Do Corporate Pension Plans Affect Audit Pricing?

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Abstract

This study examines whether corporate pension plans of client firms (hereafter, clients) influence their auditors' decisions on audit pricing. We find that auditors charge 18% higher audit fees from clients sponsoring defined benefits (DB) pension plans than those without DB pension plans. We also find that the effect of DB pension plans on audit fees is stronger when clients' earnings are more sensitive to DB pension assumptions, managers' compensation induces more risk taking, transient institutional investors have greater ownership or auditors are Big 4 audit firms. Moreover, we find that the additional audit fees charged for DB pension plans are negatively associated with the extent of manipulations of DB pension plan accounting assumptions. Collectively, our findings suggest that auditors respond to high audit risk associated with DB pension plan accounting by increasing audit effort which results in higher audit fees.

JEL Classification: D22, M42.

Keywords: Pension Plans, Audit Pricing, Audit Effort, Earnings management.

1. Introduction

Pension assets in U.S. have steadily grown in the recent decade. As of 2012, pension assets in U.S. were estimated to be $16.851 trillion, which constituted 108% of U.S. GDP in 2012 (Towers Watson 2013). There has recently been an increased interest in how corporate-sponsored pension plans affect sponsoring corporates' business decisions (e.g. Rauh 2006; Shivdasani and Stefanescu 2010; Cocco and Volpin 2012). In contrast, there is limited research on whether and how pension plans of corporates impact their auditors' decisions. Our study addresses the gap in the literature by examining three questions. First, we investigate whether auditors charge higher fees from clients with defined benefit (DB) pension plans, which involve complicated estimates in pension accounting and can facilitate earnings management by the clients. Second, we examine whether the effect of DB pension plans on audit fees varies with clients' incentives to manipulate earnings and auditors' incentive to mitigate earnings management. Lastly, we analyze whether the additional audit fees charged for DB pension plans mainly reflect increased audit effort to mitigate earnings management or risk premium to compensate for high audit risk.

Examining auditors' response to clients' pension plans is also timely in the context of the recent emphasis of regulators on the auditing of pension accounting. For example, in a public speech in 2006, Charles Niemeier, board member of the Public Company Accounting Oversight Board (PCAOB), advised auditing industry to pay more attention to pension accounting, which he believes will help improve the financial reporting system significantly (Shaw 2006). Despite the regulator's suggestion, there is limited empirical evidence on whether auditors are aware of the potential high audit risk in DB pension accounting. More importantly, the empirical evidence is surprisingly scarce on whether auditors exert more effort for clients with DB pension plans. Our study addresses both of these issues by investigating whether auditors charge higher audit fees for clients with DB pension plans and whether additional audit fees charged for DB plans reflect increased audit effort.

There are two types of pension plans in U.S., namely, defined contribution (DC) plans and defined benefit (DB) plans. In contrast to relatively straightforward rules of the DC pension plan accounting, the DB pension plan accounting is highly complicated (Kieso et al. 2010). Accounting for DB plans is more complicated because there are more estimates in pension accounting for DB plans which involve considerable discretion of and prediction by managers. Consequently, DB pension plans increase potential audit risk as managers may take advantage of the complexity of DB pension accounting and manipulate pension estimates to manage earnings (Bergstresser, Desai, and Rauh 2006; Comprix and Muller III 2006; An, Lee, and Zhang 2014).

The production view of audit process suggests that, confronted with greater potential audit risk, auditors exert more effort in attestation to reduce audit risk and charge higher audit fees to compensate for effort (e.g. Simunic 1980). In the setting of DB pension accounting, auditors can implement more substantial tests and consult actuaries to verify the estimates in DB pension accounting to reduce audit risk. In addition, auditors may choose to bear high potential audit risk and charge risk premium to compensate for the high risk (e.g. Pratt and Stice 1994; Bell, Doogar, and Solomon 2008). Therefore, regardless of whether auditors choose to increase audit effort or charge risk premium for DB pension plans, as long as auditors are aware of the high potential audit risk associated with DB pension plans, we predict that auditors charge higher audit fees from clients with DB pension plans than those without DB pension plans.

Although auditors' strategies to manage audit risk predict that auditors charge higher audit fees from clients with DB pension plans, recently regulators have raised concerns that auditors may fail to realize the potential audit risk in DB pension plans. For example, in PCAOB 2010 inspection of audit engagement in internal control auditing, valuation of pension plan assets is one of the four most common audit areas in which auditors fail to identify and sufficiently test internal controls (PCAOB 2012). While the inspection sheds light on deficiencies in the internal control auditing in pension accounting, it is premature to conclude, based on PCAOB 2010 inspection, that auditors are unaware of high potential audit risk of DB pension plans. It is possible that auditors are aware of the additional audit risk associated with DB pension plans and choose to bear the additional risk by charging risk premium. Another possibility is that auditors exert more effort to mitigate the high audit risk related with DB pension plans by implementing additional substantial tests instead of additional internal control tests as substantial tests and internal control tests are substitutes (Hogan and Wilkins 2008).

To test our prediction regarding the effect of DB pension plans on audit fees, we utilize a comprehensive sample of public firms in U.S. from 2000 to 2012. Around a third of the sample firms have DB pension plans. On average, pension assets represent 13.5% of book value of assets for companies with DB pension plans in our sample. Therefore, the adjustment in estimates of DB pension accounting can have significant impact on reported earnings, and thus involve a substantial audit risk

Consistent with our predictions, we find that auditors charge significantly higher audit fees from clients sponsoring DB pension plans than those without DB pension plans. The finding is robust when we control the self-selection in pension plans. The effect of DB pension plans on audit fees is economically meaningful as well. Auditors on average charge approximately 18 percent more in audit fees from clients with DB plans. The results suggest that auditors are aware of the potential high audit risk associated with DB pension accounting and charge higher audit fees from clients with DB pension plans.

We further examine how client characteristics affect the association between DB pension plans and audit fees. If auditors charge higher fees from clients with DB pension plans due to their concerns for potential earnings management through DB pension accounting, the effect of DB pension plans on audit fees should be more salient when managers have stronger incentives to manage earnings. Consistent with this prediction, we find that the positive effect of DB pension plans on audit fees is amplified when the estimates in DB pension accounting have greater effect on clients' earnings, managers' compensation increases with firm's risk, or transient institutional investors have greater ownership.

We also investigate how auditor characteristics shape the association between DB pension plans and audit fees. We document that Big 4 auditors charge firms with DB pension plans higher audit fees compared to non-Big 4 auditors. This finding is consistent with the notion that Big 4 auditors care more about their reputation (DeAngelo 1981) and have greater litigation costs (Dye 1993), and thus have incentives to supply more effort to mitigate earnings management and/or charge higher risk premium to compensate for possible audit failure costs.

Lastly, we explore whether the additional audit fees charged for DB pension plans are mainly due to increased audit effort or risk premium. We distinguish the two alternatives by examining the association between additional audit fees charged for DB pension plans and the extent of manipulation of the assumed rate of return on pension assets, an important estimate in DB pension accounting. On the one hand, if the additional audit fees largely reflect increased audit effort, we should observe less manipulation in the assumed rate of return on pension assets when auditors charge higher additional audit fees. On the other hand, if the additional audit fees for DB plans mainly reflect risk premium, we should observe a positive association between the additional audit fees and the extent of manipulation in assumed rate of return on pension assets as pension accounting manipulation increases audit risk. Our empirical analysis shows that when auditors charge higher audit fees for DB pension plans, assumed rates of return on pension assets are less overstated.[1] This finding suggests that the additional audit fees charged for DB pension plans mainly reflect increased

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

audit effort but not risk premium.

Our study makes at least three contributions. First, our analysis adds to a recent literature examining the effect of corporate pension plans on various business decisions, such as capital expenditure, capital structure, and M&A activities (Rauh 2006; Shivdasani and Stefanescu 2010; Cocco and Volpin 2012). In contrast to these prior studies which focus on the effect of pension plans on the decisions of sponsoring corporates, we examine how pension plans affect decisions of auditors of sponsoring corporates.

