Determinants of Corporate Conversions to Cash Balance Pension Plans

Arnold R. Cowan Iowa State University

Mark L. Power* Iowa State University

November 2003

Contact author: Department of Finance, 2330 Gerdin Business Building, Ames IA 50011-1350; mpower@iastate.edu; phone 515-294-5651. Please do not quote or cite without first checking with the authors.

Determinants of Corporate Conversions to Cash Balance Pension Plans

Abstract

Critics argue that employers' conversions of defined benefit pension plans to cash balance pension plans save money by cutting benefits for current workers (financial incentive hypothesis). Managers argue that cash balance plans help attract and retain highly mobile workers, such as those with strong technical skills (human resources hypothesis). We find that, compared to matched nonconverting firms, converting firms are larger and experience faster preconversion sales growth and less-overfunded defined benefit plans. In logistic regressions, larger firms, firms with higher ratios of plan assets to total assets, those with less volatile cash flows and those with faster sales growth are more likely to adopt cash balance plans. The results are consistent with the human resources hypothesis.

Introduction

Over the past fifteen years, several hundred corporations have converted their pension plans from the traditional defined benefit form to a hybrid known as the cash balance pension plan. The controversy surrounding cash balance plan conversions has drawn the attention of regulators and elected officials. Critics argue that the conversions decrease pension benefits for current workers, especially those in mid-career (Schultz, 2000). Employees allege that the cost savings from reduced benefits are the dominant motive for the conversions (financial incentive hypothesis). Managers argue that cash balance plans allow firms to attract and retain highly mobile workers (human resources hypothesis). In this paper, we empirically investigate the determinants of firms' decisions to convert traditional defined benefit plans to cash balance plans. This research is important, because limited empirical evidence exists to support the reasons for conversion. The relevance of this research is heightened due to the current decline in the value of defined benefit pension plan assets, the corresponding increase in unfunded pension liability and annual pension cost, and the legislative and judicial uncertainty pertaining to conversions.

We document the factors that differentiate converting firms from firms that maintain traditional defined benefit pension plans. Univariate results show that converters differ from a matched sample of firms that maintained their traditional defined benefit pension plan. Converting firms have significantly more assets and sales and a higher sales growth rate, than non-converting firms. Both the converting and control firms' pension plans are overfunded, but to a significantly lesser degree in converting firms. Growth opportunities are mixed and while converting firms have significantly lower debt ratings than control firms, there is no significant difference in profitability measures between the two samples. The univariate results also show that converting firms experienced lower rates of pension cost increase relative to the control group of firms.

We also test for differences between converters and non-converters using logistic regression analysis. This analysis shows that larger firms, firms that have higher levels of plan assets to total assets and firms that have less volatile cash flows are significantly more likely to adopt a cash balance plan. Additionally, firms with higher growth rates are significantly more likely to convert to cash balance plans, consistent with the human resources hypothesis. The parameter for the pension plan overfunding ratio is significantly negative and weakly supports an asset reversion argument for keeping the traditional defined benefit pension plan. These results together weakly support the human resource hypothesis that firms adopt CBPPs to meet the needs of a more mobile workforce, but we find no evidence that is consistent with the argument that firms convert due to poor financial performance.

The remainder of this paper begins with a review of the literature, background information on pension plan types, conversion issues, court rulings and possible conflicts with government regulations. A discussion of the data, research methods, and a discussion of results will then be presented. Last, conclusions will be drawn.

Previous Research

Pension research in two related areas – disclosure of plan considerations and plan growth – is relevant to this paper. Research on the disclosure of defined benefit plan considerations suggest that while managers may object to pension plan disclosure, firms' market values reflect unfunded pension liabilities (Feldstein and Seligman (1981); Ifflander and Martin (1982); and Sharpe (1981)). However, Chen and D'Arcy (1986) find that share price reaction differs depending on the interest rate assumption used in the firm's pension plan and on the relative size of pension liabilities at the release of FASB 36. Holland and Sutton (1988) develop a theoretical model that includes unfunded pension obligations to extend the notion that debt is positively related to risk and then empirically test their extension. The authors find that ERISA and Pension Benefit Guaranty Corporation (PBGC) insurance decrease the liability nature of the unfunded pension obligations. Alderson and VanDerhei (1992) provide evidence on the market reaction to the reversion of surplus pension assets. They show that stock prices react favorably when weak firms restructure their retirement plans after terminating overfunded defined benefit plans to recapture a large surplus.

