting restatement will be higher when the statement is associated with other errors or problems. Therefore, we propose:

H2*: The market reaction to an accounting restatement is more negative for those firms with concurrent or adjacent operating weaknesses.*

We contend that the cost of remediation when errors occur across multiple business functions will be higher than when those errors are only documented in the accounting/finance function. In particular, if the errors are indicative of problems in the information environment, then the firm will have to increase its monitoring efforts to reduce information and compliance risk. These risks are often mitigated by more stringent internal and external audit procedures. This conjecture is supported by the recent Committee of Sponsoring Organizations (COSO) 2012 report, which calls for auditors to increase their efforts to assess management's "Tone at the Top" with respect to providing a high quality financial and operating environment, particularly with respect to regulatory compliance (AICPA, 2012). Feldmann et al (2009) find evidence that audit fees increase after a restatement, because of increased risk as well as damage to the "organizational legitimacy" of the firm. In our setting, we believe that the incremental effect on audit fees will be greater in the presence of FDA inspection failures, as they provide greater evidence of risk and pervasive weakness in the organization. Therefore, we propose:

H3: *Future audit fees are higher for the restatement firms with concurrent or adjacent operating weaknesses*.

Finally, we consider the occurrence of management turnover following error-related restatements. We contend that restatements in the presence of FDA operating weaknesses are

indicative of a failure by management to set a tone that encourages compliance with regulations. Consequently, we expect that the occurrence of CEO turnover will be greater for restatements that are associated with FDA inspection weaknesses. Therefore, we propose:

H4: *The likelihood of CEO turnover is greater for those restatement firms with concurrent or adjacent operating weaknesses.*

4. Sample and Research Design

4.1 Sample

In order to investigate the relationship of non-compliance between firms' finance functions and operating functions, we focus on error-related restatements and the FDA's inspection results about quality controls over the manufacturing process for a sample of pharmaceutical and medical device companies. The FDA quality control inspection data are available from the U.S. FDA's Field Accomplishments and Compliance Tracking System (FACTS) database, which we received through a Freedom of Information Act request. The FDA is a government agency tasked with ensuring the purity, safety, and efficacy of foods, drugs, cosmetics, and medical devices. It does this, in part, through facility inspections that are intended to uncover the facility's adherence to good manufacturing practices (GMPs). FDA inspections are typically conducted by a team of expert employees and involve analyses of historical data, interviews with facility employees, and tours of the manufacturing facilities. On average, each inspection requires approximately 100 person hours of FDA inspector time. Our dataset contains the outcomes of all pharmaceutical and medical device manufacturing plant inspections conducted by the FDA from 1996 to 2006. The plant-level quality control weakness measure employed in this study is based on the summary measure derived in Gray *et al* (2011), where a

higher value is indicative of more severe compliance violations. Further details about the FDA inspection database and the development of this quality-risk score are given in Appendix A.

We merge our FDA database sample with a sample of financial accounting restatements drawn from the Audit Analytics database and the GAO restatement database over the same 1996 to 2006 time period. Because our focus is regulatory non-compliance issues, not intentional misstatement, we exclude the accounting restatements involving irregularities as identified in Hennes et al. (2008)[4] or involving fraud or investigations by the SEC as identified by the Audit Analytics database. Our final sample consists of 1106 firm-years, representing 228 unique companies. Table 1 Panel A describes our sample. We document that 108 firm-years involve error-related restatements, representing 9.76% of the sample. The number of restated firm-years increases dramatically after 2000, reaches its peak in 2003, and gradually reduces after that.

4.2 Research Design

We use the following Probit model to examine the association between error-related accounting restatements and the FDA inspection results and test our first hypothesis.

$$RESTATE_{it} = \alpha_0 + \alpha_1 QCW_{it} + \alpha_2 LAG\_QCW_{it} + \alpha_3 SIZE_{it} + \alpha_4 SALEG_{it} + \alpha_5 ROA_{it} + \alpha_6 LEVBV_{it} + \alpha_7 FREECASH_{it} + \alpha_8 FINANCE_{it} + \varepsilon_{it} \quad (1)$$

RESTATE is an indicator variable that equals 1 for firm-years with accounting restatements and 0 otherwise. *QCW* (quality control weakness), measured for each firm-year, is our main test variable measuring the FDA inspection results. We expect to find that firms with regulatory non-compliance issues with the FDA during a given year are more likely to restate their accounting numbers for the same period. We measure *QCW* in two ways. *QCW1* is the average quality control weakness score measured at the firm-year level following Gray et al. (2011). *QCW2* is an

[4] We thank Andy Leone for access to his restatement data.

indicator variable that equals 1 for a firm-year if the FDA inspection result is above the sample median, indicating weaker quality control. We expect α_1 to be positive to support our first hypothesis. Although we exclude restatements involving irregularities, it is possible that the error-related restatements result from earnings management activities. If quality control weakness leads to deteriorating future operating performance, which increases upward earnings management incentives, we may observe a positive association between the accounting restatements and past quality control weakness. Therefore, we include lagged QCW in the model.

