

**Why Do Firms Convert to Cash Balance Pension Plans?
An Empirical Investigation**

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ABSTRACT: In recent years, many corporations have replaced their traditional defined benefit plans with “cash balance” plans, defined benefit plans that share many of the characteristics of defined contribution plans. Cash balance plans have generated extensive coverage in the financial press and have been the subject of congressional hearings, but there has been little empirical evidence to date on the issues surrounding this pension innovation. This paper attempts to fill that gap. Comparing the sample of firms that convert their traditional defined benefit pension plans to cash balance format between 1985 and 2003 to the universe of defined benefit plan firms that do not convert, we document that pension service costs and average employee years to retirement are significant factors in the decision to convert to the cash balance format, supporting the claim that cash balance conversions may represent cost reduction measures that reduce benefits implicitly promised to employees. In addition, we find that cash balance firms are concentrated in service industries, where personnel costs are more salient. Overall, this paper contributes evidence relevant to the controversy regarding cash balance conversions and more generally to the literature on pension plans.

Key words: pension plans, pension conversions, postretirement benefits, implicit contracts

I. Introduction

Prior research has found some support for the Ippolito (1985) “implicit contract theory” on the role of pensions in the worker-firm relationship. This theory suggests that both pension plan terminations and conversions from defined benefit to defined contribution plans represent a transfer of wealth from employees to shareholders of the firm, violating an implicit contract with employees. In recent years, many corporations have replaced their traditional defined benefit pension plans with “cash balance” plans. Cash balance plans are technically defined benefit plans, but they share many of the characteristics of defined contribution plans. There has been considerable debate about the motivations of firms making these conversions and whether employees are better off after the conversions. In this paper we investigate if this pension plan innovation is simply a rational firm response to a labor market that values mobility or, alternatively, whether it taps into workers’ pension bond investment in the firm.

Often controversial, conversions of defined benefit plans to cash balance plans have generated extensive coverage in the financial press and have also been the subject of congressional hearings.¹ Proponents of cash balance plans assert that, because the accrued benefits are more portable, such plans are better suited to the present environment where employees change employers frequently. They also claim that such plans are easier for employees to understand than traditional defined benefit plans. Critics, however, allege that cash balance plan conversions are attempts by employers to renege on the benefits implicitly promised to their employees and that such conversions are particularly harmful to older employees with longer tenures. Concerns about age discrimination led the Treasury Department

¹ Several front page articles in the Wall Street Journal, starting in 1998 brought this issue to public attention. Interested readers are referred to the articles by Ellen Schultz listed in the references.

to impose a moratorium on cash balance plan conversions in 1999.^{2,3} If these concerns are addressed, either through new regulations or through legislation, the number of conversions to cash balance plans is likely to increase again.

We investigate some of the issues raised in the cash balance controversy by comparing the characteristics of firms that convert their traditional defined benefit plans to cash balance plans (“cash balance firms” hereafter) to those of the universe of defined benefit plan firms that do not effect these changes (“control firms” hereafter). Our results indicate that the probability of conversion to cash balance plans is significantly associated with the relative age of plan participants. Cash balance firms are characterized by employees who are closer to retirement on average, lending credence to concerns raised by opponents of these types of plans. In contrast, we do not find evidence consistent with claims by some firms that cash balance conversions are a response to labor markets that demand greater accommodations to employee mobility.

We find some indications that the decision to convert to cash balance plans is influenced by the magnitude of the pension service cost in the year prior to the change. Firms with high pension service cost are likely to perceive greater benefit from reductions in future service costs. Further, we also find that cash balance conversions are more common in service industries where personnel costs are more salient.

We believe that our study is the most comprehensive academic examination of the cash balance controversy. Our findings are likely to be of interest to policy makers and parties affected by this innovation (employees, retirees and firms). In particular, our findings may be of interest to the Treasury Department which has proposed regulations for cash balance

² Companies can adopt the cash balance format even when the moratorium is in effect. However, they do not receive the approval of the IRS. Without this approval, they may be subject to back taxes and penalties.

³ On December 10, 2002 the Treasury issued proposed regulations governing cash balance plans for public comment, and on February 2, 2004 the Treasury released its legislative proposals that provide guidance on significant issues for cash balance plans and conversions.

conversions, to Congress which is considering legislation on the issue and to the Financial Accounting Standards Board (FASB) which has added a cash balance pension project to its formal agenda. More generally, this study contributes to the literature on pension plans.

II. Institutional Background

Pension plans sponsored by U.S. employers can generally be characterized as either defined benefit plans or defined contribution plans. Traditional defined benefit plans entitle participants to an annuity of pension benefits at retirement that is usually a function of salary during their final years of employment (generally their average salary in the last three to five years), and their years of service with the employer.⁴ Employees in traditional defined benefit plans earn the major portion of their benefits in the latter part (often the last ten years) of their careers.⁵ Employers generally fund retirement benefits by making contributions that are tax deductible, subject to limits, to trusts specifically set up to pay pensions to eligible retirees. An important aspect of defined benefit pension plans is that the employer bears the risk of the pension plans' investments' performance. Defined benefit plans are generally covered by guarantees from the Pension Benefit Guaranty Corporation.

In a defined contribution plan, the employee often has a choice of whether to participate in the plan and, if so, how much to contribute to his/her retirement savings account. The employer generally matches some proportion of the employee's contribution. Both the employee's and the employer's contribution are usually invested in the capital market and the employee often has a choice of investment options. Upon retirement, the employee is entitled to the accumulation in his/her account. Unlike in defined benefit plans, the employee bears the risk of the investment

⁴ For instance a defined benefit plan may promise annual pension benefits of 1.25 percent of the average of salary during the final three years of employment for every year of service. An employee with 20 years of service would therefore receive an annual pension after retirement of 25% of the average salary in the last three years prior to retirement.

⁵ This proportion is even more pronounced in companies that offer subsidized early retirement benefits.

performance of assets in his/her retirement account. In addition, the employee earns benefits earlier in his/her career in a defined contribution plan.

In the past, large employers tended to sponsor defined benefit plans. Defined contribution plans have become more popular in recent years with many employers initiating or expanding such plans, claiming that they are better suited to the current environment of greater employee mobility. A deterrent to terminating over-funded defined benefit plans is that the surplus assets are subject to both income and excise taxes. Together, income and excise taxes can amount to over half of the surplus. Additionally, if a defined benefit plan is terminated, all plan participants are immediately vested. Converting the defined benefit plan to a cash balance format could be a means to achieve some of the benefits of a defined contribution plan without incurring the penalties associated with termination. Since cash balance plans are technically defined benefit plans, the change is considered a plan modification, not a termination, and therefore the penalties are avoided.

Under a cash balance plan, employees are assigned nominal accounts. These account balances are increased by pay credits (for instance, 3% of annual pay) and interest credits based on the account balance. The interest rate used to compute interest credits is often based on the yield on treasury bonds such as the 30-year or the one-year treasury bond although the plan assets may not be invested in these bonds. The interest credits are therefore independent of the performance of pension plan assets. In contrast, in a defined contribution plan the employee's account balance always equals the value of the pension plan assets earmarked for that employee and includes the actual investment earnings on that employee's investments. In a cash balance plan, the sum of the employees' account balances does not generally equal the total assets of the pension plan and the interest credits do not generally correspond to the actual investment

earnings of the plan. At retirement, an employee covered by a cash balance pension plan is entitled to the balance in his/her nominal account, either as a lump sum or an annuity.

