THE CONSEQUENCE OF MANAGERIAL DISCRETION

IN PENSION ACCOUNTING

By

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ABSTRACT OF THE DISSERTATION

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In this study, I investigate managers' opportunistic behavior and its consequences by using pension accounting. Literature on pension accounting documents that the characteristics of pension accounting, such as its long-term nature, complexity, and roughly regulated footnote disclosure, offer exercisable discretion over accounting numbers. I conjecture that effective internal controls and transparent disclosures constrain managers' opportunistic behavior.

The first essay examines the effect of internal control weaknesses (ICWs) on managers' choice of pension assumptions. I hypothesize that firms with ICWs are better able to opportunistically set pension assumptions, such as the expected rate of return (ERR) and the discount rate (DR), which in turn help to report higher earnings or healthier balance sheets. First, I find that firms tend to report higher ERR and DR when they receive an adverse audit opinion on internal control. In addition, I find that the firms facing more incentives to manage the funding status of pension plan are likely to choose higher DR in response to the incentives. Next, I find that firms with ICWs are more likely to adjust their biased ERR when they receive an unqualified audit opinion on internal control. Finally, I find that market returns are significantly negative for the firms assuming higher ERR in the 3-day window around the disclosure of material weaknesses if the firms' earnings are sensitive to the changed ERR.

The second essay examines whether ERR manipulation is related to disclosure of pension asset allocation. FAS 132R(1), which requires firms to disaggregate the detailed categories of pension asset allocation, provides a natural experiment for studying the effect of enhanced transparency on firm behavior. I posit that firms discretionarily assume higher ERR by using the opaque disclosure under the old standard, and adjust biased ERR downward under the greater reporting transparency. The hand-collected data allow me to identify the extent of disclosure variation under the two different reporting regimes. I measure the variation of disclosure with self-constructed disclosure scores. I find that opaque disclosure of plan asset allocation is associated with ERR management. Specifically, for firms with poor disclosure, mandated transparency in pension asset allocation plays a vital role in reducing the ERR management. I also find that ERR management is facilitated by the opaque disclosure even under the new reporting regime. Particularly, I find that firms tend to assume higher ERR through the opaque disclosure when they disaggregate the indirectly invested funds with no description of underlying asset classes.

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DEDICATION

To my son, JOONTAE HWANG

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I. Introduction

Literature on internal control reveals that managers who are weakly constrained by an internal control system are able to manipulate earnings, as evidenced by lower accrual quality of these firms. However, little research to date provides evidence on whether internal control weaknesses (ICWs) adversely affect specific accruals. In this study, I investigate the relation between ICWs and earnings management specifically in the pension accounting by focusing on pension assumption manipulation. I posit that managers of firms with ICWs are better able to opportunistically set pension assumptions, such as the expected rate of return (ERR) and the discount rate (DR), which in turn help to report higher earnings or healthier balance sheets.

Literature suggests that managers have strong incentives to manipulate pension assumptions given the long-term nature of pension assumptions and complexity in pension accounting. These characteristics of pension accounting make it difficult for users of financial statements to identify biased accounting information (Brown 2002, Picconi 2006). Furthermore, manipulation of pension assumptions is an effective method of earnings management because pension cost amounts to, on average, 16% of firm's reported income before extraordinary items (Comprix and Muller 2006). Thus, Anantharaman (2011) argues that pension assumptions are a conduit for earnings management.

Using entity level ICWs disclosed under Section 404 of the Sarbanes-Oxley Act (SOX) from 2004 to 2012, I investigate whether firms with ICWs opportunistically

assume their pension assumptions for reducing pension cost or projected pension obligation. Then, I examine whether firms with ICWs remediate these biased pension assumptions when they receive an unqualified SOX 404 audit opinion. Finally, I examine the market effects of material weakness disclosures conditional on pension assumption information based on a sample of firms that have initially disclosed material weaknesses under Section 302 and 404 of SOX and a matched sample of control firms.

I find that firms with ICWs tend to assume higher ERR than other firms when they receive an adverse audit opinion under Section 404, implying that ICWs enable managers to discretionarily set ERR at a higher level to boost earnings. I find that firms with ICWs are likely to assume higher DR than other firms when they receive an adverse audit opinion on internal control. This relation is heightened under FAS 158 that requires the funding status of pension plans be reported on the balance sheet. I also find that firms facing more incentives to manage the funding status of their pension plan are likely to choose higher DR in response to the incentives. These results reveal that firms with ICWs appear to assume higher DR for reporting healthier balance sheets. Next, with limited sample firms that have disclosed ICWs in the current year or prior years, I investigate the remediation effect of internal control problems on pension assumption management. I find firms that disclose internal control problems and subsequently receive an unqualified audit opinion on internal control decrease their ERR relative to the year ICWs are reported. However, I do not find clear evidence of the remediation effect for the firms that assume upward biased DR. Finally, I find that market returns are significantly negative for the firms assuming higher ERR in the 3-day window around the disclosure of material weaknesses if the firms' earnings are sensitive to the changed ERR. This

suggests that investors appear to be concerned about financial reporting credibility with ERR assumption that is attenuated by the presence of material weaknesses. However, I do not find this relation for the firms that assume higher DR.

This paper makes contributions to literature on internal control and pension accounting. First, I add to literature that seeks to detect earnings management, much of which focus on changes of earnings quality associated with ICWs disclosure. Chan et al. (2008) provide   evidence that firms with ICWs have more discretionary accruals, suggesting that these firms are more likely to manage earnings. Main findings of this study are consistent with the results of Chan et al. (2008) but extend their research by looking at earnings management through pension assumptions manipulation. Research has pointed out the measurement errors and omitted variables problem in discretionary accruals analysis (Bernard and Skinner 1996; Kasznik 1996; McNichols 2000). Particularly, it is difficult to investigate how aggregated accruals are intrinsically associated with earnings management, where literature has taken "a black box approach" to the factors that explain the aggregated accruals (McNichols 2000). Since pension assumptions are clearly observable and unrelated to operating performance, this study contributes to understanding how ICWs affect earnings management as a result of managers' accounting choice of pension assumptions. Secondly, this study contributes to understanding of the necessary conditions for pension assumptions manipulation. A number of prior studies have focused on managers' incentives to manipulate pension assumptions, such as managerial compensation and meeting earnings targets. In this study, I highlight the ICWs environment as a key mechanism that affects managers' ability to manipulate assumptions, complementing prior studies that focus almost entirely

on their incentives to engage in pension assumption manipulation. Finally, this study provides evidence linking financial reporting quality associated with pension assumption to stock prices. Prior studies evaluate market response to disclosure of material weaknesses by examining the characteristics of material weaknesses (Beneish et al. 2008, Hammersley 2008). This study extends prior studies by looking at the impact of material weakness disclosures on investors' belief revision about the reasonableness of pension assumption that can directly affect firms' earnings and liabilities.

In Section II, I review the related literature and develop hypotheses. Section III presents data selection and research design to test hypotheses. Section IV discusses the results. Section V concludes.

II. Prior research and hypotheses development

2.1 Internal control weaknesses and earnings management

Literature on ICWs that are required to be disclosed under SOX Section 302 and 404 points out that ICWs are positively associated with business complexity and negatively associated with firm size, profitability, and quality of corporate governance (Ge and McVay 2005, Ashbaugh-Skaife et al. 2006, Doyle et al. 2007a). Prior studies also show that ICWs can lead to lower quality of accounting accruals because of intentional earnings management or unintentional accounting errors (Ashbaugh-Skaife et al. 2006, Doyle et al. 2007b, Chan et al. 2008). These findings can be interpreted as evidence supporting a PCAOB's standard (Audit Standard No.2) that "a material weakness exists when the design or operation of internal controls does not allow for the prevention or detection of a misstatement on a timely basis and can likely result in a material misstatement in the interim or annual financial statements". Prior research

suggests that effective internal control plays a vital role in maintaining the quality of earnings by restricting managers' intentional manipulation of earnings (Jiambalvo 1996; Bell and Carcello 2000). Particularly, Doyle et al. (2007b) document that, for the firms with weak controls, intentionally biased discretionary accruals could be greater by failing to limit management's ability to manipulate earnings.

Researchers have also examined whether earnings quality is improved when firm's ICWs are remediated (Ashbaugh-Skaife et al. 2008, Bedard et al. 2011). They find that firms remediating ICWs, as evidenced by firms receiving an unqualified SOX 404 audit opinion, have greater accrual quality relative to firms that fail to remediate ICWs. These findings of the remediation effects are consistent with prior claims that effective internal control affects the quality of reported accruals. Prior studies also investigate the specific reasons of ICWs related to the remediation of ICWs. Bedard and Graham (2008) find that firms' un-remediated ICWs are likely to be associated with firms' control environment and control design, and Chan et al. (2009) report that ICWs remediation is not related to the personnel issues, but positively associated with financial resources.

Collectively, literature documents that internal control problems allow managers' earnings management, and provides the evidence of this argument by using the discretionary accruals models. However, researchers have cast doubt on the ability of discretionary accruals to accurately capture earnings manipulation because of difficulties in discriminating discretionary and non-discretionary accruals and measurement errors from omitted variables (Bernard and Skinner 1996, McNichols 2000, Comprix and Muller 2010). McNichols (2000) argues that modeling specific accrual choices can

reduce these measurement errors. Thus, in this study, I specifically investigate how ICWs affect earnings management as a result of managers' choice of pension assumptions.

2.2 Managers' manipulation of pension assumptions

Pension assumptions are categorized into demographic assumptions and economic assumptions: while demographic assumptions pertain to the composition and expected behavior of the beneficiary pool, economic assumptions pertain to how market forces will affect the cost of the plan (Anantharaman 2011). Research has focused on the economic assumptions, especially ERR and DR, that are commonly used for earnings management. Prior studies suggest that mangers have strong incentives to manipulate ERR and DR for boosting earnings or reporting healthier balance sheets.

Advantages of manipulating these pension assumptions as a discretionary accounting choice mainly come from their long-term nature and complexity. Brown (2002) argues that the long-term nature of pension assumptions makes it difficult for users of financial statements to identify errors. Picconi (2006) also suggests that investors and analysts cannot fully evaluate pension accounting information because the technical reporting requirements for pension are relatively complex. Furthermore, the pension cost manipulated by pension assumptions can strongly affect firms' earnings amount. According to Comprix and Muller (2006), pension cost amounts average 16% of the absolute value of reported income before extraordinary items. Therefore, pension assumptions are susceptible to managerial discretion, and are "a fertile area for manipulation" (Buffett and Loomis 2001; Hann et al. 2007).

The changed DR affects both balance sheets and income statements because DR is used in determining the present value of firms' pension liabilities (balance sheet side)

as well as service cost and interest cost that are main components of the pension expense (income statement side). From the balance sheet perspective, since DR is the rate at which future benefit payments are discounted back to present value, higher DR decreases the projected pension obligation (PBO), which leads to the improvement of funding status. Prior studies find that firms with the underfunded pension plans tend to reduce the size of the PBO by choosing a higher discount rate (Feldstein and Morck 1983, Amir and Gordon 1996, Asthana 1999). From the income statement perspective, the effect on pension expense is not as clear. Higher DR always reduces the service cost. However, the effect of changing DR on interest cost depends on duration of the plan liabilities (Fried et al. 2010). Thus, for the plans with longer duration of obligations, higher DR reduces both service cost and interest cost, which leads to the decrease of pension expense. Conversely, for the plan with shorter durations, the direction of pension cost is ambiguous because higher DR increases interest cost. Fried et al. (2010) demonstrate that managers tend to be motivated to choose lower DR for reducing the pension expense when their pension plans have shorter duration.

Compared to DR, the impact of changing ERR on the current pension expense is straightforward because the assumed return on plan assets directly offsets service cost and interest cost. FAS 87 requires firms to select ERR based on the actual rate of return and the pension asset allocations. The reporting standard allows managers to enjoy significant discretion in selecting ERR because the reconciliation between ERR and the actual rate of return happens over time with long amortization periods. Thus, firms with large pension assets relative to operating earnings have a powerful lever to manipulate reported earnings (Bergstresser et al. 2006). Prior studies find that ERR is not related

with the future return on the pension assets (Amir and Benartzi 1998, Jones and Walker 2003), implying that ERR can be discretionarily selected by managers. Bergstresser et al. (2006) document that managers appear to alter ERR in response to their incentives related to impending merger activities and compensation contracts. Picconi (2006) and Asthana (2008) report that ERR is manipulated by managers for meeting and beating earnings targets.

Collectively, a number of empirical studies reveal managers' incentives to manipulate pension assumptions, such as maximizing their compensation, meeting and beating earnings targets, and preparing for freezing their pension plans. However, little research has focused on managers' opportunities for manipulating pension assumptions. In this study, I highlight ineffective control environment as an 'opportunity' for pension assumption manipulation, by providing empirical evidences.

2.3 Hypotheses development

Given the discretionary nature of pension assumptions, two dimensions can be presented for managers to manipulate pension assumptions: incentives and opportunities of the assumptions manipulation. First, managers tend to make an accounting choice in their own interests, which may not necessarily be in the firms best interests (Watts and Zimmerman 1986). Literature on pension finds that managers' pension assumption choices are also influenced by reporting incentives associated with agency consideration (Blackley and Swanson 1995, Godwin et al. 1996, Asthana 1999). Second, prior research documents that ICWs allow managers to manipulate earnings by overriding financial reporting control and to use biased accrual estimates (Jiambalvo 1996, Ashbaugh-Skaife et al. 2006, Doyle et al. 2007b), implying that ICWs can create more opportunities for

managers to manipulate pension assumptions. Figure 1.1 depicts the likelihood of pension assumption manipulation. Intuitively, the likelihood of pension assumptions manipulation increases if more opportunities are provided to managers who have enough incentives to manipulate the assumptions.

To date, prior studies provide the evidence that managers' various incentives influence pension assumption manipulation (Feldstein and Morck 1983, Asthana 1999, Picconi 2006). In this study, I focus on the opportunity for pension assumption manipulation created by weak internal controls with given incentives of the pension assumption manipulation. I first test the hypothesis that firms' ERR assumption is opportunistically set by managers when ICWs exist. Since ERR manipulation is hard to be identified by users of financial statements and has a direct impact on pension cost, managers assume higher ERR assumption to boost earnings when their internal controls have material weaknesses. If managerial opportunism is important in determining ERR, this relationship should be heightened when managers are most interested in inflating profit. Thus, I test:

> H1: Ceteris paribus, firms assume higher expected rate of return on pension assets when they have internal control deficiencies.

Prior studies demonstrate that balance sheets and footnote information can be targets of managers' manipulation with similar motivation to earnings management (Amir and Livnat 1996; Gramlich et al. 2001). In particular, the SEC investigations suggest that regulators are specifically concerned about PBO manipulation through DR (Schultz 2004). Prior research finds that firms with underfunded pension plans use less conservative assumptions and tend to reduce the size of the pension obligation by

choosing a higher DR. Feldstein and Morck (1982) document that the market asymmetrically weighs underfunded plans negatively, indicating that managers have strong incentive of increasing DR within certain level of lower funding status. While the decrease of DR influences on income statements depending on duration of the plan liabilities, I do not expect these effects in my sample period from 2004 to 2012 because of the changed reporting standard FAS 158 that took effect December 15, 2006. Since FAS158 requires full recognition of the pension funding status on the balance sheets, it is not expected for managers to discretionally choose lower DR that leads to negative effects on the funding status. Therefore, I focus on investigating the effect of ICWs on DR related to the balance sheet side motivations. Since ICWs provide an opportunity to managers who have strong motivation of DR manipulation, I posit that firms with ICWs are likely to manipulate DR upward for reporting healthier balance sheets. I expect that this relation is heightened when managers have more incentives to manage their projected benefit obligations. The second hypothesis follows:

> H2A: Ceteris paribus, firms assume higher discount rate when they have internal control deficiencies.
>
> H2B: Ceteris paribus, firms with internal control deficiencies assume higher discount rate when their pension plans are underfunded.

Literature on ICWs finds that firms remediating ICWs have greater accrual quality relative to firms that fail to remediate ICWs, implying firms that have remediated internal control problems tend to adjust their biased accruals. Following the relation between the remediation of ICWs and accruals quality, I expect that firms with ICWs

may adjust their biased assumptions when they remediate the deficiencies of internal control.

> H3: Ceteris paribus, firms adjust their biased assumptions when their internal control deficiencies are remediated.

If ICWs create opportunities for managers to manipulate pension assumptions, there is a question as to whether investors react to internal control weakness disclosures associated with pension assumption information. Hammersley et al. (2008) find that market negatively reacts to the disclosure of internal control weaknesses when the weaknesses are material. Since material weakness disclosures convey incremental information about firms' reporting, I conjecture that investors cast doubt on the reasonableness of pension assumptions for the firms that have disclosed the material weaknesses. Accordingly, the higher ERR and DR can induce further drops in the stock prices in response to the disclosure of material weaknesses. I phrase my fourth hypothesis as follows:

> H4: Investor reaction to firms' material weakness disclosure is more negative when the firms assume biased pension assumptions.

III. Data selection and research design

3.1 Data selection

In this study, a sample of firms reporting ICWs is identified by the disclosures under Section 404 of SOX. Since ICWs disclosures under Section 404 require extensive reviews of the external auditors, prior research suggests that disclosures under Section 404 are better than those under Section 302 because of the objectivity in capturing the

impact on earnings management (Doyle et al. 2007b, Chan et al. 2008). Section 404 also allows identifying the remediation of ICWs when the improvement of internal control took place (Ashbaugh-Skaife et al. 2008). However, in order to test market reaction to ICWs with pension assumption information, I include material weakness disclosures under Section 302. By including the disclosures under Section 302, I am able to test the market reaction to the initial material weakness disclosures with less data constraints that reduce the power of tests to detect a market response.

I first identify the 'entity level' ICWs of firms in fiscal years 2004-2012 from the Audit Analytics database. Prior studies reveal that the entity level ICWs, such as ineffective control environment and override by senior management, cause more serious problems related to managers' discretion than account level ICWs (Amir and Gordon 1996; Chan et al. 2009; Ettredge et al. 2011). I eliminated ICWs sample observations that have mission data for cross-sectional empirical tests. This process provides a total of 618 ICWs sample firm observations that have pension plans from 2004 to 2012. Amongst 618 sample observations, 494 observations are used for estimating ERR, and 611 observations are used for estimating DR.

Next, I collect pension assumptions and other data that are used for control variables including ICWs firms and control firms from the COMPUSTAT Pension Annual and Fundamentals Annual database. Then, I merge the firms with ICWs data set with the pension data set by matching fiscal year-end and ICWs audit opinion date with CIK numbers. Then, I capture the monthly yield data (e.g. Moody's Seasoned AAA Corporate Bond-Yield, 20-years Treasury Yield) and the Inflation Index for estimating

DR from the St. Louis Federal Reserve and the Department of Labor Bureau of Labor Statistics, respectively.

Finally, for testing the fourth hypothesis, I identified initial material weaknesses observations (ICWs) spanning from 2002 to 2012 by comparing the Audit Analytics database and SEC filings from the EDGAR database. The initial ICWs sample (454 firms) was merged to the CRSP Compustat database. In this process, I deleted 127 ICWs firms that are not listed on the CRSP tapes. I obtain the final 327 sample firms that have initially disclosed material weaknesses. I select two control firms for each of ICWs firm by matching on industry, pension plan size, and ICWs disclosure timing from COMPUSTAT firms that do not report material weaknesses under either of Sections 302 or 404.

3.2 The association between ICWs and ERR

I estimate ERR with indicator variable of *ICW*, determinants of ERR and ICWs, and other control variables, by using the pooled regression model in the presence of year fixed effect. Below is the model for testing hypothesis I. All variables are measured as of fiscal year-end. Detailed variable definitions are in Appendix A.

$$
\begin{aligned}
ERR_{it} = \ & \alpha_{0t} + \alpha_{1t}ICW + \alpha_{2t}\%EQUITY + \alpha_{3t}\%RE + \alpha_{4t}\%OTHER + \alpha_{5t}ARR_t \\
& + \alpha_{6t}ARR_{t-1} + \alpha_{7t}STDARR + \alpha_{8t}FUNDING + \alpha_{9t}PLANSIZE \\
& + \alpha_{10t}DLOSS + \alpha_{11t}DFOREIGN + \alpha_{12t}RESTRUCT \\
& + \alpha_{13t}SEGMENT + \alpha_{14t}DGROWTH + \alpha_{15t}BIG4 \\
& + \alpha_{16t}PREREPORT + \alpha_{17t}LEV + \alpha_{18t}ROA + \alpha_{19t}FIRMSIZE \\
& + \alpha_{20t}CFO + \alpha_{21t}STDROA + \alpha_{22t}STDCFO + \varepsilon
\end{aligned}
$$

Equation (1)

In Equation (1), the indicator variable, internal control weaknesses (*ICW*), is the focal variable of my study: if firms receive an adverse audit opinion under Section 404 of

SOX, then *ICW* is one. Otherwise*, ICW* is zero. The model includes the key determinants of ERR assumption and control variables that affect managers' choice of ERR. First, since FAS 87 requires that ERR should be assumed based on prior experience and performance expectation, I control for the plan asset allocations by including the percentage of equities, debt securities, real estate, and other assets (*%EQUITY, %DEBT, %RE,* and *%OTHER*), the current and lagged actual rate of return on pension assets (ARR_t, ARR_{t-1}), and its standard deviation over past three years (*STDARR*). Amir and Benartzi (1998) argue that if a firm reports unbiased estimate of ERR, cross-sectional difference of ERR should reflect cross-sectional difference in the riskiness of the pension portfolio.

Next, I include determinants of ICWs because the determinants of ICWs can also affect the impact of ICWs on assumed ERR. Based on prior studies (Ge and McVey 2005, Doyle et al. 2007a, Hoitash et al. 2009), I incorporate ICWs determinants: *DLOSS* (an indicator variable set to one if the sum of earnings in t and t-1 is less than zero), *DFOREIGN* (an indicator variable set to one if the firm has foreign transaction), *RESTRUCT* (the sum of restructuring cost in years *t* and *t*–1 scaled by the firm's year *t* market capitalization), *SEGMENT* (the sum of the number of operating and geographic segments), *DGROWTH* (an indicator variable set to one if over year sales growth falls into the top quintile), *BIG4* (an indicator variable set to one if the firm is audited by one of the Big Four audit firms. I also include *PREREPORT* (an indicator variable set to one if the firm reports ICWs in the preceding year or reports material weaknesses under Section 302 in the current year) because firms that previously reported material weaknesses are more likely to report existing weaknesses (Rice and Weber 2011).

Finally, I control for the pension plan and firm characteristics that can be associated with fundamental variation in ERR or incentives to manipulate ERR. The plan and firm characteristics include *FUNDING* (fair value of plan assets divided by projected benefit obligation), *PLANSIZE* (natural logarithm of fair value of plan assets), *FIRMSIZE* (natural logarithm of total assets), *LEV* (the sum of long-term debt and debt in current liabilities divided by total assets), *ROA* (the sum of income before extraordinary items and pension expense divided by total assets), *CFO* (cash flow from operations before pension contributions divided by total assets), *STDROA* (standard deviation of profitability over the past three years), *STDCFO* (standard deviation of cash flows over the past three years).

3.3 The association between ICWs and DR

I also estimate DR with the focal variable of ICWs and control variables, by using the pooled regression model in the presence of year fixed effect. Hypothesis II is tested based on the following model.

$$
\begin{aligned}
DR_{it} = \ &\beta_{0t} + \beta_{1t}ICW + \beta_{2t}AAAYIELD + \beta_{3t}T20YIELD + \beta_{4t}INFLATION \\
&+ \beta_{5t}FUNDING_{ADJ} + \beta_{6t}DURATION + \beta_{7t}PLANSIZE \\
&+ \beta_{8t}DLOSS + \beta_{9t}DFOREIGN + \beta_{10t}RESTRUCT + \beta_{11t}SEGMENT \\
&+ \beta_{12t}DGROWTH + \beta_{13t}BIG4 + \beta_{14t}PREREPORT + \beta_{15t}LEV \\
&+ \beta_{16t}ROA + \beta_{17t}FIRMSIZE + \beta_{18t}STDROA + \beta_{19t}STDCFO \\
&+ \varepsilon
\end{aligned}
$$

Equation (2)

Like Equation 1, this model includes the key determinants of DR assumption and other control variables that affect managers' choice of DR. FAS 87 requires that DR should reflect the rate at which pension benefit could be effectively settled, and it be used

not only in measurement of the projected, the accumulated, and the vested benefit obligations but also in measurement of service and interest costs. FAS 106 suggests that DR be based on the yield of high quality fixed-income investment portfolio. Thus, DR is conceptually a function of the plan duration and the prevailing yield on high quality bonds.

Since a plan's duration is not provided directly in firms' financial statements, I incorporate a proxy of the plan duration following the prior literature of Brown (2004) and Fried et al. (2010), by measuring the ratio of service cost to the sum of interest cost and service cost (*DURATION*). The rationale behind this measurement of plan duration is that a pension plan with shorter duration tends to have high interest cost relative to service cost because of larger PBO size, and a pension plan with longer duration is vice versa. The prevailing yields on high quality bonds that are used as benchmark rates of DR vary with broader macro-economic conditions. Following the prior study (Anantharaman 2011), I control for the prevailing yields with Moody's Seasoned AAA rate Corporate Bond Index (*AAAYIELD*), the yields on 20-years Treasury Bonds (*T20YIELD*), and inflation index (*INFLATION*).

A long line of literature has revealed that managers have strong incentives to improve funding status of pension plan by choosing higher DR. Datta et al. (1996) report that managers have incentives to maintain financial slack in the form of excess pension funding. Particularly, underfunded plans have stronger incentives to choose obligation-reducing assumption (Feldstein and Morck 1983, Asthana 1999). Therefore, I control for the funding status with an adjusted funding ratio (*FUNDING$_{ADJ}$*) using estimated PBO following Hann et al. (2007) procedure. Since the funding ratio itself is a function of the

chosen DR assumption, it is necessary to adjust the estimated PBO by using assumed industry median value of DR, CR (compensation growth rate), and standard post-retirement life expectation of 15 years.

Like Equation 1, I control for the determinants of ICWs by including the following variables: *DLOSS, DFOREIGN, RESTRUCT, SEGMENT, DGROWTH, BIG4, and PREREPORT*. Following prior studies, I control for the pension plan and firm characteristics: *PLANSIZE, FIRMSIZE, LEV, ROA, STDROA,* and *STDCFO*.

3.4 Market reaction on internal control weaknesses with pension information

The following model is used for testing market reaction to material weakness disclosures combined with pension assumption information.

$$
\begin{aligned}
CAR = \; & \gamma_0 + \gamma_1 ICW + \gamma_2 HERR \, (+\gamma_2 HDR) + \gamma_3 ICW * HERR \, (+ \gamma_3 ICW * HDR) \\
& + \gamma_4 SURPRISE + \gamma_5 LATEFILE + \gamma_6 AUDITORCHANGE \\
& + \gamma_7 DIRECTORCHANGE + \gamma_8 RESTATE + \gamma_9 BIG4 \\
& + \gamma_{10} AUDITED + \gamma_{11} PLANSIZE + \gamma_{12} FIRMSIZE + \varepsilon
\end{aligned}
$$

Equation (3)

In Equation 3, I estimate cumulative abnormal return (*CAR*) over the three days of event window [-1, 1] with the initial disclosure of material weaknesses, other news, and variables of firm and pension plan characteristics.

CAR is obtained by summing the individual abnormal returns during the event window, where abnormal returns are computed based on the market model using the EVENTUS program. *ICW* is an indicator variable set to one if a firm initially discloses material weaknesses under Section 302 or 404 of SOX. *HERR* (*HDR*) is an indicator variable set one if a firm's ERR (DR) is above the annual median of the COMPUSTAT Pension Annual sample for the year. My focal variable in Equation 3 is the interaction

term, *ICW*HERR* (*ICW*HDR*), which measures the impact of ICW disclosures with the given pension assumption information on market return. I also include *HERR$_{ADJ}$* (*HDR$_{ADJ}$*) instead of *HERR* (*HDR*), which is an adjusted *HERR* (*HDR*) by replacing with previous year *HERR* (*HDR*) when material deficiencies are disclosed before the 10K filing date because current year ERR (DR) is released to investors around the 10K filing date.

To capture the effect of earnings information released during the event window, I include an earnings surprise (*SURPRISE*), which is measured by subtracting the earnings per share announced 4 quarters prior from earnings per share of the event window scaled by stock price four quarters prior. Following the prior study (Hammersley et al. 2008), I measure *SURPRISE* for the firms that disclosed material weaknesses in the amended 10K and 10Q filings, by subtracting the earnings per share as originally disclosed from the amended earnings per share scaled by stock price. To control for the presence of other news that is released during the event window, I include *LATEFILE* (an indicator variable set to one if a firm discloses the notifications of late filing within the event window), *AUDITORCHANGE* (an indicator variable set to one if a firm discloses the change of its auditor within the event window), *DIRECTORCHANGE* (an indicator variable set to one if a firm discloses the change of its directors within the event window), *RESTATE* (an indicator variable set to one if a firm announces restatement within the event window).