SIZE is the natural log of total assets at the beginning of the year. While larger firms may have more complicated business models that generate accounting errors, smaller firms generally have less effective internal control systems and experienced personnel. Thus we do not have a signed prediction for *SIZE*. We predict that sales growth (*SALEG*) is positively associated with accounting restatements because both Kedia and Philippin (2005) and Turner and Weirich (2006) suggest one reason for accounting restatements is that firms' accounting departments do not keep up with their operational growth. We control for profitability where *ROA* is income before extraordinary items divided by total assets. Following Larker et al. (2007), we control for leverage ratio *LEVBV* (total debt divided by total assets). Larker et al. (2007) find a positive association between leverage and restatements, although they propose that debt may serve as a governance factor and reduce the likelihood of accounting restatements. Finally, we use the level of free cash flows and whether a firm raised any debt or equity capital during a specific year to capture the capital market incentive for earnings management resulting from raising external capital. *FREECASH* is measured as operating cash flow minus capital expenditures scaled by total assets. *FINANCE* is an indicator variable that equals 1 if a firm raised new debt or equity capital greater than 5% of existing assets. We expect *FREECASH* (*FINANCE*) to be negatively

(positively) associated with the likelihood of accounting restatements. We also include year and auditor fixed effects in the model.

To test our second hypothesis, we examine the cross-sectional association between the abnormal stock market returns around the accounting restatement announcement dates and measures of the quality control weakness.

$$ABRET = \beta_0 + \beta_1 PRIOR\_QCW + \beta_2 RES\_AMT + \beta_3 RES\_AMT\_D + \beta_4 RES\_DURATION + \beta_5 RES\_NACC + \beta_6 RES\_REVENUE + \beta_7 RES\_CLER\_ERR + \beta_8 RES\_BOARD + \beta_9 RES\_AUDITOR + \beta_{10} RES\_PRESS + \beta_{11} RES\_8K + \beta_{12} RES\_8K_+ + \varepsilon \qquad (2)$$

Following Palmrose et al. (2004), we use a market-adjusted model based on an equal weighted index to calculate abnormal returns and *ABRET* is the cumulative abnormal return over restatement announcement days (0, 1). Since accounting restatements are on average filed 18 months after the last day of the restated accounting periods for our sample and the average restated period lasts for about 2 years, we measure *PRIOR_QCW* as the average score of the quality control weakness for each firm over the three-year period before the restatement announcements. If the market participants assess the accounting restatements, in conjunction with the operating deficiencies, we expect to find β_1 to be significantly negative.

In model (2), we control for factors that previous literature has shown to affect the market reactions. *RES_AMT* equals the absolute dollar amount of changes in book value of equity resulting from the restatements scaled by total assets. We expect to observe more negative market reactions for restatements involving higher dollar amounts. Because we do not have information about the restatement dollar amount for all our sample firms, we include an indicator variable *RES_AMT_D* that equals 1 when the restatement amount is missing and 0 otherwise. We expect the market reactions to be negatively associated with the number of years being restated

(*RES_DURATION*). We also expect to find more negative market reactions for accounting restatements involving multiple groups of accounts. *RES_NACC* is the number of groups of accounts being restated. We include *RES_REVENUE* in the model to control for the possibility that revenue related restatements are deemed to be more serious. *RES_REVENUE* equals 1 if a firm restates its revenue accounts and 0 otherwise. We include separate indictor variables as to whether a restatement disclosure includes notification of the board of directors (*RES_BOARD*) or the firm's auditor (*RES_AUDITOR*). We also include an indicator variable measuring whether a restatement is driven by clerical errors (RES_ *CLER_ERR*). Files et al. (2009) document that the market reactions to the accounting restatement are associated with the form of disclosure. Thus, we add two indicator variables capturing how firms disclose their restatements. *RES_PRESS* equals 1 if a firm disclosed a restatement in a press release and 0 otherwise. *RES_8K* equals 1 if a firm filed an 8-K with the SEC to disclose the restatement. We expect to find negative coefficients for both *RES_PRESS* and *RES_8K*. Finally, we include year fixed effect in model (2).

To test our third hypothesis, we examine whether audit fees increase more after the restatements for firms with quality control weaknesses.

$$LOG(FEE)_{it} = \gamma_0 + \gamma_1 POST_t + \gamma_2 RESTATE_i + \gamma_3 POST_t * RESTATE_i + \gamma_4 PRIOR\_QCW_{it}$$
$$+ \gamma_5 POST_t * PRIOR\_QCW_{it} + \gamma_6 SIZE_{it} + \gamma_7 ROA_{it} + \gamma_8 BUSY_{it} + \gamma_9 INTANG_{it}$$
$$+ \gamma_{10} FOREIGN_{it} + \gamma_{11} LEVBV_{it} + \gamma_{12} ICWEAK_{it} + \gamma_{13} ICDUMMY_{it} + \gamma_{14} ARINV_{it} + \varepsilon_{it} \quad (3)$$

The dependent variable of model (3) is the natural log of the audit fee in thousands of dollars. POST equals 1 for the three-year period after the restatement announcements and 0 for the three-year period before the restatement announcements. RESTATE equals 1 for firms with accounting restatements and 0 for control firms without a restatement. We match restating firms

with non-restating firms on total assets right before the restatements and impose the restriction that the size difference should be less than 15% of restating firms' total assets. For firms with restatements, we further partition the sample based on the quality control weakness measure over the three-year period before the restatements announcements either with a continuous variable (PRIOR_QCW1) or an indicator variable (PRIOR_QCW2). Therefore, γ_3 captures changes in audit fees for restating firms without quality control weaknesses issues relative to control firms and γ_5 captures whether changes in audit fees for restating firms vary with quality control weaknesses. We predict γ_5 to be significantly positive if it is more costly to fix the non-compliance issues across multiple business functions.