Cash balance plans were first developed and promoted by the benefits and actuarial firm Kwasha Lipton (now part of PriceWaterhouseCoopers) and later by larger benefits consultant firms.⁶ Bank of America, one of the first adopters in 1985, claimed that the conversion resulted in savings of \$75 million in the first year.⁷ The trickle of adoptions that began in the late eighties and early nineties became a flood in the mid and late nineties. The Government Accounting Office estimates that approximately 19% of the Fortune 1,000 firms had adopted cash balance plans by 1999, and we were able to identify over 300 adoptions in our sample. While the early adoptions in the 1980's did not receive much attention, some of the adoptions in the late nineties generated controversy.⁸ Conversions to cash balance plans were also the focus of Congressional hearings in 1999 and again in 2003. In May 2003, The FASB considered proposals from an Emerging Issues Task Force constituted to examine accounting issues related to cash balance pension plans and in September 2003 voted to add the cash balance project to its formal agenda. Furthermore, on February 2, 2004 the Treasury released its legislative proposals regarding cash balance pension plans.

III. Prior Research

Several streams of pension research provide the framework for this study. In the economics literature, Ippolito (1985) finds support for “implicit contract” theory, according to which, employees become long-term bondholders of the firm and have strong incentives to remain with the firm until retirement because their cash compensation is lower than their marginal product in

⁶ See article by Ellen Schultz in the *Wall Street Journal*, December 28, 1999.

⁷ Statement by Bank of America's senior vice president of compensation and benefits at a 1993 Conference Board meeting.

⁸ One such case is IBM's conversion of its pension plan to a cash balance format in 1998 which was featured in several front page articles in the *Wall Street Journal* and other newspapers.

the early years of employment. Consistent with this theory, Mittelstaedt and Regier (1993) document a positive association between termination of defined benefit coverage and stock price reaction.

In another stream of literature, several researchers (e.g., Ippolito, 1986, Stone, 1987, Mittelstaedt, 1989, Thomas, 1989, and Petersen, 1992) examine competing explanations for why firms terminate their defined benefit pension plans. These studies provide support for three motivations for plan terminations: breach of the implicit contract with employees, financing considerations, and tax minimization. Ippolito (1986) finds that financing considerations, i.e., debt and borrowing, are the primary considerations in pension plan terminations. Stone (1987) also provides support for a financing rationale for pension terminations—she finds that firms are more likely to terminate overfunded pension plans as funds from operations and debt capacity decrease. Mittelstaedt (1989) considers financial weakening, susceptibility to takeover and tax status, and finds that financial weakening is the primary motivation for pension plan terminations. Thomas (1989) considers the roles of financing needs, tax effects, financial statement concerns (leverage and profitability), and wealth transfer considerations. He documents significant decreases in cash flows from operations in the years preceding the plan termination and lower profits at firms that terminate their pension plans and concludes that the need for cash is the most plausible explanation for plan terminations. Consistent with Myers and Majluf's (1984) financial 'pecking order' predictions, Thomas (1989) and Mittelstaedt (1989) also find that firms experiencing financial weakness first withdraw assets slowly from their pension plans by changing actuarial assumptions while those experiencing more severe financial weakness terminate their pension plans.

The prior research discussed so far pertains to pension plan terminations with asset reversions. Haw and Jung (1991) examine the financial characteristics (earnings, debt covenants, management incentive compensation, risk and financial structure) of firms that settle overfunded pension plans without asset reversions. Settlements without asset reversions are similar to cash balance conversions because they do not represent a source of financing to the firm. However, firms can include a portion of the deferred pension gain in net income in the year of the settlement, and, therefore, settlements provide an opportunity to substantially boost net income. Haw and Jung find that firms that experience an earnings decline or have restrictive debt covenants are more likely to settle overfunded pension plans, which indicates that settlement transactions are motivated by financial statement concerns.

Some contemporaneous work directly analyzes potential determinants of the cash balance plan conversion decision. Niehaus and Yu (2003) argue that the increase in 1990 in the excise tax on excess assets from terminated plans increased the cost of switching from defined benefit to defined contribution plans, creating greater incentives for firms with overfunded defined benefit plans to switch to cash balance plans instead. Cowan and Power (2003) find that firms with underfunded defined benefit pension are more likely to convert to cash balance plans, while Coronado and Copeland (2003) do not find a significant association between plan funding and the conversion decision.

Our paper is most closely related to Coronado and Copeland (2003), who also attempt to determine whether converters are motivated by changes in labor market conditions (as proponents claim) or by a desire to reduce benefit generosity (as critics suggest). They analyze a sample of 75 firms that convert to cash balance plans, concluding that industries with younger, more mobile workers and tighter labor markets have a greater concentration of converters, and

that conversion is not motivated by cost reduction considerations. Possible limitations of the Coronado and Copeland (2003) study include the relatively small sample and the use of industry-level rather than firm-level data to measure most of the independent variables of interest. We use a more comprehensive sample of converters and firm-level data, and find evidence more consistent with the critics rather than the proponents of the cash balance plan controversy. Specifically, our results indicate that converters are more likely to have a workforce that is on average closer to retirement and therefore more likely to lose rather than gain from the conversion. Mobility and turnover are not significantly associated with the conversion decision.

IV. Research Questions and Design.

Firms converting to cash balance plans claim that their objective is to render their pension plans more responsive to a workplace where the job tenure of an employee with any single employer is likely to be shorter than in the past, and lifetime employment with a single employer is increasingly rare. They also claim that the change makes them better able to attract and retain younger employees. Detractors however allege that conversions are primarily cost reduction mechanisms, which achieve the cost reductions at the expense of older employees.

In this paper we investigate the characteristics of firms that have converted their defined benefit pension plans to a cash balance format. This analysis enhances understanding of the motivations of firms that have made change and therefore contributes useful evidence to the debate on the subject.

We use logistic estimations to jointly investigate the factors associated with firms' decisions to convert traditional defined benefit pension plans to cash balance formats. Our sample consists of all firms identified as having defined benefit pension plans, with the dependent variable (CB) taking on the value 1 if the firm has converted to a cash balance plan, and 0 otherwise. Since the

decision to convert to the cash balance format is likely to have been made in the year prior to the actual conversion, we use data for the cash balance firms in the year prior to conversion.

Our base model is:

$$CB_{i,t} = \alpha + \beta_1 \text{YEARS_TO_RETIRE}_{i,t-1} + \beta_2 \text{SERVCOST}_{i,t-1} + \beta_3 \text{SERVICE_IND}_{i,t-1} + \beta_4 \text{ROE}_{i,t-1} + \beta_5 \text{SIZE}_{i,t-1} + \beta_6 \text{DC}_{i,t-1} + \beta_7 \text{UNEMP}_{i,t-1} + \beta_8 \text{FUNDING}_{i,t-1} + \beta_9 \text{MTR}_{i,t-1} + \beta_{10} \text{FUNDING}_{i,t-1} * \text{MTR}_{i,t-1} + \sum \text{YEAR}_i (1)$$

Where for firm i and year $t-1$:

YEARS_TO_RETIRE is the natural logarithm of the ratio of the projected benefit obligation (PBO) to the accumulated benefit obligation (ABO).⁹

SERVCOST is the ratio of the pension service cost to revenue for the year.

SERVICE_IND is a dummy variable that takes the value one when the firm's primary operations are in a service industry, zero otherwise.

ROE is the return on equity in the year.

SIZE is the natural logarithm of total assets of the firm at year end.

