

**CASH BALANCE PLANS CONVERSIONS:
EVIDENCE ON THE EXCISE TAX AVOIDANCE HYPOTHESES**

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Abstract:

Firms that wish to switch from a traditional defined benefit pension plan to a defined contribution-type plan have a choice between converting to a cash balance plan or replacing the defined benefit plan with a full-fledged defined contribution plan. According to the excise tax avoidance hypothesis, firms are more likely to convert to a cash balance plan as the excess funding of the plan increases, because conversion allows the firm to avoid excise taxes on the excess assets. Our evidence supports the excise tax avoidance hypothesis.

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1. INTRODUCTION

It has been widely documented that the number of employees enrolled in traditional defined benefit pension plans has declined relative to the number enrolled in defined contribution-type plans during the past two decades (see e.g., Ippolito, 1995). An interesting aspect of this transition is the large number of firms that have converted traditional defined benefit plans into cash balance plans during the latter part of the 1990s. Cash balance plans are similar to defined contribution plans from an employee's perspective. For example, cash balance plans have individual employee account balances that are portable. However, cash balance plans operate like defined benefit plans from a sponsor's perspective and are treated as defined benefit plans for regulatory purposes. Ippolito (2002) reports that about 20 percent of defined benefit plans, weighted by participation, have converted to cash balance plans.¹ The objective of this paper is to examine why firms are converting defined benefit pension plans to cash balance plans.

Promoters of cash balance plans argue that these plans provide a defined contribution-type plan that is more valuable than a defined benefit plan for most employees, especially younger employees who are likely to switch jobs frequently during their career.² If this is the motivation, the natural question is why not simply terminate the defined benefit plan and adopt a full-fledged defined contribution plan. Ippolito and Thompson (1999) suggest that a potential answer lies in the tax code (also see Ippolito, 2001a and 2001b). Congress imposed an excise tax on reverted excess pension assets in the late 1980s and increased it to 50 percent in 1990. Thus, if a firm terminates an overfunded defined benefit plan in favor of a full-fledged defined contribution plan post 1990, it will lose 50 percent

¹ Bank of America appears to have introduced the first cash balance plan in 1985.

² We discuss some of the reasons why a defined contribution-type plan would be preferred to a defined benefit plan below. Also see Ippolito (1995).

of the plan's excess assets. If instead the firm converts to a cash balance plan, it can use all of the excess pension assets to fund future benefits. Therefore, among firms that plan to switch from a traditional defined benefit plan to a defined contribution-type plan, the likelihood of choosing a cash balance plan increases with the plan's overfunding. We refer to this explanation for cash balance plan conversions as the excise tax avoidance hypothesis.³

Clark, Haley, and Schieber (2001) examine the excise tax avoidance hypothesis by examining funding ratios of plans that converted to cash balance type plans to funding ratios of on-going traditional defined benefit plans. They do not find that converters have greater overfunding. A potential problem with their analysis, however, is that they compare the funding of plans that switch to cash balance plans to the funding of plans that remain defined benefit plans. According to the excise tax avoidance hypothesis, the comparison group should be plans that are terminated and replaced with a defined contribution plan. We therefore compare the funding status of firms that converted to cash balance plans to the funding of firms that terminated their traditional defined benefit plans. Consistent with the excise-tax avoidance hypothesis, our evidence indicates that the likelihood of a cash balance plan conversion increases with excess pension funding in the 1990s. This finding is robust to a number of alternative specifications.

We also present evidence on a controversial, although separate, issue related to cash balance plans. Conversions have received considerable press, as well as Congressional attention, because of their alleged negative effect on the retirement benefits of older employees.⁴ Under a traditional defined benefit plan, benefits generally are backend loaded, i.e., employees accrue a disproportionate amount of their retirement benefits in the latter part of their careers. Critics of cash balance plan conversions argue

³ There are other potential explanations for cash balance plan conversions, which are not pursued in this paper. For example, cash balance plans offer employees a defined contribution-type plan, but still provides the funding flexibility of a defined benefit plan to the sponsor. Also, see Clark and Schieber (2001).

⁴ IBM's conversion in 1998 received special attention. IBM subsequently altered their conversion plan to appease many of the employees who expected to be harmed by the original plan (see e.g., Schultz, Auerbach, and Burkins, 1999).

that conversions change the benefit accrual rate just as older employees are about to accrue most of their benefits. Employers are therefore accused of appropriating pension wealth from older employees.

Determining whether appropriation actually takes place is difficult, as it depends on the specific plan characteristics and transition benefits provided. We make no attempt here to measure directly whether appropriation takes place (see Clark and Schieber (2002) for such an analysis). Instead, we test whether cash balance plan conversions have occurred in situations where the implicit contract theory of pensions predicts that appropriation is likely to occur. The theory implies that appropriation is more likely to occur when firms are performing poorly (see e.g., Middelstaedt (1989), Pontiff, Shliefer, and Weisbach (1990), Petersen (1992), Ippolito and James (1992)). Contrary to this prediction, our evidence on the performance of firms that convert to cash balance plans indicates that cash balance plan conversions are not being undertaken by poor performers. Thus, either firms are appropriating wealth from employees in situations that are inconsistent with the implicit contract theory of pensions or most conversions do not involve substantial appropriation. The latter interpretation is consistent with the evidence presented by Clark and Schieber (2002) who examine how various employee groups are affected by cash balance plan conversions.

The paper proceeds as follows. In section 2, we describe the main features of cash balance plans and how they compare with defined benefit plans. We review the implicit contract theory of pensions and present the logic underlying the excise tax avoidance hypotheses in Section 3. The data and results related to the excise tax avoidance hypothesis are presented in section 4. Evidence on the performance of firms converting to cash balance plans is presented in section 5. We end with a short summary and our conclusions.

2. OVERVIEW OF CASH BALANCE PLANS

2.1 GENERAL DESCRIPTION

From an employee's perspective, a cash balance plan closely resembles a defined contribution plan with employer contributions and a guaranteed rate of return. Each employee has a hypothetical

account balance, which grows based on salary credits and interest credits. Salary credits typically are stated as a percentage of the employee's earnings with the percentage often varying with years of service.⁵ Interest is credited at a guaranteed rate that is periodically reset (e.g., the rate might equal the rate on one-year Treasury bills reset every six-months). Prior to retirement, the account balance is portable. At retirement, the participant can take the account balance as a lump sum or as a retirement annuity.