Following previous literature, we control for *SIZE* and expect larger firms to incur higher amount of audit fees. We control for *ROA* and expect to find less profitable firms to have higher audit fees. *BUSY* equals 1 if a firm's fiscal year end is December 31 and 0 otherwise. *INTANG* measures the intensity of the total intangible assets relative to total assets. *ARINV* is account receivables and inventories scaled by total assets. We use whether a firm has foreign income (*FOREIGN*) as a proxy for its complexity. We expect to find higher audit fees for firms with a fiscal year end falling in the busy season (*BUSY*), more intangible assets (*INTANGIBLE*), more assets that take effort to audit (*ARINV*), and more complex business operations (*FOREIGN*). Finally we include an indicator variable capturing internal control weakness (*ICWEAK*) in the model and expect higher audit fees for firms with internal control weakness. Because firms report internal control weakness only for the latter half of our sample period, we include an indicator variable *IC_D* to capture the existence of a report about internal control weakness. Consistent with model (1), we include year and auditor fixed effects in Model (3).

Finally, we use the following PROBIT model to test our fourth hypothesis that the likelihood of CEO turnover is higher if a firm exhibits regulatory non-compliance in both the finance and the operating functions.

$$TURNOVER_{it} = \gamma_0 + \gamma_1 RESTATE_{it} + \gamma_2 PRIOR\_QCW_{it} * RESTATE_{it} + \gamma_3 SIZE_{it} + \gamma_4 LAGSALEG_{it} + \gamma_5 PAST\_RET_{it} + \gamma_6 LAGROA_{it} + \gamma_7 LEVBV_{it} + \varepsilon_{it} \quad (3)$$

We start our model by following Hennes et al. (2008). Different from Hennes et al. (2008), we include non-restating firms in the model and examine whether the propensity of CEO turnover for restatement firms varies depending on the quality control weakness. The dependent variable *TURNOVER* in model (4) is an indicator variable that equals 1 for a firm-year if the firm has a new CEO for that year and 0 otherwise.[5] *RESTATE* is an indicator variable that equals 1 for a firm-year if a firm announces an accounting restatement during the current or past year and 0 otherwise. *PRIOR_QCW* measures the average quality control weakness over the past three-year period. If the likelihood of CEO turnover is higher for firms with regulatory non-compliance in both the finance and operating functions, we expect to find γ_2 to be significantly positive as predicted by H4. In addition, we control for *SIZE*, which is defined as the natural log of total assets, leverage, and measures of past operating performance. *LAGSALEG* is sales growth for the previous fiscal year. *PAST_RET* is the cumulative abnormal returns over the previous fiscal year, where expected returns are the CRSP value weighted returns including dividends. *LAGROA* is ROA for the previous fiscal year. We expect to find firms with worse past performance are more likely to have CEO turnover.

5. Empirical results

[5] We currently only have CEO turnover information for pharmaceutical companies, which is 75% of our sample firms. We are in the process of collecting the CEO turnover information for medical device companies as well as CEO equity ownership and other governance information for our sample.

Table 1 Panel B report distributions of main variables. QCW1 measures the quality control weakness for each firm year and ranges from 0 to 3.5. As explained by Appendix A, higher QCW1 indicates more negative FDA inspection results. Sixty-seven percent of our sample firms report at least one negative FDA inspection result for at least one plant. But only 12.4% of our sample firms received an "official action" for at least one plant where the FDA has concluded that regulatory or administrative sanctions will be recommended if issues are not resolved in a timely manner. The average log size of our sample firms is 6.89, representing $970 million of total assets, with a standard deviation of 2.50. The average return on assets is -0.044. Although the majority of the sample firms are profitable with median ROA of 0.057, the mean ROA is negatively affected by the magnitude of losses experienced by 29.8% of the sample firms. We document that our sample firms assume 29% of debt on average. Forty seven percent of our sample firms raised either debt or equity capital greater than 5% of existing assets. The median free cash flows for our sample firms are 2.60% of total assets. We find that the average abnormal 2-day market reactions to restatement announcements for our sample is -2.7%, higher than the -1.93% market reaction to error-related restatement announcements documented in Hennes at el. (2008). Since the majority of our sample period covers the pre-SOX era, we find only 20.1% of the sample firms disclose whether or not they have internal control weaknesses. Of these firms, 6.2% of sample firms report that they have internal control weaknesses. We find over 75% of the sample firms have fiscal year ends on December 31. The average intangible assets and account receivables and inventories are 17.2% and 24.2% of total assets, respectively. Finally 48% of sample firms report foreign income. Overall, the distributions of the main variables exhibit sufficient variation.

Table 2 reports correlations of our main variables. We find that smaller firms with higher inventory levels are more likely to have weaker quality controls, consistent with the explanation that firms with heavy manufacturing functions and less resources are more likely to have quality control issues. We find that the correlation between RESTATE and quality control weakness is 0.069, significant at 5% level. Other correlations are consistent with previous literature in general. For example, we document bigger firms are more profitable and more complex with foreign operations and pay higher audit fees.

We report the Probit model test results of our first hypothesis in Table 3. The Pseudo R^2s for the two model specifications are 12.8% and 12.5%, respectively, similar to the magnitude documented in Blankley et al. (2012). Consistent with our predictions, we find that the estimated coefficients on QWC1 and QWC2 are both significantly positive, suggesting firms with quality control issues are more likely to make accounting mistakes in the same period. To quantify the economic magnitude of the positive association, we also estimate the marginal effects of the explanatory variables. The estimated marginal effect on QWC2 is 0.028, suggesting that, for two average firms, the firm with higher quality control weakness are more likely to restate their financial statements by 2.8% than the one without quality control weakness. The estimated marginal effect for the continuous variable QWC1 is 0.033, suggesting that a one unit increase in QWC1 leads to 3.3% increase in the probability of restatement for an average firm. Similar to Larcker et al. (2007), we find that firms with higher leverage and lower free cash flows are more likely to restate their financial statements. We also find smaller firms with higher ROA are more likely to have accounting restatement. We do not find the control variables capturing earnings management incentives to be significant. For example, the estimated coefficients for FREECASH and FINANCE are not statistically different from 0. We also do not find that past

quality control weakness explains current period restatements, which offers no support for the argument that poor operating performance resulting from past quality control weakness might affect managers' incentive to manage earnings.