Additional evidence on firms' decisions to terminate overfunded defined benefit plans is provided by Peterson (1992). He suggests that plans are terminated to eliminate implicit future benefit promises and that financing and tax considerations influence the termination decision. The relationship between the funding of defined benefit pension plans and corporate debt ratings is examined by Carroll and Niehaus (1998). They show that an asymmetric relationship exists: unfunded pension liabilities reduce debt ratings more than an equivalent amount of excess pension assets increase debt ratings. Power, Dark and Singh (2000) report that public disclosures of firms' unfunded pension liabilities have no significant effect on firm value. Coronado and Sharpe (2003) argue that the stock market overvalues firms due to its inability to differentiate between core earnings and pension earnings. Cumulatively, these studies suggest that pensions are not managed in a disinterested way and that disclosure of defined benefit plan considerations impact firm value.

An early study by Ledolter and Power (1984) documents a short-term negative impact on private retirement plan growth following the passage of the Employee Retirement Income Security Act of 1974 (ERISA). The authors suggest that ERISA had an unintended negative effect on private retirement plan growth. Evidence of a plan preference shift from defined benefit to defined contribution is provided by Power (1987), Clark and McDermed (1990) and others. Seburn (1991) and Woodruff (1989) provide

opinions and justifications regarding this trend. Peterson (1994) empirically shows that the trend towards defined contribution plans is related to firms' interest in reducing operating leverage. Power, Ralston and Kielkopf (1995) examine Reagan era supply side economic policy and show that it did not stimulate private retirement plan growth (private savings) as anticipated.

Little empirical analysis of the cash balance conversion phenomenon has appeared to date. Existing studies report survey responses on such issues as why firms convert (Brown, et al. 2000, GAO, 2000 and Sher, 2001), conversion benefits (Elliott and More, Jr. 2000) and the issues surrounding conversion (Godwin and Key 2000, Lurie, 2000 and Arcadu and Mellors, 2000). Clark and Schieber (forthcoming) analyze the transition to hybrid plans in the United States. Brown, et al. (2001) analyze the market-value cost and effective duration of various cash-balance pension liabilities while considering term-structure effects and crediting rules that used market rates with and without IRS defined margins. They show that the present-value cost of funding and the effective duration of the cash-balance liability vary dramatically across IRS sanctioned crediting alternatives and credit ratings, respectively. More recently, Niehaus and Yu (2003) examine the influence of excise taxes and the breach of an implied pension contract on the decision to convert to cash balance plans. The authors present evidence that supports the conclusion that changes in tax regulations that apply to firms converting define benefit pension plans make it more likely that a firm would convert to a cash balance plan as opposed a full-fledged defined contribution plan. Additionally, they find

that converting firms do not seem to be poor performers and consequently are not converting to impose pension losses on plan participants.

Traditional and Cash Balance Pension Plans

Employers are not legally mandated to provide their employees with a retirement plan. However, nearly every large company in the United States sponsors a qualified plan¹. The most commonly advanced reason for employment based pension plan coverage is human resources driven – to remain competitive in the employee market (Schultz, 2000). Traditionally pension plans have been classified as defined benefit or defined contribution plan, and IRC requirements apply separately².

