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Fair value disclosure of pension plan assets and audit fees

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ABSTRACT

Effective December 2009, FAS 132(R)-1 expands the prior disclosure requirements on pension plan assets by requiring firms to disclose the fair value inputs and measurements of pension assets. This study examines whether the different level of pension asset fair value inputs required under FAS 132(R)-1 affects audit fees, and investigates whether more expanded fair value disclosure requirements alone can have any impact on audit fees that proxy for auditors' efforts. During our sample period from 2009 to 2010, we find supporting evidence that audit fees are an increasing function of Level 3 fair value assets that are more subjective. In addition, in a difference-in-difference test, we find evidence supporting our hypothesis that audit firms increase their audit fees after the adoption of FAS 132(R)-1, especially for the client firms that have more Level 3 pension assets. Considering that auditors have had access to the detailed fair value measurement information even before 2009, our results imply that a more detailed *disclosure requirement* on pension plan assets alone can affect auditors' audit efforts and audit fees accordingly.

1. Introduction

Pension assets in a defined benefit plan have been measured and disclosed with fair value in firms' annual reports. However, only after the newly revised reporting standard, FAS 132(R)-1 *Employers' Disclosures about Postretirement Benefit Plan Assets*, (or ASC 715), The U.S. Security Exchange Commission (SEC) registrant firms are required to expand the disclosure requirements of pension assets with fair market values effective December 15, 2009. More specifically, FAS 132(R)-1 requires plan-sponsoring firms to provide more detailed fair value information including fair value hierarchy and valuation methods in 10K filings. Taking advantage of these disclosure requirement changes, we investigate whether 1) the different hierarchy structure of pension assets has a different impact on audit fees, a proxy for auditors' audit efforts, and 2) a more detailed disclosure requirement itself can affect audit fees.

A long line of auditing research finds that client attributes, such as complexity and inherent risk, are vital determinants of audit fees because more complex clients tend to necessitate more difficult and time-consuming audits (Charles, Glover, & Sharp, 2010; Hay, Knechel, & Wong, 2006). However, there is scant research on auditors' response to a firm's additional disclosure of fair value assets alone. Moreover, it is not clear whether the composition of fair value assets would affect the inherent risk of audit, and therefore require more audit work.

For example, Goncharov, Riedl, and Sellhorn (2014) find that auditors charge lower fees for fair valued properties compared to properties valued at historical cost because impairment tests are required for properties valued at historical cost, but not for those valued at fair values. Therefore, fair value accounting does not necessarily increase auditors' efforts or audit fees.

On the other hand, some prior studies document that compared to the fair value of assets using quoted prices in the active market (Level 1) and significant other observable inputs (Level 2), fair value measurements using unobservable inputs (Level 3) are more susceptible to managerial discretion (Jaggi, Winder, & Lee, 2010; Song, Thomas, & Yi, 2010). In addition, Ettredge, Xu, and Yi (2014) also argue that Level 3 assets rely more on subjective assumptions and estimates, and therefore audit fees increase with fair value assets with more Level 3 inputs in bank holding company audits.

The PCAOB (AU section 328) requires auditors to obtain sufficient audit evidence to provide reasonable assurance for fair value measurements and disclosures, including testing management's process of valuation and developing independent estimates. Since fair value measurements with less observable inputs are inherently imprecise, auditors' additional audit work is centered on Level 3 pension assets when fair value inputs are disclosed. We expect that this additional audit work required for firms that have more Level 3 pension assets would lead to an increase in audit fees.

Using hand-collected fair value inputs of pension assets from the SEC's EDGAR database surrounding the effective year of FAS 132(R)-1,

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we first examine whether auditors' audit efforts are increasing with the asset value of fair value inputs. We find all three levels of fair value pension assets are positively associated with audit fees. However, when we control for each type of fair value assets in the same regression, we find supporting evidence that audit fees are an increasing function for Level 3 fair value pension assets only, but not for Level 2 or Level 1 fair value pension assets.

In addition, when we break down these Level 3 pension assets by specific asset types - equity, cash and cash equivalents, debt, and alternative assets, we find that their relationship to audit fees becomes more positive when Level 3 assets are only composed of equity or alternative assets that are harder to evaluate.

Under FAS 132(R)-1 disclosure requirements, we can isolate the disclosure effect of fair value assets from the complexity of pension assets on audit fees because pension assets have been measured and made available to auditors even prior to the adoption of FAS 132(R)-1. In other words, during the pre-FAS 132(R)-1 period, only the total fair value of pension assets was disclosed to the public through 10K reporting, while the detailed information on fair value inputs was not disclosed but still available to auditors. This lack of detailed disclosure of pension assets made it hard for the users of financials statements to access the risk and reliability associated with the reported fair value of pension assets prior to FAS 132(R)-1. However, the detailed information on fair value measures of pension assets that was only available to the auditors became available to the public under FAS 132(R)-1. This accounting disclosure rule change provides a unique setting where we can investigate the *disclosure* effect of fair value measurement of pension assets with the adoption of FAS 132(R)-1 on audit fees with a pre- and post-FAS 132(R)-1 sample, spanning years from 2005 to 2010, which is the focus of our second hypothesis.

To measure the impact of the new disclosure requirement on audit fees, we compare the changes in audit fees in the pre- and post-FAS 132(R)-1 periods for firms holding more Level 3 assets to the changes in audit fees for the control firms over the same period (i.e., firms holding Level 3 assets less than the sample median Level 3 assets). We find that audit firms increase their fees for client firms with higher percentages of Level 3 pension assets than the other control firms in the post-FAS 132(R)-1 period. This finding is consistent with our interpretation that a simple disclosure requirement of more detailed fair value of pension assets can increase auditors' audit efforts in their attempt to reduce audit risk or/and litigation risks associated with detailed disclosures.

This study makes a couple of important contributions to accounting literature. First, while there is a long line of research that examines audit fee determinants, there are very few that examine the association between audit fees and fair value estimates in the pension plan. One notable exception is Cullinan (1997). Our finding of a positive association between audit fees and Level 3 assets is consistent with Cullinan (1997), but we extend his study by looking at the fair value inputs of pension assets and comparing the effects of each input. In addition, by focusing on single-employer pension plans with S&P500 firms we complement Cullinan (1997) which investigates audit fees with multi-employer pension plans composed of many small sponsoring firms.

