Pension Contributions and Earnings Quality

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Abstract

We investigate whether defined benefit (DB) pension contributions convey information about earnings quality proxied by different measurements of discretionary accruals. We find that earnings quality is positively associated with total pension contributions. More interestingly, we document a positive but statistically stronger relation between earnings quality and *voluntary* pension contributions. In contrast, our evidence does not suggest that a similar relationship holds for earnings quality and *mandatory* pension contributions. Our results are consistent with the theoretical argument that voluntary pension contributions is indicative of firms' earnings quality since both the voluntary pension contributions and earnings quality result from the same set of incentives behind managerial discretions. Our study sheds light on the management's motivation for making voluntary pension contributions and improves our understanding of firms' consideration in funding strategies for DB pension plans.

Pension Contributions and Earnings Quality

1. Introduction

We investigate the information content of pension contributions to the extent that they are associated with the information conveyed in the earnings, usually defined as earnings quality. Whether or not DB pension contributions provide indications about the quality of earnings is important for several reasons. Since the nature of the pension contributions is such that they do not affect the earnings despite their effect on operating cash flows, first, an examination of the relationship between pension contributions and earnings quality improves our understanding of firms' funding strategies and the management's incentives for making voluntary pension contributions. Second, pension contributions are both mandatory and voluntary. Further scrutiny on the relation between earnings quality and mandatory versus voluntary components of the pension contributions provides more evidence on their similarities and differences. Third, both earnings quality and voluntary pension contributions are reflective of managerial incentives and discretions, and our study is one of the first to shed light on the consideration management might have in implementation of its strategies.

Current pension funding rules (i.e., Employee Retirement Income Security Act of 1974 (ERISA), Internal Revenue Code (IRC) funding rules, Pension Protection Act of 2006 (PPA 2006), and Pension Relief Act of 2010 (PRA 2010)) require firms that sponsor DB pension plans to make financial contributions to their pension funds based on legally specified formulas. While pension funding is subject to different rules by the government, the management can exercise certain flexibility with respect to the amount of contributions as long as they fall within the minimum and maximum range allowed. In other words, the current regulation leaves enough leeway for the manager to develop and implement within these constraints a funding strategy that is indicative of his needs and incentives.

Given the generally poor understanding we have of the firm's funding strategy and the paucity of empirical investigation in the field, little research has been done to assess the managerial considerations behind such a strategy. A notable exception is Francis and Reiter (1987), who document that a firm's funding for pension plans is affected by its finance incentives and labor concerns. On the other hand, Cheng and Michalski (2010) study the determinants of funding status of pension plans and find that the funding status is hinged upon more general economic and accounting factors.

Our study complements those studies in that we focus on whether DB pension contributions convey information about financial reporting quality proxied by discretionary accruals. More specifically, we hypothesize that the voluntary pension contributions to be positively associated with earnings quality due to two salient theoretical arguments. First, since pension contributions reduce operating cash flows but have no effect on earnings, it would be costly for managers to make voluntary pension contributions, which increase discretionary accruals and as such reduce earnings quality in the sense of reflecting the underlying firm performance. We thus posit that firms that make voluntary pension contributions are more likely to have better earnings quality, i.e., to have earnings associated with less uncertainty over realization of expected cash flows or earnings less tainted by opportunistic manipulations of the manager. Second, voluntary pension contributions increase the likelihood that managers have to raise external financing, resulting in an increase in cost of capital. Since the increase in cost of capital, others being equal, reduces the firm's market value, firms with better earnings quality and therefore better market valuations are more likely to make voluntary pension contributions. We, however, do not expect firms with mandatory pension contributions to have any association with discretionary accruals since mandatory pension contributions are required by law.

Our analysis provides strong evidence that supports the above hypothesis. In a multivariate setting that controls for various factors, we find discretionary accruals are negatively associated with discretionary pension contributions. Since the greater discretionary accruals the lower is the earnings quality, the result implies a positive relationship between earnings quality and volutary pension contributions. In contrast, we do not find any statistically meaningful relationship between mandatory pension contributions and earnings quality as proxied by discretionary accruals. For completeness, we also study the association between total pension contributions and discretionary accruals, our analysis identifies a positive (negative) relationship between earnings quality (discretionary accruals) and voluntary pension contributions. However the relation is statistically weaker than that between discretionary accruals and voluntary pension contribution, suggesting that the result is driven by the effect of voluntary pension contributions.

GAAP does not require firms to disclose mandatory or voluntary pension contribution levels[1]. To conduct our tests, we use proxies developed by Moody's (2006) for measurement of mandatory pension contributions. Specifically, mandatory

[1] The GAAP disclosure requirements for defined benefit pension plans are governed by FAS 132R (FASB 2003). FAS 132R requires firms to disclose total pension contributions. Firms are not required to disaggregate total contributions into mandatory and discretionary portions.

contributions are defined as the service cost plus (ABO-FVPA)/30 if a firm's pension accumulated benefit obligation (ABO) is larger than its fair value pension assets (FVPA), and zero otherwise. We define voluntary pension contributions as the difference between the total pension contributions and the mandatory pension contributions calculated from the Moody's model.

Our results are robust to alternative measurement of mandatory pension contributions as suggested by Campbell, Dhaliwal, and Schwartz (2010). Moreover, to ensure the results do not suffer from any cross-sectional and/or auto correlational biases, we run the regression analyses following Fama and Macbeth (1973), which yield similar results.

A main feature of our research design is that it includes proxies for both mandatory and voluntary pension contributions. This approach has two benefits. First, it mitigates biased coefficients and mis-estimation of the pension contribution components in the (likely) case that the determinants of non-mandatory and mandatory are interrelated. Specifically, while non-mandatory contributions reflect firm's economic conditions and strategic choices, these factors may also affect a sponsor's mandatory contributions. For example, a higher return on pension plan assets improves firm performance, leading to possible higher non-mandatory pension contributions. On the other hand, a higher return on pension plan assets will decrease the mandated pension contributions since it leads to a higher level of fair value of pension assets. Taken together, if we do not consider proxies for mandatory and non-mandatory simultaneously in estimation, the coefficients on the pension contribution components should be biased. Also, because our proxies capture the mandatory versus voluntary nature of the pension contributions, we are able to make directional tests of the hypothesis on the relation between pension contributions and earnings quality.

Our paper contributes to the literature in several important ways. First, our paper is the first to study the information content of pension contributions as it pertains to earnings quality. Second, our study improves our understanding of the management's motivations for making voluntary pension contributions, which has obvious implications for interpreting pension numbers in financial statements and for designing pension funding rules. Third, our findings should be of interest to accounting standard setters. For instance, the FASB currently requires firms to disclose the total pension contributions but not their constituent components. Since our results suggest that voluntary pension contributions offer indications of earnings quality, FASB might consider a mandatory disclosure of voluntary pension contributions for firms with underfunded pension plans so that they would have more incentives to turn their plans around.