Although each participant has an account balance, the funds are managed like a traditional defined benefit plan. Contributions and investment earnings are not actually allocated to individual accounts; instead, contributions are made to a common trust fund for all participants and benefits are paid from the fund. Participants do not choose how "their" account balance is invested. The plan's trustee invests the assets and the sponsor is liable for any shortfall that might occur. If the return on the plan's assets exceeds the guaranteed interest credit, then the extra investment earnings are used to build up the plan assets and thereby reduce future sponsor contributions. Thus, from the sponsor's perspective a cash balance plan operates like a traditional defined benefit plan, and it is subject to the same regulations as a defined benefit plan.

2.2 PATTERN OF BENEFIT ACCRUALS

An important difference between a traditional defined benefit plan and a cash balance plan (and the source of much of the controversy surrounding cash balance plans) is the pattern of benefit accruals over an employee's service with a given employer. With traditional defined benefit plans, benefits are backend loaded – i.e., a large percentage of total benefits are accrued at the end of an employee's career. In contrast, cash balance plans typically have a smoother accrual pattern.⁶

⁵ For example, Countrymark Corporation's plan credits the account balance with three percent of salary for employees with less than five years of service, but nine percent of salary for employees with 30 years of service (Littell, 1996).

⁶ If a cash balance plan increases the salary credit with years of service, the cash balance plan could have a benefit accrual pattern that more closely matches a traditional defined benefit plan.

To illustrate the different accrual patterns, Figure 1 compares a hypothetical defined benefit plan to a hypothetical cash balance plan (with a constant salary crediting rate) with respect to the present value of accrued benefits. This comparison is made under the constraint that the present value of accrued benefits at retirement for an employee with 30 years of service is identical under the two plans. In the early years of service, employees accrue a relatively low pension benefit under a traditional defined benefit plan compared to a cash balance plan. Accrued benefits then grow at a higher rate under the traditional defined benefit plan so that at the end of 30 years of service, the two plans provide the same level of benefits.

2.3 EFFECT OF A CONVERSION ON BENEFITS

The effect of a conversion from a defined benefit plan to a cash balance plan on the value of an existing participant's retirement benefits depends on his/her years of service to date and his/her expectations regarding additional service. To illustrate, suppose that a sponsor converts the defined benefit plan depicted in Figure 1 to the cash balance plan, also depicted in Figure 1. In this case, the benefit formulas are set so that a newly hired employee who expects to remain with the firm for 30 years would be indifferent between the two plans.

Existing participants, however, may not be indifferent. Suppose that the sponsor sets the initial account balance under the new cash balance plan equal to the present value of accrued benefits under the old defined benefit plan at the time of conversion. In other words, each employee's account balance begins with exactly the same amount (in present value terms) that the employee had accrued under the traditional defined benefit plan. Following conversion, the account balance grows according to the cash balance plan formula. Figure 2 illustrates the effect of conversion on an employee with 20 years of service (dashed line) and an employee with 6 years of service (dotted line). For the employee with 20 years of service, the conversion results in a lower present value of benefits than would have occurred if

the employee stayed with the firm under the traditional defined benefit plan. This illustrates one way that cash balance plan conversions can cause losses to older employees.^{7,8}

On the other hand, younger employees who do not expect to be with the firm for many years might prefer a conversion to a cash balance plan, because it gives them a higher expected benefit. The dotted line in Figure 2 illustrates this result for the case of a conversion after an employee's sixth year of service. Provided the worker plans to leave the firm before 25 years of service, he/she is better off with the conversion. Thus, converting to a cash balance plan could have a favorable impact on some groups of employees while hurting other groups.

Clark and Schieber (2001, 2002) analyze the effect of cash balance plan conversions on the retirement benefits of employees using information on a number of conversions. They find that most employees benefit from cash balance plan conversions. They also argue that older employees, the most “at-risk” group of employees, often receive transitional benefits, which at least partially compensates them for the losses they otherwise would suffer with a cash balance plan conversion.

3. HYPOTHESES

3.1 Background on Defined Benefit Plans and Implicit Contracts

Since we examine the choice a firm makes when they switch from a traditional defined benefit pension plan to a defined contribution-type plan, we begin by reviewing the theory on the advantages and disadvantages of defined benefit pension plans. The implicit contract theory of defined benefit plans posits that although benefits are backend loaded, employees pay for these benefits in the form of

⁷ The disadvantage to older employees of converting to a cash balance plan can be offset by either grandfathering their benefits under the old plan or by setting salary credits higher for older employees.

⁸ In contrast to the previous analysis, under some conversions, the account balance initially is set lower than the present value of accrued benefits under the old defined benefit plan, which might seem to violate ERISA's requirement that plan changes not reduce benefits that employees have already accrued. To conform to ERISA, in cases where the initial account balance is set lower than the accrued benefits, an exiting employee is entitled to benefits equal to the maximum of the present value of the accrued benefits under the old defined benefit plan or the account balance under the new cash balance plan. Consequently, for a period of time following the conversion, an employee's benefits are frozen at the level of accrued benefits at the time of conversion. This effect of cash balance plan conversions sometimes is referred to as a plateau effect.

foregone wages relatively evenly over their service with the sponsoring employer. The difference between the cumulative amount paid by employees and the present value of their accrued benefits can be viewed as a bond posted by employees (Ippolito, 1985). With a typical defined benefit plan, an employee's pension bond initially grows with additional service. After some years of service, the bond declines in value until it reaches zero at normal retirement age.

Because workers lose their pension bond if they leave the firm, defined benefit plans can help to reduce quit rates, promote employee effort, and screen-out lower quality job applicants. In addition, defined benefit formulas can be structured to induce employees to retire at certain ages.⁹ These incentive effects are the primary benefits of having a defined benefit plan according to the implicit contract theory. The value of the incentive effects will vary across firms depending on the nature of the work being performed. For example, if employers pay for on-the-job training and the value of this training is transferable to other employers, then the pension bond helps employers reduce quit rates and thereby capture part of the return on their investment in employees' human capital.

According to the implicit contract theory, a cost of a defined benefit plan is the additional compensation that employees demand for subjecting themselves to either the immobility induced by the pension bond or the low level of accrued benefits if they leave the firm early in their careers. Ippolito (1994) refers to this additional compensation as an indenture premium. The indenture premium demanded is likely to vary across employees depending on characteristics, such as age and education, which determine the value of their future opportunities. For example, a young, talented computer programmer might place little value on the retirement benefits provided by a defined benefit plan compared to a 401(k) plan, and therefore might require higher cash wages (an indenture premium) to work for a firm offering a defined benefit plan compared to an otherwise identical firm offering a 401(k) plan.