Second, our study extends the literature on the effect of audit risk on audit fees. While an extant body of research documents that auditors charge higher audit fees when they perceive greater risk in an engagement, most of studies in this area are unable to differentiate whether higher audit fees result from increased audit effort or risk premium (DeFond and Zhang 2014). DeFond and Zhang (2014) point out that the distinction is important because additional audit effort improves audit quality while risk premium is a deadweight loss. Our results suggest that the additional audit fees charged for DB pension plans are largely due to increased audit effort but not risk premium.

Last but not least, our results have potential implications for regulators who have expressed concerns regarding the state of auditing in pension accounting. To design public policies on auditing in pension accounting, it is imperative for regulators to know whether auditors are aware of the risk in pension accounting and whether they supply more effort to manage such risk. Our article provides large sample empirical evidence that auditors are aware of potential audit risk associated with pension plan accounting and exert more effort to manage such risk, and thus helps to address regulators' concerns.

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

2. Literature Review and Hypotheses Development

2.1 Audit Fees and Defined Benefit Pension Plans

There are two basic types of corporate pension plans in U.S.: defined contribution (DC) and defined benefit (DB). In a DC plan, the employer is required to make regular contributions to employees' pension accounts and the employer does not make promise on 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 plan accounting, accounting for DB plan is much more complicated (Kieso et al. 2010), as it involves a substantial degree of managerial discretion and judgment. Specifically, Accounting Standards Codification (*ASC*) 715 requires that net period pension costs in DB pension plans, which are reported on sponsoring firms' income statements, are calculated as the sum of service costs, interest costs, amortized prior service costs and amortized deferred gains and losses less the assumed return on pension assets (FASB 2009). As *ASC* 715 does not provide specific guidance on pension assumptions such as assumed rate of return on pension assets, sponsoring companies are afforded considerable latitude in their pension assumptions.

As DB pension accounting provides managers with considerable discretion to determine pension assumptions, managers may abuse such discretion to manipulate earnings. Consistent with this notion, prior research provides extant evidence that managers exploit the accounting complexity of DB pension plans to manage companies' earnings. For instance, Bergstresser et al. (2006) show that, in order to inflate reported earnings, managers aggressively overestimate the assumed rates of return on DB pension assets around critical business decisions such as acquisitions, meeting or beating critical earnings threshold and exercising management stock options. Comprix and Muller III (2006) find that managers increase assumed rates of return on DB 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 DB pension assets to meet or beat analyst forecasts.

Earnings management increases potential risk for auditors because auditors are responsible for assuring that financial statements faithfully reflect firms' underlying economics (DeFond and Zhang 2014). Consistent the view that auditors' responsibility extends to assuring financial reporting quality, the US supreme court rules that auditors are held legally liable for misleading financial statements even when those statements comply with the GAAP (Ball 2009). 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 auditor reputation and reduces market share of auditors involved even when lawsuits are not incurred (Weber, Willenborg, and Zhang 2008; Skinner and Srinivasan 2012). Therefore, earnings management leads to greater risk for auditors.

There are at least two strategies for auditors to manage audit risk. One strategy is to supply additional audit effort in order to detect earnings management (e.g., Simunic 1980). In the context of our research question, auditors may choose to exert more effort for clients with DB pension accounting due to at least two reasons. First, DB pension accounting provides managers with more discretion in financial reporting than DC pension accounting, which may lead to greater extent of earnings management prior to audit. Thus, to reduce audit risk to the acceptable level, auditors have to exert more effort. Second, even if auditors expect the overall magnitude of earnings management prior to audit to be comparable between clients with DB pension plans and those with DC pension plans, it will require more effort from the auditors to identify 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 substantial tests and consult actuaries to identify manipulations in DB pension accounting. To sum up, auditors have to exert more effort for clients with DB pension plans if they wish to reduce the audit risk to acceptable level, and thus they will charge higher audit fees to compensate for the additional audit effort.

Another strategy to respond to the high audit risk is to bear audit risk by charging risk premium (e.g. Pratt and Stice 1994; Bell et al. 2008). In the context of our research question, if an auditor believes that a client with a DB pension plan may exploit the discretion provided by DB pension plan accounting to manipulate earnings, the auditor may not exert additional effort to detect earnings management but charge risk premium in audit fees to insure against possible loss from failure to identify pension accounting manipulations.

In summary, prior research suggests that (i) managers use the discretion provided by DB pension plan accounting to manipulate earnings, and (ii) audit firms charge higher fees due to increased audit effort and/or risk premium from the clients with high audit risk. Integrating these two sets of findings, we posit that audit firms will charge higher fees for their services from clients with DB pension plans, which leads to our first hypothesis.

H1. Ceteris paribus, auditors charge higher audit fees from clients with DB pension plans than those without DB plans.

2.2 Client-firm Characteristics and the Effect of Defined Benefit Pension Plans on Audit Fees

In the development of H1, we argue that auditors charge greater audit fees for clients with DB pension plans because the auditors are concerned about 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 for the firms with stronger incentives to manage earnings.

We examine several conditions in which managers could be incentivized to manipulate earnings. First, we predict that the effect of DB pension plans on audit fees will be stronger when pension assumptions have a greater impact on reported earnings. Intuitively, when pension assumptions have greater effect on reported earnings, managers have stronger incentives to manipulate pension assumptions to manage earnings. Consistent with this notion, Bergstresser et al. (2006) find that managers are more aggressive in their assumptions regarding assumed return rates on pension plan assets when firm's reported profits are more sensitive to such assumption. Therefore, we predict that among firms with DB pension plans auditors charge higher audit fees from the clients whose reported earnings are more sensitive to pension assumptions.

Second, we predict that the effect of DB pension plans on audit fees will be stronger for the firms with higher proportion of institutional investors with short investment horizons. Bushee (1998) shows that institutional investors with short investment horizons (referred to as "transient" institutional investors) exhibit preferences for near-term earnings over the long-term growth, which creates incentives for managing earnings. Consistent with this, prior studies show that higher presence of transient institutional investors encourages earnings management practices (Bushee 1998; Matsumoto 2002; Burns et al. 2010). Accordingly, we predict that among clients with DB pension plans, auditors charge higher audit fees from the clients with higher proportion of transient institutional investors.

Third, we conjecture that the effect of DB pension plans on audit fees will be greater for the clients with higher managerial risk taking incentives. Specifically, we argue that the effect of DB pension plans on audit fees will be amplified for the clients with high sensitivity of management compensation to stock return volatility (vega). Prior research shows that higher vega induces management to engage in more risk-taking behaviour (e.g., Coles, Daniel, and Naveen 2006). Since earnings management increases information asymmetry, it also increases 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. Thus, we predict that among clients with DB pension plans, auditors charge higher audit fees from the clients with higher vega.

In summary, the above theoretical arguments lead to the following set of hypotheses.

H2.a Ceteris paribus, the effect of DB pension plans on audit fees is stronger for the clients with higher sensitivity of reported earnings to pension assumptions.

H2.b Ceteris paribus, the effect of DB pension plans on audit fees is stronger for the clients with higher proportion of transient institutional investors.

H2.c Ceteris paribus, the effect of DB pension plans on audit fees will be stronger for the clients with higher sensitivity of management compensation to stock return volatility (vega).

