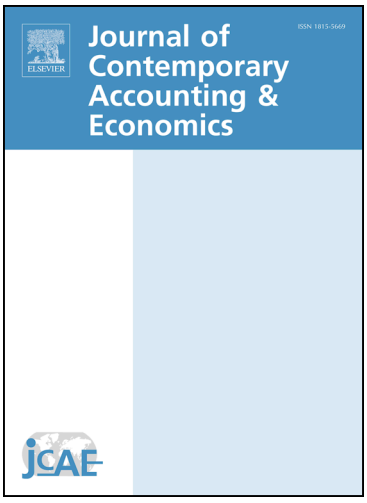


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# Do Corporate Pension Plans Affect Audit Pricing?

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# Do Corporate Pension Plans Affect Audit Pricing?


## Abstract

We examine whether corporate pension plans of client firms (hereafter, clients) influence auditors' decisions on audit pricing for the clients in the U.S. We find that, on average, auditors charge higher fees for auditing financial statements of client firms sponsoring defined benefits (DB) pension plans than matched firms without DB pension plans. Moreover, we find that the effect of DB pension plans on audit fees is stronger when clients' earnings are more sensitive to DB pension estimates, or when managers' compensation induces more risk taking. Finally, we find that the additional audit fees charged for clients with DB pension plans are negatively associated with the extent of manipulations of DB pension accounting estimates. Collectively, our findings suggest that auditors consider managers' incentive to manipulate earrings and increase audit effort to reduce audit risk associated with DB pension accounting, which results in higher audit fees.



*JEL Classification*: M40, M42, M48

**Keywords:** Pension Plans, Audit Pricing, Audit Effort, Audit Risk, Earnings Management.

## 1. Introduction

Both regulators and the general public have expressed increasing concerns about earnings manipulations through pension accounting in the post Sarbanes-Oxley (SOX) Act period. For instance, The Economist reported that:

> *"...literally billions of dollars have been conjured on to firms' balance sheets and profit and loss accounts in recent years, flattering reported earnings. Without manipulations of their pension accounts, industry icons such as IBM, General Motors and Boeing would have reported drastically worse financial results."* (The Economist 2004).

Relatedly, in a 2006 public speech Charles Niemeier, board member of the Public Company Accounting Oversight Board (PCAOB), advised the auditing industry to pay more attention to pension accounting, which he believes will significantly improve the financial reporting system (Shaw 2006). Given the increasing concerns regarding companies' manipulations of pension accounting, it is important to understand whether auditors—the "gatekeepers" of financial reporting quality (Doty 2014)—exercise more effort and thus charge higher audit fees when pension accounting involves higher risk.

There are two types of pension plans in the U.S., namely, defined contribution (DC) plans and defined benefit (DB) plans. DB pension accounting is far more complicated than DC pension accounting and estimates in DB pension accounting involve considerable discretion of and prediction by managers (Kieso et al. 2011). Further, small changes in DB pension accounting estimates can have a material

impact on the sponsoring firm's reported earnings (An et al. 2014; Bauman and Shaw 2014).[1] Therefore, pension accounting provides an appealing setting to examine which factors influence the adjustment of auditors' effort when confronted with complex accounting estimates and whether increased audit effort mitigates manipulations in complex accounting estimates.

DB pension plans increase potential audit risk, as managers may abuse the complexity of and discretion afforded by DB pension accounting and manipulate pension estimates in order to manage earnings (Bergstresser et al. 2006; Comprix and Muller III 2006; An et al. 2014). The production view of audit process suggests that, when confronted with greater potential audit risk, auditors exert more effort in attestation to reduce the audit risk, and they charge higher audit fees to compensate for the effort (e.g., Simunic 1980). In the setting of DB pension accounting, auditors can implement more substantive tests and consult actuaries to verify the pension accounting estimates in order to reduce audit risk. Therefore, if auditors are aware of the high potential audit risk driven by DB pension plans and increase their audit effort to manage the risk, we expect that auditors charge higher fees for auditing financial statements of clients with DB pension plans than they do for clients without DB pension plans.

To test this prediction, we utilize a comprehensive sample of public firms in the U.S. from 2004 to 2012. On average, pension assets represent 11.6% of the book

[1] An et al. (2014) show that an increase of 25 basis points in the assumed return on pension plan assets allowed Verizon Communication to report $389 million of total earnings in 2000 instead of net loss that would have been reported otherwise had the firm not increased the assumed return. Similarly, Bauman and Shaw (2014) use a randomly selected sample of 147 firms to show that slight changes in DB pension accounting estimates can significantly influence reported earnings of sponsoring firms.

value of assets for companies in our sample that have DB pension plans. Therefore, the adjustments in DB pension accounting estimates can have significant impact on reported earnings, and thus pose a substantial audit risk.

Using propensity score matching research design, we document that auditors charge significantly higher fees for auditing the financial statements of clients sponsoring DB pension plans than they do for matched firms without DB pension plans. The effect of DB pension plans on audit fees is robust when we control for firm's financial risk associated with unfunded pension plan obligations as well a variety of other client firm and auditor characteristics suggested in prior literature. The effect of DB pension plans on audit fees is economically meaningful—auditors charge, on average, 8 percent more in audit fees for clients with DB plans. To the extent that audit fees proxy for audit effort—an assertion which has been supported in studies employing data available for both audit labor hours and audit fees (Bell et al., 2001; Bedard and Johnstone 2006) —the finding indicates that auditors exert more effort for clients with DB pension plans.

We further examine whether auditors consider clients' incentives to manage earnings through pension accounting to determine the adjustment of audit effort. We find that the positive effect of DB pension plans on audit fees is amplified when the estimates in DB pension accounting have a greater effect on clients' earnings, and when managers' compensation has higher sensitivity to a firm's equity risk—circumstances under which managers have stronger incentives to manipulate earnings (Bergstresser et al. 2006; Armstrong et al. 2013). These results are consistent

with the view that auditors exert more effort for clients with DB pension plans when they perceive that the managers have stronger incentive to manage earnings.

Last, we explore whether the additional audit effort exerted for clients with DB pension plans indeed alleviates earnings management through pension accounting. On the one hand, increased audit effort can increase the probability of identifying manipulated accounting estimates, thereby allowing the auditor to undo the manipulation (Caramanis and Lennox 2008; Lobo and Zhao 2013). On the other hand, pension accounting estimates are highly complex and auditing these estimates requires special knowledge on financial markets and pensions (Kieso et al. 2011). Consequently, complex accounting estimates are particularly challenging for auditors and audit effort may not be effective in mitigating the manipulations in such estimates (Bratten et al. 2013; Christensen et al, 2013; Griffith et al. 2015). To explore this research question, we examine the manipulations of the assumed rate of return on pension assets, which is an important estimate in DB pension accounting (Bergstresser et al. 2006; An et al. 2014). If the additional audit effort curbs earnings management through pension accounting, we should observe less manipulation in the assumed rate of return on pension assets when the auditors charge higher audit fees. Our results show that when auditors charge higher audit fees for clients with DB pension plans, overstatement of assumed rates of return on pension assets is reduced.[2] This finding suggests that the additional audit effort exerted for clients with DB pension plans, on average, mitigates earnings management through pension

[2] We focus on overstatement of assumed rate of return on pension assets, which inflates reported earnings, because prior studies show that auditors are mainly concerned about overstatement of earnings (e.g., Caramanis and Lennox 2008).

accounting.

Our analysis adds to recent literature examining the effect of corporate pension plans on various business decisions, such as investments, capital structure, and M&A activities (Rauh 2006; Shivdasani and Stefanescu 2010; Cocco and Volpin 2013; Chaudhry et al. 2017). In contrast to these prior studies that focus on the effect of pension plans on the decisions of sponsoring corporations, we examine how pension plans affect decisions of the auditors of the sponsoring corporations, which is not well understood in the current literature.[3] Using the pension accounting setting, this study sheds light on how auditors adjust their effort when confronted with complex accounting estimates and whether their effort can constrain the manipulations in these estimates.

Our results also have potential implications for regulators who have expressed concerns regarding the state of auditing in pension accounting. In order to design public policies for auditing in pension accounting, regulators need to know whether auditors exert more effort when confronted with higher risk in pension accounting and

[3] While DeFond et al. (2002), Whisenant et al. (2003), and Krishnan and Sengupta (2011) do not aim at examining the effect of pension plans on audit pricing, they include some of the pension plan-related variables as controls in their models. Our study is different from these studies in four important ways. First, the samples of these studies are dominated by observations before SOX (including Section 404) became fully effective. The institutional changes in the recent decade had a profound impact on both accounting choices of the client firms and auditing practices, and regulators are mainly concerned about auditing pension accounting in the post-SOX period. Therefore, we examine the effect of DB pensions plan on auditing in the post-SOX period. Second, these studies do not examine whether the effect of DB pension plans on audit fees is due to audit risk associated with earnings management. It is possible that auditors charge higher audit fees due to their concerns about financial risk related to pension plans. In contrast, we address this question by examining the moderating effects of clients' characteristics that are related with earnings management incentives, while explicitly controlling for clients' financial risk related with DB pension plan obligations. Third, we examine whether the additional audit effort for clients with DB pension plans mitigates earnings management through pension accounting, which is not investigated in these three studies. Fourth, different from these three studies, in examining the effect of client pension plans on audit pricing we control for self-selection in pension plans—an important issue pointed out by prior research (Shivdasani and Stefanescu 2010).

to what extent the additional effort mitigates earnings management through pension accounting. Our article provides large-sample evidence showing that auditors do exert more effort in attestation of pension accounting with higher risk. Further, our results suggest that increased audit effort mitigates earnings management through pension accounting. As such, our results are useful in addressing regulators' concerns.