⁹ See Ippolito (1997) for an overview of the incentive effects of pensions and cites to the original literature.

The reason pension contracts are viewed as implicit contracts is that the sponsoring firm has the opportunity at any time to appropriate a portion of employees' pension bonds by eliminating the accrual of additional benefits under the plan. For example, a plan termination followed by an adoption of a defined contribution plan with a lower benefit accrual rate would impose a loss on employees. Although the firm has the ability to appropriate, the implicit contract theory posits that both employees and the firm expect that appropriation typically will not occur, because appropriation would impose costs on the firm that typically would exceed the value that the firm could appropriate from employees. One of the potential costs of appropriation is a reduction in future labor productivity, as a result of lost employee trust and the lost incentive effects from not having a traditional defined benefit plan. The implicit contract framework suggests that an important determinant of appropriation will be the firm's performance, because poor performance will indicate a shorter expected life and therefore a lower cost associated with appropriation (see e.g., Petersen, 1992 and Ippolito and James, 1992).¹⁰

Summarizing, the implicit contract theory implies that the choice of a defined benefit or a defined contribution-type plan depends, in part, on the magnitude of the beneficial incentive effects of a defined benefit plan versus the indenture premiums demand by employees. In addition, the theory implies that appropriation of employees' pension bonds is more likely to occur when firms are performing poorly. Although not part of the implicit contract theory, a firm's pension plan choice will depend on administrative costs. Defined benefit plans generally have greater administrative costs than defined contribution plans, because of additional regulations and valuation requirements. This

¹⁰ Other factors might influence the incentive to appropriate. Since the cost of breaking an implicit contract with unionized employees is likely to be higher than with non-unionized employees, the implicit contract perspective implies that firms with unionized workers would be less likely to appropriate, all else equal. Also, if managers who have developed a reputation with existing employees find it personally costly to break implicit contracts with employees, then firms which have undergone control changes (e.g., following a takeover) are more likely to appropriate (Shleifer and Summers, 1988). Ippolito and James (1992) and Chaplinsky, Niehaus, and Van de Gucht (1998) analyze whether firms break implicit pension contracts in leveraged buyout transactions. Middelstaedt (1990), Petersen (1992) and Pontiff, Shleifer, and Weisbach (1990) analyze whether firms break implicit contracts in pension plan reversions. The magnitude of the one-time gain from breaking the implicit contract would also influence firms' decisions to appropriate. This amount typically is greater if the plan has a unit-benefit formula and a large proportion of participants are in the middle of their careers.

administrative cost differential, however, generally falls as the size of the plan (number of participants) increases.¹¹ Consequently, bigger plans are more likely to be defined benefit plans, all else equal.

3.2 Excise Tax Avoidance Hypothesis

Consider a firm with a defined benefit pension plan that wishes to switch to a defined contribution-type plan. The reason for the switch is not important for our purposes, but presumably the benefit of switching (the savings in indenture premiums plus the value (if any) appropriated from employees) exceeds the cost of switching (the foregone productivity gains from not having a defined benefit plan). The issue is whether to switch to a full-fledged defined contribution plan or convert to a cash balance plan.

Switching to a defined contribution plan is likely to save administrative costs because the firm no longer needs to comply with the regulations related to defined benefit plans or pay for the actuarial valuations of pension liabilities. The same savings in administrative costs would not be expected if the firm converts to a cash balance plan, because cash balance plans must comply with the same regulations as traditional defined benefit plans. Let PVC equal the present value of the administrative costs savings from switching to a defined contribution plan versus converting to a cash balance plan. We expect PVC to have a fixed cost component and a component that varies with the size of the pension plan as measured by the value of pension liabilities.¹² That is, $PVC = \gamma + \delta(PL)$, where γ is the differential fixed cost and δ is the differential cost per dollar of dollar of pension liabilities (PL) ($\gamma > 0$ and $\delta > 0$).

If a firm terminates an overfunded defined benefit plan in favor of a full-fledged defined contribution plan, the firm will have to pay excise taxes on the excess pension assets. The Tax Reform Act of 1986 levied a ten percent excise tax on reverted pension assets and in 1988 the rate was increased to 15 percent. In 1990, Congress increased the excise tax to 20 percent of reverted assets, provided that 25 percent of the pension surplus is used as a cushion for a replacement plan, or that benefits are

¹¹ Also, the differential administrative costs have increased over time, which helps to explain the growth in defined contribution plans. See Clark and McDermed (1990) and chapter 12 in Ippolito (1997) for supporting evidence.

increased by 25 percent; otherwise, the excise tax is 50 percent. By converting to a cash balance plan, the firm can use the excess pension assets to fund future benefits, thus avoiding the excise tax on the excess pension assets.¹³

Let EXFUND equal a plan's excess pension assets, i.e., the maximum of zero and the difference between pension assets and pension liabilities. Then, a firm that wishes to switch to a defined contribution-type plan would choose a cash balance plan conversion if the savings in excise taxes exceeds the extra administrative cost of a cash balance plan, i.e., if $\tau(\text{EXFUND}) > \gamma + \delta(\text{PL})$, where τ is the applicable excise tax rate. Dividing by pension liabilities (PL), we find the following condition for converting to a cash balance plan:

$$\tau(\text{EXFUND}/\text{PL}) - \gamma/\text{PL} - \delta > 0.$$

This condition is more likely to be satisfied as the product of the funding ratio (EXFUND/PL) and the tax rate increases, and as the size of the pension plan (PL) increases. Since the excise tax increased substantially in 1990, we expect a positive relationship between pension funding and the likelihood of a cash balance plan conversion during the 1990s.

3.3 Methodology

To test the predictions, we estimate a logistic regression model using firms that switched from defined benefit plans to either cash balance plans or defined contribution plans. Let the dichotomous variable CB equal one if the firm switches to a cash balance plan and zero if it switches to a defined contribution plan. We estimate models of the following form:

$$\text{Prob}(\text{CB} = 1) = \exp[\alpha + \beta_1(\text{EXFUND}/\text{PL})_i + \beta_2 (\text{D90s} \times \text{EXFUND}/\text{PL})_i + \beta_3 (1/\text{PL})_i + \varepsilon_i],$$

where $\exp(\)$ is the exponential function, the subscript i refers to firm i , and the β 's are coefficients to be estimated. A positive value for the sum of the β_1 and β_2 coefficients would indicate that excess funding

¹² We use the value of pension liabilities as opposed to the number of employees, because the latter is not generally disclosed in *Compustat*.