More importantly, pension assets have been measured with fair values and the fair value of pension assets information was available to auditors even in the pre-FAS 132(R)-1 period. Therefore, our research design enables us to investigate the effect of a simple fair value disclosure of pension assets on audit fees with the adoption of FAS 132(R)-1. Findings of this study should help standard setters evaluate how a simple reporting rule change can affect auditor's audit efforts associated with pension plans.

Section 2 provides a background of fair value disclosure of pension assets, related literature review, and hypotheses. Section 3 presents research design used to test our hypotheses. Sections 4 and 5 describe the data, and empirical results. Section 6 summarizes our findings with concluding remarks.

2. Background, literature review and hypotheses development

2.1. Background of the disclosure about fair value hierarchy of pension assets

The FASB has required firms to report pension plan assets on a fair-value basis since the adoption of FAS 87 *Employers' Accounting for Pensions* that took effect in December 1985. However, the fair value disclosure of pension assets under the FAS 87 does not require the disclosure of specific measurements and inputs for the fair value hierarchy. In an effort to improve reporting transparency associated with pension plan assets, the FASB adopted FAS 132(R)-1, effective as of December 15, 2009. Under FAS 132(R)-1, firms are required to disclose not only specific categories of pension assets but also information about fair value hierarchy of pension assets with the valuation techniques used to develop fair value measurements.[1]

More specifically, the FASB requires firms to disclose fair value measurements using quoted prices in active markets for identical assets or liabilities (Level 1), significant other observable inputs (Level 2), and significant unobservable inputs (Level 3) (FASB, 2008). The FAS 132(R)-1 also requires a reconciliation of the beginning and the ending balance of Level 3 pension assets. These disclosure requirements for fair value pension assets are similar to the disclosure about fair value measurements under FAS 157, *Fair Value Measurements*. However, the FASB clearly notes that FAS 157 should not be applied for pension assets because gains or losses on pension assets do not directly affect net income due to the provision under FAS 87 called the corridor approach.[2] While the disclosures about fair value measurements of pension assets are not within the scope of FAS 157, the definition for fair value inputs and valuation techniques used for measurements in FAS 157 are applied to the fair value measurements of pension assets. It is worthwhile to note that under the FAS 157, observable inputs are required to reflect market data obtained from sources independent of the reporting entity, and unobservable inputs are required to reflect reporting entity's own assumptions and estimates (FASB, 2006). For example, when a plan-sponsoring firm uses 'the present value measurement' defined in FAS 157 for its Level 3 pension assets, the measurement includes the firm's own assumptions and estimates, such as estimates of future cash flow and its timing, and discounted value.

Overall, while the newly required disclosure about the fair value measurements of pension assets is expected to facilitate users of financial statements to assess the reliability of fair value measurements, at the same time, the new disclosure requirements may increase the audit risks that result in more audit efforts in auditing pension plan assets.

2.2. Literature review and hypothesis development

Audit fees are often analyzed by the audit risk model: inherent risk, control risk, and detection risk. Charles et al. (2010) document that based on the audit risk model, auditors are to increase the level of audit efforts to reduce the detection risk when client firms have more accounts and disclosures that are more likely to be manipulated or misstated. They also find a strong relationship between audit fees and risk of material misstatement, and conclude that audit fees are adjusted in response to risks faced by the auditors. Prior studies also find a positive

[1] The FASB provides the example of major categories as follows: cash and cash equivalents, equities (segregated by industry type, company size, and investment objective), debt securities (segregated by issuers), asset-backed securities, structured debt, derivatives (segregated by type of underlying risk in the contract), investment funds (segregated by type of fund) (FASB, 2008).

[2] FAS 87 requires recognition of gains and losses in excess of 10% of the greater amount between the projected benefit obligation and the fair value of pension assets. In addition, the excess over the 10% is amortized over the average remaining expected service period of active employees (FASB, 1985).

relation between earnings management risk and audit fees (Bedard & Johnstone, 2004; Gul, Chen, & Tsui, 2003). These findings indicate that auditors try to mitigate the litigation and reputation risks by putting more effort (i.e., higher audit fees).

A long line of auditing literature also finds that client firms' characteristics are associated with audit fees (Hay et al., 2006; Simunic, 1980). In particular, researchers posit that the more complex a client is, the harder it is to audit due to more time spent in audit, and there is ample empirical evidence to that effect in the setting where the proxy for complexity is the number of business segments, subsidiaries, and foreign transactions.

Using the audit fee model, Cullinan (1997) documents that the pension plan size, audit opinion, and inherent risk factors are also determinants for audit fees in pension audit markets. Particularly, he finds that the "hard-to-audit" variable that measures the magnitude of the joint venture and real estate is significantly associated with audit fees, indicating that auditors charge higher audit fees to compensate for their additional audit work in pension audit markets as well.

The literature on fair value accounting finds that information asymmetry is increasing across the Level 1, 2, and 3 fair value measurements, and managers use their discretion in measuring the fair value of assets, especially Level 3 assets. For example, prior studies document that a model-based valuation of Level 3 assets is considered to be the least reliable because of unobservable information and subjective nature of estimates, while a market-based value is more reliable because of its verifiability (Jaggi et al., 2010; Riedl & Serafeim, 2011). Song et al. (2010) document that the value relevance of Level 1 and 2 fair value inputs is greater than that of Level 3 fair value input, implying that Level 3 fair value assets will cause a greater level of information asymmetry between investors and management. Song et al. (2010) also document that the estimates in the valuation of Level 3 assets are more likely to be biased and to be subject to managerial discretion.

In summary, while fair value measurements may accurately reflect price volatility of pension assets, fair value measures, especially those assets without readily available market price (Level 3 assets) are less verifiable by auditors and investors. Because of this subjective nature in fair value measurements, the PCAOB's 2010 Inspection Report states that the valuation of pension plan assets was one of the audit areas with "deficiencies attributable to failures to identify and test controls" (PCAOB, 2012). Based on the discussion above, we state our first hypothesis as follows:

H1. Ceteris paribus, audit fees are an increasing function of the Level 3 fair value pension assets.

While we focus on the impact of the ambiguity in fair value inputs of pension plan assets on audit fees in Hypothesis 1, we turn our focus to the impact of the new changes in the *disclosure requirement itself* on audit fees in Hypothesis 2.