DC is the proportion of firms in firm i 's two digit SIC code who sponsor defined contribution plans.

UNEMP is the unemployment rate in the two-digit SIC code in which the firm operates.

FUNDING is the difference between plan assets and PBO in the year scaled by the PBO.

MTR is the after-financing marginal tax rate.

YEAR _{i} is a vector of dummy variables that take the value one when the observation pertains to year i and zero otherwise.

In the Ippolito (1985) framework, the independent variables proxy for the magnitude of the pension bond that employees have invested in the firm or the benefits to the firm from breaking the implicit contract with employees. Petersen (1992) finds that the likelihood of plan termination increases as the proportion of older employees who have longer tenure at the firm increases. The age distribution of plan participants, which affects the size of the pension bond, is the most significant determinant in pension plan terminations. Opponents of conversions to cash balance plans contend that these conversions will also tap into the pension bond investment of

⁹ The accumulated benefit obligation is the actuarial present value of pension benefits earned by employees as of the report date without considering future salary increases. The projected benefit obligation also incorporates increases in the size of the benefit due to likely future salary increases.

employees. If their claims are justified, the probability of conversion to cash balance plans should increase with the relative age of the workforce in the firm.

If, on the other hand, conversions are motivated by a desire to attract and retain younger employees, one would expect to see more conversions in firms with a higher proportion of younger employees. Since we do not have demographic data for the employees of individual firms, we use the natural logarithm of the ratio of the PBO to the ABO (YEARS_TO_RETIRE) as a proxy for the average number of future years of service for firms' employees. Ceteris paribus, this ratio is higher in firms with younger employees where years of future service is expected to be higher.¹⁰

Firms with higher pension expenses are likely to have greater incentives to reduce these expenses. In line with Petersen (1992), who finds a positive association between the likelihood of plan termination and pension expense per active employee, we therefore expect pre-conversion pension expense to be higher for converters. We focus on the service cost component of pension expense because this component, not being affected by the investment performance of pension plan assets, is less noisy than the total pension expense. SERVCOST is measured as the ratio of pension service cost to sales revenue.

Personnel-related costs are likely to be more salient for firms that are in labor rather than capital intensive service industries (e.g., service industries) where employee-related costs are a larger proportion of total costs. The dummy variable (SERVICE-IND), which takes the value one when the firm operates in a service industry and zero otherwise, proxies for this factor.

¹⁰ Subramanyam and Zhang (2000) estimate average years of future service as $\log(\text{PBO}/\text{ABO})/\log(1+\text{INCRC})$ where INCRC is the assumed rate of compensation increase. Since we find very little variation in INCRC in our sample and a number of instances where this variable is missing on Compustat, we use the numerator of the Subramanyam and Zhang variable as our proxy for years of future service.

The increased profitability from pension plan cost savings is likely to be most attractive to firms that are experiencing low profitability. We conjecture that firms that convert to cash balance plans are less profitable in the year prior to the change than firms that do not. Our proxy for firm profitability is the return on equity (ROE). In addition, the fixed costs associated with cash balance conversions might make these conversions more prohibitive to smaller firms. We use the natural logarithm of total assets (SIZE) to proxy for firm size.

Firms operating in industries with a greater preponderance of defined contribution plans might have greater incentives to convert to cash balance plans, so as to be better aligned with industry norms while avoiding technical termination of existing plans. We introduce the variable DC in our logistic regression to capture this construct. Of all firms in the industry with pension plans, DC measures the proportion with defined contribution plans, industry being defined by the two-digit SIC code.

Firms that have converted their pension plans to a cash-balance format contend that this change helps them to attract employees in tight labor markets. If this contention is accurate, we expect to see more cash balance conversions in industries and periods where unemployment is low. We introduce the variable UNEMP to proxy for this effect, where UNEMP is the unemployment rate in the industry in the year prior to conversion, industry being defined by the two-digit SIC code.

Over the past few decades, firms have exhibited a preference towards defined contribution plans rather than defined benefit plans. If a firm's defined benefit pension plan is over-funded, terminating it and initiating a defined contribution plan instead subjects the firm to sizable tax penalties. In contrast, converting the defined benefit plan to a cash balance format is considered a modification of the old plan, not a termination, and, thus, allows the firm to avoid these

penalties. We predict that firms with over-funded plans are more likely to convert to cash balance formats to avoid the tax penalties associated with termination. We proxy for the levels of pension plan funding using the variables FUNDING, MTR and their interaction. FUNDING is the difference between pension plan assets and the projected benefit obligation (PBO) scaled by the PBO,¹¹ and MTR is the after-financing marginal tax rate for the firm in the year prior to conversion. We hypothesize that firms that have high values of FUNDING and/or MTR would be more likely to convert rather than terminate their plans.

We also include an indicator variable for each calendar year to control for trends and macro-economic factors, such as the state of the economy, or regulatory factors that could affect the rate of cash balance conversions.

In addition to our base model (1), we estimate an augmented model that includes more detailed information provided by firms in their Form 5500 filings with the Department of Labor (DOL). It is likely that the variable UNEMP, measured at the industry level, is too noisy to measure the worker mobility construct at the level of the firm. We therefore use Form 5500 data to construct an alternate firm-level variable (TURNOVER), defined as the ratio of active plan participants who left the plan in the year preceding conversion to the total number of plan participants. We also include in the augmented model an additional proxy, ACTIVE, for the age distribution of plan participants. ACTIVE is measured as the ratio of active to total plan participants in the year preceding conversion, using data provided in the Form 5500 filing.

Form 5500 also includes information on unionization data and actuarial firm identity. Ippolito (1986) finds that firms that terminate their pension plans are less likely to have

¹¹ Results are insensitive to the use of an alternative proxy for the funding variable, based on the accumulated benefit obligation (ABO).

unionized workers. We include the variable UNION, measured as the proportion of the firm's employees who are subject to collective bargaining, to capture the relative bargaining power construct.¹²

Media reports and Congressional hearings testimony have questioned the role of larger benefits consulting and actuarial firms in promoting cash balance conversions, suggesting that these firms have a vested interest in increasing consulting revenue. To investigate whether being a client of one of the larger actuarial firms is related to the conversion decision, we introduce the dummy variable ACTUARY in the augmented model. ACTUARY takes the value 1 if the firm is a client of one of the eight largest actuarial firms (in terms of number of plans served in 1998), and zero otherwise.¹³

V. Sample Selection

We use Form 5500 filings for the years 1998 and 1999 to identify all firms with defined benefit plans. Using the COMPUSTAT database, we determine the identity of the publicly traded firms that sponsor these defined benefit plans by matching the employer identification number (EIN) of the plan sponsor. This constitutes our total sample, including both cash balance converters and non-converters.

We identify our initial sample of cash balance firms from multiple sources. First, we perform a word search of firms' SEC filings for mentions of cash balance pension plans conversions.¹⁴ We extract the names of additional firms from a list of cash balance firms compiled by an employee group that maintains a website with information on cash balance

¹² Ellen Schultz (WSJ, January 21, 1999) documents that in some companies that have converted to cash balance plans, unions have negotiated better benefits for unionized workers.

¹³ The use of Form 5500 data results in significant reduction in sample size. In the interests of parsimony, we exclude the tax-related variables that also cause significant sample reduction when analyzing the model augmented with Form 5500 data. The tax-related variables are insignificant in the base model estimation, and are not significantly correlated with the Form 5500 variables.