Defined Benefit Pension Plans (DBPPs)

Defined benefit pension plans are common, although the total number of plans has been decreasing and managers consider them to be the most complex type of qualified plan.⁴ A defined benefit plan provides workers a specific monthly benefit upon retirement, typically in the form of an annuity. The benefit is guaranteed by the Pension Benefit Guaranty Corporation (PBGC). The plan sponsor (employer) must pre-fund expected retirement benefits; therefore, investment gains and losses affect the annual pension cost. Individual accounts are not set up for each employee; instead employer contributions are paid into an unallocated account that is used to meet benefit obliga-

¹ A gualified plan meets the requirements of the Employee Retirement Security Act of 1974, as amended. Qualified plans benefit from favorable Internal Revenue Code provisions regarding tax deductibility of contributions and tax deferral of investment earnings. ² 26 U.S.C. 414(j).

⁴ The total number of defined benefit pension plans (175,143) peaked in 1983 and has declined steadily to 56,405 in 1998 (EBRI, 2003).

tions to retirees. Most defined benefit plans are not fully funded. If the plan is terminated or taken over due to bankruptcy, the PBGC assumes the unfunded benefit liability.⁶

Defined benefit plans typically use a formula to determine an employee's retirement benefit, although a flat benefit may be provided. A defined benefit formula uses a variety of assumptions, including the workers age, years of employment, and annual income to determine the value of the retirement benefit. Defined benefit pension plans vary widely from company to company and it is important to understand the underlying factors that affect pension cost. Most defined benefit plans are based upon a formula that takes into account the employee's past service for the company and average earnings for 3 to 5 years of employment and a multiplier. An example of the final average pay paradigm would be a company offering a retirement pension equaling 1.5 percent multiplied by years of service multiplied by the employee's average salary over the last three years of service. Thus an employee who has worked for the company for 30 years would receive a much larger pension benefit than a similarly paid employee who had worked for 15 years. In general, defined benefit pension plans reward long-

⁶ For example, on April 1, 2003 the PBGC announced that it became the trustee of US Airways' pension plan for pilots and would be responsible for paying pension benefits to approximately 6,000 pilots. The plan was underfunded by \$2.5 billion and the PBGC estimated that it would be liable for approximately \$600 million (PBGC, 2003).

service employees and encourage workers to stay with the company until they are fully vested in their retirement benefit. This plan characteristic contributes to employee entrenchment and dissatisfied due to a lack of labor force mobility, which is a result of the back-loaded accumulation of pension benefit. It is also problematic that employees covered by this plan type and that change jobs frequently will never be able to reach the greatest benefit producing years of the plan. Many employers view the defined benefit plan as complex, costly, and underappreciated by employees when compared to other more visible plan types, such as 401(k) or 403(b) plans.

Defined Contribution Pension Plans (DCPPs)

The other general category of pension plans is the defined contribution. Defined contribution plans have become very popular since the passage of the Employee Retirement Income Security Act of 1974⁷, ostensibly due to their simplicity and the saturation of the large employer market for defined benefit plans. The DCPP resembles a tax sheltered savings account in the employee's name. Usually on a monthly basis, a predetermined amount of the employee's income is deposited into an employee controlled accumulation account. For example, an employer may deposit 6% of the employee's monthly income on a pre-tax basis into the employees account without an employee match. Investment income earned on the account balance is income tax deferred and if withdrawals are made for retirement purposes, the distribution is treated as ordinary income.

⁷ The number of DC plans has steadily increased, with 207,748 plans in 1975 and 673,626 plans in 1998 (EBRI, 2003).

Under a defined contribution form of pension plan the employee is responsible for accumulation and liquidation risks, which is opposite of a defined benefit plan where the employer is responsible. In a DCP, the employer is required to offer plan participants a variety of options for investment purposes, but the employee is responsible for investing retirement contributions wisely; if they do not, the employer has limited liability and the plan is not insured by the PBGC (Stewart and Yaffe, 1999). At retirement the employee is not guaranteed a benefit, instead the retirement benefit must be funded out of the participants personal account balance. Many liquidation options are available to the plan participant, and include, but are not limited to the purchase of an annuity, interest payments only, and a lump sum withdrawal.