2.3 Auditor Characteristics and the Effect of Defined Benefit Pension Plans on Audit Fees

In this section, we develop hypotheses regarding the effect of audit firm characteristics on the DB pension plan-audit fees relation. First, we predict that the effect of DB pension plans on audit fees should be stronger for the Big 4 audit firms than for the non-Big 4 firms. As discussed in the development of H1, DB pension accounting provides managers with more opportunities to manipulate earnings. Big 4 audit firms have more reputation capital compared to the non-Big 4 firms (DeAngelo 1981; Francis and Wang 2008). Further, Big 4 audit firms are more likely to be the targets of deep pockets lawsuits if they fail to identify misstatements in financial reporting (Dye 1993; Lennox 1999). Therefore, Big 4 audit firms are more sensitive to the costs of audit failure than the non-Big 4 firms, and thus are predicted to charge higher fees from the firms with DB pension plans compared to the non-Big 4 audit firms.

Second, we explore potential interplays between auditor industry specialization and DB pension plan-audit fees relation. On the one hand, industry specialist auditors may charge lower fees from clients with DB pension plans because industry expertise can improve audit efficiency (Hay and Jeter 2011). Specifically, to reduce audit risk to acceptable level, industry specialists can exert less effort as their audit procedure is more efficient, and thus may charge lower fees from clients with DB pension plans compared with non-specialists. On the other hand, industry specialist auditors have reputation capital as industry experts (Craswell, Francis, and Taylor 1995), and thus have stronger incentive to make effort to mitigate earnings management or to charge higher risk premium to compensate for possible reputation impairment. In this case, industry specialist auditors will charge higher audit fees from clients with DB pension plans compared to non-specialists. Given the above countervailing arguments, we are unable to make a signed prediction on the effect of auditor industry expertise on the association between audit fees and DB pension plans.

The above discussion leads to the following set of hypotheses.

H3.a Ceteris paribus, the effect of DB pension plans on audit fees is stronger for Big 4 audit firms than for non-Big 4 audit firms.

H3.b The effect of DB pension plans on audit fees is not different between industry specialized audit firms and non-specialized audit firms.

2.4 Additional Audit Fees for Defined Benefit Pension Plans: Higher Audit Effort or Risk Premium?

As discussed in the development of H1, auditors are predicted to charge higher fees for DB pension plans because they increase audit effort and/or require risk premium for DB pension plans. In this section, we attempt to identify which of the two aforementioned mechanisms dominantly drives the predicted association between DB pension plans and audit fees. To differentiate between the two mechanisms, we examine the association between additional audit fees for DB pension plans and the extent of income-increasing manipulations of DB pension assumptions.

Our intuition is as follows. If the additional audit fees for DB pension plans mainly reflect higher audit effort, the magnitude of income-increasing manipulations of DB pension assumptions should be negatively associated with additional audit fees for DB pension plans, since higher audit effort improves audit quality and mitigates earnings management (e.g. Caramanisa and Lennox 2008; Lobo and Zhao 2013). In contrast, if the additional audit fees for DB pension plans mainly reflect risk premium, additional audit fees should be positively associated with the magnitude of income-increasing manipulations of DB pension assumptions since excessive overstatement of clients' reported earnings increases the audit risk for the auditors. The above discussion leads to the following hypothesis:

H4. Ceteris paribus, the extent of income-increasing manipulations of DB pension assumptions is negatively (positively) associated with additional audit fees for DB pension plans if the additional audit fees mainly reflect additional audit effort (risk premium).[2]

3. Data and Descriptive Statistics

We obtain the audit fee data from Audit Analytics database and collect the pension data from the Compustat pension annual files. Compustat pension annual files provide detailed information about the pension items for firms that sponsor DB

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[2] 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 typically are more concerned about overstatement of clients' earnings (DeFond and Jiambalvo 1993; Kinney and Martin 1994; Nelson, Elliott and Tarpley 2002; Caramanisa and Lennox 2008). Accordingly, we expect auditors to be especially concerned about income-increasing manipulations rather than income-decreasing manipulations of DB pension accounting assumptions.

pension plans. Firm financial information comes from Compustat fundamental annual files. Since the Audit Analytics dataset starts at 2000, our sample period is from 2000 to 2012. After excluding firm-years with incomplete data our final sample consists of 41,558 firm-year observations. We define all the variables in this article in Appendix A and winsorize each variable at both the upper and lower one-percentile to mitigate the effect of outliers.[3]

Table 1 presents the summary statistics of the variables. The table shows that the mean and median log audit fees are 6.441 ($US 627,000) and 6.422 ($US 615,000), respectively. The mean of the DB pension plan dummy is 0.329, implying that about one-third of the firms in our sample sponsor a DB pension plan. About 77% of the firms in our sample are audited by the Big 4 auditors and 23.2% of firms are audited by the specialist auditor of their industry. Further, a typical firm in our sample has market-to-book ratio of 2.676, and leverage ratio of 0.164.

Table 2 reports the correlation matrix of the variables. The table shows that log audit fee is positively and significantly associated with the DB pension plan dummy (Pearson correlation coefficient=0.46, *p*-value<0.01), an observation which provides a preliminary support for H1. The table also reveals that a number of variables are substantially correlated with each other. To mitigate potential multicollinearity concern, we calculate the Variance Inflation Factor (VIF) of the variables. A VIF above 5 indicates a multicollinearity problem (O'Brien 2007). The (untabulated) results show that the highest VIF among the variables is 2.23, suggesting that

[3] We do not winsorize dummy variables (e.g., DB pension plan and Big 4 dummies) since by construction these variables do not suffer typical outlier problem.

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 examine the relation between DB pension plans and audit fees using regression analysis. Since firms have discretion in choosing pension plan type, self-selection bias is a potential concern (Shivdasani and Stefanescu 2010). To address this concern, we adopt the widely used Heckman (1979) approach in our baseline regression using the following two-step process. In the first step, we estimate the probability that a firm sponsors a DB pension plan using a probit regression. Shivdasani and Stefanescu (2010) show that companies are more likely to adopt DB pension plans when they are in more unionized industries and in industries with greater employee tenure, when they are larger and when they have less growth opportunity, less volatile profit and more tangible assets. We therefore control for degree of unionization of the industry (*UNION*), company size (*SIZE*), employee tenure of the industry (*TENURE*), market-to-book ratio (*MB*), profit volatility (*PROFV*), asset tangibility (*TANG*). Further, Chang, Kang, and Zhang (2013) document that firms are more likely to sponsor DB pension plans when they have more employees, when they are older and when they are in financial distress. Thus we control for the number of employees (*LEMP*), firm age (*LAGE*) and Z-score (*ZSCORE*). The results of the first-step probit regression are presented in Appendix B and are largely consistent with Shivdasani and Stefanescu (2010) and Chang et al.

(2013). In the second step, we calculate the inverse Mills ratio using the estimates of the probit regression and include it as an additional control in our baseline regression model for audit fees.[4] The baseline regression specification is as follows.

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

where i denotes firm, t denotes the year, *Ind* is industry fixed effects based on two-digit SIC codes, *Yr* is year fixed effects, and ε is the error term. We employ the audit fee model developed by Simunic (1980) and define log audit fees (*LAFEE*) as the natural log of the dollar amount of audit fees a firm pays its auditor over the fiscal year. Following prior research (e.g., Shivdasani and Stefanescu 2010; Chang, Kang, and Zhang 2013), we define the DB pension dummy (*DUMDB*) as a dummy variable equal to one if the firm sponsors a DB pension plan (i.e., the firm has non-missing pension assets and liabilities in the Compustat pension annual files) and zero otherwise. The selection of control variables follows prior literature on audit fees (e.g. Johnstone and Bédard 2003; Gul and Goodwin 2010; Hanlon et al. 2012; Bentley et al. 2013). Detailed definitions of the main and control variables are presented in Appendix A. The standard errors are adjusted for heteroskedasticity and clustering at firm level.

[4] Lennox et al. (2012) emphasize that it is important to employ exogenous independent variables in the first-step model that can be validly excluded from the second-step model. In this study, the *UNION* and *LEMP* variables are reasonably assumed to be exogenous, as they are not expected to have a direct effect on auditors' decision of audit pricing. Further, the results in the Appendix B show that *UNION* and *LEMP* are highly significant predictors of DB pension plans adoption, which suggests the validity of these variables as instruments.