¹⁴ Firms are required to disclose major changes to their pension plans in their SEC filings. A conversion to a cash balance format is likely to qualify as a major change requiring disclosure.

conversions.¹⁵ The Department of Labor provides a third source of data. We scan the Form 5500, filed by sponsors of pension plans with the DOL, for names of pension plans that contain the term “cash balance.” Finally, we identify a few firms from newspaper and other media reports on the cash balance controversy. Table 1 describes our sample selection process. From our initial sample of firms with cash balance pension plans, we eliminate those that are not publicly traded (non-profits, private companies etc.) and are left with a sample of 390 firms. We are able to identify the year of the pension plan conversion for 323 of these firms. We are able to obtain COMPUSTAT data for 278 of these firms. These firms constitute our primary cash balance sample.¹⁶ The total sample less our identified cash balance firms gives us our first control sample of 1166 firms. We randomly assign years to control firms, using a random number generator, so that the proportion of the control sample in each year equals that of the cash balance sample in the same year.

For some of our analyses we use a matched-pair design instead of utilizing the total control sample, to better control for industry and size effects that might drive some of our results. This “matched sample” consists of matched pairs of cash balance and non-cash balance firms, where the matching is done on industry and size. We first attempt to find matches within the same four-digit SIC code. If multiple matches are found, we pick the firm closest in size as measured by total assets. If no match is found, we repeat the process at the three- or two-digit SIC code level, if necessary. We found matches for 268 cash balance firms using this procedure.

¹⁵ We accessed this website <http://www.cashpensions.org> on 1/16/2001.

¹⁶ To the best of our knowledge this is the most comprehensive sample of conversions to cash balance plans used in any study. In comparison, Coronado et al. (2003) use a sample of 75 cash balance firms.

We obtain accounting data from the COMPUSTAT database, and pension plan data from the DOL Form 5500 filings for the years 1993 to 2000.¹⁷ We obtain data on unemployment rates across various industries in our sample period from the Bureau of Labor Statistics. MTR data come from John Graham's database of marginal tax rates.

VI. Descriptive Statistics and Empirical Tests

Industry Composition

We use two-digit SIC codes to assign sample firms to 65 industry classifications. Table 2 presents statistics that describe the distribution of both the cash balance and the control firms across industries. While the distribution across industries for both samples is similar for most industries, a few differences are apparent. Firms that convert their defined benefit pension plans into cash balance plans are concentrated in the communications, utility, banking, business services, insurance and retailing industries. In general, cash balance firms seem to be over-represented in service industries and slightly under-represented in manufacturing industries with the following exceptions: construction, coal mining and production of agricultural crops.

Year of Conversion to Cash Balance Plans

Table 3 provides an analysis of the number of conversions to cash balance plans by year. The earliest conversion in our sample is by Bank of America in 1985. The largest number of conversions (19) in the first ten years was in 1989, which was shortly after SFAS 87 "Employers' Accounting for Pensions" became effective for most firms. This standard changed the measurement of the pension expense and the pension obligation for many firms and consequently, some may have invoked changes to reduce the magnitude of these items. This was also shortly after the provisions regarding pensions in the Tax Reform Act of 1986 and the

¹⁷ Due to a lag of about two to three years in the availability of Form 5500 data from the DOL, 2000 was the most recent year for which Form 5500 data was available.

Omnibus Budget Reconciliation Act of 1987 became effective.¹⁸ The number of conversions declined in subsequent years before accelerating in the mid-nineties. The observed increase could be related to the boom in the capital markets during this period, which caused many pension plans to become over-funded. The number of conversions peaked in 1998 at 51. The dramatic decline in the number of conversions since 1999 may be attributable to the moratorium imposed by the Treasury on approvals for cash balance conversions in 1999 and the adverse publicity that cash balance conversions have received.

Financial Ratios and Descriptive Statistics.

Table 4 presents data on selected variables and ratios across cash balance and matched control firms where the matching was done first on industry and then on size as measured by total assets. The numbers pertain to the year prior to the conversion for the cash balance firms. We test differences between the samples for statistical significance using the paired t-test and the Wilcoxon signed ranked test.

Employees at cash balance firms are considerably older than those at their matched counterparts. `YEARS_TO_RETIRE` is lower for cash balance firms and the difference is significant at better than the 1% level in both the t-test and the Wilcoxon signed rank test. `ACTIVE` too is significantly lower for the cash balance sample in the Wilcoxon test. However, we do not find significant differences in employee turnover between the matched firms. Overall, univariate test results do not support claims that the conversion decision was a response to the needs of a younger, more mobile workforce.

¹⁸ The tax reform act of 1986 applied a 10 percent excise tax on surplus assets when overfunded plans were terminated. This made pension terminations more costly and may have increased the attractiveness of cash balance conversions as an alternative. The Omnibus Budget Reconciliation Act of 1987 (OBRA87) lowered the maximum limit up to which contributions by the employer to pension plans are tax deductible to 150% of the current liability.

We also do not find evidence at the univariate level that the conversion decision is linked to the magnitude of service costs, the funding or unionization status or the identity of actuarial firms. We do find some evidence that cash balance firms are less profitable than the control firms (median ROE of 11.39% versus 12.95% and median ROA of 5.03 versus 5.64), weakly consistent with cash balance conversions being part of a strategy to improve profitability.

Statistically significant differences in the median and mean values of SIZE and number of employees between the cash balance firms and the matched control firms indicate that the cash balance firms are considerably larger than the control firms, even after our attempt to match on size. This evidence is indicative of significant fixed costs associated with cash balance conversions acting as a deterrent for smaller firms. However, market capitalization does not differ significantly between the matched firms.¹⁹

We also find no significant differences across cash balance and control firms in the pension discount or compensation increase rate assumptions, or in the median value of the long-term return on plan assets assumption.

Multivariate Tests.

As mentioned earlier, we perform our multivariate analyses using both the full control sample and a matched-pair sample for additional robustness. Correlations between the independent variables (not reported) were not high enough to warrant concern, none of the correlation coefficients exceeding 0.33 in absolute value.

Logistic Estimation Results Using the Full Control Sample

Table 5 presents the results of the logistic estimation of both our base model and the augmented model using Form 5500 data. To control for industry effects, the independent

¹⁹ When we match on industry alone, the values of total assets, market capitalization and number of employees of cash balance firms are more than double the corresponding values for their matched counterparts.

variables are mean-differenced by industry, defined by the two-digit SIC code. The models include dummy variables for years to control for macro-economic factors that could affect the decision to convert to cash balance plans. For the sake of brevity we do not report the coefficients and p-values associated with these dummy variables. The independent variables in the logistic regressions are winsorized at the 1% and the 99% levels to reduce the impact of outliers.

Both models have significant explanatory power, and we reject the null hypothesis that the coefficients are jointly zero at less than the 0.001 level in both cases. `YEARS_TO_RETIRE`, is a proxy for the average years to retirement in each firm. The coefficient on this variable is negative, and it is significant at better than the 0.01 level in both models, indicating that firms whose employees are closer to retirement are more likely to convert to cash balance plans and supporting the breach of implicit contract hypothesis. Model (2) also includes a different proxy for employee age distribution, `ACTIVE`, the ratio of active employees to all defined benefit pension plan participants. This variable is not statistically different from zero at conventional levels.²⁰

The coefficient on `SERVCOST` is positive and significant at less than the 5% level in both models, consistent with our hypothesis. Reductions in future pension costs are likely to be of greater concern for firms that currently have a high level of pension expenses. The coefficient of `SERVICE-IND` is also positive and significant at less than the 1% level in both estimations, consistent with our predictions. Human capital tends to be the main resource in these industries and employee costs such as pension costs likely have greater salience.