The remainder of the paper is structured as follows. Section 2 reviews the literature and develops the hypotheses. Section 3 describes the data and provides descriptive statistics. Section 4 presents empirical results, and Section 5 concludes.

## 2. Literature Review and Hypotheses

Prior to developing our hypotheses, a brief discussion of the distinction between financial statements of a pension plan and financial statements of the sponsoring firm is warranted. A corporate pension plan and the firm that sponsors the plan are separate legal and accounting entities that maintain their books under separate FASB standards (Kieso et al. 2011). Accordingly, the financial statements of the sponsoring firm include the firm's pension expense and unfunded pension obligation (commonly referred to as "pension accounting"), but they do not include the assets or liabilities of the actual pension plan (commonly referred to as "accounting for employee benefit plans"). Consistent with this, there are two distinct audits associated with corporate pension plans: (1) the audit of the financial statements of the sponsoring firm and (2) the audit of the financial statements of the actual pension plan. In this paper, we focus solely on the fees for the former because investors and regulators are primarily

concerned about quality of financial statements of the sponsoring firm.[4]

### 2.1 Audit Fees and Defined Benefit Pension Plans

There are two basic types of corporate pension plans in the U.S.: defined contribution (DC) plans and defined benefit (DB) plans. In a DC plan, the employer is required to make regular contributions to employees' pension accounts, and the employer does not make promises for the ultimate benefits paid out to employees. In a DB plan, the employer determines periodic contributions to a pension fund based on the estimated future pension payments and the assumed rate of return on pension assets. In contrast to relatively straightforward rules of DC pension accounting, DB pension accounting is much more complicated (Kieso et al. 2011), as it involves a substantial degree of managerial discretion and judgment in setting pension estimates. Specifically, the Accounting Standards Codification (ASC) 715 stipulates that net periodic pension costs in DB pension plans, which are reported on sponsoring firms' income statements, should be calculated as the sum of service costs, interest costs, amortized prior service costs, and amortized deferred gains and losses, less the expected return on pension plan assets (FASB 2009). As ASC 715 does not provide specific guidance on pension estimates such as assumed rate of return on pension assets, sponsoring companies are afforded considerable latitude in setting their pension estimates (Bergstresser et al. 2006; An et al. 2014).

[4] For the discussion on fees for the audit of financial statements of the pension plan, please refer to Cullinan (1997). In the Audit Analytics database, these fees are classified among non-audit fees, while the fees for the audit of financial statements of the sponsoring firm are coded as audit fees. We control for non-audit fees in our analysis.

The considerable discretion in setting pension estimates afforded by DB pension accounting rules makes DB pension accounting a fertile ground for earnings management practices. Consistent with this view, prior research shows that managers exploit the latitude afforded by DB pension accounting to manage companies' earnings. Bergstresser et al. (2006) find that, in order to boost corporate profits, managers aggressively overestimate the assumed rates of return on pension assets around critical business decisions such as acquisitions, meeting or beating critical earnings thresholds, and exercising management stock options. Comprix and Muller III (2006) show that managers increase assumed rates of return on pension assets to overstate pension income because CEO cash compensation is sensitive to pension income. An et al. (2014) document that companies manipulate assumed rates of return on pension assets in order to meet or beat analyst forecasts.

Earnings management increases audit risk because auditors are responsible for assuring that financial statements faithfully reflect firms' underlying economics (DeFond and Zhang 2014). Consistent with the view that auditors' responsibility extends to assuring financial reporting quality, the U.S. Supreme Court has ruled that auditors are held legally liable for misleading financial statements, even when those statements formally comply with the GAAP (Ball 2009).[5] Thus, auditors' failure to detect severe earnings management may trigger lawsuits against auditors, resulting in substantial legal costs (Lys and Watts 1994). In addition, failure to detect earnings management impairs the auditors' reputation and reduces market share for auditors

[5] The case of United States v. Simon (425 F.2d 796, 1969), United States Court of Appeals, Second Circuit; Argued April 18, 1969; Decided November 12, 1969; Certiorari Denied March 30, 1970.

involved, even when lawsuits are not incurred (Weber et al. 2008; Skinner and Srinivasan 2012). Therefore, earnings management leads to greater risk for auditors.[6]

Faced with high audit risk, auditors can supply additional audit effort in order to detect earnings management (e.g., Simunic 1980), and charge higher audit fees to compensate for the additional audit effort. In the context of our research question, auditors can choose to exert more effort in auditing financial statements of clients sponsoring DB pension plans on the basis of at least two reasons. First, DB pension accounting provides managers with considerable discretion in financial reporting, which may lead to a higher level of earnings management by clients with DB pension plans prior to audit. Thus, to reduce audit risk to an acceptable level, auditors must exert more effort. Second, even if auditors expect the overall level of earnings management prior to an audit to be comparable between clients with DB pension plans and those without DB pension plans, it will require more effort from the auditors to detect earnings management through DB pension accounting, compared to earnings management through other accounts. This is because DB pension accounting is highly complicated and auditors may have to implement more substantive tests and consult actuaries in order to identify manipulations in reported pension expenses.

Based on the above arguments, we posit that, to compensate for the additional

[6] Anecdotal evidence suggests that the costs of failure for the auditors to detect earnings management through pension accounting can be quite substantial. For instance, the audit firm Deloitte & Touche paid $38.25 million as part of a $325 million investor settlement related to Delphi Corporation misconduct, which involved an improper treatment by Delphi of a $202 million warranty payment as an actuarial loss in its pension plan. This treatment enabled company to amortize the payment as an adjustment of pension expense over several years and averted the hit to the reported profits. See Stanford Law School Securities Class Action Filings (http://securities.stanford.edu/filings-case.html?id=103389) and U.S. SEC Litigation Releases (https://www.sec.gov/litigation/complaints/2006/comp19891.pdf) for further details.

audit effort, audit firms charge higher fees for auditing financial statements of clients with DB pension plans, which leads to our first hypothesis.

**H1:** Auditors charge higher fees for auditing financial statements of clients with DB pension plans than for those without DB pension plans.

## 2.2 Clients' Incentives to Manage Earnings and the Moderators of the Defined Benefit Pension Plan-Audit Fees Relation

In the development of H1, we argue that auditors charge higher fees for auditing financial statements of clients with DB pension plans because the auditors exert effort to curb earnings management through DB pension accounting. If that is the case, we expect that the effect of DB pension plans on audit fees will be amplified when clients have stronger incentives to manage earnings. This line of reasoning gives rise to cross-sectional patterns in the hypothesized DB pension plan-audit fees relation.

Building on prior research, we examine several conditions in which managers could be incentivized to manage earnings.[7] First, we predict that the effect of DB pension plans on audit fees is stronger when pension estimates have a greater impact on reported earnings. Intuitively, when pension estimates have greater effect on reported earnings, managers have stronger incentives to manipulate pension estimates to manage earnings. Consistent with this notion, Bergstresser et al. (2006) find that

[7] Our focus is on managers' ex ante incentives to manage earnings as opposed to ex post indicators of earnings management (e.g., evidence of earnings meeting or beating analysts' forecasts, large discretionary accruals etc.). The latter is a joint product of both ex-ante managers' incentives to manage earnings and audit effort to mitigate earnings management. Since higher audit effort leads to higher audit fees, including ex-post earnings management indicators as proxies for managers' incentives to manage earnings in the audit pricing model is likely to result in biased estimates due to endogeneity.

managers are more aggressive in their estimates regarding assumed return rates on pension plan assets when firms' reported profits are more sensitive to such estimates. Therefore, we predict that the effect of DB pension plans on the audit fees is amplified for clients with higher sensitivity of reported earnings to pension estimates.

Second, we predict that the effect of DB pension plans on audit fees is amplified for clients with high sensitivity of management compensation to stock return volatility (vega). Managerial compensation incentives—in particular equity incentives—have been highlighted as an important determinant of managers' decision to manipulate earnings (Ball 2009). Reflecting this view, PCAOB (2012) stipulates that auditors should carefully evaluate and consider client executive compensation practices to identify audit risk (PCAOB Release No. 2012-001). Prior research shows that higher vega induces management to engage in more risk-taking behavior (e.g., Coles et al. 2006). Because earnings management increases information asymmetry, it also increases a firm's equity risk (Hribar and Jenkins 2004; Kravet and Shevlin 2010; Rajgopal and Venkatachalam 2011), and thus can be thought of as a risky project for managers (Armstrong et al. 2013). Consistent with this notion, Armstrong et al. (2013) find that higher vega encourages earnings management. Further, evidence in Chen et al. (2015) suggests that auditors recognize the effect of vega on earnings management. Thus, we predict that the effect of DB pension plans on the audit fees is stronger for clients with higher vega.