The paper proceeds as follows. In the next section, we develop our hypotheses. Section Three describes the research design, variable measurements and the sample. The empirical results are reported in Section Four, while Section Five discusses robust tests. Section 6 concludes the paper.

2. Hypothesis Development

2.1 Institutional background

Current pension funding rules (i.e., Employee Retirement Income Security Act of 1974 (ERISA), Internal Revenue Code (IRC) funding rules, Pension Protection Act of 2006 (PPA 2006), and SFAS 158) require firms that sponsor DB pension plans to make financial contributions to their pension funds contingent upon the pension funding status measured by the difference between the fair value of plan assets and the pension benefit obligations (PBOs). The pension plan is considered overfunded if the fair value of pension assets is greater than the pension benefit obligations (PBOs), and underfunded otherwise. Although firms with overfunded plans are not obligated to make contributions to their pension funds, they have the incentives to make contributions up to certain full funding limits, beyond which the contributions lose their favorable tax treatment. On the other hand, firms with underfunded pension plans are required by law to make contributions based on a formula that considers the employee's age, tenure, and salary. While pension funding is subject to different rules by the government, the management can exercise certain flexibility with respect to the amount of contributions as long as they fall within the minimum and maximum allowed. In other words, the current regulation leaves enough room for the manager to develop and implement within these constraints a funding strategy that is indicative of his needs and incentives.

2.2 Prior Studies

Most studies on DB pension plans focus on two issues: the value relevance of pension accounting information, and earnings management in pension accounting (e.g., pension discount rate, investment rate of return, termination/settlement of overfunded defined benefit plans, etc.). In value relevance studies, the research question centers around whether pension data as provided in the financial statements are systematically incorporated in stock prices. In the earnings management field, researchers attempt to investigate managerial discretion on pension numbers reported in financial statements.

There have been some scattered studies that examine the funding strategy and managerial incentives for its implementation. In one of the early studies, Francis and

Reiter (1987) discover that a firm's funding strategy is associated with its finance incentives, labor incentives, and financial statement incentives. More recently, Cheng et al. (2010) document that the funding status is affected by both economic and accounting factors. With respect to economic determinants, they find that firms contribute more when funding status is low and when profitability, cash flows from operations and the marginal tax rate are high, and that firms contribute less when the average retirement benefit and leverage are high. With respect to accounting determinants, they find that firms are less likely to contribute when their default risk is high and when their credit rating is near the investment/non-investment grade cut-off.

Our paper differs from previous studies in two important ways. First, we focus on defined benefit pension contributions rather than the funding status of DB pension plans**.** Second, we examine both the total pension contributions and their constituent components-mandatory and voluntary pension contributions-and investigate whether and how these components affect earnings quality differently.

2.3 Hypothesis development

Our major goal is to investigate whether management uses pension contributions to convey certain information about earnings quality as proxied by discretionary accruals. When examining the relation between pension contributions and discretionary accruals, it is important to distinguish between situations where the management voluntarily contributes and situations where the management is forced to do so. The manager would conceivably face the choice of making pension contributions when the firm has adequate cash flows to do so. Motives for such a contribution include conveying positive information about earnings or improving monitoring. Under both scenarios, voluntary pension contributions could be an indicator of better earnings quality.

We hypothesize that the voluntary pension contributions to be positively associated with earnings quality due to two salient theoretical arguments. First, since pension contributions reduce operating cash flows but have no effect on earnings, it would be costly for managers to make voluntary pension contributions, which increase discretionary accruals and as such reduce earnings quality in the sense of reflecting the underlying firm performance.[2] We thus posit that firms that make voluntary pension contributions are more likely to have better earnings quality, i.e., to have earnings associated with less uncertainty over realization of expected cash flows or earnings less tainted by opportunistic manipulations of the manager. Second, voluntary pension contributions increase the likelihood that managers have to raise external financing, resulting in an increase in cost of capital. Since the increase in cost of capital, others being equal, reduces the firm's market value, firms with better earnings quality and therefore better market valuations are more likely to make voluntary pension contributions. Stated in alternative form, our first and second hypotheses are as follows:

H1: Voluntary pension contributions are positively associated with earnings quality as proxied by different measurements of discretionary accruals.

H2: Mandatory pension contributions are not associated with earnings quality as proxied by different measurements of discretionary accruals.

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[2] The familiar expression for accruals is ACCRUALS=EARNINGS-OPEARTING CASH FLOWS. Given that the pension contributions have no effect on earnings but reduce the operating cash flows, the amount of total accruals would increase as a result. According to both Jones and modified Jones models that are followed in the study, non-discretionary accruals are measured as a function of changes in such accounting variables as revenues, equipment, and receivables, leaving the pension-contributions-induced accrual increase to fall within the category of discretionary accruals.

For completeness, we also study the association between total pension contributions and discretionary accruals. Since the total pension contributions consist of both mandatory and voluntary pension contributions, we do not expect they would be associated with earnings quality to the same extent as do the voluntary pension contributions. Accordingly, stated in the alternative form, our third hypothesis is as follows:

H3: Total pension contributions are positively associated earnings quality but the degree of association is weaker than in the case of voluntary pension contributions stated in H1.

3. Data, Variable Measurements, and Models

3.1 Sample selection

We obtain data on pension contributions and pension plan funded status from Compustat. Panel A of Table 2 summarizes the selection process of our testing samples (sample1 is for models 1&3, sample 2 is for models 2&4 respectively). We limit our sample to the years 1991 through 2009 because data on pension contributions are not available in Compustat before 1990. We begin with the overall universe of Compustat firms that sponsoring defined pension benefit plans. We eliminate 1,822 (sample 1) / 12,061 (sample 2) observations without sufficient Compustat data for calculating mandatory and discretionary pension contribution measures, and 7,295 (sample 1) /5,630 (sample 2) firm-year observations without sufficient Compustat data for estimating discretionary accruals. Our multivariate models additionally require data to estimate firms' return on assets (ROA), size, operating cycle, book to market ratio (BM), leverage ratio, operating cash flows, and auditor from Compustat, the firms' dividend payment data from the Center for Research in Security Prices (CRSP), and institutional holding from Thomson Reuters' Institutional (13f) Holdings database. This restriction eliminates an additional 10,572 (sample 1) / 7,131 (sample 2) observations, resulting in a final sample of 24,910 (sample 1) / 19,777 (sample 2) observations.

Panel B of Table 2 presents a breakdown of our samples by fiscal year. Year concentration doesn't appear to be a concern as no single year comprises more than 8 percent of the sample. Panel C of Table 2 presents an industry breakdown of our sample firms by the first 2-digit SIC code. The utilities industry (SIC 49) represents the largest group of firms in the sample (10.8% in sample 1 and 12.1% in sample 2)[3]. Our models include controls for both industry and year in order to reduce the effects of industry or year concentration. Finally, we winsorize all necessary data at the top and bottom 1 percent to mitigate the influence of outliers.