²⁰ After SFAS 132 in 1998, the ABO is only required to be disclosed if the firm has an additional minimum pension liability. ABO is not disclosed by most firms after this date. In robustness checks we investigate the impact of excluding the `YEARS_TO_RETIRE` variable from the logistic regression. Results for the other variables are very similar to those currently reported.

ROE has a negative coefficient as hypothesized, but it is not statistically significant at conventional levels. When we control for industry and other factors, firm profitability does not appear to play a major role in cash balance conversions.

Our univariate tests reveal that firms that convert to cash balance format are larger than the control firms, and we find similar results in our multivariate models. SIZE is significant at less than the 1% level in both models. The probability of converting to the cash balance format increases as firm size increases. Fixed costs associated with conversion to cash balance formats might inhibit smaller firms from converting or, alternatively, large firms might have bigger cost savings from conversion.

Contrary to our hypothesis, the coefficient on DC is negative and significant, i.e., firms operating in industries characterized by higher proportions of defined contribution plans are *less* likely to convert to cash balance plans. Rather than moving closer to industry norms, it appears as if converters might be covertly moving away from more generous industry norms.

As discussed earlier, cash balance conversions have been positioned as a response to a labor market where employees value mobility. This would suggest that converters would be operating in industries with low unemployment and high employee turnover. Empirical results do not support this contention. UNEMP is not statistically significant, indicating conversions are not associated with the unemployment rate in the industry. Additionally, we find no evidence that firms experiencing high employee turnover are more likely to convert to cash balance plans. TURNOVER, the pre-conversion year ratio of pension plan members who leave the firm to the total number of plan participants, is not statistically significant.²¹

²¹ Coronado et al. (2003) report in one of their analyses that cash balance conversions are positively related to industry level measures of employee mobility. However, they only find this result when they also include industry dummies in their model. Since their measure of employee mobility is at the industry level, there is likely to be a

We hypothesize that firms with over-funded plans might be more likely to convert to cash balance plans to avoid the tax consequences of termination, especially if they faced higher marginal tax rates. We do not find support for this hypothesis. FUNDING, MTR and FUNDING*MTR are all statistically insignificant.

UNION, the proportion of the firm's employees covered by collective bargaining agreements, proxies for the possibility that union opposition might constrain firms from converting to cash balance plans. Our results do not support this prediction. The coefficient of UNION has the predicted sign, but it is not statistically significant at conventional levels. Some media reports suggest that because of the complexity of the change, union officials were unable to recognize that cash balance conversions were not in their members' best interest. Reports also suggest that, in some cases, unions were able to extract other concessions from management at the time of conversion that might have made them more favorably disposed to conversions.²²

ACTUARY is a dummy variable that takes the value one when the actuarial firm that performs the firm's pension plan's actuarial work is one of the eight largest actuarial firms, measured by the number of their clients. Reports in the financial press suggest that the larger actuarial firms actively promote cash balance conversions. This variable is also not statistically significant at conventional levels. We do not find evidence, therefore, that specific actuarial firms are associated with cash balance conversions.

Logistic Estimation Results for the Matched-Pair Sample

The concentration of cash balance firms in specific industries suggest that industry factors could be important in influencing cash balance conversions. In the tests described in the

high degree of collinearity between their mobility measure and the industry dummies which might contribute to their results. In contrast, we use a firm specific measure of employee mobility.

²² See article in the Wall Street Journal, January 21, 1999.

previous paragraphs, we attempt to control for industry by mean-differencing the independent variables by industry. As an alternative control for industry factors, we repeat our analyses pairing each of our cash balance firms to a control firms in its industry that matches its size as closely as possible. Table 1 describes the matching process. Since the firms are matched by industry we exclude from the analysis variables that are defined at the industry level such as UNEMP and DC. The independent variables in the logistic estimation are the difference in variables across each matched pair. The results of these estimations are presented in Table 6. Since the inclusion of MTR and the Form 5500 variables in the model result in a substantial decrease in sample size, we also present results excluding these variables.

Despite our attempts to control for size in the matching procedure, we find that SIZE is significant at less than the 1% level in all estimations, consistent with our previous results. Also consistent with our earlier results, we find that the age distribution of employees is associated with the conversion decision. YEARS_TO_RETIRE is negative in all estimations and significant at conventional levels in models (3) and (4). In model (5) this variable is only marginally significant in one-tailed tests, but our second proxy for the age distribution, ACTIVE, is now significant at the 2% level.

Again, we do not find evidence that cash balance conversions are a response to employee mobility – the sign of the coefficient on TURNOVER is negative although statistically insignificant. Also consistent with earlier results, we do not find evidence that unionized firms and those using the largest actuarial firms are more likely to convert. We find some indications that firms with over-funded pension plans who face high marginal tax rates might be more likely to convert to cash balance plans. FUNDING*MTR is positive but statistically significant only at the 9% level.

Overall, our results in this section are consistent with firms with employees who are closer to retirement choosing to convert to cash balance plans, perhaps to decrease their future pension obligations.

Sensitivity Tests

Because conversions to cash balance plans could involve transfers of wealth from employees to shareholders, we also examine whether firms undertaking cash balance conversions have a history of poor employee relations. We construct a measure of employee relations (EMPREL) as a composite of ratings of different facets of employee relations compiled by KLD Research & Analytics Inc. These facets include union relations, layoff and workforce reduction records, profit-sharing policies, employee involvement in management and quality of retirement benefits. We find this variable is not statistically significant in our logit model and conclude that cash balance conversions are not related to the quality of employee relations.

We use YEARS_TO_RETIRE, the logarithm of the ratio of the PBO to the ABO as our proxy for the relative age of firms' employees. Subramanyam and Zhang divide this variable by the logarithm of (1+assumed rate of compensation increase) to compute their proxy for relative employee age. When we use this alternative proxy for relative age, our results are similar to those reported. Because of the substantial reduction in sample size due to missing data on the assumed rate of compensation increase on COMPUSTAT, and lack of variation in this variable when it is available, we do not use this alternative proxy in our main analysis.

Research on pension plan terminations and reversions (e.g., Ippolito, 1986, Stone, 1987, Thomas, 1989, Mittelstaedt, 1989) finds that financing and cash flow considerations are the primary motivations for these actions. Unlike pension reversions, cash balance conversions are not an immediate source of financing and cash flow. Nevertheless, we examine the role of

financing and cash flow considerations in cash balance conversions. We introduce cash flow variables (cash flow from operations, cash flow from investing) and variables that proxy for the ease with which firms can undertake additional borrowing (debt to assets ratio, ratio of fixed to total assets, ratio of intangible to total assets) in the logistic regression. The only one of these additional variables that was statistically significant at conventional levels was the ratio of intangible to total assets. However, the sign on this variable was opposite to what we would expect if firms had undertaken conversions because sizable intangible assets constrained their borrowing. Cash balance conversions do not seem to be driven by a need for immediate cash flow and do not substitute for borrowing in financing the firm.

In other sensitivity tests, we use natural logarithm of market capitalizations of firms as the size proxy in the logistic regressions instead of the natural logarithm of total assets. Results are qualitatively similar. Results are also similar when we use return on assets as the profitability proxy in place of return on equity.

We also investigate the sensitivity of results to using the pension expense instead of pension service cost in the logistic regressions. Pension expense is not statistically significant at conventional levels. Pension expense includes gains and losses on the investment of pension assets, interest costs and amortization of prior service costs, in addition to service costs. We conjecture that these additional items make pension expense a noisy proxy for the perceived cost of pensions.