Table 4 Panel A reports the characteristics of the accounting restatements for firms with quality control weakness below and above the sample median, separately. Consistent with our expectation, we find the mean 2-day abnormal returns for firms with higher quality control weaknesses are -0.0361, significantly lower than the mean abnormal returns for firms with lower levels of quality control weakness. In addition, comparing with firms with high versus low quality control weaknesses, we document that firms with weaker quality controls restate more accounts for a longer period. Firms with weaker quality controls are also more likely to restate accounts related to inventory or capital expenditures, consistent with the arguments made in Feng *et al* (2012), as well as our conjecture that firms with heavy manufacturing functions and less resources are more likely to have quality control issues. Finally, we find firms with quality control weakness are more likely to announce the accounting restatements in a more transparent way with press releases. We do not find the dollar amount of the restatements or the party initiating the restatements to be different across the two groups of firms.

Table 4 Panel B reports the empirical results of the abnormal returns around the restatement announcement dates. Consistent with the univariate descriptions presented in Panel A, we find significantly negative coefficients for both measures of quality control weakness, suggesting more negative market reactions for restatement announcements with existing weaker quality controls. Based on the estimated coefficient for *QCW2*, the abnormal stock returns around the restatement announcement dates for firms with higher than median quality control weaknesses are 5.4% lower than the rest of the restatement announcements. As to the control

variables, we find more negative market reactions for restatement announcements through press releases. Most other control variables are insignificant probably due to the small sample size.

Table 5 reports incremental changes in audit fees after the restatements for firms with existing quality control weaknesses relative to firms without quality control weaknesses. For this table, we use firms without restatements as the control group to capture the potential intertemporal changes in audit fees. We do not find significant intertemporal changes in audit fees for non-restatement firms as the estimated coefficient for POST is insignificant for all three specifications. Column (1) reports the empirical results without partitioning the restating firms based on the quality control weakness. We find the estimated coefficient for RESTATE*POST is not significantly different from 0. Thus, we do not find the audit fees increase on average for restating firms relative to non-restating firm. However, after we further partition the restating firms based on the quality control weakness, we find significantly positive coefficients for PRIOR_QCW1*POST and PRIOR_QCW2*POST, suggesting that the increase in audit fees is significantly higher for restating firms with weaker quality controls. Specifically, we find the estimated coefficients for POST*QCW1 and POST*QWC2 are 0.275 and 0.421, respectively. Compared with the 19% increase in audit fees after restatement reported in Feldmann et al. (2009), our results suggest that audit fees increase by over 40% for restating firms with quality control weaknesses above the sample median and that an increase of one standard deviation in quality control weakness leads to a 13% increase in audit fees after the restatements. All the control variables are significant in the expected direction. For example, we find higher audit fees for larger and less profitable firms, for firms with more intangible assets and operating assets such as inventories or receivables, more foreign operations, and internal control weaknesses.

Finally, Table 6 reports test of H4 results related to CEO turnover. Panel A provides univariate descriptions of the percentage of CEO turnover. For firms with above median quality control weakness, we find the CEO turnover ratio is 37.2% for restating firms, much higher (*p-value* = 0.0068) than the 15.4% for non-restating firms. However, for firms with below the median quality control weaknesses, we find the CEO turnover ratio is 27.9%, which is not significantly different from 0.23 for the non-restating firms. Thus, accounting restatements affect CEO turnover ratio only for firms with existing high level of quality control weaknesses. The Probit model results presented in Panel B is consistent with the univariate descriptions in Panel A. Specifically, we find in column (1) that the propensity of CEO turnover is not significantly associated with restatements. The estimated coefficient for RESTATE is 0.362 with p-value equals 0.133. Consistent with Hennes et al. (2008), in Table 6 column (2), we find that the impact of restatements on the likelihood of CEO turnover varies depending on the magnitude of market reactions to these restatements. The estimated coefficient for RESTATE_ABRET is significantly negative, suggesting a higher turnover ratio for restatements with more negative market reactions. Controlling for the impact of market reactions to restatement announcements in column (3) and column (4), we find the interaction term PRIOR_QCW*RESTATE is significantly positive when prior quality control weakness is measured using both a continuous variable (column 3) and an indicator variable (column 4). These results suggest that the impact of restatements on CEO turnover is positively associated with the level of quality control weakness. Therefore, investors and the board of directions treat regulatory non-compliance across multiple business functions more seriously than when the non-compliance only happens incidentally.

6. Conclusion

Using a sample of pharmaceutical and medical device firms that are subject to FDA inspections, we examine the capital market implications of non-compliance with financial reporting and operating regulations. We first investigate whether FDA inspection weaknesses serve as a determinant of error-related restatements, as the operating environment that is subject to operating failure provides information to the accounting and financial reporting function. Additionally, we contend that the policies and personnel that are responsible for compliance with regulations have responsibilities that go across multiple business processes. We then investigate the costs to the firm and managers as a result of multiple compliance deficiencies, including the market reaction to restatement activity, the potential increase to audit fees, and the likelihood of CEO turnover following the restatement.