3.2 Descriptive statistics

We present summary statistics of the sample variables in Table 3. The mean and median total assets are $900 million and $893. Mean book-to-market ratio for our sample is 0.4960 (median 0.5107). These statistics show that our firms are generally larger than the average in size with somewhat higher book-to-market ratios, which is consistent with the nature of firms with DB pension plans. The distributions of our mandatory pension contribution measures (MC_PENSEXP and MC_MDYS) appear to be quite similar. The mean values (0.0028 and 0.0026, respectively) are larger than their corresponding median values (0.0000 for both) because mandatory pension contributions are censored at zero and consequently skewed right. The mean (median) of MC_PENSPPC is 0.0037 (0.0015).

[3] To ensure our results are not driven by utility firms, we remove them from our sample. Not surprisingly, our inferences are quantitatively and qualitatively unchanged.

The average discretionary accruals (Jones and modified Jones) are -0.0222 and -0.0234 respectively, and are slightly left skewed. The average and median return on assets are 0.0356 and 0.0413. The mean (median) level of debt is 1.0203 (0.3672) of assets. The mean (median) firms' operating cash flows is 0.0926 (0.0889) of assets, while the mean (median) retained earnings for the sample is 0.1582 (0.1968). The average age of the sample firms is about 22 years. Additionally, 87.59 percent of the firm-observations in our sample are audited by big four firms, 19.86 percent observations with negative earnings before extraordinary items, and 66.87 percent firm-observations' pension plan are under-funded.

Table 4 presents Pearson and Spearman correlation coefficients among variables in sample 1. Consistent with our expectation, discretionary accruals has a strong positive correlation with ROA, OpCycle, and UnderFunded. We also find an expected negative relation between discretionary accruals and OpCashFlow, OWNER, H-INDEX.

3.3 Variable measurement

GAAP does not require firms to disclose mandatory and voluntary pension contribution levels. As an alternative, we use the measurement developed by Moody's (2006) as a proxy of mandatory pension contributions. Specifically, Moody's (2006) defines mandatory pension contributions as the service cost plus (ABO-FVPA)/30 if a firm's pension accumulated benefit obligation is larger than its fair value pension assets (ABO>FVPA), and zero otherwise. We measure voluntary pension contributions as the difference between firms' total pension plan contribution during year t and the mandatory pension contributions estimated from the methodology discussed above. As described above, we use discretionary accruals as our measurement of earnings quality.

Following Defond and Jiambalvo (1994), we estimate a cross-sectional version of the Jones (1991) model for each (two-digit SIC) industry and year. After winsorizing at the 1st and 99th percentiles, to obtain discretionary accruals (DA), we first regress the following:

$$\frac{TA_{i,t}}{A_{,it-1}} = a_1 \times \left(\frac{1}{A_{,it-1}}\right) + a_2 \times \frac{\Delta REV_{i,t}}{A_{i,t-1}} + a_3 \times \frac{GPPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t} \ , \quad (1)$$

where $TA_{i,t}$ is the total accruals for firm i in fiscal year t, $A_{,it-1}$ is the total assets for firm i in fiscal year t−1, $\Delta REV_{i,t}$ measures the change in revenues for firm i in year t less revenues in t−1, $GPPE_{i,t}$ is gross property plant and equipment for firm i at the end of year t, and $\varepsilon_{i,t}$ is the residue. We run regression (1) cross-sectionally on an annual basis on all firms recorded in Compustat with the same two-digit SIC industry code. DA is then estimated as:

$$DA_{i,t} = \frac{TA_{i,t}}{A_{,it-1}} - \tilde{a}_1 \times \left(\frac{1}{A_{,it-1}}\right) - \tilde{a}_2 \times \frac{\Delta REV_{i,t}}{A_{i,t-1}} - \tilde{a}_3 \times \frac{GPPE_{i,t}}{A_{i,t-1}} \ , \quad (2)$$

where ãs are the estimated parameters from equation (1).

We also repeat our analyses using the modified Jones model, following Dechow et al. (1995) to adjust for growth in credit sales. The modified Jones model estimates discretionary accruals by adjusting the regression (1) to the following:

$$\frac{TA_{i,t}}{A_{i,t-1}} = a_1 \times \left(\frac{1}{A_{,it-1}}\right) + a_2 \times \frac{(\Delta REV_{i,t} - \Delta REC_{i,t})}{A_{i,t-1}} + a_3 \times \frac{GPPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t} \ , \quad (3)$$

where $\Delta REC_{i,t}$ is the change of accounts receivable. All other variables are the same as defined in equation (1).

We follow Defond and Jiambalvo (1994) to define total accruals as the sum of changes in inventory, accounts receivable, and other current assets less the sum of changes in accounts payable, income taxes payable, and other current liabilities. Working capital accruals are measured from Compustat data and defined as the sum of the changes in item INVT, inventories, item RECT, accounting receivable, and Item ACO, other current assets, less the sum of the changes in Item AP, accounts payable, item TXP, taxes payable, and item LCO, other current liabilities. Specifically, total accruals are defined as follows:

Total Accruals= ((ΔINVT+ΔRECT+ΔACO)-(ΔAP+ΔTXP+ΔLCO))/AT_t_1.

We also repeat our analyses using total accrual definition brought up by Dechow et al. (1995). Specifically:

Accruals = (ΔCA - ΔCash) - (ΔCL - ΔSTD - ΔTP) - Dep

where ΔCA = change in current assets (Compustat item ACT),

ΔCash = change in cash/cash equivalents (Compustat item CHE),

ΔCL = change in current liabilities (Compustat item LCT),

ΔSTD = change in debt included in current liabilities (Compustat item DLC),

ΔTP = change in income taxes payable (Compustat item TXP), and

Dep = depreciation and amortization expense (Compustat item DP)