Some benefits consulting firms have suggested that firms might have converted to cash balance plans to get relief from limits on the tax deductibility of pension funding imposed by the Omnibus Budget Reconciliation Act of 1987 (OBRA'87).²³ Prior to OBRA'87, contributions to pension plans were tax deductible up to the full funding limit (corresponding to the projected

²³ See 'Unfolding of a predictable surprise' by Watson Wyatt Worldwide.

benefit obligation (PBO)). OBRA'87 limited tax deductibility to 150% of the current liability (which corresponds to the ABO, the accumulated benefit obligation). Converting to cash balance plans, could for some firms, alleviate this constraint by increasing the current liability. We introduce a dummy variable in the logistic regression that takes the value one for all firms where the PBO is greater than 150% of the ABO in the year prior to conversion. The coefficient on this dummy variable is not statistically significant at conventional levels in our models. Our results, therefore, do not indicate that OBRA'87 is a major driver of the conversion decision.

We also examine the possibility that using a single dummy variable for all eight of the largest actuarial firms is too broad a categorization and obscures the effect of individual actuarial firms. We introduce individual dummy variables for each of the eight largest actuarial firms. These dummy variables are not statistically significant, again indicating the absence of actuarial firm specific effects. Similarly, defining ACTUARY as a dummy variable when the actuarial firm is one of the four largest (instead of eight largest) does not change our results.

Changes in Pension Variables over Time.

Our results so far suggest that cash balance conversions could be part of a strategy to reduce the future pension obligation and to reduce pension costs. In this section we examine changes in variables that proxy for these effects in the years surrounding the conversion. We examine these variables for both the cash balance firms and the matched sample of non-cash balance firms. If the strategy is successful, we should see differences between samples on these variables in the years following the conversion.

A company's conversion from a traditional defined benefit plan to a cash balance plan generally constitutes a negative plan amendment as per SFAS 87. The positive effects of this amendment on financial statements are recognized as a reduction in prior service costs. To

recognize the reduction in the projected benefit obligation due to the amendment, the company first reduces the balance of any existing unrecognized prior service cost. Any excess becomes a negative unrecognized prior service cost. We examine changes in the unrecognized prior service cost in the years surrounding the conversion. We perform this investigation for the samples of cash balance and matched firms over a seven-year period surrounding the conversion year (for years -3 through year +3, with 0 being the conversion year). We scale changes in unrecognized prior service costs between years by the PBO in that year. We present the results of this analysis in Panel A of Table 7. Cash balance firms had a more negative change in unrecognized prior service costs than their matched firms in the year of the conversion. This is consistent with firms anticipating that the conversion will reduce their future pension obligation. Since the unrecognized prior service cost is amortized in future years, this would have a positive impact on cash balance firms' income in the future.

We investigate the pattern of increases around the conversion year in PBO and pension service cost for both the cash balance and the matched firms, and report results in panel B of Table 7. Both PBO and service costs for each firm were scaled by their values in the year of conversion and are expressed as percentages. For the most part, differences between these variables across the two samples are insignificant. It is possible that converters would have had higher PBO and service costs absent the conversion. Alternatively, many firms that converted to the cash balance format may have increased the generosity of other facets of their pension plans in the face of employee resistance to the conversions.

Summary and Conclusions

Conversions of traditional defined benefit pension plans to cash balance plans have generated considerable controversy, have been featured extensively in the press, and have been the focus of

congressional hearings. Proponents of cash balance plans assert that these plans are better understood and appreciated by employees than traditional defined benefit plans. They also claim that employees in today's more mobile workforce benefit from cash balance plans because they are more portable. Critics, however, argue that the primary motivation in making the change is cost savings, both in terms of required contribution of assets to the pension plan and the accounting pension expense that is reported on the income statement. They also point out that, in the absence of transition provisions, the cost savings are achieved at the expense of older workers with longer tenure.

This paper is an attempt to discriminate between these two competing explanations for cash balance conversions. We identify a sample of firms that convert their traditional defined benefit pension plans to a cash balance format and a control sample of firms with defined benefit pension plans that do not make the change. By analyzing these two samples, we determine the characteristics of firms that convert and provide insight regarding the motivations for cash balance conversions.

We find indications that the workforce of firms that undertake conversions to cash balance plans has had a longer tenure with the firm, on average. Our results lend credence to the claims of cash balance conversion opponents that firms benefit from these conversions at the expense of older workers. We also do not find evidence supporting firms' claims that cash balance conversions are a response to tighter labor markets and a more mobile workforce.

Our results on the age distribution of employees and the relation of conversions to employee mobility differ from those reported in Coronado et al. (2003). The difference in our results may be attributed to several factors. We believe that we have a more comprehensive sample of firms that convert to cash balance plans. We use firm characteristics in the year prior to the conversion

in our analysis. They use firm characteristics in a single year (1998) which could be several years after or prior to the conversion. Finally they use industry specific proxies for employee mobility and the age distribution of employees while we use firm-specific measures.

We investigate whether cash balance conversions result in a discernible reduction in the unrecognized prior service costs that will be reflected in future pension expense. We find indications that unrecognized prior service cost does decline in the year of conversion.

Overall, our analysis indicates that firms with a higher proportion of older workers are more likely to convert to cash balance plans, particularly if they are large and operate in service industries. Our results are consistent with claims that cash balance conversions may be cost reducing mechanisms that transfer wealth from employees to shareholders. In the Ippolito (1985) framework, employees in these firms have invested in the pension bond of their employers. By converting to cash balance plans, employers appear to have broken the implicit contract with their employees and tapped into the pension bond.

Our results suggest that firms attempted to reduce their pension obligations and boost their future income through cash balance conversions. However, we are unable to find significant differences between cash balance firms and the matched control sample in the growth of the PBO and in pension service costs in the years after conversion. It is possible that converters might have fared worse than control firms had it not been for the conversion. Alternatively, firms that converted to cash balance plans might have increased the generosity of other facets of their pension plans in the face of opposition from employees and regulators.

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Table 1
Sample selection for cash balance firms

Number of firms identified as having converted to cash balance plans	390
Less firms where year of conversion could not be determined	67
Less firms where COMPUSTAT data was not available	<u>45</u>
Sample for tests not requiring matching	278
Less firms where matches could not be found	<u>10</u>
Sample for tests requiring matching	268
Composition of the matched-pair sample	
Matches at the four-digit SIC code level	226
Matches at the three-digit SIC code level	20
Matches at the two-digit SIC code level	<u>22</u>
Total	268