With the adoption of FAS 132(R)-1, audit client firms are required to disclose their pension assets with fair value hierarchy levels. This mandated new disclosure requirement of pension assets may expose auditors to greater risks due to additional information previously unknown to the public, which in turn can lead to higher audit fees. For example, Seetharaman, Gul, and Lynn (2002) document that additional audit work arises from the higher litigation risk and the extensive disclosure requirements lead to higher audit fees. Similarly, Gillan and Panasian (2014) also document that auditors charge higher audit fees for the firms with more complex disclosures because of a greater litigation risk associated with such disclosures.

However, the effect of the mandated disclosure on audit fees will not be uniform across client firms. If audit firms charge higher fees from the effective year of FAS 132(R)-1, the cross-sectional difference in audit fees will be determined by the structure of fair value hierarchy of client firms as long as audit firms respond differently to each fair value input. As we will document through the test of Hypothesis 1, audit fees are more highly associated with the Level 3 pension assets.

If audit fees for firms with more Level 3 fair value pension assets indeed increase in the post-FAS 132(R)-1 period, as compared to its control firms with relatively less Level 3 fair value pension assets, then we attribute these audit fee increases to the new disclosure effect not to additional work associated with Level 3 assets. This is because auditors already had access to detailed information on the fair value hierarchy of pension assets even prior to the FAS 132(R)-1 regime.

Since audit pricing is generally determined before the commencement of the engagement (Chant, 1996), audit firms will reflect the effect of FAS 132(R)-1 on audit engagement pricing by considering the magnitude of pension assets in the year preceding the announcement of FAS 132(R)-1. Hence, we posit that the effect of fair value disclosure of pension assets under the FAS 132(R)-1 may be more pronounced for the client firms that hold more Level 3 assets. Therefore, we expect audit firms to increase their audit fees more for client firms that have more Level 3 fair value assets compared to those firms that have less Level 3 fair value assets during the post FAS 132(R)-1 period. We state our second hypothesis as follows:

H2. Ceteris paribus, audit firms are more likely to adjust the audit fees upward in the post period of FAS 132(R)-1 when client firms' pension plans include more Level 3 fair value assets than their counterparts that have less Level 3 fair value assets.

In sum, we believe a new disclosure requirement in 10-K reports under FAS 132(R)-1 gives us a unique opportunity to examine the impact of the detailed disclosure of pension plan assets, which is the focus of H2 as opposed to H1 that is focusing on the composition of fair value hierarchy level of pension plan assets. In H1, we try to examine the impact of *the ambiguity* in fair value inputs of pension assets on audit fees. On the other hand, in H2, we examine the impact of the new *disclosure requirement itself* on audit fees under FAS 132(R)-1 by closely looking at the cross-sectional variation of the ambiguity in fair value inputs of pension assets between pre- and post-FAS 132(R)-1.

3. Research design

3.1. The effect of fair value hierarchy on audit fees

To investigate how the difference in the fair value hierarchy levels affects audit fees with pension assets, we design our test models with a sample from the post-FAS 132(R)-1 period. Hypothesis 1 predicts that audit firms respond differently to each fair value hierarchy level of pension assets. Specifically, we expect that audit firms will charge higher audit fees to firms with more Level 3 pension assets. We test Hypothesis 1 with the following specification, using a pooled regression model with year fixed effects where standard errors are adjusted for clustering at the firm level. All variables are measured as of the fiscal year-end. The subscripts i and t stands for a firm and a year, respectively.

$$\begin{aligned} LOGARF_{i,t} = \; & \alpha_0 + \alpha_1 L1PLAN_{i,t} + \alpha_2 L2PLAN_{i,t} + \alpha_3 L3PLAN_{i,t} \\ & + \alpha_4 LEVERAGE_{i,t} + \alpha_5 MB_{i,t} + \alpha_6 DLOSS_{i,t} \\ & + \alpha_7 DSPEICIAL_{i,t} + \alpha_8 MODIFY_{i,t} + \alpha_9 ARINV_{i,t} \\ & + \alpha_{10} SEGMENT_{i,t} + \alpha_{11} DFOREIGN_{i,t} + \alpha_{12} ACHANGE_{i,t} \\ & + \alpha_{13} CFO_{i,t} + \alpha_{14} ROA_{i,t} + \alpha_{15} FIRMSIZE_{i,t} \\ & + \alpha_{16} INDUSTRY_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

Eq. (1) uses *LOGARF* (the natural logarithm of Audit-Related Fees) as the dependent variable. The SEC (2003) requires firms to disclose the detailed categories of audit fees by breaking Tax Fees and Audit-Related Fees out of the "All Other" category,[3] and requires the service fee for

[3] Previously, the SEC requires registrant firms to disclose details about the bills from

pension plan audits to be classified and disclosed as "Audit-Related Fees". We include the test variables *L1PLAN* (the natural logarithm of Level 1 fair value of pension assets), *L2PLAN* (the natural logarithm of Level 2 fair value of pension assets), and *L3PLAN* (the natural logarithm of Level 3 fair value of pension assets) in order to measure the changes in audit fees with the incremental value of each fair value hierarchy level, respectively Level 1, 2 and 3. We predict that $\alpha_3 > 0$.

Since most S&P 500 firms have single-employer pension plans, we expect that the characteristics of plan-sponsoring firms strongly affect audit risk in pension plan audits. Furthermore, because plan-sponsoring firms' auditors tend to audit their pension plans (Cullinan, 1997), the auditors are likely to regard pension plan audits as a part of firms' financial statement audits.

To control for the risk of financial failure, we include *LEVERAGE* (the ratio of debt to total assets), *MB* (the ratio of market value to book value of equity), and *DLOSS* (an indicator variable set to one if the sum of earnings in t and t-1 is negative, otherwise zero). We control for the additional audit work that may be required by the auditor with *DSPECIAL* (an indicator variable set to one if the firm reports special item, otherwise zero) and *MODIFY* (an indicator variable set to one if the audit opinion to the firm is other than unqualified opinion, otherwise zero). *AR_INV* (the ratio of the sum of account receivable and inventory to total assets) is included to control for the inherent risks and audit difficulties associated with firm characteristics. We control for the firms' business complexity with *SEGMENT* (the sum of the number of operating and geographic segments) and *DFOREIGN* (an indicator variable set to one if the firm has any foreign transactions, otherwise zero). We include *ACHANGE* (an indicator variable set to one if the auditor in the current year is different from the auditor in the previous year, otherwise zero) to control for the auditor changes. To control for the profitability, we include *ROA* (the income before extraordinary items after adding back pension expense divided by total assets) and *CFO* (cash flow from operations before pension contributions divided by total assets). We control for the size of firm with *FIRMSIZE* (the natural logarithm of total assets of firm). Finally, *INDUSTRY* is 12 indicator variables based on the industry classification used in Fama and French (1997).