In summary, based on the above arguments, we propose the following set of hypotheses.

**H2.a:** The effect of DB pension plans on audit fees is stronger for clients with higher sensitivity of reported earnings to pension accounting estimates.

**H2.b:** The effect of DB pension plans on audit fees is stronger for clients with higher vega.

## 2.3 Additional Audit Effort and the Manipulation of DB Pension Accounting Estimates

In developing our theoretical arguments, we reason that due to high potential audit risk of DB pension accounting, auditors charge higher fees to compensate for the additional audit effort involved in auditing the financial statements of clients sponsoring DB pension plans (hereafter, additional audit effort for DB pension plans). In this section, we examine whether the additional audit effort for DB pension plan indeed mitigates earnings management through pension accounting. To address the question, we examine the association between additional audit fees charged for auditing financial statements of clients with DB pension plans (hereafter, additional fees for DB pension plans) and the extent of income-increasing manipulations of DB pension estimates.

On the one hand, the additional audit effort for DB pension plans can facilitate identifying and mitigating earnings management through pension accounting. In this case, the magnitude of income-increasing manipulations of DB pension estimates

should be negatively associated with additional audit fees for the DB pension plans.[8] On the other hand, pension accounting estimates are highly complicated and challenging for auditors and thus audit effort may not be effective in constraining the manipulation in these estimates. In such scenario, there should be no significant association between additional audit fees and the magnitude of income-increasing manipulations of DB pension estimates. In light of the above discussion, we are unable to make a signed prediction. Therefore, our third hypothesis is expressed in the null form:

> **H3:** There is no significant association between the extent of income-increasing manipulations of DB pension accounting estimates and additional audit fees for DB pension plans.

## 3. Data and Sample

### 3.1 Data and Variables

This study focuses on post-SOX period because regulators are primarily concerned about pension accounting auditing in the post-SOX period and post-SOX period and pre-SOX period are not comparable due to the significant institutional changes such as internal control auditing requested by SOX 404. As SOX 404 is effective from

[8] Prior research suggests that auditors are likely to be sued or suffer reputation damage if they fail to identify earnings inflation of their clients, while they are usually not penalized for failure to identify earnings deflation of clients (St. Pierre and Anderson 1984; Kellogg 1984). Therefore, auditors are primarily concerned about overstatement of clients' earnings (DeFond and Jiambalvo 1993; Nelson et al. 2002; Caramanis and Lennox 2008). Accordingly, we expect auditors to be especially concerned about income-increasing manipulations rather than income-decreasing manipulations of DB pension accounting estimates.

2004, our sample period starts from 2004. We obtained the audit fee data from the Audit Analytics database which provides detailed audit information for a large span of accounting firms and publicly registered companies. The pension data were collected from the Compustat Pension Annual files, which provide detailed information about the pension items for firms that sponsor DB pension plans. Firm financial information was obtained from the Compustat Fundamental Annual files. Our sample spans the period 2004 to 2012.

We employ the audit fee model developed by Simunic (1980) and define log audit fees ($LAFEE_{i,t}$) as the natural log of the dollar amount of audit fees a firm *i* pays its auditor for auditing that firm's financial statements for fiscal year *t*. Following prior research (e.g., Shivdasani and Stefanescu 2010; Chang et al. 2013), we define the DB dummy ($DUMDB_{i,t}$) as a dummy variable equal to one if firm *i* sponsors a DB pension plan in fiscal year *t* (i.e., if firm *i* has non-missing pension assets and liabilities in the Compustat Pension Annual files in fiscal year *t*), and zero otherwise.

Since firms sponsoring DB pension plans have an obligation to pay promised future pension benefits, such firms have high financial risk when their pension plan assets are insufficient to pay pension obligations. In turn, high financial risk can lead to higher audit fees (e.g., Simunic 1980; Hay et al. 2006). To rule out this alternative explanation, we control for pension plan deficit (*DEF*). Following prior research (Franzoni and Marin 2006), we calculate *DEF* as the gap between projected pension obligations and pension plan assets in a DB pension plan scaled by sponsoring firm's total assets. For the firms that do not sponsor DB pension plans we set *DEF* equal to

zero, as these firms do not promise future pension benefits.

The selection of other control variables follows prior literature on audit pricing (e.g., Johnstone and Bedard 2003; Gul and Goodwin 2010; Bentley et al. 2013). These variables include Big four dummy *(BIG4*), auditor industry specialist dummy (*SPEC*), log auditor tenure (*LTNR*), audit opinion (*OPINION*), fiscal year-end dummy (*YE*), restatement dummy (*REST*), accruals earnings management (*ACCR*), firm size (*SIZE*), market-to-book (*MB*), leverage (*LEV*), return on assets (*ROA*), tangibility (*TANG*), foreign sales (*FRSALE*), log number of segments (*LSEG*), receivable and inventory ratio (*RECINV*), log non-audit fees (*LNAFEE*), accelerated filer dummy (*ACCLR*), and internal control weakness dummy (*ICW*). Detailed definitions of these variables are presented in Appendix 1. Following common practice, we winsorize each variable (except for the dummy variables) at both the upper and lower one-percentile to mitigate the effect of outliers.

### 3.2 Propensity Score Matching

Because firms have discretion in choosing pension plan type, self-selection bias is a potential concern in our study. Comparison between DB and non-DB firms in Appendix 2 does suggest that these two types of firms have different characteristics. For example, DB firms, on average, are larger and more profitable than non-DB firms. Further, DB firms have lower market-to-book, higher leverage, higher tangibility, and greater proportion of foreign sales. In addition, DB firms, on average, are more likely to be audited by a Big 4 auditor or an industry specialist auditor.

To control for potential selection bias, we adopt a propensity score matching method. Propensity score matching controls for the selection bias resulting from the observed differences in firm characteristics without imposing structural form relation between the dependent variable and these characteristics (Tucker 2010; Lennox et al. 2012). In the first step, we estimate the probability that a firm sponsors a DB pension plan using a probit regression. Following the suggestion of Shipman et al. (2017), we include all the control variables listed in Section 3.1 (except for pension deficit) in the regression.[9] The results of the probit regression are presented in Panel A of Appendix 3 and are generally consistent with the comparison of firm characteristics in Appendix 2.

In the second step, we compute the propensity of having DB pension plans as the fitted value from the probit regression in the first step. In the last step, we match each DB firm with a non-DB firm in the same year with the closest propensity score. Our final sample consists of 26,666 firm-year observations, in which 13,333 are DB firms and 13,333 are matched non-DB firms. Panel B of Appendix 3 presents the comparison of propensity scores between DB and matched non-DB firms. The panel shows that there is no statistically significant difference in the means of propensity scores between these two groups (*p*-value =0.931). The comparable propensity scores for the two groups suggest the good fit of the matching (Tucker 2010; Lennox et al. 2012; Kim et al. 2017).

[9] Shipman et al. (2017) emphasize that propensity score matching should not include variables in the matching stage that are excluded in the baseline regression model (audit fee model in our case). Our findings are robust if we use in the matching stage the variables associated with pension plan selection, which are identified in Shivdasani and Stefanescu (2010).

### 3.3 Summary Statistics

Table 1 presents summary statistics of the variables. The table shows that the mean and median log audit fees are 7.415 ($US 1.66 million) and 7.434 ($US 1.693 million), respectively. The mean DB dummy is 0.500 because we require a one-for-one matching between DB firms and matched non-DB firms. Approximately 86.2% of the sample firms are audited by Big Four auditors, and 29.1% of the sample firms are audited by a specialist auditor in their industry. Further, a typical firm in our sample has a market-to-book ratio of 2.337, and a leverage ratio of 0.198.

Table 2 reports the correlation matrix of the variables. The table shows that the log audit fee is positively and significantly associated with the DB dummy (Pearson correlation coefficient=0.05, *p*-value<0.01). The table also reveals that a number of variables are substantially correlated with each other. To mitigate any potential multicollinearity concerns, we calculate the Variance Inflation Factor (VIF) of the variables. Noting that a VIF above 5 indicates a multicollinearity problem (O'Brien 2007), the (untabulated) results show that the highest VIF among the variables is 1.74, suggesting that multicollinearity is not a concern for our analysis.