Employers and employees positively view the defined contribution approach to financing old-age economic security. Employers like DCPPs because they are less complex, highly visible, potentially less costly, and accumulation and liquidation decisions (risks) are the responsibility of the employee. Additionally, this plan type is not insured by the Pension Benefit Guaranty Corporation, which should help lower plan cost. From a human resources perspective, DCPPs may assist in retaining and attracting highly mobile workers in a tight labor market. However, pension regulation requires that employers keep track of retirement investment accounts for every employee and employers have some responsibility for educating employees so that responsible accumulation and liquidation decisions can be made.

Employees like the DCPP because it is less complex, highly visible, and portable. Most employees want to be involved in account accumulation and liquidation de-

cision making. Account accumulation portability is especially important if the employee does not plan on staying with the company for the rest of his or her career. Unlike the defined benefit plan, in which the greatest income producing years are the latest, in a defined contribution plan it is usually the money invested in the early years that will return the most retirement income in the long run. Hybrid plans, like the cash balance pension plan, have characteristics of both of the traditional pension plans previously discussed.

Cash Balance Pension Plans (CBPPs)

The cash balance pension plan is a hybrid plan. It is technically a defined benefit plan because federal pension law defines any pension plan with an unallocated account as defined benefit. However, the cash balance plan has the visibility and portability characteristics of the defined contribution pension plan. Cash balance plans are relatively new in the labor force, with the first plan being put into place in 1985 (Schultz, 2000). CBPPs have been gaining popularity and nearly 22% of Fortune 500 companies have converted (Stewart and Yaffe, 1999).

During employment (accumulation phase) a cash balance pension plan is similar to a defined contribution plan with the employer contributing a certain percentage of the employee's income on an allocated account basis. However, the employee does not bear the investment risk of this account, as they would under the defined contribution plan. Instead, the employer predetermines a rate of return on the account and that is the amount of investment earnings credited during the plan year. For example, an employer sets aside an amount equal to 5% of an employee's income each year and promises a return on that account of an amount equal to the Treasury bill rate plus 1%. A significant difference between individual allocation accounts as described above is that the CBPP account is hypothetical, one found only on paper. Like a DBPP, the CBPP allows the plan sponsor to pool actual contributions and investment returns on an unallocated basis. The employer may be able to immediately lower pension cost by converting a DBPP to a CBPP because the terminal value of the defined benefit plan may be greater than the beginning fund balance of the cash balance plan⁸. The CBPP sponsor is responsible for investment gains and losses. If the plan sponsor uses a conservative rate of interest, excess return can be used to lower annual pension cost. Last, CBPP benefits grow steadily over the working years of the employee, while most defined benefit plans are back loaded and result in a higher benefit for long service employees.

CBPP Conversion Controversy

Converting a DBPP into a CBPP can become a contentious labor – management issue. Thomas (2000) presents the popular and financial press view on cash balance conversion from the perspective of both the employer and employee. In general, conversions become most contentious when long-service employees do not receive credit for their high growth years under the traditional defined benefit plan. The employee implication is a lower retirement benefit under the CBPP relative to the anticipated DBPP retirement benefit and possible lower pension cost for the plan sponsor. Differences in benefit levels at conversion are a result of the gradual growth of benefits under

⁸ Niehaus and Yu (2003) empirically determine that employers convert to cash balance plans rather than defined contribution plans to protect the value of over-funded

the CBPP and the back-loading that takes place in DBPP that are final average pay plans. The present value of vested-accrued benefits under the DBPP, for the longservice employee, most likely will be greater than the value of the conversion benefit required under the CBPP. Consequently, the plan sponsor will not have to make a contribution until the CBPP accumulation account is underfunded. This creates a problem: if the employee were to quit, the employer would be required to payout the original value of the defined benefit plan because "the law prohibits a cutback of alreadyaccrued benefits" (UAW Research Dept., 2000). If the employee continues working, the discounted sum from the defined benefit plan is placed in a cash balance account where it will not grow as fast as it would have during the high growth years of the defined benefit plan. This creates what is known as a "wear away" period (UAW Research Dept., 2000).