The regression results are presented in Column (1) of Table 3. The results show that the coefficient of DB dummy is positive and statistically significant (*t*-statistic=10.196, *p*-value<0.01).[5] The finding provides support for H1 which predicts that auditors charge higher audit fees from clients with DB pension plans than those without DB plans.[6] The effect of DB pension plans on the audit fees is also economically meaningful. Specifically, the magnitude of the coefficient suggests that, all else equal, firms with DB pension plan are charged 17.6% higher audit fees than firms without DB pension plans.

Lennox et al. (2012) caution that Heckman approach may potentially lead to multicollinearity problem, making empirical results fragile. To assess the robustness of our finding, we re-estimate our baseline model excluding the inverse Mill's ratio. The results are reported in Column (2) of Table 3 and further confirm the positive association between DB pension plans and audit fees (*t*-statistic=10.035, *p*-value<0.01). Further, the magnitude of the effect remains qualitatively identical compared to the model which includes inverse Mill's ratio. Based on these results, we conclude that our findings are robust to potential multicollinearity issue.

The results for the control variables are largely consistent with prior literature

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[5] All reported *p*-values are for the two-tail tests unless stated otherwise.

[6] We conduct two additional untabulated tests to address potential self-selection in pension plans. In the first test, we use the propensity score matching method (Rosenbaum and Rubin 1983). In each year, we match each DB firm with a DC firm that has the closest predicted probability of sponsoring a DB plan. The predicted probability is calculated as the fitted value from the probit regression in the Heckman (1979) approach as shown in Appendix B. The results for the propensity score matching test show that clients with DB pension plans are charged higher audit fees (*t*-statistic=7.728, *p*-value<0.01). In the second test, we estimate our baseline model with firm fixed effect to control for time-invariant unobservable firm characteristics. When firm fixed effects are included, the coefficient for DB pension plan dummy captures the average change in audit fees when firm switches from DC pension plan to DB pension plan. In spite of the low frequency of pension plan type change in our sample which reduces the testing power, we still find that the coefficient for DB pension plan dummy is positive and significant (*t*-statistic=3.405, *p*-value<0.01).

(e.g., Johnstone and Bédard 2003; Gul and Goodwin 2010; Hanlon et al. 2012; Bentley et al. 2013). Audit fees are positively and significantly related to Big 4 dummy, auditor industry specialization, and auditor tenure, suggesting that Big 4 auditors, industry specialist auditors, and auditors with longer tenure charge higher fees. Audit fees are positively and significantly related to audit opinion and restatement, suggesting that firms that do not receive a standard, unqualified audit opinion and firms with restatements in the preceding three years are charged higher audit fees due to the higher audit risk faced by auditors. Audit fees are also positively and significantly related to fiscal year-end dummy, suggesting that firms with December fiscal year-end pay higher audit fees because of the high demand of auditing services during that period. Further, large firms, firms with greater foreign sales and more business segments pay higher audit fees. These firms have more complex business, which increases the workload of the auditor in auditing the financial statements. Also, firms with higher market-to-book, leverage, receivables and inventory ratio, and lower tangibility pay higher audit fees. These firms have greater inherent uncertainty in their business operations which increases audit risk.

4.2 The Relation between DB Pension Plans and Audit Fees: The Effect of Client Firm Characteristics

The results reported in the previous section suggest that clients with DB pension plans are charged higher audit fees compared to clients that do not sponsor DB pension plans. In this section, we explore whether the effect of DB plans on audit fees is stronger for clients with greater incentives to manipulate their DB pension accounting assumptions. Specifically, H2.a, H2.b, and H2.c predict that the effect of DB pensions plans on audit fees should be amplified for the clients whose earnings are more sensitive to pension assumptions, clients with greater proportion of transient institutional ownership, and clients with higher sensitivity of management compensation to the stock price volatility (vega), respectively.

First, we examine the effect of clients' earnings sensitivity to pension assumptions on the DB pension plans-audit fees relation. Following Bergstresser et al. (2006), we consider four alternative pension sensitivity measures. Pension sensitivity measure one (*PSEN1*) is defined as the log of pension plan assets over total assets. Pension sensitivity measure two (*PSEN2*) is defined as the log of pension plan assets over operating income. Pension sensitivity measure three (*PSEN3*) is defined as the log of projected pension obligations over operating income. Pension sensitivity measure four (*PSEN4*) is defined as the log of pension plan assets over three-year moving average operating income. For each of the four measures, higher value indicates greater sensitivity of the firm's reported profits to pension assumptions. Accordingly, H2.a predicts that we should observe a stronger effect of DB pension plans on audit fees for the clients with higher pension sensitivity measures.

To test H2.a, we modify our baseline model to include the interaction term between the DB dummy and the pension sensitivity measure. 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=5.008, p-value<0.01).[7] The findings suggest that among clients with DB pension plans, clients with higher pension sensitivities (and thus, greater incentives to manipulate pension accounting assumptions) are charged higher audit fees, which is consistent with the prediction in H2.a.

Next, we examine the effect of transient institutional investors on the relation between DB plans and audit fees. Since transient institutional investors prefer near-term earnings over long-term value (Bushee 1998; 2001), their presence encourages earnings management practices. Accordingly, H2.b predicts that we should observe a stronger effect of DB plans on audit fees for clients with greater proportion of transient institutional investors. We define transient institutional ownership as the number of shares held by transient institutional investors over total shares outstanding. To construct the measure of transient institutional ownership, we obtain the institutional ownership data from Thomason Financial's CDA Spectrum database and the institutional investor classification data from Bushee (1998, 2001)[8]. Transient institutions are characterized as having high portfolio turnover and highly diversified portfolio holdings.

To test H2.b, we modify our baseline model to include the interaction term between the DB dummy and transient institutional ownership. The results are

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[7] Using *PSEN2*, *PSEN3*, and *PSEN4* measures results in 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.

[8] The classification data is available from the author's website at http://accounting.wharton.upenn.edu/faculty/bushee/IIclass.html.

presented in Column (1) of Table 5. The coefficient for the interaction term between DB pension plan dummy and transient institutional ownership is positive and statistically significant (*t*-statistics=2.195, *p*-value<0.05), suggesting that the effect of DB plans on audit fees is stronger for clients with greater transient institutional ownership. To gauge the robustness of our results, we further include the interaction term between DB pension plan dummy and non-transient institutional ownership (i.e., the sum of quasi-index and dedicated institutional ownership). The results are reported in Column (2) of Table 5. The coefficient for the interaction term between transient institutional ownership and the DB dummy retains the positive sign and statistical significance (*t*-statistic=3.440, *p*-value<0.01) while the interaction coefficient between non-transient institutional ownership and DB dummy is not significant. Overall, the findings provide support for H2b which predicts that the effect of DB pension plans on audit fees is amplified for clients with greater transient institutional ownership.

Finally, we explore the impact of managerial risk-taking incentives on the relation between DB plans and audit fees. Prior research shows that higher sensitivity of management compensation to stock price volatility (higher vega) encourages earnings management (Armstrong et al. 2013). Accordingly, H2.c predicts that the effect of DB plans on audit fees will be stronger for clients with higher vega. Following prior research (Core and Guay 2002; and 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 obtain the management compensation data from the ExecuComp database which contains detailed information of the option compensation of top management for S&P 1500 firms.

To test H2.c, we modify our baseline model to include the interaction term between the DB pension plan dummy and vega. The regression results are presented in Column (1) of Table 6. The coefficient for the interaction term between DB pension plan dummy and vega is positive and significant (*t*-statistics=4.420, *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 pension plan dummy and the sensitivity of management compensation to stock price (delta).[9] The results are reported in Column (2) of Table 6. The coefficient for the interaction term between DB pension plan dummy and vega remains positive and statistically significant (*t*-statistic=3.531, *p*-value<0.01). Interestingly, the interaction between delta and DB pension plan dummy is also positive, yet only marginally significant. Overall, the results are consistent with H2c which predicts that the effect of DB pension plans on audit fees is amplified for clients with higher vega.