We find that higher FDA inspection scores, our proxy for operating non-compliance, is a positive determinant of error-related restatement activity. Specifically, we document that a one unit increase in the average quality control weakness score measured at the firm-year level leads to 3.3% increase in the probability of restatement for an average firm. Given the positive association between the restatement and operating weakness, we also document that the negative market reaction to the restatement is greater for those firms with evidence of weaker FDA inspection scores. We also find that audit fees are higher for restating firms that also have weaker performance on FDA inspections, consistent with regulatory non-compliance leading to more costly monitoring and remediation of compliance weaknesses. Finally, we document that the instance of CEO turnover is greater for managers of restating firms in the presence of higher FDA inspection scores. We believe that this finding is consistent with stakeholders expecting

managers to cultivate a tone at the top that supports compliance, and penalizing those managers that do not effectively manage their compliance risks.

We believe that this study increases our understanding of the determinants and costs associated with restatement activity. While there has been extensive research studying restatements, most of those studies have focused on the restatement as an isolated event. We contribute to the body of restatement research by considering the presence of other compliance weaknesses in conjunction with the financial accounting restatement. Taken together, our results suggest that error-related restatements may be associated with compliance problems in other functions of the firm, and that stakeholders will impose costs on those firms and managers that do not cultivate a culture of compliance and attempt to mitigate compliance risks. While we realize that our setting and related results may not be generalizable to all restatement activity, we believe that the results of our study do suggest that researchers, practitioners, and regulators consider further examination of the relationship between financial reporting compliance and compliance with other regulations across the business functions of the firm to better understand the complete impact of restatement activity on the firm.

Appendix - **Measure of Plant-Level Quality Risk from FDA Inspection Data**

Some of the following is paraphrased from Gray et al. (2011), where the interested reader can find a more detailed description. The FDA is responsible for inspecting the plants that produce drug products for consumption in the U.S. to ensure compliance with GMPs [Good Manufacturing Practices]. The inspectors are trained to consistently follow the *Investigations Operations Manual* (FDA 2012) to conduct these inspections. Data was obtained via a Freedom of Information Act request to the FDA for the outcomes of all plant inspections from January 1996-January 2006. The time period represents a time of relative stability of FDA inspection guidelines, between the 1993 increase in FDA authority (Farley 1993) and the full implementation of risk-based inspections and increased focus on enforcement under the Obama administration (Sharfstein 2009).

For each inspection conducted at a particular facility, there are two separate assessments of its quality risk. The first is an indication as to whether the inspector issued a "Form 483" with the establishment inspection report (EIR). A Form 483 is issued "when in the investigator's 'judgment,' conditions or practices observed, indicate that any food, drug, device, or cosmetic have been adulterated or are being prepared, packed, or held under conditions whereby they may become adulterated or rendered injurious to health" (FDA 2012, Section 5.2.3). The EIR, with or without a Form 483, is then sent to the FDA district office. The district examines the EIR, and also checks other sources of information regarding the plant's compliance (e.g., consumer complaints and/or tests of samples purchased from the trade), and makes one of three determinations. An "official action" is the most severe determination. In this case, the FDA has concluded that regulatory or administrative sanctions will be recommended if issues are not resolved in a timely manner. Next is the "voluntary action" category. This means that while one or more objectionable conditions were found at the facility, the FDA district office is not going to recommend any further administrative action beyond routine re-inspection. The third is a recommendation of "no action," which indicates that no follow-up is required. A panel of four industry experts with extensive experience at both the FDA and FDA-regulated plants went through a Delphi Process (Linston and Turoff 1975) to develop the quality risk score heuristic. The panel biographies are

given in Gray et al. (2011). They included a former FDA district director, two individuals with substantial operational experience in FDA-regulated facilities, and one individual with significant quality consulting experience. After a series of independent interviews, the panel agreed on a "score" for each possible set of inspection outcomes. These scores are given in Table A1, along with percentages of each combination of outcomes for our sample in this paper.

Table A1: Distribution of Possible Plant Inspection Outcomes – Single Inspection

Form 483	District Decision	Percent of Inspections for Plants Used in Study, 1996-2006 (n=1106)	Delphi Panel Consensus Quality Risk (QR)Score
No	No Action	39.3%	0
No	Voluntary Action	5.6%	0.5
No	Official Action	1.4%	3
Yes	No Action	3.0%	1
Yes	Voluntary Action	35.7%	1.5
Yes	Official Action	15.0%	3.5

Having determined appropriate single-inspection scores, the next challenge was to determine a method to handle the fact that we are interested in firm-year measure, aggregating all plant inspections for a given firm over the fiscal year. We take a simple average of all of the plant level inspection scores for a given firm in a given year. These compilation represents QCW1, our primary variable of interest. We also transform the firm-level scores to a zero/one indicator variable, QCW2, which equals 1 if QCW is above the median firm-level score in a given year, and 0 otherwise.