This issue has caused many employees to stand up against the conversion to cash balance pension plans. Employees and their legislators view this as a form of age discrimination that should not be allowed to happen. However, it is fully within the legal right for a company to terminate a pension plan at any time, since they are not required by law to provide one, thus conversion proponents contend that conversion is completely legal and actually keeps many companies from discontinuing pension plans altogether.

defined benefit plans by avoiding the current 50 percent excess tax on reverted pension assets.

There have been several court rulings on legality of the conversion process. Georgia Pacific Corporation had to defend conversion to a cash balance pension plan in court. The case first was heard in 1999 and turned on the method that Georgia Pacific Corporation used to discount an employee's defined benefit plan when setting up the cash balance pension account for him. This suit focused on whether a company is required to use a specific interest rate provided by the Pension Benefit Guaranty Corporation for present value calculations or if employers can use any realistic interest rate. Georgia Pacific prevailed in the initial case, stating that there was no requirement on what rate was to be use. However, the 11th US Circuit Court of Appeals (Lyons vs. G. P., 2000) over turned the lower court and held that cash balance pension plans must follow defined benefit plan regulations (Anand, 2000).

Numerous other cases have been presented in tax court to determine if the practice of converting to a cash balance pension plan is a form of age discrimination. However, legislators have provided a safe harbor in the IRC that states that "will not cause a cash balance plan to fail to satisfy the requirement of section 411(b)(1)(H),"(Schultz, 2000). In other words, cash balance plans do not violate age discrimination laws. This one sentence of IRS code has not satisfied the many opponents of the cash balance plan and legislators are still trying to determine whether cash balance plans violate age discrimination laws⁹.

⁹ On April 7, 2003, the Treasury Department and Internal Revenue Service jointly withdrew proposed regulations that interpret the statutory age-discrimination rules for all qualified plans, including cash balance plans (see http://www.ustreas.gove/press/releases/js161.html).

The most notable conversion controversy involved IBM and its 1998 decision to convert its traditional defined benefit plan into a cash balance plan. Soon after the conversion, employees complained that it was unfair (Schultz, Auerbach and Burkins, 1999). In response, IBM gave employees the option to stay with the old plan or switch to the cash balance plan. This option did not satisfy IBM employees and an ADEA suit was filed in federal court. The United States District Court for the Southern District of Illinois (Cooper, 2003) ruled against IBM and concluded that CBPPs discriminate against older workers, cut their benefits and serve to lower plan costs and improve the bottom line of firms that use them. Additionally, the Seventh Circuit of Appeals found that CBPPs are subject to pension regulation and that as a consequence, Xerox miscal-culated pension payouts in its cash-balance plan (Schultz, 2003). These rulings further contribute to the legislative and legal uncertainty surrounding cash-balance conversions.

Research Process

Hypotheses

The potential motives for conversion from a traditional defined benefit plan to a cash balance plan fall into two categories: cost savings conditional on a particular set of present and future employees, and using plan design as a labor recruitment and retention tool. The *financial incentive hypothesis* predicts that employers switch from DBPPs to CBPPs to reduce the costs of retirement benefits. Cash balance plans are less costly if they enable firms to reduce aggregate pension payments, reduce employer contributions or take advantage of interest arbitrage when pension assets generate excess earnings. The *human resources hypothesis* predicts that firms switch to CBPPs because they help recruit and retain employees in an environment where workers are less likely to stay

with one employer their entire career. The portability of cash balance plan accumulations potentially provides significantly larger benefits for short-service employees than final average pay plans (Geisel, 1990).

The hypotheses are not mutually exclusive. Managers may perceive cash balance plans as both less expensive and a more effective recruitment tool. Some of the detailed predictions of the hypotheses are opposite, allowing us to draw inferences about which effect is dominant.

Sample and Matching Procedure

Data are collected for the selected variables for a sample of companies that converted to the CBPP and compared against a matched sample of firms similar in market size and in the same industry who retained their traditional defined benefit pension plans. The three categories of variables include: (1) employment and pension plan characteristics; (2) firm size, growth opportunities and capital intensity; and (3) firm financial performance and risk.