3.2. The disclosure effect of fair value pension assets on audit fees

We adopt a difference-in-difference approach to investigate the effect of the mandated disclosure of the fair value hierarchy level related to the magnitude of Level 3 pension assets on audit fees under FAS 132(R)-1. That is, we compare pre- and post-FAS 132(R)-1 changes in audit fees for the firms that have relatively more Level 3 pension assets to the changes in audit fees over the same period for the control firms. We use a similar specification as in Eq. (1) but estimate audit fees with the firm-level fixed effect model.

$$\begin{aligned} LOGARF_{i,t} = {} & \alpha_0 + \alpha_1 POST_{i,t} + \alpha_2 POST_{i,t} * HIGH\,L3_{i,t} + \alpha_3 LEVERAGE_{i,t} \\ & + \alpha_4 MB_{i,t} + \alpha_5 DLOSS_{i,t} + \alpha_6 DSPEICIAL_{i,t} + \alpha_7 MODIFY_{i,t} \\ & + \alpha_8 ARINV_{i,t} \alpha_9 SEGMENT_{i,t} + \alpha_{10} DFOREIGN_{i,t} \\ & + \alpha_{11} ACHANGE_{i,t} + \alpha_{12} CFO_{i,t} + \alpha_{13} ROA_{i,t} \\ & + \alpha_{14} FIRMSIZE_{i,t} + \alpha_{15} PLANSIZE_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

The indicator variable, *POST*, takes a value of one if firms' fiscal year end is in the post-period (i.e. year 2009 or 2010), zero otherwise. It measures the variation of Audit-Related Fees after the adoption of FAS 132(R)-1. The indicator variable, *HIGH_L3*, measures a variation of Audit-Related Fees for the firms with more Level 3 pension assets, which is set to one if a firm's percentage of Level 3 pension assets is above the cross-sectional median of Level 3 pension assets in year 2008.[4] Otherwise, it is set to zero. Note that we estimate the regression Eq. (2) with the firm-fixed effects, therefore, we do not include the variable, *HIGH_L3* because it does not vary within the firm. The interaction term, *POST*HIGH_L3*, measures the variation of Audit-Related Fees affected by FAS 132(R)-1 for the firms that have more Level 3 pension assets (i.e. HIGH_L3 = 1 group) relative to the firms that have less Level 3 pension assets (i.e. HIGH_L3 = 0 group) between the pre- and post-period. Hypothesis 2 predicts that the expected risks from the mandated disclosure of Level 3 pension assets will lead to an increase in Audit-Related Fees under the FAS 132(R)-1, especially for those firms that have more Level 3 pension assets ($\alpha_2 > 0$).

4. Data description

4.1. Sample selection

The sample selection process starts with S&P 500 firms that have defined benefit pension plans. We identify the sample by matching Compustat Pension Data with S&P 500 firms in 2009, which yields 297 unique sample firms. We hand-collect the fair value hierarchy information of pension assets and detailed pension asset allocations (types of investments) for these sample firms from the EDGAR 10K filings, spanning the fiscal years 2009–2010. Using the firms' 10K filings, we also identify domestic pension plan size by excluding international pension plans within the same plan sponsor firms between 2008 and 2010, because the international plan is not likely to be included in the audit scope of pension plans. The fair value level 3 information for the year 2008 is obtained from the Level 3 reconciliation in year 2009. We eliminate seven firms that do not disclose the fair value hierarchy level information about pension assets even after the adoption of FAS 132(R)-1.

We obtain the Audit-Related Fees data for fiscal years from 2005 to 2010 from the EDGAR and Audit Analytics database. The SEC requires firms to provide the nature of the services that are categorized in Audit-Related Fees, such as employee benefit plan audits, due diligence and accounting consulting related to M&A in the proxy statement. We find 15 firms that have disclosed no payment for Audit-Related Fees or have clearly described that the Audit-Related Fees are paid for non-pension audit services during the period. We drop these 15 firms from our sample because these firms may classify pension audit fees as 'Audit Fees' instead of Audit-Related Fees.

Finally, for multivariate regression analysis, we eliminated 22 observations that do not have COMPUSTAT control variables. The final sample consists of 992 firm-year observations for the pre-FAS 132(R)-1 period (2005 to 2008) and 494 firm-year observations for the post-period spanning from year 2009 to 2010. Table 1 summarizes the sample selection process.

4.2. Descriptive statistics

Table 2 describes summary statistics. The mean (median) Audit-Related Fees (*AuditFees*) in the sample is $1,506k ($543k) with an interquartile range from $204k to 1,349k. The mean Audit-Related Fees is even higher than that of the third quartile, indicating the distribution is skewed to the right. The skewed distribution of Audit-Related Fees is

(*footnote continued*)
the auditor, specifically, the fees to be broken down into three categories: audit fees, financial information systems design and implementation fees, and all other fees. In the final rule, the SEC eliminates one disclosure category, financial information systems design and implementation (SEC, 2003).

[4] Because we (the public) do not observe a client firm's L3 pension assets prior to 2009, we assume that a firm's L3 pension asset size does not change much year to year. We validate our assumption by comparing the average L3 pension assets between the pre-period (2008) and the post-period (2009 and 2010). The mean size of L3 pension assets is 3.72 (2008) and 3.70 (2009 and 2010), respectively, and they are not statistically different at the conventional level, which gives us some confidence that the L3 pension asset size does not vary much year to year at least, on average.

Table 1
Sample selection.