In line with literature (Beneish et al. 2008 and Hammersley et al. 2008), I control for the audit quality with *BIG4* and *AUDITED* (an indicator variable set to one if a firm is subject to auditor attestation of internal control under SOX 404). I include *FIRMSIZE* and *PLANSIZE* in order to control for the firm and plan characteristics.

3.5 Descriptive statistics

Table 1.1 displays the distribution of the dependent and independent variables, and Wilcoxon rank sum test results that measure the difference in means (median) between ICWs firms and control firms. ICWs firms assume, on average, higher ERR and DR than control firms. The mean (median) ERR of ICWs firms and control firms are 7.69% (8.00%) and 7.49% (8.00%), with the inter-quartile range of 7.30-8.50% and 7.00-8.30%, respectively. The mean (median) DR of ICWs firms and control firms are 5.59% (5.75%) and 5.44% (5.67%), with the inter-quartile range of 5.25-6.00% and 5.00-6.00%, respectively. Figure 1.2 shows that the control firms' ERRs decrease steadily during the whole sample period, where the ICWs firms' ERRs slightly increase during the 2006-2009 period. The average ERRs of ICWs firms are higher than those of control firms except for the years 2006, 2011, and 2012. DRs of both ICWs firms and control firms fluctuate during the sample period following the variation of the bond market yield curve. Particularly, ICWs firms' DRs are higher than those of the control firms from the year 2005 to 2009. I conjecture that the higher DRs of ICWs firms during the period attribute to the impact of FAS 158 that requires the recognition of the pension funding gap in the balance sheet. Table 1.1 shows the Wilcoxon rank sum test results that ICWs firms have, on average, higher *%EQUITY, LEV, STDROA, STDCFO, DLOSS, DFOREIGN, RESTRUCT*, and *SEGMENT*, but have lower *DURATION, FUNDING, PLANSIZE, FIRMSIZE, ROA, CFO*, and *BIG4*.

Table 1.2 presents the correlations between dependent variables and independent variables. *ICW*, variable of interests, is positively correlated with *ERR, DR, %EQUITY, LEV, STDCFO, DLOSS, DFOREIGN, SEGMENT,* and *PREPREORT*, and negatively correlated with *FUNDING, PLANSIZE, FIRMSIZE, ROA, CFO,* and *BIG4* among the

economic determinants and the plan and firm characteristics. The results indicate that ICWs firms are likely to invest pension assets in riskier assets, and to have more financial/business risk and complexity, where these firms have worse pension funding status and profitability, and have smaller size of firm and plan assets. In the case of dependent variables, *ERR* is positively correlated with *%EQUTITY, ARR, FUNDING, PLANSIZE, ROA, CFO,* and *BIG4,* and negatively correlated with *%OTHER, %RE, FIRMSIZE, LEV, STDCFO, SEGMENT, DLOSS,* and *DFOREIGN. DR* is positively correlated with *AAAYIELD, T20YIELD, FUNDGING, LEV, STDCFO,* and *DGROWTH,* and negatively correlated with *DURATION, INFLATION, PLANSIZE, FIRMSIZE, DFOREIGN,* and *SEGMENT*.

Table 1.3 presents the material weakness reporting types and the confounding news events that are incorporated to control for the presence of other filings in the market reaction analysis. Panel A of Table 1.3 reports that most of sample firms initially disclosed the material weaknesses on 10K or 10Q filings (including the amended financial statements), but 23.24% of firms disclosed the material weaknesses on 8K filings. Panel B of Table 1.3 presents that material weakness disclosures are contaminated by 103 earnings announcements and 79 restatements news. Many other news relate to the change of director and auditor, and the delayed 10K or 10Q filings.

IV. Results

4.1 Do internal control weaknesses affect ERR management?

To measure the impact of ICWs on ERR assumption after controlling for characteristics of firms and pension plans, I compare the incremental value of coefficients of ERR when the *ICW* component is added. Table 1.4 reports the regression results of

estimating Equation 1, where each column presents coefficients with standard errors that are estimated by pooled regression in the presence of year fixed effect.

Column (1) of Table 1.4 presents the results of the basic model with determinants of ERR assumption and ICWs, and control variables for pension plan and firm characteristics. I find that ICWs are positively and significantly related with ERR at less than 1 percent level, implying that firms with ICWs tend to choose higher ERR when they receive an adverse audit opinion on internal control. The significantly positive coefficient on %*EQUITY* indicates that firms are likely to assume higher ERR when they invest in riskier assets compared to debt securities. The positive coefficients on *PLANSIZE* and *ROA* indicate that firms with larger plans and more profitability are likely to assume higher ERR. This suggests, consistent with Bergstresser et al. (2006) and Anantharaman (2011), that these firms have superior resources and better opportunities to expect better returns of pension funds. On the other hand, *FIRMSIZE* and *CFO* are negatively and significantly related with ERR. I conjecture that firms with large size and more cash flows have less incentive to assume higher ERR for boosting their earnings.

Since firms with ICWs are likely to have more risk exposure (Doyle et al. 2007a), it is expected that managers in ICWs firms will increase the %*EQUITY* percentage in their pension asset allocations in order to justify a high ERR. Prior studies (Bergstresser et al. 2006 and Chuk 2013) find evidence that ERR manipulation leads to the changes in the plan asset allocation for justifying selected biased ERR. To test this prediction, I re-estimate ERR with *ICW* and its interaction term, *ICW*HIEQUITY*, where *HIEQUITY* is an indicator set to one if %*EQUITY* is the highest tercile of the annual pooled sample for that year. I find no evidence that firms with ICWs tend to invest in riskier assets in order

to inflate ERR. Column (2) of Table 1.4 presents that the coefficient on *ICW*HIEQUITY* is insignificant.

Column (3) of Table 1.4 reports regression results that include the indicator variable, *HISENS_{IS}*, and its interaction term with internal control weaknesses. The indicator variable, *HISENS_{IS}* is set to one if earnings sensitivity to the assumed ERR is the highest tercile of the annual pooled sample for that year, where the earnings sensitivity is measured by the ratio of pension assets to a firm's operating income. The interaction term (*ICW*HISENS_{IS}*) measures the incremental value of ERR for ICWs firms whose reported earnings are more sensitive to the assumed ERR. I find no evidence that firms with ICWs tend to assume higher ERR when those firms have higher earnings sensitivity.

4.2 Do internal control weaknesses affect DR management?

Table 1.5 displays the results of estimating Equation 2 that investigates whether ICWs affect managers' DR assumption choice. In column (1) of Panel A, I find that ICWs are positively and significantly associated with DR assumption at less than 5 percent level, implying that firms with ICWs are more likely to assume higher DR when they receive an adverse audit opinion on internal control. In the control variables, consistent with prior studies (Feldstein and Morck 1983, Brown 2004, Anantharaman 2011), DR is significantly associated with benchmark yields. DR is negatively related to *FUNDING_{ADJ}* and *DURATION*, indicating that the firm tends to decrease DR when it has a better funding status and longer *DURATION*. Similar to Equation 1, the coefficient on *PLANSIZE* is significantly positive, and the coefficient on *FIRMSIZE* is significantly negative. The negative coefficients on *DLOSS, FOREGIN*, and *SEGMENT* imply that

lower DR is assumed by loss firms and firms facing complexity with foreign transaction and multi-segments. The significantly positive coefficient on *DGROWTH* implies that growth firms are more likely to assume higher DR.

From column (2) to (4) of Panel A, I investigate the effect of ICWs on DR with liabilities sensitivity to the assumed DR. Column (2) of Panel A reports regression results that include the indicator variable, $HISENS_{BS}$, and its interaction term with internal control weaknesses. The indicator variable, $HISENS_{BS}$ is set to one if the liabilities sensitivity is above the median of the annual pooled sample for that year, where the liabilities sensitivity is measured by the ratio of projected benefit obligation to a firm's total liabilities. The interaction term ($ICW*HISENS_{BS}$) measures the incremental value of DR for ICWs firms whose reported liabilities are more sensitive to the assumed DR. I find no evidence that firms with ICWs tend to assume higher DR when those firms have higher liabilities sensitivity. In column (3) of Panel A, I investigate whether firms with ICWs are more likely to assume higher DR subsequent to FAS 158. Prior study (Fried 2010) documents that firms chose higher DR subsequent to FAS 158 with attempting to mitigate negative impacts of FAS 158 because firms are required to recognize the funding status of their pension plan on the balance sheets. I include additional dummy variable, *POST158*, which indicates post-period of FAS 158. I find no clear evidence that firms with ICWs tend to choose higher DR subsequent to FAS 158. However, column (4) of Panel A presents that ICWs firms that have high liabilities sensitivity are more likely to assume higher DR under FAS 158. The dummy variable, ICW_{HSBS}, indicates ICWs firms whose liabilities sensitivity is above the annual median of the pooled sample. Interaction term ($ICW_{HSBS}*POST158$) measures the incremental value of DR for the

ICWs firms that have higher liabilities sensitivity in the post-period of FAS 158. Column (4) of Panel A shows that the interaction term, $ICW_{HSBS}*POST158$, is positively and significantly related with DR at less than 1% level.

Panel B of Table 1.5 presents specifications designed to test the impact of ICWs on DR with particular attention to pension funding status. Literature on pension accounting has shown that firms with severely underfunded pension plans are likely to choose higher DR for reducing the size of their pension obligation. If similar distinction exists in the sample of this study, I expect that ICWs may encourage managers to manipulate DR upward when their funding status is poor. To test this prediction, I incorporate indicator variables, *LOWFUND* and *LOWFUND1,* and their interaction terms with ICWs. *LOWFUND* and *LOWFUND1* are set to one if the firm's funding status is below the annual median and the lowest tercile of the annual pooled sample for the year, respectively. First, I find no evidence that firms with ICWs are more likely to assume higher DR when these firms have poor funding status. Column (1) of Panel B presents that the coefficient on *ICW*LOWFUND* is insignificant. Next, I separately estimate DR with ICW_{HSBS} and its interaction terms with *LOWFUND (LOWFUND1)*. Column (2) of Panel B presents that $ICW_{HSBS}*LOWFUND$ is positively and significantly associated with DR at less than 10% level, implying that ICWs firms with high liabilities sensitivity are likely to assume higher DR when their plans are significantly underfunded. The coefficient on $ICW_{HSBS}*LOWFUND$ indicates that ICWs firms with higher liabilities sensitivity assume 12.1 basis points higher DR compared to other firms. This relation is heightened when managers have stronger incentive to reduce the firms' pension obligations. Column (3) of Panel B reports that $ICW_{HSBS}* LOWFUND1$ is positively and

significantly associated with DR at less than 5% level. The results are consistent with prior findings that mangers are better able to manipulate DR upward on the condition of lower funding status, and provide evidence that ICWs enable managers to choose DR opportunistically, particularly, when the firm's liabilities are very sensitive to the assumed DR.

4.3 Does the remediation of internal control weaknesses lead to the adjustment of biased pension assumptions?

I examine whether firms with ICWs adjust their biased pension assumptions when they receive an unqualified SOX 404 audit opinion. Before the investigation on remediation of ICWs, I preliminarily explore the relation between ICWs disclosure and pension assumptions. Figure 1.3 A presents that the difference of average ERR between ICWs firms and control firms (the same year firms proportional to ICWs firms) narrows from year 0 points (ICWs disclosure year) to year 1 point, and then it becomes wide. The ERR of ICWs firms is decreased from 7.88% (year 0 point), which is 9 basis points higher than that of control firms, to 7.81% (year 1 point), which is 6 basis points higher than that of control firms. This distribution reflects the univariate relation between remediation of ICWs and ERR adjustment in the following year of ICWs. Meanwhile, firms with ICWs assume higher DR even in the following year of ICWs than control firms. Figure 1.3 B shows that ICWs firms' magnitude of decreasing rate of ERR is smaller than that of control firms even after ICWs disclosure year (point 0).

In order to test whether biased assumptions are adjusted, I estimate ERR and DR assumption with *ICWFIX* (*ICWFIX* is set to one if firms received an unqualified SOX 404 audit opinion right after an adverse SOX 404 audit opinion) and *ICWFIX1* (*ICWFIX1* is set to one if firms received an unqualified SOX 404 audit opinion for two consecutive

years after adverse SOX 404 audit opinion) in the limited sample firms that have disclosed ICWs in current or prior years. I incorporate *ICWFIX1* because of the following reason: since pension assumptions are usually determined at the end of the prior fiscal year (Amir and Benartzi 1998, Chuk 2013), the current year pension assumptions are not able to be adjusted even when firms with ICWs receive an unqualified audit opinion. As prior studies reveal that accruals quality is effectively improved when firms with ICWs receive an unqualified audit opinion under Section 404 of SOX, I expect that firms with ICWs also adjust their biased pension assumptions when they remediate their ICWs problems.

Table 1.6 reports test results for the effect of ICWs remediation on ERR. First, I estimate ERR assumption with dummy *ICWFIX* that measures the difference of ERR within firm years between receiving an unqualified SOX 404 opinion and failing to receive the opinion with the fixed effect model. Column (1) of Panel A presents that the coefficient on *ICWFIX* is significantly negative at less than 10% level, indicating that firms with ICWs tend to adjust their biased ERR downward when they receive an unqualified audit opinion under Section 404. This relation is heightened when ERR is estimated with *ICWFIX1*. Column (2) of Panel A presents that *ICWFIX1* is significantly and negatively associated with ERR at less than 5% level.

Next, I estimate DR with $ICWFIX_{HSBS}$ (indicator variable set to one if a firm receives an unqualified SOX 404 audit opinion after an adverse SOX 404 audit opinion and its liabilities sensitivity is above the annual median of the pooled sample) and its interaction with *LOWFUND*. Column (1) of Panel B presents that the coefficient on *ICWFIX*LOWFUNDING* is negative but insignificant. Since ICWs firms with

significantly underfunded plan (*LOWFUND1*) are more likely to assume higher DR, I estimate DR with $ICWFIX_{HSBS}$ and its interaction with *LOWFUND1*. Column (2) of Panel B presents that the interaction term, $ICWFIX_{HSBS}*LOWFUND1$, is negatively and significantly associated with DR at less than 10% level. The results indicate that ICWs firms with significantly underfunded plan tend to adjust their biased DR downward when they receive an unqualified SOX 404 audit opinion.

4.4 Does market react to ICWs announcement with pension assumption information?

Table 1.7 presents the regression analysis for testing Hypothesis 4. First, I regress the cumulative abnormal returns (*CAR*) on the disclosure of material weaknesses, confounding news event, and proxies for audit quality with material weaknesses sample (*ICW*) and control sample in an attempt to compare the estimated coefficients to those found in prior literature. Column (1) of Panel A reports that positive news events such as, earnings surprise (*SURPRISE*), are significantly and positively related with *CAR* at less than 1% level, and negative news events, such as director changes (*DIRECTORCHANGE*) and restatement announcement (*RESTATE*), are significantly and negatively related with *CAR* at less than 5% level, respectively. However, I find no evidence that market negatively reacts to the initial disclosure of material weaknesses. I conjecture that the insignificant coefficient on *ICW* attributes to noise induced by the clustering of 10K and 10Q filings coincident with material weaknesses disclosures. Beneish et al. (2008) also document that firms tend to release positive news concurrently with material weakness disclosures. Panel A of Table 1.3 shows the proportion of initial ICWs disclosure through 10K or 10Q filings is 71.6%. Column (2) of Panel A presents that *SURPRISE* of ICWs firms are negatively and significantly associated with *CAR*, where *SURPRISE* of control

firms are positively and significantly associated with *CAR*. The results imply that investors do not positively react to earnings surprise because announcements of ICWs indicate the likelihood of misstatement in the financial statements including earnings numbers.

Panel B of Table 1.7 presents the regression results for testing whether investors react to ICWs announcements with the assessment of ERR assumption. The regression results include the dummy variable, $HERR_{ADJ}$, and its interaction with *ICW*, where $HERR_{ADJ}$ indicates that a firm's ERR is above the median of the COMPUSTAT pension sample firms. In order to reflect pension assumption information related to *ICW* disclosure, I use the adjusted indicator, $HERR_{ADJ}$, by replacing the indicator variable of t-1 when *ICW* is disclosed before the 10K filing date. I find no evidence that investors negatively react to material weakness announcements with higher ERR. Column (1) of Panel B reports that the coefficient on the interaction term, $ICW*HERR_{ADJ}$, is insignificant. I include another dummy variable, ICW_{HSIS}, which indicates firms that announce material weaknesses and whose earnings sensitivity is above the annual median of COMPUSTAT sample for that year. I conjecture that the earnings sensitivity likely affects investors' interpretation of firms' *ICW* disclosure combined with ERR assumption. Column (2) of Panel B presents that the interaction term, $ICW_{HSIS}*HERR_{ADJ}$, is negatively and significantly associated with *CAR* at less than 10% level, implying that investors negatively react to firms' *ICW* announcement when these firms assume higher ERR and its earnings sensitivity is high. I re-estimate *CAR* with limited sample firms that have higher earnings sensitivity to the assumed ERR. Test results in column (3) of Panel B are consistent with the results in column (2).

In Panel C of Table 1.7, I estimate a model that contains interactions between material weaknesses indicator and HDR_{ADJ}. HDR_{ADJ} indicates that firm's DR is above the median of COMPUSTAT pension sample firms. As with $HERR_{ADJ}$, HDR_{ADJ} is replaced with that of previous year when ICW is disclosed before the 10K filing date. I do not find that returns are more negative for firms with ICWs assuming higher DR, though I test the market reaction with ICW_{HSBS} that indicates firms that announce material weaknesses and whose liabilities sensitivity is above the annual median of COMPUSTAT sample for that year. Column (1) and (2) present that the coefficients on interaction terms, $ICW*HDR_{ADJ}$ and $ICW_{HSBS}*HDR_{ADJ}$, are insignificant.

Collectively, I find that material weakness disclosures negatively affect the stock prices of firms assuming higher ERR when these firms' earnings are highly sensitive to the assumed ERR. However, I do not find this relation for the firms that assume higher DR. These results are consistent with prior studies. Coronado et al. (2008) find that market prices ERR assumptions that are embedded in the income statements, rather than the pension balance sheet information revealed in the footnotes. DR assumption strongly affects pension balance sheet information, but its influence on income statement is ambiguous.

V. Conclusion

Using the sample of entity level ICWs reported under Section 404 of SOX from 2004 to 2012, I investigate whether ICWs allow managers to manipulate pension assumptions, which can lead to firms' desired earnings or healthier balance sheets. I also examine whether the remediation of ICWs is associated with the adjustment of biased pension assumptions. The relation between ICWs and pension assumptions holds after

controlling for known determinants of each pension assumption and ICWs. Then, using the sample of the initial disclosures of material weaknesses under Section 302 and 404, I evaluate the market effects of material weakness disclosures combined with pension assumption information.

First, I find significant and positive relation between ICWs and ERR assumption. These results are consistent with the hypothesis that ICWs create more opportunities for mangers to manipulate ERR in order to boost earnings. Secondly, I find evidence that firms with ICWs are likely to increase DR assumption to report healthier balance sheets. I find that firms with ICWs assume significantly higher DR under FAS 158 when they have higher liabilities sensitivity to the assumed DR. Particularly, ICWs firms facing large incentives to manage their pension funding status appear to change DR upward in response to the incentives when these firms have higher liabilities sensitivity to the assumed DR. Thirdly, I find that firms with ICWs are likely to adjust their biased ERR when these firms' ICWs problems are remediated. However, I do not find clear evidence of ICWs remediation effects on DR adjustment except for the case of firms with poor funding status combined with higher liabilities sensitivity. Finally, in the market reaction tests, I find that returns are more negative for firms assuming higher ERR when these firms initially announce material weakness disclosures.

This paper has several prominent limitations. First, since I use proxy of ICWs disclosed under Section 404 for the actual presence of internal control deficiencies, there can be a systemic bias depending on auditors' assessments of internal control systems. It is hard for auditors to exactly pinpoint existence of ICWs when internal control problems occur in the firms. Secondly, though duration is critical determinant of DR, I am not able

to use actual duration in estimating DR because actual duration is not provided by the financial statements. Therefore, there can be measurement errors in estimating DR by using the proxy of duration measured by the ratio of service cost to the sum of interest cost and service cost. Finally, my search for contaminating news events in the market reaction tests may not fully reveal all confounding news affecting market returns.

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Appendix: Variable definitions

Variable name	Definition and Source
Dependent Variables	
ERR	The expected rate of return (ERR) assumption on pension assets: Compustat Pension item PPROR
DR	The discount rate (DR) assumption used to discount projected future benefit payments to their present value: Compustat Pension item PBARR.
CAR	The cumulative abnormal returns within three days event window
Variables of Interest	
ICW	*ICW* is an indicator variable set to one if firms received adverse SOX 404 opinion from auditor, and to zero otherwise: Audit Analytics SOX404 Internal Controls
POST158	*POST158 i*s an indicator variable set to one if a firm's fiscal year end is post-FASB158 period, and to zero otherwise.
ICWFIX	*ICWFIX i*s set to one if a firm received an unqualified SOX 404 audit opinion right after adverse SOX 404 audit opinion, and to zero otherwise.
ICWFIX1	*ICWFIX1* is set to one if a firm received an unqualified SOX 404 audit opinion within two consecutive years after adverse SOX 404 audit opinion, and to zero otherwise.
Control variables	
AAAYIELD	The Moody's Seasoned AAA Corporate Bond Yield, matched by fiscal-year end month. Source: Federal Reserve Economic Data (FRED) from the St. Louis Federal Reserve
T20YIELD	The 20-year Treasury Constant Maturity Rate, matched by fiscal year-end month, from FRED.

INFLATION	The Consumer Price Index from the Department of Labor Bureau of Labor Statistics, matched by fiscal year-end month. Units: 1982-84 set to 100.
%EQUITY	The percentage of pension plan assets invested in equities (PNATE)
%DEBT	The percentage of pension plan assets invested in debt securities (PNATD)
%RE	The percentage of pension plan assets invested in real estate (PNATR)
%OTHER	The percentage of pension plan assets not invested in equities, debt securities, or real estate (PNATO)
ARR_t	The actual investment return on pension assets (PBARAT) / Beginning balance of pension assets (PPLAO)
STDARR	The standard deviation of ARR over the past three years: Compustat
FUNDING	Fair value of plan assets (PPLAO) / Projected benefit obligation (PBPRO).
$FUNDING_{ADJ}$	Fair value of plan assets (PPLAO) / estimated Projected benefit obligation. Projected benefit obligation is estimated by using assumed industry median value of DR, CR (compensation growth rate), and standard post-retirement life expectation of 15 years
PLANSIZE	Natural logarithm of [1+fair value of plan assets (PPLAO)] at the end of the year.
DURATION	Service cost (PPSC) / [interest cost (PPIC) + service cost (PPSC)]
LEV	Long-term debt (DLTT) + Debt in current liabilities (DLC) / Total assets.
ROA	Income before extraordinary items and pension expense (IB + PPC) / Total assets (AT)
STDROA	The standard deviation of ROA over the past three years: Compustat
FIRMSIZE	Natural logarithm of [1+total assets (AT)] of the plan sponsor at the end of the year.
CFO	Cash flow from operations before pension contributions (OANCF + PBEC)/Total assets.

STDCFO	The standard deviation of CFO over the past three years: Compustat
SEGMENT	The sum of the number of operating and geographic segments reported by the Compustat Segments database for the firm in year t
DLOSS	An indicator variable set to one if earnings before extraordinary items in years t and $t-1$ sum to less than zero, and zero otherwise
DFOREIGN	An indicator variable set to one if the firm has a non-zero foreign currency translation in year t, and to zero otherwise
DGROWTH	An indicator variable set to one if year over year sales growth falls into the top quintile, and to zero otherwise
RESTRUCT	The aggregate restructuring cost in years t and $t-1$ scaled by the firm's year t market capitalization
BIG4	Indicator variable set to one if a firm is audited by one of the Big 4 audit firms, and to zero otherwise.
PREREPORT	Indicator variable set to one if a firm reports ICWs in the preceding year, or reports material weaknesses under the SOX302 in the current year.
SURPRISE	The earnings surprises for the quarter measured by subtracting earnings per share announced 4 quarters prior from earnings per share of event window scaled by stock price 4 quarters prior.
LATEFILE	An indicator variable set to one if a firm discloses the notifications of late filing within the event window, and to zero otherwise.
AUDITORCHANGE	An indicator variable set to one if a firm discloses the auditor changes within the event window, and to zero otherwise.
DIRECTORCHANGE	An indicator variable set to one if a firm discloses the director changes within the event window, and to zero otherwise.
RESTATE	An indicator variable set to one if a firm announces restatement within the event window, and to zero otherwise.

Figure 1.1 - The Likelihood of Pension Assumption Manipulation

Opportunities

: ICWs

Incentives:

: Compensation,

Meeting target
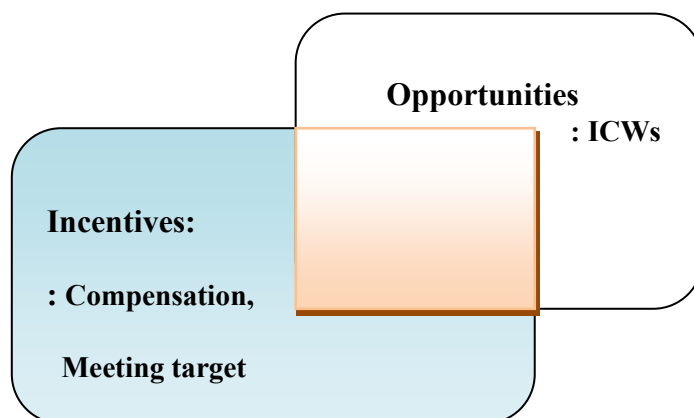
Figure 1.2 - Yearly Trend of ERR and DR
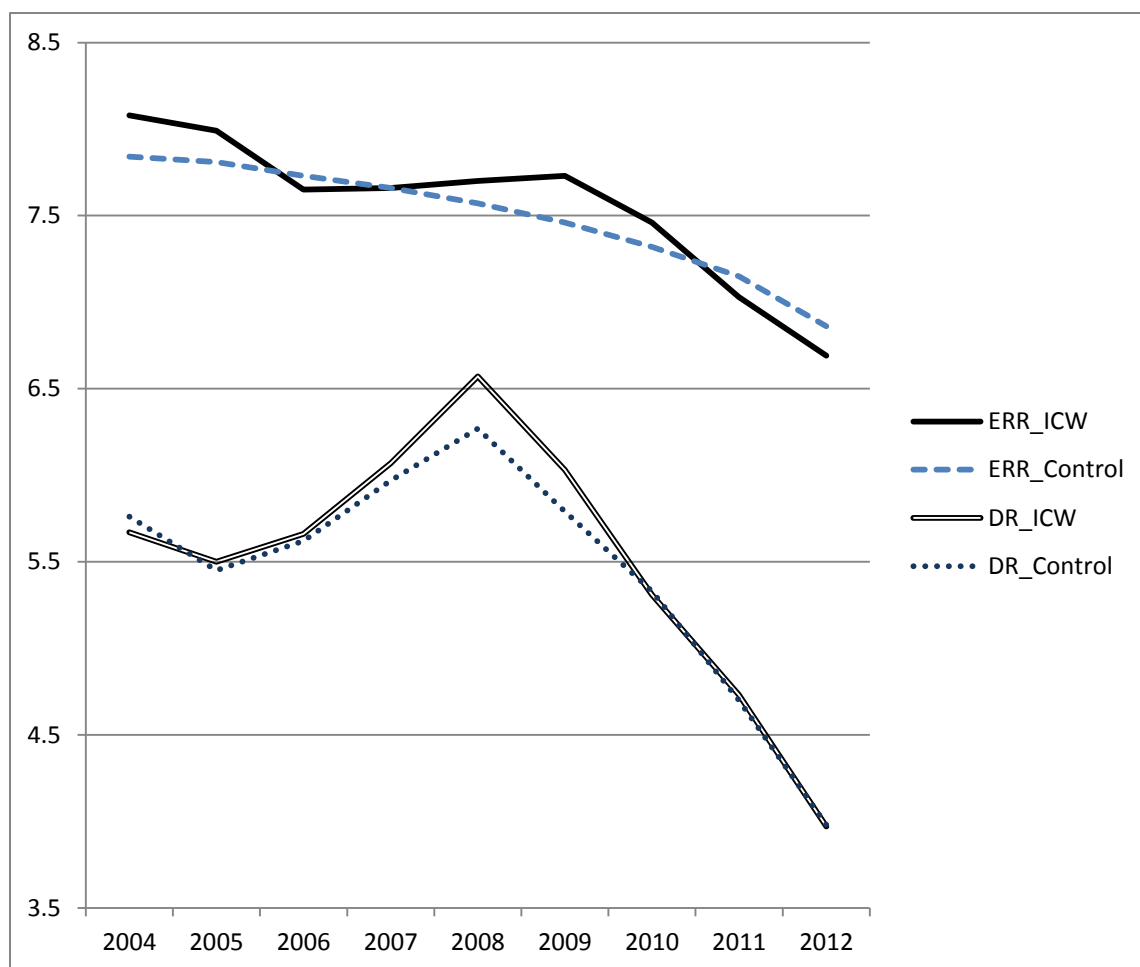
Figure 1.3 - Distribution of ERR and DR in Year of ICWs Disclosure (Event Year)