It is difficult to identify converters and their dates of conversion, of which we can find no comprehensive, publicly available list. We developed an initial list of over 300 companies that converted to cash balance pensions from various sources. For inclusion in the final sample, we required that we be able to identify the conversion date and that the firm be publicly traded on the NYSE, Nasdaq or AMEX, and that Compustat data be available for the firm. Eighty-six companies meet the criteria.¹¹

¹¹ Our sample of converting companies is extensive when compared to the population of firms that sponsor cash balance plans. The GAO (2000) state about 19 percent

To construct the non-converting sample, we match each converting firm to all firms on Compustat that have the same 3-digit NAICS code and the same fiscal year ending date. To be included, a matching firm must not have converted to a cash balance plan or otherwise terminated its defined benefit plan as of the end of the fiscal year in which the corresponding converting firm made its switch. A non-converting firm also must be traded on the NYSE, Nasdaq or AMEX and must meet the following criteria in the fiscal year preceding the conversion.: It must have reported defined benefit pension plan assets greater than \$1 million, and must be of similar size to the converting firm as indicated by either total assets or sales being within 30% above or below the converting firm. The process yields 680 non-converting firms in the final sample, some of which match more than one converting firm. When more than one non-converting firm matches a converting firm, we use the average of the matching non-converting firms in the paired difference analysis.

Results

Univariate Tests

Except where stated to the contrary, we obtain all data from the *Compustat* database, and the variables are measured as of the fiscal year preceding the conversion.

We use the amount of *pension plan assets* and its ratio to total assets to control for the importance of pension plans in firms' decision-making. We expect that firms would be more likely to make a change, the more pension assets they have. Panel A of table 1 reports that converting firms have a mean \$3.4 billion in defined benefit pension

of Fortune 1000 firms sponsor cash balance plans and Stewart and Yaffe (1999) report that 22 percent of Fortune 500 companies have converted.

assets, versus \$1.7 billion for matched non-converting control firms, a statistically significant difference. However, the ratios of pension to total assets, 18.9% for converting firms and 14.6% for control firms, are not statistically different.

Firms with underfunded defined benefit plans would be more likely to convert to reduce underfunding, under the financial incentive hypothesis. The mean and median pension overfunding ratios are positive for both converting and control firms, indicating that pensions are not underfunded on average in either group. The median overfunding ratio of converting firms, 22.6% is less than that of control firms, 32.7%, a statistically significant paired difference consistent with the financial incentive hypothesis.

The financial incentive hypothesis implies that firms are more likely to convert when pension costs are higher. We use several measures of pension costs: the ratios of net period pension cost to sales and total assets indicate the relative size of pension costs, net of pension plan earnings. Pension service cost, a component of net period pension cost, measures the present value of expected future pension payments created by employee work during the year; we scale it by sales. None of the cost measures differs between converting and control firms.

The financial incentive to convert is greater if costs are growing rapidly. We examine the growth rate of net period pension cost and of its ratio to sales over the four years preceding conversion. Converting firms exhibit a negative mean growth rate of pension cost and its ratio to sales, and a negative median ratio to sales. The mean and median growth rates are less for converting firms than their matched controls; the dif-

ference is significant at the 5% level except for the mean pension cost growth rate difference, which is significant at the 10% level.

Coronado and Sharpe (2003) argue that pension plan accounting artificially inflates reported net income, but that stock market valuations, especially in periods of high stock prices, are consistent with investors treating the pension effects as operating earnings. Following Coronado and Sharpe, we calculate pension earnings as the negative of the difference between net period pension cost and pension service cost. The resulting figure consists mainly of the expected return on plan assets net of the interest cost attributed to the time value of accumulated benefit obligations. Coronado and Sharpe point out that the expected return on plan assets assumes that a risk premium will be earned, but is subject to smoothing and therefore understates the negative effects of risk. The attributed interest cost does not include an equity risk premium, and therefore the pension earnings number tends to overstate the economic gains, or understate the economic losses, on pension plans. Under the financial incentive hypothesis, firms with lower pension earnings compared to peers may be inclined to convert to a cash balance plan in order to reduce the growth of present value of future benefit obligations. Panel A shows that pension earnings, scaled by sales or assets, do not differ between converting and control firms.