	Number of observations	Number of unique firms
Pre-FAS 132(R)-1 (2005–2008)		
S&P 500 firms with defined-benefit pensions	992	252
Post-FAS 132(R)-1 (2009–2010)		
S&P 500 firms with defined-benefit pensions		297
Less: Firms that do not disclose fair value hierarchy in 2009		− 7
Less: Disclosed Audit-Related Fees are not related with pension audit		− 15
Less: Firms with missing data for control variables	494	− 22 253

The table reports a sample selection process.

pension assets, and Audit Related Fees is significantly negative, but the correlation between *L3RATIO*, the percentages of Level 3 assets to total fair value pension assets, and Audit Related Fees is significantly positive. These correlation results imply that auditors charge lower fees for the firms that have more Level 2 pension assets and higher fees for the firms that have more Level 3 pension assets, which is consistent with our prediction at least in the univariate analysis.

Amongst control variables, *USPLAN*, *FIRMSIZE*, *AR_INV*, *MODIFY*, and *SEGMENT* are positively correlated with Audit-Related Fees. These results suggest that pension plan sponsor firms' characteristics are related to audit firms' service pricing on pension audits. That is, audit firms charge higher audit fees to the client firms that are large, complex with multi-segments in business, and have modified audit opinion and more hard-to-audit assets. Consistent with prior studies, *ACHANGE* is negatively correlated with Audit-Related Fees, indicating that there are price competitions between audit firms for the new client firms (Chan,

Table 2
Descriptive statistics.

Variable	N	P5	P25	P50	P75	P95	Mean	SD
AuditFees	1503	33.5	203.9	542.6	1349.1	6200.0	1506.4	3234.4
L1PLAN	494	0.0	100.5	479.0	1536.5	6917.0	1551.5	3129.5
L2PLAN	494	3.5	246.0	835.0	1956.0	8546.0	2070.0	3902.5
L3PLAN	752	0.0	1.7	53.3	336.3	2971.0	513.0	1308.3
LEVERAGE	1748	0.04	0.15	0.23	0.34	0.54	0.25	0.15
MB	1745	0.71	1.46	2.25	3.65	7.82	2.53	33.39
DLOSS	1748	0	0	0	0	1	0.19	0.39
DSPECIAL	1749	0	1	1	1	1	0.83	0.38
MODIFY	1749	0	0	1	1	1	0.57	0.49
AR_INV	1733	0.05	0.12	0.22	0.32	0.66	0.25	0.17
SEGMENT	1749	1	5	7	10	16	7.55	4.56
DFOREIGN	1749	0	0	1	1	1	0.74	0.44
ACHANGE	1749	0	0	0	0	0	0.03	0.17
CFO	1744	0.01	0.06	0.10	0.14	0.22	0.10	0.07
ROA	1748	− 0.02	0.02	0.05	0.10	0.16	0.06	0.07
FIRMSIZE	1748	2709.4	6673.6	18145.5	42837.5	233323.0	74350.5	235119.1
PLANSIZE	1748	113.1	532.5	1680.9	4359.5	18412.0	4869.2	10704.2
USPLAN	752	92.8	438.2	1440.0	3592.8	15649.0	3877.4	7372.0

The table reports summary statistics of the sample used in this study. *AuditFees* is the Audit Related Fees from Audit Analytics and reported in $1000's. All other variables are defined in Appendix A.

mainly attributable to the skewed distribution of pension plan size. For the regression analysis, Audit-Related Fees and pension plan size variables are log-transformed to reduce biases in coefficients due to the skewed distribution of our sample.

The mean (median) sizes of Level 1, Level 2, and Level 3 pension assets are $1,552m ($479m), $2,070m ($835m), and $513m ($53m), respectively, indicating that firms invest less in Level 3 assets such as hedge funds and private equity. Many firms (24%) do not invest in Level 3 assets at all (not tabulated).

The mean (median) of *FIRMSIZE* and *PLANSIZE* are $74.4bn ($18.1bn) and $4.9bn ($1.7bn), respectively. We separately capture the *USPLAN* that excludes international pension plan assets from EDGAR database with the limited sample period (2008–2010). The mean (median) of *USPLAN* is $3,877m ($1,440m), with the inter-quartile range from $438m to $3,593m. Earnings (measured before pension expenses) are 6.0% of total assets, and the mean cash flows from operations is 10.0%. The sum of account receivables and inventories is 25.0% of total assets. The mean (median) number of *SEGMENT* is 7.6 (7.0), respectively.

4.3. Correlation coefficients

Table 3 presents the Spearman correlation coefficients between the dependent variable and the main variables of interest. The correlation between *L2RATIO*, the percentages of Level 2 assets to total fair value

Table 3
Correlation coefficients.

	LOGARF	*L1RATIO*	*L2RATIO*	*L3RATIO*
LOGARF	1.000			
L1RATIO	0.047	1.000		
L2RATIO	− 0.083[a]	− 0.913[c]	1.000	
L3RATIO	0.093[b]	− 0.103[b]	− 0.313[c]	1.000
LEVERAGE	0.013	0.030	− 0.063	0.084
MB	− 0.011	− 0.006	0.017	− 0.027
DLOSS	− 0.021	0.054	− 0.064	0.031
DSPECIAL	− 0.014	− 0.103[b]	0.099[b]	− 0.001
MODIFY	0.049[b]	− 0.016	− 0.005	0.049
AR_INV	0.095[c]	0.178[c]	− 0.131[c]	− 0.094[b]
SEGMENT	0.132[c]	− 0.011	− 0.008	0.046
DFOREIGN	− 0.032	− 0.099[b]	0.137[c]	− 0.102[b]
ACHANGE	− 0.150[c]	− 0.043	0.008	0.081[a]
CFO	− 0.165[c]	− 0.046	0.052	− 0.020
ROA	− 0.069[c]	− 0.104[b]	0.102[b]	− 0.008
FIRMSIZE	0.508[c]	0.050	− 0.104[c]	0.138[c]
USPLAN	0.452[c]	− 0.008	− 0.105[b]	0.267[c]

The table reports Spearman Correlation coefficients between variables used in this study. *L1RATIO*, *L2LATION*, and *L3LATIO* are the percentages of Level 1, 2, and 3 assets to total fair value pension assets, respectively. All other variables are defined in Appendix A.

[a] Indicates statistical significance at 10% level in one-tailed test.
[b] Indicates statistical significance at 5% level in one-tailed test.
[c] Indicates statistical significance at 1% level in one-tailed test.