¹³ This story also suggests that cash balance plans would be temporary structures, because once the excess pension assets are exhausted, the plan can be terminated and a defined contribution plan can be established.

during the 1990s increases the likelihood of a cash balance plan conversion. A negative β_3 coefficient would be consistent with larger plans being more likely to convert to a cash balance plan because of the fixed administrative costs associated with defined benefit plans.

Ideally, the excise tax avoidance hypothesis would be tested using plan level data.

Unfortunately, we do not have plan level data.¹⁴ Therefore, we use firm level data to test the implication of the excise tax avoidance hypothesis. Since firms can sponsor multiple plans, firm level funding measures a particular plan's funding with error. While we expect that the funding of a particular plan would be positively correlated with firm level funding, the measurement error introduces a bias in our estimates. In a multiple regression framework with one variable measured with error, the estimated coefficient on the variable measured with error is biased toward zero (Greene, 2000). Thus, we suspect that the measurement error biases against finding a significant effect of pension funding on the likelihood of a cash balance plan conversion.

4. EMPIRICAL ANALYSIS

4.1 Cash Balance Plan Sample

Our sample of firms sponsoring cash balance plans is constructed from a list published in the May 31, 1999 issue of *Pensions & Investments* and a list provided by the Kwasha Lipton consulting group. Several additional firms with cash balance plans were identified by searching annual reports on *Compact Disclosure* during 1990-1998 for disclosures describing cash balance plan conversions, and from business press articles describing cash balance plans. This process identified 358 private and public firms with cash balance plans. One-hundred and sixty-one of these firms are on the *CRSP* database, indicating that the sponsor was a publicly traded company at some point in their history. After excluding firms without identifiable conversion dates, 96 firms remain in the sample. We further

¹⁴ Identifying cash balance plans is difficult and costly. Disclosures on Forms 5500 did not identify when a plan was a cash balance plan until 1999 and as of July 2002 the complete 1999 Form 5500 data were not yet available.

exclude firms that do not have data reported in *Compustat* during the three years prior to the conversion. Our sample of cash balance plan converters consists of 73 public firms with conversions during the 1985-1998 period.

Table 1 gives the frequency distribution for the conversion year. Relatively few conversions took place in the latter 1980s and early 1990s, but the number of conversions increased in the mid-1990s. Table 2 indicates that the firms with cash balance plan conversions come from a broad range of industries. However, it is worth noting that the requirement that the companies in our sample be publicly traded eliminates a large number of service (medical, accounting, and financial) firms from the sample.

4.2 Defined Benefit Terminator Sample

We also construct a sample of firms that terminated a traditional defined benefit plan (but did not convert to a cash balance plan) by searching annual reports between 1990 and 1999 contained in *Compact Disclosure* using a variety terms, such as: “terminated plan,” “terminated pension,” “frozen benefit.” In a number of cases, annual reports from the 1990s indicated that a plan was terminated in the 1980s; we include these cases in our sample. The resulting sample consists of 84 firms that either froze benefit accruals or terminated a defined benefit plan. We treat firms that froze benefits the same as those that explicitly terminated plans, although the results are not sensitive to this treatment.

We cannot identify a date when the plan was altered for seven firms and six firms are not on the *Compustat* database. One company terminated its plan as part of a bankruptcy process and is therefore deleted. Finally, we cannot find pension data either in *Compustat* or in annual reports available on *Lexis-Nexis* for 18 firms. The final sample of defined benefit terminators therefore consists of 52 firms. Table 1 gives the frequency distribution for the termination year and Table 2 gives the frequency distribution for five major industry categories.

Even with plan level data in 1999, we would need to be trace plans back in time using Form 5500s from prior years to identify the plan’s funding prior to the cash balance plan conversion.

Of the 52 defined benefit terminators, 25 firms created a defined contribution plan and six created a new defined benefit plan to replace the terminated defined benefit plan. All six of the firms that created a new defined benefit plan did so in the in the 1980s, as part of pension asset reversion, i.e., the firm terminated an over-funded plan, reverted the excess assets to the firm, and established a follow-on defined benefit plan (usually with the same characteristics as the terminated plan). We could not identify the replacement plan for the remaining 21 firms in the sample. We estimate the models both including and excluding these 21 firms and find similar results.

Panel A of Table 3 provides descriptive statistics for the variables used in the empirical analysis. The variable measuring pension liabilities (PL) equals the value of the accumulated benefit obligation in the year prior to the pension change.¹⁵ The excess funding ratio (EXFUND/PL) equals the ratio of excess pension assets divided by pension liabilities. The numerator of the excess funding ratio equals the maximum of zero and the difference between the value of pension assets and the accumulated benefit obligation in the year prior to the pension change. Since we control for firm size and firm performance in the analysis, we include descriptive statistics for these variables in Table 3 as well. Firm size is measured using total firm assets in the year prior to the pension change, and firm performance is measured using the average return on assets during the three years prior to the pension change (MEANROA). Return on assets equals operating income divided by total assets. The descriptive statistics indicate that firms converting to cash balance plans are on average larger and have greater pension liabilities than firms terminating their defined benefit plans. We find no significant difference between the two types of firms with respect to excess funding ratios or firm performance. Panel B of Table 3 gives correlation coefficients between the variables. Not surprisingly, pension liabilities and

¹⁵ The results are unchanged when we recalculate the pension variables using an adjusted pension liability measure that assumes a common discount rate for all firms in a given year. Specifically, let $avgrate_t$ equal the average reported assumed discount rate for all firms reporting on *Compustat* in year t . Then, assuming the duration of pension liabilities equals nine, the adjusted accumulated benefit obligation for firm i equals (reported ABO for firm i in year t) times $\exp(9(avgrate_t - rate_{i,t}))$, where $rate_{i,t}$ is the rate assumed by firm i in year t .

firm asset value are highly correlated. The correlation coefficients between the other variables, however, are relatively small.

4.3 Logistic Regression Analysis

Table 4 presents the results of estimating logistic regression models for the likelihood of converting to a cash balance plan. Following the framework presented earlier, the explanatory variables include the funding ratio (EXFUND/PL) and the inverse of the pension liabilities (1/PL).¹⁶ Since the full amount of the excise tax was not implemented until 1990, we include a dichotomous variable, D90s, to indicate that the pension change occurred during the 1990s, and we interact D90s with (EXFUND/PL). In some specifications, we include as control variables the natural logarithm of total assets (LOGASSETS) and the average return on assets in the three years prior to the pension change (MEANROA). These are included to control for possible firm size or firm performance effects on the pension choice.