The results from panel A suggest that converting firms, on average, do not have higher or more rapidly growing pension costs, or lower pension earnings, contrary to the financial incentive hypothesis. Converting firms do have lower overfunding than control firms, but still are overfunded, on average.

Panel B reports that converting firms are significantly larger than control firms, with a median of approximately \$6 billion dollars in assets versus \$5 billion for controls. Under the financial incentive hypothesis, higher labor costs could provide an impetus for management to seek pension cost reductions. However, converting and control firms do not differ in the total number of employees, employees relative to sales, or growth rate of employees. For example, converting and control firms have a mean of 4.621 and 4.735 employees per million dollars of sales, respectively, a difference that is statistically insignificant at conventional levels.

Under the human resources hypothesis, firms with more highly skilled work forces would be more likely to convert to cash balance plans. Such firms can be expected to be more capital intensive, as measured by long term assets or capital expenditures, per employee or per dollar of sales. However, panel B reveals no discernible difference between converting and control firms on these measures.

Panel C of table 1 reports proxies for growth opportunities. Higher growth opportunities tend to require more attention to recruitment and retention of higher skilled employees. Therefore, under the human resources hypothesis, we would expect converting firms to be those that have more growth opportunities. Panel C shows that converting firms have significantly higher sales growth rates on average; the mean sales growth rates of converting and control firms are 53.9% and 21.5% respectively. Another proxy for growth opportunities, the ratio of intangible to total assets, is inconsistent with the sales growth result. Control firms have a mean 8.3% intangible assets, compared to 7.2% for converting firms. While the mean paired difference is not statistically different

from zero, the medians of 4.1% and 3.1% for control and converting firms, respectively, do differ significantly. Converting and control firms do not differ in their research and development expenses scaled by assets or sales.

Under the financial incentive hypothesis, poor financial performance would be a potential stimulant to pension changes. Panel D of table 1 reports no significant difference in profitability between converting and control firms. Control firms have higher debt ratios than converting firms. Thus, there is no evidence to support the prediction that firms adopt cash balance pension plans in response to subpar financial performance.

Peterson (1992) argues that firms benefit most from contributing to pension plans when their tax rates are high. If cash balance conversions are an attempt to reduce contributions, as would be consistent with the financial incentive hypothesis, then we should see conversions by firms with lower tax rates. Panel D reports that converting firms' mean (median) marginal tax rate is 28.4% (35%), while control firms face mean and median rates of 28.3% and 31.6% respectively. The median paired difference is significant at the 1% level. The result does not support the financial incentive hypothesis.

Peterson (1994) reports that firms with higher cash-flow variability are more likely to select defined contribution pension plans over defined benefit plans. He attributes the tendency to a need for greater financial flexibility when cash flows are more volatile. Because cash balance plans also are more flexible than defined benefit plans, Peterson's argument suggests that firms with more volatile cash flows should be more

likely to convert. However, Panel C reports the opposite: a significantly lower coefficient of variation of operating income before depreciation for converting firms. The result suggests that financial flexibility is not a driving force in cash balance conversions.

Panel D also reports that buy-and-hold abnormal stock returns and residual standard deviations of stock returns do not differ between converting and non-converting firms.

Logistic Regressions

Table 2 reports three logistic regressions, where the second and third drop successive explanatory variables from the first, for the adoption of a cash balance pension plan. In contrast to table 1, there is no pairing of specific converting firms with specific control firms, and each control firm enters the sample exactly once.