1999; Jensen & Payne, 2003). *CFO* and *ROA* are negatively correlated with Audit-Related Fees, implying that audit firms charge higher fees for the firms with poor performance. *USPLAN* is negatively associated with *L2RATIO* while it is positively associated with *L3RATIO*, indicating that firms with large plans are likely to include less Level 2 assets and more Level 3 assets.

5. Empirical results

5.1. The impact of fair value hierarchy level on audit fees

In Hypothesis 1, we investigate how each fair value hierarchy level of pension assets affects audit fees differently.[5] Table 4 reports the cross-sectional regression results with variables of the fair value hierarchy information and the investment types of pension assets. Columns (1), (2), and (3) report the impact of each level of fair value pension assets, *L1PLAN*, *L2PLAN*, and *L3PLAN* on audit fees in separate regressions. The coefficients for all three types of pension assets are positive and significant at the conventional level, which indicate that the overall level of pension assets and audit fees are positively associated. To see marginal effect of the Level 3 pension assets on audit fees after controlling for Leve1 1 and Level 2 pension assets, we include all *L1PLAN*, *L2PLAN* and *L3PLAN* in the same regression, and report the results in Column (4). Column (4) reveals that only the coefficient for *L3PLAN* is positive ($p = 0.077$ with one tailed test), but marginally significant where coefficients of other fair value assets are also positive but insignificant, which supports our Hypothesis 1.

In Table 5, we report the results of our audit fee regression Eq. (1) where we further break down each fair value asset group by its investment type. More specifically, we break down the pension asset allocation into equity (*EQUITY*), debt (*DEBT*), cash and cash equivalents (*CCE*), and alternative investments (*ALTTOTAL*) within each fair value hierarchy level. We find that amongst Level 3 assets, *L3ALTTOTAL* is positively and significantly associated with audit fees at less than the 5% level. The results imply that Level 3 alternative investments (e.g. real estate, private equity, and hedge funds) require additional audit efforts in order to assess the reasonableness of valuation techniques. We also find that *L1EQUITY*, *L2EQUITY*, and *L3EQUITY* are all positively and significantly associated with audit fees at less than 1%, 5%, and 10% level, respectively, which implies that audit firms charge higher audit fees for the firms that have more equity assets. We believe that these results are attributable to the increased financial risks of pension plans with aggressive investments. However, we do not see a statistical difference between *L1EQUITY* and *L3EQUITY* (OR *L3ALTTOTAL*), though.

5.2. The disclosure impact of FAS 132(R)-1 on audit fees

Table 6 reports the results of Hypothesis 2. The main test variable, the interaction term between *HIGH_L3* and *POST*, captures the variation of audit fees for the firms that hold more Level 3 pension assets between the pre- and post-FAS 132(R)-1 periods compared to those firms that hold less Level 3 pension assets.[6] Through this exercise, we try to examine the expanded disclosure requirement alone can affect auditor's audit efforts. Column (1) presents that the coefficient for

Table 4
The effect of pension asset fair value hierarchy on audit fees.

	(1)	(2)	(3)	(4)
	LOGARF	*LOGARF*	*LOGARF*	*LOGARF*
L1PLAN	0.134[b]			0.0803
	(1.83)			(0.94)
L2PLAN		0.123[a]		0.0574
		(1.52)		(0.70)
L3PLAN			0.129[c]	0.0841[a]
			(2.53)	(1.43)
LEVERAGE	0.626	0.564	0.549	0.5683
	(0.94)	(0.89)	(0.85)	(0.87)
MB	0.003[b]	0.004[c]	0.004[b]	0.0032[b]
	(2.28)	(2.43)	(2.33)	(2.21)
DLOSS	0.013	0.009	− 0.055	− 0.001
	(0.05)	(0.03)	(− 0.19)	(− 0.00)
DSPECIAL	0.108	0.036	0.052	0.0629
	(0.60)	(0.20)	(0.28)	(0.32)
MODIFY	− 0.105	− 0.063	− 0.074	− 0.0623
	(− 0.49)	(− 0.30)	(− 0.35)	(− 0.31)
AR_INV	0.123	0.606	0.638	0.559
	(0.14)	(0.62)	(0.68)	(0.57)
SEGMENT	0.013	0.016	0.012	0.0104
	(0.46)	(0.59)	(0.47)	(0.39)
DFOREIGN	0.192	0.110	0.207	0.2263
	(0.53)	(0.29)	(0.57)	(0.64)
ACHANGE	0.114	0.076	− 0.083	0.0517
	(0.11)	(0.09)	(− 0.08)	(0.05)
CFO	− 1.942	− 1.075	− 1.21	− 1.883
	(− 0.67)	(− 0.40)	(− 0.45)	(− 0.64)
ROA	1.607	0.805	0.671	1.147
	(1.17)	(0.66)	(0.54)	(0.75)
FIRMSIZE	0.820[c]	0.825[c]	0.807[c]	0.7212[c]
	(9.72)	(6.81)	(8.26)	(6.87)
Intercept	4.262[c]	4.172[c]	4.608[c]	4.839[c]
	(5.30)	(4.69)	(5.71)	(6.11)
N	494	494	494	494
R^2	0.340	0.335	0.343	0.345
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Firm fixed effect	No	No	No	No

The table reports the results of regression for fiscal year 2009–2010 with year and industry fixed effects. *L1PLAN*, *L2PLAN*, and *L3PLAN* are Level 1, 2, and 3 fair value pension assets at the end of the year. All other variables are defined in Appendix A. t-statistics are in parentheses. Standard errors are clustered at the firm level.

[a] Indicates statistical significance at 10% level in one-tailed test.

[b] Indicates statistical significance at 5% level in one-tailed test.

[c] Indicates statistical significance at 1% level in one-tailed test.

*HIGH_L3*POST* is positive and significant at less than the 5% level ($p = 0.026$), along with the significantly negative coefficient on *POST*, implying that audit firms charge higher audit fees for the firms that hold more Level 3 assets in the post-FAS 132(R)-1 period compared with the pre-FAS 132(R)-1 period. Economically, the coefficient on *HIGH_L3*POST* indicates that firms holding more Level 3 (i.e., *HIGH_L3* firms) pay 7.7% ($= -0.391 + 0.314$) lower audit fees in the post-period than those in the pre-period, where firms, on average, pay 39.1% lower audit fees in the post-period.