A: Distribution of ERR and DR (rate)
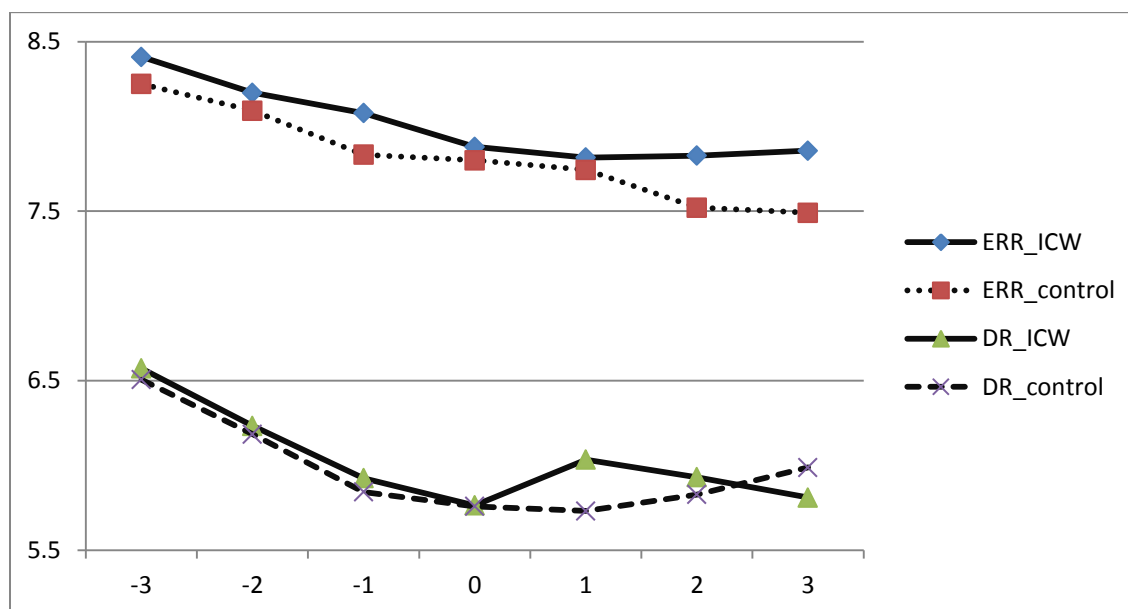
B: Distribution of ERR and DR (change of rate)
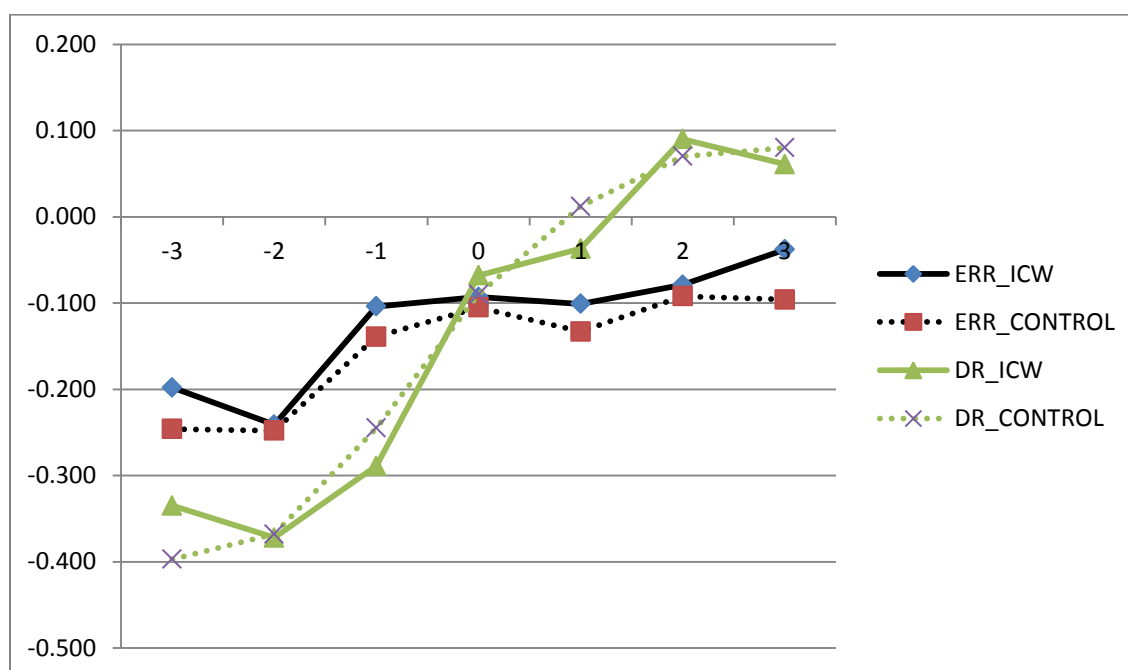
Table 1.1 - Descriptive statistics

Sample: ICWs (618 firms), Control (15,825 firms) firm-year observations pooled over 2004 to 2012

	Mean		Median		Q1		Q3	
	ICW	**Control**	**ICW**	**Control**	**ICW**	**Control**	**ICW**	**Control**
ERR	**7.69**	**7.49**	**8.00**	**8.00**	7.30	7.00	8.50	8.30
DR	**5.59**	**5.44**	5.75	5.67	5.25	5.00	6.00	6.00
%EQUITY	**57.81**	**55.14**	**61.30**	**59.00**	51.70	48.00	68.00	66.00
%RE	**1.33**	**1.42**	**0.00**	**0.00**	0.00	0.00	0.00	0.00
%OTHER	4.98	5.99	0.00	0.50	0.00	0.00	5.00	7.00
ARR$_t$	6.88	7.45	9.04	9.04	5.11	3.97	12.55	12.64
STDARR	10.40	13.17	7.57	8.17	3.44	3.66	15.39	16.35
DURATION	**0.29**	**0.31**	**0.28**	**0.31**	0.14	0.18	0.40	0.43
AAAYIELD	5.13	4.97	5.33	5.26	5.06	5.04	5.36	5.36
T20YIELD	4.32	4.07	4.65	4.35	4.28	3.46	4.77	4.65
INFLATION	206.02	211.41	202.90	210.23	196.80	201.80	215.95	219.18
FUNDING	**0.71**	**0.76**	**0.75**	**0.78**	0.60	0.65	0.86	0.90
PLANSIZE	**4.33**	**4.90**	**4.38**	**4.96**	2.74	3.18	5.87	6.63
FIRMSIZE	**7.40**	**7.98**	**7.23**	**7.92**	6.11	6.66	8.44	9.26
LEV	**0.45**	**0.26**	**0.25**	**0.23**	0.12	0.11	0.39	0.36
ROA	**-0.06**	**0.03**	**0.01**	**0.04**	-0.03	0.01	0.04	0.07
CFO	**0.04**	**0.08**	**0.05**	**0.08**	0.01	0.03	0.09	0.12
STDROA	**0.09**	**0.05**	**0.03**	**0.02**	0.01	0.01	0.07	0.04
STDCFO	**0.04**	**0.03**	**0.03**	**0.02**	0.02	0.01	0.05	0.04
DLOSS	**0.59**	**0.32**	**1**	**0**	0	0	1	1
DFOREIGN	**0.71**	**0.57**	1	1	0	0	1	1
RESTRUCT	**0.05**	**0.02**	**0**	**0**	0	0	0.02	0.01
SEGMENT	**5.81**	**5.02**	**5**	**5**	3	1	8	7
DGROWTH	0.21	0.18	0	0	0	0	0	0
BIG4	**0.83**	**0.88**	1	1	1	1	1	1

Bold Text indicates significance between ICWs sample and control sample at the 0.05 level or better one-tailed. Difference in means and medians are assessed using a t-test (Wilcoxon rank sum test).

Table 1.2 - Correlations

	ICW	*ERR*	*DR*
ICW		0.0287***	0.0213**
ERR	0.0287***		0.5557***
DR	0.0213**	0.5557***	
Determinants of ERR and DR			
%EQUITY	0.0287***	0.4467***	0.1952***
%RE	-0.0053	-0.04***	-0.0727***
%OTHER	-0.0153*	-0.208***	-0.1323***
ARR$_t$	-0.0015	0.0175**	-0.0539***
STDARR	-0.0061	0.02**	0.0259***
DURATION	-0.031***	-0.1724***	-0.1022***
AAAYIELD	0.0486***	0.1941***	0.5823***
T20YIELD	0.0561***	0.1939***	0.4556***
INFLATION	-0.0856***	-0.2329***	-0.405***
FUNDING	-0.0185**	0.0877***	0.1554***
PLANSIZE	-0.0349***	0.0739***	-0.0768***
Determinants of ICWs and firm characteristics			
FIRMSIZE	-0.0551***	-0.0661***	-0.1139***
LEV	0.0625***	-0.0236***	0.0214**
ROA	-0.0918***	0.0485***	-0.0041
CFO	-0.0786***	0.0213**	0.0071
STDROA	0.0141	-0.0146*	-0.0031
STDCFO	0.0508***	-0.0245***	0.0312***
DLOSS	0.1111***	-0.0424***	-0.0061
DFOREIGN	0.0474***	-0.0792***	-0.074***
RESTRUCT	0.0034	-0.0002	-0.0046
SEGMENT	0.0332***	-0.0642***	-0.0991***
DGROWTH	0.011	-0.0122	0.0359***
PREREPORT	0.6275***	0.0051	0.0134
BIG4	-0.0215**	0.0182**	-0.0146*

*, **, *** indicate statistical significance at 10%, 5%, and 1% level respectively

Table 1.3 - Reporting types and confounding news in market reaction tests

Panel A: Types of ICWs reporting

Types of ICWs Reporting	Number of Firms	% of Firms
Filing of 10K	156	47.71
Filing of 10Q	36	11.01
Filing of 10K and 10Q amendment	18	5.50
Filing of 8K	76	23.24
Notification of Late Filing (10K and 10Q)	12	3.67
Multi-reporting	24	7.34
Other (e.g. Form CORRESP, proxy statement)	5	1.53
Total	327	100.00

Panel B: Confounding news events in the 3-days window around announcement of ICWs

Confounding News Events	Number of Firms	% of Firms
Earnings announcement	69	37.50
Change of director	7	3.80
Restatement	38	20.65
Delay in filing	20	10.87
Multi-events	50	27.17
Earnings announcement	34	
Change of director	5	
Change of auditor	2	
Restatement	41	
Delay in filing	19	
Total	184	100.00

Table 1.4 - Do internal control weaknesses affect ERR management?

	(1) ERR		(2) ERR		(3) ERR	
ICW	**.179*****	**(3.42)**	**.209*****	**(2.95)**	**.1258**	**(1.56)**
%EQUITY	.029***	(17.47)	.0291***	(13.94)	.0289***	(17.53)
%RE	-.0028	(-0.37)	-.0028	(-0.37)	-.0027	(-0.35)
%OTHER	-.0033	(-1.24)	-.0033	(-1.23)	-.0033	(-1.24)
HIEQUITYI1			-.0027	(-0.06)		
ICW#HIEQUITY1			-.0863	(-0.86)		
HISENS$_{IS}$1					-.0196	(-0.39)
ICW#HISENS$_{IS}$1					.1132	(0.96)
ARR$_t$	2.2e-04	(1.30)	2.2e-04	(1.30)	2.2e-04	(1.30)
ARR$_{t-1}$	-1.8e-04***	(-3.69)	-1.9e-04***	(-3.70)	-1.8e-04***	(-3.66)
FUNDING	-.0278	(-0.20)	-.0279	(-0.20)	-.0275	(-0.20)
PLANSIZE	.1949***	(9.91)	.1948***	(9.89)	.1981***	(9.02)
LEV	.0831	(1.17)	.0831	(1.17)	.0817	(1.14)
ROA	.5922***	(2.91)	.593***	(2.92)	.5932***	(2.91)
FIRMSIZE	-.1765***	(-9.03)	-.1764***	(-9.02)	-.1792***	(-8.38)
CFO	-.9122***	(-3.86)	-.9105***	(-3.85)	-.9281***	(-3.86)
STDARR	5.1e-04***	(5.74)	5.1e-04***	(5.71)	5.1e-04***	(5.73)
STDCFO	-.9512**	(-2.24)	-.9529**	(-2.24)	-.9561**	(-2.26)
STDROA	.005	(0.28)	.0052	(0.29)	.0045	(0.25)
DLOSS	-.0734*	(-1.96)	-.0735**	(-1.96)	-.071*	(-1.91)
DFOREIGN	-.2054***	(-5.01)	-.2056***	(-5.01)	-.2059***	(-5.03)
RESTRUCT	-6.8e-07	(-0.22)	-6.8e-07	(-0.22)	-6.0e-07	(-0.19)
SEGMENT	-.0105	(-1.55)	-.0105	(-1.55)	-.0105	(-1.55)
DGROWTH	.0256	(0.78)	.0259	(0.79)	.0256	(0.78)
BIG4	.0112	(0.16)	.0108	(0.16)	.01	(0.14)
PREREPORT	-.1087	(-1.04)	-.1114	(-1.07)	-.1144	(-1.07)
_cons	6.717***	(34.90)	6.712***	(32.65)	6.732***	(35.06)
N	13221		13221		13221	
R^2	0.2649		0.2650		0.2650	

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively. Standard errors are in parentheses. Standard errors are corrected for clustering at the firm level. Table 1.4 reports the results of pooled regression for fiscal year 2004 to 2012 in the presence of year fixed effect.

ICW is an indicator variable set to one if firms receives adverse SOX 404 opinion from auditor. *HIEQUITY1* is an indicator variable set to one if *%EQUITY* is the highest tercile of the annual pooled sample for the year. *HISENS$_{IS}$1* is an indicator variable set to one if a firm's earnings sensitivity to ERR (the ratio of pension assets to firm operating income) is the highest tercile of the annual pooled sample for the year. *ARR$_t$* is actual investment return on pension assets for year t/ beginning balance of pension assets for year t. *ARR$_{t-1}$* is actual investment return on pension assets for year t/ beginning balance of pension assets for year t-1.

Table 1.5 - Do internal control weaknesses affect DR management?

Panel A: The effect of ICWs on DR assumption with liabilities sensitivity to DR

	(1)	(2)	(3)	(4)
	DR	DR	DR	DR
ICW	**.1049****	**.0651**	**.0462**	
	(2.57)	(1.02)	(1.09)	
ICW_{HSBS}				.0318
				(0.70)
ICW_{LSBS}				.0623
				(0.86)
$HISENS_{BS}$		.0291		
		(0.68)		
POST158			-.0149	-.0162
			(-0.36)	(-0.39)
$ICW\#HISENS_{BS}$		.0817		
		(0.91)		
ICW#POST158			.1098	
			(1.49)	
$ICW_{HSBS}\#POST158$				**.2294*****
				(2.75)
$ICW_{LSBS}\#POST158$				.0049
				(0.04)
DURATION	-.4508***	-.4497***	-.4511***	-.4502***
	(-4.22)	(-4.22)	(-4.22)	(-4.22)
FUNDINGADJ	-1.087***	-1.079***	-1.087***	-1.086***
	(-16.20)	(-15.70)	(-16.19)	(-16.20)
AAAYIELD	.518***	.5143***	.5108***	.5074***
	(6.60)	(6.55)	(6.52)	(6.47)
T20YIELD	-.0529	-.0497	-.0483	-.0453
	(-0.80)	(-0.75)	(-0.69)	(-0.65)
INFLATION	-.0109	-.011	-.0108	-.0108
	(-0.99)	(-1.00)	(-0.98)	(-0.98)
PLANSIZE	.1131***	.1054***	.1131***	.1121***
	(9.57)	(6.37)	(9.59)	(9.53)
LEV	.071	.0789*	.0708	.0727
	(1.57)	(1.71)	(1.57)	(1.61)
ROA	.1343*	.1321*	.1346*	.135*
	(1.70)	(1.69)	(1.71)	(1.72)
FIRMSIZE	-.0783***	-.0703***	-.0783***	-.0772***
	(-7.13)	(-4.13)	(-7.14)	(-7.00)
STDCFO	-.3037	-.3084	-.3085	-.3133
	(-1.19)	(-1.21)	(-1.21)	(-1.23)
STDROA	.0082	.0079	.0083	.0084
	(1.13)	(1.10)	(1.16)	(1.16)
DLOSS	-.1317***	-.1306***	-.1319***	-.132***
	(-5.66)	(-5.61)	(-5.66)	(-5.66)
DFOREIGN	-.1572***	-.1578***	-.1572***	-.1573***

	(-4.83)	(-4.83)	(-4.83)	(-4.84)
RESTRUCT	1.2e-06	1.3e-06	1.3e-06	1.3e-06
	(1.04)	(1.08)	(1.06)	(1.06)
SEGMENT	-.0191***	-.0193***	-.0191***	-.019***
	(-3.86)	(-3.90)	(-3.84)	(-3.84)
DGROWTH	.1284***	.1289***	.128***	.128***
	(4.69)	(4.69)	(4.68)	(4.68)
BIG4	-.021	-.0224	-.02	-.0202
	(-0.49)	(-0.53)	(-0.47)	(-0.48)
PREREPORT	-.1073	-.1066	-.1233	-.123
	(-1.28)	(-1.28)	(-1.50)	(-1.50)
_cons	6.554***	6.531***	6.547***	6.54***
	(3.22)	(3.21)	(3.22)	(3.21)
N	16276	16276	16276	16276
R²	0.4820	0.4821	0.4821	0.4822

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively. Standard errors are in parentheses. Standard errors are corrected for clustering at the firm level. Panel A reports the results of pooled regression for fiscal year 2004 to 2012 in the presence of year fixed effect.

$FUNDING_{ADJ}$ is adjusted pension plan funding ratio, computed by replacing discount rate and compensation growth rate with industry median values and assuming post retirement life expectation as 15 years. *DURATION* is measured by the ratio of service cost to the sum of interest cost and service cost.

ICW_{HSBS} is an indicator variable set to one if a firm receives adverse SOX 404 opinion from auditor and its liabilities sensitivity (the ratio of projected benefit obligation to firm's total liabilities) is above the annual median of the pooled sample for the year. ICW_{LSBS} is an indicator variable set to one if a firm receives adverse SOX 404 opinion from auditor and its liabilities sensitivity is below the annual median of the pooled sample for the year. $HISENS_{BS}$ is an indicator variable set to one if a firm's liabilities sensitivity is above the annual median of the pooled sample for the year. *POST158 i*s an indicator variable set to one if a firm's fiscal year end is post-FASB158 period.

Panel B: The effect of ICWs on DR assumption with funding status

	(1)		(2)		(3)	
	DR		DR		DR	
ICW	.0921*	(1.76)				
ICW$_{HSBS}$			.1083*	(1.67)	.1004	(1.62)
ICW$_{LSBS}$			.0675	(0.94)	.0523	(0.85)
DURATION	-.3178***	(-3.30)	-.3165***	(-3.29)	-.2911***	(-3.10)
FUNDING$_{ADJ}$	-1.388***	(-15.25)	-1.388***	(-15.25)	-1.386***	(-15.13)
LOWFUND	-.573***	(-16.62)	-.5738***	(-16.65)		
LOWFUND1					-.6265***	(-16.72)
ICW# LOWFUND	.0469	(0.64)				
ICW$_{HSBS}$# LOWFUND			**.1209***	**(1.71)**		
ICW$_{LSBS}$# LOWFUND			4.6e-04	(0.00)		
ICW$_{HSBS}$# LOWFUND1					**.1954****	**(2.00)**
ICW$_{LSBS}$# LOWFUND1					.0409	(0.30)
AAAYIELD	.4512***	(5.89)	.4496***	(5.87)	.5268***	(7.01)
T20YIELD	-.1204*	(-1.94)	-.119*	(-1.92)	-.1705***	(-2.76)
INFLATION	-.0074	(-0.76)	-.0074	(-0.76)	-.0041	(-0.42)
PLANSIZE	.0878***	(7.33)	.0868***	(7.25)	.0711***	(6.15)
LEV	.1252***	(2.98)	.1272***	(3.02)	.0851**	(2.07)
ROA	.1174	(1.55)	.1174	(1.55)	.0775	(1.04)
FIRMSIZE	-.0729***	(-7.08)	-.0717***	(-6.91)	-.0564***	(-5.62)
STDCFO	-.298	(-1.27)	-.2979	(-1.28)	-.1773	(-0.76)
STDROA	.0024	(0.33)	.0024	(0.33)	5.8e-04	(0.08)
DLOSS	-.0905***	(-4.19)	-.0904***	(-4.18)	-.0912***	(-4.27)
DFOREIGN	-.1236***	(-4.03)	-.1235***	(-4.03)	-.1354***	(-4.44)
RESTRUCT	1.7e-06	(1.46)	1.7e-06	(1.47)	4.0e-07	(0.35)
SEGMENT	-.0128***	(-2.66)	-.0128***	(-2.65)	-.0119**	(-2.52)
DGROWTH	.1162***	(4.40)	.1163***	(4.40)	.1149***	(4.33)
BIG4	.0069	(0.17)	.0065	(0.16)	.0075	(0.19)
PREREPORT	-.0994	(-1.26)	-.0953	(-1.25)	-.118	(-1.55)
cons	7.024***	(3.93)	7.026***	(3.93)	6.103***	(3.46)
N	16276		16276		16276	
R^2	0.5287		0.5288		0.5293	

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively. Standard errors are in parentheses. Standard errors are corrected for clustering at the firm level. Panel B reports the results of pooled regression for fiscal year 2004 to 2012 in the presence of year fixed effect.

ICW_{HSBS} is an indicator variable set to one if a firm receives adverse SOX 404 opinion from auditor and its liabilities sensitivity is above the annual median of the pooled sample for the year. ICW_{LSBS} is an indicator variable set to one if a firm receives adverse SOX 404 opinion from auditor and its liabilities sensitivity is below the annual median of the pooled sample for the year. *LOWFUND* is an indicator variable set to one if *FUNDING* is below the annual median of the annual pooled sample for the year. *LOWFUND1* is an indicator variable set to one if *FUNDING* is the lowest tercile of the annual pooled sample for the year.

Table 1.6 - Does remediation of internal control weaknesses lead to the adjustment of biased pension assumptions?

Panel A: The effect of ICWs remediation on ERR

	(1) ERR		(2) ERR	
ICWFIX	**-.05***	**(-1.79)**		
ICWFIX1			**-.0467****	**(-2.00)**
%EQUITY	.0097***	(10.60)	.0098***	(10.64)
%RE	.0143***	(2.67)	.0143***	(2.67)
%OTHER	.0025**	(2.10)	.0025**	(2.11)
ARR$_t$	-.0012	(-0.77)	-.0011	(-0.72)
ARR$_{t-1}$	.0011	(1.12)	.0011	(1.11)
FUNDING	-.0788	(-0.73)	-.0822	(-0.77)
PLANSIZE	-.1137***	(-2.87)	-.1119***	(-2.82)
LEV	-.2016***	(-10.42)	-.2012***	(-10.40)
ROA	-.4138***	(-4.64)	-.4128***	(-4.63)
FIRMSIZE	-.0322	(-0.94)	-.0352	(-1.02)
CFO	.0474	(0.29)	.0475	(0.29)
STDARR	.0013	(0.87)	.0012	(0.82)
STDCFO	1.031***	(3.01)	1.027***	(2.99)
STDROA	.0045	(0.09)	.0042	(0.08)
DLOSS	-.0217	(-0.86)	-.0217	(-0.86)
DFOREIGN	-.0779	(-1.55)	-.0751	(-1.49)
RESTRUCT	8.8e-05	(1.15)	9.0e-05	(1.17)
SEGMENT	.0055	(0.81)	.0054	(0.79)
DGROWTH	.0603**	(2.24)	.0616**	(2.29)
BIG4	-.042	(-0.67)	-.0439	(-0.70)
PREREPORT	.0222	(0.57)	.0169	(0.43)
_cons	8.278***	(31.41)	8.293***	(31.43)
N	2546		2546	
R^2	0.4031		0.4034	

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively. Panel A of Table 1.6 reports the results of fixed effect regressions for the firms that received adverse SOX 404 opinion in the current or prior year. Specifications in fixed effect regression are estimated in the presence of year by firm fixed effect for fiscal year 2004 to 2012.

ICWFIX is an indicator variable set to one if firms received an unqualified SOX 404 audit opinion right after adverse SOX 404 audit opinion. *ICWFIX1* is an indicator variable if firms received an unqualified SOX 404 audit opinion within the two consecutive years after adverse SOX 404 audit opinion.

Panel B: The effect of ICWs remediation on DR

	(1) DR		(2) DR	
$ICWFIX_{HSBS}$	.0932*	(1.71)	.1035**	(2.38)
DURATION	.0107	(0.23)	.0066	(0.14)
$FUNDING_{ADJ}$	-1.478***	(-23.52)	-1.378***	(-22.02)
LOWFUND	-.3468***	(-13.18)		
LOWFUND1			-.2744***	(-9.68)
$ICWFIX_{HSBS}$ # LOWFUND	-.0442	(-0.62)		
$ICWFIX_{HSBS}$ # LOWFUND1			**-.14***	**(-1.86)**
AAAYIELD	.672***	(5.67)	.744***	(6.20)
T20YIELD	-.1831*	(-1.88)	-.2587***	(-2.62)
INFLATION	.0049	(0.57)	.0101	(1.15)
PLANSIZE	.1811***	(6.56)	.1687***	(6.02)
LEV	.2062**	(2.14)	.1995**	(2.04)
ROA	-.0652	(-1.02)	-.0657	(-1.02)
FIRMSIZE	.0348	(1.17)	.0486	(1.60)
STDCFO	.0507	(0.16)	.1127	(0.35)
STDROA	.0391	(0.84)	.0354	(0.75)
DLOSS	.0063	(0.27)	.0029	(0.13)
DFOREIGN	.0619	(1.31)	.0498	(1.04)
RESTRUCT	-1.4e-05	(-0.19)	-1.2e-05	(-0.16)
SEGMENT	-.0063	(-1.06)	-.0082	(-1.35)
DGROWTH	-.0108	(-0.46)	-.0099	(-0.42)
BIG4	.0771	(1.52)	.0646	(1.26)
PREREPORT	.0407	(1.16)	.0351	(0.99)
_cons	2.253	(1.48)	1.063	(0.69)
N	3118		3118	
R^2	0.7422		0.7354	

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively. Panel B reports the results of fixed effect regressions for the firms that received adverse SOX 404 opinion in the current or prior year. Specifications in fixed effect regression are estimated in the presence of year by firm fixed effect for fiscal year 2004 to 2012.

$ICWFIX_{HSBS}$ is an indicator variable set to one if a firm receives unqualified SOX 404 audit opinion after adverse SOX 404 audit opinion and its liabilities sensitivity is above the annual median of the pooled sample for the year. LOWFUND is an indicator variable set to one if FUNDING is below the annual median of the pooled sample for that year. LOWFUND1 is an indicator variable set to one if FUNDING is the lowest tercile of the annual pooled sample for the year.

Table 1.7 - Does market react to ICWs announcement with pension assumption information?

Panel A: Market reaction to ICWs announcement

	(1)		(2)	
	CAR		*CAR*	
ICW	-1.0e-04	(-0.02)	5.8e-04	(0.13)
SURPRISE	**.0579*****	**(2.72)**	**.1344*****	**(3.88)**
ICW#SURPRISE			**-.1229*****	**(-2.80)**
LATEFILE	-6.4e-04	(-0.07)	-.001	(-0.11)
AUDITORCHANGE	-6.5e-05	(-0.00)	-6.2e-04	(-0.02)
DIRECTORCHANGE	**-.027****	**(-2.43)**	**-.0273****	**(-2.47)**
RESTATE	**-.0166****	**(-2.15)**	**-.0173****	**(-2.25)**
BIG4	.0077	(1.32)	.0075	(1.29)
AUDITED	-1.1e-04	(-0.02)	-6.7e-04	(-0.13)
_cons	-.0031	(-0.18)	-.0027	(-0.16)
N	974		974	
R²	0.0270		0.0349	

Panel A of Table 1.7 reports the results of OLS regression with ICW sample (n=327) and control sample (n=647) in the presence of year fixed effect.

CAR is cumulative abnormal returns within 3-days event window. *SURPRISE* is earnings surprises for the quarter measured by subtracting earnings per share announced 4 quarters prior from earnings per share of event window scaled by stock price 4 quarters prior. *LATEFILE* is an indicator variable set to one if a firm discloses the notifications of late filing within the event window. *AUDITORCHANGE* is an indicator variable set to one if a firm discloses the auditor changes within the event window. *DIRECTORCHANGE* is an indicator variable set to one if a firm discloses the director changes within the event window. *RESTATE* is an indicator variable set to one if a firm announces restatement within the event window.