## 4. Empirical Results

### 4.1 The Relation between DB Pension Plans and Audit Fees

In this section, we use regression analysis to examine the relation between DB pension plans and audit fees. The baseline regression specification is as follows.

$$
\begin{aligned}
LAFEE_{i,t} &= \beta_0 + \beta_1 \cdot DUMDB_{i,t} + \beta_2 \cdot DEF_{i,t} + \beta_3 \cdot BIG4_{i,t} + \beta_4 \cdot SPEC_{i,t} \\
&+ \beta_5 \cdot LTNR_{i,t} + \beta_6 \cdot OPINION_{i,t} + \beta_7 \cdot YE_{i,t} + \beta_8 \cdot REST_{i,t} + \beta_9 \cdot ACCR_{i,t} \\
&+ \beta_{10} \cdot SIZE_{i,t} + \beta_{11} \cdot MB_{i,t} + \beta_{12} \cdot LEV_{i,t} + \beta_{13} \cdot ROA_{i,t} + \beta_{14} \cdot TANG_{i,t} \\
&+ \beta_{15} \cdot FRSALE_{i,t} + \beta_{16} \cdot LSEG_{i,t} + \beta_{17} \cdot RECINV_{i,t} + \beta_{18} \cdot LNAFEE_{i,t} \\
&+ \beta_{19} \cdot ACCLR_{i,t} + \beta_{20} \cdot ICW_{i,t} + Ind + Yr + \varepsilon_{i,t}
\end{aligned} \tag{1}
$$

where *i* denotes firm, *t* denotes the year, and $\varepsilon$ is the error term. The dependent variable is log audit fees (*LAFEE*), which is defined as the natural log of the dollar amount of audit fees a firm pays its auditor for auditing that firm's financial statements over the fiscal year. The explanatory variable of interest is the DB dummy (*DUMDB*) which equals one if the firm sponsors a DB pension plan, and zero otherwise. Other variables are defined in Section 3.1 and Appendix 1. To control for industry fixed effects, we include industry dummies (*Ind*) based on two-digit SIC codes. We also include year dummies (*Yr*) to control for year fixed effects in audit pricing. The standard errors are adjusted for heteroskedasticity and clustering at firm level.

The regression results are presented in Table 3, showing that the coefficient of the DB dummy is positive and statistically significant (*t*-statistic=2.968, *p*-value<0.01).[10] This finding provides support for H1, which predicts that auditors charge higher audit fees for clients with DB pension plans than clients without DB plans. As we include the variable of pension plan deficit (*DEF*) in the model, the coefficient on DB dummy measures the average additional audit fees charged for clients with DB pension plans when there is no deficits in DB pension plans. The effect of DB pension plans on the audit fees is economically meaningful. Specifically, the magnitude of the coefficient

[10] All reported *p*-values are for two-tailed tests.

suggests that, all else being equal, auditors charge audit fees that are, on average, 8% higher for auditing financial statements of clients with DB pension plans than for clients without DB pension plans. The results for the control variables are largely consistent with economic intuition and prior literature (e.g., Johnstone and Bedard 2003; Gul and Goodwin 2010; Krishnan and Sengupta 2011; Bentley et al. 2013). For example, the positive coefficient on pension plan deficit *(DEF)* suggests that auditors charge higher fees for clients with DB pension plans when the plans are in greater deficits.

To further address potential self-selection in pension plans, we conduct three (untabulated) robustness tests. In the first test, we conduct changes analysis based on our baseline model. Changes analysis removes time-invariant unobservable client characteristics which could be associated with both audit fees and the selection of pension plan type. The coefficient for change in the DB dummy captures the average change in audit fees when a client starts sponsoring a DB pension plan.[11] In the second test, we include a number of additional institutional ownership and board characteristics controls, which could potentially influence both client firm demand for auditing services (and thus, the amount of audit fees) and the choice of pension plan type.[12] In the third test, we estimate our model on the full sample instead of the

[11] See Woolridge (2002) for the discussion of changes analysis with explanatory dummy variables. As an alternative to changes analysis, we also estimated our baseline model with firm fixed effects. The results (untabulated) show that the coefficient for the DB dummy remains positive and significant.

[12] Our selection of corporate governance controls follows prior research (e.g., Chen et al. 2015) and includes ownership by dedicated institutional investors (*DEDIO*), the governance index (*GINDEX*), board independence (*BIDP*), CEO unity (*CEOUNI*), audit committee size (*ACSIZE*), and audit committee busyness (*ACBUSY*). The data of the governance index and board characteristics is available in RiskMetrics which only covers S&P 1500 firms. With corporate governance controls, the sample size reduces from 26,666 observations to 9,198 observations. Therefore, due to concerns for restricted sample, we do not include these variables in our main tests. For construction of these variables, please

propensity score matched sample.[13] We use Heckman (1979) approach with Heckman's lambda included as a self-selection control in the regression. All other variables are the same as in Eq. (1). In each of the three tests, the coefficient of DB dummy is positive and significant, providing further reassurance that our findings are not driven by self-selection of pension plan type.

### 4.2 The Relation between DB Pension Plans and Audit Fees: The Effect of Client Firm Incentives to Manage Earnings

In this section, we explore whether the documented effect of DB plans on audit fees is stronger when clients have greater incentives to manage earnings. Specifically, H2.a and H2.b predict that the effect of DB pension plans on audit fees is amplified for clients with higher earnings' sensitivity to pension estimates and higher sensitivity of management compensation to the stock price volatility (vega), respectively.

To test H2.a, we modify our baseline model to include the interaction term between the DB dummy and the pension sensitivity measure. For completeness, we consider four alternative pension sensitivity measures suggested by Bergstresser et al. (2006) which we label *PSEN1*, *PSEN2*, *PSEN3*, and *PSEN4*, respectively. *PSEN1* is defined as the log of pension plan assets over total assets. *PSEN2* is defined as the log of pension plan assets over operating income. *PSEN3* is defined as the log of projected pension obligations over operating income. *PSEN4* is defined as the log of pension plan assets over three-year moving average operating income. For each of the

refer to Appendix 1.

[13] The sample of this test is the same as that used in Appendix 2 (i.e., 39,640 firm-year observations).

four measures, higher value indicates greater sensitivity of the firm's reported profits to pension estimates.

The results are presented in Table 4, where Columns (1) to (4) report the results for each of the four alternative pension sensitivity measures, respectively. The results show that the coefficient of the interaction term is positive and statistically significant for each of the four pension sensitivity measures (smallest *t*-statistic=3.690, *p*-value<0.01).[14] The findings suggest that the documented effect of DB pension plans on audit fees is amplified for clients whose earnings are more sensitive to pension estimates, and thus provide support for H2.a.

To test H2.b, we modify our baseline model to include the interaction term between the DB dummy and vega. Following prior research (Core and Guay 2002; Armstrong et al. 2013), we calculate vega as the log of the dollar change in the top five management's option holdings in response to 0.01 unit change in stock return volatility. We obtained the management compensation data from the ExecuComp database, which contains detailed information on the option compensation of top management for S&P 1500 firms.

The regression results are presented in Column (1) of Table 5. The coefficient for the interaction term between the DB dummy and vega is positive and significant (*t*-statistics=2.734, *p*-value<0.01), suggesting that the effect of DB plans on audit fees is amplified for clients with higher vega. For robustness purposes, we further modify our baseline model to include the interaction between the DB dummy and the

[14] Using *PSEN2*, *PSEN3*, and *PSEN4* measures results in a slight reduction in sample sizes for these tests, because the three measures impose additional data restrictions such as positive operating income or positive three-year moving average operating income.

sensitivity of management compensation to stock price (delta).[15] The results are reported in Column (2) of Table 5. The coefficient for the interaction term between the DB dummy and vega remains positive and statistically significant. Overall, the results are consistent with H2.b, which predicts that the effect of DB pension plans on audit fees is amplified for clients with higher vega.

In sum, the results reported in this section provide a strong support for our prediction that the effect of DB pension plans on audit fees is amplified when clients have stronger incentives to manage earnings. These findings are consistent with the view that the higher fees charged for auditing financial statements of clients sponsoring DB pension plans reflect increased auditors' efforts to curb potential earnings management through DB pension accounting.

### 4.3 Additional Audit Fees for DB Pension Plans and Abnormal Assumed Return Rates on Pension Assets

As discussed earlier, the documented effect of DB pension plans on audit fees is consistent with auditors increasing their effort to mitigate manipulations of pension accounting estimates. In this section, we examine whether increased audit effort indeed mitigates earnings management through manipulation of pension accounting estimates. To address this question, we examine the relation between the extent of

[15] Armstrong et al. (2013) show that delta has two countervailing effects on managers' incentives to manage earnings. On the one hand, earnings management inflates stock price, and this effect encourages managers with high delta to manipulate earnings. On the other hand, earnings management increases equity risk, and this effect discourages managers with high delta from managing earnings. Therefore, we cannot provide directional predictions regarding the effect of delta on the DB pension plan–audit fees relation. Instead, we include delta in our analysis as an additional control for assessing the robustness of our results for vega.

income-increasing manipulations in the DB pension accounting estimates and the additional fees charged for auditing financial statements of clients with DB pension plans (hereafter, additional fees for DB plans). Specifically, we reason that if increased audit effort indeed alleviates earnings management through pension accounting, we should observe a negative association between the additional fees for DB plans (which proxy for increased audit effort) and the extent of the income-increasing manipulations in the DB pension plan estimates.