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

4.3 The Relation between DB Pension Plans and Audit Fees: The Effect of Auditor Characteristics

In this section, we investigate whether auditor characteristics affect the relation between DB pension plans and audit fees. First, we examine the impact of the Big 4 auditing firms on the DB pension plan-audit fees relation.[10] Big 4 auditors have more reputation capital at stake and face higher litigation risk as compared to non-Big 4 auditors (e.g. DeAngelo 1981; Dye 1993; Lennox 1999; Francis and Wang 2008), and thus are more sensitive to potential audit failure. Accordingly, H3.a predicts that Big 4 auditors will charge higher fees from clients with DB pension plans compared to the non-Big 4 auditors.

To test H3.a, we modify our baseline model to include the interaction term between the Big 4 dummy and the DB pension plan dummy. We define the Big 4 dummy as a dummy variable equal to one if the firm is audited by one of the Big 4 auditors and zero otherwise. The results are presented in Column (1) of Table 7. The coefficient for the interaction term between the DB dummy and the Big 4 dummy is positive and statistically significant (t-statistics=3.405, p-value<0.01). The results show that the effect of DB plans on audit fees is stronger for clients audited by Big 4 auditors, and thus are consistent with the prediction in H3.a.

Next, we examine the effect of auditor's industry specialization on the DB pension plan-audit fees relation. As discussed in the development of H3.b, auditor's industry specialization may have countervailing effects on the DB pension plan-audit

[10] Big 4 auditors include Deloitte, PricewaterhouseCoopers, Ernst&Young, and KPMG.

fees relation. To examine the effect of auditor's industry specialization on the DB pension plan-audit fees relation, we modify our baseline model to include the interaction term between DB pension plan dummy and auditor industry specialization. We define auditor industry specialization as a dummy variable equal to one if the firm is audited by the specialist auditor of the firm's industry and zero otherwise. Following prior literature (e.g. Gul, Fung, and Jaggi 2009), we define industry specialist auditors as auditors with the largest market share by client assets in the two-digit SIC industry. The results are presented in Column (2) of Table 7 and show that the coefficient of the interaction term is not significant (*t*-statistic=0.454, *p*-value=0.64).

For robustness purposes, we modify our baseline model to include the interaction terms between the Big 4 dummy and auditor industry specialization with the DB pension plan dummy in the same regression. The results are reported in Column (3) of Table 7. The coefficient for the interaction term between the DB pension plan dummy and the Big 4 dummy remains positive and significant (*t*-statistics=3.408, *p*-value<0.01), and the coefficient for the interaction term between the DB pension plan dummy and the industry specialization dummy remains insignificant (*t*-statistics=-0.287, *p*-value=0.77). Overall, the results suggest that Big 4 auditors charge higher fees from the clients with DB pension plans compared to the non-Big 4 auditors, and thus provide support for H3.a. In contrast, we find no evidence that industry specialists charge higher fees from the clients with DB pension plans compared to the non-specialists.[11]

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

Our results show a positive association between DB pension plans and audit fees, consistent with the notion that audit firms view clients with DB pensions plans as more risky in terms of the audit risk, and thus charge these firms higher fees. As discussed in the development of H1, higher audit fees charged from the firms with DB pension plans could reflect either increased audit effort or risk premium. In the section, we attempt to distinguish these two explanations by examining the relation between the extent of income-increasing manipulations in the DB pension plan accounting assumptions and the additional fees charged from the clients with DB pension plans. Specifically, H4 predicts that if additional fees mainly reflect increased audit effort (risk premium), we should observe a negative (positive) association between the additional fees and the extent of the income-increasing manipulations in the pension plan assumptions.

Our analysis focuses on the manipulations of the assumed return on pension assets.[12] Higher assumed rate of return on pension assets inflates reported earnings.

[11] In untabulated test, we examine whether auditors specialized in attestation of DB pension plans charge different audit fees for clients with DB plans compared to other auditors. An auditor is defined as specialist in DB plans if the auditor has the largest number of clients with DB plans. Similar to the reasoning for industry specialization, pension plan specialization also has two countervailing effects. On the one hand, DB plan specialist auditors may charge lower audit fees because they are more efficient in auditing of DB pension accounting due to their expertise. On the other hand, DB plan specialist auditors may make more effort for clients with DB plans to protect their reputation as specialist and thus charge higher fees. After controlling for Big 4 affiliation and auditor industry specialization, we find no evidence that the DB pension plan specialization affects the relation between DB pension plans and audit fees.

[12] 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

To test H4, we investigate the relation between the abnormal assumed rate of return on pension assets and the additional audit fees for the DB pension plans. We estimate the following regression model:

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

where i denotes firm, t denotes the year, *Ind* is industry fixed effects based on two-digit SIC codes, *Yr* is year fixed effects, and ε is the error term. *ABPPROR* is the abnormal assumed return rate on pension assets. As accounting standards (SFAS 87) specify that actual return rate of pension assets is important benchmark for assumed return rate of pension assets, we calculate the abnormal assumed return rate on pension assets (*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.[13] *ABLAFEE* is the additional audit fees charged for the firms with DB pension plans. We measure the additional fees charged from a client with DB pension plan (*ABLAFEE*) as unexplained audit fees after controlling for audit fee determinants other than DB pension dummy. Specifically, we calculate *ABLAFEE* as the coefficient on DB pension dummy plus the residual in the regression in Column (2) of Table 3.[14] We

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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) motivate our choice of abnormal expected return rate on pension plan assets as the proxy for the extent of earnings management through pension accounting.

[13] The estimates of the regression are presented in Appendix C.

[14] We do not measure *ABLAFEE* as the coefficient on DB pension dummy due to two reasons. First, the coefficient on DB pension 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

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 higher manipulation incentives of pension accounting.[15] We also include M&A dummy (*M&A*) and beating prior year earnings dummy (*BEAT*) since 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 firm 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 the Column (1) of Table 8. The results show that additional audit fees are negatively and significantly associated with the abnormal assumed return rate on pension plan assets (*t*-statistic=-2.938, *p*-value<0.01). These findings indicate that the additional fees primarily reflect increased audit effort, and not risk premium.[16]

To gain further insight, we partition the sample into two sub-samples, one with positive abnormal assumed return rates and the other with negative abnormal assumed return rates. Prior research suggests that auditors are mainly concerned with failure to

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plans, Second, if we measured *ABLAFEE* as the coefficient on DB pension 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*.

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

[16] It is possible that auditors exert more effort when clients' manipulation of pre-audit assumed return rate of pension assets is more excessive. We are unable to control such effort adjustment because pre-audit pension accounting data is not available. However, it is worth noting that such effort adjustment biases *against* the finding of negative association between audit effort and audited abnormal assumed return on pension assets. The fact that we still observe significantly negative association between audited abnormal assumed return rate and additional audit fees strongly supports the notion that the additional audit fees mainly reflect audit effort to mitigate pension accounting manipulation.

detect manipulations aimed at overstatement of reported earnings (DeFond and Jiambalvo 1993; Kinney and Martin 1994; Nelson, Elliott and Tarpley 2002; Caramanisa and Lennox 2008). Accordingly, we expect the negative association between the abnormal assumed return rate on pension assets and additional audit fees to concentrate in the sub-sample of positive abnormal assumed return rates. To test this conjecture, we first partition the sample into two groups based on the sign of abnormal assumed return rates. Next, we estimate eq. (2) for each of the two sub-samples using Tobit regression (Ashbaugh-Skife et al., 2008). The results are reported in Columns (2) and (3) of Table 8 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=-1.995, p-value<0.05). 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=-0.437, p-value=0.66). The results suggest that our findings with regard to the full sample are mainly driven by the firms with positive abnormal assumed return rates on pension plan asset (i.e., clients that engage in income-increasing manipulations of pension plan assumptions). The results provide further support for our conclusion that additional audit fees charged from clients with DB pension plans mainly reflect increased audit effort and not risk premium. 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; Kinney and Martin 1994; Nelson, Elliott and Tarpley 2002;

Caramanisa and Lennox 2008).