Panel B: Market reaction to ICWs announcement with earnings sensitivity to ERR

	(1) CAR	(2) CAR	(3) CAR	(4) CAR
ICW	.0034	.0048		.0193[*]
	(0.57)	(0.79)		(1.71)
ICW_{HSIS}			.0203[**]	
			(2.34)	
$SURPRISE$	.0586[***]	.0588[***]	.0585[***]	.033
	(2.74)	(2.75)	(2.75)	(0.88)
$HERR$	.0058			
	(1.18)			
$ICW\#HERR$	-.0075			
	(-0.93)			
$HERR_{ADJ}$		.0068	.0064	.0099
		(1.41)	(1.45)	(1.20)
$ICW\#HERR_{ADJ}$		-.0103		-.0248[*]
		(-1.27)		(-1.84)
$ICW_{HSIS}\# HERR_{ADJ}$			-.0179[*]	
			(-1.70)	
$LATEFILE$	9.4e-05	2.2e-04	-.0026	-.0046
	(0.01)	(0.02)	(-0.28)	(-0.30)
$AUDITORCHANGE$	-8.7e-05	2.6e-04	3.2e-04	.0204
	(-0.00)	(0.01)	(0.01)	(0.30)
$DIRECTORCHANGE$	-.0267[**]	-.0265[**]	-.0269[**]	-.001
	(-2.40)	(-2.38)	(-2.43)	(-0.05)
$RESTATE$	-.0161[**]	-.0158[**]	-.0194[***]	-.0067
	(-2.05)	(-2.01)	(-2.64)	(-0.56)
$BIG4$	.0073	.0073	.0079	.0102
	(1.19)	(1.19)	(1.30)	(0.92)
$AUDITED$	-.001	-8.3e-04	1.6e-04	-7.7e-04
	(-0.19)	(-0.16)	(0.03)	(-0.09)
$FIRMSIZE$	.0026[*]	.0025[*]	.0032[**]	.0036
	(1.70)	(1.69)	(2.05)	(1.03)
$PLANSIZE$	-.0021	-.0021	-.0031[**]	-.0037
	(-1.42)	(-1.42)	(-2.01)	(-1.01)
$\_cons$	-.0151	-.0155	-.0174	-.0129
	(-0.79)	(-0.81)	(-0.92)	(-0.42)
N	974	974	974	461
R^2	0.0312	0.0321	0.0360	0.0446

First three columns of Panel B report the results of OLS regression with ICW sample and control sample. Fourth column reports the results of regression with limited sample that have high earnings sensitivity (above the annual median of the COMPUSTAT sample for the year). ICW_{HSIS} is an indicator variable set to one if a firm with high earnings sensitivity discloses material weaknesses for the year. $HERR$ is an indicator variable set to one if a firm's ERR is above the annual median of the COMPUSTAT sample for the year. $HERR_{ADJ}$ is the adjusted $HERR$ by replacing with previous year $HERR$ when material deficiencies are disclosed before the 10K filing dates.

Panel C: Market reaction to ICWs announcement with liabilities sensitivity to DR

	(1) CAR		(2) CAR		(3) CAR	
ICW	-1.6e-04	(-0.03)	.0013	(0.21)		
SURPRISE	**.0579*****	**(2.71)**	**.0583*****	**(2.73)**	**.0579*****	**(2.72)**
HDR	.0013	(0.28)				
$ICW\#HDR$	-1.1e-04	(-0.01)				
HDR_{ADJ}			.0013	(0.29)	-4.1e-04	(-0.10)
$ICW\# HDR_{ADJ}$			-.0032	(-0.39)		
ICW_{HSBS}					.0021	(0.29)
$ICW_{HSBS}\#HDR_{ADJ}$					.0038	(0.40)
$LATEFILE$	-2.2e-04	(-0.02)	-2.0e-04	(-0.02)	-.0014	(-0.15)
$AUDITORCHANGE$	-.0012	(-0.04)	-.0015	(-0.05)	-.0025	(-0.08)
DIRECTORCHANGE	**-.027****	**(-2.43)**	**-.0268****	**(-2.41)**	**-.0272****	**(-2.45)**
RESTATE	**-.0167****	**(-2.14)**	**-.0165****	**(-2.12)**	**-.0185****	**(-2.45)**
$BIG4$	.0075	(1.22)	.0075	(1.21)	.0071	(1.15)
$AUDITED$	-.001	(-0.19)	-9.6e-04	(-0.18)	-6.6e-04	(-0.13)
$FIRMSIZE$	.0024	(1.61)	.0024	(1.61)	.0028*	(1.76)
$PLANSIZE$	-.0017	(-1.25)	-.0017	(-1.25)	-.0021	(-1.40)
$\_cons$	-.0131	(-0.69)	-.0132	(-0.69)	-.014	(-0.74)
N	974		974		974	
R^2	0.0298		0.0299		0.0304	

Panel C of Table 1.7 reports the results of OLS regression with ICW sample and control sample in the presence of year fixed effect.

ICW_{HSBS} is an indicator variable set to one if a firm with high liabilities sensitivity discloses material weaknesses for the year. HDR is an indicator variable set to one if a firm's DR is above the median of the COMPUSTAT sample for the year. HDR_{ADJ} is the adjusted HDR by replacing with previous year HDR when material deficiencies are disclosed before the 10K filing dates.

CHAPTER 2: Disclosure of Pension Asset Allocation and Expected Rate of Return Management

I. Introduction

Prior studies document that managers expect a benefit derived from limiting the ability of users of financial statements in detecting earnings management, and that greater reporting transparency reduces the prevalence of earnings management attempts (Hirst and Hopkin 1998, Fields et al. 2001, Hunton et al. 2006). I examine the relation between earnings management and opaque disclosure, by focusing on the assumed expected rate of return of pension funds (ERR) and the disclosure of pension asset allocation. Literature provides evidence that ERR is a powerful tool for managers to inflate their earnings. I investigate whether earnings management through this channel is related to the disclosure of pension asset allocation. I posit that firms discretionarily assume higher ERR by using opaque disclosure under FAS132R, and adjust higher ERR under FAS132R(1) that requires a greater disclosure of pension asset allocation. I also conjecture that firms exercise discretion in choosing ERR by using opaque disclosure even under FAS132R(1) because managerial discretion is often allowed in how the new standard is applied (Berger and Hann 2007). I, therefore, exploit opaque disclosure of pension asset allocation generated under the two reporting regimes in order to examine ERR management.

Extant research suggests that ERR assumption is susceptible to managerial discretion because of its long term nature; reconciliation between ERR and actual rate of return happens over time with long amortization periods. Because of this, it is difficult for users of financial statements to identify errors in ERR. Furthermore, investors and

analysts have not fully evaluated ERR assumption due to roughly regulated footnote disclosures of pension asset allocations. Unbiased ERR should be explained by the riskiness of the pension asset allocation (Amir and Benartzi 1998). Under FAS132R, firms are able to disclose broad categories of pension asset class, such as equity, debt, real estate, and other. A major concern with FAS132R was that firms could hide the true pension asset allocation behind the "Other" asset category that can capture all categories from residual assets to high risk assets. FAS132R(1) requires that the disaggregated pension asset classes be presented based on relevant information about the riskiness of each pension asset class. The new standard also requires the firm to disaggregate categories of pension assets with the fair value hierarchy level information. Therefore, I expect investors are able to more precisely evaluate the reasonableness of ERR, which leads to firms to adjust their biased ERR in the post-FAS132R(1) period.

Using hand-collected pension asset allocation data for the eight years spanning from 2003 to 2010, I explore the association of opaque disclosure with ERR management in the pre-period, transition period, and post-period based on FAS132R(1) effective year. In the pre- and post-period tests, I examine whether higher ERR is driven by the opaque disclosure category, and whether higher ERR is justified by higher future actual return of the opaque category. I classify "Other" assets as the category of opaque disclosure in the pre-period, and include the indirectly invested funds disclosed with no description of the underlying asset classes (legal structure type of funds) in the category of opaque disclosure in the post-period. In the transition period tests, I investigate whether firms with poor disclosure in the pre-period tend to decrease ERR in the post-period. My investigation begins with constructing a measurement that captures the extent of opaque

disclosure in the pre-period. I construct the disclosure score by reflecting the relevant information of the pension asset allocation across all disclosure avenues. Then, I identify the firms with poor disclosure based on the disclosure score.

Consistent with my prediction, I find that firms with poor disclosure in the pre-period assume lower ERR compared to other firms in the post-period, implying that firms with poor disclosure discretionarily assume higher ERR in the pre-period and adjust the upward biased ERR in the post-period. Then, I investigate whether the difference in the extent of disclosure between the new and old standards is associated with the ERR adjustment by comparing the disclosure scores of the pre- and post-period. I find that the firms tend to decrease ERR when they considerably improve the extent of disclosure in the post-period, and the firms increase ERR when they do not improve the extent of disclosure. These results indicate that ERR adjustment is highly related to the improvement of disclosure.

I turn to the issue of whether opaque disclosure facilitates ERR management in the pre- and post-period. I find no evidence that opaque disclosure is associated with ERR management in the pre-period, spanning from 2003 to 2008. Higher ERR driven by opaque disclosure is supported by higher future actual return. Particularly, in the first three years of the pre-period (2003~2005), opaque disclosure is not related with ERR. In the second three years of the pre-period (2006~2008), however, opaque disclosure is significantly associated with ERR, and higher ERR driven by opaque disclosure is not justified by higher future actual returns. I conjecture that, in the first three years of pre-period, managers of pension funds are restricted from manipulating ERR by using opaque

disclosure because of the SEC's prevention actions for the reasonableness of ERR, such as the warning announcement in 2002 and investigation in 2004.

In the post-period tests, I find that opaque disclosure is associated with ERR management. The results provide evidence that firms assume higher ERR by using opaque disclosure, and such higher ERR is not supported by the future actual return of the opaque disclosure category. I further investigate what components of opaque disclosure drive ERR management by breaking down opaque disclosure category by the fair value hierarchy level[1] and the types of funds. I find that opaque disclosure is associated with ERR management when it contains Level 2 assets, and particularly when it contains the legal structure type of funds, such as common collective trust funds and commingled funds. I find no evidence that the "Other" asset category is associated with ERR management in the post-period.

The results make three main contributions. First, I directly illustrate the impact of FAS132R(1) on ERR management. Chuk (2013) provides evidence that firms respond to FAS132R by changing asset allocations for justifying the assumed ERR or by changing ERR for adjusting to the extant asset allocations. This study is consistent with the results of Chuk (2013) but extends her study by looking at the extent of disclosure about pension asset allocation. Her study is based on the assumption that there is an unbiased relation between ERR and pension asset allocations under FAS132R, even though she documents that broadly disaggregated asset categories can cause measurement error. I closely look at the issue of broadly disaggregated asset categories and the cross-sectional variation of

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[1] The level within the fair value hierarchy in which the fair value measurements in their entirety fall, segregates 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).

disclosure under FAS132R because the impact of mandated transparency is not uniform across firms. The hand-collected asset allocation data allow me to identify the firms with poor disclosure by measuring the extent of disclosure variation. Specifically, I argue that firms assume higher ERR by hiding the asset allocation, and such firms adjust ERR so as to report reasonable ERR when they are exposed to the mandated transparency. I view the adjustment of asset allocation with high risk assets as unrealistic because it can make pension funding status worse, which can trigger another expense.

Second, this study highlights the importance of disclosure in restricting managers' earnings management motivation. Hunton et al. (2006) demonstrate that earnings management is reduced under the transparent disclosure environment with the experiment setting. The empirical evidence in this study complements the study of Hunton et al. (2006); further, negative relation between the improvement of disclosure and the change of ERR suggests that the extent of opaque disclosure is a necessary condition for earnings management. Healy and Wahlen (1999) document that research is needed to determine the condition in which discretion in financial reporting is used to manage earnings. Therefore, this study responds to the call for research that aims to identify the condition of earnings management.

Third, the results of this study helps standard setters assess the source of earnings management. Berger and Hann (2007) document that there is considerable managerial discretion where a mandated standard exists. Particularly, my finding of the new type of opaque disclosure that facilitates ERR management in the post-period points to the channel where the common place of earnings management is, and provides direct evidence for standard setters who seek to make room for improvement of the standard.

Section II provides background of FAS132R(1), related literature review, and hypotheses. Section III presents research design to test hypotheses. Section IV and V describe data and empirical results. Section VI concludes.

II. Literature review and hypotheses development

2.1 Background of FAS132R(1)

The Financial Accounting Standard Board (FASB) has progressed toward greater transparency in pension plans by expanding disclosure requirements on asset allocation. FAS132R, which took effect for fiscal years beginning after December 15, 2003, requires the provision of information about annual pension asset allocation, along with a narrative description of investment policies and strategies. However, many firms provide information about pension asset allocations so broadly that it is difficult for users of financial statements to analyze risks and returns of pension funds (Zion and Carache 2005). Firms tend to interpret the example of pension asset allocation (equity securities, debt securities, real estate, and all other assets) in FAS132R as required disclosure and use them as templates in their financial statements (Chuk 2013). Particularly, the "all other assets" category includes not only cash and short-term investments but also alternative investments, such as private equity and hedge fund, which catches all categories of pension funds (Zion and Carache 2005). Many firms disclose being invested in the "Other" category with no detailed description about underlying assets, even though the "Other" category is a significant percentage of their total plan assets. Furthermore, since the investment of pension funds to hedge funds and private equities has increased[2], the disclosure of pension asset allocation is uninformative if there is no detailed

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[2] Bank of New York (2006) reports "retirement plans will be the largest cumulative investors in hedge funds in the period 2006 to 2010, accounting for 65% of the total inflows into hedge funds".

description on "Other" category or disaggregated voluntary disclosure of "Other" assets. The FASB also stated in a staff position report, "Users of financial statements have indicated that disclosures pertaining to the required categories of plan assets are not specific enough to evaluate the nature and risks of assets held as investments"(FASB, 2008).

FAS132R(1), which became effective after December 15, 2009, requires firms to disaggregate the broad asset categories of equity, debt, real estate, and other – which were required by FAS132R, into more detailed subcategories[3]. The FASB documents that the objective of disclosure about plan assets is providing relevant information to investors to understand plan asset allocation, and it requires firms to determine how to disaggregate categories of plan assets based on this objective. The FASB also expands the disclosure requirements for pension assets at fair market value to improve the quality of information provided to users of financial statements. The FASB states, "Information about the inputs used for fair value measurements of plan assets would allow users to assess the relative reliability of those measurements and the effects of fair value measurements on an employer's financial statements"(FASB, 2008).

FAS132R(1) encourages managers of pension funds to assume their ERR more precisely reflecting the disclosed information about the pension asset allocations. However, the impact of FAS132R(1) is not uniform across firms because each firm's disclosure level was different under the old regime. Therefore, how improved transparency under FAS132(1) affects firms' ERR decision is an empirical issue.

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[3]FASB provides the example of major categories as follow: 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).

2.2 Literature Review

ERR should be selected based on the historical returns of pension funds and future performance expectation (FAS 87). However, a long line of literature on pension accounting provides evidence that managers opportunistically select biased ERR, which is effectively used to offset the service cost and interest cost of pension expense. Buffett (2008) documents "why CEOs opt for a high investment assumption: It lets them report higher earnings". Prior studies suggest that cross-sectional variation in firms' assumed ERRs does not accurately reflect the expected performance of pension asset allocation. Amir and Benartzi (1998) document that the difference of ERR can be fully explained by differences of plan asset allocation and riskiness if ERR is not biased. They find that the association between ERR and the asset allocation is rather weak, and conclude that firms' ERRs are discretionary selected. Bergstresser et al. (2006) find that managers appear to alter ERR in response to their incentives related to impending merger activities and compensation contracts. They also find that ERR manipulation leads to changes in the plan asset allocation in order to justify selected biased ERR. Chuk (2013) finds that firms tend to justify their biased ERR by increasing riskier securities in the pension asset allocation, or tend to adjust their biased ERR downward in the post period of FAS132R. Picconi (2006) and Asthana (2008) report that ERR is likely to be manipulated by managers for meeting their earnings targets.

The underlying reason of ERR manipulation is that managers have more leeway in their choice of ERR and can enjoy the discretionary effects on earnings with less concern about the detection risk of their biased ERR choices. Particularly, since the reconciliation between ERR and actual rate of return happens over time with long

amortization periods, users of financial statements have difficulties in identifying errors in ERR choices. Watts and Zimmerman (1990) document that earnings management occurs when managers have exercisable discretion over the accounting numbers. Fields et al. (2001) argue that rational managers would not attempt earnings management if investors can unravel the effects of the earnings management. This means that the prevalence of ERR manipulation can be reduced if managers' attempts in earnings management are easily detected. Hunton et al. (2006) argue that the transparent financial disclosures help users of financial statements easily detect earnings management, so that earnings management can be significantly reduced. Using experimental setting, they find that the increased reporting transparency dampens earnings management attempts in the context of comprehensive income reporting. Lee et al. (2005) also find that firms are more likely to attempt earnings management through realized securities' gains and losses when they select less transparent disclosure.

Literature on disclosure finds that managers' discretionary behavior is restricted by greater disclosure. Analytical research provides predictions about the complementary relation between disclosure and information quality (Dye 1985, Jung and Kwon 1988, Verrecchia 1990). Based on these predictions, Francis et al. (2008) find empirical evidence that earnings quality is significantly associated with voluntary disclosure. They document that firms with good earnings quality select higher levels of disclosure than firms with poor earnings quality do. Meanwhile, in the context of segment disclosure, Berger and Hann (2007) suggest the importance of disaggregated disclosure for users of financial statement. The insight from this study is that greater disclosure plays a vital role in controlling managers' self-interest motivation. They find that managers tend to

withhold lower performance segments in the restated disclosure under FAS131 when the agency problem dominates. These results indicate that managers are more likely to conceal their underperformance associated with the agency problem through the broad disclosure. They document that greater disclosure enables corporate governance mechanism to discipline managers' underperformance driven by the agency problem.

2.3 Hypotheses Development

As noted above, literature on pension accounting reveals that managers have strong incentives to manipulate ERR for boosting earnings, and provides evidence that ERRs of pension funds are significantly biased, by measuring cross-sectional difference of ERR with managers' motivations. The characteristics of pension assumptions, such as complexity and long-term nature, and roughly regulated footnote disclosure, make it difficult for users of financial statements to identify biased ERR assumption, and allow managers to manage earnings with the opportunistic choice of ERR assumption. Collectively, the difficulty in detecting such manipulation ex ante, ex post may facilitate upward biased ERR assumption.

In the point that FAS132R, the old reporting regime, required mandatory disclosures of pension asset allocations, it has provided considerably useful information for investors to understand the riskiness of pension assets compared to previous times. Because of this, Chuk (2013) documents that FAS132R provides incremental information that allows users of financial statement to better evaluate the reasonableness of the ERR. However, under the old regime, firms disaggregated pension assets with broad categories, such as equities, debt securities, real estate, and other assets. Since the "Other" category can include not only residual assets but also risky assets, such as alternative investments,

the expected returns of pension funds tend to differ in the degree of detailed underlying assets included in "Other". Investors are not capable of precisely evaluating the assumed ERR when the "Other" category is included in pension asset allocations with no description of what underlying asset classes they are. Thus, I predict that opaque disclosure with the "Other" category is used to manipulate ERR upward in the pre-FAS132R(1) period. My first hypothesis is follow:

> H1: Ceteris paribus, managers of firms are likely to discretionarily assume ERR upward in the pre-FAS132R(1) period when they include more opaque disclosure categories in the pension asset allocation.

Since FAS132R(1) requires managers to provide further disaggregation of major categories of pension assets based on the nature and risks of assets, investors are expected to precisely evaluate the reasonableness of ERR for their investment decisions. Managers are ultimately concerned about the punishment for earnings management when earnings management is easily detected (Hunton et al. 2006). Auditors also rigorously test whether ERR is supported by the asset allocation because of the higher litigation risk for the detailed disclosure (Chuk 2013). Hence, managers' earnings management motivation can be curtailed by the improved transparency, and managers are required to adjust biased ERR under the greater disclosure environment. However, since firms voluntarily disclosed their disaggregated information about the pension asset allocations during the pre-FAS132R(1) period, the effect of FAS132R(1) on the firms' choice of disclosure is not the same across all firms. I posit that the effect of greater disclosure under FAS132R(1) may be more pronounced when managers' voluntary disclosure was poor in the pre-FAS132R(1) period. Hence, the next hypothesis states:

H2: Ceteris paribus, managers of firms are likely to adjust ERR assumption downward in the post-FAS132R(1) period when they disclosed pension asset allocations in an uninformative way in the pre-FAS132R(1) period.

While the objective of FAS132R(1) is encouraging managers to disaggregate specific pension asset classes, yet managers have flexibility in reporting formats even under FAS132R(1). This flexibility in reporting format can affect the informativeness of disclosure. For example, a firm is able to disclose the underlying assets held in the indirectly invested funds, or only disclose information about the legal structure type of funds, such as common collective trust funds, commingled funds, and regulated investment company funds (see Post-FAS 132R(1) period examples in Appendix A). If the firms disaggregate only the legal structure type of funds with no narrative disclosure of what the underlying asset class is, investors are not able to analyze the related riskiness of pension asset allocation and to evaluate the reasonableness of ERR. Thus, disclosure of the legal structure type of funds, which is another type of opaque disclosure, can be used to conceal information about the pension asset allocation in post-FAS132R(1). I posit that firms that include the legal structure type of funds in the pension assets allocation tend to discretionarily assume higher ERR. Final hypothesis state:

H3: Ceteris paribus, managers of firms are likely to discretionarily assume ERR upward even in the post-FAS132R(1) period when they include more opaque disclosure categories in the pension asset allocation.

III. Research Design

I investigate the association between the opaque disclosures in the pension asset allocations and the assumed ERR in three test periods: Pre-period, Transition period, and

Post-period. Pre- and Post-periods are split based on the before and after adoption date of FAS132R(1), and Transition period includes both just before the adoption year of FAS132R(1) and Post-period. In the Pre- and Post-period, I examine the relation between opaque disclosures of pension asset allocations and the assumed ERR through cross-sectional variation and within firm variation. I define the categories of pension asset allocation as the 'opaque assets' that are not specified in enough detail to evaluate the associated risks of assets and the reasonableness of the assumed ERR. Following this definition, in the Pre-period tests, I classify "Other" assets as the opaque assets. And, in the Post-period tests, I include the legal structure type of funds, such as common collective trust funds and commingled funds, as well as "Other" assets in the opaque assets. In the Transition period tests, I compare the change of ERR between Pre- and Post-period for the firms with poor disclosure in year 2008. I measure the extent of disclosure for the Pre-period in order to identify the firms with poor disclosure (see Figure 2.1 Timeline of Tests).

3.1 Does opaque disclosure of asset allocation facilitate ERR management in the Pre-Period?

I test Hypothesis 1 with the following specification, using pooled regression model and fixed effect model. All variables are measured as of fiscal year end. Detailed variable definitions are in Appendix C.

$$
\begin{aligned}
ERR_t = \ & \alpha_0 + \alpha_1 \%OPAQUE_t + \alpha_2 \%EQUITY_t + \alpha_3 \%RE_t + \alpha_4 CCE_t + \alpha_{5t} ALT_t \\
& + \alpha_6 FIRMSIZE_t + \alpha_7 PLANSIZE_t + \alpha_8 ARR_{t-1} + \alpha_9 ARR_{t-2} \\
& + \alpha_{10} GEXPECT_t + \alpha_{11} BSPREAD_t + \varepsilon
\end{aligned}
$$

Equation 1a

$$ARR_{t+1} = \ \alpha_0 + \alpha_1\%OPAQUE_t + \alpha_2\%EQUITY_t + \alpha_3\%RE_t + \alpha_4CCE_t + \alpha_{5t}ALT_t$$
$$+\ \alpha_6FIRMSIZE_t + \alpha_7PLANSIZE_t + \alpha_8ARR_t + \alpha_9ARR_{t-1} + \varepsilon$$

Equation 1b

Equation 1a uses ERR_t as the dependent variable. ERR is usually determined at the end of the prior fiscal year, and affects reported earnings of the fiscal year (Amir and Benartzi 1998, Chuk 2013). However, I regress the current year ERR on the current year pension assets allocation because of the following two reasons. First, ERR is established based on planned asset classes in the investment portfolio (target allocation), and current year asset allocation tends to be restricted in the target allocation. Second, users of financial statements tend to evaluate the reasonableness of ERR based on current year asset allocation.

Since ERR should be an unbiased estimation of the future return on pension asset allocation, I include the types of disclosed pension asset categories in the Equation 1a: *%OPAQUE* (the percentage of pension assets disclosed as being invested in "Other" assets), *%EQUITY* (the percentage of pension assets disclosed as being invested in equities), *%RE* (the percentage of pension assets disclosed as being invested in real estate), *%CCE* (the percentage of pension assets disclosed as being invested in cash and cash equivalents), and *%ALT* (the percentage of pension assets disclosed as being invested in alternative investments). My focal variable is *%OPAQUE*. I conjecture that firms tend to assume higher ERR to increase earnings when they disclose being invested in more opaque assets. Therefore, I predict $\alpha_1 > 0.$

Because the historical return of pension funds should be considered in assuming ERR (FAS 87), I include one year and two year lagged actual rate of return *(ARR$_{t-1}$* and *ARR$_{t-2}$*), where the actual rate of return is computed by the actual investment return scaled

by the beginning balance of pension assets. I control for the size of firm and plan with *FIRMSIZE* (the natural logarithm of total assets of firm) and *PLANSIZE* (the natural logarithm of fair value of plan assets) because of economic scales. I also include *GEXPECT* (the weighted average of expected earnings growth in the next 12 months: Duke / CFO Magazine) and *BSPREAD* (the average default spread between AAA-rated and BAA-rated bond at the end of fiscal year: St. Louis Federal Reserve) to capture the stock market and bond market expectation.

In Equation 1b, I investigate whether opaque assets (*%OPAQUE*) provide relevant information for ERR. I design a prediction model by regressing the future actual rate of return of pension funds on the current pension asset allocations (*%OPAQUE, %EQUITY, %RE, %CCE,* and *%ALT*), the current and lagged actual rate of return (ARR_t ARR_{t-1}), and the size of firm and pension plan. I use ARR_{t+1} (ARR for year t+1 period) and ARR_{t+2} (the compounded rate of annual return on pension assets for year t+1 and t+2) as the variables for the future actual rate of return. Like Equation 1a, my focal variable is *%OPAQUE*, as a proxy of ambiguously disclosed plan assets. I investigate whether opaque disclosures facilitate ERR management by comparing the coefficient on *%OPAQUE* in Equation 1a and Equation 1b. If opaque assets provide irrelevant information for ERR due to ERR management, the coefficient on *%OPAQUE* in the Equation 1a is positively significant and the coefficient on *%OPAQUE* in Equation 1b is insignificant or negatively significant.

3.2 Does the disclosure regime shift affect ERRs more for firms that disclosed opaquely in the pre-period?

I test Hypothesis 2 with the following specification, using the firm level fixed effect regression model.

$$ERR_t = \beta_0 + \beta_1 POST_t + \beta_2 LOWDISC_t + \beta_{3t} LOWDISC_t * POST_t$$
$$+ \beta_4 EQUITY_{COMPUSTATt} + \beta_5 RE_{COMPUSTATt} + \beta_6 OTHER_{COMPUSTATt}$$
$$+ \beta_{7t} ARR_{ADJt-1} + \beta_8 ARR_{ADJt-2} + \beta_9 STDARR_t + \beta_{10} FUNDING_t$$
$$+ \beta_{11} PLANSIZE_t + \beta_{12} FIRMSIZE_t + \beta_{13} LEVERAGE_t + \beta_{14} ROA_t$$
$$+ \beta_{15} CFO_t + \beta_{16} STDROA_t + \beta_{17} STDCFO_t + \beta_{18} L3\_FVPA_t$$
$$+ \beta_{19} GEXPECT_t + \beta_{20} BSPREAD_t + \varepsilon$$

Equation 2

In Equation 2, I estimate ERR with variables of interest (indicator variables and their interaction term), the determinants of ERR and the disclosure of pension asset allocation. The indicator variable, *POST*, takes a value of one if firms' fiscal year end is in the Post-period. Otherwise, *POST* is zero. It measures variation of ERR after adoption of FAS132R(1). Indicator variable, *LOWDISC*, measures variation of ERR for the firms with poor disclosure in the Pre-period (year 2008), which is set to one if a firm's disclosure score (*DISC*) is below the annual median of distribution. Otherwise it is set to zero. I define and discuss the disclosure measurements in detail in the following Section 3.4. Note that *LOWDISC* does not vary within firm-years because I code the same value of disclosure score for firm-years. The interaction term, *LOWDISC*POST*, measures the variation of ERR in the Transition period for the firms with poor disclosure in the Pre-period. Hypothesis 2 predicts that more transparent disclosure of pension asset allocation for the firms with poor disclosure will lead to the adjustment of biased ERR ($\beta_3 < 0$). I also test whether firms tend to adjust their ERR when they significantly improve their disclosure, by using *HICHANGE* (the indicator variable set to one if firms' *DISC* change is in the highest quintile of the sample distribution) and *LOWCHANG* (the indicator

variable set to one if firms' *DISC* change is in the lowest quintile of the sample distribution), and each of interaction terms with *POST*. *HICHANGE*POST* and *LOWCHANGE*POST* measure variation of ERR in the Transition period for the firms whose *DISC* have improved or deteriorated from 2008 to 2009.