To test this conjecture, we investigate the relation between the abnormal assumed rate of return on pension assets and the additional audit fees for the DB pension plans. A higher assumed rate of return on pension assets reduces pension expenses, and thus inflates reported earnings.[16] We estimate the following regression model:

$$\begin{aligned} ABPPROR_{i,t} &= \beta_0 + \beta_1 \cdot ABLAFEE_{i,t} + \beta_2 \cdot PSEN1_{i,t} + \beta_3 \cdot M\&A_{i,t} \\ &+ \beta_4 \cdot BEAT_{i,t} + \beta_5 \cdot SIZE_{i,t} + \beta_6 \cdot MB_{i,t} + \beta_7 \cdot LEV_{i,t} + Ind + Yr + \varepsilon_{i,t} \end{aligned} \quad (2)$$

The dependent variable, *ABPPROR*, is the abnormal assumed return rate on pension assets. As accounting standards (SFAS 87) specify that the actual return rate of pension assets is an important benchmark for the assumed return rate of pension assets, we calculate *ABPPROR* by first regressing the assumed rate of return on pension assets (*PPROR*) against both concurrent and lagged actual rate of return on pension assets (*PBRRR*), and then taking the residuals of the regression.[17] The

[16] The annual cost of DB plans is mainly determined by three primary calculations: a service cost, an interest cost, and an offsetting assumed return on pension plan assets. While firms enjoy substantial latitude in choosing the assumed return on pension plan assets, they have limited discretion over their reported service and interest costs (Bergstresser et al. 2006). This observation, coupled with prior empirical evidence of managers opportunistically choosing the assumed return rate on pension plan assets (e.g., Bergstresser et al. 2006; Comprix and Muller III 2006; An et al. 2014), motivates our choice of abnormal expected return rate on pension plan assets as the proxy for the extent of earnings management through pension accounting.

[17] The estimates of the regression are presented in Appendix 4.

explanatory variable of interest, *ABLAFEE*, is the additional audit fees for DB plans. We measure *ABLAFEE* as the unexplained portion of audit fees after controlling for audit fee determinants other than DB dummy. Specifically, we estimate audit fee model (Equation (1)) without DB dummy (*DUMDB*) for the whole sample and measure *ABLAFEE* as the residual of the regression for observations with DB pension plans.[18] We follow Bergstresser et al. (2006) in selecting the control variables. Specifically, we include pension sensitivity measured with *PSEN1*, as Bergstresser et al. (2006) show that higher pension sensitivity results in larger manipulation incentives for pension accounting.[19] We also include the M&A dummy (*M&A*) and beating prior year earnings dummy (*BEAT*) as controls, as Bergstresser et al. (2006) show that firms prior to M&A and firms beating prior year earnings are more likely to manipulate pension accounting. We further include firm size (*SIZE*), market-to-book (*MB*), and leverage (*LEV*) to control for client characteristics. The sample size for this test is reduced to 12,796 observations due to availability of data required to estimate *ABPPROR*.

The regression results are presented in Column (1) of Table 6, showing that additional audit fees for DB plans are negatively and significantly associated with the abnormal assumed return rate on pension plan assets (*t*-statistic=-3.394, *p*-value<0.01).

[18] We do not measure *ABLAFEE* as the coefficient on the DB dummy in Equation (1) for two reasons. First, the coefficient on the DB dummy does not measure the additional audit fees for a specific client with DB pension plan, but the average additional audit fees charged for all the clients with DB pension plans, Second, if we measured *ABLAFEE* as the coefficient on DB dummy, there was no variation for the variable of *ABLAFEE* in Equation (2), and Equation (2) could not be estimated because the observations used to estimate Equation (2) all have DB pension plans for the availability of the variable of *ABPPROR*.

[19] Our results are qualitatively the same if we control for pension sensitivity using *PSEN2*, *PSEN3* or *PSEN4* measures.

These findings suggest that increased audit effort (as reflected in the additional fees for DB plans) indeed mitigates earnings management though pension accounting estimates.[20]

Prior research suggests that auditors primarily exert effort to correct manipulations aimed at overstatement of reported earnings (DeFond and Jiambalvo 1993; Nelson et al. 2002; Caramanis and Lennox 2008). Accordingly, we expect the negative association between the abnormal assumed return rate on pension assets and additional audit fees to be concentrated in the sub-sample of positive abnormal assumed return rates. To test this conjecture, we first partition the sample into two groups, based on sign of abnormal assumed return rates. Next, we estimate Equation (2) for each of the two sub-samples. To account for potential truncation bias resulting from sample partitioning, we estimate the models using Tobit regression (Ashbaugh-Skife et al. 2008).

The results are reported in Columns (2) and (3) of Table 6, for the sub-samples of positive and negative abnormal assumed rates of return, respectively. Column (2) shows that the coefficient for additional audit fees is negative and statistically significant (*z*-statistic=-2.382, *p*-value=0.017). In contrast, Column (3) shows that the coefficient for additional audit fees in the sub-sample with negative abnormal assumed return rates is statistically insignificant (*z*-statistic=-0.585, *p*-value=0.558).

[20] A potential concern is that the additional audit fees may reflect risk premium but not additional audit effort (Pratt and Stice 1994; Bell et al. 2008). However, if the additional audit fees for DB pension plans mainly reflect risk premium, additional audit fees should be *positively* associated with the magnitude of the manipulation in DB pension estimates, because the manipulation increases the audit risk for the auditors. Hence, the documented negative association between the additional audit fees and the manipulation in DB pension estimates suggests that, in our setting, the additional audit fees are unlikely to reflect risk premium.

The results suggest that our findings with regard to the full sample are mainly driven by firms with positive abnormal assumed return rates on pension plan assets (i.e., clients that engage in income-increasing manipulations of pension accounting estimates). These results provide further support for our conclusion that increased audit effort mitigates earnings management through pension accounting by client firms. Our findings are also consistent with prior literature suggesting that auditors are mainly concerned about earnings inflation, but not earnings deflation (DeFond and Jiambalvo 1993; Nelson et al. 2002; Caramanis and Lennox 2008).

## 5. Conclusions and Directions for Further Research

In this paper, we examine the effect of corporate pension plans on audit pricing. Using a large sample of U.S. firms for the period 2004-2012, we document that auditors charge higher audit fees for auditing financial statements of clients with DB pension plans, as compared to those without DB pension plans. The documented effect of DB pension plans on audit fees is more pronounced when client earnings are more sensitive to DB pension estimates, or when manager compensation induces more risk taking. Furthermore, we find that the additional audit fees charged for clients sponsoring DB pension plans are negatively associated with the extent of manipulation in the assumed return rates—an important DB pension accounting estimate. Collectively, our results are consistent with the view that auditors charge higher fees to compensate for additional effort when auditing financial statements of clients who sponsor DB pension plans. Further, our findings suggest that auditors

consider clients' incentives to manipulate pension accounting in adjusting their effort and that increased audit effort mitigates pension accounting manipulations.

Our study extends the literature on the effects of corporate pension plans on business decisions. A growing strand of literature examines how pension plans affect sponsoring corporations' investment and financing decisions (e.g., Rauh 2006; Shivdasani and Stefanescu 2010; Cocco and Volpin 2013; Chaudhry et al. 2017). However, little is known about whether pension plans influence auditors' decisions. Our study addresses this gap in the literature. Furthermore, our study should be informative for regulators who have recently expressed concerns regarding the auditing of pension accounting. Our results suggest that auditors do consider audit risk in pension accounting and exert more effort in attesting financial statements of clients sponsoring DB pension plans than those without DB pension plans. Furthermore, our findings indicate that increased audit effort curbs manipulations of pension estimates.

We conclude by suggesting several avenues for future research. First, listed firms can disclose information related to pension accounting in the footnotes of their financial statements. For example, firms can disclose the sensitivity of pension plans to critical estimates, qualitative and quantitative information on critical estimates, and target and actual allocation of pension plan assets. The detailed disclosure can help financial statement users to assess the validity of pension estimates and thus mitigate managers' incentive to manipulate pension estimates. Therefore, it could be worthwhile to examine whether and to what extent the footnote disclosures related to

pension accounting reduce audit risk and influence audit pricing. Second, PCAOB conducts regular inspections of the engagements of audit firms (DeFond and Lennox 2017). If PCAOB inspectors report higher rates of deficiencies related to pension accounting auditing, the inspected auditors might become more cautious in pension accounting auditing and provide higher quality following the inspections. We leave these issues for future research.

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**TABLE 1. Summary Statistics**

This table presents the summary statistics of the variables. Variable definitions are presented in Appendix 1.

| Variable | Mean | S.D. | 25% | Median | 75% |
|---|---|---|---|---|---|
| *LAFEE* | 7.415 | 1.322 | 6.575 | 7.434 | 8.310 |
| *DUMDB* | 0.500 | 0.500 | 0.000 | 0.500 | 1.000 |
| *DEF* | 0.013 | 0.029 | 0.000 | 0.000 | 0.011 |
| *BIG4* | 0.862 | 0.345 | 1.000 | 1.000 | 1.000 |
| *SPEC* | 0.291 | 0.454 | 0.000 | 0.000 | 1.000 |
| *LTNR* | 2.072 | 0.908 | 1.386 | 2.079 | 2.773 |
| *OPIN* | 0.406 | 0.491 | 0.000 | 0.000 | 1.000 |
| *YE* | 0.739 | 0.439 | 0.000 | 1.000 | 1.000 |
| *REST* | 0.176 | 0.381 | 0.000 | 0.000 | 0.000 |
| *ACCR* | 0.044 | 0.055 | 0.011 | 0.028 | 0.057 |
| *SIZE* | 7.965 | 2.027 | 6.607 | 7.838 | 9.355 |
| *MB* | 2.337 | 3.004 | 1.127 | 1.787 | 2.842 |
| *LEV* | 0.198 | 0.182 | 0.045 | 0.162 | 0.298 |
| *ROA* | 0.075 | 0.096 | 0.024 | 0.070 | 0.118 |
| *TANG* | 0.276 | 0.258 | 0.050 | 0.187 | 0.459 |
| *FRSALE* | 0.311 | 0.411 | 0.000 | 0.079 | 0.542 |
| *LSEG* | 1.267 | 1.041 | 0.000 | 1.099 | 2.197 |
| *RECINV* | 0.296 | 0.221 | 0.112 | 0.248 | 0.426 |
| *LNAFEE* | 5.399 | 2.152 | 4.328 | 5.645 | 6.881 |
| *ACCLR* | 0.847 | 0.360 | 1.000 | 1.000 | 1.000 |
| *ICW* | 0.035 | 0.183 | 0.000 | 0.000 | 0.000 |
| Obs. | | | 26,666 | | |