3.4 Empirical models

We estimate the following two regression models to examine the association between pension contributions and earnings quality:

$$
\begin{aligned}
DA_{it} = {} & \alpha_0 + \alpha_1 DC\_MDYS_{it} + \alpha_2 MC\_MDYS_{it} + \alpha_3 AGE_{it} + \alpha_4 BM_{it} + \alpha_5 BIG4_{it} + \alpha_6 CAPITAL_{it} \\
& + \alpha_7 DIV_{it} + \alpha_8 FIN_{it} + \alpha_9 GROWTH_{it} + \alpha_{10} H\_INDEX_{it} + \alpha_{11} LEV_{it} + \alpha_{12} LIT_{it} + \alpha_{13} LOSS_{it} \\
& + \alpha_{14} OWNER_{it} + \alpha_{15} OpCashFlow_{it} + \alpha_{16} OpCycle_{it} + \alpha_{17} ROA_{it} + \alpha_{18} RetEarnings_{it} + \alpha_{19} SIZE_{it} \\
& + \alpha_{20} UnderFunded_{it} + Year\_FixedEffects + Industry\_FixedEffects + \varepsilon_{it} \quad (4)
\end{aligned}
$$

$$
\begin{aligned}
DA_{it} = {} & \alpha_0 + \alpha_1 TotalPC_{it} + \alpha_2 AGE_{it} + \alpha_3 BM_{it} + \alpha_4 BIG4_{it} + \alpha_5 CAPITAL_{it} + \alpha_6 DIV_{it} + \alpha_7 FIN_{it} \\
& + \alpha_8 GROWTH_{it} + \alpha_9 H\_INDEX_{it} + \alpha_{10} LEV_{it} + \alpha_{11} LIT_{it} + \alpha_{13} LOSS_{it} + \alpha_{13} OWNER_{it} \\
& + \alpha_{14} OpCashFlow_{it} + \alpha_{15} OpCycle_{it} + \alpha_{16} ROA_{it} + \alpha_{17} \mathrm{Re}tEarnings_{it} + \alpha_{18} SIZE_{it} \\
& + \alpha_{19} UnderFunded_{it} + Year\_FixedEffec\,ts + Industry\_FixedEffec\,ts + \varepsilon_{it} \qquad (5)
\end{aligned}
$$

Model (4) is intended to test Hypotheses 1 and 2, and model (5) is intended for Hypothesis 3. The dependent variables are discretionary accruals estimated from Jones and the modified Jones model, respectively. The test variables are discretionary pension contributions (DC_MDYS), mandatory pension contributions (MC_MDYS) and total pension contributions (TotalPC). As stated in our hypotheses, we expect firms with higher voluntary pension contributions to be associated with lower discretionary accruals. We, however, do not expect firms with mandatory pension contributions to have any association with discretionary accruals. We have no priori expectation on total pension contributions but include the test for completeness.

In addition to the above variables of interest, we also control for several other factors suggested by previous literature as being associated with the discretionary accruals. We first include the log of a firm's assets to control for firm size. Previous studies (Kothari et al., 2005; and Daniel et al., 2008) find that firm size is negatively correlated with discretionary accruals. We also predict a negative coefficient for SIZE and use natural logarithm of total assets (SIZE) at the end of the period as our measure of firm size. Second, we include firm growth as a control variable because prior literature suggests that firm growth is positively associated with discretionary accruals (Menon and Williams 2004). Following Menon and Williams (2004), we use book-to-market ratio (BM), which is related to market expectations of growth prospects, as our measure of the growth opportunities.

Third, we include the debt to equity ratio (LEV) to control for the effects of leverage on accruals as DeFond and Jiambalvo (1994) document that managers of high leverage firms resort to income-increasing abnormal accruals to avoid violating debt-covenants. Sweeney (1994) also shows that firms manage earnings upward even after the violation of debt covenants. Fourth, we follow the prior literature to control for firm performance. Dechow et al. (1995) show that Jones-type abnormal accruals measures are sensitive to firm performance. We use return on assets from the prior year as our measure of firm performance and predict a negative coefficient for ROA. We also include another performance variable-operating cash flow (OpCashFlow) to control for the effect of operating cash flows on abnormal accruals. Subramanyam (1996) finds a negative and significant relationship between operating cash flows and abnormal accruals. We predict a negative coefficient for OpCashFlow.

We also control for the following variables: the operating cycle (OpCycle), pension funding status (Unfunded), financing incentives (FIN), firm litigation risk based on industry classification to control for the effects of expected litigation on earnings quality (LIT), ownership dispersion (OWNER), capital intensity (CAPITA), Hefindahl-Hershman Index (H_INDEX), dividend payment (DIV), firm age (AGE), retained earnings (RetEarnings), and firm loss (LOSS).

All variables are defined in Table 1.

Insert Table 1 here

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4. Empirical Results

To test our hypotheses, both the discretionary accruals derived from the Jones model and from the modified Jones model are regressed on a firm's total pension contributions, mandatory contributions, voluntary pension contributions and the various control variables. Table 5 contains the estimation results of these models. It is noteworthy that the adjusted R^2 are above 19 percent for all of the four models.

Insert Table 5 here

Models 1-2 contain the results of estimating equations (4) and (5) in which discretionary accruals (DA) estimated from Jones model are the dependent variables. Model 1 shows that the coefficient on total pension contributions is -0.1908, significant at 5%, suggesting that firms with larger pension contributions are associated with lower discretionary accruals. To examine whether different multiples are applied to different components of pension contributions in the determination of earnings quality, the discretionary accruals is expressed as a linear function of two components of pension contributions-mandatory and voluntary. Model 2 shows the results. As expected, the coefficient on voluntary pension contributions is -0.3060, significant at 1% level. This result suggests that firms with greater voluntary pension contributions increases have a lower level of discretionary accruals, consistent with the assumption that the manager might do so to convey more information to investors.

The control variables in the model generally have the expected signs. Firm age, firm size, book-to-market ratio of the equity, firm growth and operating cash flows all have negative and significant signs, suggesting that older firms, larger firms, firms with larger cash flows or higher sales growth exhibit lower discretionary accruals. Capital intensity, operating cycle, retained earnings, financial position, have positive and significant signs, suggesting that firms with higher capital intensity, higher retained earnings, longer operation cycles or firms that issued debt or equity during the year that amounts to 20 percent or more of existing debt or equity have a larger discretionary accruals. It is noteworthy, however, that the coefficient of ROA is positive and significant, and the coefficient of LOSS is negative and significant, implying that firms with a higher return on assets have a higher discretionary accruals while firms with higher loss are related to a lower discretionary accruals. The coefficients on all other control variables are insignificantly different from zero.

Taken together, the findings in Model 1 and Model 2 of Table 5 suggest a negative relationship between discretionary accruals and total pension contributions, and a similar but statistically stronger relation between discretionary accruals and voluntary pension contributions. However, we do not find a significant relation between mandatory pension contributions and discretionary accruals. These results are consistent with our hypotheses that voluntary pension contributions convey information about earnings quality while mandatory pension contributions do not. The different coefficients on the pension contributions components also point to the necessity of discomposing the total contributions into different components for mitigating the biases on the coefficients.

Models 3-4 contain the results of estimating equations (4) and (5) in which discretionary accruals (DA) derived from the modified Jones model are the dependent variables. Results in Models 3-4 are highly consistent with those reported in Models 1-2.