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Table 1: Sample

Panel A: Sample

Year	N	QCW1	Restated firms
1996	67	1.2048	1
1997	68	1.2467	2
1998	64	1.2375	2
1999	89	0.9922	7
2000	112	1.2482	14
2001	121	1.1359	14
2002	119	0.9702	14
2003	131	0.8051	20
2004	120	1.0434	17
2005	122	0.7728	10
2006	93	0.7778	7
Total	1106	1.0483	108

Panel B: Variable distributions

	N	MEAN	STD	10%	25%	50%	75%	90%
QCW1	1106	1.016	0.899	0	0	1.0	1.5	2.0
SIZE	1089	6.895	2.496	3.296	5.011	7.194	8.920	10.172
ROA	1067	-0.044	0.336	-0.380	-0.054	0.057	0.115	0.182
SALEG	1056	1.216	0.581	0.856	1.006	1.095	1.244	1.594
LEVBV	1081	0.286	0.275	0	0.098	0.237	0.371	0.596
FINANCE	1106	0.472	0.499	0	0	0	1	1
FREECASH	1060	0.026	0.287	-0.292	0.019	0.103	0.167	0.231
ABRET	82	-0.027	0.084	-0.078	-0.045	-0.015	0.012	0.032
LOGFEE	711	6.818	1.719	4.495	5.451	6.776	8.102	9.169
IC_DUMMY	1106	0.201	0.404	0	0	0	0	1
ICWEAK	228	0.062	0.241	0	0	0	0	0
BUSY	1106	0.752	0.432	0	1	1	1	1
INTANG	1002	0.172	0.176	0	0.028	0.119	0.262	0.441
FOREIGN	1106	0.484	0.499	0	0	0	1	1
ARINV	1083	0.242	0.138	0.062	0.148	0.234	0.315	0.416

Variable definitions:
QCW1 – Quality control weakness measure following Gray et al. (2011).
SIZE – Natural log of total assets at the beginning of the fiscal year.
SALEG – Sales growth relative to last year.
ROA – Income before extraordinary items divided by beginning balance of total assets.

LEVBV – Long-term and short-term debt divided by total assets.
FREECASH – Operating cash flows minus capital expenditures divided by total assets.
FINANCE – Indicator variable that equals 1 if a firms issue equity or debt that greater than 5% of the beginning total assets during the fiscal year, 0 otherwise.
ABRET – Cumulative two-day abnormal stock market returns based on value-weighted CRSP index from day 0 to day 1 around accounting restatements.
LOGFEE – Natural log of audit fees in thousands.
IC_DUMMY – Indicator variable that equals 1 if internal control weakness information is included in Audit Analytics, 0 otherwise.
IC_WEAK – Indicator variable that equals 1 for internal control weakness, 0 otherwise.
BUSY – Indicator variable that equals 1 if a firm's fiscal year end is December 31.
INTANG – Total intangible assets divided by total assets.
FOREIGN – Indicator variable that equals 1 if a firm has foreign income.
ARINV – Sum of accounting receivables and inventory divided by total assets.

Table 2: Correlations of Main Variables

	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
QCW1(1)	**-0.096**	0.004	0.023	-0.041	-0.013	-0.056	0.004	-0.027	-0.074	**0.092**	0.069
SIZE (2)	1.0	**-0.188**	**-0.131**	**0.492**	**0.508**	**0.889**	**0.195**	**0.216**	**0.479**	-0.015	0.004
LEVBV (3)		1.0	0.039	**-0.349**	**-0.282**	**-0.118**	0.044	**0.083**	-0.063	-0.042	0.052
SALEG (4)			1.0	**-0.244**	**-0.251**	**-0.145**	0.051	0.044	**-0.120**	**-0.092**	-0.041
ROA (5)				1.0	**0.913**	**0.406**	-0.043	0.064	**0.289**	**0.267**	0.034
FREECASH (6)					1.0	**0.421**	-0.048	**0.104**	**0.318**	**0.246**	0.031
LOGFEE (7)						1.0	**0.179**	**0.245**	**0.594**	0.064	0.037
BUSY(8)							1.0	0.078	0.063	**-0.192**	-0.017
INTANG (9)								1.0	**0.146**	**-0.252**	0.117
FOREIGN (10)									1.0	**0.114**	0.031
ARINV (11)										1.0	0.011
RESTATE (12)											1.0

*Numbers in bold indicate significant level at 1% or lower.

Table 3: Association between accounting restatements and quality control weakness

VARIABLES	RESTATE Column (1)	RESTATE Column (2)
QCW1	**0.164****	
	[0.037]	
LAG_QCW1	**-0.036**	
	[0.548]	
QCW2		**0.249****
		[0.037]
LAG_QCW2		**0.029**
		[0.787]
SIZE	-0.082*	-0.081*
	[0.078]	*[0.083]*
SALEG	-0.089	-0.077
	[0.672]	*[0.723]*
ROA	0.999*	1.005*
	[0.056]	*[0.063]*
LEVBV	0.642**	0.631**
	[0.038]	*[0.044]*
FREECASH	-0.208	-0.219
	[0.287]	*[0.267]*
FINANCE	-0.025	-0.019
	[0.866]	*[0.882]*
Constant	-1.688**	-1.746**
	[0.056]	*[0.037]*
Year fixed effect	Yes	Yes
Auditor fixed effect	Yes	Yes
Observations	970	970
Pseudo R^2	12.8%	12.5%

Note: Table 3 reports a Probit model of the probability of accounting restatements. All specifications include year fixed effects and auditor fixed effects. Standard errors are clustered at the firm level. P-values based on two-tailed tests are reported in parentheses.

RESTATE – Indicator variable that equals 1 for restated firm-years, 0 otherwise.
QCW1 – Quality control weakness measure following Gray et al. (2011).
LAG_QCW1 – First lag of QCW1.
QCW2 – Indicator variable that equals 1 if QCW is above the median, 0 otherwise.
LAG_QCW2 – First lag of QCW2.
SIZE – Natural log of total assets at the beginning of the fiscal year.
SALEG – Sales growth relative to last year.
ROA – Income before extraordinary items divided by beginning balance of total assets.

LEVBV – Long-term and short-term debt divided by total assets.
FREECASH – Operating cash flows minus capital expenditures divided by total assets.
FINANCE – Indicator variable that equals 1 if a firms issue equity or debt that greater than 5% of the beginning total assets during the fiscal year, 0 otherwise.