As an additional test, we include an alternative dummy variable, *HIGH_ALT3*, which takes a value of one if a firms' Level 3 alternative investments percentages are above the median in year 2009, zero otherwise.[7] Because the test results in Table 5 present that audit fees' responsiveness to alternative investments is much stronger than other pension assets, we expect that audit firms charge higher audit fees for the firms holding more alternative investments in the post-FAS 132(R)-1 period. For this investigation, we assume that firms' pension

[5] Audit-Related Fees disclosed in a firm's proxy statement includes not only employee benefit plan audits but also other fees for the assurance and related services. To establish the responsiveness of audit fees to pension plan audits, we first investigate whether pension plan size is specifically related to Audit-Related Fees. Untabulated results show that audit fees are actually an increasing function of pension plan size, which is consistent with findings in Cullinan (1997).

[6] We use the firm fixed effect regression to control for the within-firm variation. *HIGH_L3* takes a value of 1 for each year during our sample period when a firm's Level 3 fair value pension asset is above the median value of the 2008 Level 3 fair value. Since there is no variation in *HIGH_L3* within the firm during the sample period, *HIGH_L3* is not included in regression models with the firm fixed effect.

[7] While the 2008 Level 3 pension assets information is available through a firm's 2009 financial statements (reconciliation of Level 3 assets), the alternative assets in Level 3 category variable (*HIGH_ALT3*) is not available until 2009.

Table 5
The effect of pension asset fair value hierarchy on audit fees - further evidence.

	LOGARF	
L1EQUITY	0.0251[c]	(2.55)
L1CCE	0.0132	(0.55)
L1ALTTOTAL	0.0039	(0.21)
L2EQUITY	0.0175[b]	(1.80)
L2DEBT	0.0161	(1.37)
L2CCE	0.0015	(0.03)
L2ALTTOTAL	0.0189[a]	(1.58)
L3EQUITY	0.0350[a]	(1.61)
L3DEBT	− 0.1401	(− 1.03)
L3CCE	− 0.0048	(− 0.10)
L3ALTTOTAL	0.0302[b]	(2.18)
LEVERAGE	0.3739	(0.57)
MB	0.0038[b]	(2.06)
DLOSS	0.0555	(0.21)
DSPECIAL	0.0357	(0.17)
MODIFY	− 0.066	(− 0.33)
AR_INV	0.2606	(0.26)
SEGMENT	0.0133	(0.53)
DFOREIGN	0.1959	(0.58)
ACHANGE	0.1325	(0.10)
CFO	− 1.551	(− 0.49)
ROA	1.891	(1.12)
FIRMSIZE	0.9216[c]	(10.03)
Intercept	2.248[b]	(1.94)
N	494	
R^2	0.3489	
Industry fixed effects	Yes	
Year fixed effects	Yes	
Firm fixed effects	No	

The table reports the results of regression for fiscal year 2009–2010 with year and industry fixed effects. L1, L2, or L3 stands for Level 1, Level 2 or Level 3 fair value pension assets, respectively. The suffix in each variable, *EQUITY* refers to investment in equity, *DEBT* refers to investment in debt, *CCE* refers to cash and cash equivalents, and *ALTTOTAL* refers to alternative investment. All other variables are defined in Appendix A. t-statistics are in parentheses. Standard errors are clustered at the firm level.

[a] Indicates statistical significance at 10% level in one-tailed test.

[b] Indicates statistical significance at 5% level in one-tailed test.

[c] Indicates statistical significance at 1% level in one-tailed test.

asset allocations have not significantly changed between 2008 and 2009. The coefficient on *HIGH_ALT3*POST* is significantly positive at less than the 5% level (p = 0.019, Column 2), which indicates that the audit fees' responsiveness to the disclosure of Level 3 fair value assets increases for the firms holding more alternative investments in the post-FAS 132(R)-1 period.

Overall, our study provides evidence that audit firms tend to increase their audit fees immediately following mandated disclosure of fair value pension assets, especially for the client firms that hold more Level 3 pension assets. We believe that the positive association between fair value disclosure and audit fees is attributable to the audit firms' increased audit efforts in order to reduce the litigation risk associated with the increased fair value *disclosure requirements* related to pension plan assets.

5.3. Robustness tests

In measuring our key variable, *HIGH_L3*, in Hypothesis 2, we acknowledge that our approach may suffer from the measurement error issue. We conduct three additional tests to see if our results are robust to alternative measures of *HIGH_L3* and a different sample period.[8]

First, instead of using the dichotomous variable as used in our current version (i.e. High vs. Low), we partition the L3 pension assets of year 2008 into decile groups, and allocate values from 0 to 9 and scale the variable by 9 so the new indicator variable ranges between 0 to 1 (by the increment of 0.1).[9] The reported results with the finer measure (i.e., decile variable as opposed to dichotomous variable) are similar to our original findings.

Second, we restrict our sample period one year before and one year after 2009 when FAS132(R)-1 became effective (i.e. 2008, 2009 and 2010). By having a shorter test window, we lose some statistical power. However, it is less likely that the indicator variable (i.e., High vs. Low or decile rankings) of L3 pension assets for any given firm will change from year 2008 to 2009 or 2010. With the shorter sample periods, we again obtain similar results to our original findings.

Third, we measure the average L3 pension assets using three years of data (i.e. 2008, 2009, 2010) to create the indicator variable based on this average measure as opposed to the current *HIGH_L3* that is based on L3 pension assets in 2008. The main findings from our regression analysis with this alternative indicator variable are also very similar to the original findings.

Table 6
The effect of fair value disclosure of pension assets on audit fees.