Table 2
Distribution of Sample across Industries

Two digit SIC code	SIC Code description	Cash Balance Sample		Full Control Sample		Cash balance as % of firms with defined benefit plans in each industry
		No.	% of CB sample	No.	% of control sample	
1	Agriculture production – crops	2	0.5	4	0.3	33
2	Agricultural produce-livestock, dairy	0	0	1	0.1	0
7	Agriculture services	0	0	1	0.1	0
10	Metal mining	1	0.3	5	0.4	17
12	Coal mining	2	0.5	3	0.3	40
13	Oil and gas extraction	1	0.3	21	1.8	5
14	Mining, quarry non-metallic minerals	0	0	4	0.3	0
15	Bldg. Construction-general contractor	2	0.5	3	0.3	40
16	Heavy construction excl. buildings	2	0.5	1	0.1	67
17	Construction-special trade	0	0	1	0.1	0
20	Food and kindred products	7	1.8	48	4.1	13
21	Tobacco products	1	0.3	5	0.4	17
22	Textile mill products	1	0.3	13	1.1	7
23	Apparel and other finished products	3	0.8	18	1.5	14
24	Lumber&wood products excl. furniture	1	0.3	8	0.7	11
25	Furniture and fixtures	2	0.5	16	1.4	11
26	Paper and allied products	6	1.5	28	2.4	18
27	Printing, publishing & allied	9	2.3	23	2.0	28
28	Chemicals & allied products	22	5.6	74	6.3	23
29	Petroleum refining & related industries	6	1.5	16	1.4	27
30	Rubber & misc. plastic products	7	1.8	34	2.9	17
31	Leather & leather products	0	0	6	0.5	0
32	Stone, clay, glass & concrete products	4	1.0	22	1.9	15
33	Primary metal industries	8	2.1	38	3.3	17
34	Fabricated metal excluding machinery	14	3.6	45	3.9	24
35	Industrial, comm. m/c, computer eqpt.	20	5.1	82	7.0	20
36	Electrical equipment excl. computers	18	4.6	53	4.5	25
37	Transportation equipment	11	2.8	58	5.0	16
38	Measuring instr., photo gds, watches	14	3.6	38	3.3	27
39	Misc. manufacturing industries	2	0.5	19	1.6	10
40	Railroad transportation	0	0	5	0.4	0

Two digit SIC code	SIC Code description	Cash Balance Sample		Full Control Sample		Cash balance as % of firms with defined benefit plans in each industry
		No.	% of CB sample	No.	% of control sample	
41	Transit & passenger transport	0	0	1	0.1	0
42	Motor freight, transport, warehousing	0	0	6	0.5	0
44	Water transportation	1	0.3	3	0.3	25
45	Transportation by air	0	0	8	0.7	0
47	Transportation services	2	0.5	4	0.3	33
48	Communications	16	4.1	42	3.6	28
49	Electric, gas, sanitary services	47	12.1	85	7.3	36
50	Durable goods – wholesale	6	1.5	26	2.2	19
51	Non-durable goods-wholesale	5	1.3	19	1.6	21
52	Bldg material, hardware, grdn – retail	1	0.3	2	0.2	33
53	General merchandise stores	7	1.8	8	0.7	47
54	Food stores	7	1.8	19	1.6	27
55	Auto dealers, gas stations	0	0	3	0.3	0
56	Apparel & accessory stores	2	0.5	5	0.4	29
57	Home furniture & equipment stores	0	0	3	0.3	0
58	Eating and drinking places	6	1.5	6	0.5	50
59	Miscellaneous retail	4	1.0	9	0.8	31
60	Depository institutions	50	12.8	86	7.4	37
61	Non-depository credit institutions	7	1.8	10	0.9	41
62	Security & commodity brokers	1	0.3	6	0.5	14
63	Insurance carriers	26	6.7	36	3.1	42
64	Insurance agents, brokers & service	4	1.0	7	0.6	36
65	Real estate	1	0.3	5	0.4	17
67	Holding, other investment offices	4	1.0	16	1.4	20
70	Hotels, other lodging places	3	0.8	4	0.3	43
72	Personal services	2	0.5	2	0.2	50
73	Business services	15	3.8	23	2	39
75	Auto repair, services, parking	2	0.5	2	0.2	50
78	Motion pictures	0	0	3	0.3	0
79	Amusements, recreation	0	0	2	0.2	0
80	Health services	3	0.8	2	0.2	60
82	Educational services	1	0.3	0	0	100
87	Engineering, accounting., R&D, mgmt. & public relations services	1	0.3	11	0.9	8
99	Non-classifiable establishments	0	0	9	0.8	0
	Totals	390	100%	1166	100%	

Table 3
Cash Balance Conversions by Year

Year	Number of Conversions	Percentage of Total Conversions
1985	2	0.6
1986	6	1.9
1987	8	2.5
1988	7	2.2
1989	19	5.9
1990	7	2.2
1991	4	1.2
1992	13	4.0
1993	9	2.8
1994	12	3.7
1995	17	5.3
1996	30	9.3
1997	44	13.6
1998	51	15.8
1999	44	13.6
2000	26	8.1
2001	11	3.4
2002	12	3.7
2003	1	0.3

The sample includes the 323 conversions to cash balance plans for which the year of the conversion could be determined.

Table 4
Univariate Tests for Matched-Pair Differences between Cash Balance and Control Firms

Variable/Ratio	Sample	Mean	75%	Median	25%	N
YEARS_TO_RETIRE	CB	0.155***	0.208	0.134###	0.069	126
	Non-CB	0.217***	0.247	0.195###	0.102	126
ACTIVE	CB	0.572	0.717	0.558##	0.465	102
	Non-CB	0.605	0.738	0.642##	0.514	102
TURNOVER	CB	0.110	0.155	0.091	0.047	100
	Non-CB	1.275	0.133	0.083	0.033	100
SERVCOST	CB	0.64	0.73	0.51	0.30	164
	Non-CB	0.56	0.70	0.48	0.27	164
FUNDING	CB	0.105	0.207	0.054	-0.075	187
	Non-CB	0.064	0.188	0.040	-0.125	187
(Plan assets-ABO)/ABO	CB	0.299	0.406	0.212	0.089	126
	Non-CB	0.310	0.469	0.241	0.044	126
MTR (%)	CB	25.5**	35.0	34.5##	7.7	127
	Non-CB	29.2**	35.0	35.0##	32.2	127
UNION	CB	26.6	54.2	0.0	0.0	102
	Non-CB	28.1	62.0	0.0	0.0	102
ACTUARY	CB	0.771	1.000	1.000	1.000	105
	Non-CB	0.819	1.000	1.000	1.000	105
ROE (%)	CB	4.04	16.14	11.39##	6.59	255
	Non-CB	10.32	17.81	12.95##	8.78	255
Return on assets (%)	CB	4.84	7.26	5.03	2.93	209
	Non-CB	5.37	7.65	5.64	3.22	209
SIZE	CB	7.92***	9.04	7.76***	6.73	257
	Non-CB	7.61***	9.02	7.45***	6.20	257
Logarithm of market capitalization	CB	7.26	8.62	7.25	5.97	199
	Non-CB	7.09	8.39	6.93	5.91	199
Number of employees	CB	21,382	22,400	7,215##	2,825	225
	Non-CB	18,225	16,100	6,100##	2,170	225
Pension discount rate (%)	CB	7.41	7.75	7.25	7.00	135
	Non-CB	7.44	7.75	7.50	7.15	135
Assumed rate of compensation increase	CB	4.75	5.00	4.70	4.38	108
	Non-CB	4.66	5.00	4.53	4.25	108
Assumed long-term return on plan assets	CB	8.98*	9.50	9.00	8.50	126
	Non-CB	8.78*	9.50	9.00	8.25	126

*** Difference in means between matched firms significant at the 1% level.

** Difference in means between matched firms significant at the 5% level.

* Difference in means between matched firms significant at the 10% level.

Difference between matched firms significant at the 1% level in the Wilcoxon signed rank test.

Difference between matched firms significant at the 5% level in the Wilcoxon signed rank test.

Difference between matched firms significant at the 10% level in the Wilcoxon signed rank test.

Notes:

Cash balance firms and non-cash balance firms are matched on industry and size.

YEARS_TO_RETIRE is the natural logarithm of PBO/ABO.

