Journal of Forensic and Investigative Accounting
Volume 12: Issue 2, July–December 2020

The Effects of Accounting Complexity and the Choice of Accounting Methods on Financial Reporting Quality: Evidence from the Oil and Gas Industry

Russell Barber
*Dana Hollie**

1 Introduction

This study examines how accounting complexity and conservatism of accounting standards relate to financial reporting quality. We measure financial reporting quality by the occurrence of a restatement, and we identify accounting complexity by the choice a firm makes between successful efforts and full cost accounting methods in the oil and gas industry. Successful efforts is generally perceived as a more complex and more conservative accounting method, while full cost is perceived as a less complex accounting method. The oil and gas industry is a unique setting where a firm can freely choose between two accounting methods that follow generally accepted accounting principles (GAAP) to account for their oil and gas exploration costs. Therefore, this study provides insight into the ongoing debate within the Financial Accounting Standards Board (FASB) on accounting complexity and financial reporting quality. Overall, we find that the conservative aspect of the successful efforts accounting method helps to negate some of the negative consequences associated with a more complex accounting choice.

The oil and gas exploration industry had $180 billion in revenue in 2016,[1] and is a significant part of the U.S. economy with a total market capitalization of $326 billion.[2] Because of the size of the oil and gas industry, the financial reporting quality of the industry is an area of interest to regulators, investors, and auditors alike. Regulators want accounting standards they issue to be transparent and beneficial to financial statement users. Investors want the information in the financial statements to be accurate and reliable. Auditors want to identify financial reporting risk factors to assist in pricing audits properly and preparing effective auditing procedures based on risk to reduce audit failures.

Oil and gas exploration firms can choose between two accounting methods for exploration costs: successful efforts or full cost. Under the full cost accounting method, all exploration costs are capitalized whether the exploration is successful or not. Under the successful efforts method, exploration costs are capitalized when the exploration is successful and oil is discovered. Moreover, the successful efforts method involves more judgment regarding capitalization, and the application of successful efforts is more complex regarding impairment rules.[3]

While both accounting methods may pose subsequent period accounting challenges, successful efforts is generally more complex at the beginning of capitalizing or expensing exploration costs. Hence, we define the successful efforts method as the more complex accounting method. Successful efforts is differentiated also from full cost by its more conservative approach to capitalizing assets at the onset, which may help facilitate reducing the amount of errors in subsequent periods. Regulators disagree over which method is better. While the FASB has set guidelines for successful

[1] We define this industry as SIC 1311 (crude petroleum and natural gas). The major activity in this industry is oil and gas exploration, so we refer to this industry as the "oil and gas exploration" industry. We have excluded SIC 2911 from the sample because of differences in operations. SIC 1311 primarily focuses on upstream operations and SIC 2911 focuses on both upstream and downstream operations (often mainly focusing on downstream operations).

[2] Revenue and market capitalization for SIC code 1311 were obtained from Bloomberg.

[3] We confirmed this information with a Big 4 audit partner. The complexity of successful efforts was the explanation given by the audit partner for successful efforts firms generally having higher audit fees, as can be seen in Table 2, Panel A. The successful efforts method has more complexity regarding capitalization. For example, the impairment test is a two-stage test as opposed to a one-stage test for the full cost method.

*The authors are, respectively, Assistant Professor of Accounting at the University of Colorado – Denver and Associate Professor and Alan and Karen Barry Endowed Professor of Accounting at the University of Toledo and a Visiting Scholar at the Securities and Exchange Commission.

efforts accounting (its preferred method), it has referred full cost firms to the Securities Exchange Commission (SEC) guidelines for full cost accounting rather than creating separate guidelines for full cost firms.

Discussions of oil and gas accounting differences often involve the comparability and conservativeness of financial reporting methods. Throughout the past several decades, the differences between full cost and successful efforts have been debated. Recent news has addressed differences in oil and gas accounting standards for impairment recognition. For example, on March 28, 2016, the Wall Street Journal discussed the differences in impairments between full cost and successful efforts (Dai 2016). Differences between the two methods cause expense recognition to occur in different time-periods and in different amounts. In the article, a partner at Binder, Dijker, Otte, and Co.is quoted as saying, "The different accounting methods firms adopt, as well as the different commodity prices firms use to measure their valuations, lead to different ways of recognizing losses from oil and gas assets." This example is just one comparison differences that arise between the two methods.

The percentage of firms using successful efforts over full cost accounting increased throughout our sample period. Successful efforts firms accounted for 45% of oil and gas exploration firms at the beginning of our sample period (2003), and at the end of our sample period (2016) they accounted for 62%.[4] Figure 1 provides an illustration of the percentage of firms using successful efforts over time. There are several reasons for firms choosing one method over the other. A plausible explanation is that firms exhibited more accounting conservatism after the Sarbanes Oxley Act, as was shown in Lara, Osma, and Penalva (2009). The resulting increase in the number of firms selecting successful efforts may be because this method uses a more conservative capitalization method. Another plausible explanation is changes in oil prices. When oil prices drop, the successful efforts method is less likely to result in an impairment. We acknowledge there could be various reasons managers choose one method over the other. [*See Figure 1, pg. 380*]

Firms that choose successful efforts often cite more transparency, analyst preferences, and comparability as their motivation for choosing it. For example, on October 10, 2007, Anadarko Petroleum Company (APC) announced that it was converting from full cost to successful efforts, resulting in a decrease in retained earnings of approximately $130 million. The day of the announcement, APC shares increased 2.5%, indicating that the switch was positive news to investors. More recently, on August 3, 2016, Apache Corp. made the switch from full cost to successful efforts and cited transparency and comparability as the reasons behind the change (Oil and Gas Investor 2016).

Prior studies have examined differences in firm characteristics, earnings response coefficients (ERCs), and the value relevance of full cost and successful efforts firms. However, prior research has not examined which method has more financial reporting failures, such as restatements, which is an indication of poor financial reporting quality. By comparing successful efforts firms using a more complex and conservative financial reporting method against full cost firms using a less complex accounting method, we provide insight into the FASB discussion on whether reducing complexity in financial reporting is always beneficial to the users of financial information.

In a sample of oil and gas exploration firms with the primary SIC code of 1311 from 2003 to 2016, we find that firms using successful efforts for exploration costs have better overall financial reporting quality. In this setting, we show that a more complex but conservative accounting choice is associated with better financial reporting quality than the less complex accounting choice, using restatements as a proxy for financial reporting quality.

Our results provide empirical evidence that firms using successful efforts have better financial reporting quality than firms using full cost. Firms choosing a more conservative accounting method, despite its complexity, contributes to higher financial reporting quality than a less complex accounting method. This result suggests that we need to use a more holistic approach to evaluate the cost and benefits of accounting complexity and conservatism. The full cost method is both less conservative and less complex, and its lower financial reporting quality appears to outweigh any benefits associated with the lower complexity attributed to it.