The first column of Table 4 presents the results using the entire sample. The coefficient on (1/PL) is negative and statistically significant, which suggests that firms with larger pension plans are more likely to convert to a cash balance plan. This result is consistent with the notion that there are fixed administrative costs associated with defined benefit plans, which increase the likelihood that larger firms will choose defined benefit plans, all else equal (Clark and McDermed, 1990).

The coefficient on (EXFUND/PL) is negative, but the coefficient on the interaction variable is positive. The sum of the coefficients is positive and statistically significant, indicating that greater excess pension funding during the 1990s increases the probability that a firm would convert to a cash balance plan. The coefficient estimates indicate that the effect of excess pension funding is economically significant as well. For a firm that would like to switch to a defined contribution-type plan in the 1990s with an excess funding ratio of 10 percent and pension liabilities of \$10 million, the predicted probability of a cash balance plan conversion is 0.45. An increase in the funding ratio to 20

percent increases the predicted probability to 0.69. Thus, the effect of additional excess funding on the predicted probability is substantial.

The economic significance of the results is further illustrated in Figure 3 where the predicted probability of a cash balance plan conversion is plotted as a function of the excess funding ratio for two values of pension liabilities. The predicted probabilities are based on the parameter estimates from column one of Table 4, assuming the plan change occurs in the 1990s. The figure illustrates that both pension funding and plan size have a pronounced effect on the predicted probability. For a firm with a relatively high value of pension liabilities (\$100 million), the predicted probability is significantly higher than for a firm with a relatively low value of pension liabilities (\$10 million). For both firms, however, the predicted probability increases significantly as the funding ratio increases between zero and 50 percent.

The second column of Table 4 includes the control variables LOGASSETS and MEANROA. The coefficient on LOGASSETS is positive and statistically significant, indicating that larger firms are more likely to choose cash balance plans even after controlling for the size of the firm's pension plans. The coefficient on MEANROA is not statistically significant, indicating recent firm performance does not appear to influence the choice. More importantly, the results with respect to funding ratios are unchanged after controlling for firm size and firm performance. The third column of Table 4 reports the results when we include only the defined benefit terminators for which we could confirm that a full-fledged defined contribution plan was created as a replacement plan. The signs and statistical significance of the coefficients are unchanged relative to the full sample.

Since most of the changes in the sample occur in the 1990s, Table 5 presents results when just the observations with pension changes in the 1990s are used. This eliminates the need for the dummy variable (D90s) and the interaction variable. The first column uses all observations in the 1990s and the second column uses only defined benefit terminators that we know created a defined contribution

¹⁶ Although not reported, we estimated the model with an alternative measure of plan size, the natural logarithm of

replacement plan. Consistent with the hypothesis that greater pension funding in the 1990s increases the likelihood of a cash balance plan conversion, the coefficient on (EXFUND/PL) is positive and statistically significant in both models. Also, the coefficients on (1/PL) and LOGASSETS are again statistically significant indicating that larger firms and firms with larger pension plans are more likely to convert to a cash balance plan.

The high correlation between firm size and pension liabilities and the fact that cash balance plan converters tend to be larger than defined benefit terminators motivate us to estimate the model using only firms with pension changes during the 1990s that are relatively small, i.e., those with assets less than \$2 billion. This restriction greatly reduces the number of firms in the sample that convert to cash balance plans, but does not diminish substantially the number of defined benefit terminators. The results of this analysis are reported in column 3 of Table 5. Overall, the results are consistent with the previous findings. Pension funding is positively related to the likelihood of a cash balance plan conversion and the coefficient is statistically significant at the 8 percent level. Thus, even among smaller firms, pension funding helps to explain which firms convert to cash balance plans versus terminate defined benefit plans in favor of defined contribution plans.

5. Firm Performance and Appropriation

Regardless of the choice of replacement plan, switching from a defined benefit plan can impose losses on employees. Stated differently, the opportunity to appropriate part of employees' pension bonds exists when moving to a cash balance plan or to a full-fledged defined contribution plan. Whether appropriation takes place depends on the new benefit formula and transition rules adopted. Also, employees could be compensated for any pension losses through increases in other forms of compensation. As noted earlier, the appropriation issue has made cash balance plan conversions highly controversial. In this section, we present indirect evidence on the appropriation issue.

pension liabilities, and found similar results.

We make no attempt to determine directly whether appropriation takes place in cash balance plan conversions. Clark and Schieber (2002) conduct such an analysis and find that most employees benefit from cash balance plan conversions, and that transition benefits often compensate older employees for their apparent pension losses. Instead, we investigate whether conversions take place when the implicit contract theory of pensions suggests appropriation is likely to occur, i.e., when firms are performing poorly. Thus, we compare the performance of firms that convert to cash balance plans to a variety of performance benchmarks.

Operating Performance. Table 6 provides information about the operating performance of firms with cash balance plan conversions using the methods suggested by Barber and Lyon (1996). Operating performance is measured as the return on assets and is denoted by MEANROA; it equals the annual average of operating income before depreciation divided by total assets over the three-year period prior to the conversion.¹⁷ Row one compares the performance of firms with cash balance conversions to the median performance of other publicly-traded firms with the same two-digit SIC code. The data indicate that firms with CB plan conversions tend to have better performance than other firms in the same industry. The mean (median) difference between MEANROA of firms with cash balance plan conversions and the median of other firms in the same industry is 2.80 percent (0.56 percent). The t-test and the rank sum test indicate that the mean and median difference is significantly different from zero.

The data in row 2 of Table 6 compares firms with cash balance plan conversions to other firms with the same two-digit SIC code that are matched based on asset size three years prior to the conversion. In particular, the control group in row two only includes firms with total assets between 70 percent and 130 percent of the total assets for the firm with the cash balance plan conversion.¹⁸ Again, the data indicate that the firms with cash balance plan conversions performed better than the benchmark

¹⁷ We also measured operating performance using data for the three-year period before the conversion and the year of the conversion and found the same results.

¹⁸ We also used a 90 percent and 110 percent size filter and found similar results.

firms. The mean (median) difference in MEANROA is 2.83 percent (0.43 percent), which is statistically significant.