ACTIVE is the ratio of active participants to total participants in the firm's defined benefit plans.

TURNOVER	is the ratio of the number of plan participants who separated from the firm to the total number of plan participants.
SERVCOST	is the ratio of the pension service cost to revenue for the year.
FUNDING	is $(\text{plan assets} - \text{PBO}) / \text{PBO}$.
MTR	is the after-financing marginal tax rate for the firm
UNION	is the proportion of the firm's employees covered by plans subject to collective bargaining agreements.
ACTUARY	is a dummy variable that takes the value 1 if the firm's actuarial firm is one of the eight largest of all actuarial firms in terms of number of plans served in 1999.
ROE	is the return on equity for the firm for the year
SIZE	is the natural logarithm of total assets of the firm at year end.

Table 5
Logistic Estimation of the Cash Balance Plan Conversion Decision Model
Full Control Sample
(Two-tailed p-values in parentheses)

Variable	Predicted Sign	Base Model (Model 1)	Base Model w/Form 5500 Variables and w/o Tax Variables (Model 2)
Intercept	?	-1.081 (0.24)	0.058 (0.88)
YEARS_TO_RETIRE	-	-4.050 (0.003)	-0.572 (0.003)
ACTIVE	-		0.089 (0.48)
SERVCOST	+	123.95 (0.01)	18.070 (0.03)
SERVICE-IND	+	1.275 (0.0002)	0.216 (0.0001)
ROE	-	-0.807 (0.14)	-0.062 (0.57)
SIZE	+	0.483 (0.0001)	0.065 (0.0001)
DC	+	-2.252 (0.007)	-0.191 (0.05)
UNEMP	+	-0.024 (0.79)	
TURNOVER	+		-0.375 (0.18)
FUNDING	+	-0.059 (0.91)	
MTR	+	-0.827 (0.46)	
FUNDING * MTR	+	-1.043 (0.76)	
UNION	-		-0.0004 (0.47)
ACTUARY	+		-0.067 (0.16)
No. of observations		376	385
Log. Likelihood		-168.65	-163.92

Notes:

The independent variables, excluding those defined at the industry level, are mean-differenced by industry where industry is defined by the two digit SIC code. The independent variables (excluding dummy variables) are winsorized at the 1% and the 99% levels. The logistic regression includes dummy variables for years. The coefficients and p-values for these dummy variables are not reported.

CB the dependent variable, is a dummy variable that takes the value one when the firm is a cash balance firm, zero otherwise.

YEARS_TO_RETIRE is the natural logarithm of PBO/ABO.

ACTIVE is the ratio of active participants to total participants in the firm's defined benefit plans.

SERVCOST is the ratio of the pension service cost to revenue for the year.

SERVICE-IND is a dummy variable taking the value one when the firm is in a service industry, zero otherwise.

ROE is the return on equity for the firm for the year.

SIZE is the natural logarithm of total assets of the firm at year end.

DC is the proportion of firms in the industry (defined by two-digit SIC codes) that have defined contribution plans.

UNEMP is the unemployment rate for the year in the industry (defined by the two-digit SIC code).

TURNOVER is the ratio of the number of plan participants who separated from the firm to the total number of plan participants.

FUNDING is $(\text{plan assets} - \text{PBO}) / \text{PBO}$. SERVCOST is the ratio of the pension service cost to revenue for the year.

MTR is the after-financing marginal tax rate for the firm.

UNION is the proportion of the firm's employees covered by plans subject to collective bargaining agreements.

ACTUARY is a dummy variable that takes the value 1 if the firm's actuarial firm is one of the eight largest of all actuarial firms in terms of number of plans served in 1999.

Table 6
Matched-Pair Sample Logistic Estimation of the Cash Balance Plan Conversion Decision
(Two-tailed p-values in parentheses)

Variable	Predicted Sign	Base Model w/o Industry-Level Variables (Model 3)	Base Model w/o Industry-Level and Tax Variables (Model 4)	Model 4 Augmented with Form 5500 variables
YEARS_TO_RETIRE	-	-9.573 (0.02)	-4.210 (0.004)	-3.244 (0.19)
ACTIVE	-			-5.627 (0.02)
SERVCOST	+	265.4 (0.07)	26.310 (0.31)	-10.17 (0.93)
ROE	-	0.671 (0.14)	0.033 (0.86)	-0.129 (0.81)
SIZE	+	2.907 (0.000)	0.810 (0.002)	1.528 (0.003)
TURNOVER	+			-3.068 (0.14)
FUNDING	+	-1.047 (0.42)		
MTR	+	-1.459 (0.58)		
FUNDING*MTR	+	9.473 (0.09)		
UNION	-			0.002 (0.83)
ACTUARY	+			-0.83 (0.28)
Sample Size*		56	105	58
Log. Likelihood		-18.3	-60.8	-26.2

Notes:

* The sample size refers to the number of pairs of observations, one each from the cash balance and the matched sample

The independent variables are the differences in the corresponding variable between the cash balance and the matched control firm. The independent variables are winsorized at the 1% and the 99% levels. The logistic regression includes dummy variables for years. The coefficients and p-values for these dummy variables are not reported.

CB the dependent variable, is a dummy variable that takes the value one when the firm is a cash balance firm, zero otherwise.

YEARS_TO_RETIRE is the natural logarithm of PBO/ABO.

ACTIVE is the ratio of active participants to total participants in the firm's defined benefit plans.

SERVCOST is the ratio of the pension service cost to revenue for the year.

ROE is the return on equity for the firm for the year.

SIZE is the natural logarithm of total assets of the firm at year end.

TURNOVER is the ratio of the number of plan participants who separated from the firm to the total number of plan participants.

FUNDING is $(\text{plan assets}-\text{PBO})/\text{PBO}$. SERVCOST is the ratio of the pension service cost to revenue for the year.

MTR is the after-financing marginal tax rate for the firm.

UNION is the proportion of the firm's employees covered by plans subject to collective bargaining agreements.

ACTUARY is a dummy variable that takes the value 1 if the firm's actuarial firm is one of the eight largest of all actuarial firms in terms of number of plans served in 1999.

Table 7
Pension Variables around Conversion Year

Panel A: Changes in Unrecognized Prior Service Cost

Year relative to conversion year	Change in Unrecognized Prior Service Cost	
	Cash balance firms	Matched non-cash balance firms
-3	-0.009	0.000
-2	-0.008	-0.012
-1	0.000	0.000
0	-0.241***	0.000***
1	0.005	-0.004
2	0.019	-0.051
3	0.000	0.000

Panel B: Projected benefit obligation and pension service costs

Year relative to conversion year	Projected Benefit Obligation		Pension Service Cost	
	Cash balance firms	Matched non-cash balance firms	Cash balance firms	Matched non-cash balance firms
-3	76.7	74.6	78.3	80.6
-2	86.0	82.7	90.9	89.5
-1	93.2*	91.7*	92.7	93.7
0	100.0	100.0	100.0	100.0
1	106.5	107.5	106.7	109.2
2	114.9	114.2	106.7	107.7
3	127.2	126.3	122.6*	111.2*

*** Differences between the samples are significant at the 1% level

** Differences between the samples are significant at the 5% level

* Differences between the samples are significant at the 10% level

Differences between samples are tested for using the Wilcoxon signed rank test

In panel A, changes in unrecognized prior service cost are expressed as a percentage of the projected benefit obligation (PBO) for the firm. In panel B, PBO and pension service costs are expressed as a percentage of their values in the year of the conversion to cash balance plans for the cash balance sample.