This study has practical implications for regulators, auditors, investors, and academics. It is relevant to regulators because it shows that reducing accounting complexity alone does not necessarily improve financial reporting quality. In other words, it is important to consider that accounting standards are multifaceted and that other aspects of the accounting

[4] The increasing percentage of firms using successful efforts is predominantly caused by mergers and newer firms selecting successful efforts at a higher rate than in the past. We found that only eight firms in our sample period switched methods. Five firms switched to successful efforts and three firms switched to full cost. We did not have enough firms change methods to do a change model.

standard may help mitigate negative consequences of complex accounting standards. Our findings are relevant to academics as we show a setting in which more accounting complexity, coupled with more conservatism, suggests better financial reporting quality than one with less complexity. The findings also are relevant to auditors because it shows that full cost firms may be at greater risk for financial reporting failures. This information can help auditors make better risk assessments and help determine appropriate audit fees and audit effort based on potential risks associated with each accounting method. This study is also relevant to investors because information about financial reporting quality can help investors be more aware when looking at financial statements that employ various accounting methods, specifically in the oil and gas industry. Accordingly, investors can make better decisions by looking at the financials with a more discerning eye.

The remainder of this article proceeds as follows. Section 2 discusses the background of successful efforts and full cost methods. Section 3 reviews the related literature and hypothesis development. Section 4 describes the sample selection criteria and research design. Section 5 presents our empirical findings. Section 6 presents additional analysis. Section 7 includes our summary and conclusion.

2 Background of Successful Efforts and Full Cost Accounting Methods

Although successful efforts and full cost are both allowed under GAAP, the regulatory decision to allow the option between the two methods has not been without controversy. Prior to the 1960s, the only method used by oil and gas firms to account for exploration costs was successful efforts. The full cost method came about because of problems with the application of the historical cost model under successful efforts. In the oil and gas industry, amounts spent on exploration have no predictable relationship to the value of oil and gas discovered. A large amount may be spent to find nothing, but in another geographical area, a small amount spent could result in a large discovery.

The motivation for creating the full cost method was frustration with a historical cost concept that penalizes enterprises for exploration efforts that result in no discoveries and does not reward enterprises with the recognition of the value discovered for efforts resulting in discoveries.[5] Although full cost does not accomplish the latter goal, it does accomplish the former by capitalizing all exploration costs as long as discovered values exceed costs on a company-wide basis. Full cost also had a desirable impact on reported income and net assets for growing firms.

In the early 1960s, the full cost method was implemented, and its use grew rapidly. In 1969, the Accounting Principles Board (APB) published *Accounting Research Study No. 11, Financial Reporting in the Extractive Industries* (ARS 11; 1969), which analyzed extractive industries and recommended using successful efforts over full cost. The FASB replaced the APB in 1973, and it became responsible for setting accounting standards. In 1977, the FASB issued an exposure draft requiring firms to use the successful efforts method rather than full cost. The SEC agreed with the FASB that a uniform system of accounting should be used, and later in 1977 the FASB issued *Statement of Financial Accounting Standards No. 19, Financial Accounting and Reporting by Oil and Gas Producing Companies* (SFAS No. 19; 1977). This new accounting standard required firms to use the successful efforts method. However, shortly after the passage of SFAS No. 19, political pressure began to rise.

During the 1970s, the oil and gas industry was heavily criticized for high profits and low competition, and the extra attention that came with the new accounting rule caused the industry to lobby and resist the prohibition of the full cost method (Sutton 1984). The Department of Energy and the Department of Justice expressed concern about the impact of SFAS No. 19 on competition and antitrust issues. The Federal Trade Commission asked the SEC to reverse its support of SFAS No. 19. The SEC held hearings about full cost and successful efforts and subsequently issued *Accounting Series Release No. 253*, which allowed both the successful efforts and full cost methods to be used (ASR 253; 1978). After the FASB was overridden by the SEC issuing ASR 253, the FASB formally suspended the requirement to use only successful efforts in *SFAS No. 25, Suspension of Certain Accounting Requirements for Oil and Gas Producing Companies* (SFAS 25; 1979). Today, firms have the option of employing either the successful efforts or full cost method.

The oil and gas exploration industry has two allowable accounting methods for exploration costs: successful efforts and full cost. Under successful efforts, firms capitalize exploration costs when the exploration is successful and expense the exploration costs when the exploration is unsuccessful. Under full cost, firms capitalize all exploration costs, even if the exploration is not successful.

[5] http://www.swlearning.com/accounting/wolk/sixth_edition/chapter15.pdf

3 Related Literature and Hypothesis Development

Related Literature

After the events surrounding accounting standard regulations for the full cost method in the late 1970s, research was conducted to identify the differences between companies that used each method. Much of this research stemmed from differences claimed by full cost firms who had lobbied to preserve the full cost method (Sutton 1984). A significant argument made by lobbyists in favor of preserving the full cost method was that full cost companies was more different than successful efforts companies, so the full cost method should remain intact because of these firm differences. Lobbyists claimed that full cost firms were more aggressive in exploration operations, were younger, and were financially constrained, which meant that debt ratios were more critical for them. Because of these claims, Deakin (1979) performed a study examining whether the claimed differences were relevant and accurate. Deakin (1979) found that full cost firms in the 1970s had higher leverage and were more likely to use outside capital.

Dhaliwal (1980) found that firms using the full cost method in the 1970s had higher debt-to-equity ratios. The ability to capitalize expenditures allows some firms to avoid debt covenant violations. Debt covenant violations were a concern when the FASB attempted to prohibit the use of the full cost method. Based on Dhaliwal's (1980) findings, using the full cost method to avoid debt covenant violations appeared to be a valid issue at that time.

In an eight-month window, Collins and Dent (1979) performed an oil and gas study that examined how the proposal to eliminate the full cost method affected the market price of oil and gas firms. The study showed that the average risk-adjusted return for firms using the full cost method was significantly less than the average risk-adjusted return for firms using the successful efforts method. When the FASB proposed a ban on full cost, the firms using full cost at the time were viewed by investors as inferior to successful efforts firms as a result of the announcement.

Limited studies have examined the earnings quality and value relevance differences of full cost and successful efforts firms. The earliest study related to the earnings quality of firms was performed by Sunder (1976). Sunder (1976) found that successful efforts firms had more conservative numbers for assets and income. Harris and Ohlson (1987) showed that firms using successful efforts had higher market-to-book coefficients, which indicates that the successful efforts' book value has greater explanatory power of market value than the full cost method. Bandyopadhyay (1994) found that successful efforts ERCs are higher than full cost ERCs. In contrast, Bryant (2003) used a within firm approach and found that the full cost method is more value relevant when using earnings information to explain market value variation.

High earnings quality faithfully represents the features of the firm's fundamental earnings process that are relevant to a specific decision made by a specific decision-maker (Dechow, Ge, and Schrand 2010). Dechow et al., (2010) identify various proxies that have been used to measure earnings quality. One of the proxies they identify for earnings quality is restatements. Defond (2010) indicates that a restatement is a good measure of earnings quality because a restatement is based on an actual event. Prior research has extensively incorporated the use of restatements as a proxy for financial reporting quality (e.g, Demerjian, Lev, Lewis, and McVay 2013; Cao, Myers and Omer 2012; and Desai, Krishnamurthy, and Venkataraman 2006). Restated financial statements represent a financial reporting failure and an acknowledgement that the previously reported financial statement numbers were inaccurate.