5. Additional Analysis

5.1 *Additional measurement of voluntary contributions*

To check the robustness of our findings, we use two alternative measurements of mandatory pension contributions estimated from Campbell et al. (2010). The first measure (MC_PENSEXP) is defined as service cost divided by the firm's total assets as of year t-1 if a firm's pension benefit obligation is larger than its fair value pension assets (PBO>FVPA), and zero otherwise. The second measure (MC_PENSPPC) is defined as the aggregate pension expense divided by total firm assets as of year t – 1 if aggregate pension plans are underfunded, and zero otherwise.

The results using the alternative measurements of mandatory/voluntary pension contributions presented in Table 6 are highly consistent with those in Table 5

Insert Table 6 here

5.2. *Fama MacBeth Analysis*

Our empirical analyses are based on nineteen years of pooled cross-sectional data in which the same firm can appear multiple times in the sample. Therefore, our observations may not be independent, which could in turn cause cross-sectional and autocorrelational problems. Since it is well recognized that the Fama and Macbeth (1973) approach has been effective in tackling these problems and thus providing a better inference on the estimates, we, as robustness checks, conduct regression analyses on a year-by-year basis for our sample following Fama and Macbeth (1973). The untabulated analysis results are consistent with those in Tables 4 and 5.

6. Conclusion

In this study, we investigate whether defined benefit pension contributions have information content as pertains to earnings quality proxied by discretionary accruals. We find that earnings quality is positively associated with total pension contributions. After decomposing DB pension contributions into mandatory and voluntary components, we find a statistically stronger relation between voluntary pension contributions and earnings quality. In contrast, we find mandatory pension contributions are not associated with earnings quality. Our results show that voluntary pension contributions are indicative of firms' earnings quality while mandatory pension contributions are not. Consistent with theoretical inference on the relationships, the results have implications for both practitioners and policy-makers. Given the paucity of research in the field of pension funding strategies, our study also contributes to the literature and helps future researchers in their effort to improve our understanding of the managerial consideration in pension contribution.

Given that mandatory pension contributions are not disclosed, a prominent caveat of our study concerns the validity of our empirical proxies for mandatory pension contributions. Although we believe that we mitigate this issue by adopting different proxies for mandatory pension contributions used in recent research and the credit rating agencies, the possibility might still remain that our proxies be biased in capturing the actual amount of the mandatory pension contributions. It is our hope that future research and better data availability can help fix this issue.

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Table 1

Variable Definitions (in alphabetical order)

Variables	Definitions	Predicted Relation to Accruals
DA	Discretionary accruals estimated using the cross-sectional Jones (1991) model (DA_Jones) or using the cross-sectional modified Jones model as advanced by Dechow et al.(1995) (DA_Modified Jones)	N/A
TotalPC	Firm's total pension plan contribution	+/-
DC_MDYS	Firm's total pension plan contribution (TotalPc) during year t minus firm's mandatory pension contribution according to Moody's (2006), MC_MDYS.	+/-
DC_PENSEXP	Firm's total pension plan contribution (PBEC) during year t minus firm's mandatory pension contribution, MC_PENSEXP.	+/-
DC_PENSPPC	Firm's total pension plan contribution (PBEC) during year t minus firm's mandatory pension contribution, MC_PENSPPC.	+/-
MC_MDYS	Estimate mandatory pension contributions according to MDYS (2006). If (ABO > FVPA), then equals the service cost plus (ABO – FVPA / 30), all divided by total firm assets as of year t – 1; if (ABO < FVPA), then equals zero;	-
MC_PENSEXP	If aggregate pension plans are underfunded, then equals service cost divided by total firm assets as of year t – 1; if aggregate pension plans are overfunded, then equals zero;	-
MC_PENSPPC	If aggregate pension plans are underfunded, then equals the aggregate pension expense divided by total firm assets as of year t – 1; if aggregate pension plans are overfunded, then equals zero;	-
AGE	Firm age calculated as the natural log of the number of months from the first appearance of the firm in the CRSP database;	-
BM	Ratio of book to market value of equity calculated as book value of equity;	-
Big4	Dummy variable equals to one if the firm is audited by big 4 auditors, and 0 otherwise;	+/-
Capital	Capital intensity calculated as net PP&E divided by total assets;	-

Unfunded	Dummy variable equals to one if the firm is underfunded, and 0 otherwise. A firm is defined as underfunded when its pension benefit obligation exceeds fair value asset;	<u>**+/-**</u>
DIV	Dummy variable equals to 1 if the firm pays cash dividend during the year, and 0 otherwise. Payment of ordinary cash dividends is identified using CRSP distribution code. The first digit of the CRSP distribution code must be 1, the second digit must be between 0 and 4 and a third digit other than 6, 7, or 9;	+/-
FIN	Dummy variable equals to 1 if the firm issues debt or equity during the year that amounts to 20 percent or more of existing debt or equity , and 0 otherwise;	+/-
Growth	Sales growth calculated as change in sales scales by beginning period sales;	+
H_INDEX	Herfindahl-Hirschman industry-specific index measured as the sum of the square ratio of a firm's sales to the total industry sales across all firms in the same two-digit SIC code;	+
LEV	Leverage calculated as the sum of current and long-term debt divided by market value of equity;	+/-
LIT	Dummy variable equals to set to 1 if the firm's SIC falls in the following industries: SIC codes 2833–2836, 8731–8734, 7371–7379, 3570–3577, and 3600–3674, and 0 otherwise;	+/-
LOSS	Dummy variable equals to 1 if earnings before extraordinary items is less than zero, and 0 otherwise.	+/-
OWNER	Diversity of shareholders calculated as the natural log of number of shareholders for the firm less the natural log of the average number of shareholders for all firms in the firm's size decile;	-
OpCashFlow	Firm's net operation cash flows deflated by total assets	
OpCycle	Natural log of the firm's operating cycle measured in days based on turnover in accounts receivable and inventory. Specifically, the firm's operating cycle = 180*((accounts receivable + lag accounts receivable)/sales+(inventory+ lag inventory)/cost of good sold);	+
ROA	Income before extraordinary items divided by total assets at the end of year t – 1;	+/-
RetEarnings	Retained earnings deflated by total assets;	-
SIZE	Natural logarithm of total assets.	-

Table 2

Panel A: Sample 1 Select Process

Selection Criteria	Sample 1	Sample 2
All firm-year observations for firms sponsoring defined pension benefits plans with fiscal year between 1991 and 2009 in Compustat pension database	44,599	44,599
Less: Firms with missing data for computing mandatory or discretionary pension contribution measures	(1,822)	(12,061)
Less: Firms with missing data to estimate discretionary accruals	(7,295)	(5,630)
Less: Firms with missing data for control variables	(10,572)	(7,131)
Final sample	24,910	19,777