I control for the pension asset allocations with *%EQUITY$_{COMPUSTAT}$* (the percentage of pension assets invested in equities), *%RE$_{COMPUSTAT}$* (the percentage of pension assets invested in real estate), *%OTHER$_{COMPUSTAT}$* (the percentage of pension assets not invested in equities, debt securities, and real estate). *%OTHER$_{COMPUSTAT}$* is not a meaningful proxy of the opaque assets because it includes cash and cash equivalents and alternative investments that are voluntarily disclosed in 10K filing. Unlike the Pre-period tests, I include 'adjusted' ARRs (*ARR$_{ADJt-1}$* and *ARR$_{ADJt-2}$*) that are computed by replacing ARR of fiscal year 2008 with ARR of fiscal year 2007 in order to isolate the effect of financial crisis in 2008. I include *FUNDING* (the fair value of plan assets scaled by the projected benefit obligation) and *LEVERAGE* (the change of the ratio of debt to total assets) to reflect firms' financial risk. I also include *ROA* (profitability), *STDROA* (the standard deviation of profitability over the past three years), *CFO* (the cash flows from operations scaled by total assets), and *STDCFO* (the standard deviation of cash flows over the past three years) to capture firms' business risk. Similar to the Pre-period test models, I control for the firm size and plan size with *FIRMSIZE* and *PLANSIZE*, and control for the stock market and bond market expectation with *GEXPECT* and *BSPREAD*.

3.3 Does opaque disclosure of asset allocation facilitate ERR management even in the post-period?

For testing Hypothesis 3, I design pooled and fixed effect regression models to investigate whether the ambiguously disclosed plan assets play a role in managing ERR even in the Post-period.

$$
\begin{aligned}
ERR_t = \ & \gamma_0 + \gamma_1 \%OPAQUE_t + \gamma_2 \%CCE_t + \gamma_3 \%EQUITYTOTAL_t + \gamma_4 \%RE_t \\
& + \gamma_5 \%ABS_t + \gamma_6 \%DERIVATIVE_t + \gamma_7 \%HEDGE_t + \gamma_8 \%PE_t \\
& + \gamma_9 \%ALT_t + \gamma_{10} ARR_{ADJt-1} + \gamma_{11} ARR_{ADJt-2} + \gamma_{12} PLANSIZE_t \\
& + \gamma_{13} FIRMSIZE_t + \gamma_{14} L1RATIO_t + \gamma_{15} L3RATIO_t \\
& + \gamma_{16} GEXPECT_t + \gamma_{17} BSPREAD_t + \varepsilon
\end{aligned}
$$

Equation 3a

$$
\begin{aligned}
ARR_{t+1} = \ & \gamma_0 + \gamma_1 \%OPAQUE_t + \gamma_2 \%CCE_t + \gamma_3 \%EQUITYTOTAL_t + \gamma_4 \%RE_t \\
& + \gamma_5 \%ABS_t + \gamma_6 \%DERIVATIVE_t + \gamma_7 \%HEDGE_t + \gamma_8 \%PE_t \\
& + \gamma_9 \%ALT_t + \gamma_{10} ARR_{ADJt} + \gamma_{11} ARR_{ADJt-1} + \gamma_{12} PLANSIZE_t \\
& + \gamma_{14} FIRMSIZE_t + \gamma_{14} L1RATIO_t + \gamma_{15} L3RATIO_t + \varepsilon
\end{aligned}
$$

Equation 3b

In Equation 3a, my variable of interest is *%OPAQUE* that represents ambiguously disclosed plan assets in the Post-period, which includes plan assets disclosed as being invested in "Other" assets and the legal structure type of funds. I conjecture that firms are likely to assume higher ERR when they disclose being invested in more opaque assets. Thus, Hypothesis 3 predicts $\gamma_1 > 0.$

Like the Pre-period tests, I control for the current year pension asset allocations. Since firms are required to disaggregate detailed subcategories of pension assets under the new reporting regime, I incorporate these categories that represent the percentage of pension assets disclosed as being invested in each asset category. Specifically, I include *%CCE* (cash and cash equivalents, including money market funds, short-term investment, and guaranteed investment contracts), *%EQUITYTOTAL* (equities, domestic

and international equities, large and small market capitalization equities), *%DEBTTOTAL* (debt securities, domestic and international debt securities, government and corporate debt securities, investment-grade and under investment grade debt securities), *%RE* (real estate), *%ABS* (mortgage-backed securities and asset-backed securities), *%DERIVATIVE* (derivatives such as futures, options, and swaps), *%HEDGE* (hedge funds, fund of hedge funds, and absolute return funds), *%PE* (private equities and venture capital), *%ALT* (limited partnerships and alternative investments). I include the aggregates of investments to equities and debt securities (*%EQUITYTOTAL* and *%DEBTTOTAL*) instead of including all the types of subcategories of equities and debt securities. Since managers of plan sponsors have flexibility in classifying the categories of the asset allocations, controlling for all the types of pension assets may not fully reflect actual asset allocation in a consistent way. For example, firms can classify the same debt security assets by the regional categories (domestic vs. international), or by type of issuer (government vs. corporate), or by grade of issuer (prime vs. junk). Even if a firm discloses an investment in debt security as "domestic" based on regional category, it does not mean that this firm holds none of corporate debt security or none of prime debt security.

I control for the actual rate of returns of pension funds with one year and two years lagged adjusted ARR (*ARR$_{ADJt-1}$*, and *ARR$_{ADJt-2}$*). Like Pre-period regression models, I control for the firm and plan size (*FIRMSIZE* and *PLANSIZE*), and the stock market and bond market expectation (*GEXPECT* and *BSPREAD*). I also include *L1RATIO* (the share of fair value hierarchy Level 1 assets) and *L3RATIO* (the share of fair value hierarchy Level 3 assets) to control for the fair value hierarchy level information disclosed under FAS132R(1).

In Equation 3b, I examine the relation between the opaque assets and the future actual return with the similar specification of Equation 3a. My focal variable, *%OPAQUE*, measures the variation of the future actual rate of return of the pension funds that is attributable to the ambiguously disclosed assets. I control for the disaggregated pension asset allocations, the firm and plan size, and the fair value hierarchy level information with the same variables in the Equation 3a. I control for the historical actual rate of return with current and lagged adjusted ARRs (ARR_{ADJt}, and ARR_{ADJt-1}). Hypothesis 3 predicts that the coefficient on *%OPAQUE* in the Equation 3b is insignificant or negative when firms manage their ERR by using opaque assets in the Post-period.

To explore what components of opaque assets are used to manipulate ERR, I break down opaque assets by the fair value hierarchy levels. Since firms are required to disclose the pension asset allocation based on the fair value hierarchy levels under the new standard, I break down each category of pension asset allocation by Level 1, Level 2, and Level 3. I investigate which fair value hierarchy level of opaque assets drive managers' ERR management in the Post-period, by using similar specification of Equation 3a and 3b. Next, I break down opaque assets by the types of funds and "Other" assets in order to investigate what types of funds are used for the ERR management. Specifically, I include common collective trust funds (*%CCT*), commingled funds (*%COMMINGLED*), mutual funds (*%MUTUAL*), regulated investment company funds (*%RIC*), and "Other" assets (*%OTHER*).

3.4 Measuring Disclosure

In the Transition period tests, I have focused on the mandatory changes in the extent of disclosure of the plan asset allocations between Pre- and Post-period and its

association with ERR assumption. Therefore, measuring the extent of opaque disclosure in the Pre-period is critical to my research question. I begin by detailing the procedures for constructing the disclosure scores on which the testing indicator variables are built. Although counting the number of the categories of pension asset allocation may serve as one way of starting point in measuring the extent of disclosure, it is a crude and imprecise measurement because firms' investment strategies of the plan assets can strongly affect the amount of disclosed information. Hence, I focus on isolating the effect of the variation of investment strategies in constructing the disclosure score. To isolate the real investment changes in the pension assets, I measure the specific difference of the disclosure within the same investment criteria.

I construct the ordinal measure of disclosure score (*DISC)*, which is the sum of total points earned four categories of disclosure scores using the 10-K filing data of fiscal year 2008. *DISC* indicates cross-sectional variation of the opaque disclosure of the pension asset allocations based on the voluntary disclosures. Since literature points out the importance of reliability in self-constructed disclosure index (Botosan 1997, Francis et al. 2007), I code each disclosure item with internal consistency to support the reliability in the index.

The *DISC* reflects four categories of voluntary information: Unusual Score (*UNUSUAL*), Inferred Score (*INFER*), Standard Score (*STANDARD*), and Supporting Score (*SUPPORTING*). *DISC* is the sum of 19 elements of four categories following my coding scheme. Appendix B summarizes the major elements of *DISC*. First, *UNUSUAL* measures the extent of disclosure of asset categories other than equities, debt securities, and real estate. Since FAS132R only illustrates the disclosure of the asset allocation as

"equities, bond, real estate and all other", many firms have ambiguously disclosed the alternative investments as a part of "all other". However, some firms describe their allocation to alternative investments as a note to "all other", or disaggregate the types of alternative investments. Thus, I award zero points to four points to the firms on a spectrum of disclosure from most opaque to most transparent. Specifically, zero points are assigned to the firms that disclose being invested in the "Other" category with no description of what the underlying asset class may be. One point is assigned to the firms that disclose being invested in the "Other" category with some description of what the underlying asset is. I also award one point to the firms that disaggregate cash and cash equivalents (CCE) with the "Other" category because CCE narrows down the possibilities for what "Other" might consist of. Two points are awarded to the firms that disaggregate the alternative investments with no description of what specific type of alternative asset classes they are, such as private equities and hedge funds. Three points are awarded to the firms that disaggregate the alternative investments with description of what asset classes are included in the alternative investments. Four points are awarded to the firms that disaggregate all asset categories labeled by underlying asset class. For example, firms disaggregate each alternative asset class into a separate category with specific asset allocation percentage. I also award four points to the firms that disaggregate only equities, debt securities, and real estate assets with no opaque disclosure.

INFER measures the extent of disclosure of non-standard asset categories by comparing the pension asset allocation of 2008 to the ending balance of Level 3 assets of 2008, obtained from the Level 3 reconciliation of 2009. I make the assumption that Level 3 assets are likely to be real estate or alternative asset classes (e.g. private equities and

hedge funds). Higher score is given to firms that disaggregate at least some likely-Level 3 categories. Zero points are assigned to the firms that disclose no likely-Level 3 categories even though there is a non-zero ending balance of Level 3 assets at the end of 2008. One point is assigned to the firms that disaggregate an the "Other" category with no supporting disclosure on the underlying asset classes when they have non-zero ending balance of Level 3 assets for 2008. Two points are assigned to the firms that disaggregate "Other" assets (but no supporting description on the underlying asset class) and real estate because the real estate category narrows down the possibilities for what "Other" might be. Three points are assigned to the firms that disaggregates some likely-Level 3 asset categories (e.g. real estate, private equities, and hedge funds) when they have non-zero ending balance of Level 3 assets for year 2008. Firms that disaggregate more than one likely-Level 3 category do not get additional points. For example, a firm with "Real Estate" and "Private Equity" does not get more points than a firm with only "Real Estate" or "Private Equity".

STANDARD measures the extent of disclosure of standard categories, such as equities and debt securities assets, which are commonly allocated among the sample firms. Some firms disclose subcategories of equities and debt securities in the asset allocation based on region (domestic, international), size (small cap, large cap), issuer (government, agency, corporate), grade (investment grade, under investment grade). For example, when a firm invests the pension fund in equities, it either discloses a size of equity issuers, such as "Large Cap" and "Small Cap", or it does not. Firms are awarded one point for each of their specified disclosure of standard categories of pension funds.

Since five items compose *STANDARD*, potential maximum score is five points if all of these items are disclosed.

SUPPORTING measures the extent of disclosure of supporting items that are additional to the pension asset allocation table. *SUPPORTING* is scored by counting binary coded points with five disclosure items: target allocation, the company's own stock, ERRs for each asset category, historical return and its period (over 10 years or not). These items can be used to support the validity of the assumed ERR with the asset allocations. Particularly, I include the period (over 10 years) of historical return in the plan assets because this information reveals firms' actual return on pension assets before 1998, the effective year of FAS132.

To compare the difference in the extent of disclosure of the asset allocation between the Pre- and Post-period, I construct *UNUSUAL, STANDARD*, and *SUPPORTING* for year 2009 with the same coding scheme of year 2008. Since *INFER* classifies a spectrum of disclosure of 2008 by comparing disclosed asset categories to the true underlying asset allocation that is inferred from Level 3 reconciliation of 2009, *INFER* is not included in measurement of 2009.

Table 2.4 presents the descriptive statistics pertaining to four disclosure scores for the Pre- and Post-period samples. The range of scores reported in Table 2.4 reflects a cross-sectional variation in the extent of disclosure of the pension asset allocation. Specifically, 30.1% and 80.8% of firms are awarded zero points of *UNUSUAL* and *STANDARD* in year 2008 respectively, whereas only 2.5% and 11.2% of firms are awarded zero points of *UNUSUAL* and *STANDARD* in year 2009. *UNUSUAL* and *STANDARD* for the Post-period are, on average, increased. Mean (median) *UNUSUAL* of

Pre- and Post-period are 2.26 (3) and 2.61 (3), and mean (median) *STANDARD* of Pre- and Post-period are 0.26 (0) and 2.25 (2). However, the distribution of *SUPPORTING* in 2008 is almost similar to that of 2009.

IV. Data Description

4.1 Sample Selection

The sample is composed of three periods: Pre-period, Transition period, and Post-period. The Pre-period sample consists of observations spanning fiscal year 2003 - 2008 because data of pension asset allocations is available from year 2003, which is the effective year of the old reporting regime (FAS132R). I hand-collect the Pre-period asset allocation from the 10-K pension footnotes for all S&P 500 firms. This allows us to identify the disclosure variation amongst the firms (see Pre-FAS 132R(1) period examples of Appendix A). Even though FAS132R only illustrates the disclosure as "equities, bond, real estate and all other", some firms voluntarily disaggregate specific asset categories of pension allocations. I obtain 1,699 firm/year observations as the Pre-period sample.

In the Transition period, I collect the pension asset allocations from COMPUSTAT database in order to obtain comparability between two different reporting regimes. My main sample of the Transition period consists of observations spanning fiscal year 2008 - 2010. However, I collect 26 firms' Transition period data spanning fiscal year 2009 - 2011 to include the data for the fiscal year before the adoption year of FAS132R(1) because these firms' fiscal year of 2009 ends before the effective date of the new reporting standard. I eliminate 15 sample firms that do not provide information for the control variables. I also delete seven sample firms that do not disclose the fair value

hierarchy levels even after adoption of new reporting standard. This process yields a final sample of 821 observations from 276 unique firms. Table 2.1 summarizes the sample selection process.

The Post-period sample consists of observations spanning fiscal year 2009 - 2010 where the new standard is fully implemented. I hand-collect the Post-period asset allocations from the 10-K footnotes for the Transition period sample firms, yielding a total of 545 observations from 276 unique firms. I identify the pension asset allocations with two dimensions; the disaggregated asset allocation (categories of plan assets) and the fair value hierarchy level (Level 1, Level 2, and Level 3).

Finally, I obtain most data for the dependent and control variables from COMPUSTAT. I capture the firms' earnings growth expectation from Duke/CFO magazine, Global Business Outlook Survey, and monthly bond yields data from the St. Louis Federal Reserve.

4.2 Descriptive Statistics

Table 2.2 describes the distribution of the dependent variable, ERR, by year. The mean (median) ERR in the sample is 8.14% (8.25%) with inter-quartile range of 7.97-8.50%. The mean (median) ERR has declined over the whole Pre-period. Particularly, it has significantly decreased in year 2004, 2005, and 2009 (t test p-value: less than 5%). There are two potential explanations of this trend: plan managers' revision of long term economic expectations and the effect of the changed reporting standards. First, capital market future expectation is considerably decreased (Chuk 2013). The SEC also takes action for the firms to reflect long term market expectation to their ERR assumption (Stuart 2005). For example, The SEC investigates the reasonableness of pension

assumptions for six firms in October 2004. Second, revised reporting standards, FAS132R in 2003 and FAS132R(1) in 2009, require more transparent disclosure of the plan asset allocation compared to each of the pre-period (year 2002 and 2008). This enables investors to precisely assess the reasonableness of ERR compared to previous times. The decreased ERR can be attributable to plan managers' adjustment of biased ERR responding to the changed reporting rules.

Panel A of Table 2.3 displays the Pre-period asset allocations that firms have disclosed in the 10-K footnotes. Most pension plans disclose being invested in equity and debt security assets. The mean (median) proportion of equity investment in the sample is 61.79% (64%). The mean (median) proportion of debt security assets in the sample is 29.98% (29%). 33.7% and 22.4% of the sample firms report their investments in real estate and cash and cash equivalents. The proportions of real estate and cash and cash equivalents are, on average, 1.78% and 1.51%, respectively. While 20.5% of firms disclose their investments in non-standard asset categories (*%ALT*) such as alternative investments, 37.9% of firms ambiguously disclose being invested in the "Other" asset category. The proportions of alternative investments and "Other" assets are, on average, 2.66% and 2.29%, respectively. In the Pre-period, pension asset allocations have shifted considerably over time. The second table of Panel A displays that the percentage of equity is significantly decreased from 2007 to 2008, while the percentage of debt security is significantly increased in the same period. This pattern is consistent with the finding of Amir et al. (2010) that firms have reduced the weight on equities and shifted pension assets to less risky assets in order to decrease the volatility of comprehensive income

after the adoption of FAS158[4]. Another notable pattern is that firms have monotonically increased their investments in alternative investments. The mean proportion of alternative investments categories is augmented from 1.7% in 2003 to 4.2% in 2008. Finally, I compare my hand-collected data with Compustat data. The third table of Panel A displays that *%OTHER_COMPUSTAT* is larger than the sum of *%ALT* and *%OPAQUE* that are hand-collected, implying that Compustat "Other" pension asset category includes not only the disclosed "Other" category but also alternative investments, cash and cash equivalents that are specifically disaggregated in the 10K footnotes.

Panel B of Table 2.3 describes the Post-period pension asset allocations. Disclosed pension asset allocations vary significantly across plan sponsors in the Post-period. In the Pre-period of 2008, only 19.6% of firms have specifically disaggregated domestic and international equity or government and corporate debt security (not tabulated). However, in the Post-period, most of firms (89.9% of firms) specifically disaggregate their equity and debt security assets by region (domestic or international), by size (large or small market), by issuer (government or corporate), or by grade (above or below investment grade). For example, the mean (median) proportions of debt security categories follows: 9.68% (1.94%) in debt security, 1.55% (0%) in domestic debt security, 0.56% (0%) in international debt security, 7.24% (5.43%) in government debt security, 10.03% (6.73%) in corporate debt security, 1.49% (0%) in investment-grade debt security, and 0.41% (0%) in below investment-grade debt security, respectively. The mean (median) of the aggregated debt security investments is 30.97% (29.43%). Since the firm has flexibility in classification of asset allocation, each firm's disaggregated equity and

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[4] FAS158 requires full recognition of the pension surplus/deficit on the balance sheet and immediate recognition of actuarial gains/losses in other comprehensive income.

debt assets classification can be based on different criteria. For example, some firms disaggregate their debt securities by grade (prime and junk) instead of issuer (government and corporate). Because of this, the mean (median) of *%DEBTPRIME* and *%DEBTJUNK* for the firms with the asset categories are 17.32% (14.75%) and 5.19% (5.04%), which are considerably larger than the mean (median) for whole sample. Many firms specifically disaggregate alternative investments categories that have been disclosed as part of "Other" assets in the Pre-period. While 19.45% of firms disaggregate "alternative investment" that is less transparent disclosure, 26.3% and 34.7% of firms disaggregate specific types of alternative investments, "hedge fund" and "private equity" respectively. The proportions of alternative investment categories are, on average, 2.22% in hedge fund, 2.18% in private equity, and 1.3% in "alternative investments" respectively.

Panel C of Table 2.3 displays the pension assets allocations for the Transition period captured from the Compustat database. The mean (median) shares of equities and debt security assets are 52.80% (56%) and 36.89% (35.1%), respectively, while the share of real estate and other assets are, on average, 1.86% and 8.09% of the total pension assets, respectively.

Panel D of Table 2.3 displays ambiguously disclosed pension assets in the Post-period. The mean of *%OPAQUE* is 6.71%, which is larger than *%OPAQUE* in the Pre-period (2.29%) that only includes "Other" assets. In the Post-period, I additionally include the legal structure type of funds in the opaque assets, such as common collective trust funds and commingled funds, because disclosure of these types of funds does not provide useful information in assessing reasonableness of ERR. Since FAS132R(1) requires firms to disclose their pension assets more detailed categories, the proportion of

"Other" assets in the Post-period (0.98%) is reduced compared to that of Pre-period (2.29%). However, in the Post-period, the proportions of major legal structure typed funds are larger than that of "Other" assets. The mean proportions of common collective trust funds *(%CCT)*, commingled funds *(%COMMINGLED)*, and mutual funds *(%MUTUAL)* are 2.63%, 1.21%, and 1.48%, respectively.

Table 2.5 describes control variables for the tests in the three periods. In the Pre-period, the mean (median) of ARR_{t-1} is 8.78% (10.55%) with inter-quartile range of 6.48-13.88%, and the mean (median) of the firm and plan size are $63.3bn ($15.3bn) and $4.0bn ($1.3bn), respectively. Next, in the Transition and Post period, the mean (median) of ARR_{ADJt-1} is 12.22% (12.07%). The mean (median) of the firm and plan size are $74.1bn ($17.5) and $4.4bn ($1.5bn), respectively. The mean (median) leverage is 26.2% (24.2%). The mean (median) of funding ratio is 77.8% (76.7%) with inter-quartile range of 68.3-85.6%, indicating that most pension plans are underfunded. Earnings (measured before pension expenses) are 4.7% (4.7%) of total assets, and the mean (median) volatility of profitability is 3.5% (1.5%). The mean of cash flows from operations is 10.4% (10.3%) of total assets, and the mean (median) volatility of cash flows scaled by assets is 2.6% (1.9%). The mean (median) of Level 3 assets are 8.5% (5.1%) of total fair value plan assets.

4.3 Correlation

Table 2.6 presents the Spearman Correlations between the explanatory variables and the variables of interest in the Transition period. The correlation between *DISC* and *ERR* is significantly positive, implying that firms' disclosure are likely to be transparent to justify their higher ERR. Except for *SUPPORTING*, components of *DISC* are positively

correlated with one another. *SUPPORTING* is also correlated with *STANDARD*. The results imply that my four disclosure scores reflect firms' consistently coordinated disclosure strategies across various avenues (Botosan 1997).

Amongst variables of pension asset allocations, $\%EQUITY_{COMPUSTA}$ and $\%RE_{COMPUSTA}$ are positively correlated with ERR, but $\%DEBT_{COMPUSTA}$ is negatively correlated with ERR. This suggests that firms are likely to expect higher return of pension funds when they hold riskier assets, such as equity and real estate. *L3_FVPA* is also positively correlated with ERR because most of Level 3 assets are riskier assets. ARR_{ADJt-1} and ARR_{ADJt-2} are positively correlated with ERR, indicating that firms consider the historical return in their assuming ERR. *LEVERAGE* is positively correlated with ERR, suggesting that financially constrained firms are likely to assume higher ERR to minimize pension expense. Contrary to my expectation, *STDROA* and *STDCFO* are negatively correlated with ERR. I conjecture that firms with business risk are more likely to have a concern about additional contribution to the plan, resulting in investing in less risky pension assets and assuming lower ERR.

V. Empirical Results

5.1 Does opaque disclosure of asset allocation facilitate ERR management in the pre-period?

Panel A of Table 2.7 presents the results of estimating Equation 1a, to test whether opaque disclosure of pension asset allocation is associated with ERR management in the Pre-period. Note that the asset allocations to *%OPAQUE* are ambiguously disclosed being invested in "Other" assets. Particularly, I separately estimate ERR and future ARR for the limited sample period from 2006 to 2008 in order

to isolate the SEC intervention effects by warning (2002) and investigation (2004). In the first two columns, I estimate ERR by using all sample of the Pre-period, and in the next two columns, I estimate ERR for fiscal year 2006 to 2008 sample.

In the Column (1), I find that *%OPAQUE* is positively and significantly related with ERR at less than 10% level in the pooled regression where standard errors are corrected for clustering at the firm level. The relationship between opaque disclosure and the assumed ERR is heightened when I regress ERR on explanatory variables with the sample from fiscal year 2006 to 2008. Column (3) presents that *%OPAQUE* is positively and significantly related to ERR at less than 1% level. In the Column (2), *%OPAQUE* is positively and significantly related with the assumed ERR at less than 10% level in the presence of firm by year fixed effects. The magnitude of estimated coefficients in specifications with firm fixed effects should be compared to the within-firm variation rather than the cross-sectional variation. Therefore, the results imply that the firm is more likely to increase ERR when it increases "Other" assets in the pension asset allocation. However, Column (4) presents that the coefficient on *%OPAQUE* is insignificant.

Consistent with Amir and Benartzi (1998), the allocations to riskier pension assets, such as equities and alternative investments, are positively and significantly associated with the assumed ERR in the pooled model and fixed effect model, implying that these coefficients represent a part of risk premium of each pension assets. Unexpectedly, *%CCE* is also positively and significantly related with the assumed ERR in the Column (1). Larger plans are more likely to assume higher ERR, consistent with the fact that larger plans have superior resources and better opportunities to expect better returns of pension funds. However, *FIRMSIZE* remains negatively and significantly

associated with the assumed ERR in the pooled model. I posit that smaller firms have strong incentive to manipulate ERR upward because the smaller firms' earnings are more likely to be affected by the pension expense. To explore this conjecture, I test the same specification with additional explanatory variable, *SENSITIVITY* (log ratio of total pension assets to operating income). I find that the significance of the coefficient on *FIRMSIZE* disappears (not tabulated). Since historical return of pension fund should be considered in assuming ERR, positive and significant association between ERR and lagged variables of ARR is expected. The coefficient on ARR_{t-1} is significantly positive in the Column (3), while it is insignificant in the Column (1).

Panel B of Table 2.7 presents the regression results of estimating future ARR. Since firms with more opaque assets have expected higher returns of the pension funds, I investigate the reasonableness of this expectation by regressing one year ahead of the actual return rate (ARR_{t+1}) and compounded rate of annual return for year t+1 and t+2 period (ARR_{t+2}) on *%OPAQUE*. In the first four models, I estimate ARR_{t+1} and ARR_{t+2} by using all sample firms of the Pre-period. I investigate the association between opaque disclosure and future ARR with the pooled regression model in the Column (1) and (2), and the firm fixed effect model in the Column (3) and (4). I find that the coefficient on *%OPAQUE* is insignificant in the Column (1), but is significantly positive at less than 1% level in the Column (2), implying the opaque assets are positively associated with future return of pension funds in the sample period. I separately estimate the future ARR with the opaque assets with limited sample period from 2006 to 2008. Column (5) to (8) presents that the coefficients on *%OPAQUE* are all insignificant in the pooled and fixed effect models. Overall results suggest that higher ERR with opaque assets is not

supported by the future actual return of opaque assets in the limited sample period, indicating that opaque assets facilitate ERR management.

Next, I estimate the gap of ERR and ARR_{t+2} (*ERRMINUSARR*) with the opaque assets. If opaque disclosure of asset allocation facilitates ERR manipulation, the significantly positive coefficient on *%OPAQUE* is expected. Panel C of Table 2.7 presents that in the pooled model, the coefficient on *%OPAQUE* is negatively significant at less than 5% level in the Pre-period, while it is insignificant with the limited sample period.

5.2 Does the disclosure regime shift affect ERRs more for firms that disclosed opaquely in the Pre-period?: Transition tests

In the Transition period, I investigate whether firms with poor disclosure in the Pre-period tend to decrease their ERR in the Post-period. Panel A of Table 2.8 reports the regression results of Equation 2 with firm fixed effects. In the Column (1) of Panel A, I regress ERR on covariates, including indicator variables *(LOWUNUSUAL, LOWINFER, LOWSTANDARD*, and *LOWSUPPORTING*) that capture the variation of ERR for a firm with poor disclosure based on each of four disclosure categories. Indicator variables are set to one if each of four disclosure scores (Unusual Score, Inferred Score, Standard Score, and Supporting Score) is below the annual median of the sample distribution for the year. The regression model focuses on examining what disclosure score categories drive ERR adjustment for the firms with poor disclosure, by using the interaction terms (*LOWUNUSUAL*POST, LOWINFER*POST, LOWSTANDARD*POST,* and *LOWSUPPORTING*POST*). I find no significant coefficient on these interaction terms,

implying that single measurement of disclosure score is unable to capture the poor disclosure firms' ERR variation related to a shift in reporting regime.