Restatements are a good measure of financial reporting quality because they are events that occurred and are not dependent on subjective analysis. Restatements also have a clear and direct impact on investors. Palmrose, Richardson, and Sholz (2004) showed that restatements have an average negative market-adjusted return of 9.2% near the restatement announcement window. Hribar and Jenkins (2004) showed that firms have an increase in cost of equity capital after a restatement. Restatements also create reputational damage to managers that lead to turnover and poorer future employment opportunities (Desai, Hogan, and Wilkins 2006). Based on these studies, we assume that a restatement is an objective and reasonable measure of a financial reporting failure that has a negative impact on investors and managers. Accordingly, we use restatements as a proxy to identify poor earnings and financial reporting quality in our study. Similar to Cheng, Hsieh, and Yip (2007), the purpose of this research is to examine whether the choice of an accounting method is associated with better financial reporting quality. However, we specifically focus on the successful efforts and full cost methods in the oil and gas industry because the methods are appropriate for examining the relative importance of complexity on financial reporting quality.

This study is the first to examine which method may be associated with more financial reporting failures as proxied by restatements. This research fills a gap in the literature by examining the benefits of more or less accounting complexity, which provides insight as to whether the reduced complexity of the full cost method provides greater financial reporting quality compared to the successful efforts method. This study also contributes to when firms are more likely to misstate financial statements as it relates to the accounting choice of successful efforts versus full cost firms. Addressing this question is important to the efficient functioning of capital markets which can lead to improved returns, less costly litigation for auditors, and enhancing investor protection (Dechow, Ge, Larson, and Sloan 2011), more specifically in the oil and gas industry which is a multi-billion dollar industry.

Hypothesis Development

The successful efforts method of accounting capitalizes exploration costs when the exploration is successful and oil is discovered, and the full cost method capitalizes all exploration costs, regardless of whether the exploration is successful. The full cost method goes against the historically conservative nature of accounting, but it is perceived as the less complex method of the two. DeFond, Lim, and Zang (2016) show that conservative accounting practices are associated with lower restatement rates. However, when more conservatism is accompanied by greater complexity, as is the case with the successful efforts method, we do not know if conservatism outweighs the financial reporting disadvantages associated with greater complexity.

The successful efforts method involves more judgments regarding capitalization, and the application of successful efforts is more complex regarding capitalization and impairment rules. Theoretical predictions apply to financial statement complexity regardless of whether financial statement complexity stems from the complexity of the firm's business transactions (business complexity) or the complexity associated with reporting standards (accounting complexity) (Guay, Samuels, and Taylor 2016).

Regulators expend resources to make accounting information less complex and easier to process (FASB 2007). Hobson (2011) found that providing less complex financial information led to greater processing of that information. On the other hand, managers may intentionally choose to adopt more complex accounting choices if the personal benefits outweigh the costs. For example, Li (2008) found a negative relationship between firm performance and financial statement complexity as evidence that managers intentionally increase financial reporting complexity to disguise poor performance. Additionally, a complex financial statement may reflect the complexity of the firm's business transactions and associated reporting requirements. That is, managers attempt to avoid unnecessary complexity when preparing financial statements, but complex transactions and complex reporting may necessitate complex financial statements. Bloomfield (2008) suggested an alternative explanation for the negative relationship between firm performance and financial statement complexity documented by Li (2008), which is that poor performance requires managers to provide more detailed explanations.

The FASB view is that reducing unnecessary complexity in financial reporting benefits all FASB stakeholders.[6] Reducing complexity enables financial statement users to more easily identify and understand financial information; less complexity also reduces the attestation effort and costs for auditors and lowers preparers' implementation costs. FASB Chairman Russell Golden said in December 2015 at the AICPA Conference on Current SEC and PCAOB Developments, "For investors, overly complex financial reports often obscure important information they need to make sound capital allocation decisions. For preparers, a complicated, unclear, hard-to-understand standard obscures its meaning. And even when an accounting treatment is clear, applying it can be lengthy, difficult, and expensive" (Murphy 2015). On the contrary, the complexity of the firm's business transactions or the complexity of applying the accounting standard may call for more accounting complexity in order for the financial information to be transparent and intelligible for the users of this information. Ultimately, it could be that the higher complexity associated with the successful efforts method may or may not create problems that outweigh the benefits of the conservativeness of the method. This study provides empirical evidence that contributes to this discussion. Our hypothesis stated in the null form is as follows:

> **H_0:** Using the successful efforts accounting method (the more conservative method) is associated with the same financial reporting quality (measured by restatements) as using the full cost accounting method (the less complex method).

[6] The FASB further discusses their simplification efforts online at http://www.fasb.org/simplification.

4 Sample Selection and Research Design

Sample Selection

We used Compustat and identified 3,459 firm-year observations with the primary SIC code of 1311 from 2003 to 2016.[7] We dropped 1,611 observations with missing selection criteria variables in Compustat. Next, we obtained audit fee and restatement information from Audit Analytics. We eliminated 178 observations because of missing information in Audit Analytics. We obtained exploration cost data from Bloomberg and 10-K reports. We eliminated 475 observations when exploration cost data was either missing, reported in a foreign currency, or zero. We used the remaining 1,195 observations for our propensity-score matching.

We began the propensity-score matching process by estimating a probit model of the probability that firms choose the successful efforts method. We used the probabilities estimated from the probit model to match firms within a caliper distance of 0.03.[8] We matched without replacement and eliminated 265 observations when there was no match within the required caliper distance. Our final sample consists of 190 firms and 930 firm-year observations. There are 74 observations with a restatement and 856 observations with no restatement in the final sample. We also checked for Accounting and Auditing Enforcement Releases (AAER) to determine whether our restatements were the result of intentional or unintentional behavior.[9] [*See Table 1, pg. 381*]

Descriptive statistics are reported in Table 2. Panel A of Table 2 shows the characteristics for the successful efforts and full cost firms used in the first stage of the propensity-score matching process where we used a probit model for estimating the likelihood of using the successful efforts method. There is a statistically significant difference in the means that shows successful efforts firms are larger in size, pay higher audit fees, are older, have longer audit tenure, and are more likely to experience a loss than full cost firms. Full cost firms have higher exploration costs. There are no statistically significant differences in means for leverage, business segments, foreign incorporation, market-to-book, merger activity, material weaknesses, return on assets, use of a Big 4 audit firm, use of a Tier 2 auditor, and special items. [*See Table 2, pg. 381–382*]

Panel B of Table 2 shows the characteristics for the successful efforts and full cost firms in the restatement sample. This sample is a result of matching based on a firm's propensity to use the successful efforts method. An important requirement of propensity-score matching is that the treatment and control groups have similar means for explanatory variables (covariate balancing). Covariate balancing requires that no significant differences exist between the explanatory variables of successful efforts and full cost firms. The outcome variable (restatements) is the only statistical difference that should exist between the treatment group and the control group. Descriptive statistics of the restatement sample are consistent with the requirements of propensity-score matching. The number of restatements is the only characteristic difference with statistical significance between successful efforts and full cost firms.

Panel C of Table 2 shows the descriptive statistics for restated and non-restated firms in our restatement sample. There is a significant difference in means that shows firms with restatements are more likely to use the full cost method, are more likely to have merger activity, and are more likely to have an internal control weakness. Firms without restatements are older, have longer audit tenure, are more likely to be incorporated outside of the United States, and have higher exploration costs.

Research Design

Propensity-Score Matching

[7] For robustness, we tested restatements by including SIC code 2911. However, with the sample attrition from propensity-score matching, there were no SIC code 2911 firms with a restatement in the final sample. As a result, our analysis is presented only with SIC 1311 firms.