Table 2
Panel B: Distribution by Year

Year	Sample 1-3		Sample 4	
	Freq	%	Freq	%
1991	1,402	5.63	1,398	7.07
1992	1,447	5.81	1,442	7.29
1993	1,468	5.89	1,463	7.40
1994	1,487	5.97	1,482	7.49
1995	1,504	6.04	1,496	7.56
1996	1,513	6.07	1,503	7.60
1997	1,498	6.01	1,487	7.52
1998	1,414	5.68	839	4.24
1999	1,344	5.40	923	4.67
2000	1,248	5.01	700	3.54
2001	1,209	4.85	329	1.66
2002	1,197	4.81	156	0.79
2003	1,219	4.89	805	4.07
2004	1,199	4.81	980	4.96
2005	1,215	4.88	1,014	5.13
2006	1,218	4.89	1,011	5.11
2007	1,185	4.76	986	4.99
2008	1,152	4.62	945	4.78
2009	991	3.98	818	4.14
Total	24,910	100	19,777	100

Table 2

Panel C: Distribution by Industry (the first two digits of SIC)

SIC	Sample 1-3		Sample 4	
	Count	%	Count	%
10	372	1.5	272	1.4
12	88	0.4	71	0.4
13	689	2.8	534	2.7
14	125	0.5	107	0.5
15	26	0.1	22	0.1
16	90	0.4	71	0.4
17	61	0.2	51	0.3
20	1,020	4.1	805	4.1
21	86	0.3	61	0.3
22	294	1.2	234	1.2
23	294	1.2	239	1.2
24	141	0.6	105	0.5
25	305	1.2	237	1.2
26	699	2.8	575	2.9
27	632	2.5	516	2.6
28	1,910	7.7	1,489	7.5
29	451	1.8	364	1.8
30	491	2.0	392	2.0
31	198	0.8	160	0.8
32	368	1.5	306	1.5
33	935	3.8	745	3.8
34	870	3.5	697	3.5
35	2,018	8.1	1,586	8.0
36	1,717	6.9	1,267	6.4
37	1,035	4.2	820	4.1
38	1,214	4.9	943	4.8
39	302	1.2	246	1.2
40	130	0.5	94	0.5
41	19	0.1	16	0.1
42	143	0.6	118	0.6
44	156	0.6	127	0.6
45	244	1.0	171	0.9
46	12	0.0	12	0.1
47	41	0.2	35	0.2
48	748	3.0	616	3.1
49	2,684	10.8	2,388	12.1
50	589	2.4	467	2.4

51	394	1.6	306	1.5
52	40	0.2	36	0.2
53	285	1.1	238	1.2
54	269	1.1	213	1.1
55	57	0.2	47	0.2
56	219	0.9	155	0.8
57	79	0.3	67	0.3
58	190	0.8	134	0.7
59	220	0.9	176	0.9
60	14	0.1	12	0.1
62	48	0.2	35	0.2
63	73	0.3	48	0.2
64	98	0.4	76	0.4
65	56	0.2	46	0.2
67	31	0.1	22	0.1
70	92	0.4	73	0.4
72	73	0.3	54	0.3
73	771	3.1	552	2.8
75	74	0.3	60	0.3
76	4	0.0	4	0.0
78	54	0.2	43	0.2
79	100	0.4	65	0.3
80	112	0.4	101	0.5
82	32	0.1	26	0.1
87	283	1.1	203	1.0
90	4	0.0		
99	41	0.2	26	0.1
Total	24,910	100	19,777	100

Table 3

Descriptive Statistics

	N	Mean	1st Quartile	Median	3rd Quartile
DA_Jones	24,910	-0.0222	-0.0666	-0.0220	0.0220
DA_ModifiedJones	19,777	-0.0234	-0.0664	-0.0227	0.0209
MC_PENSEXP	24,910	0.0028	0.0000	0.0012	0.0044
DC_PENSEXP	24,910	0.0002	-0.0021	0.0000	0.0007
MC_MOODYS	19,777	0.0026	0.0000	0.0006	0.0040
DC_MOODYS	19,777	0.0002	-0.0017	0.0000	0.0005
MC_PENSPPC	24,910	0.0037	0.0000	0.0015	0.0054
DC_PENSPPC	24,910	-0.0006	-0.0026	0.0000	0.0005
TotalPC	24,910	0.0030	0.0000	0.0000	0.0027
ROA	24,910	0.0356	0.0081	0.0413	0.0789
SIZE	24,910	6.8014	5.4863	6.7950	8.1372
OpCycle	24,910	4.6466	4.3084	4.6934	5.0272
BM	24,910	0.4960	0.3045	0.5107	0.7704
LEV	24,910	1.0203	0.1307	0.3672	0.8434
OpCashFlow	24,910	0.0926	0.0486	0.0889	0.1356
Big4	24,910	0.8759	1.0000	1.0000	1.0000
LOSS	24,910	0.1986	0.0000	0.0000	0.0000
RetEarnings	24,910	0.1582	0.0344	0.1968	0.4011
FIN	24,910	0.4830	0.0000	0.0000	1.0000
LIT	24,910	0.1004	0.0000	0.0000	0.0000
CAPITAL	24,910	0.3945	0.1918	0.3349	0.5673
GROWTH	24,910	0.0801	-0.0222	0.0556	0.1444
DIV	24,910	0.6619	0.0000	1.0000	1.0000
AGE	24,910	5.5806	4.9698	5.8242	6.2461
OWNER	24,910	-0.9924	-1.8269	-0.7752	0.0820
H_INDEX	24,910	0.0614	0.0306	0.0453	0.0732
UnderFunded	24,910	0.6687	0.0000	1.0000	1.0000