**TABLE 2. Correlation Matrix**

This table presents the correlation matrix of the variables. Variable definitions are presented in Appendix 1. Bold text denotes significance at the 1% level.

| | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* | *(9)* | *(10)* | *(11)* | *(12)* | *(13)* | *(14)* | *(15)* | *(16)* | *(17)* | *(18)* | *(19)* | *(20)* | *(21)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *(1) LAFEE* | 1.00 | | | | | | | | | | | | | | | | | | | | |
| *(2) DUMDB* | **0.05** | 1.00 | | | | | | | | | | | | | | | | | | | |
| *(3) DEF* | **0.10** | **0.44** | 1.00 | | | | | | | | | | | | | | | | | | |
| *(4) BIG4* | **0.51** | 0.00 | **0.06** | 1.00 | | | | | | | | | | | | | | | | | |
| *(5) SPEC* | **0.15** | 0.01 | 0.01 | **0.22** | 1.00 | | | | | | | | | | | | | | | | |
| *(6) LTNR* | **0.26** | **0.06** | **0.14** | **0.27** | **0.11** | 1.00 | | | | | | | | | | | | | | | |
| *(7) OPIN* | **0.17** | **0.03** | **0.02** | **0.14** | **0.02** | **0.06** | 1.00 | | | | | | | | | | | | | | |
| *(8) YE* | 0.01 | 0.02 | -0.01 | **-0.02** | **0.02** | **-0.14** | **-0.03** | 1.00 | | | | | | | | | | | | | |
| *(9) REST* | -0.01 | 0.02 | **0.02** | **-0.02** | -0.01 | **-0.05** | **0.09** | **-0.03** | 1.00 | | | | | | | | | | | | |
| *(10) ACCR* | **-0.09** | -0.01 | **0.03** | **-0.03** | **-0.05** | 0.01 | **0.04** | **-0.05** | **0.07** | 1.00 | | | | | | | | | | | |
| *(11) SIZE* | **0.76** | **-0.03** | **-0.08** | **0.37** | **0.18** | **0.09** | **0.05** | **0.12** | **-0.10** | **-0.23** | 1.00 | | | | | | | | | | |
| *(12) MB* | **0.06** | 0.00 | **0.02** | **0.07** | **0.02** | **0.08** | 0.01 | **-0.04** | **-0.03** | **0.03** | -0.01 | 1.00 | | | | | | | | | |
| *(13) LEV* | **0.17** | **-0.02** | **0.04** | **0.15** | -0.01 | -0.01 | **0.11** | **0.12** | **0.03** | 0.01 | **0.14** | **-0.03** | 1.00 | | | | | | | | |
| *(14) ROA* | **0.17** | -0.01 | **0.02** | **0.16** | **0.06** | **0.16** | 0.01 | **-0.07** | **-0.06** | **-0.10** | **0.11** | **0.25** | **-0.02** | 1.00 | | | | | | | |
| *(15) TANG* | **0.07** | **-0.05** | **0.02** | **0.16** | **0.04** | **0.05** | **0.10** | **0.08** | **-0.02** | **-0.03** | **0.11** | -0.01 | **0.35** | **0.07** | 1.00 | | | | | | |
| *(16) FRSALE* | **0.30** | 0.01 | **0.10** | **0.17** | **0.09** | **0.13** | **0.07** | **-0.06** | 0.00 | **0.06** | **0.09** | **0.07** | **-0.04** | **0.09** | 0.00 | 1.00 | | | | | |
| *(17) LSEG* | **0.18** | 0.01 | **0.08** | **0.18** | 0.01 | **0.15** | **0.23** | **-0.07** | **0.04** | **0.07** | 0.00 | **0.02** | **0.10** | **0.14** | **0.17** | **0.14** | 1.00 | | | | |
| *(18) RECINV* | **-0.26** | **0.02** | **-0.03** | **-0.29** | **-0.04** | **-0.18** | **-0.16** | **-0.04** | -0.01 | **-0.07** | **-0.11** | **-0.09** | **-0.30** | **-0.10** | **-0.54** | **-0.16** | **-0.25** | 1.00 | | | |
| *(19) LNAFEE* | **0.63** | **0.03** | **0.06** | **0.36** | **0.12** | **0.22** | **0.09** | **-0.04** | **-0.03** | **-0.07** | **0.53** | **0.07** | **0.12** | **0.13** | **-0.06** | **0.25** | **0.09** | **-0.10** | 1.00 | | |
| *(20)ACCLR* | **0.33** | **0.04** | **0.01** | **0.26** | **0.06** | **0.16** | **0.05** | **0.11** | 0.01 | **-0.04** | **0.25** | **0.04** | **0.08** | **0.10** | 0.01 | 0.00 | **-0.03** | **-0.10** | **0.12** | 1.00 | |
| *(21) ICW* | **0.04** | **0.03** | **0.03** | 0.00 | -0.01 | **-0.04** | **0.08** | 0.01 | **0.18** | **0.03** | **-0.05** | -0.01 | **0.03** | **-0.07** | -0.01 | 0.01 | **0.03** | 0.00 | -0.01 | **0.08** | 1.00 |

**TABLE 3. Audit Fees and Defined Benefit Pension Plans**

This table presents regression results for the relation between audit fees and defined benefit pension. *LAFEE* is log audit fees. *DUMDB* is defined as a dummy variable equal to one if the firm has defined benefit pension plans, and zero otherwise. Other variables are defined in Appendix 1. *t*-statistics (in parentheses) are computed using standard errors robust to both clustering at the firm level and heteroskedasticity. Constant term, year fixed-effects, and industry fixed-effects based on two-digit SIC codes are included. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

| Dependent Variable: | *LAFEE* | |
|---|---|---|
| | *Coeff.* | *t-statistics* |
| ***DUMDB*** | ***0.078*** | ***(2.968)****** |
| *DEF* | 2.275 | (7.098)*** |
| *BIG4* | 0.278 | (8.357)*** |
| *SPEC* | -0.047 | (-2.157)** |
| *LTNR* | 0.023 | (1.665)* |
| *OPIN* | 0.067 | (2.770)*** |
| *YE* | -0.017 | (-0.600) |
| *REST* | 0.125 | (5.889)*** |
| *ACCR* | 0.214 | (1.501) |
| *SIZE* | 0.465 | (35.867)*** |
| *MB* | 0.005 | (1.852)* |
| *LEV* | 0.241 | (3.167)*** |
| *ROA* | -0.418 | (-3.912)*** |
| *TANG* | -0.629 | (-7.330)*** |
| *FRSALE* | 0.224 | (5.494)*** |
| *LSEG* | 0.016 | (1.063) |
| *RECINV* | 0.244 | (2.976)*** |
| *LNAFEE* | 0.095 | (12.649)*** |
| *ACCLR* | 0.361 | (12.661)*** |
| *ICW* | 0.394 | (9.834)*** |
| Obs. | 26,666 | |
| $R^2$ | 0.825 | |

**TABLE 4. The Effect of Client's Earnings Sensitivity to Pension Estimates**

This table presents regression results for the moderating effects of client's earnings sensitivity to pension estimates. *LAFEE* is log audit fees. *DUMDB* is defined as a dummy variable equal to one if the firm has defined benefit pension plans, and zero otherwise. *PSEN1* is defined as the log of the ratio of pension plan assets over total assets. *PSEN2* is defined as the log of the ratio of pension plan assets over operating income. *PSEN3* is defined as the log of the ratio of projected pension obligations over operating income. *PSEN4* is defined as the log of the ratio of pension plan assets over three-year moving average operating income. Other variables are defined in Appendix 1. *t*-statistics (in parentheses) are computed using standard errors robust to both clustering at the firm level and heteroskedasticity. Constant term, year fixed-effects, and industry fixed-effects based on two-digit SIC codes are included in both regressions. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

| Dependent Variable: | *LAFEE* | *LAFEE* | *LAFEE* | *LAFEE* |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *DUMDB* | 0.288 | 0.117 | 0.111 | 0.108 |
| | (6.218)*** | (3.618)*** | (3.559)*** | (3.387)*** |
| ***DUMDB*PSEN1*** | ***0.055*** | | | |
| | ***(5.690)****** | | | |
| ***DUMDB*PSEN2*** | | ***0.041*** | | |
| | | ***(3.913)****** | | |
| ***DUMDB*PSEN3*** | | | ***0.042*** | |
| | | | ***(3.721)****** | |
| ***DUMDB*PSEN4*** | | | | ***0.038*** |
| | | | | ***(3.690)****** |
| *DEF* | 1.276 | 1.703 | 1.535 | 1.764 |
| | (4.262)*** | (5.025)*** | (4.226)*** | (5.212)*** |
| *BIG4* | 0.258 | 0.263 | 0.272 | 0.257 |
| | (7.511)*** | (7.470)*** | (7.870)*** | (7.319)*** |
| *SPEC* | -0.047 | -0.051 | -0.051 | -0.052 |
| | (-2.155)** | (-2.271)** | (-2.313)** | (-2.305)** |
| *LTNR* | 0.016 | 0.021 | 0.022 | 0.022 |
| | (1.141) | (1.422) | (1.577) | (1.516) |
| *OPIN* | 0.066 | 0.064 | 0.063 | 0.063 |
| | (2.641)*** | (2.493)** | (2.531)** | (2.449)** |
| *YE* | -0.032 | -0.032 | -0.026 | -0.031 |
| | (-1.094) | (-1.078) | (-0.895) | (-1.067) |
| *REST* | 0.130 | 0.125 | 0.126 | 0.127 |
| | (5.803)*** | (5.435)*** | (5.616)*** | (5.504)*** |