[8] Results hold for matching on every caliper distance from 0.01 through 0.10. We elected to report results using a caliper of 0.03, because it is the most commonly used caliper for propensity-score matching in the accounting literature (Shipman, Swanquist, and Whited 2016).

[9] Only one firm in our sample period was cited with an AAER enforcement action. The cited firm used successful efforts and had two related AAERs. We also verified that no restatements in the final sample were due to clerical errors or SEC Staff Accounting Bulletins. All restatements in the final sample relate to financial reporting quality.

We believe that the likelihood of using the successful efforts method is based on observable firm characteristics, so we used propensity-score matching to address potential endogeneity. Following Rosenbaum and Rubin (1983), we used propensity-score matching to control for differences in observable firm characteristics between firms using each accounting method while estimating treatment effects. Propensity-score matching is a method of matching observations based on the probability of undergoing the treatment, which in our study is the probability of using the successful efforts method. Propensity-score matching minimizes differences between the characteristics of firms using successful efforts and full cost to prevent these differences from leading to functional form misspecification.[10]

We started the propensity-score matching process by using a probit model to estimate the likelihood that firms choose the successful efforts method (treatment model). All variables in the treatment model should be in the outcome models, and all variables in the outcome models should be in the treatment model (Shipman et al., 2016). Hence, all variables included in the probit model used to estimate the likelihood that firms choose the successful efforts method also are included in our restatement test. Variables used in our regression have been shown in prior research to affect the probability of firms selecting the successful efforts method (Deakin 1979; Lilien and Pastena 1982; Malmquist 1990) or the probability of a restatement (e.g., Romanus, Maher, and Fleming 2008; Blankley, Hurtt, and MacGregor 2014; Srinivasan, Wahid, and Yu 2015). The definitions for all variables can be found in Appendix A. Our probit model estimating the likelihood that firms use the successful efforts method is as follows:

$$\begin{aligned}\text{Method} = {} & \beta_0 + \beta_1\text{Size} + \beta_2\text{Leverage} + \beta_3\text{Business} + \beta_4\text{Fees} + \beta_5\text{Age} + \beta_6\text{Tenure} + \\ & \beta_7\text{Foreign} + \beta_8\text{MTB} + \beta_9\text{Merger} + \beta_{10}\text{Material\_Weakness} + \beta_{11}\text{Loss} + \beta_{12}\text{ROA} \\ & + \beta_{13}\text{Big4} + \beta_{14}\text{Tier2} + \beta_{15}\text{Sprecial\_items} + \beta_{16}\text{Compustat\_Items} + \beta_{17}\text{Exploration} + \beta_{18}\text{Year} + \varepsilon\end{aligned}$$

Table 3 reports the probit model estimation results for the accounting choice of successful efforts.[11] Table 3 shows that higher audit fees (p-value = 0.02), older firms (p-value = <0.01), losses (p-value = 0.04), and higher ROA (p-value = 0.07) make a firm more likely to use the successful efforts method. Higher exploration costs (p-value = <0.01), use of a Big 4 auditor (p-value = <0.01), use of a Tier 2 auditor (p-value = <0.01), and Compustat items (p-value = 0.02) make a firm less likely to use the successful efforts method. [*See Table 3, pg. 383*]

Restatements

Our proxy for financial reporting quality is the use of restatements. We used a probit regression model to estimate the probability of a restatement. The purpose of this test was to determine whether firms using successful efforts have a lower or higher likelihood of experiencing a restatement. Several variables used in our regression have been shown in prior research to affect the probability of a restatement (e.g., Romanus et al., 2008; Blankley et al., 2014; Srinivasan et al., 2015). Because we used propensity-score matching, all variables included in the probit model used to estimate the likelihood that firms choose the successful efforts method also were included in our restatement test of financial reporting quality. The definitions for all variables can be found in Appendix A. Our restatement regression model is as follows:

$$\begin{aligned}\text{Restatement} = {} & \beta_0 + \beta_1\text{Method} + \beta_2\text{Size} + \beta_3\text{Leverage} + \beta_4\text{Business} + \beta_5\text{Feees} + \beta_6\text{Age} + \\ & \beta_7\text{Tenure} + \beta_8\text{Foreign} + \beta_9\text{MTB} + \beta_{10}\text{Merger} + \beta_{11}\text{Material\_weakness} + \beta_{12}\text{Loss} + \beta_{13}\text{ROA} + \beta_{14}\text{Big4} + \\ & \beta_{15}\text{Tier2} + \beta_{16}\text{Sprecial\_items} + \beta_{17}\text{Compustat\_items} + \\ & \beta_{18}\text{Exploration} + \beta_{19}\text{Year} + \varepsilon\end{aligned}$$

[10] Functional form misspecification is a type of endogeneity that occurs when the relation between the outcome variable and the explanatory variables is not properly specified, which results in biased estimates (Shipman et al., 2016). The bias resulting from functional form misspecification is exacerbated when the characteristics of the treatment and control group become dissimilar. By matching observations based on observable characteristics using the estimated likelihood of receiving the treatment, propensity-score matching forms treatment and control groups that are similar across explanatory variables (covariate balancing). Reducing differences in covariates between the treatment and control groups helps to effectively match counterfactuals. This balancing of covariates allows for relaxed assumptions about the functional form of variable relations, thereby alleviating the concern about functional form misspecification that can result in biased estimates (Shipman et al., 2016).

[11] We examined variable inflation factors (VIFs) to identify potential multicollinearity. According to Greene (2000, 255-56), "as a rule of thumb, for standardized data a VIF > 10 indicates harmful collinearity." All our variables included in the first-stage model and second-stage models have VIFs under 10.

The dependent variable is Restatement. Firms with a restatement are assigned a value of one and zero otherwise. Method, our primary variable of interest, is coded as a one if the firm uses successful efforts and zero otherwise.

5 Empirical Findings

Table 4 shows that the use of successful efforts is negatively associated with the likelihood of a restatement. Our variable of interest (Method) shows successful efforts has a negative association with restatements (coefficient = -0.363, p-value = <0.01). This finding supports the assertion that successful efforts firms are less likely to have restatements despite successful efforts being the more complex accounting method. It appears that the benefits of the more conservative method outweigh the financial reporting disadvantages that accompany a more complex method. The lower complexity of the full cost method does not appear to be associated with increased financial reporting quality more than the benefits of using the more complex and more conservative successful efforts method. Control variable coefficients with statistical significance include Foreign, MTB, Merger, Material_Weakness, and Exploration. [*See Table 4, pg. 384*]

Our main result is that firms using successful efforts are less likely to have a restatement. This benefit indicates that successful efforts firms are associated with having higher financial reporting quality. In this setting, the more complex and more conservative accounting choice (successful efforts) is associated with better financial reporting quality than the less complex accounting choice (full cost).

6 Additional Analyses

Restatements with a Negative Effect on the Financial Statements

Table 5 presents the results of an additional analysis to determine whether the successful efforts method versus the full cost method has a different influence on the likelihood of a restatement that results in a negative effect on the financial statements. Partitioning restatements based on the effect to the financial statements is important because restatements with a negative effect have more severe consequences (Shin, Xu, Lacina, and Zhang 2014). We use Audit Analytics to identify whether the net effect of the restatement was positive or negative on the financial statements. Of the 74 restatements in our main analysis, 61 restatements had a negative effect on the financial statements.[12] After dropping 13 positive effect restatements from the sample and matching based on the propensity score to use the successful efforts method, we have a final sample of 912 firm-year observations. [*See Table5, pg. 385*]

Table 5 shows that the use of successful efforts is negatively associated with the likelihood of a restatement with a negative effect on the financial statement. Our variable of interest (Method) shows successful efforts has a negative association with restatements that have an adverse effect on the financial statements (coefficient = -0.258, p-value = 0.08). This finding is consistent with our main analysis and supports the assertion that successful efforts firms are less likely to have restatements in general and are also less likely to have restatements with a negative effect on the financial statements.