5. Conclusions

We examine the effect of corporate pension plans on audit pricing in this article. We show that auditors charge higher audit fees from clients with defined benefit (DB) pension plans. The positive effect of DB pension plans on audit fees is consistent with the notion that auditors are aware of the potential high audit risk associated with DB pension plans.

We also investigate the effect of client and auditor characteristics on the DB pension plan-audit fees relation. We find that the effect of DB pension plans on audit fees is more pronounced when clients' earnings are more sensitive to DB pension assumptions, transient institutional investors own more shares or managers' compensation induces more risk taking. These findings suggest that auditors consider clients' incentive to manipulate earnings in deciding audit pricing for the clients with DB pension plans. We also document that Big 4 auditors charge higher audit fees for clients with DB pension plans compared to non-Big 4 auditors. The results are consistent with the notion that Big 4 auditors are more sensitive to potential audit risk associated with the complexity of DB pension accounting.

Finally, we examine the association between additional audit fees charged for DB pension plans and the extent of manipulations of assumed rates of return on pension assets, a critical DB pension accounting assumption. We find that the additional audit fees are negatively associated with the extent of manipulation in the assumed return rates. This finding suggests that the additional audit fees charged for DB pension plans are mainly driven by increased audit effort and not risk premium.

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 corporates' investment and financing decisions (e.g. Rauh 2006; Shivdasani and Stefanescu 2010; Cocco and Volpin 2012). However, little is known about whether pension plans influence auditors' decisions. This study fills the void in the literature by investigating the impact of corporate pension plans on audit pricing. Furthermore, our study should be informative for regulators who have recently expressed concerns that auditors may fail to realize the potential audit risk in DB pension plans. Our results suggest that auditors are aware of such risk and incorporate it in their audit pricing decisions.

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Appendix A. Variable Definitions

ADLAFEE = Additional audit fees charged for DB pension plans, defined as coefficient on DB pension dummy (*DB*) plus the residual in the regression in Column (1) of Table 3.

ABPPROR = Abnormal assumed rate of return on plan assets, defined as the residual from the regression in Appendix C.

ACCR = the absolute value of discretionary accruals estimated following Dechow et al. (1995).

BEAT = Beating prior year earnings dummy, defined as a dummy variable equal to one if the ratio of change in net income (NI) over book assets (AT) falls between 0 and 0.01, and zero otherwise.

BIG4 = Big 4 dummy, defined as a dummy variable equal to one if the firm is audited by one of the Big 4 auditors and zero otherwise.

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.

LAFEE = Log audit fees. Audit fees (AFEE) is the fees paid to the auditor for auditing services.

LAGE = Log firm age. Firm age is the number of years since the firm first appears in CRSP.

LEMP = log number of employees (EMP).

LEV = Leverage, defined as long-term debt (DLTT) / total assets (AT).

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 (PRCC_F) * shares outstanding (CSHPRI)) / book equity (CEQ).

NONTRAIO = Non-transient institutional ownership, defined as the proportion of shares held by non-transient (i.e., quasi-index and dedicated) institutional investors.

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 (PBARAT) over pension plan assets (PPLAO).

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

PROFV = Profit volatility, defined as the standard deviation of quarterly profitability over the preceding 5 years. Profitability is defined as operating income (IBQ) / total assets (ATQ).

PSEN1 = Pension sensitivity measure one, defined as the log of the ratio of pension plan assets (PPLAO) over total assets (AT).

PSEN2 = Pension sensitivity measure two, defined as the log of the ratio of pension plan assets (PPLAO) over operating income (OIADP).

PSEN3 = Pension sensitivity measure three, defined as the log of the ratio of projected pension obligations (PBPRO) over operating income (OIADP).

PSEN4 = Pension sensitivity measure three, defined as the log of the ratio of pension plan assets (PPLAO) over three-year moving average operating income (OIADP).

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

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

SPEC = Auditor industry specialist dummy, define as a dummy variable equal to one if the firm's auditor is industry specialist and zero otherwise. Industry specialist is the auditor with the largest market share by client assets in the industry.

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

TRAIO = Transient institutional ownership, defined as the proportion of shares held by transient institutional investors.

TENURE = Employee tenure, defined as the median employee tenure of the firm's industry.

UNION = Unionization, defined as the percentage of employees covered by the labor union in the firm's industry.

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.

ZCORE = Altman's Z-score, defined as defined as (3.3 * Operating income (IOADP) + Sales (SALE) + 1.4*Retained earnings (RE) + 1.2*(Current assets (ACT) - Current Liability (LCT))) / Book Assets (AT).

Appendix B. DB Pension Choice

This table presents the regression results for the determinants of DB pension choice. Our original sample consists of all firms in the Audit Analytics database spanning the period 2000-2012. We obtain the pension data from Compustat pension annual database and firm financial information from Compustat fundamental annual files. *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 A. The regression is run by the 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.

Dependent Variable:	*DUMDB*
UNION	1.526
	(4.583)***
LEMP	0.166
	(6.492)***
SIZE	0.173
	(7.131)***
TENURE	0.010
	(0.990)
MB	-0.007
	(-1.633)
PROFV	-3.156
	(-5.182)***
TANG	0.271
	(1.978)**
LAGE	0.390
	(14.197)***
ZSCORE	0.005
	(0.397)
Obs.	0.363
R^2	41,558

Appendix C. Abnormal Assumed Rate of Return on Plan Assets

This table presents the regression results for calculating the assumed rate of return on plan assets. Our original sample consists of all firms in the Audit Analytics database spanning the period 2000-2012. We obtain the pension data from Compustat pension annual database and firm financial information from Compustat fundamental annual files. *PPROR* is asssumed 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*
PBRRR	0.011
	(6.334)***
Lagged PBRRR	0.010
	(5.623)***
Obs.	12,796
R^2	0.180

Table 1. Summary Statistics

This table presents the summary statistics of the variables. Our original sample consists of all firms in the Audit Analytics database spanning the period 2000-2012. We obtain the pension data from Compustat pension annual database and firm financial information from Compustat fundamental annual files. Variable definitions are presented in Appendix A.

Variable	Mean	S.D.	25%	Median	75%
LAFEE	6.441	1.389	5.395	6.422	7.378
DUMDB	0.329	0.470	0.000	0.000	1.000
BIG4	0.769	0.421	1.000	1.000	1.000
SPEC	0.232	0.422	0.000	0.000	0.000
LTNR	1.914	0.924	1.386	1.946	2.565
OPIN	0.399	0.490	0.000	0.000	1.000
YE	0.702	0.457	0.000	1.000	1.000
REST	0.172	0.377	0.000	0.000	0.000
ACCR	0.074	0.092	0.020	0.044	0.090
SIZE	6.025	2.162	4.423	5.925	7.510
MB	2.676	3.783	1.134	1.896	3.285
LEV	0.164	0.191	0.000	0.106	0.269
ROA	-0.001	0.244	-0.017	0.061	0.113
TANG	0.258	0.235	0.072	0.175	0.385
FRSALE	0.277	0.374	0.000	0.070	0.472
LSEG	1.351	0.845	1.099	1.099	2.197
RECINV	0.247	0.185	0.094	0.214	0.356
Obs.			41,558		

Table 2. Correlation Matrix

This table presents the correlation matrix of the variables. Our original sample consists of all firms in the Audit Analytics database spanning the period 2000-2012. We obtain the pension data from Compustat pension annual database and firm financial information from Compustat fundamental annual files. Variable definitions are presented in Appendix A.