	(1)		(2)	
	LOGARF		*LOGARF*	
POST	− 0.391[b]	(− 3.01)	− 0.395[b]	(− 3.09)
*HIGH_L3*POST*	0.314[a]	(1.95)		
*HIGH_ALT3*POST*			0.334[a]	(2.09)
LEVERAGE	0.807	(0.89)	0.752	(0.83)
MB	0.000	(0.23)	0.000	(0.23)
DLOSS	0.067	(0.41)	0.066	(0.41)
DSPECIAL	− 0.009	(− 0.07)	− 0.012	(− 0.09)
MODIFY	− 0.003	(− 0.03)	0.004	(0.04)
AR_INV	0.911	(0.69)	0.811	(0.62)
SEGMENT	− 0.020	(− 0.74)	− 0.021	(− 0.78)
DFOREIGN	− 0.761[a]	(− 2.28)	− 0.778[b]	(− 2.34)
ACHANGE	− 1.505[b]	(− 6.41)	− 1.49[b]	(− 6.35)
CFO	− 2.392[a]	(− 1.96)	− 2.337[a]	(− 1.91)
ROA	0.363	(0.46)	0.409	(0.52)
FIRMSIZE	0.509[a]	(2.16)	0.519[a]	(2.21)
PLANSIZE	0.079	(0.36)	0.052	(0.23)
Intercept	8.051[b]	(3.57)	8.205[b]	(3.65)
N	1486		1486	
R^2	0.052		0.053	
Industry	No		No	
Year	No		No	
Firm	Yes		Yes	

The table reports the results of regression for fiscal year 2005–2010 with firm fixed effect. *HIGH_L3* is an indicator variable set to one if the firms' Level 3 pension asset ratios are over the annual median in 2008. *HIGH_ALT3* is an indicator variable set to one if the firms' Level 3 alternative investments ratios are over the annual median in 2009. All other variables are defined in Appendix A. t-statistics are in parentheses.

[a] Indicates statistical significance at 5% level in one-tailed test.

[b] Indicates statistical significance at 1% level in one-tailed test.

6. Conclusion

This paper investigates how fair value hierarchy levels of pension assets affect audit fees associated with pension plans, and examines whether the mandated disclosure of fair value itself affects audit fees. We hypothesize that audit firms increase their audit fees for client firms that have more Level 3 assets, and we find supporting evidence. In addition, we posit that audit firms are likely to adjust audit fees upward after mandated disclosure of fair value inputs and valuation techniques for pension assets. In particular, we compare the changes in audit fees in the pre- and post-FAS 132(R)-1 period for the firms holding more Level 3 pension assets to the changes in audit fees for the control firms over the same period. Because pension assets have been measured at

[8] Additional test results are available upon requests.

[9] The portfolio approach with decile variables has been widely used in accounting research (e.g. Khan and Watts (2009), Kraft, Leone, and Wasley (2007), Louis, Sun, and Urcan (2012), Sloan (1996) and Teoh and Zhang (2011)).

fair value and available to the auditors even in the pre-FAS 132(R)-1 period, our research design enables us to investigate the effect of additional required disclosure of fair value on audit fees with the adoption of FAS 132(R)-1. We find that audit firms charge higher audit fees for the firms that hold more Level 3 pension assets under the mandated disclosure of fair value inputs and measurements. The results imply that expanded disclosure requirements alone can affect auditors' audit efforts and audit fees accordingly.

Conflicts of interest

No conflicts of interest are declared.

Appendix A. Variable definitions

Variable name	Definitions
Dependent variable and variables of interest	
LOGARF	Natural logarithm of [1 + Audit Related Fees(*AuditFees*)] of the year.
POST	An indicator variable if firms' fiscal year end is post-FAS 132(R)-1 period, then set to one. Otherwise, set to zero.
HIGH_L3	An indicator variable set to one if the firms' Level 3 assets ratios are over the annual median in 2008. Otherwise, set to zero.
HIGH_ALT3	An indicator variable set to one if the firms' Level 3 alternative investments ratios are over the annual median in 2009. Otherwise, set to zero.
Variables measuring the fair value hierarchy of pension assets and allocation	
All fair value of pension assets are measured with fair value hierarchy level 1, 2, and 3 with defined variables below	
USPLAN	Natural logarithm of [1 + fair value of pension assets] of the year, where pension assets are measured with US plan by excluding international plan
L1PLAN	Natural logarithm of [1 + level 1 fair value of pension assets] of the year, where pension assets are measured with US plan by excluding international plan
L2PLAN	Natural logarithm of [1 + level 2 fair value of pension assets] of the year, where pension assets are measured with US plan by excluding international plan
L3PLAN	Natural logarithm of [1 + level 3 fair value of pension assets] of the year, where pension assets are measured with US plan by excluding international plan
L1RATIO	The percentage of level 1 fair value of pension assets to the total pension assets
L2RATIO	The percentage of level 2 fair value of pension assets to the total pension assets
L3RATIO	The percentage of level 3 fair value of pension assets to the total pension assets
LxEQUITY	The percentage of *Lx* fair value pension plan assets invested in equities, where *x* can be 1, 2 or 3.
LxDEBT	The percentage of *Lx* fair value pension plan assets invested in debt securities, where *x* can be 1, 2 or 3.
LxCCE	The percentage of *Lx* fair value pension plan assets invested in cash or cash equivalents, where *x* can be 1, 2 or 3.
LxALT	The percentage of *Lx* fair value pension plan assets invested in alternative investments such as real estate, private equity, hedge funds, or asset backed securities, where *x* can be 1, 2 or 3.
Control variables	
LEVERAGE	Long-term debt + Debt in current liabilities/Total assets at the end of the year.
MB	Market value of equity divided by the book value of equity.
DLOSS	An indicator variable set to one if earnings before extraordinary items in years *t* and *t*–1 sum to less than zero. Otherwise, set to zero.
DSPECIAL	An indicator variable set to one if the firm reported special items (Compustat item 6) in the current year.
MODIFY	An indicator variable set to one if the audit opinion code has any value other than one (unqualified opinion).
AR_INV	Account receivable plus inventory scaled by total assets.
SEGMENT	The sum of the number of operating and geographic segments reported by the Compustat Segments database for the firm.
DFOREIGEN	An indicator variable set to one if the firm has a non-zero foreign currency translation. Otherwise, set to zero.
ACHANGE	An indicator variable set to one if the auditor in the current year is different from the auditor in the past year. Otherwise, set to zero.
CFO	Cash flow from operations before pension contributions/Total assets at the end of the year.
ROA	Income before extraordinary items and pension expense/Total assets at the end of the year.
FIRMSIZE	Natural logarithm of [1 + total assets] of the plan sponsor at the end of the year.
PLANSIZE	Natural logarithm of [1 + pension plan assets] of the plan sponsor at the end of the year.

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