Restatement Materiality

We also performed additional analysis to determine whether successful efforts vs full cost has an association with the materiality of a restatement. The materiality of a restatement dictates how a company corrects prior period errors. If the restatement is material, the company is required to file SEC Form 8-K item 4.02 that states the financial statements can no longer be relied upon and will be reissued (Whalen, Usvyatsky, and Tanona 2017). When errors are immaterial, companies can correct prior period errors in the current year financial statements and do not have to reissue the previously misstated financial statements. The SEC requires all firms to file a form 8-K item 4.02 Non-Reliance disclosure within four business days of determining that a prior period financial statement is determined unreliable as of August 23, 2004. We begin our additional analysis of materiality using a sample of financial statements that were issued after this date. We performed separate analysis for the 33 restated firm-years we identified that required an 8-K 4.02 item. Using a new sample for firm-years with financial statements issued after August 23, 2004, we matched based on the propensity score to use the successful efforts method and have a final sample with 818 firm-year observations. Results are presented in Table 6. [*See Table 6, pg. 386*]

Table 6 does not show statistical evidence that the use of successful efforts is negatively associated with the likelihood of a material restatement that requires an 8-K 4.02 item. Although the negative coefficient is consistent with our

[12] We did not perform separate analysis for the 13 restatements with a positive effect on the financial statements because of the small sample size.

other results, the p-value is not statistically significant. Overall, our main result in Table 4 does show evidence that the successful efforts method is associated with fewer restatements. However, we do not find evidence in Table 6 that the successful efforts method is associated with a lower likelihood of material restatements.

7 Summary and Conclusion

We examine whether financial reporting quality differs when firms use the successful efforts method versus the full cost method. Prior literature shows that providing less accounting complexity leads to greater processing of that information (Hobson 2011). In contrast, prior research also shows that more conservative accounting choices are associated with fewer restatements (DeFond et al., 2016). However, when a more complex accounting choice is accompanied by greater conservatism, as is the case with the successful efforts method, prior research has not addressed whether conservatism (or other facets) outweighs the financial reporting disadvantages associated with greater accounting complexity.

Using the oil and gas industry as a setting, our empirical findings provide evidence that the successful efforts method, which is more complex but also more conservative, is associated with better financial reporting quality than the less complex full cost method. Given that firms can choose which accounting method to employ, this study is important because it gives insight into the impact of accounting complexity and choice on financial reporting quality. Regulators can use this research when weighing the benefits of complexity, coupled with facets of financial reporting such as conservatism, against the benefits of less complexity when establishing and updating accounting standards. Regulators also may be better able to identify firms that may have a greater likelihood of financial reporting failures in the oil and gas industry. Auditors may be able to better specify audit risks and estimate audit effort and pricing for full cost versus successful efforts firms. Investors may consider our findings when analyzing financial statements across oil and gas exploration firms using the successful efforts versus full cost methods. Examining the stock market's reaction to restatements of successful efforts and full cost firms is a potential area for future research.

A potential limitation of this study is that not all restatements are directly- related to the accounting choice of successful efforts or full cost. Because of this limitation, we cannot conclude causation in our concluding remarks. However, we do provide evidence that a significant association exists showing that firms choosing successful efforts over full cost accounting have better financial reporting quality proxied by restatements.

Appendix A

Variable Definitions

Age – The number of years the firm has been in Compustat

Big4 - A binary dummy that equals 1 if the firm is audited by a BIG 4 auditor and zero otherwise

Business – The number of business segments

Compustat Items – The number of non-missing Compustat items a firm reports. More items are associated with greater complexity

Exploration – The logarithm of the ratio of exploration costs to total assets

Fees – The log of audit fees

Foreign – A binary dummy that equals 1 if the firm is incorporated outside the United States and zero otherwise

Leverage – Total debt / total assets

Loss - A binary dummy that equals 1 if the firm experienced a loss and a zero otherwise

Material_Weakness - A binary dummy that equals 1 if the observation has an internal control weakness identified during the year in either the SOX 302 report or the SOX 404 report and a zero otherwise.

Merger – A binary dummy that equals 1 if the observation has a merger and a zero otherwise

Method – A binary dummy that equals 1 if the firm uses the successful efforts method and a zero if the firm uses full cost

MTB – Market to book ratio

Restatement – A binary dummy that equals 1 if the observation is a restatement and a zero otherwise

ROA – Income before extraordinary items / total assets

Size – The log of market value

Special_Items – Special items scaled by total assets

Tenure – The log of the number of consecutive years audited by the same audit firm

Tier2 – A binary dummy equals 1 if the firm is audited by BDO Seidman or Grant Thornton

Year – Identified as Compustat FYEAR

References

Bandyopadhyay, Sati P. Market reaction to earnings announcements of successful efforts and full cost firms in the oil and gas industry. *The Accounting* Review (1994): 657–674.

Blankley, Alan I., David N. Hurtt, and Jason E. MacGregor. The relationship between audit report lags and future restatements. *Auditing: A Journal of Practice & Theory* 33, no. 2 (2014): 27–57.

Bloomfield, R. 2008. Discussion of the annual report readability, current earnings, and earnings persistence. *Journal of Accounting and Economics*, 45, 248–252.

Bryant, Lisa. Relative value relevance of the successful efforts and full cost accounting methods in the oil and gas industry. *Review of Accounting Studies* 8, no. 1 (2003): 5–28.

Cao, Y., A. L. Myers, and C. T. Omer. 2012. Does company reputation matter for financial reporting quality? Evidence from restatements. Contemporary Accounting Research 29(3):956–990.

C.S. Agnes Cheng, Su-Jane Hsieh, Yewmun Yip. 2007. Impact of accounting choices on firm valuation and earnings quality: The case of transition obligation under SFAS 106, *Review of Accounting and Finance*, 6 (4):419–441

Collins, Daniel W., and Warren T. Dent. The proposed elimination of full cost accounting in the extractive petroleum industry: An empirical assessment of the market consequences. *Journal of Accounting and Economics* 1, no. 1 (1979): 3–44.

Dai, Shasha. Slowly, Painfully, firms recognize losses from energy deals, *Wall Street Journal*. (2016)

Deakin III, Edward B. An analysis of differences between non–major oil firms using successful efforts and full cost methods. *The Accounting Review* (1979): 722–734.

Dechow, P. M., Ge, W., Larson, C. R., Sloan, R. G., 2011. Predicting material accounting misstatements. Contemporary Accounting Research 28 (1), 17–82.

Dechow, P., W. Ge, and C. Schrand. 2010. Understanding earnings quality: a review of the proxies, their determinants, and their consequences, *Journal of Accounting and Economics*, 50 (2–3), pp. 344–401.

DeFond, Mark L. "Earnings quality research: Advances, challenges and future research." *Journal of Accounting and Economics* 50, no. 2–3 (2010): 402–409.