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*	*(16)*	*(17)*
(1) LAFEE	1.00																
(2) DUMDB	0.46	1.00															
(3) BIG4	0.42	0.20	1.00														
(4) SPEC	0.20	0.12	0.27	1.00													
(5) LTNR	0.31	0.27	0.23	0.13	1.00												
(6) OPIN	0.19	0.11	0.12	0.05	0.01	1.00											
(7) YE	0.07	0.03	0.06	0.02	-0.07	0.03	1.00										
(8) REST	0.06	-0.02	-0.03	-0.01	-0.07	0.09	-0.03	1.00									
(9) ACCR	-0.23	-0.20	-0.15	-0.07	-0.14	-0.02	0.03	0.03	1.00								
(10) SIZE	0.78	0.50	0.43	0.22	0.30	0.14	0.08	-0.03	-0.30	1.00							
(11) MB	0.00	-0.03	0.02	0.01	0.00	-0.02	0.03	-0.02	0.03	-0.02	1.00						
(12) LEV	0.23	0.20	0.12	0.06	0.05	0.09	0.12	0.02	-0.08	0.32	-0.09	1.00					
(13) ROA	0.30	0.24	0.13	0.07	0.18	-0.03	-0.07	-0.03	-0.33	0.44	-0.02	0.08	1.00				
(14) TANG	0.06	0.20	0.06	0.05	0.06	0.03	0.10	0.00	-0.15	0.28	-0.08	0.34	0.15	1.00			
(15) FRSALE	0.30	0.15	0.13	0.07	0.05	0.03	0.02	-0.01	-0.05	0.21	0.01	-0.08	0.09	-0.14	1.00		
(16) LSEG	0.11	0.18	0.05	0.03	0.03	0.13	-0.05	0.01	-0.07	0.14	-0.04	0.04	0.11	0.03	0.02	1.00	
(17) RECINV	-0.09	0.04	-0.14	-0.07	0.04	-0.05	-0.20	0.00	0.00	-0.18	-0.07	-0.18	0.18	-0.28	0.06	0.06	1.00

Table 3. Audit Fees and Defined Benefit Pension Plans

This table presents the regression results for the relation between audit fees and defined benefit pension. Our original sample consists of all firms in the Audit Analytics database spanning the period 2000-2012. We obtain the pension data from Compustat pension annual database and firm financial information from Compustat fundamental annual files. *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. *Inverse Mills Ratio* is computed from the probit model presented in Appendix B. Other variables are defined in Appendix A. *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.

Model:	Heckman	OLS
Dependent Variable:	*LAFEE*	*LAFEE*
	(1)	(2)
DUMDB	***0.176***	***0.172***
	(10.196)*	***(10.035)****
Inverse Mills Ratio	0.037	
	(1.921)*	
BIG4	0.249	0.249
	(15.635)***	(15.652)***
SPEC	0.032	0.033
	(2.411)**	(2.480)**
LTNR	0.064	0.060
	(9.231)***	(9.015)***
OPIN	0.125	0.125
	(14.283)***	(14.277)***
YE	0.082	0.084
	(5.353)***	(5.532)***
REST	0.165	0.165
	(13.260)***	(13.257)***
ACCR	0.039	0.055
	(0.935)	(1.308)
SIZE	0.518	0.510
	(74.841)***	(103.530)***
MB	0.004	0.004
	(3.249)***	(3.575)***
LEV	0.208	0.206
	(6.081)***	(6.016)***
ROA	-0.547	-0.567
	(-21.189)***	(-22.750)***
TANG	-0.534	-0.553

	(-12.186)***	(-13.051)***
FRSALE	0.239	0.240
	(11.263)***	(11.323)***
LSEG	0.028	0.027
	(3.527)***	(3.400)***
RECINV	0.601	0.577
	(12.854)***	(12.952)***
Obs.	41,558	41,558
R^2	0.823	0.823

Table 4. Audit Fees and Defined Benefit Pension Sensitivities

This table presents the regression results for the relation between audit fees and defined benefit pension sensitivity measures. Our original sample consists of all firms in the Audit Analytics database spanning the period 2000-2012. We obtain the pension data from Compustat pension annual database and firm financial information from Compustat fundamental annual files. *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 (PPLAO) over total assets (AT). *PSEN2* is defined as the log of the ratio of pension plan assets (PPLAO) over operating income (OIADP). *PSEN3* is defined as the log of the ratio of projected pension obligations (PBPRO) over operating income (OIADP). *PSEN4* is defined as the log of the ratio of pension plan assets (PPLAO) over three-year moving average operating income (OIADP). *Inverse Mills Ratio* is computed from the probit model presented in Appendix B. Other variables are defined in Appendix A. *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 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	0.269	0.223	0.207	0.210
	(10.665)***	(11.638)***	(11.310)***	(11.020)***
DUMDB*PSEN1	***0.038***			
	(5.008)***			
DUMDB*PSEN2		***0.061***		
		(7.061)***		
DUMDB*PSEN3			***0.065***	
			(7.579)***	
DUMDB*PSEN4				***0.058***
				(6.531)***
Inverse Mills Ratio	0.040	0.043	0.041	0.043
	(2.072)**	(2.171)**	(2.102)**	(2.192)**
BIG4	0.250	0.240	0.242	0.238
	(15.675)***	(14.856)***	(15.037)***	(14.769)***
SPEC	0.031	0.037	0.037	0.036
	(2.294)**	(2.732)***	(2.773)***	(2.669)***
LTNR	0.061	0.061	0.062	0.062
	(8.878)***	(8.646)***	(8.826)***	(8.793)***
OPIN	0.126	0.125	0.123	0.126
	(14.441)***	(14.120)***	(14.041)***	(14.218)***
YE	0.080	0.074	0.077	0.074
	(5.226)***	(4.749)***	(4.978)***	(4.758)***
REST	0.164	0.163	0.162	0.163

	(13.148)***	(12.891)***	(12.925)***	(12.913)***
ACCR	0.040	0.068	0.065	0.070
	(0.946)	(1.591)	(1.539)	(1.635)
SIZE	0.520	0.516	0.515	0.517
	(75.615)***	(72.620)***	(72.997)***	(72.592)***
MB	0.004	0.004	0.004	0.005
	(3.125)***	(3.650)***	(3.633)***	(3.671)***
LEV	0.211	0.213	0.213	0.210
	(6.188)***	(6.079)***	(6.144)***	(5.991)***
ROA	-0.547	-0.532	-0.530	-0.534
	(-21.232)***	(-20.201)***	(-20.189)***	(-20.264)***
TANG	-0.533	-0.526	-0.528	-0.526
	(-12.255)***	(-11.883)***	(-12.015)***	(-11.902)***
FRSALE	0.240	0.240	0.237	0.240
	(11.348)***	(11.119)***	(11.084)***	(11.092)***
LSEG	0.027	0.024	0.023	0.025
	(3.443)***	(3.017)***	(2.936)***	(3.128)***
RECINV	0.600	0.596	0.592	0.594
	(12.864)***	(12.628)***	(12.632)***	(12.571)***
Obs.	41,558	39,417	39,992	39,430
R^2	0.824	0.827	0.827	0.827