Table 4: Market reactions to accounting restatements

Panel A: Comparison of restatement characteristics depending on quality control weakness.

	PRIOR_QCW2 =0	PRIOR_QCW2 =1	Difference in means
ABRET	-0.0028	-0.0361	*[0.0379]***
RES_DURATION	2.0427	2.4755	*[0.3346]*
RES_NACC	1.6667	2.2941	*[0.0863]**
RES_INV_CAPEX	0.0370	0.1765	*[0.0214]***
RES_8K	0.3333	0.2794	*[0.6183]*
RES_PRESS	0.0370	0.1618	*[0.0351]***
RES_BOARD	0.3333	0.3500	*[0.8867]*
RES_AUDITOR	0.5417	0.5833	*[0.7347]*
RES_REVENUE	0.2593	0.2500	*[0.9273]*
RES_AMT	0.0092	0.0105	*[0.8456]*

Panel B: Association between market reactions to restatements and quality control weakness

	Column (1) ABRET	Column (2) ABRET
PRIOR_QCW1	**-0.048****	
	[0.025]	
PRIOR_QCW2		**-0.054****
		[0.015]
RES_AMT	-0.485	-0.505
	[0.193]	*[0.112]*
RES_AMT_D	0.079**	0.083**
	[0.031]	*[0.021]*
RES_DURATION	0.004	0.006
	[0.305]	*[0.156]*
RES_NACC	0.007	0.004
	[0.345]	*[0.409]*
RES_REVENUE	-0.004	-0.004
	[0.889]	*[0.869]*
RES_CLER_ERR	-0.039	-0.039
	[0.431]	*[0.189]*
RES_BOARD	0.008	0.030
	[0.839]	*[0.352]*
RES_AUDITOR	0.021	-0.003
	[0.487]	*[0.931]*
RES_8K	-0.038	-0.042
	[0.271]	*[0.232]*
RES_PRESS	-0.066	-0.073*
	[0.143]	*[0.065]*
PAST_RET_60	0.088	0.086
	[0.409]	*[0.296]*
Constant	-0.034	-0.053
	[0.275]	*[0.121]*
Year fixed effect	Yes	Yes
Observations	73	73
R-squared	0.353	0.359

Note: Table 4 Panel A reports descriptions of restatement characteristics based on the level of quality control weakness. Panel B reports the multivariate regression results of the association between the market reactions to the accounting restatements and existing quality control weakness. All specifications include year fixed effects. Standard errors are clustered at the firm level. P-values based on two-tailed t-tests are reported in parentheses.

ABRET – Cumulative two-day abnormal stock market returns based on value-weighted CRSP index from day 0 to day 1 around accounting restatements.
PRIOR_QCW1 – Average quality control weakness measured over three years before the restatements announcements.
PRIOR_QCW2 – Indicator variable that equals 1 if PRIOR_QCW1 is above the median, 0 otherwise.
RES_DURATION – Number of fiscal years being restated.
RES_NACC – Number of account groups being restated.
RES_INV_CAPEX -- Indicator variable that equals 1 if the restatement involves inventory or capital expenditure, 0

otherwise.

RES_8K – Indicator variable that equals 1 if the restatement is filed in an 8-K filing, 0 otherwise.

RES_PRESS – Indicator variable that equals 1 if the restatement is announced in a press release, 0 otherwise.

RES_BOARD – Indicates disclosure of Board of Directors and/or Audit Committee involvement or notification in the restatement.

RES_AUDITOR – Indicates disclosure of the auditor's knowledge or involvement in the restatement.

RES_REVENUE – Indicator variable that equals 1 if the restatement involves revenue, 0 otherwise.

RES_AMT_D – Indicator variable that equals 1 if the dollar amount of the impact of the restatement on cumulative net income is reported by Audit Analytics, 0 otherwise.

RES_AMT -- Absolute value of the dollar amount of impact of the restatement on cumulative net income divided by the total assets reported by the year end before the restatement announcement when RES_AMT_D=1, 0 when RES_AMT_D = 0.

RES_CLER_ERR – Indicator variable that equals 1 if errors in accounting and clerical applications noted.

PAST_RET_60 -- Cumulative abnormal returns over 60 days prior to restatement announcements.

Table 5: Changes in audit fees after accounting restatements

VARIABLES	COLUMN (1) LOG (FEES)	COLUMN (2) LOG (FEES)	COLUMN (3) LOG (FEES)
Constant	1.762***	1.769***	1.729***
	[0.000]	*[0.000]*	*[0.000]*
POST	-0.064	-0.062	-0.065
	[0.548]	*[0.551]*	*[0.534]*
RESTATE	-0.011	-0.101	-0.103
	[0.872]	*[0.264]*	*[0.241]*
RESTATE*POST	0.085	-0.187	-0.131
	[0.525]	*[0.259]*	*[0.412]*
PRIOR_QCW1		0.086	
		[0.114]	
PRIOR_QCW1*POST		**0.275*** **	
		[0.004]	
PRIOR_QCW2			0.176*
			[0.077]
PRIOR_QCW2*POST			**0.421** **
			[0.011]
SIZE	0.525***	0.522***	0.524***
	[0.000]	*[0.000]*	*[0.000]*
ROA	-0.404***	-0.368***	-0.370***
	[0.001]	*[0.001]*	*[0.001]*
BUSY	0.305***	0.279***	0.287***
	[0.000]	*[0.000]*	*[0.000]*
INTANG	0.457***	0.511***	0.533***
	[0.008]	*[0.002]*	*[0.002]*
FOREIGN	0.389***	0.386***	0.380***
	[0.000]	*[0.000]*	*[0.000]*
LEVBV	-0.054	-0.060	-0.046
	[0.614]	*[0.569]*	*[0.660]*
ARINV	1.758***	1.714***	1.717***
	[0.000]	*[0.000]*	*[0.000]*
IC_D	0.230**	0.313***	0.316***
	[0.020]	*[0.002]*	*[0.001]*
IC_WEAK	0.491***	0.451***	0.359**
	[0.003]	*[0.005]*	*[0.026]*
Auditor fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
Observations	547	547	547
R-squared	0.849	0.855	0.855