Table 4 Correlation Matrix

Variable	DA_ Jones	Total PC	ROA	SIZE	Op Cycle	BM	LEV	Op Cash Flow	Big4	LOSS	Ret Earnings	FIN	LIT	CAPI TAL	GROW TH	DIV	AGE	OWN ER	H_ INDEX	Under Funded
DA_Jones	**1.00**	**0.03**	**0.11**	0.01	**0.02**	0.01	**-0.02**	**-0.18**	0.01	**-0.08**	**0.04**	**0.03**	0.01	**0.05**	0.00	0.01	-0.01	-0.01	**-0.02**	**0.02**
TotalPC	**0.06**	**1.00**	**0.05**	**0.10**	-0.01	**-0.07**	0.00	**0.03**	**0.05**	-0.01	**-0.03**	0.00	**0.02**	**-0.11**	**-0.03**	0.00	**0.10**	**-0.04**	**0.02**	**0.22**
ROA	**0.08**	**0.05**	**1.00**	**0.09**	**-0.03**	**0.12**	**-0.33**	**0.56**	**0.04**	**-0.66**	**0.48**	**-0.10**	0.01	**0.06**	**0.19**	**0.22**	**0.06**	**0.06**	**-0.02**	**-0.05**
SIZE	0.02	**0.28**	**0.04**	**1.00**	**-0.15**	**-0.06**	**-0.02**	**0.13**	**0.24**	**-0.13**	**0.16**	0.01	**-0.04**	**0.14**	**-0.03**	**0.33**	**0.30**	**0.06**	**-0.07**	0.02
Op Cycle	**0.02**	**-0.02**	-0.01	**-0.18**	**1.00**	**0.05**	**-0.04**	**-0.13**	**-0.02**	**0.06**	**0.06**	0.00	**0.19**	**-0.41**	**-0.12**	**-0.08**	**-0.03**	**-0.02**	-0.01	0.01
BM	0.00	**-0.10**	**-0.31**	**-0.16**	**0.04**	**1.00**	**-0.38**	0.00	**-0.02**	**-0.10**	**0.29**	**-0.17**	**-0.03**	**0.04**	0.01	**0.09**	0.01	-0.01	**0.02**	**-0.05**
LEV	-0.01	**-0.06**	**-0.54**	**0.08**	**-0.14**	**0.30**	**1.00**	**-0.23**	0.00	**0.34**	**-0.30**	**0.12**	**-0.07**	0.01	**-0.10**	**-0.20**	**-0.05**	**-0.12**	**0.03**	**0.04**
Op CashFlow	**-0.19**	**0.05**	**0.59**	**0.10**	**-0.13**	**-0.28**	**-0.42**	**1.00**	**0.06**	**-0.39**	**0.37**	**-0.08**	**0.03**	**0.17**	**0.14**	**0.20**	**0.03**	**0.06**	**-0.03**	**-0.02**
Big4	0.01	**0.13**	**0.03**	**0.22**	**-0.02**	**-0.05**	0.00	**0.04**	**1.00**	**-0.03**	**0.07**	0.00	**-0.02**	**-0.03**	**0.02**	**0.03**	**0.02**	**-0.07**	**0.02**	**0.04**
LOSS	**-0.09**	-0.01	**-0.66**	**-0.12**	**0.07**	**0.08**	**0.29**	**-0.40**	**-0.03**	**1.00**	**-0.39**	**0.09**	**0.04**	**-0.11**	**-0.16**	**-0.28**	**-0.10**	**-0.08**	**0.05**	**0.08**
Ret Earnings	**0.04**	**0.03**	**0.51**	**0.02**	**0.11**	**0.04**	**-0.52**	**0.41**	**0.03**	**-0.39**	**1.00**	**-0.16**	**-0.08**	**0.06**	**0.04**	**0.37**	**0.19**	0.01	**0.02**	**-0.10**
FIN	**0.03**	0.01	**-0.07**	0.01	0.01	**-0.14**	**0.17**	**-0.08**	0.00	**0.09**	**-0.14**	**1.00**	-0.01	**0.05**	**0.10**	**-0.09**	**-0.11**	**-0.06**	**0.03**	**0.04**
LIT	0.01	**0.03**	**0.04**	**-0.03**	**0.20**	**-0.11**	**-0.19**	**0.04**	**-0.02**	**0.04**	0.00	-0.01	**1.00**	**-0.21**	0.01	**-0.12**	**-0.05**	**0.03**	**-0.13**	**0.07**
CAPITAL	**0.04**	**-0.14**	0.01	**0.14**	**-0.42**	**0.07**	**0.23**	**0.16**	**-0.02**	**-0.11**	0.01	**0.04**	**-0.22**	**1.00**	**0.17**	**0.21**	**0.06**	**0.10**	**-0.12**	**-0.12**
GROWTH	-0.01	**-0.03**	**0.32**	0.00	**-0.11**	**-0.16**	**-0.15**	**0.18**	**0.02**	**-0.25**	**0.10**	**0.09**	**0.02**	**0.11**	**1.00**	**-0.02**	**-0.12**	**-0.03**	**-0.03**	0.01
DIV	0.01	0.00	**0.20**	**0.32**	**-0.11**	-0.01	**-0.12**	**0.21**	**0.03**	**-0.28**	**0.36**	**-0.09**	**-0.12**	**0.22**	0.01	**1.00**	**0.31**	**0.19**	**-0.06**	**-0.16**
AGE	-0.01	**0.15**	**0.04**	**0.37**	**-0.06**	0.00	0.01	**0.03**	**0.04**	**-0.11**	**0.21**	**-0.09**	**-0.06**	**0.09**	**-0.10**	**0.33**	**1.00**	**0.21**	**-0.06**	**-0.10**
OWNER	-0.01	**-0.14**	**0.06**	**0.05**	**-0.05**	**-0.06**	**-0.06**	**0.06**	**-0.07**	**-0.07**	**0.02**	**-0.05**	**0.02**	**0.11**	**-0.03**	**0.18**	**0.18**	**1.00**	**-0.07**	**-0.12**
H_INDEX	**-0.05**	0.00	-0.02	**-0.15**	**0.06**	**0.04**	**-0.06**	-0.01	**0.03**	**0.07**	**0.06**	**0.04**	**-0.15**	**-0.18**	**-0.03**	**-0.13**	**-0.13**	**-0.14**	**1.00**	**0.02**
Under Funded	**0.03**	**0.30**	**-0.05**	**0.02**	**0.03**	**-0.05**	-0.01	**-0.03**	**0.04**	**0.08**	**-0.09**	**0.04**	**0.07**	**-0.12**	0.01	**-0.16**	**-0.11**	**-0.12**	**0.05**	**1.00**

* Pearson(Spearman) correlation show above (below) the diagonal. Cells with fonts in bold are significant at 1 percent level.

Table 5 Pension Contributions and Earnings Quality

Depend variables: Discretionary accruals estimated from Jones Model for models1&2, and discretionary accruals estimated from Modified Jones Model for models3&4. Test variables: Total pension contributions (TotalPC), mandatory pension contributions estimated from Moody's (2006) (MC_MDYS), and discretionary pension contributions (DC_MOODYS) equal to firm's total pension plan contribution during year t minus firm's mandatory pension contribution estimated from Moody's (2006).