Table 5. The Effect of Transient Institutional Ownership

This table presents the regression results for the interaction with institutional ownership. Our original sample consists of all firms in the Audit Analytics database spanning the period 2000-2012. We obtain the pension data from Compustat pension annual database and firm financial information from Compustat fundamental annual files.*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. *TRAIO* is transient institutional ownership, which is defined as the proportion of shares held by transient institutional investors. *NONTRAIO i*s non-transient institutional ownership, which is defined as the proportion of shares held by non-transient institutional investors. *Inverse Mills Ratio* is computed from the probit model presented in Appendix B. Other variables are defined in Appendix A. *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 in both regressions. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable:	*LAFEE*	*LAFEE*
	(1)	(2)
DUMDB	0.152	0.107
	(6.607)***	(3.718)***
DUMDB*TRAIO	***0.227***	***0.196***
	(2.195)	***(3.440)***
TRAIO	0.252	0.245
	(4.144)***	(3.883)***
*DUMDB*NONTRAIO*		-0.044
		(-0.409)
NONTRAIO		0.018
		(0.508)
Inverse Mills Ratio	0.039	0.044
	(2.016)**	(2.289)**
BIG4	0.238	0.236
	(14.906)***	(14.739)***
SPEC	0.032	0.032
	(2.423)**	(2.419)**
LTNR	0.064	0.062
	(9.350)***	(9.066)***
OPIN	0.122	0.121
	(14.006)***	(13.856)***
YE	0.080	0.080
	(5.242)***	(5.262)***
REST	0.163	0.164
	(13.158)***	(13.267)***
ACCR	0.038	0.045

	(0.909)	(1.072)
SIZE	0.516	0.515
	(74.377)***	(74.254)***
MB	0.003	0.003
	(2.657)***	(2.569)**
LEV	0.192	0.195
	(5.602)***	(5.689)***
ROA	-0.565	-0.560
	(-21.952)***	(-21.829)***
TANG	-0.511	-0.505
	(-11.701)***	(-11.608)***
FRSALE	0.247	0.252
	(11.700)***	(12.098)***
LSEG	0.030	0.030
	(3.787)***	(3.788)***
RECINV	0.623	0.624
	(13.364)***	(13.424)***
Obs.	41,558	41,558
R^2	0.824	0.824

Table 6. The Effect of CEO Option Incentives

This table presents the regression results for the interaction with CEO option incentives. Our original sample consists of all firms in the Audit Analytics database spanning the period 2000-2012. We obtain the pension data from Compustat pension annual database and firm financial information from Compustat fundamental annual files. *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. *Inverse Mills Ratio* is computed from the probit model presented in Appendix B. Other variables are defined in Appendix A. *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 in both regressions. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable:	*LAFEE*	*LAFEE*
	(1)	(2)
DUMDB	-0.025	-0.019
	(-0.493)	(-0.736)
DUMDB*VEGA	***0.043***	***0.046***
	(4.420)*	***(3.531)****
VEGA	0.011	0.044
	(1.469)	(4.630)***
*DUMDB*DELTA*		0.018
		(1.778)*
DELTA		0.008
		(1.136)
Inverse Mills Ratio	0.021	0.019
	(0.499)	(0.456)
BIG4	0.116	0.115
	(3.725)***	(3.697)***
SPEC	0.032	0.033
	(1.718)*	(1.802)*
LTNR	0.050	0.047
	(4.641)***	(4.438)***
OPIN	0.095	0.094
	(7.493)***	(7.355)***
YE	0.128	0.126
	(5.481)***	(5.390)***
REST	0.190	0.188

	(10.407)***	(10.357)***
ACCR	0.147	0.143
	(1.549)	(1.522)
SIZE	0.521	0.529
	(41.705)***	(41.326)***
MB	0.003	0.005
	(1.549)	(2.081)**
LEV	0.191	0.182
	(3.006)***	(2.874)***
ROA	-0.688	-0.630
	(-9.403)***	(-8.612)***
TANG	-0.530	-0.526
	(-7.146)***	(-7.103)***
FRSALE	0.404	0.399
	(12.346)***	(12.260)***
LSEG	0.040	0.040
	(3.584)***	(3.625)***
RECINV	0.825	0.806
	(8.868)***	(8.653)***
Obs.	14,565	14,565
R^2	0.799	0.800

Table 7. The Effect of Auditor Characteristics

This table presents the regression results for the interaction with Big 4 and auditor industry specialization. Our original sample consists of all firms in the Audit Analytics database spanning the period 2000-2012. We obtain the pension data from Compustat pension annual database and firm financial information from Compustat fundamental annual files. *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. *BIG4* is defined as a dummy variable equal to one if the firm is audited by one of the Big 4 auditors and zero otherwise. *SPEC* is define as a dummy variable equal to one if the firm's auditor is industry specialist and zero otherwise. *Inverse Mills Ratio* is computed from the probit model presented in Appendix B. Other variables are defined in Appendix A. *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 in both regressions. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable:	*LAFEE*	*LAFEE*	*LAFEE*
	(1)	(2)	(3)
DUMDB	0.067	0.171	0.067
	(1.846)*	(9.116)***	(1.853)*
DUMDB*BIG4	***0.126***		***0.128***
	(3.405)***		***(3.408)******
DUMDB*SPEC		***0.012***	***-0.008***
		(0.454)	***(-0.287)***
Inverse Mills Ratio	0.025	0.030	0.025
	(1.311)	(1.543)	(1.317)
BIG4	0.223	0.246	0.222
	(13.006)***	(15.256)***	(12.785)***
SPEC	0.036	0.031	0.040
	(2.711)***	(1.916)*	(2.403)**
LTNR	0.056	0.057	0.057
	(8.228)***	(8.340)***	(8.240)***
OPIN	0.128	0.128	0.128
	(14.644)***	(14.618)***	(14.642)***
YE	0.082	0.081	0.082
	(5.330)***	(5.271)***	(5.333)***
REST	0.167	0.168	0.168
	(13.308)***	(13.323)***	(13.313)***
ACCR	0.045	0.047	0.045
	(1.067)	(1.108)	(1.065)
SIZE	0.516	0.517	0.516
	(74.380)***	(74.326)***	(74.197)***
MB	0.004	0.004	0.004
	(3.255)***	(3.302)***	(3.254)***

LEV	0.212	0.214	0.212
	(6.194)***	(6.242)***	(6.197)***
ROA	-0.550	-0.552	-0.550
	(-21.369)***	(-21.389)***	(-21.373)***
TANG	-0.546	-0.543	-0.546
	(-12.525)***	(-12.420)***	(-12.521)***
FRSALE	0.240	0.241	0.240
	(11.364)***	(11.390)***	(11.368)***
LSEG	0.027	0.028	0.027
	(3.409)***	(3.524)***	(3.407)***
RECINV	0.595	0.603	0.595
	(12.833)***	(12.949)***	(12.831)***
Obs.	41,558	41,558	41,558
R^2	0.825	0.825	0.825

Table 8. Abnormal Assumed Return Rates on Pension Assets and Additional Audit Fees for DB Pension Plans

This table presents the regression results of abnormal assumed return rates on pension assets and abnormal audit fees. Our original sample consists of all firms in the Audit Analytics database spanning the period 2000-2012. We obtain the pension data from Compustat pension annual database and firm financial information from Compustat fundamental annual files. *ABPPROR* is abnormal assumed rate of return on plan assets, which is measured as the residual from the regression in Appendix C. *ADLAFEE* is additional audit fees charged for DB pension plans, which is measured as coefficient on DB pension dummy (*DB*) plus the residual in the regression in Column (1) of Table 3. Other variables are defined in Appendix A. *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	***-0.0013***	***-0.0008***	***-0.0002***
	(-2.938)***	***(-1.995)*****	***(-0.437)***
PSEN1	0.0038	0.0006	0.0026
	(14.883)***	(6.142)***	(8.141)***
M&A	0.0033	0.0002	0.0036
	(8.166)***	(1.513)	(6.005)***
BEAT	0.0007	0.0001	0.0007
	(2.213)**	(0.456)	(1.488)
SIZE	-0.0000	0.0002	-0.0006
	(-0.152)	(3.422)***	(-2.575)**
MB	-0.0000	-0.0000	-0.0001
	(-0.409)	(-0.494)	(-0.708)
LEV	0.0093	0.0008	0.0091
	(5.728)***	(1.264)	(4.087)***
Obs.	12,796	8,020	4,776
R^2	0.134	-	-
Log Likelihood	-	32959.51	14763.64