DeFond, Mark L., Chee Yeow Lim, and Yoonseok Zang. Client conservatism and auditor–client

contracting. *The Accounting Review* 91, no. 1 (2015): 69–98.

Demerjian, Peter R., Baruch Lev, Melissa F. Lewis, and Sarah E. McVay. "Managerial ability and earnings quality." *The Accounting Review* 88, no. 2 (2012): 463–498.

Desai, Hemang, Chris E. Hogan, and Michael S. Wilkins. "The reputational penalty for aggressive accounting: Earnings restatements and management turnover." *The Accounting* Review 81, no. 1 (2006): 83–112.

Desai, H., Krishnamurthy, S., Venkataraman, K., 2006. Do short sellers target firms with poor earnings quality? Evidence from earnings restatements. Review of Accounting Studies 11, 71–90.

Dhaliwal, Dan S. The effect of the firm's capital structure on the choice of accounting methods. The *Accounting Review* (1980): 78–84.

Financial Accounting Standards Board. 2007. Conceptual framework: Joint project of the IASB and FASB 2007.

William Greene, 2000. Econometric Analysis, 4th Ed., Wiley Publisher.

Guay, W., D. Samuels, D. Taylor. 2016. Guiding through the fog: Financial statement complexity and voluntary disclosure. Discussion of the annual report readability, current earnings, and earnings persistence. *Journal of Accounting and Economics*, 62, 234–269.

Harris, Trevor S., and James A. Ohlson. Accounting disclosures and the market's valuation of oil and gas properties. *The Accounting Review* (1987): 651–670.

Hobson, J. L. 2011. Do the benefits of reducing accounting complexity persist in markets prone to bubble? *Contemporary Accounting Research* 28, 957–989.

Hribar, Paul, and Nicole Thorne Jenkins. The effect of accounting restatements on earnings revisions and the estimated cost of capital. *Review of Accounting Studies* 9, no. 2–3 (2004): 337–356.

Lara, Juan Manuel García, Beatriz García Osma, and Fernando Penalva. Accounting conservatism and corporate governance. *Review of Accounting Studies* 14, no. 1 (2009): 161–201.

Li, F. 2008. Aannual report readability, current earnings, and earnings persistence. *Journal of Accounting and Economics*, 45, 221–247.

Lilien, Steven, and Victor Pastena. "Determinants of intramethod choice in the oil and gas industry." *Journal of Accounting and Economics* 4, no. 3 (1982): 145–170.

Malmquist, David H. Efficient contracting and the choice of accounting method in the oil and gas industry. *Journal of Accounting and Economics* 12, no. 1–3 (1990): 173–205.

Murphy, M. L. 2015. Will simpler also be better? *Journal of Accountancy* (April) http://www.journalofaccountancy.com/issues/2015/apr/financial–reporting–auditing–complexity.html Oil and gas Investor: http://www.oilandgasinvestor.com/apache–converts–successful–efforts–accounting–method–1081346 (2016)

Palmrose, Zoe–Vonna, Vernon J. Richardson, and Susan Scholz. Determinants of market reactions to restatement announcements. *Journal of Accounting and Economics* 37, no. 1 (2004): 59–89.

Romanus, Robin N., John J. Maher, and Damon M. Fleming. Auditor industry specialization, auditor changes, and accounting restatements. *Accounting Horizons* 22, no. 4 (2008): 389–413.

Rosenbaum, Paul R., and Donald B. Rubin. The central role of the propensity score in observational studies for causal effects. *Biometrika* 70, no. 1 (1983): 41–55.

Shin, Haeyoung, Randall Z. Xu, Michael Lacina, and Jin Zhang. Audit Committee Expertise and Early Accounting Error Detection: Evidence from Financial Restatements. *Journal of Investigative and Forensic Accounting* 6, no. 1 (2014) 181–221.

Shipman, Jonathan E., Quinn T. Swanquist, and Robert L. Whited. Propensity score matching in accounting research. *The Accounting Review* 92, no. 1 (2016): 213–244.

Srinivasan, Suraj, Aida Sijamic Wahid, and Gwen Yu. Admitting mistakes: Home country effect on the reliability of restatement reporting. *The Accounting Review* 90, no. 3 (2014): 1201–1240.

Sunder, Shyam. Properties of accounting numbers under full costing and successful efforts costing in the petroleum industry. *The Accounting Review* 51, no. 1 (1976): 1–18.

Sutton, Timothy G. Lobbying of accounting standard–setting bodies in the UK and the USA: a Downsian analysis." *Accounting, Organizations and Society* 9, no. 1 (1984): 81

Whalen, Don, Olga Usvyatsky, and Dennis Tanona. 2016 financial restatements: A sixteen–year Comparison. *Audit Analytics*, Sutton, MA.

Figure 1


Percent of Firms Choosing Successful Efforts Over Time
65.00%
60.00%
55.00%
50.00%
45.00%
40.00%
35.00%
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016

Table 1: Sample Summary

Restatement Sample Selection	
Compustat firm observations from 2003-2016	3,459
Exclude observations with missing variables in compustat	(1,611)
Exclude observations with missing information in Audit Analytics	(178)
Exclude observations with zero or missing exploration cost data	(475)
Total observations used in PSM	1,195
Exclude firms without a match	(265)
Total observations in the restatement sample	930
Unique firms	190

Table 2

Panel A: Descriptive statistics by method for included variables in the method probability model

	Successful Efforts					Full Cost					Difference		
Variable	Mean	Q1	Median	Q3	SD	Mean	Q1	Median	Q3	SD	Diff in Means	P Value	
Size	6.474	4.879	6.611	8.198	2.396	6.206	4.824	6.268	7.710	2.077	-0.267	0.04	**
Leverage	0.335	0.177	0.285	0.433	0.277	0.313	0.135	0.269	0.412	0.274	-0.022	0.18	
Business	1.430	1.000	1.000	1.000	1.000	1.347	1.000	1.000	1.000	0.965	-0.083	0.14	
Fees	13.391	12.652	13.552	14.225	1.263	13.163	12.525	13.320	13.965	1.192	-0.229	<0.01	***
Age	14.077	7.000	14.000	21.000	8.124	12.501	7.000	11.000	18.000	7.058	-1.576	<0.01	***
Tenure	1.813	1.099	1.946	2.485	0.851	1.702	1.099	1.792	2.303	0.769	-0.111	0.02	**
Foreign	0.246	0.000	0.000	0.000	0.431	0.229	0.000	0.000	0.000	0.421	-0.016	0.51	
MTB	2.701	1.053	1.951	2.850	5.919	2.611	0.993	1.630	2.907	4.982	-0.091	0.77	
Merger	0.092	0.000	0.000	0.000	0.289	0.095	0.000	0.000	0.000	0.294	0.004	0.84	
Material_Weakness	0.110	0.000	0.000	0.000	0.314	0.107	0.000	0.000	0.000	0.310	-0.003	0.86	
Loss	0.498	0.000	0.000	1.000	0.500	0.442	0.000	0.000	1.000	0.497	-0.056	0.05	**
ROA	-0.095	-0.097	0.000	0.058	0.358	-0.110	-0.128	0.017	0.066	0.369	-0.015	0.48	
Big4	0.632	0.000	1.000	1.000	0.483	0.662	0.000	1.000	1.000	0.474	0.030	0.29	
TIer2	0.129	0.000	0.000	0.000	0.335	0.142	0.000	0.000	0.000	0.350	0.014	0.49	
Special_Items	-0.003	-0.003	0.000	0.000	0.040	-0.001	-0.003	0.000	0.000	0.040	0.001	0.55	
Compustat_Items	5.818	5.784	5.826	5.861	0.060	5.816	5.787	5.823	5.855	0.057	-0.002	0.58	
Exploration	0.045	0.005	0.023	0.055	0.063	0.062	0.012	0.036	0.086	0.073	0.017	<0.01	***

*, **, *** Denote significant at the 10 percent, 5 percent, and 1 percent levels, respectively. The variables used in the regression model are as defined in Appendix A. All continuous variables are winsorized at 1 and 99 percent. There are 598 successful effort observations and 597 full cost observations in Panel A.