Next, I estimate ERR with the indicator variable, *LOWDISC*, and its interaction term with *POST*. Note that *LOWDISC* indicates firms with poor disclosure identified by *DISC* that is the aggregate of four disclosure scores. Column (2) of Panel A present that *LOWDSCORE*POST* is negatively and significantly related with ERR at less than 5% level, implying the firms with poor disclosure are more likely to decrease their ERR in the Post-period. The coefficient on *LOWDISC*POST* indicates that firms with poor disclosure decrease 10.1 basis points of their ERR compared to other firms in the Post-period.

In the Column (3) to (5) of Panel A, I investigate the association between ERR adjustment and firms' disclosure improvement by measuring the change of *DISC* (sum of *UNUSUAL, STANDARD,* and *SUPPORTING*). Column (3) presents that indicator variable, *POST*, and its interaction term, *HICHANGE*POST*, are negatively and significantly related with ERR at less than 5% level. The significant coefficients on *HICHANGE*POST* and *POST* indicate that firms tend to decrease 10.7 basis points in the Post-period compared to other firms when they considerably improve their disclosure level, where other firms decrease, on average, 13.8 basis points of ERR in the Post-period. Column (4) presents that the coefficient on *LOWCHANGE*POST* is significantly positive and the coefficient on *POST* is significantly negative. The results indicate that firms are likely to increase 13.2 basis points of ERR in the Post-period compared to other firms when their disclosure level is not improved, where other firms decrease 18.3 basis points of ERR in the Post-period. In the Column (5), I incorporate two interaction terms,

HICHANGE*POST and *LOWCHANGE*POST*, within one model. The significant coefficient on *LOWCHANGE*POST* indicates that firms that do not improve the level of disclosure tend to increase 11.5 basis points of ERR compared to the firms that have marginally improved disclosure level.

To test the robustness of results, I examine the inter-temporal change of ERR with the variables of interest and the changes of control variables between 2008 and 2009, and between 2008 and 2010. Below is the inter-temporal change regression model. I use the current year change of variables in Equation 2.

$$
\begin{aligned}
\Delta ERR_t = \ & \beta_0 + \beta_1 POST_t + \ \beta_2 LOWDISC_t + \beta_{3t} LOWDISC_t * POST_t \\
& + \beta_4 \Delta EQUITY_{COMPUSTATt} + \beta_5 \Delta RE_{COMPUSTATt} \\
& + \beta_6 \Delta OTHER_{COMPUSTATt} + \beta_{7t} \Delta ARR_{ADJt-1} + \beta_8 \Delta ARR_{ADJt-2} \\
& + \beta_9 \Delta STDARR_t + \beta_{10} \Delta FUNDING_t + \beta_{11} \Delta PLANSIZE_t \\
& + \beta_{12} \Delta FIRMSIZE_t + \beta_{13} \Delta LEVERAGE_t + \beta_{14} \Delta ROA_t \ + \beta_{15} \Delta CFO_t \\
& + \beta_{16} \Delta STDROA_t + \beta_{17} \Delta STDCFO_t + \beta_{18} \Delta L3\_FVPA_t \\
& + \beta_{19} \Delta GEXPECT_t + \beta_{20} \Delta BSPREAD_t + \varepsilon
\end{aligned}
$$

Panel B of Table 2.8 reports the results of the inter-temporal change regression between 2008 and 2009. Column (1) of Panel B presents that *LOWUNUSUAL* is negatively and significantly associated with the change of ERR at less than 10% level, implying that the ERR adjustment of *LOWDISC* firms is mostly driven by the *LOWUNUSUAL* sample firms. The results for variables of interest in Column (2) to (5) of Panel B are consistent with Panel A of Table 2.8, where the coefficients and their statistical significance on the change of ERR are different. Significantly negative coefficients on *LOWDISC and HICHANGE* provide evidence that these sub-sample firms are likely to adjust ERR downward in year 2009, and significantly positive coefficient on *LOWCHANGE* indicates these sub-sample firms are likely to increase their ERR in year

2009 compared to other firms. Panel C of Table 2.8 reports results of the inter-temporal change regression between 2008 and 2010. Column (1) of Panel C presents that the coefficient on *LOWUNUSUAL* is insignificant. The coefficients on variables of interest in Column (2) to (5) of Panel C remain significant in the predicted direction and are also consistent with Panel A and B of Table 2.8.

Collectively, the regression results provide consistent evidence that firms with poor disclosure are likely to decrease their ERR in the Post-period. While the decrease of ERR is small in magnitude, these estimates are consistent with adjustments of biased ERR, which is economically meaningful. Tests with inter-temporal regression also provide supportive results of Hypothesis 2.

5.3 Does opaque disclosure of asset allocation facilitate ERR management even in the Post-period?

I investigate whether firms use opaque disclosure to manipulate ERR even in the Post-period. Note that the category of opaque assets includes not only "Other" assets but also uninformatively disclosed legal structure type of funds, such as commingled fund and common collective trust funds. Panel A of Table 2.9 reports the results of estimating Equation 3a and 3b by using the pooled model (first three columns) and fixed effect model (next three columns). Column (1) presents that *%OPAQUE* is positively and significantly associated with the assumed ERR at less than 1% level. The significant coefficient on *%OPAQUE* indicates that the increases of ERR are most likely to occur in 1.7 basis points increments as result of 1% point increase of opaque assets. Column (2) and (3) present that *%OPAQUE* is negatively and significantly related with ARR_{t+1} and ARR_{t+2} at less than 1% level, respectively.

Column (4) of Panel A presents that the opaque assets are positively and significantly associated with ERR at less than 1% level with the presence of firm fixed effect. The coefficient on *%OPAQUE* indicates firms are likely to increase 0.7 basis points of ERR when they increase 1% of the opaque assets compared to debt security assets. Column (5) and (6) present that *%OPAQUE* is negatively and significantly associated with future actual return (*ARR*$_{t+1}$ *and ARR*$_{t+2}$) at less than 1% with the presence of firm fixed effect, indicating that the opaque assets tend to incur adverse consequence in the future actual returns of pension funds. I also regress *ERRMINUSARR* (the gap of *ERR* and *ARR*$_{t+2}$) on the opaque assets with same specification of Panel A of Table 2.9. Column (1) and (2) of Panel B present that the coefficient on *%OPAQUE* is significantly positive at less than 1% level in the pooled model and fixed effect model respectively, indicating higher ERR with opaque disclosure is not justified by that of the future actual returns. These results provide evidence that firms tend to use opaque disclosure of the asset allocation in order to manipulate their assumed ERR even under the new reporting regime.

In the Panel C of Table 2.9, I specifically explore the opaque disclosure by the fair value hierarchy level of the pension assets. Column (1) presents that *%L2OPAQUE* (Level 2 opaque assets) is positively and significantly related with the assumed ERR at less than 1% level, whereas the coefficients on *%L1OPAQUE* and *%L3OPAQUE* are insignificant. Column (2) and (3) present that *%L2OPAQUE* is negatively and significantly associated with *ARR*$_{t+1}$ and *ARR*$_{t+2}$ at less than 1% level. The results indicate that opaque disclosure of Level 2 assets is highly associated with the assumed ERR in the positive direction, and this relation is not justified by future actual return. I conjecture

that these results reflect the fact that most of the legal structure types of funds are classified as Level 2 assets.

In the Panel D of Table 2.9, I repeat analysis with the components of opaque assets, specifically *%CCT, %COMMINGLED, %MUTUAL, %RIC,* and *%OTHER*. Column (1) of Panel D reports that *%CCT, %COMMINGLED, and %MUTUAL* are significantly and positively related with ERR at less than 1% level, and *%RIC* is significantly and positively related with ERR at less than 5% level. However, the coefficients on *%OTHER* are insignificant. Column (2) and (3) presents that *%CCT, %COMMINGLED, and %MUTUAL* are significantly and negatively related with ARR_{t+1} at less than 1% or 5% level, and *%RIC* is also significantly associated with ARR_{t+2} at less than 5% level. The results imply that firms are more likely to manage their ERR with legal structure type of funds, and "Other" assets are not likely to be used for managing ERR in the Post-period.

VI. Conclusion

This study examines whether earnings management is associated with disclosure by focusing on pension assumption management. I hypothesize that firms discretionarily assume higher ERR by withholding information about pension asset allocations under the less transparent environment, and such firms decrease ERR under the greater reporting transparency. I also posit that firms assume higher ERR by using new type of opaque disclosure even under the new reporting regime. I test these hypotheses by comparing the higher ERR that is driven by opaque assets to the future actual rate of return of opaque assets in the pre- and post-period tests, and by comparing ERR of firms with poor disclosure between two different reporting regimes in the transition period tests.

Particularly, the mandated change of reporting standard allows us to examine the managers' reporting choice of ERR based on voluntarily disclosure of pension asset allocation in the pre-period by using self-constructed disclosure scores. I believe that the disclosure scores precisely measure the variation of disclosure about pension asset allocations that are linked to ERR management.

First, this study provides evidence that opaque disclosure of plan asset allocation is associated with ERR management under the old reporting regime. Secondly, I find that firms with poor disclosure are more likely to adjust their biased ERR under the new reporting regime. The results suggest that, for the firms with poor disclosure, the mandated transparency in pension asset allocation plays a vital role in reducing the ERR management. I also find that firms decrease ERR in the Post period when they improve the extent of disclosure. Finally, ERR management is facilitated by the opaque disclosure even under the new reporting regime. Particularly, I find that firms tend to assume higher ERR through the opaque disclosure when they disaggregate the indirectly invested funds with no description of underlying asset classes.

This paper includes several limitations. First, one or two years of the future actual rate of return does not seem to be a long enough time horizon to compare with ERR because ERR should be assumed based on the average long term expected return of pension fund assets. My measurement of the future actual return can be affected by realized returns of a particular point in the future time line. Amir and Benartzi (1998) document that pension asset allocations are better predictor of long term return rather than short term return. Second, the indicator variables to identify firms with poor disclosure may roughly reflect the relation between the dependent variable and the extent

of disclosure. Since indicator variables are used to map a continuous variable onto a dichotomous measurement space, the mapping process can be critical (Hay et al. 2006). Therefore, the dependent variable in this study can be sensitive to these critical points of the mapping process.

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Appendix A: Examples of asset allocation disclosure from 10-K filings

Pre-FASB 132(r)(1) Period: Examples of Unusual Score (*UNUSUAL*)

The Unusual Score classifies firms on a spectrum, from most opaque to most transparent, based only on disclosures made in the 10-K pension footnote.

Alcoa Inc: Zero points (most opaque)

Asset category	Policy range	2008	2007
Equity securities	30–60%	38%	54%
Debt securities	30–55%	47	35
Real estate	5–15%	7	6
Other	0–15%	8	5
Total		100%	100%

Alcoa Inc. is assigned zero points as it has an opaque "Other" category with no description of what the underlying asset class may be (cash and cash equivalents / alternative-type assets).

Schlumberger Limited: One point

	US	Int'l
Equity securities	55%	65%
Debt securities	33	25
Other investments	12	10
	100%	100%

The asset allocation objectives are to diversify the portfolio among several asset classes to reduce volatility while maintaining an asset mix that provides the highest expected rate of return consistent with an acceptable level of risk. There is no investment of any plan assets in Schlumberger common stock. Schlumberger's asset allocation strategy is reviewed at least annually. Other investments above consist primarily of alternative investments such as real estate and private equity.

Schlumberger Limited is assigned one point as it has an "Other" category with some description of what the underlying asset class is (cash and cash equivalents / real estate / alternative-type assets).

Raytheon Company: One point

Pension Benefits Asset Information

Asset category	2008
Debt securities	39%
Equity securities	37%
Cash	18%
Real estate	3%
Other	3%
Total	100%

Raytheon Company is assigned one point as it disaggregates a "Cash" category that narrows down the possibilities for what "Other" might consist of.

AutoZone Inc.: Two Points

	August 29, 2009		August 30, 2008	
	Current	Target	Current	Target
Domestic equities	17.0%	22.5%	22.7%	27.5%
International equities	40.3	34.0	33.3	29.0
Alternative investments	26.4	30.5	31.4	30.5
Real estate	8.7	11.0	11.8	11.0
Cash and cash equivalents	7.6	2.0	0.8	2.0
	100.0%	100.0%	100.0%	100.0%

AutoZone Inc. is assigned two points as it disaggregates alternative investments into a separate category, but provides no description of what specific types of alternative asset classes they are (e.g., private equity, hedge funds, commodities, etc.).

BB&T Corp.: Three points

BB&T periodically reviews its asset allocation and investment policy and during 2006 made changes to its target asset allocation. BB&T has established guidelines within each asset category to ensure the appropriate balance of risk and reward. The current target asset allocations for the plan assets include a range of 35% to 45% for U.S. equity securities, 7% to 13% for international equity securities, 20% to 30% for fixed income securities, and 10% to 30% for alternative investments, which include real estate, hedge funds, private equities and commodities, with any remainder to be held in cash equivalents. The allocation of plan assets for the defined benefit pension plans, by asset category as of December 31, 2008 and 2007 is detailed in the table below.

Allocation of Plan Assets	December 31,	
	2008	2007
U.S. equity securities	44%	43%
International equity securities	13	13
Fixed income securities	31	31
Alternative investments	9	9
Cash equivalents	3	4
Total	100%	100%

BB&T Corp. is assigned three points as it disaggregates alternative investments into a separate category, and also provides a narrative description of what asset classes are included in the alternative investments category.

Equifax Inc: Four points (most transparent)

	Range		Actual	
USRIP	2008	2007	2008	2007
Large-Cap Equity	10%–35%	15%–35%	14.3%	20.6%
Small- and Mid-Cap Equity	0%–15%	2%–10%	3.3%	13.1%
International Equity	10%–30%	10%–30%	12.0%	17.5%
Private Equity	2%–10%	2%–8%	7.5%	6.2%
Hedge Funds	10%–30%	15%–30%	19.0%	19.4%
Real Assets	2%–10%	2%–10%	6.3%	1.7%
Fixed Income	15%–40%	10%–25%	28.9%	12.3%
Cash	0%–15%	0%–15%	8.7%	9.2%

Equifax Inc. is assigned four points as all disclosed asset categories are labeled by underlying asset class; there are no opaque categories. It disaggregates each alternative asset class into a separate category with a specific asset allocation percentage disclosed for each.

Pre-FASB 132(r)(1) Period: Examples of Inferred Score (*INFER*)

The inferred score classifies firms on a spectrum, from most opaque to most transparent, by attempting to compare asset categories disclosed in the 10-K pension footnote to the 'true' underlying asset allocation in that period. The true underlying asset allocation in 2008 is partially inferred from the 2009 post-FASB 132(r)(1) reconciliation of Level 3 assets from beginning to end of the year. The opening balance of Level 3 assets in 2009 provides the ending balance for 2008; I make the assumption that Level 3 assets are most likely to be alternative asset classes (real estate, private equity, hedge funds, or commodities).

Caterpillar Inc: Zero points (most opaque)
* Level3 ending balance for 2008 = $231m

	Target Allocation	Percentage of Plan Assets at Year-end		
	2009	2008	2007	2006
U.S. pension:				
Equity securities	70%	70%	70%	74%
Debt securities	25%	30%	27%	26%
Real estate	5%	–	–	–
Cash	–	–	3%	–
Total	100%	100%	100%	100%

Caterpillar Inc is assigned zero points because it has non-zero Level 3 assets at the end of 2008, yet provides no disaggregation or even narrative disclosure of the existence of any asset classes that are likely to be Level 3.

Lockheed Martin Corp: One point
* Level3 ending balance for 2008 = $3,015m

	Defined Benefit Pension Plans	
	2008	2007
Asset category:		
Equity securities	49%	61%
Debt securities	36	30
Other	15	9
	100%	100%

Lockheed Martin Corp is assigned one point because it has non-zero Level 3 assets at the end of 2008, but does disaggregate an asset category "Other" in 2008. However, it still does not provide any narrative disclosure of what these "Other" assets might be.

Quintiles Transnational Holdings Inc.: Two points
* Level3 beginning balance of 2009 = $1,792m

| | December 31, | | | |
| | Pension Plan | | Post-Retirement Benefit Plans | |
	2008	2007	2008	2007
Equity	32%	52%	55%	55%
Debt	52%	33%	30%	29%
Real estate	6%	6%	8%	7%
Other	10%	9%	7%	9%
Total	100%	100%	100%	100%

Quintiles Transnational Holdings Inc. is assigned two points because it has non-zero Level 3 assets at the end of 2008, but does disaggregate an asset category "Other" in 2008. It gets one more point than the previous example because it also disaggregates "Real Estate" into a separate category, thereby narrowing down the possibilities for what "Other" might be. However, it still does not provide any narrative disclosure of what these "Other" assets actually are.

Bank of New York Mellon Corp: Three points
* Level3 beginning balance of 2009 = $222m

| Asset allocations | Domestic | | Foreign | |
(in millions)	2008	2007	2008	2007
Equities	57%	67%	53%	59%
Fixed income	33	26	32	29
Private equities	5	2	-	-
Alternative investment	4	3	10	10
Real estate	-	-	3	2
Cash	1	2	2	-
Total plan assets	100%	100%	100%	100%

Bank of New York Mellon Corp is assigned three points because it has non-zero Level 3 assets at the end of 2008, and also disaggregates at least one specific category that is likely-Level 3 (private equity, alternative investments, and real estate).

Post-FASB 132(r)(1) Period: Examples of transparent and opaque disclosure in

the 10-K pension footnote

Transparent disclosure

Bristol Myers-Squibb, Inc.

Plan Assets

The fair value of pension and postretirement plan assets by asset category at December 31, 2009 was as follows:

Dollars in Millions	Level 1	Level 2	Level 3	Total
Equity Securities	$ 1,724	$ 1,516	$ 8	$ 3,248
Fixed Income Securities	139	322	—	461
U.S. Treasury Bills	113	—	—	113
U.S. Government Agency Securities	18	—	—	18
Government Backed and Index Linked Government Securities	—	304	—	304
Corporate Debt	—	294	18	312
Short-Term Investments	—	219	—	219
Mortgage and Asset Backed Securities	—	90	19	109
Hedge Funds	—	63	—	63
Real Estate	—	8	8	16
Venture Capital and Limited Partnerships	—	—	391	391
Insurance Contracts	—	—	141	141
Cash and Cash Equivalents	(14)	—	—	(14)
Total plan assets at fair value	$ 1,980	$ 2,816	$ 585	$ 5,381

Bristol Myers-Squibb Co. disclosure is relatively transparent as all disclosed asset categories are labeled by asset class; there are no opaque asset categories disclosed.

Opaque disclosure

Alcoa Inc.

	Level 1	Level 2	Level 3	Total
Equity securities	$ 1,332	$.	$.	$ 1,332
Equity securities (commingled funds)	.	1,523	.	1,523
Debt securities	3,742	842	.	4,584
Other investments	229	172	762	1,163
Total*	$ 5,303	$ 2,537	$ 762	$ 8,602

Marsh & McLennan Inc.

Assets (In millions of dollars)	Fair Value Measurements at December 31, 2009			
	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total
MMC common stock	$ 176	$ —	$ —	$ 176
Corporate stocks	1,611	176	11	1,798
Government securities	25	400	3	428
Corporate obligations	17	950	5	972
Partnership interests	—	—	301	301
Common/collective trusts	8	4,165	—	4,173
Insurance group annuity contracts	—	—	17	17
Short-term investment funds	299	3	—	302
Swaps	—	10	—	10
Other investments	125	34	180	339
Private equity	—	—	336	336
Real estate	3	4	269	276
Total investments	$ 2,264	$ 5,742	$ 1,122	$9,128

SLM Corp.

	Fair value at December 31, 2009	Quoted prices in active markets (Level 1)	Based on Other Observable Inputs (Level 2)	Unobservable Inputs (Level 3)	Fair value at December 31, 2008
Assets measured at fair value on a recurring basis:					
Cash and cash equivalents	$ 37,862,392	$ —	$ 37,862,392	$ —	$ 57,206,048
Mutual funds	159,221,849	—	159,221,849	—	154,573,651
Total investments	$ 197,084,241	$ —	$ 197,084,241	$ —	$ 211,779,699

The three examples above are relatively opaque disclosure, as there are opaque and uninformative asset categories, with no narrative disclosure of what the underlying asset class might be.

Appendix B: The coding schemes for the overall disclosure scores in the pre-FASB 132(r)(1) period

The disclosure score in the pre-FASB 132(r)(1) period (*DISC*) is the aggregate of four scores: the unusual score (*UNUSUAL*), the inferred score (*INFER*), a score for extent of disclosure of the "standard" asset categories - equity and debt (*STANDARD*), and a score for extent of disclosure of other supporting items of information in addition to the asset allocation table (*SUPPORTING*).

I. Unusual Score: Measures extent of disclosure of asset categories other than Equity, Debt, and Real Estate

0: If the firm disaggregates only an "Other" category with no narrative disclosure of what the underlying asset classes are.

1: If the firm disaggregates an "Other" category with no narrative disclosure, but also disaggregates "Cash and Cash Equivalents" separately, thus narrowing down the possibilities for what "Other" might consist of.

1: If the firm disaggregates an "Other" category but provides some narrative disclosure of what the underlying asset classes are.

2: If the firm disaggregates an "Alternative investments" or "Limited partnership" category with no narrative disclosure of what the underlying alternative asset classes are.

3: If the firm disaggregates "Alternative investments" with narrative disclosure of what the underlying asset classes are.

4: If all asset classes disaggregated by the firm are transparent (i.e., they are labeled by   what the underlying asset class is). There are no opaque categories disclosed.

II. Inferred Score: Measures extent of disclosure of non-standard asset categories by comparing the 10-K asset allocation disclosure to the 2008 ending balance of Level 3 assets, obtained from the 2009 Level 3 reconciliation. Higher score is given to firms that disaggregate at least some likely-Level 3 category (Real Estate, Private Equity, Hedge funds, or Commodities).

0: If the firm discloses no likely-Level 3 categories even though there is a non-zero ending balance of Level 3 assets for 2008.

1: If the firm has non-zero ending balance of Level 3 assets for 2008, but disaggregates an "Other" category (but no supporting disclosure on the underlying asset classes).

2: If the firm has non-zero ending balance of Level 3 assets for 2008, but disaggregates an "Other" category (but no supporting disclosure on the underlying asset classes) in addition to a "Real Estate" category. This firm gets two (as opposed to one) point because the disaggregation of "Real Estate" narrows down the possibilities for what the "Other" assets might be.

3: If the firm has non-zero ending balance of Level 3 assets for 2008, and disaggregates some category of likely-Level 3 assets (Real Estate, Private Equity, Hedge funds, or Commodities). Firms that disaggregate more than one likely-Level 3 category does not get additional points (e.g., a firm with "Real Estate"

and "Private Equity" does not get more points than a firm with only "Real Estate" or "Private Equity").

III. Standard Score: Measures extent of disclosure of standard categories (equity and debt)

+1: If the firm disaggregates equities by region (U.S. / International)

+1: If the firm disaggregates equities by size (Small / Mid / Large)

+1: If the firm disaggregates debt securities by issuer (Government / Agency / Corporate)

+1: If the firm disaggregates debt securities by region (U.S. / International)

+1: If the firm disaggregates debt securities by grade (Prime / Junk)

IV. Supporting Score: Measures extent of disclosure of supporting items of information in addition to the asset allocation table

+1: If the firm discloses target asset allocation for the coming year

+1: If the firm discloses proportion of assets in own company stock

+1: If the firm discloses a separate ERR for each asset category disaggregated in the table

+1: If the firm discloses average historical (actual) return on pension assets

+1: If the period for which historical returns are disclosed is at least ten years.

Appendix C: Variable definitions

Variable Name	Definitions and data source
POST	Indicator variable if firms' fiscal year end is post-FASB132(r)(1) period, then set to one. Otherwise, set to zero.
Dependent Variable	
ERR	The expected rate of return (ERR) assumption on pension assets: Compustat
ARR	The actual investment return on pension assets / Beginning balance of pension assets: Compustat
ARR_{ADJ}	'Adjusted' ARR, computed by replacing fiscal year 2008 ARR with fiscal year 2007 ARR: Compustat
ARR_{t+2}	The compounded rate of annual return on pension assets for year t+1 and t+2: Compustat
ERRMINUSARR	*ERR* minus ARR_{t+2}.
Variables measuring asset allocation disclosure transparency in the pre-FASB132(r)(1) period	
UNUSUAL, LOWUNUSUAL	The firm's Unusual Score for that year (see Appendix B). *LOWUNUSUAL* is an indicator variable set to one if *UNUSUAL* is below the annual median for that year.
INFER, LOWINFER	The firm's Inferred Score for that year (see Appendix B). *LOWINFER* is an indicator variable set to one if *INFER* is below the annual median for that year.
STANDARD, LOWSTANDARD	The firm's Standard Score for that year (see Appendix B). *LOWSTANDARD* is an indicator variable set to one if *STANDARD* is zero points for that year.
SUPPORTING, LOWSUPPORTING	The firm's Supporting Score for that year (see Appendix B). *LOWSUPPORTING* is an indicator variable set to one if *SUPPORTING* is below the annual median for that year.
DISC, LOWDISC	Disclosure score in the Pre-period that is calculated by sum of total points earned with four categories (*UNUSUAL*, *INFER*, *STANDARD*, and *SUPPORTING*). *LOWDISC* is an indicator variable set to one if the firm's *DISC* is below the annual median for that year.
Variables measuring change in asset allocation disclosure transparency from pre- to post-FASB 132(r)(1) period	
HICHANGE	Identifies firms whose *DISC* improved from 2008 to 2009. Indicator variable set to one if the change in the firm's *UNUSUAL* + *STANDARD* + *SUPPORTING* is in the highest quintile of the distribution. The change measure does not include *INFER* because *INFER* cannot be measured for 2009.

LOWCHANGE	Identifies firms whose *DISC* deteriorated from 2008 to 2009. Indicator variable set to one if the change in the firm's *UNUSUAL + STANDARD + SUPPORTING* is in the lowest quintile of the distribution. The change measure does not include *INFER* because *INFER* cannot be measured for 2009.

Asset allocation from Compustat

$\%EQUITY_{COMPUSTAT}$	The percentage of pension plan assets invested in equities
$\%DEBT_{COMPUSTAT}$	The percentage of pension plan assets invested in debt securities
$\%RE_{COMPUSTAT}$	The percentage of pension plan assets invested in real estate
$\%OTHER_{COMPUSTAT}$	The percentage of pension plan assets not invested in equities, debt securities, or real estate

Asset allocation for the pre-FASB 132(r)(1) period, hand-collected from 10-K filings

%EQUITY	The percentage of pension plan assets disclosed as being invested in equities
%DEBT	The percentage of pension plan assets disclosed as being invested in debt securities
%RE	The percentage of pension plan assets disclosed as being invested in real estate
%ALT	The percentage of pension plan assets disclosed as being invested in alternative investments such as private equity, venture capital funds, hedge funds, or commodities
%CCE	The percentage of pension plan assets disclosed as being invested in cash or cash equivalents
%OPAQUE	The percentage of pension plan assets disclosed as being invested in "Other" assets

Asset allocation for the post-FASB 132(r)(1) period, hand-collected from 10-K filings

All measures represent percentage of pension assets disclosed as being invested in each asset category.

%CCE	Cash or cash equivalents (including money market funds and short- term investments) and Guaranteed investment contracts.
%EQUITY	Equities, equity mutual funds, and equity commingled funds.
%EQUITYUS	Domestic (US) equities, equity mutual funds, and equity commingled funds.
%EQUITYINTL	International equities, equity mutual funds, and equity commingled funds
%EQUITYLARGECAP	Large market capitalization equities, equity mutual funds, and equity commingled funds
%EQUITYSMALLCAP	Mid or small market capitalization equities, equity mutual funds, and equity commingled funds

%EQUITYTOTAL	The aggregate of equity investments, disclosed under any of the following labels: *%EQUITY, %EQUITYUS %EQUITYINTL, %EQUITYLARGECAP, %EQUITYSMALLCAP*.
%DEBT	Debt securities, debt security mutual funds, and debt security commingled funds
%DEBTUS	Domestic (US) debt securities, debt security mutual funds, and debt security commingled funds
%DEBTINTL	International debt securities, debt security mutual funds, and debt security commingled funds
%DEBTGOV	Government debt securities, debt security mutual funds, and debt security commingled funds
%DEBTCORP	Corporate debt securities, debt security mutual funds, and debt security commingled funds
%DEBTPRIME	Investment-grade debt securities, debt security mutual funds, and debt security commingled funds
%DEBTJUNK	Below-investment-grade debt securities, debt security mutual funds, and debt security commingled funds
%DEBTTOTAL	The aggregate of debt investments, disclosed under any of the following labels: *%DEBT, %DEBTUS, %DEBTINTL, %DEBTGOV, %DEBTCORP, %DEBTPRIME, %DEBTJUNK*
%RE	Real estate and real estate funds
%ABS	Mortgage-backed securities and asset-backed securities
%DERIVATIVE	Derivatives such as futures, options, and swaps
%HEDGE	Hedge funds, funds of hedge funds, and absolute return funds
%PE	Private equity funds or venture capital funds
%ALT	Limited partnerships or alternative investments
%OPAQUE	Disclosed as being invested in "Other" assets or legal structure type of funds such as mutual funds, commingled funds, and common/collective trust funds with no narrative disclosure of what the underlying asset class is.