**TABLE 4 (cont.)**

| | | | | |
|---|---|---|---|---|
| *ACCR* | 0.294 | 0.303 | 0.286 | 0.336 |
| | (1.904)* | (1.809)* | (1.766)* | (2.042)** |
| *SIZE* | 0.470 | 0.470 | 0.470 | 0.472 |
| | (35.084)*** | (34.189)*** | (34.857)*** | (34.094)*** |
| *MB* | 0.004 | 0.005 | 0.005 | 0.005 |
| | (1.804)* | (2.097)** | (1.859)* | (2.067)** |
| *LEV* | 0.240 | 0.237 | 0.237 | 0.238 |
| | (3.084)*** | (2.943)*** | (2.984)*** | (2.940)*** |
| *ROA* | -0.475 | -0.382 | -0.364 | -0.405 |
| | (-4.137)*** | (-2.916)*** | (-2.786)*** | (-3.186)*** |
| *TANG* | -0.651 | -0.665 | -0.660 | -0.666 |
| | (-7.310)*** | (-7.247)*** | (-7.319)*** | (-7.259)*** |
| *FRSALE* | 0.221 | 0.213 | 0.213 | 0.212 |
| | (5.421)*** | (5.064)*** | (5.162)*** | (5.021)*** |
| *LSEG* | 0.015 | 0.017 | 0.016 | 0.017 |
| | (0.968) | (1.069) | (0.967) | (1.038) |
| *RECINV* | 0.208 | 0.192 | 0.198 | 0.193 |
| | (2.388)** | (2.168)** | (2.280)** | (2.176)** |
| *LNAFEE* | 0.092 | 0.093 | 0.092 | 0.093 |
| | (12.342)*** | (12.079)*** | (12.301)*** | (11.975)*** |
| *ACCLR* | 0.360 | 0.365 | 0.366 | 0.365 |
| | (12.345)*** | (12.219)*** | (12.549)*** | (12.157)*** |
| *ICW* | 0.412 | 0.398 | 0.395 | 0.398 |
| | (10.763)*** | (9.765)*** | (9.938)*** | (9.899)*** |
| Obs. | 25,216 | 24,376 | 25,105 | 24,296 |
| $R^2$ | 0.824 | 0.823 | 0.825 | 0.824 |

**TABLE 5. The Effect of Managerial Equity Risk-Taking Incentives**

This table presents regression results for the moderating effects of managerial equity risk-taking incentives. *LAFEE* is log audit fees. *DUMDB* is defined as a dummy variable equal to one if the firm has defined benefit pension plans, and zero otherwise. *VEGA* is management equity compensation vega, which is defined as the log of the dollar change in the management's option holdings in response to 0.01 unit change in stock return volatility. *DELTA* is management equity compensation delta, which is defined as the log of the dollar change in the management's stock and option holdings in response to 1% change in stock price. Other variables are defined in Panel B of Appendix 1. *t*-statistics (in parentheses) are computed using standard errors robust to both clustering at the firm level and heteroskedasticity. Constant term, year fixed-effects, and industry fixed-effects based on two-digit SIC codes are included in both regressions. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

| Dependent Variable: | *LAFEE* (1) | | *LAFEE* (2) | |
|---|---|---|---|---|
| | *Coeff.* | *t-statistics* | *Coeff.* | *t-statistics* |
| *DUMDB* | 0.079 | (1.362) | -0.082 | (-0.767) |
| ***DUMDB*VEGA*** | ***0.037*** | ***(2.734)****** | ***0.041*** | ***(2.060)**** |
| *VEGA* | 0.011 | (1.851)* | 0.019 | (1.833)* |
| *DUMDB*DELTA* | | | -0.013 | (-1.002) |
| *DELTA* | | | -0.021 | (-1.324) |
| *DEF* | 1.924 | (5.633)*** | 2.037 | (6.016)*** |
| *BIG4* | 0.108 | (2.175)** | 0.110 | (2.194)** |
| *SPEC* | -0.001 | (-0.053) | -0.002 | (-0.064) |
| *LTNR* | -0.005 | (-0.339) | -0.006 | (-0.414) |
| *OPIN* | 0.056 | (2.724)*** | 0.057 | (2.760)*** |
| *YE* | 0.029 | (1.012) | 0.028 | (0.959) |
| *REST* | 0.117 | (3.771)*** | 0.118 | (3.798)*** |
| *ACCR* | 0.227 | (1.501) | 0.224 | (1.475) |
| *SIZE* | 0.463 | (39.294)*** | 0.465 | (38.589)*** |
| *MB* | 0.002 | (0.661) | 0.002 | (0.662) |
| *LEV* | 0.128 | (1.589) | 0.130 | (1.614) |
| *ROA* | -0.570 | (-3.820)*** | -0.548 | (-3.849)*** |
| *TANG* | -0.512 | (-5.256)*** | -0.515 | (-5.270)*** |
| *FRSALE* | 0.327 | (7.876)*** | 0.327 | (7.898)*** |
| *LSEG* | 0.042 | (2.644)*** | 0.043 | (2.793)*** |
| *RECINV* | 0.274 | (2.177)** | 0.275 | (2.188)** |
| *LNAFEE* | 0.089 | (10.636)*** | 0.089 | (10.474)*** |
| *ACCLR* | 0.584 | (11.737)*** | 0.581 | (11.599)*** |
| *ICW* | 0.446 | (8.335)*** | 0.447 | (8.375)*** |
| Obs. | 11,420 | | 11,420 | |
| $R^2$ | 0.788 | | 0.789 | |

**TABLE 6. Abnormal Assumed Return Rates on Pension Assets and Additional Audit Fees for DB Pension Plans**

This table presents regression results of abnormal assumed return rates on pension assets and abnormal audit fees. *ABPPROR* is abnormal assumed rate of return on plan assets, which is measured as the residual from the regression in Appendix 4. *ABLAFEE* is additional audit fees charged for DB pension plans. Other variables are defined in Appendix 1. *t*-statistics in Column (1) and *z*-statistics in Columns (2) and (3) are computed using standard errors robust to both clustering at the firm level and heteroskedasticity. Constant term, year fixed-effects and, industry fixed-effects based on two-digit SIC codes are included in both regressions. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

| | Full Sample | Tobit Regression using Positive *ABPPROR* | Tobit Regression using Negative *ABPPROR* |
|---|---|---|---|
| Dependent Variable: | *ABPPROR* | *ABPPROR* | *ABPPROR* |
| | (1) | (2) | (3) |
| ***ABLAFEE*** | ***-0.197*** | ***-0.085*** | ***-0.043*** |
| | ***(-3.394)****** | ***(-2.382)**** | ***(-0.585)*** |
| *PSEN1* | 0.416 | 0.054 | 0.277 |
| | (13.942)*** | (4.960)*** | (7.483)*** |
| *M&A* | 0.056 | 0.006 | 0.066 |
| | (1.483) | (0.362) | (1.094) |
| *BEAT* | 0.363 | 0.020 | 0.351 |
| | (7.579)*** | (1.168) | (4.776)*** |
| *SIZE* | -0.032 | 0.018 | -0.066 |
| | (-1.482) | (2.329)** | (-2.482)** |
| *MB* | -0.007 | -0.002 | -0.008 |
| | (-0.984) | (-0.728) | (-0.712) |
| *LEV* | 1.023 | 0.082 | 0.992 |
| | (5.020)*** | (1.115) | (3.418)*** |
| Obs. | 9,187 | 5,840 | 3,347 |
| $R^2$ | 0.146 | - | - |
| Log Likelihood | - | -2872.083 | -5154.253 |