The operating performance results contrast sharply with the results reported in studies examining the termination of overfunded pension plans during the 1980s. For example, Thomas (1989) finds that firms that terminated overfunded plans and that were not subject to control changes had significantly lower operating performance than non-terminating firms. Petersen (1992) finds that, after controlling for a number of other factors, the likelihood of an overfunded termination is negatively related to return on assets. Middelstaedt (1989) finds that termination of overfunded plans is associated with financial weakening, as measured by changes in predicted bankruptcy probabilities. Thus, our operating performance results suggest that cash balance plan conversions are motivated by fundamentally different factors than the wave of overfunded pension terminations during the 1980s.

Stock Price Performance. The results regarding stock price performance in Table 7 reinforce this conclusion. The stock price performance of firms with cash balance plan conversions is not significantly different than the CRSP equal-weighted or value-weighted portfolios during the years prior to the conversion. For example, the mean (median) difference between the holding period return for firms with cash balance plan conversions and the CRSP equally-weighted portfolio in the year prior to conversion is 2.2 percent (3.7 percent), and neither is statistically different from zero.

Table 7 also reports stock price performance results compared to size-matched portfolios and book-to-market matched portfolios. Following Barber and Lyon (1997), size-matched portfolios consist of all firms with market capitalization in June of each year within 90 percent and 110 percent of the sample firm's market capitalization in June. Book-to-market matched portfolios consist of all firms with book-to-market ratios at the year end within 90 percent and 110 percent of the sample firm's book-to-market ratio at year end. Both size- and book-to-market matchings are performed every year during the comparison period. Table 7 shows that, compared to size-matched portfolios, the stock price performance of firms with cash balance plan conversions is either insignificantly different from zero, or in one case (three years prior to the conversion) positive. Compared to book-to-market matched

portfolios, the stock price performance of firms with cash balance plans is insignificantly different from zero.

These results indicate that firms that undertake cash balance plan conversions are not poorly performing, which is contrary to what the implicit contract theory of pensions would predict if the firms undertaking conversions were motivated by appropriation. Since we do not identify whether appropriation is actually taking place, we can only conclude that either (1) cash balance plan converters are appropriating in situations that are inconsistent with the implicit contract theory or (2) little if any appropriation is actually taking place.

6. Summary

Although cash balance plans have been growing in importance in the past decade, little is known about the characteristics of firms that are converting to these plans. Our analysis focuses on whether excise taxes help to explain cash balance plan conversions. According to the excise tax avoidance hypothesis, among firms that plan to switch from a defined benefit plan to a defined contribution-type plan during the 1990s, the likelihood of cash balance plan conversion increases as excess pension funding increases (Ippolito and Thompson, 1999). Our evidence supports this prediction.

Because cash balance plan conversions have been criticized for appropriating wealth from employees, we also examine whether conversions are taking place when firms are performing poorly, which is when the implicit contract theory of pensions suggests that appropriation would take place. However, we do not find that cash balance plan converters are poor performers. This evidence suggests one of two possibilities: (1) cash balance plan converters are appropriating, but not in situations that are consistent with what the economic theory of pensions predicts, or (2) firms are not typically appropriating wealth from employees when they undertake cash balance plan conversions. Our evidence cannot distinguish between these two explanations; however, the latter interpretation is consistent with the evidence presented by Clark and Schieber (2001).

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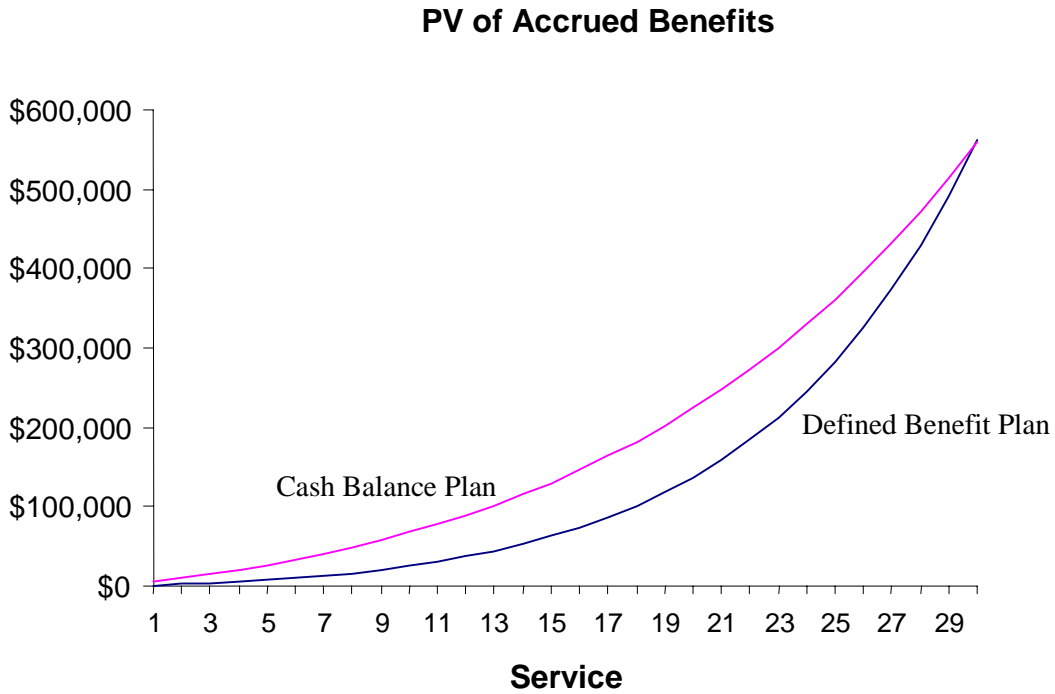
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Figure 1

Comparison of Defined Benefit and Cash Balance Plans
With respect to the Present Value of Accrued Benefits

Parameters are chosen so that the present value of accrued benefits is the same under both plans for an employee with 30 years of experience.