Table 2

Panel B: Descriptive statistics by method for included variables in the restatement sample

	Successful Efforts					Full Cost					Difference		
Variable	Mean	Q1	Median	Q3	SD	Mean	Q1	Median	Q3	SD	Diff in Means	P Value	
Restated	0.058	0.000	0.000	0.000	0.234	0.101	0.000	0.000	0.000	0.302	0.043	0.02	**
Size	6.400	4.932	6.667	8.033	2.319	6.330	4.910	6.358	7.902	2.137	-0.070	0.63	
Leverage	0.324	0.172	0.282	0.419	0.271	0.332	0.159	0.287	0.427	0.276	0.008	0.67	
Business	1.387	1.000	1.000	1.000	0.954	1.357	1.000	1.000	1.000	0.981	-0.030	0.64	
Fees	13.267	12.504	13.446	14.078	1.209	13.243	12.616	13.381	14.072	1.229	-0.024	0.76	
Age	13.445	6.000	13.000	20.000	7.753	13.166	8.000	12.000	19.000	7.171	-0.280	0.57	
Tenure	1.783	1.099	1.792	2.398	0.834	1.758	1.386	1.946	2.303	0.770	-0.025	0.64	
Foreign	0.215	0.000	0.000	0.000	0.411	0.232	0.000	0.000	0.000	0.423	0.017	0.53	
MTB	2.648	1.144	1.977	2.885	5.642	2.777	0.951	1.611	3.002	5.229	0.128	0.72	
Merger	0.097	0.000	0.000	0.000	0.296	0.090	0.000	0.000	0.000	0.287	-0.006	0.74	
Material_Weakness	0.103	0.000	0.000	0.000	0.305	0.108	0.000	0.000	0.000	0.310	0.004	0.83	
Loss	0.447	0.000	0.000	1.000	0.498	0.465	0.000	0.000	1.000	0.499	0.017	0.60	
ROA	-0.089	-0.083	0.012	0.064	0.374	-0.096	-0.128	0.012	0.065	0.332	-0.007	0.76	
Big4	0.649	0.000	1.000	1.000	0.478	0.637	0.000	1.000	1.000	0.482	-0.013	0.68	
TIer2	0.129	0.000	0.000	0.000	0.336	0.138	0.000	0.000	0.000	0.345	0.009	0.70	
Special_Items	-0.001	-0.003	0.000	0.000	0.039	0.000	-0.004	0.000	0.000	0.039	0.001	0.59	
Compustat_Items	5.819	5.787	5.829	5.861	0.061	5.817	5.787	5.826	5.855	0.057	-0.002	0.69	
Exploration	0.052	0.006	0.029	0.064	0.068	0.055	0.011	0.029	0.074	0.066	0.003	0.47	

Panel C: Descriptive statistics separated by restatement for included variables

	Restated					Not Restated					Difference		
Variable	Mean	Q1	Median	Q3	SD	Mean	Q1	Median	Q3	SD	Diff in Means	P Value	
Method	0.365	0.000	0.000	1.000	0.485	0.512	0.000	1.000	1.000	0.500	0.147	0.02	**
Size	6.148	4.971	5.805	7.587	1.896	6.384	4.884	6.551	7.977	2.256	0.235	0.38	
Leverage	0.361	0.157	0.330	0.452	0.301	0.325	0.163	0.282	0.417	0.271	-0.036	0.28	
Business	1.432	1.000	1.000	1.000	1.086	1.367	1.000	1.000	1.000	0.957	-0.066	0.58	
Fees	13.271	12.706	13.407	13.911	1.144	13.254	12.534	13.419	14.080	1.225	-0.017	0.91	
Age	11.554	4.000	9.500	19.000	8.288	13.457	7.000	13.000	19.000	7.376	1.903	0.06	*
Tenure	1.588	1.099	1.792	2.303	0.879	1.786	1.386	1.946	2.398	0.794	0.198	0.04	**
Foreign	0.108	0.000	0.000	0.000	0.313	0.234	0.000	0.000	0.000	0.423	0.126	<0.01	***
MTB	4.045	0.744	1.896	3.468	9.442	2.597	1.033	1.792	2.896	4.933	-1.447	0.20	
Merger	0.216	0.000	0.000	0.000	0.414	0.083	0.000	0.000	0.000	0.276	-0.133	<0.01	***
Material_Weakness	0.392	0.000	0.000	1.000	0.492	0.081	0.000	0.000	0.000	0.272	-0.311	<0.01	***
Loss	0.541	0.000	1.000	1.000	0.502	0.449	0.000	0.000	1.000	0.498	-0.092	0.13	
ROA	-0.148	-0.124	-0.007	0.047	0.428	-0.088	-0.097	0.013	0.067	0.346	0.060	0.25	
Big4	0.662	0.000	1.000	1.000	0.476	0.641	0.000	1.000	1.000	0.480	-0.021	0.72	
Tier2	0.095	0.000	0.000	0.000	0.295	0.137	0.000	0.000	0.000	0.344	0.042	0.31	
Special_Items	0.000	-0.007	0.000	0.000	0.051	-0.001	-0.003	0.000	0.000	0.038	-0.001	0.93	
Compustat_Items	5.821	5.793	5.825	5.858	0.058	5.818	5.787	5.826	5.858	0.059	-0.003	0.64	
Exploration	0.040	0.004	0.019	0.058	0.048	0.055	0.009	0.031	0.069	0.069	0.015	0.02	**

*, **, *** Denote significant at the 10 percent, 5 percent, and 1 percent levels, respectively. The variables used in the regression model are as defined in Appendix A. All continuous variables are winsorized at 1 and 99 percent. There are 465 successful effort observations and 465 full cost observations in Panel A. 74 observations were restated and 856 observations were not restated in Panel B.