**APPENDIX 1. Variable Definitions**

| |
|---|
| *ABLAFEE* = Additional audit fees charged for DB pension plans. We estimate Equation (1) without the DB dummy (*DUMDB*) for the whole sample and measure *ABLAFEE* as the residual of the regression for observations with DB pension plans. |
| *ABPPROR* = Abnormal assumed rate of return on plan assets, defined as the residual from the regression in Appendix 4. |
| *ACBUSY* = Audit committee busyness, defined as the proportion of directors in the audit committee that hold more than one outside directorship. |
| *ACCR* = Accruals earnings management, defined as the absolute value of discretionary accruals estimated following Dechow et al. (1995). |
| *ACCLR* = Accelerated filer dummy, defined as a dummy variable equal to one if the firm is an accelerated filer, and zero otherwise. |
| *ACSIZE* = Audit committee size, defined as the log of the number of directors in the audit committee. |
| *BEAT* = Beating the prior year earnings dummy, defined as a dummy variable equal to one if the ratio of change in net income (Compustat item NI) over book assets (Compustat item AT) falls between 0 and 0.01, and zero otherwise. |
| *BIDP* = Board independence, defined as the proportion of independence directors in the board. |
| *BIG4* = Big Four dummy, defined as a dummy variable equal to one if the firm is audited by one of the Big Four auditors, and zero otherwise. |
| *CEOUNI* = CEO unity, defined as a dummy variable equal to one if the CEO and the Chairman of the board are same and zero otherwise. |
| *DEF* = Pension deficits, defined as (projected pension obligations (Compustat item PBPRO) - pension plan assets (Compustat item PPLAO)) / book assets (Compustat item AT). We set a firm's pension deficits to zero if the firm does not have a defined benefit pension plan. |
| *DELTA* = Management equity compensation delta; defined as the log of the dollar change in the management's stock and option holdings in response to 1% change in stock price. |
| *DUMDB* = DB dummy, defined as a dummy variable equal to one if the firm has defined benefit pension plans, and zero otherwise. |
| *FRSALE* = Foreign sales, defined as the proportion of sales by foreign segments. |
| *GINDEX* = Governance index, estimated following Gompers et al. (2003). |
| *ICW* = Internal control weakness dummy, define as a dummy variable equal to one if the firm discloses internal control weakness, and zero otherwise. |
| *LAFEE* = Log audit fees. Audit fees are the fees paid to the auditor for auditing the firm's financial statements. |
| *LEV* = Leverage, defined as long-term debt (Compustat item DLTT) / total assets (Compustat item AT). |
| *LNAFEE* = Log non-audit fees. Non-audit fees are the fees paid to the auditor for non-audit services. |
| *LSEG* = Log number of segments. Number of segments is the number of business segments within the firm. |
| *LTNR* = Log auditor tenure. Auditor tenure is the number of years the firm has retained its |

current auditor.

*M&A* = M&A dummy, defined as a dummy variable if the firm has been an acquirer during the fiscal year, and zero otherwise.

*MB* = Market-to-book, defined as (stock price (Compustat item PRCC_F) * shares outstanding (Compustat item CSHPRI)) / book equity (Compustat item CEQ).

*OPIN* = Audit opinion, defined as a dummy variable equal to one if the audit opinion is not a standard, unqualified opinion, and zero otherwise.

*PBRRR* = Actual rate of return on plan assets, defined as the ratio of actual return on plan assets (Compustat item PBARAT) over pension plan assets (Compustat item PPLAO).

*PPROR* = Assumed rate of return on plan assets (Compustat item PPROR), defined as the firm's assumption about anticipated rates earned by its pension plan assets.

*PSEN* = Sensitivity measure of firm's earnings to pension estimates following Bergstresser et al. (2006).

*RECINV* = Receivable and inventory ratio, defined as (accounts receivable (Compustat item RECT) + inventory (Compustat item INVT)) / total assets (Compustat item AT).

*REST* = Restatement dummy, defined as a dummy variable equal to one if the firm restates its financial statements in the preceding three years, and zero otherwise.

*ROA* = Return on assets, defined as operating income after depreciation (Compustat item OIADP) / total assets (Compustat item AT).

*SIZE* = Firm size, defined as the log of total assets (Compustat item AT).

*SPEC* = Auditor industry specialist dummy, defined as a dummy variable equal to one if the firm's auditor is an industry specialist, and zero otherwise. Industry specialist is defined as the auditor with the largest market share by client assets in the industry based on the two-digit SIC code.

*TANG* = Tangibility, defined as property, plant, and equipment (Compustat item PPENT) / total assets (Compustat item AT).

*VEGA* = Management equity compensation vega, defined as the log of the dollar change in the management's option holdings in response to 0.01 unit change in stock return volatility.

*YE* = Fiscal year-end dummy, defined as a dummy variable equal to one if the firm's fiscal year end is December, and zero otherwise.

**APPENDIX 2. Comparison of Firm Characteristics**

This table presents the comparison of firm characteristics between DB and non-DB firms. *DUMDB* is defined as a dummy variable equal to one if the firm has defined benefit pension plans, and zero otherwise. Other variables are defined in Appendix 1. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

| Variable | DB Firms (*DUMDB*=1) | Non-DB Firms (*DUMDB*=0) | Difference between the two Groups |
|---|---|---|---|
| *BIG4* | 0.863 | 0.651 | 0.212*** |
| *SPEC* | 0.294 | 0.195 | 0.099*** |
| *LTNR* | 2.127 | 1.683 | 0.444*** |
| *OPIN* | 0.419 | 0.321 | 0.098*** |
| *YE* | 0.746 | 0.730 | 0.016*** |
| *REST* | 0.182 | 0.200 | -0.018*** |
| *ACCR* | 0.043 | 0.076 | -0.033*** |
| *SIZE* | 7.899 | 5.737 | 2.162*** |
| *MB* | 2.335 | 2.558 | -0.223*** |
| *LEV* | 0.195 | 0.139 | 0.056*** |
| *ROA* | 0.073 | -0.022 | 0.095*** |
| *TANG* | 0.263 | 0.119 | 0.144*** |
| *FRSALE* | 0.315 | 0.215 | 0.100*** |
| *LSEG* | 1.279 | 1.009 | 0.270*** |
| *RECINV* | 0.301 | 0.284 | 0.017*** |
| *LNAFEE* | 5.458 | 3.773 | 1.685*** |
| *ACCLR* | 0.861 | 0.664 | 0.197*** |
| *ICW* | 0.039 | 0.052 | -0.013*** |
| Obs. | 13,333 | 26,307 | - |

## APPENDIX 3. Propensity Score Matching

Panel A of this table presents the model of pension plan choice used in propensity score matching. Panel B of this table presents the comparison of propensity scores between DB firms and their matched non-DB firms. *DUMDB* is defined as a dummy variable equal to one if the firm has defined benefit pension plans, and zero otherwise. Other variables are defined in Appendix 1. The regression is estimated using Probit model. *z*-statistics are computed using standard errors robust to both clustering at the firm level and heteroskedasticity. Constant term, year fixed-effects, and industry fixed-effects based on two-digit SIC codes are included. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

**Panel A. Regression Model**

| Dependent Variable: | *DUMDB* | |
|---|---|---|
| | *Coeff.* | *z-statistics* |
| *BIG4* | 0.009 | (0.160) |
| *SPEC* | -0.028 | (-0.738) |
| *LTNR* | 0.168 | (8.564)*** |
| *OPIN* | 0.169 | (6.852)*** |
| *YE* | -0.010 | (-0.194) |
| *REST* | 0.041 | (1.302) |
| *ACCR* | -0.816 | (-4.780)*** |
| *SIZE* | 0.245 | (16.046)*** |
| *MB* | -0.005 | (-1.011) |
| *LEV* | 0.231 | (2.245)** |
| *ROA* | 0.685 | (4.925)*** |
| *TANG* | 0.465 | (3.721)*** |
| *FRSALE* | 0.199 | (3.850)*** |
| *LSEG* | 0.146 | (6.659)*** |
| *RECINV* | 0.821 | (6.368)*** |
| *LNAFEE* | 0.062 | (6.533)*** |
| *ACCLR* | 0.096 | (2.158)** |
| *ICW* | -0.155 | (-3.574)*** |
| Obs. | 39,640 | |
| $R^2$ | 0.295 | |

**Panel B. Comparison of Propensity Score**

| Variable | DB Firms | Matched non-DB Firms | Difference between the two Groups |
|---|---|---|---|
| *Propensity Score* | 56.515% | 56.487% | 0.028% |
| Obs. | 13,333 | 13,333 | - |

**APPENDIX 4. Model of Abnormal Assumed Rate of Return on Plan Assets**

This table presents regression results for calculating the assumed rate of return on plan assets. The regression is estimated using OLS. *PPROR* is assumed rate of return on plan assets, which is defined as the firm's assumption about anticipated rates earned by its pension plan assets. *PBRRR* is actual rate of return on plan assets, which is defined as the ratio of actual return on plan assets (PBARAT) over pension plan assets (PPLAO). *t*-statistics are computed using standard errors robust to both clustering at the firm level and heteroskedasticity. Constant term, year fixed-effects, and industry fixed-effects based on two-digit SIC codes are included. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

| Dependent Variable: *PPROR* | *Coeff.* | *t-statistics* |
|---|---|---|
| *PBRRR* | 0.010 | (5.062)*** |
| *Lagged PBRRR* | 0.008 | (4.438)*** |
| Obs. | 9,187 | |
| $R^2$ | 0.121 | |