Assumptions:

Initial salary = \$40,000

Salary growth rate = 4.0%

Interest rate = 6.35%

Defined benefit plan:

β = generosity parameter = 0.015, t = years of service, S_t = salary in year t , A = Cost of retirement annuity = \$10 (lump sum of \$10 converts to \$1 of annual income for life), years to retirement = $T - t$

Annual benefit formula = 0.015 (final salary) (years of service)

Present value of accrued benefit at $t = (\beta A S_{t-1} t) / (1+r)^{T-t}$

Cash balance plan:

c = salary crediting rate = 10%

r = Interest crediting rate = 6.35%

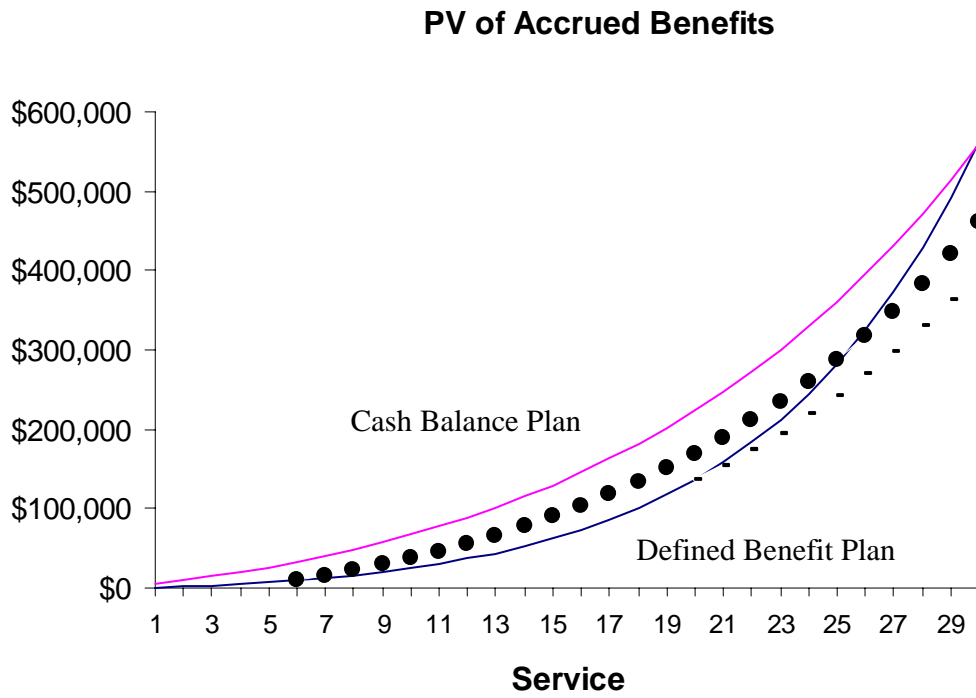
PV_t^{CB} = present value of accrued benefit at $t = PV_{t-1}^{CB} (1+r) + c S_t$; where $PV_0 = 0$.

Figure 2

Effect of a Conversion to a Cash Balance Plan on the Present Value of Accrued Benefits

Parameters are chosen so that the present value of accrued benefits is the same under both plans for an employee with 30 years of experience.

- Conversion after 6 years of service
- Conversion after 20 years of service



See Figure 1 for assumptions

Figure 3

Predicted Probability of Conversion to a Cash Balance Plan as Function of Excess Pension Assets

Based on logistic regression model in column 1 of Table 4. The bottom curve is for a hypothetical firm with pension liabilities equal to \$10 million and the top curve is for a hypothetical firm with pension liabilities equal to \$100 million.

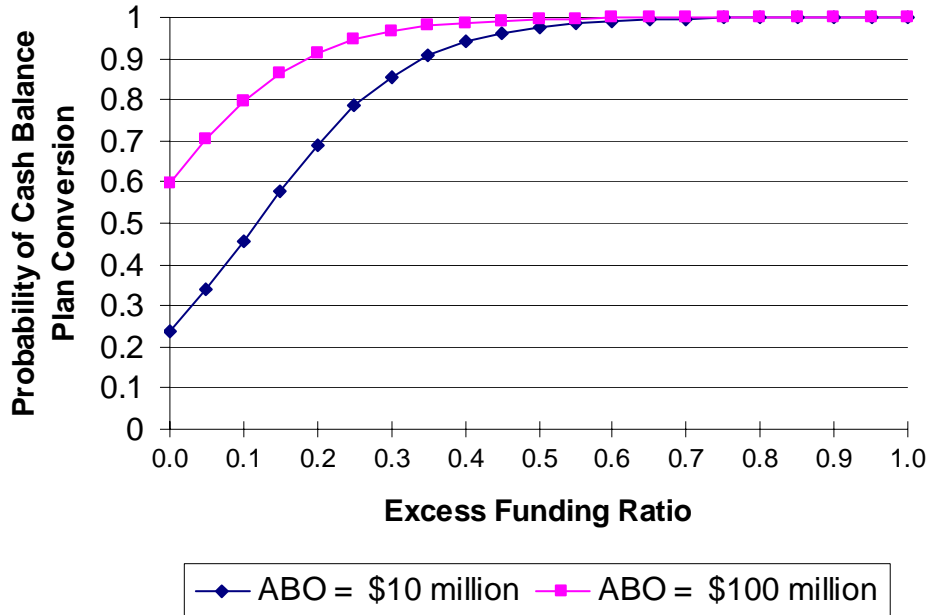


Table 1

Frequency Distribution by Year for Sample Firms

Numbers in column 2 give the number of firms that converted a traditional defined benefit plan into a cash balance plan and the numbers in column 3 give the number of firms that terminated their traditional defined benefit plan.

<u>Year</u>	<u>Firms Converting to Cash Balance Plans</u>	<u>Firms Terminating Defined Benefit Plans</u>
1985	1	0
1986	2	0
1987	1	6
1988	5	6
1989	5	5
1990	3	0
1991	3	4
1992	5	6
1993	5	1
1994	7	2
1995	8	6
1996	11	8
1997	12	5
1998	5	2
1999	<u>0</u>	<u>1</u>
Total	73	52

Table 2

Frequency Distribution of Two-Digit SIC codes for Sample Firms

Numbers in column 2 give the number of firms that converted a traditional defined benefit plan into a cash balance plan and the numbers in column 3 give the number of firms that terminated their traditional defined benefit plan.

<u>2-digit SIC code</u>	<u>Description</u>	<u>Firms Converting to Cash Balance Plans</u>	<u>Firms Terminating Defined Benefit Plans</u>
10-19	Mining & Construction	2	5
20-39	Manufacturing	30	18
40-49	Transportation & Public Utilities	13	4
50-59	Wholesale & Retail Trade	6	15
60-69	Finance, Insurance & Real Estate	16	5
70-89	Services	<u>6</u>	<u>5</u>
	Total	73	52

Table 3

Descriptive Statistics for Cash Balance Plan Converters and Defined Benefit Plan Terminators

Assets equal the firm's total assets in the year prior to the pension change; MEANROA equals the average of the return on assets for the three year period prior to the pension change; return on assets equals operating income before depreciation divided by total assets; EXFUND equals the maximum of zero and the value of pension assets minus the accumulated benefit obligation; PL equals the accumulated benefit obligation.