Variable	Model 1 Coefficient t-statistic	Model 2 Coefficient t-statistic	Model 3 Coefficient t-statistic	Model 4 Coefficient t-statistic
Intercept	-0.0164	-0.0057	-0.0015	0.0182
	(-1.11)	(-0.33)	(-0.10)	(1.02)
TotalPC	-0.1908		-0.2013	
	(-2.31)**		(-2.38)**	
DC_MOODYS		-0.3060		-0.3143
		(-2.84)***		(-2.85)***
MC_MDYS		-0.2703		-0.1889
		(-1.52)		(-1.04)
AGE	-0.0023	-0.0027	-0.0025	-0.0029
	(-3.66)***	(-3.79)***	(-3.85)***	(-4.00)***
BM	-0.0026	-0.0040	-0.0029	-0.0044
	(-5.50)***	(-5.51)***	(-6.01)***	(-5.93)***
BIG4	0.0022	0.0021	0.0025	0.0024
	(1.48)	(1.30)	(1.63)	(1.45)
CAPITAL	0.0460	0.0438	0.0322	0.0302
	(15.28)***	(12.95)***	(10.46)***	(8.71)***
DIV	-0.0004	0.0008	-0.0002	0.0010
	(-0.34)	(0.58)	(-0.12)	(0.70)
FIN	0.0037	0.0035	0.0050	0.0047
	(3.74)***	(3.14)***	(4.90)***	(4.21)***
GROWTH	-0.0107	-0.0137	0.0195	0.0182
	(-4.74)***	(-5.26)***	(8.43)***	(6.86)***
H_INDEX	0.0048	-0.0009	0.0094	0.0038
	(0.28)	(-0.05)	(0.54)	(0.21)
LEV	-0.0003	-0.0006	-0.0004	-0.0008
	(-1.25)	(-1.88)*	(-1.55)	(-2.26)**
LIT	-0.0012	-0.0028	-0.0006	-0.0024
	(-0.51)	(-1.10)	(-0.25)	(-0.89)
LOSS	-0.0126	-0.0120	-0.0133	-0.0127
	(-7.54)***	(-6.37)***	(-7.81)***	(-6.62)***
OWNER	-0.0001	-0.0001	0.0001	-0.0000

	(-0.19)	(-0.36)	(0.17)	(-0.13)
OpCashFlow	-0.4812	-0.4862	-0.4904	-0.4986
	(-61.88)***	(-55.21)***	(-61.74)***	(-55.29)***
OpCycle	0.0126	0.0124	0.0114	0.0111
	(10.17)***	(8.89)***	(8.96)***	(7.78)***
ROA	0.2761	0.2745	0.2901	0.2902
	(34.31)***	(29.69)***	(35.30)***	(30.65)***
RetEarnings	0.0123	0.0125	0.0129	0.0133
	(8.92)***	(7.51)***	(9.16)***	(7.78)***
SIZE	-0.0006	-0.0005	-0.0009	-0.0008
	(-1.78)*	(-1.39)	(-2.73)***	(-2.15)**
UnderFunded	0.0006	-0.0001	0.0009	-0.0001
	(0.56)	(-0.04)	(0.77)	(-0.04)
Year-fixed effects	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes
N	24,910	19,777	24,910	19,777
R-Square	0.2027	0.2057	0.2140	0.2180
Adj R-Sq	0.1995	0.2017	0.2108	0.2141
Model Pr>F	0.0000	0.0000	0.0000	0.0000

* Significant at 10%; ** Significant at 5%; *** Significant at 1% . Each of the continuous variables is winsorized at 1% and 99% to mitigate outliers. All variables are defined in Table1.

Table 6 Pension Contributions and Earnings Quality-Robustness Test
Depend variables: Discretionary accruals estimated from Jones Model for models1&2, and discretionary accruals estimated from Modified Jones Model for models3&4. Test variables: Mandatory pension contributions estimated from Campbell (2010), and discretionary pension contributions equal to firm's total pension plan contribution during year t minus firm's mandatory pension contribution estimated from Campbell (2010).

Variable	Model 1 Coefficient t-statistic	Model 2 Coefficient t-statistic	Model 3 Coefficient t-statistic	Model 4 Coefficient t-statistic
Intercept	-0.0154	-0.0161	-0.0004	-0.0012
	(-1.05)	(-1.09)	(-0.03)	(-0.08)
DC_PENSEXP	-0.2594		-0.2691	
	(-2.89)***		(-2.93)***	
DC_PENSPPC		-0.2459		-0.2401
		(-2.72)***		(-2.60)***
MC_PENSEXP	-0.0562		-0.0498	
	(-0.36)		(-0.31)	
MC_PENSPPC		-0.1074		-0.1220
		(-0.96)		(-1.07)
AGE	-0.0023	-0.0023	-0.0025	-0.0025
	(-3.69)***	(-3.70)***	(-3.88)***	(-3.89)***
BM	-0.0026	-0.0026	-0.0029	-0.0029
	(-5.47)***	(-5.45)***	(-5.98)***	(-5.97)***
Big4	0.0022	0.0022	0.0025	0.0025
	(1.44)	(1.47)	(1.59)	(1.62)
CAPITAL	0.0460	0.0459	0.0321	0.0321
	(15.26)***	(15.23)***	(10.43)***	(10.42)***
DIV	-0.0005	-0.0005	-0.0003	-0.0002
	(-0.41)	(-0.40)	(-0.21)	(-0.18)
FIN	0.0037	0.0037	0.0050	0.0050
	(3.73)***	(3.74)***	(4.89)***	(4.90)***
GROWTH	-0.0107	-0.0107	0.0195	0.0196
	(-4.72)***	(-4.71)***	(8.45)***	(8.45)***
H_INDEX	0.0051	0.0050	0.0097	0.0096
	(0.30)	(0.30)	(0.56)	(0.55)
LEV	-0.0003	-0.0003	-0.0003	-0.0004
	(-1.23)	(-1.26)	(-1.52)	(-1.56)
LIT	-0.0011	-0.0012	-0.0006	-0.0006
	(-0.50)	(-0.51)	(-0.25)	(-0.25)
LOSS	-0.0126	-0.0126	-0.0133	-0.0133
	(-7.55)***	(-7.57)***	(-7.82)***	(-7.84)***

OWNER	-0.0001	-0.0001	0.0000	0.0000
	(-0.25)	(-0.22)	(0.10)	(0.13)
OpCashFlow	-0.4818	-0.4816	-0.4911	-0.4907
	(-61.86)***	(-61.89)***	(-61.72)***	(-61.74)***
OpCycle	0.0126	0.0126	0.0114	0.0114
	(10.18)***	(10.19)***	(8.98)***	(8.98)***
ROA	0.2762	0.2763	0.2902	0.2902
	(34.33)***	(34.33)***	(35.32)***	(35.31)***
RetEarnings	0.0122	0.0123	0.0128	0.0129
	(8.87)***	(8.92)***	(9.11)***	(9.15)***
SIZE	-0.0005	-0.0005	-0.0009	-0.0008
	(-1.73)*	(-1.65)*	(-2.68)***	(-2.62)***
UnderFunded	-0.0002	-0.0000	-0.0000	0.0003
	(-0.15)	(-0.02)	(-0.01)	(0.25)
Year-fixed effects	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes
N	24,910	24,910	24,910	24,910
R-Square	0.2028	0.2028	0.2140	0.2140
Adj R-Sq	0.1996	0.1995	0.2108	0.2108
Model Pr>F	0.0000	0.0000	0.0000	0.0000

*Significant at 10%; ** Ssignificant at 5%; *** Significant at 1% . Each of the continuous variables is winsorized at 1 % and 99 % to mitigate outliers. All variables are defined in Table 1.