Other Control variables

STDARR	The standard deviation of ARR over the past three years: Compustat
FUNDING	Fair value of plan assets at the year-end / Projected benefit obligation at the year-end: Compustat
PLANSIZE	Natural logarithm of [1+fair value of plan assets] at the end of the year: Compustat
FIRMSIZE	Natural logarithm of [1+total assets (AT)] of the plan sponsor at the end of the year: Compustat

LEVERAGE	Long-term debt + Debt in current liabilities / Total assets at the end of the year: Compustat
ROA	Income before extraordinary items and pension expense / Total assets at the end of the year: Compustat
CFO	Cash flow from operations before pension contributions / Total assets at the end of the year: Compustat
STDROA	The standard deviation of ROA over the past three years: Compustat
STDCFO	The standard deviation of CFO over the past three years: Compustat
L3_FVPA	The percentage of Level 3 assets to total plan assets at the end of year. For 2008, the beginning balance of Level 3 assets for 2009 is used as the ending balance for 2008.
GEXPECT	Weighted average expected earnings growth in the next 12 months: Duke's Fuqua School of Business/CFO Magazine Business Outlook
BSPREAD	Average default spread between AAA-rated and BAA-rated bond at the end of year: St. Louis Federal Reserve database

Figure 2.1 - Timeline of Tests
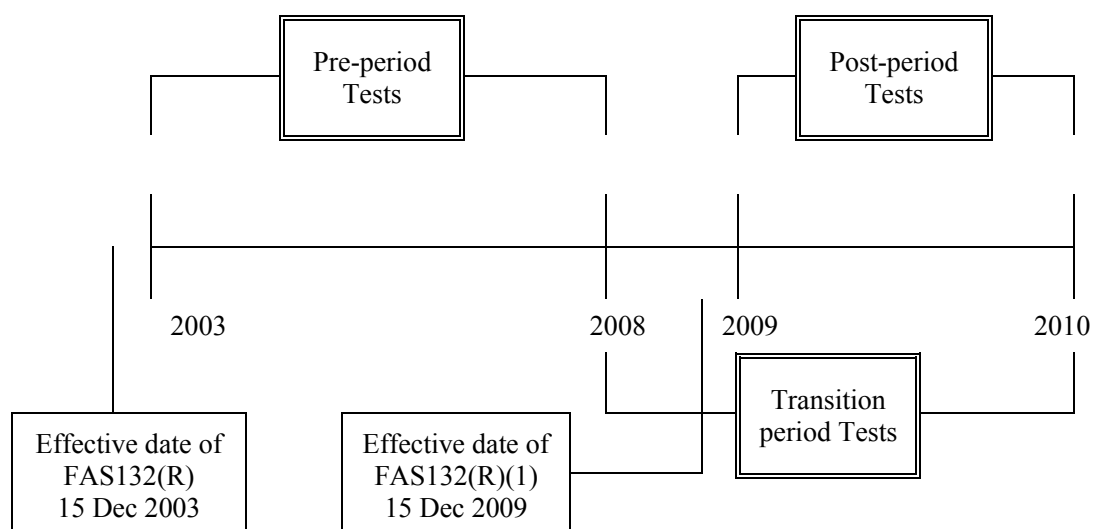
Table 2.1 - Sample selection

	Number of Observations	Number of Firms
<u>Pre-Period</u>		
S&P 500 firms with defined-benefit pensions from 2003 - 2008	1,699	303
<u>Post-Period</u>		
S&P 500 firms with defined-benefit pensions in 2008		297
Less: Firms with missing data for control variables		-15
Less: Firms that do not disclose fair value hierarchy in 2009		-7
2009 - 2010	545	276

Table 2.2 - Descriptive statistics of the expected rate of return (ERR) on pension assets

Year	N	P5	P25	P50	P75	P95	Mean	SD
(Pre-period)								
2003	259	7.32	8.20	8.50	8.90	9.00	8.46	0.59
2004	279	7.34	8.00	8.50	8.75	9.00	8.36	0.59
2005	287	6.97	8.00	8.50	8.50	9.00	8.21	0.69
2006	296	6.65	8.00	8.25	8.50	9.00	8.13	0.72
2007	293	6.82	7.92	8.25	8.50	9.00	8.12	0.66
2008	285	6.58	7.80	8.20	8.50	9.00	8.06	0.69
(Post-period)								
2009	276	6.60	7.75	8.00	8.50	8.80	7.94	0.81
2010	269	6.50	7.50	8.00	8.26	8.75	7.86	0.81
Total	2,244	6.80	7.97	8.25	8.50	9.00	8.14	0.72

Table 2.3 - Descriptive statistics of pension asset allocation

Panel A: Pre-FASB 132(r)(1) period

Data distribution (hand-collected data)

Variable	N	P5	P25	P50	P75	P95	Mean	SD	% of firms with the category
%EQUITY	1,699	37.0	57.0	64.0	70.0	78.0	61.8	13.4	99.4
%DEBT	1,699	13.8	24.0	29.0	35.0	50.0	30.0	11.3	99.6
%RE	1,699	0	0	0	3.0	9.0	1.8	3.1	33.7
%CCE	1,699	0	0	0	0	7.7	1.5	6.3	22.4
%ALT	1,699	0	0	0	0	16.0	2.7	7.6	20.5
%OPAQUE	1,699	0	0	0	3.0	11.0	2.3	4.9	37.9

Data distribution by year (hand-collected data)

	%EQUITY		%DEBT		%ALT		%OPAQUE	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
2003	64.4	65.0	28.5	28.0	1.7	0	2.0	0
2004	65.3	66.0	28.0	27.0	1.8	0	2.2	0
2005	64.4	65.7	28.3	28.0	2.0	0	2.3	0
2006	63.7	66.0	28.2	28.0	2.7	0	2.4	0
2007	61.1	64.0	30.0	29.0	3.5	0	2.1	0
2008	52.1	54.4	36.7	35.0	4.2	0	2.7	0

Data distribution by year (Compustat data)

	$\%EQUITY_{COMPUSTA}$		$\%DEBT_{COMPUSTAT}$		$\%RE_{COMPUSTAT}$		$\%OTHER_{COMPUSTAT}$	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
2003	64.7	65.4	29.0	28.0	1.9	0	4.4	1.8
2004	65.6	66.0	28.3	28.0	1.8	0	4.4	1.0
2005	64.3	65.5	28.9	29.0	1.8	0	5.0	1.0
2006	64.1	66.0	28.5	28.0	1.9	0	5.5	1.0
2007	61.4	64.0	31.0	30.0	1.9	0	5.6	1.0
2008	52.2	54.6	37.4	36.0	2.2	0	7.9	2.0

Panel B: Post-FASB 132(r)(1) period

Data distribution (hand-collected data)

Variable	For Whole Sample			For sample with % > 0			% of firms with the category
	Median	Mean	SD	Median	Mean	SD	
%CCE	3.09	4.79	7.11	3.64	5.63	7.38	85.32
%EQUITYTOTAL	51.85	48.19	18.81	52.35	49.18	17.67	97.98
%EQUITY	1.14	18.91	24.13	34.56	35.42	22.49	53.39
%EQUITYUS	0	11.58	16.52	26.61	27.68	14.36	41.83
%EQUITYINTL	8	10.78	12.06	17.06	17.91	10.67	60.18
%EQUITYLAGERCAP	0	5.13	12.43	22.35	24.54	16.22	20.92
%EQUITYSMALLCAP	0	1.79	4.47	8.49	9.03	5.98	19.82
%DEBTTOTAL	29.43	30.97	14.9	30	31.49	14.47	98.35
%DEBT	1.94	9.68	13.3	15.3	16.97	13.66	57.06
%DEBTUS	0	1.55	8.89	23.23	25.61	26.59	6.06
%DEBTINTL	0	0.56	2.77	4.36	6.45	7.22	8.62
%DEBTGOV	5.43	7.24	8.07	9.14	10.81	7.66	66.97
%DEBTCORP	6.73	10.03	11.98	13.35	16.32	11.44	61.47
%DEBTPRIME	0	1.49	6.1	14.75	17.32	12.64	8.62
%DEBTJUNK	0	0.41	1.59	5.04	5.19	2.73	7.89
%RE	0	1.99	2.84	3.93	4.1	2.83	48.62
%ABS	0	1.53	3.16	2.51	4.04	4.04	37.80
%DERIVATIVE	0	0.13	1.14	0.21	1.38	3.11	11.19
%HEDGE	0	2.22	5.62	5.41	8.45	8.24	26.24
%PE	0	2.18	4.9	4.5	6.28	6.6	34.68
%ALT	0	1.3	4.5	4.05	6.7	8.28	19.45
%OPAQUE	0	6.71	15.49	6.71	17.28	20.85	38.90

Data distribution (Compustat data)

Variable	For Whole Sample			For sample with % > 0			% of firms with the category
	Mean	Median	SD	Mean	Median	SD	
%EQUITY$_{COMPUSTAT}$	53.57	57.00	15.69	54.29	57.00	14.50	98.5
%DEBT$_{COMPUSTAT}$	36.63	35.00	14.02	37.19	35.00	13.36	98.7
%RE$_{COMPUSTAT}$	1.66	0.00	2.76	4.56	4.54	2.77	38.5
%OTHER$_{COMPUSTAT}$	7.98	3.00	12.90	12.52	7.75	14.29	65.0

Panel C: Transition period data from Compustat database

Variable	N	P5	P25	P50	P75	P95	Mean	SD
%EQUITY_{COMPUSTAT}	821	24.00	45.00	56.00	63.00	72.60	52.80	15.93
%DEBT_{COMPUSTAT}	821	16.00	28.30	35.10	44.00	62.20	36.89	15.04
%RE_{COMPUSTAT}	821	0	0	0	3.00	8.50	1.86	3.26
%OTHER_{COMPUSTAT}	821	0	0	3.00	10.90	35.00	8.09	13.13

Panel D: Descriptions of the opaque asset categories disclosed in the post-period

Variable	For Whole Sample			For sample with % > 0			% of firms with the category
	Median	Mean	SD	Median	Mean	SD	
%CCT	0	2.63	9.47	24.44	23.47	17.78	11.19
%COMMINGLED	0	1.21	7.3	24.3	27.5	22.48	4.40
%MUTUAL	0	1.48	7.06	6.32	12.98	17.1	11.38
%RIC	0	0.31	2.11	8.61	9.29	7.32	3.30
%BALANCE_MASTER	0	0.1	1.35	3.12	6.03	9.11	1.65
%EXCHANGE	0	0.01	0.18	2.16	2.16	2.93	0.37
%OTHER	0	0.98	3.85	1.77	4.01	6.91	24.77
%OPAQUETOTAL	0	6.71	15.49	6.71	17.28	20.85	38.90

In the Panel A, *%OPAQUE* is the percentage of plan assets disclosed as being invested in 'Other' assets in the pre-period.

In the Panel B, *%OPAQUE* includes plan assets disclosed as being invested in 'Other' assets and indirectly invested funds disclosed with no description (legal structure type of funds), such as commingled fund, common/collective trust fund. *%EQUITYTOTAL* is the percentage of plan assets that is the aggregate of equity investments, disclosed under any of the following labels: *%EQUITY, %EQUITYUS,*
%EQUITYINTL, %EQUITYLARGECAP, and %EQUITYSMALLCAP.

%DEBTTOTAL is the percentage of plans assets that is the aggregate of debt investments, disclosed under any of the following
labels: *%DEBT, %DEBTUS, %DEBTINTL, %DEBTGOV, %DEBTCORP,*
%DEBTPRIME, %DEBTJUNK.

In the Panel C, asset allocation indicates the percentage of plan assets invested in each investment vehicle that is classified by Compustat database.

Panel D displays the components of Post-period *%OPAQUE* assets, which are the percentage of plan assets as being invested in 'Other' assets or listed legal structure type of funds.

%CCT, %COMMINGLED, %MUTUAL, and *%RIC* are the percentages of plan assets disclosed as being invested in common/collective trust funds, commingled funds, mutual funds, and regulated investment company funds without further description. *%BALANCE_MASTER* is the percentage of plan assets disclosed as being invested in balanced funds or master funds without further description. *%EXCHANGE* is the percentage of plan assets disclosed as being invested in exchange funds without further description.

Table 2.4 - Distribution of disclosure index categories

	Pre-Period			Post-Period		
	Unusual Score 2008			Unusual Score 2009		
No. of Score	Frequency	Percent	Cum. Percent	Frequency	Percent	Cum. Percent
0	83	30.07	30.07	7	2.54	2.54
1	15	5.43	35.51	76	27.54	30.07
2	17	6.16	41.67	25	9.06	39.13
3	81	29.35	71.01	107	38.77	77.9
4	80	28.99	100	61	22.1	100

	Inferred Score 2008		
No. of Score	Frequency	Percent	Cum. Percent
0	45	16.3	16.3
1	47	17.03	33.33
2	32	11.59	44.93
3	152	55.07	100

	Standard Score 2008			Standard Score 2009		
No. of Score	Frequency	Percent	Cum. Percent	Frequency	Percent	Cum. Percent
0	223	80.8	80.8	31	11.23	11.23
1	37	13.41	94.2	42	15.22	26.45
2	14	5.07	99.28	83	30.07	56.52
3	2	0.72	100	74	26.81	83.33
4				41	14.86	98.19
5				5	1.81	100

	Supporting Score 2008			Supporting Score 2009		
No. of Score	Frequency	Percent	Cum. Percent	Frequency	Percent	Cum. Percent
0	19	6.88	6.88	12	4.35	4.35
1	122	44.2	51.09	136	49.28	53.62
2	105	38.04	89.13	98	35.51	89.13
3	18	6.52	95.65	17	6.16	95.29
4	9	3.26	98.91	11	3.99	99.28
5	3	1.09	100	2	0.72	100

Table 2.4 reports the distribution of disclosure index for Pre-period (2008) and Post-period (2009). Unusual Score measures extent of disclosure of asset categories other than equity, debt, and real estate. Firms award higher Unusual Score when all the alternative investments disaggregated by the firms are transparent (i.e., they are labeled by what the underlying asset class is). Inferred Score measures extent of disclosure of non-standard asset categories by comparing the 10-K asset allocation disclosure to the 2008 ending balance of Level 3 assets, obtained from the 2009 Level 3 reconciliation. Higher score is given to firms that disaggregate at least some likely-Level 3

category (real estate, private equities, hedge funds, or commodities). Standard Score measures extent of disclosure of standard categories (equity and debt). Supporting Score measures the extent of disclosure of supporting items that are additional to the pension asset allocation table.

Table 2.5 - Descriptive statistics of explanatory variables

Variable	N	P5	P25	P50	P75	P95	Mean	SD
(Pre-period)								
ARR_{t-1}	1699	-10.81	6.48	10.55	13.88	22.16	8.78	10.02
FIRMSIZE	1699	7.73	8.67	9.64	10.49	12.30	9.72	1.44
PLANSIZE	1699	4.43	5.89	7.19	8.15	9.61	7.05	1.66
(Transition and Post-period)								
ARR_{ADJt-1}	821	1.79	8.14	12.07	15.70	23.76	12.22	8.64
STDARR	821	8.80	16.73	21.30	24.54	28.78	20.54	7.00
FIRMSIZE	821	7.90	8.84	9.77	10.65	12.38	9.86	1.43
PLANSIZE	821	4.64	6.09	7.30	8.26	9.75	7.20	1.61
FUNDING	821	0.55	0.68	0.77	0.86	1.02	0.78	0.16
LEVERAGE	821	0.04	0.15	0.24	0.35	0.55	0.26	0.16
ROA	821	-0.06	0.02	0.05	0.09	0.16	0.05	0.09
CFO	821	0.01	0.06	0.10	0.14	0.22	0.10	0.07
STDROA	821	0	0.01	0.01	0.03	0.14	0.03	0.06
STDCFO	821	0	0.01	0.02	0.04	0.08	0.03	0.02
L3_FVPA	821	0	0.34	5.10	11.35	28.74	8.51	12.01

ARR_{t-1} is actual investment return on pension assets for year t-1/ beginning balance of pension assets for year t-1. ARR_{ADJt-1} is adjusted ARR_{t-1}, computed by replacing fiscal year 2008 ARR with fiscal year 2007 ARR. FIRMSIZE is the natural logarithm of (1+total assets at the end of year). PLANSIZE is the natural logarithm of (1+fair value of plan assets at the end of year). STDARR is the standard deviation of ARR over the past three years. FUNDING is the fair value of plan assets of the year end / projected benefit obligation of the year end. LEVERAGE is (Long term debt + debt in current liabilities at the end of year) / total assets at the end of year. ROA is income before extraordinary items and before pension expense / total assets at the end of the year. STDROA is the standard deviation of ROA over the past three years. CFO is cash from operating activities before pension contributions / total assets at the end of the year. STDCFO is the standard deviation of CFO over the past three years. L3_FVPA is the percentage of fair value hierarchy Level 3 assets to total fair value plan assets at the end of year.

Table 2.6 - Spearman correlations

	ERR	ARR_{t+1}	UNUSUAL	INFER	STANDARD	SUPPORT ING	DISC
ARR_{t+1}	0.15***						
UNUSUAL	0.02	-0.01					
INFER	0.08**	0.01	0.15***				
STANDARD	0.12***	0.02	0.18***	0.14***			
SUPPORTING	0.09**	-0.01	0.05	-0.04	0.12***		
DISC	0.11***	-1.1e-03	0.77***	0.57***	0.45***	0.40***	
%EQUITY COMPUSTAT	0.29***	0.01	0.04	-0.09***	0.04	0.03	0.01
%DEBT COMPUSTAT	-0.37***	-0.03	0.09**	-0.03	-0.07**	-0.01	0.02
%RE COMPUSTAT	0.21***	-0.03	-0.06*	0.23***	0.13***	-0.04	0.08**
%OTHER COMPUSTAT	0.02	-0.01	-0.12***	0.07**	-3.10e-03	-0.01	-0.05
ARR_{ADJt-1}	0.12***	-0.19***	-0.02	0.02	0.05	0.01	0.01
ARR_{ADJt-2}	0.13***	0.03	-0.02	0.03	0.05	3.80e-03	0.01
STDARR	0.28***	-0.04	0.04	3.0e-04	0.12***	0.01	0.05
FUNDING	0.04	-0.20***	0.06	0.07*	0.02	0.10***	0.11***
PLANSIZE	0.36***	-0.05	0.03	-2.1e-03	-0.04	0.17***	0.07**
LEVERAGE	0.11***	0.07**	0.02	0.06*	-0.02	-0.02	0.03
ROA	0.04	-0.07**	0.03	-0.01	-0.03	0.05	0.03
CFO	0.01	0.02	0.01	-0.14***	-0.06	0.12***	-0.03
STDROA	-0.08**	-0.02	-0.08**	-0.12***	-0.08**	4.50e-03	-0.12***
STDCFO	-0.13***	-0.05	0.03	-0.08**	-0.09***	-0.04	-0.05
FIRMSIZE	0.04	-0.03	0.07*	0.10***	0.01	0.07**	0.12***
L3_FVPA	0.20***	-0.02	-0.07**	0.06*	0.07**	0.03	0.01
GEXPECT	-0.10***	-0.64***	-4.3e-03	4.7e-03	-2.6e-03	3.40e-03	0
BSPREAD	0.11***	0.54***	4.4e-03	-0.01	-2.2e-03	0.01	3.7e-03

*, **, *** indicate statistical significance at 10%, 5%, and 1% level respectively

Table 2.6 reports Spearman Correlation between dependent variable and independent variables. ARR_{t+1} is actual investment return on pension assets for year t+1/ beginning balance of plan assets for year t+1. *UNUSUAL, INFER, STANDARD, SUPPORTING* are coded indexes for Unusual Score, Inferred Score, Standard Score, and Supporting Score, respectively. *DISC* is disclosure score in the Pre-period that is calculated by sum of total points earned with four categories (*UNUSUAL, INFER, STANDARD, SUPPORTING*).

Table 2.7 - Does opaque disclosure of asset allocation facilitate ERR management? Pre-Period tests

Panel A: The association of opaque disclosure with ERR in the pre-period

	2003~2008		2006~2008	
	Pooled	Fixed	Pooled	Fixed
	(1)	(2)	(3)	(4)
	ERR	*ERR*	*ERR*	*ERR*
%EQUITY	.0175***	.0063***	.0175***	.0047
	(6.38)	(2.75)	(5.77)	(1.55)
%RE	.0168*	.0087	.0197**	.0239
	(1.90)	(0.89)	(2.26)	(1.53)
%CCE	.0131**	-.0041	.0109*	-.0018
	(2.37)	(-0.89)	(1.85)	(-0.68)
%ALT	.0175***	.0063	.0172***	-1.2e-04
	(5.11)	(1.63)	(5.46)	(-0.03)
%OPAQUE	**.0106***	**.0048***	**.0135****	**3.0e-04**
	(1.95)	**(1.81)**	**(2.77)**	**(0.07)**
FIRMSIZE	-.0768***	.0973	-.0881***	.1278
	(-3.36)	(1.34)	(-3.52)	(1.33)
PLANSIZE	.1702***	-.0472	.193***	-.1196
	(7.02)	(-0.55)	(7.42)	(-1.19)
ARR_{t-1}	.0025	-.0032**	.0438***	.0022
	(0.83)	(-1.98)	(2.84)	(0.24)
ARR_{t-2}	8.7e-06	8.0e-04***	-.0467***	-.0043
	(0.01)	(3.83)	(-3.57)	(-0.56)
GEXPECT	-.0144	-6.1e-04	-.0084	-.0011
	(-1.17)	(-0.08)	(-0.73)	(-0.13)
BSPREAD	.0618	-.0574	.0627	-.0337
	(0.47)	(-0.78)	(0.46)	(-0.44)
_cons	6.959***	7.404***	6.499***	7.452***
	(17.18)	(9.88)	(15.72)	(8.48)
N	1699	1699	874	874
R²	0.2755	0.1899	0.2934	0.0775

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively. Standard errors are in parentheses. Standard errors are clustered at the firm level. First two columns of Panel A report the results of regression for fiscal year 2003 to 2008. Next two columns report the results of regression for fiscal year 2006 to 2008. Specifications in Pooled regression are estimated using OLS in the presence of year fixed effect. Specifications in Fixed Effect regression are estimated in the presence of year by firm fixed effect.

ERR is the expected rate of return captured from Compustat. *%EQUITY, %RE, %CCE, %ALT* are the percentages of plan assets disclosed as being invested in equities, real estate, cash and cash equivalents, and alternative investments in the Pre-period. *%OPAQUE* is the percentage of plan assets disclosed as being invested in 'Other' assets in the Pre-period.

ARR_{t-1} is actual investment return on pension assets for year t-1/ beginning balance of pension assets for year t-1. ARR_{t-2} is actual investment return on pension assets for year t-1/ beginning balance of pension assets for year t-2. *FIRMSIZE* is the natural logarithm of (1+total assets at the end of year). *PLANSIZE* is the natural logarithm of (1+fair value of plan assets at the end of year). *GEXPECT* is weighted average of expected earnings growth in the next 12 months. *BSPREAD* is average default spread between AAA-rated and BAA-rated bond at the end of year.

Panel B: The association of opaque disclosure with ARR in the pre-period

	2003~2008				2006~2008			
	Pooled		Fixed		Pooled		Fixed	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ARR_{t+1}	ARR_{t+2}	ARR_{t+1}	ARR_{t+2}	ARR_{t+1}	ARR_{t+2}	ARR_{t+1}	ARR_{t+2}
%EQUITY	-.0045	-.0164	.0132	.012	-.0744***	-.0806***	-.0238	.0299
	(-0.29)	(-1.44)	(0.38)	(0.56)	(-3.14)	(-5.09)	(-0.43)	(1.16)
%RE	-.0189	-.0265	-.2718**	-.2548**	-.157**	-.156***	-1.035***	-.4894**
	(-0.47)	(-0.75)	(-2.35)	(-2.52)	(-2.55)	(-3.51)	(-3.69)	(-2.17)
%CCE	-.0336	-.0229	-.0283	-.005	-.0938**	-.075**	.0618	.0911*
	(-1.22)	(-1.35)	(-0.53)	(-0.10)	(-2.22)	(-2.30)	(0.90)	(1.79)
%ALT	.0349*	.0178	.0103	-.0106	-.0052	-.0253	.0405	.0133
	(1.91)	(1.09)	(0.18)	(-0.29)	(-0.16)	(-0.93)	(0.36)	(0.27)
%OPAQUE	**.0454**	**.0608***	**.0053**	**.039**	**.0244**	**.0397**	**.0623**	**.0693**
	(1.45)	**(3.18)**	**(0.11)**	**(1.38)**	**(0.43)**	**(1.29)**	**(0.56)**	**(1.42)**
FIRMSIZE	-.0349	-.0814	1.702*	1.504***	.0169	-.1006	1.928	2.219**
	(-0.33)	(-0.92)	(1.72)	(2.79)	(0.09)	(-0.69)	(0.92)	(2.58)
PLANSIZE	.3589***	.3202***	-6.227***	-4.036***	.1598	.1825	-11.24***	-5.126***
	(3.62)	(3.84)	(-4.74)	(-4.98)	(0.89)	(1.41)	(-3.86)	(-2.71)
ARR_t	-.4927***	-.3237***	-.4819***	-.3401***	-.8433***	-.5252***	-1.18***	-.7594***
	(-9.07)	(-9.63)	(-9.73)	(-11.23)	(-6.86)	(-7.67)	(-7.04)	(-10.38)
ARR_{t-1}	.0479	.0485**	-.0332	-.0079	.1598*	.0755*	.2119	.0899
	(1.22)	(2.10)	(-0.83)	(-0.39)	(1.81)	(1.74)	(1.47)	(1.29)
constant	17.78***	15.43***	46.88***	30.11***	20.48***	9.439***	58.93***	13.56
	(11.18)	(12.76)	(4.92)	(4.75)	(8.14)	(5.92)	(2.93)	(1.19)
N	1680	1652	1680	1652	855	836	855	836
R^2	0.7973	0.8336	0.8265	0.8806	0.8066	0.8232	0.8697	0.9261

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively. Standard errors are in parentheses. Standard errors are clustered at the firm level. First four columns of Panel B report the results of regression for fiscal year 2003 to 2008. Next four columns report the results of regression for fiscal year 2006 to 2008. Specifications in pooled regression are estimated using OLS in the presence of year fixed effect. Specifications in Fixed Effect regression are estimated in the presence of year by firm fixed effect.

ARR_{t+1} is actual investment return on pension assets for year t+1/ beginning balance of pension assets for year t+1 at the end of year.

ARR_{t+2} is the compound rate of annual return on pension plan assets for year t+1 and t+2. *%EQUITY, %RE, %CCE, %ALT* are the percentages of plan assets disclosed as being invested in equities, real estate, cash and cash equivalents, and alternative investments in the Pre-period. *%OPAQUE* is the percentage of plan assets disclosed as being invested in 'Other' assets in the Pre-period.

ARR_t is actual investment return on pension assets for year t/ beginning balance of pension assets for year t. ARR_{t2} is actual investment return on pension assets for year t/ beginning balance of pension assets for year t-1. *FIRMSIZE* is the natural logarithm of (1+total assets at the end of year). *PLANSIZE* is the natural logarithm of (1+fair value of plan assets at the end of year).

Panel C: The association of opaque disclosure with the gap between ERR and ARR

	2003~2008		2006~2008	
	Pooled	Fixed	Pooled	Fixed
	(1)	(2)	(3)	(4)
	ERRMINUSARR	*ERRMINUSARR*	*ERRMINUSARR*	*ERRMINUSARR*
%EQUITY	.0316***	-.024	.0897***	-.0528*
	(2.66)	(-1.09)	(5.26)	(-1.86)
%RE	.0432	.2083**	.1686***	.4094**
	(1.22)	(2.40)	(3.77)	(2.26)
%CCE	.0438**	.0103	.0959***	-.0823
	(2.53)	(0.22)	(2.96)	(-1.54)
%ALT	.0036	.0142	.044*	-.0313
	(0.20)	(0.41)	(1.71)	(-0.64)
%OPAQUE	**-.0492****	**-.0451***	**-.0286**	**-.0925***
	(-2.38)	**(-1.65)**	**(-0.89)**	**(-1.81)**
FIRMSIZE	.0487	-1.185**	.0489	-1.987**
	(0.55)	(-2.31)	(0.34)	(-2.38)
PLANSIZE	-.1248	2.966***	.0427	3.058**
	(-1.43)	(4.47)	(0.31)	(2.13)
ARR$_t$	.2554***	.2798***	.4384***	.7146***
	(7.26)	(9.14)	(6.45)	(9.50)
ARR$_{t-1}$	-.0577***	.0015	-.0837**	-.1159*
	(-2.60)	(0.07)	(-2.03)	(-1.72)
GEXPECT	.3435***	.497***	.3016***	.3178***
	(4.55)	(5.48)	(4.04)	(4.11)
BSPREAD	-3.239**	-2.874**	-1.904	-3.88***
	(-2.40)	(-2.18)	(-1.44)	(-2.68)
constant	-9.563***	-19.78***	2.862	20.63*
	(-3.88)	(-3.20)	(0.80)	(1.95)
N	1652	1652	836	836
R²	0.8398	0.8906	0.8284	0.9348

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively. Standard errors are in parentheses. Standard errors are clustered at the firm level.