<i>PANEL A</i>		<u>Firms Converting to Cash Balance Plans</u>	<u>Firms Terminating Defined Benefit Plans</u>	p-value of test for difference in means and medians
Assets (in millions)	Number	73	52	
	Mean	12,104.9	1,867.5	0.01
	Median	2,784.3	147.8	0.01
PL (in millions)	Number	61	52	
	Mean	1,239.2	38.6	0.01
	Median	187.0	4.3	0.01
EXFUND/PL (%)	Number	61	52	
	Mean	32.2	46.1	0.18
	Median	18.8	25.3	0.48
MEANROA (%)	Number	73	52	
	Mean	11.8	9.9	0.24
	Median	12.4	10.0	0.37

<i>Panel B</i>	<u>Correlation Coefficient (p-value)</u>		
	<u>PL</u>	<u>EXFUND/PL</u>	<u>MEANROA</u>
Assets	0.41 (0.01)	-0.02 (0.86)	-0.13 (0.15)
PL		-0.04 (0.67)	0.22 (0.02)
EXFUND/PL			-0.06 (0.50)

Table 4

Logistic regression analysis of the probability that a firm converts to a cash balance plan relative to the probability that a firm terminates a defined benefit plan

EXFUND equals the maximum of zero and the value of pension assets minus the accumulated benefit obligation of the firm's pension plans in the year prior to the pension change. PL equals the accumulated benefit obligation in the year prior to the pension change. MEANROA is the average return on assets over the three year period prior to the pension change, LOGASSETS is the natural logarithm of total assets in the year of the pension change. D90s equals one if the pension change occurred during the 1990s and zero otherwise. Column (3) includes only defined benefit terminators for which we could confirm that the firm switched to a defined contribution plan.

	Coefficient Estimates (p-values)		
	(1)	(2)	(3)
			Includes only DB terminators with a confirmed DC <u>replacement plan</u>
Intercept	2.28 (0.05)	-3.97 (0.07)	-2.78 (0.29)
D90s	-1.72 (0.16)	-1.72 (0.22)	-2.48 (0.16)
EXFUND/PL	-3.45 (0.07)	-4.59 (0.04)	-5.02 (0.05)
D90s x (EXFUND/PL)	13.27 (0.01)	15.03 (0.01)	17.72 (0.01)
(1/PL)	-17.24 (0.01)	-11.32 (0.01)	-13.36 (0.02)
MEANROA		1.45 (0.72)	-1.03 (0.83)
LOGASSETS		0.84 (0.01)	0.87 (0.01)
Pseudo-R ²	0.49	0.60	0.55
Obs. with CB=1	61	61	61
Obs. with CB=0	52	52	25

Table 5

Logistic regression analysis using only observations in the 1990s of the probability that a firm converts to a cash balance plan relative to the probability that a firm terminates a defined benefit plan

EXFUND equals the maximum of zero and the value of pension assets minus the accumulated benefit obligation of the firm's pension plans in the year prior to the pension change. PL equals the accumulated benefit obligation in the year prior to the pension change. MEANROA is the average return on assets over the three year period prior to the pension change, LOGASSETS is the natural logarithm of total assets in the year of the pension change. Column (2) includes only defined benefit terminators for which we could confirm that the firm switched to a defined contribution plan. Column (3) includes only firms with total assets in excess of \$2 billion

	Coefficient Estimates (p-values)		
	(1)	(2)	(3)
		<u>Includes only DB terminators with a confirmed DC replacement plan</u>	<u>Includes only firms with total firm assets less than \$2 billion</u>
Intercept	-7.25 (0.01)	-7.21 (0.03)	-11.46 (0.01)
EXFUND/PL	10.74 (0.03)	15.73 (0.04)	11.51 (0.08)
(1/PL)	-10.55 (0.04)	-15.72 (0.04)	-10.50 (0.11)
MEANROA	2.30 (0.65)	2.30 (0.69)	-1.49 (0.81)
LOGASSETS	1.05 (0.01)	1.17 (0.01)	1.87 (0.01)
Pseudo-R ²	0.63	0.58	0.63
Obs. with CB=1	52	52	23
Obs. with CB=0	35	18	32

Table 6

Operating Performance of Firms that Converted to Cash Balance Plans

Operating performance (MEANROA) is the average return on assets over a three-year period prior to the conversion. Return on assets is defined as operating income before depreciation divided by total assets.

	Obs.	<u>Median</u>	<u>Mean</u>
Difference between MEANROA of firms with cash balance plan conversions and the median of MEANROA of firms with the same two-digit SIC code	71	0.56%*	2.80%**
Difference between MEANROA of firms with cash balance plan conversions and the median of MEANROA of firms with the same two-digit SIC code and with assets between 70% and 130% of total assets for the firm with the cash balance plan conversion [#]	66	0.43%*	2.83%**

Firms with no matches are excluded.

* indicates significance at the 5% level using a t-test for the mean and sign ranked test for the median.

** indicates significance at the 1% level using a t-test for the mean and sign ranked test for the median.

Table 7

Stock Price Performance of Firms that Converted to Cash Balance Plans

Stock price performance is measured using the annual holding period return for each of the three years prior to the conversion

Difference between firms with cash balance plan conversions and	Number of observations		
	Mean		
	Median		
	Years Relative to the year of Conversion		
	<u>1 year</u>	<u>2 years</u>	<u>3 years</u>
CRSP equally-weighted index	70 2.2% 3.7%	68 10.5% -3.7%	67 -1.1% -5.1%
CRSP value-weighted index	70 1.8% -0.5%	68 11.4% -10.7%	67 1.5% -10.1%
Size-matched portfolios [#]	70 7.2% 5.6%	68 11.7% -6.8%	67 38.1% ^{**} 21.9% ^{**}
Book-to-market matched portfolios ⁺	63 6.6% 1.7%	59 16.3% -1.9%	59 14.5% -0.7%

Size-matched portfolios consist of all firms with market capitalization at the end of each year within 90 percent and 110 percent of the sample firm's market capitalization.

+ Book-to-market matched portfolios consist of all firms with book-to-market ratios at the year end within 90 percent and 110 percent of the sample firm's book-to-market ratio at year end.

** indicates significance at the 1% level using a t-test for the mean and sign ranked test for the median.