Note: Table 5 reports changes in audit fees after restatements relative to non-restating firms. Restating firms are matched with non-restating firms on SIZE. All specifications include year fixed effects and auditor fixed effects. Standard errors are clustered at the firm level. P-values based on two-tailed t-tests are reported in parentheses.

LOG(FEES) – Natural log of total audit fees for each firm-year.
POST – Indicator variable that equals 1 for three years after restatements and 0 for three years before restatements.
RESTATE – Indicator variable that equals 1 for firms with restatements, 0 for control firms matched with restating firms on size.
PRIOR_QCW1 – Average quality control weakness measured over the past three years before the restatement announcements when RESTATE=1, 0 if RESTATE=0.
PRIOR_QCW2 – Indicator variable that equals 1 if PRIOR_QCW1 is above the median, 0 otherwise.
SIZE – Natural log of total assets at the beginning of the year.
ROA – Income before extraordinary item divided by beginning balance of total assets.
BUSY – Indicator variable that equals 1 if a firm's fiscal year end is December 31.
INTANG – Total intangible assets divided by total assets.
FOREIGN – Indicator variable that equals 1 if a firm has foreign income.
LEVBV – Total long-term and short-term debt divided by total assets at the beginning of the year.
ARINV – Sum of accounting receivables and inventory divided by total assets.
IC_D – Indicator variable that equals 1 if internal control weakness information is included in Audit Analytics, 0 otherwise.
IC_WEAK – Indicator variable that equals 1 for internal control weakness, 0 otherwise.

Table 6: CEO turnover around accounting restatements

Panel A: Univariate descriptions

	RESTATE=0	RESTATE = 1	Difference in means
PRIOR_QCW2 =1	0.154	0.372	*p-value = 0.0068****
N	363	43	
PRIOR_QCW2 =0	0.230	0.279	*p-value = 0.4755*
N	365	43	

Panel B: Probit model regression results of CEO TURNOVER.

	Column (1)	Column (2)	Column (3)	Column (4)
Intercept	-0.535	-0.494	-0.208	-0.306
	[0.187]	*[0.229]*	*[0.655]*	*[0.470]*
RESTATE	0.362	0.229	-0.266	-0.380
	[0.133]	*[0.402]*	*[0.511]*	*[0.347]*
RESTATE_ABRET		-3.206**	-3.487**	-3.524***
		[0.023]	*[0.016]*	*[0.008]*
PRIOR_QCW1			-0.242*	
			[0.060]	
PRIOR_QCW1*RESTATE			**0.453****	
			[0.045]	
PRIOR_QCW2				-0.433**
				[0.010]
PRIOR_QCW2*RESTATE				**0.904***
				[0.086]
SIZE	-0.018	-0.014	-0.021	-0.010
	[0.705]	*[0.764]*	*[0.654]*	*[0.840]*
LAGSALEG	-0.267	-0.289	-0.274	-0.246
	[0.222]	*[0.199]*	*[0.248]*	*[0.287]*
PAST_RET	-0.123	-0.130	-0.118	-0.122
	[0.522]	*[0.497]*	*[0.553]*	*[0.534]*
LAGROA	-0.304	-0.341	-0.358	-0.312
	[0.514]	*[0.478]*	*[0.469]*	*[0.518]*
LEVERAGE	-0.231	-0.232	-0.219	-0.198
	[0.591]	*[0.594]*	*[0.621]*	*[0.662]*
Year fixed effect	Yes	Yes	Yes	Yes
N	686	686	686	686
Pseudo R2	5.73%	6.08%	7.08%	7.96%

Note: Table 6 presents empirical results of CEO turnover around accounting restatements. Panel A reports univariate

results partitioning our sample based on the existence of restatements and quality control weakness. Panel B reports Probit model multivariate regression results of the probability of CEO turnover. All specifications include year fixed effects. Standard errors are clustered at the firm level. P-values based on two-tailed tests are reported in parentheses.

TURNOVER – Indicator variable that equals 1 for a firm-year if the firm has a new CEO, 0 otherwise.
RESTATE – Indicator variable that equals 1 if a firm announces accounting restatement in current or past fiscal year, 0 otherwise.
RESTATE_ABRET – Two-day abnormal stock returns around the restatement announcements if RESTATE=1. 0 if RESTATE=0.
PRIOR_QCW1 – Average quality control weakness measured over the past three years.
PRIOR_QCW2 – Indicator variable that equals 1 if PRIOR_QCW1 is above the median, 0 otherwise.
SIZE – Natural log of total assets at the beginning of the year.
LAGSALEG – Sales growth for the previous fiscal year.
PAST_RET – Cumulative abnormal returns over the previous fiscal year, where expected returns are the CRSP value weighted returns including dividends.
LAGROA – Income before extraordinary items scaled by total assets for the previous fiscal year.
LEVERAGE – Total long-term and short-term debt divided by total assets at the beginning of the year.