First two columns of Panel C report the results of regression for fiscal year 2003 to 2008. Next two columns report the results of regression for fiscal year 2006 to 2008. Specifications in pooled regression are estimated using OLS in the presence of year fixed effect. Specifications in Fixed Effect regression are estimated in the presence of year by firm fixed effect.

ERRMINUSARR is *ERR* minus *ARR$_{t+2}$* where *ARR$_{t+2}$* is the compound rate of annual return on pension plan for year t+1 and t+2.

Table 2.8 - Does the disclosure regime shift affect ERRs more for firms that disclosed opaquely in the pre-period?

Panel A: Tests with 2008-2010 data with firm fixed-effects

	(1) ERR	(2) ERR	(3) ERR	(4) ERR	(5) ERR
$\%EQUITY_{COMPUSTAT}$	3.3e-04	4.0e-04	3.8e-04	5.6e-04	4.3e-04
	(0.22)	(0.28)	(0.25)	(0.38)	(0.29)
$\%RE_{COMPUSTAT}$	-.0011	-3.1e-04	-.003	-8.7e-04	-.0022
	(-0.10)	(-0.03)	(-0.26)	(-0.08)	(-0.20)
$\%OTHER_{COMPUSTAT}$	-.0019	-.0019	-.0018	-.0017	-.0018
	(-1.24)	(-1.28)	(-1.21)	(-1.10)	(-1.18)
ARR_{ADJt-1}	.0028	.003	.0028	.003	.003
	(0.61)	(0.65)	(0.61)	(0.69)	(0.67)
ARR_{ADJt-2}	-.0048	-.0051	-.0047	-.0049	-.0047
	(-0.92)	(-0.98)	(-0.88)	(-0.96)	(-0.93)
STDARR	-.0026	-.0024	-.0028	-.0025	-.0026
	(-0.55)	(-0.52)	(-0.61)	(-0.53)	(-0.56)
FUNDING	-.0624	-.0447	-.0189	-.0548	-.0691
	(-0.22)	(-0.16)	(-0.07)	(-0.19)	(-0.24)
PLANSIZE	.1038	.1104	.0983	.0962	.1009
	(0.66)	(0.71)	(0.63)	(0.64)	(0.67)
LEVERAGE	-.0088	.0262	-.0456	-.0082	-.0182
	(-0.03)	(0.10)	(-0.18)	(-0.03)	(-0.07)
ROA	.0327	.048	.0353	.0275	.0407
	(0.24)	(0.34)	(0.26)	(0.21)	(0.30)
CFO	.5413	.4974	.5151	.5172	.5157
	(1.52)	(1.37)	(1.42)	(1.43)	(1.43)
STDROA	.3622	.3551	.3095	.4031	.3546
	(0.77)	(0.77)	(0.68)	(0.91)	(0.80)
STDCFO	-1.183	-1.177	-1.241	-1.302	-1.238
	(-1.31)	(-1.31)	(-1.40)	(-1.47)	(-1.41)
FIRMSIZE	.0274	.0269	.0238	.0295	.0246
	(0.23)	(0.22)	(0.20)	(0.24)	(0.20)
L3_FVPA	.0038	.0034	.0035	.003	.0031
	(0.88)	(0.81)	(0.81)	(0.70)	(0.71)
GEXPECT	-.0068	-.007	-.007	-.007[*]	-.007[*]
	(-1.58)	(-1.65)	(-1.63)	(-1.69)	(-1.69)
BSPREAD	-.0623	-.0608	-.0631	-.0623	-.0633
	(-1.43)	(-1.36)	(-1.44)	(-1.42)	(-1.45)
POST	-.0729	-.1113	-.1381[**]	-.1834[**]	-.1679[**]
	(-0.95)	(-1.47)	(-1.99)	(-2.59)	(-2.45)
LOWUNUSUAL#POST	-.0616				
	(-1.35)				
LOWINFER#POST	-.0219				
	(-0.53)				
LOWSTANDARD#POST	-.0442				
	(-1.05)				

LOWSUPPORTING #POST	-.0232				
	(-0.61)				
LOWDISC#POST		**-.1009****			
		(-2.50)			
HICHANGE#POST			**-.1071****		**-.0742**
			(-2.22)		**(-1.55)**
LOWCHANGE#POST				**.1322****	**.1146****
				(2.46)	**(2.11)**
constant	7.24***	7.171***	7.305***	7.258***	7.299***
	(6.12)	(6.11)	(6.25)	(6.16)	(6.25)
N	821	821	821	821	821
R^2	0.1543	0.1562	0.1530	0.1592	0.1624

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

Panel A reports the results of regression for fiscal year 2008 to 2010 in the presence of firm fixed effect.

LOWUNUSUAL is an indicator variable set to one if *UNUSUAL* is below the annual median of distribution for that year. *LOWINFER* is an indicator variable set to one if *INFER* is below the annual median of distribution for that year. *LOWSTANDARD* is an indicator variable set to one if *STANDARD* is zero points for that year. *LOWSUPPORTING* is an indicator variable set to one if *SUPPORTING* is below the annual median of distribution for that year. *LOWDISC* is an indicator variable set to one if the firm's *DISC* is below the annual median of distribution for that year. *HICHANGE* is an indicator variable set to one if the change in the firm's disclosure score (*UNUSUAL + STANDARD + SUPPORTING*) is in the highest quintile of the distribution. *LOWCHANGE* is an indicator variable set to one if the change in the firm's disclosure score (*UNUSUAL + STANDARD + SUPPORTING*) is in the lowest quintile of the distribution.

%EQUITY$_{COMPUSTAT}$ is the percentage of pension plan assets that are invested in equities captured from Compustat. *%RE$_{COMPUSTAT}$* is the percentage of pension plan assets that are invested in real estate captured from Compustat. *%OTHER$_{COMPUSTAT}$* is the percentage of pension plan assets that are not invested in equities, debt securities, or real estate captured from Compustat.

Panel B: Regression in changes from 2008 to 2009

	(1) ΔERR	(2) ΔERR	(3) ΔERR	(4) ΔERR	(5) ΔERR
$\Delta\%EQUITY_{COMPUSTAT}$	-.0028[*]	-.0027[*]	-.0026	-.0024	-.0025
	(-1.73)	(-1.75)	(-1.64)	(-1.52)	(-1.60)
$\Delta\%RE_{COMPUSTAT}$	-.0275	-.0271	-.0299	-.0277	-.0292
	(-1.20)	(-1.18)	(-1.27)	(-1.18)	(-1.25)
$\Delta\%OTHER_{COMPUSTAT}$	-.0043[***]	-.0041[***]	-.0041[***]	-.0038[***]	-.004[***]
	(-3.25)	(-3.30)	(-3.24)	(-2.90)	(-3.06)
ΔARR_{ADJt-1}	.0031	.0033	.0039	.0049	.0046
	(0.38)	(0.42)	(0.49)	(0.65)	(0.61)
ΔARR_{ADJt-2}	-.0044	-.0047	-.0045	-.0052	-.0047
	(-0.59)	(-0.64)	(-0.59)	(-0.73)	(-0.67)
$\Delta STDARR$	-.0147[**]	-.0145[**]	-.0147[**]	-.0151[**]	-.015[**]
	(-2.40)	(-2.47)	(-2.46)	(-2.58)	(-2.56)
$\Delta FUNDIGN$	-.6163[**]	-.5802[**]	-.531[*]	-.5496[*]	-.5857[**]
	(-2.10)	(-2.00)	(-1.80)	(-1.88)	(-1.97)
$\Delta PLANSIZE$	.5289[***]	.5423[***]	.5272[***]	.5516[***]	.557[***]
	(2.85)	(3.00)	(2.94)	(3.11)	(3.10)
$\Delta LEVERAGE$	-.3612	-.3959	-.4621	-.4256	-.4197
	(-0.91)	(-1.01)	(-1.16)	(-1.07)	(-1.07)
ΔROA	-.0849	-.0783	-.0981	-.0911	-.0814
	(-0.50)	(-0.46)	(-0.57)	(-0.57)	(-0.49)
ΔCFO	.5026	.3974	.4612	.4769	.4711
	(1.36)	(1.05)	(1.22)	(1.29)	(1.26)
$\Delta STDROA$	-.1094	-.1444	-.1379	-.07	-.0989
	(-0.24)	(-0.33)	(-0.32)	(-0.17)	(-0.23)
$\Delta STDCFO$	-.7805	-.6731	-.8242	-.9055	-.821
	(-0.70)	(-0.61)	(-0.77)	(-0.88)	(-0.78)
$\Delta FIRMSIZE$	.0402	.0299	.0336	.0273	.0131
	(0.28)	(0.21)	(0.25)	(0.20)	(0.10)
$\Delta GEXPECT$	.0281	.0274	.0267	.0262	.0257
	(1.42)	(1.40)	(1.35)	(1.38)	(1.36)
$\Delta BSPREAD$	.05	.0534	.0562	.0565	.0552
	(0.66)	(0.69)	(0.73)	(0.74)	(0.72)
$\Delta L3\_FVPA$	.0076	.007	.0072	.0068	.0071
	(1.23)	(1.18)	(1.18)	(1.16)	(1.18)
LOWUNUSUAL	**-.0851**[*]				
	(-1.75)				
LOWINFER	-.0395				
	(-1.03)				
LOWSTANDARD	.0013				
	(0.03)				
LOWSUPPORTING	-.0203				
	(-0.52)				
LOWDISC		**-.108**[**]			
		(-2.31)			
HICHANGE				**-.0904**[**]	**-.0663**
				(-2.01)	**(-1.46)**

				.1036**	.089*
LOWCHANGE				**(2.20)**	**(1.86)**
constant	-.4735**	-.4795**	-.4889**	-.5207**	-.497**
	(-2.14)	(-2.33)	(-2.31)	(-2.52)	(-2.39)
N	276	276	276	276	276
R^2	0.1431	0.1427	0.1316	0.1366	0.1407

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

Panel B reports the results of inter-temporal change regression. Standard errors are clustered at the firm level. *ΔVariable* measures a current year change of each variable between 2008 and 2009.

Panel C: Regression in changes from 2008 to 2010

	(1) ΔERR	(2) ΔERR	(3) ΔERR	(4) ΔERR	(5) ΔERR
$\Delta\%EQUITY_{COMPUSTAT}$	.0036	.0036	.0035	.0036	.0035
	(1.44)	(1.49)	(1.41)	(1.50)	(1.42)
$\Delta\%RE_{COMPUSTAT}$	.0136*	.0148*	.0121	.0141*	.0127
	(1.67)	(1.89)	(1.56)	(1.79)	(1.65)
$\Delta\%OTHER_{COMPUSTAT}$	-8.6e-04	-9.0e-04	-6.9e-04	-6.2e-04	-6.8e-04
	(-0.34)	(-0.37)	(-0.28)	(-0.25)	(-0.28)
ΔARR_{ADJt-1}	.0153**	.0153**	.0156**	.0157**	.0153**
	(2.07)	(2.13)	(2.13)	(2.25)	(2.17)
ΔARR_{ADJt-2}	-.0137**	-.0146**	-.014**	-.0144***	-.014**
	(-2.25)	(-2.46)	(-2.29)	(-2.59)	(-2.50)
$\Delta STDARR$	-.0073	-.0059	-.0075	-.0064	-.0066
	(-0.55)	(-0.46)	(-0.57)	(-0.50)	(-0.50)
$\Delta FUNDING$	.3793	.4205	.452	.3689	.3625
	(1.05)	(1.18)	(1.28)	(1.06)	(1.05)
$\Delta PLANSIZE$	-.1314	-.1271	-.1464	-.1541	-.1445
	(-0.39)	(-0.39)	(-0.45)	(-0.50)	(-0.47)
$\Delta LEVERAGE$	-.0216	.1008	-.0189	.0538	.0362
	(-0.06)	(0.31)	(-0.06)	(0.16)	(0.11)
ΔROA	.1351	.1798	.156	.1436	.1631
	(0.63)	(0.82)	(0.72)	(0.71)	(0.79)
ΔCFO	.7111	.7152	.6903	.6962	.6989
	(1.30)	(1.29)	(1.24)	(1.25)	(1.27)
$\Delta STDROA$	.2422	.3133	.2032	.3669	.301
	(0.40)	(0.51)	(0.34)	(0.63)	(0.52)
$\Delta STDCFO$	-1.137	-1.225	-1.299	-1.367	-1.273
	(-1.05)	(-1.16)	(-1.23)	(-1.28)	(-1.21)
$\Delta FIRMSIZE$	.2281	.2318	.2215	.2334	.2282
	(1.17)	(1.22)	(1.16)	(1.24)	(1.21)
$\Delta GEXPECT$	.019	.0161	.0146	.016	.0155
	(0.97)	(0.84)	(0.76)	(0.88)	(0.84)
$\Delta BSPREAD$	.224	.1945	.171	.1878	.181
	(0.95)	(0.84)	(0.74)	(0.85)	(0.81)
$\Delta L3\_FVPA$	.0012	.0013	.0012	8.6e-04	8.3e-04
	(0.59)	(0.66)	(0.60)	(0.40)	(0.39)
$LOWUNUSUAL$	-.0437				
	(-0.80)				
$LOWINFER$	-3.4e-04				
	(-0.01)				
$LOWSTANDARD$	-.0615				
	(-1.21)				
$LOWSUPPORTING$	-.051				
	(-1.15)				
LOWDISC		**-.0987**			
		(-2.12)			
HICHANGE				**-.1149***		**-.0783**
				(-1.82)		**(-1.19)**

LOWCHANGE				**.145*****	**.1258****
				(2.74)	**(2.29)**
constant	-.3109**	-.3491***	-.3659***	-.4158***	-.3974***
	(-2.46)	(-2.81)	(-3.02)	(-3.42)	(-3.29)
N	269	269	269	269	269
R²	0.1107	0.1130	0.1116	0.1234	0.1292

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

Panel C reports the results of inter-temporal change regression. Standard errors are clustered at the firm level. *ΔVariable* measures a current year change of each variable between 2008 and 2010.

Table 2.9 - Does opaque disclosure of asset allocation facilitate ERR management even in the post-period?

Panel A: The association of opaque disclosure with ERR and ARR in the post-period

	Pooled			Fixed effect		
	(1)	(2)	(3)	(4)	(5)	(6)
	ERR	ARR_{t+1}	ARR_{t+2}	ERR	ARR_{t+1}	ARR_{t+2}
%CCE	-.0089	-.0972***	-.1111***	-.0054	-.0972***	-.0756***
	(-0.78)	(-2.71)	(-4.03)	(-0.81)	(-2.71)	(-4.34)
%EQUITY TOTAL	.0216***	-.1025***	-.0787***	.0111***	-.1025***	-.0475***
	(5.39)	(-4.87)	(-4.87)	(3.84)	(-4.87)	(-4.61)
%RE	.0353**	-.0366	-.0158	.014	-.0366	-.0327
	(2.33)	(-0.58)	(-0.35)	(1.57)	(-0.58)	(-1.03)
%ABS	.0133	-.006	-.0116	.0072	-.006	-.0588*
	(1.39)	(-0.13)	(-0.25)	(1.05)	(-0.13)	(-1.69)
%DERIVATIVE	.0271	.0293	.0015	.014	.0293	-.0331
	(0.99)	(0.28)	(0.04)	(0.82)	(0.28)	(-1.14)
%HEDGE	.0223***	-.0817**	-.0818***	.0153**	-.0817**	-.0518**
	(2.80)	(-2.26)	(-2.91)	(2.52)	(-2.26)	(-2.46)
%PE	.0252***	-.091**	-.1004***	.0175***	-.091**	-.0629**
	(2.78)	(-2.10)	(-2.76)	(3.05)	(-2.10)	(-2.29)
%ALT	.028***	-.0577	-.0489	.0114***	-.0577	-.0212
	(3.35)	(-1.59)	(-1.53)	(2.63)	(-1.59)	(-1.21)
%OPAQUE	**.0171*****	**-.071*****	**-.062*****	**.0074*****	**-.071*****	**-.0471*****
	(4.83)	(-4.06)	(-4.31)	(2.68)	(-4.06)	(-4.63)
ARR_{ADJ}		.104	-.0233		.104	-.0191*
		(1.04)	(-0.97)		(1.04)	(-1.91)
ARR_{ADJ2}		-.0685	.0256**		-.0685	-.0815*
		(-0.63)	(1.99)		(-0.63)	(-1.93)
ARR_{ADJt-1}	-2.8e-04			.0082**		
	(-0.04)			(2.11)		
ARR_{ADJt-2}	.0073			-.0058		
	(0.82)			(-1.37)		
PLANSIZE	.2343***	.0819	.1587	.2606***	.0819	.1478
	(7.18)	(0.60)	(1.48)	(6.93)	(0.60)	(1.20)
FIRMSIZE	-.1454***	.0814	.029	-.1621***	.0814	-.031
	(-4.46)	(0.49)	(0.20)	(-4.52)	(0.49)	(-0.21)
L1RATIO	7.6e-04	.0026	-.0031	.0014	.0026	.0035
	(0.49)	(0.33)	(-0.55)	(1.15)	(0.33)	(0.33)
L3RATIO	-5.0e-04	.007	.0234	-9.1e-04	.007	.0124
	(-0.09)	(0.30)	(1.54)	(-0.39)	(0.30)	(1.40)
GEXPECT	.0113			-.0028		
	(1.09)			(-0.60)		
BSPREAD	-.2742			-.0331		

	(-0.85)			(-0.29)		
cons	6.174***	9.447***	11.51***	6.822***	9.447***	11.89***
	(15.37)	(6.44)	(9.77)	(19.99)	(6.44)	(9.15)
N	545	534	500	545	534	500
R^2	0.4125	0.4233	0.2198			

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

First three columns of Panel A report the results of OLS regression with year fixed effect for fiscal year 2009 to 2010, and next three columns of Panel A report the results of regression with year by firm fixed effect for the same period.

ARR_{t+1} is actual investment return on pension assets for year t+1/ beginning balance of pension assets for year t+1. ARR_{t+2} is the compound rate of annual return on pension plan assets for year t+1 and t+2.
%OPAQUE is the percentage of pension plan assets disclosed as being invested in "Other" assets or legal structure type of funds such as mutual funds, commingled funds, and common/collective trust funds with no narrative disclosure of what the underlying asset class is.
%CCE, %EQUITYTOTAL, %RE, %ABS,%DERIVATIVE, %HEDGE, %PE, %ALT are the percentages of plan assets disclosed as being invested in cash and cash equivalents (including guaranteed investment contracts), equities, real estate, assets backed securities (including mortgage backed securities), derivatives, hedge funds, private equities, and alternative investments in the post-period.

Panel B: The association of opaque disclosure with the gap between ERR and ARR in the post-period

	Pooled		Fixed effect	
	(1)		(2)	
	ERRMINUSARR		*ERRMINUSARR*	
%CCE	.1061***	(4.95)	.0715***	(4.96)
%EQUITYTOTAL	.0987***	(5.85)	.0579***	(5.09)
%RE	.0538	(1.19)	.0556*	(1.76)
%ABS	.0229	(0.48)	.0658*	(1.86)
%DERIVATIVE	.0252	(0.61)	.0503	(1.52)
%HEDGE	.0986***	(3.39)	.0577**	(2.40)
%PE	.1232***	(3.24)	.0816***	(2.69)
%ALT	.0721**	(2.31)	.0357*	(1.81)
%OPAQUE	**.0774***	**(5.28)**	**.0534***	**(4.89)**
ARR_{ADJ}	.0252	(0.99)	.0179*	(1.74)
ARR_{ADJ2}	-.0203	(-1.33)	.0817*	(1.90)
PLANSIZE	.0742	(0.69)	.0961	(0.80)
FIRMSIZE	-.1734	(-1.14)	-.1135	(-0.70)
L1RATIO	.0033	(0.58)	-.0017	(-0.16)
L3RATIO	-.0222	(-1.54)	-.0125	(-1.38)
GEXPECT	.0255	(0.40)	.0943	(1.11)
BSPREAD	-3.678*	(-1.76)	-4.533*	(-1.90)
_cons	-2.388	(-1.03)	-1.547	(-0.66)
N	500		500	
R²	0.2730			

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

First column of Panel B reports the results of OLS regression with year fixed effect for fiscal year 2009 to 2010, and next column of Panel B reports the results of regression with year by firm fixed effect for the same period.

ERRMINUSARR is *ERR* minus ARR_{t+2} where ARR_{t+2} is the compound rate of annual return on pension plan for year t+1 and t+2.

Panel C: Breaking down opaque disclosure by fair value hierarchy level

	(1) ERR		(2) ARR_{t+1}		(3) ARR_{t+2}	
%L1EQUITY	.0196***	(3.62)	-.1487***	(-3.97)	-.1109***	(-4.73)
%L1CCE	-.0199	(-1.53)	-.1531***	(-2.82)	-.1418***	(-4.12)
%L1ABS	-.0117	(-0.24)	-.1343	(-0.88)	-.2097	(-1.52)
%L1DERIVATIVE	.1646	(0.22)	1.148	(0.55)	-3.191	(-0.75)
%L1RE	.0612	(1.40)	-.0333	(-0.16)	.0729	(0.55)
%L1PE	.3686	(0.50)	5.094**	(2.00)	5.566**	(2.58)
%L1HEDGE	.1379**	(2.13)	-.0285	(-0.09)	-.4502***	(-4.85)
%L1ALT	.0111*	(1.72)	-.0571*	(-1.71)	-.0784***	(-3.18)
%L1OPAQUE	**.004**	**(0.41)**	**-.1213****	**(-2.41)**	**-.0858****	**(-2.58)**
%L2EQUITY	.0184***	(3.68)	-.1337***	(-3.92)	-.0949***	(-4.41)
%L2DEBT	-.0025	(-0.54)	-.047	(-1.64)	-.0306	(-1.54)
%L2CCE	-.0022	(-0.12)	-.1068***	(-2.66)	-.1041***	(-3.69)
%L2ABS	.0128	(1.25)	-.0484	(-0.88)	-.0373	(-0.72)
%L2DERIVATIVE	.0419***	(3.04)	.0278	(0.20)	.0064	(0.11)
%L2RE	.0368*	(1.75)	-.2792**	(-2.13)	-.1452	(-1.48)
%L2PE	.0259	(0.92)	.0027	(0.02)	.0096	(0.11)
%L2HEDGE	.0112	(1.19)	-.18***	(-2.69)	-.1063**	(-2.09)
%L2ALT	.023	(0.44)	-.2691	(-1.48)	-.1647	(-1.03)
%L2OPAQUE	**.0176****	**(3.51)**	**-.0951****	**(-3.05)**	**-.0741****	**(-3.65)**
%L3EQUITY	.023*	(1.82)	-.1533***	(-3.42)	-.097***	(-3.81)
%L3DEBT	-.0117	(-0.50)	-.0057	(-0.07)	.1098	(1.42)
%L3CCE	.0021	(0.09)	-.0234	(-0.45)	-.0308	(-0.65)
%L3ABS	-.0112	(-0.22)	-.0947	(-0.63)	-.0787	(-0.59)
%L3DERIVATIVE	-.0454***	(-3.87)	-.1848**	(-2.56)	-.0452	(-0.78)
%L3RE	.0282	(1.36)	.0186	(0.28)	.011	(0.21)
%L3PE	.0251***	(2.95)	-.1323**	(-2.56)	-.1121***	(-2.93)
%L3HEDGE	.0172*	(1.93)	-.1077**	(-2.21)	-.0813**	(-2.25)
%L3ALT	.0262***	(3.83)	-.0935**	(-2.04)	-.0495	(-1.22)
%L3OPAQUE	**-.0045**	**(-0.11)**	**-.3322****	**(-2.40)**	**-.2472****	**(-3.00)**
ARR_{ADJ}			.1045	(1.03)	-.0213	(-0.91)
ARR_{ADJ2}			-.067	(-0.61)	.0273**	(2.16)
ARR_{ADJt-1}	4.9e-04	(0.06)				
ARR_{ADJt-2}	.0074	(0.83)				
PLANSIZE	.2288***	(6.51)	.1161	(0.78)	.2223*	(1.88)
FIRMSIZE	-.138***	(-4.01)	.1233	(0.67)	.0283	(0.20)
GEXPECT	.0103	(1.06)				
BSPREAD	-.3655	(-1.12)				
_cons	6.767***	(12.81)	12.7***	(4.85)	13.31***	(7.68)
N	545		534		500	
R^2	0.4378		0.4373		0.2664	

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

Panel C reports the results of OLS regression with year fixed effect for fiscal year 2009 to 2010.

%L1OPAQUE, %L2OPAQUE, and %L3OPAQUE are the percentages of pension plan assets disclosed as being invested in other or legal structure type of funds that are classified as fair value hierarchy Level 1, Level 2, and Level 3 respectively.

%L1EQUITY, %L1CCE, %L1ABS, %L1DERIVATIVE, %L1RE, %L1PE, %L1HEDGE, %L1ALT are the percentages of assets disclosed as being invested in equities, cash and cash equivalents, asset-backed securities, derivatives, real estate, private equities, hedge funds, and alternative investments that are classified as Level1 of fair value hierarchy.
%L2EQUITY, %L2DEBT, %L2CCE, %L2ABS, %L2DERIVATIVE, %L2RE, %L2PE, %L2HEDGE, %L2ALT are the percentages of assets disclosed as being invested in equities, debt securities, cash and cash equivalents, asset-backed securities, derivatives, real estate, private equities, hedge funds, and alternative investments that are classified as Level2 of fair value hierarchy.
%L3EQUITY, %L3DEBT, %L3CCE, %L3ABS, %L3DERIVATIVE, %L3RE, %L3PE, %L3HEDGE, %L3ALT are the percentages of assets disclosed as being invested in equities, debt securities, cash and cash equivalents, asset-backed securities, derivatives, real estate, private equities, hedge funds, and alternative investments that are classified as Level3 of fair value hierarchy.

Panel D: Breaking down opaque disclosure by type of funds and "Other" assets

	(1) ERR		(2) ARR_{t+1}		(3) ARR_{t+2}	
%CCE	-.0088	(-0.77)	-.0968***	(-2.68)	-.1118***	(-4.02)
%EQUITY TOTAL	.0217***	(5.39)	-.1023***	(-4.86)	-.0795***	(-4.88)
%RE	.034**	(2.25)	-.0351	(-0.56)	-.0123	(-0.27)
%ABS	.0114	(1.16)	-.0093	(-0.20)	-.0115	(-0.25)
%DERIVATIVE	.0256	(0.93)	.0281	(0.27)	.0023	(0.05)
%HEDGE	.0226***	(2.82)	-.0814**	(-2.24)	-.0813***	(-2.88)
%PE	.0247***	(2.71)	-.0922**	(-2.19)	-.1003***	(-2.72)
%ALT	.0279***	(3.29)	-.0615*	(-1.75)	-.0505*	(-1.66)
%CCT	**.0167*****	**(4.07)**	**-.0938*****	**(-4.52)**	**-.0717*****	**(-4.50)**
%COMMINGLED	**.0209*****	**(3.78)**	**-.0583*****	**(-2.69)**	**-.0569****	**(-2.56)**
%MUTUAL	**.0164*****	**(3.89)**	**-.0615*****	**(-2.97)**	**-.0609*****	**(-3.88)**
%RIC	**.0226****	**(2.06)**	**-.0113**	**(-0.19)**	**-.0776****	**(-2.09)**
%OTHER	**.006**	**(0.75)**	**-.069***	**(-1.77)**	**-.0377**	**(-1.02)**
ARR_{ADJ}			.1056	(1.04)	-.0217	(-0.94)
ARR_{ADJ2}			-.07	(-0.63)	.0243*	(1.88)
ARR_{ADJt-1}	-.001	(-0.13)				
ARR_{ADJt-2}	.0082	(0.92)				
PLANSIZE	.2329***	(7.06)	.0929	(0.68)	.1632	(1.51)
FIRMSIZE	-.1424***	(-4.32)	.0692	(0.42)	.0135	(0.09)
L1RATIO	8.4e-04	(0.54)	.0028	(0.35)	-.003	(-0.52)
L3RATIO	-1.5e-07	(-0.00)	.0061	(0.26)	.0219	(1.43)
GEXPECT	.0127	(1.22)				
BSPREAD	-.3056	(-0.94)				
_cons	6.169***	(15.34)	9.492***	(6.43)	11.67***	(9.85)
N	545		534		500	
R^2	0.4156		0.4264		0.2282	

*, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

Panel D reports the results of OLS regression with year fixed effect for fiscal year 2009 to 2010.

%CCT, %COMMINGLED, %MUTUAL, and *%RIC* are the percentages of plan assets disclosed as being invested in common/collective trust funds, commingled funds, mutual funds, and regulated investment company funds without further description. *%OTHER* is the percentage of pension plan assets ambiguously disclosed as being invested 'Other' assets.

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