Table 3: Results
Probability Model Analysis

$$\text{Method} = \beta_0 \text{ Intercept} + \beta_1 \text{ Size} + \beta_2 \text{ Leverage} + \beta_3 \text{ Business} + \beta_4 \text{ Fees} + \beta_5 \text{ Age} + \beta_6 \text{ Tenure} + \beta_7 \text{ Foreign} + \beta_8 \text{ MTB} + \beta_9 \text{ Merger} + \beta_{10} \text{ Material\_Weakness} + \beta_{11} \text{ Loss} + \beta_{12} \text{ ROA} + \beta_{13} \text{ Big4} + \beta_{14} \text{ Tier2} + \beta_{15} \text{ Special\_Items} + \beta_{16} \text{ Compustat\_Items} + \beta_{17} \text{ Exploration} + \beta_{18} \text{ Year} + \varepsilon$$

Variable	Pred. Sign	Coeff.	p value
Intercept		12.046	0.03 **
Size	+	0.028	0.38
Leverage	+	0.195	0.24
Business	+	0.010	0.81
Fees	+	0.168	0.02 **
Age	+	0.016	<0.01 ***
Tenure	+	0.006	0.92
Foreign	+/-	0.009	0.93
MTB	-	0.008	0.27
Merger	+	-0.074	0.59
Material_Weakness	-	0.047	0.71
Loss	+	0.206	0.04 **
ROA	+	0.255	0.07 *
Big4	+/-	-0.651	<0.01 ***
Tier2	+/-	-0.468	<0.01 ***
Special_Items	+/-	-0.710	0.46
Compustat_Items	+/-	-2.476	0.02 **
Exploration	-	-1.716	<0.01 ***
Year Dummies	Yes		
Observations	1,195		
Psuedo R-Square	0.05		
AUC	0.65		

*, **, *** Denote significant at the 10 percent, 5 percent, and 1 percent levels, respectively. The variables used in the regression model are as defined in Appendix A. All continuous variables are winsorized at 1 and 99 percent.

Table 4: Results
Restatement Analysis

$$\text{Restatement} = \beta_0 \text{ Intercept} + \beta_1 \text{ Method} + \beta_2 \text{ Size} + \beta_3 \text{ Leverage} + \beta_4 \text{ Business} + \beta_5 \text{ Fees} + \beta_6 \text{ Age} + \beta_7 \text{ Tenure} + \beta_8 \text{ Foreign} + \beta_9 \text{ MTB} + \beta_{10} \text{ Merger} + \beta_{11} \text{ Material\_Weakness} + \beta_{12} \text{ Loss} + \beta_{13} \text{ ROA} + \beta_{14} \text{ Big4} + \beta_{15} \text{ Tier2} + \beta_{16} \text{ Special\_Items} + \beta_{17} \text{ Compustat\_Items} + \beta_{18} \text{ Exploration} + \beta_{19} \text{ Year} + \varepsilon$$

Variable	Pred. Sign	Coeff.	p value
Intercept		-1.966	0.86
Method	+/-	-0.363	<0.01 ***
Size	-	0.062	0.31
Leverage	+	0.169	0.59
Business	+	-0.058	0.43
Fees	+/-	-0.035	0.78
Age	-	-0.001	0.91
Tenure	-	-0.020	0.86
Foreign	-	-0.552	<0.01 ***
MTB	+	0.019	0.08 *
Merger	+	0.547	<0.01 ***
Material_Weakness	+	1.184	<0.01 ***
Loss	+	0.142	0.44
ROA	-	-0.049	0.85
Big4	-	0.105	0.65
Tier2	-	-0.161	0.56
Special_Items	+	1.840	0.28
Compustat_Items	+	0.146	0.94
Exploration	+/-	-2.676	0.04 **
Year Dummies	Yes		
Observations	930		
Psuedo R-Square	0.19		
AUC	0.79		

*, **, *** Denote significant at the 10 percent, 5 percent, and 1 percent levels, respectively. The variables used in the regression model are as defined in Appendix A. All continuous variables are winsorized at 1 and 99 percent.

Table 5: Results
Analysis of Restatements With a Negative Net Effect on the Financial Statements

$$\text{Restatement} = \beta_0 \text{ Intercept} + \beta_1 \text{ Method} + \beta_2 \text{ Size} + \beta_3 \text{ Leverage} + \beta_4 \text{ Business} + \beta_5 \text{ Fees} + \beta_6 \text{ Age} + \beta_7 \text{ Tenure} + \beta_8 \text{ Foreign} + \beta_9 \text{ MTB} + \beta_{10} \text{ Merger} + \beta_{11} \text{ Material\_Weakness} + \beta_{12} \text{ Loss} + \beta_{13} \text{ ROA} + \beta_{14} \text{ Big4} + \beta_{15} \text{ Tier2} + \beta_{16} \text{ Special\_Items} + \beta_{17} \text{ Compustat\_Items} + \beta_{18} \text{ Exploration} + \beta_{19} \text{ Year} + \varepsilon$$

Variable	Pred. Sign	Coeff.	p value
Intercept		-4.346	0.71
Method	+/-	-0.258	0.08 *
Size	-	0.061	0.36
Leverage	+	0.098	0.77
Business	+	-0.023	0.76
Fees	+/-	0.105	0.45
Age	-	0.005	0.68
Tenure	-	-0.050	0.66
Foreign	-	-0.767	<0.01 ***
MTB	+	0.029	<0.01 ***
Merger	+	0.487	0.03 **
Material_Weakness	+	1.032	<0.01 ***
Loss	+	0.222	0.25
ROA	-	0.311	0.34
Big4	-	-0.376	0.13
Tier2	-	-0.773	0.02 **
Special_Items	+	-0.732	0.70
Compustat_Items	+	0.261	0.90
Exploration	+/-	-2.254	0.10 *
Year Dummies	Yes		
Observations	912		
Psuedo R-Square	0.18		
AUC	0.79		

*, **, *** Denote significant at the 10 percent, 5 percent, and 1 percent levels, respectively. The variables used in the regression model are as defined in Appendix A. All continuous variables are winsorized at 1 and 99 percent.

Table 6: Results
8-K Non-Reliance Restatement Analysis

$$\text{Restatement} = \beta_0 \text{ Intercept} + \beta_1 \text{ Method} + \beta_2 \text{ Size} + \beta_3 \text{ Leverage} + \beta_4 \text{ Business} + \beta_5 \text{ Fees} + \beta_6 \text{ Age} + \beta_7 \text{ Tenure} + \beta_8 \text{ Foreign} + \beta_9 \text{ MTB} + \beta_{10} \text{ Merger} + \beta_{11} \text{ Material\_Weakness} + \beta_{12} \text{ Loss} + \beta_{13} \text{ ROA} + \beta_{14} \text{ Big4} + \beta_{15} \text{ Tier2} + \beta_{16} \text{ Special\_Items} + \beta_{17} \text{ Compustat\_Items} + \beta_{18} \text{ Exploration} + \beta_{19} \text{ Year} + \varepsilon$$

Variable	Pred. Sign	Coeff.	p value
Intercept		7.421	0.99
Method	+/-	-0.071	0.72
Size	-	0.028	0.76
Leverage	+	0.109	0.81
Business	+	-0.108	0.36
Fees	+/-	-0.007	0.97
Age	-	0.025	0.16
Tenure	-	-0.269	0.06 *
Foreign	-	-0.401	0.17
MTB	+	0.003	0.90
Merger	+	0.655	0.03 **
Material_Weakness	+	1.290	<0.01 ***
Loss	+	-0.013	0.96
ROA	-	0.438	0.34
Big4	-	-0.473	0.12
Tier2	-	-0.373	0.30
Special_Items	+	-1.946	0.54
Compustat_Items	+	-2.566	0.36
Exploration	+/-	-2.278	0.18
Year Dummies	Yes		
Observations	818		
Psuedo R-Square	0.27		
AUC	0.88		

*, **, *** Denote significant at the 10 percent, 5 percent, and 1 percent levels, respectively. The variables used in the regression model are as defined in Appendix A. All continuous variables are winsorized at 1 and 99 percent.