Consistent with the univariate results, firms with more assets, higher debt ratios, more volatile cash flows, and more rapidly growing sales are more likely to adopt cash balance plans. Return on assets, the intangible assets ratio, long term assets per employee, employees per million dollars of sales, pension periodic service cost relative, growth rate of the ratio of net periodic pension cost to sales, and pension earnings have no statistically significant effect on the probability of conversion in the presence of the other explanatory variables.

Firms with underfunded pension plans are significantly more likely to convert.

Summary

Our empirical tests of the determinants of cash balance pension plans favor the human resources hypothesis. We find no evidence that the conversion of defined benefit pension plans to cash balance plans is a response to poor financial performance or to high or rising pension costs. Conversions do appear to be influenced by financial incentives in one way: Firms with underfunded pension plans are more likely to convert. However, we cannot tell whether the result is due to underfunded firms trying to reduce pension costs by converting, or overfunded firms resisting conversion. Overfunded firms might avoid conversion to preserve their higher value of the implicit option to terminate the plan and capture excess assets, which could be complicated by conversion.

We find some support for the human resources hypothesis that firms adopt cash balance plans to better appeal to younger, more skilled and more mobile workers. Firms with more rapidly growing sales are significantly more likely to convert. However, the support for the human resource hypothesis is mitigated by the fact that that other measures of growth opportunities do not bolster the sales growth result.

The results suggest that public policy regarding cash balance conversions should not be predicated on the assumption that conversions stem from financial management considerations as opposed to human resource management concerns.

References

- Anand, Vineeta. "Participants Win Big in Georgia-Pacific Cash Balance Case," Pension and Investments, August 21, 2000, Vol. 28, 1-2.
- Arcadu. A.T. and Mellors, F. "Cash balance conversions," Journal of Accountancy, Feb 2000, 22-28.
- Alderson, M.J. and VanDerhei, J.L. "Additional Evidence on the Reaction of Shareholders to the Reversion of Surplus Pension Assets," Journal of Risk and Insurance, Vol. LIX, No. 2 (June, 1992), 262-2
- Brown, D.T., Dybvig, P.H. and Marshall, W.J. "The cost and duration of cash-balance pension plans," Financial Analysts Journal, Nov/Dec 2001, 50-62.
- Brown, K., et al., "The Unfolding of a Predictable Surprise," Bethesda, MD: Watson Wyatt Worldwide, 2000.
- Carroll, T.J. and Niehaus, G. "Pension Plan Funding and Corporate Debt Ratings," Journal of Risk and Insurance, Vol. 65, No. 3, September, 1998, 427-441.
- Chen, K. C. and D'Arcy, S. P. "Market Sensitivity to Interest Rate Assumptions in Corporate Pension Plans," Journal of Risk and Insurance, Volume LIII, No. 2, June, 1986, 210 - 225.
- Clark, R.L. and McDermed, A. "The Choice of Pension Plans in a Changing Regulatory Environment," Washington, DC: American Enterprise Institute for Public Policy Research, 1990.
- Clark, R., an Schieber, S. " An Empirical Analysis of the Transition to Hybrid Pension Plans in the United States," in Public Policies and Private Pensions, edited by W. Gale, J. Shoven, and M. Warshawsky. Washington, DC: The Brookings Institution. Forthcoming.
- Cooper, K., Harrington, B. and Hillesheim, M. vs. The IBM Personal Pension Plan and IBM Corporation, United States District Court for the Southern District of Illinois, July 31, 2003.
- Coronado, Julia Lynn and Steven A. Sharpe. "Did Pension Plan Accounting Contribute to a Stock Market 'Bubble'?" Brookings Papers on Economic Activity, Forthcoming 2003.
- EBRI, "Facts from EBRI," January, 2003, www.ebri.org/facts/.
- Elliott, K.R. and Moore, J.H., Jr. "Cash Balance Pension Plans: The New Wave," Compensation and Working Conditions, Summer 2000, 3-11.
- Feldstein, M. and Seligman, S. "Pension Funding, Share prices, and National Savings," The Journal of Finance, Vol. 36, No. 4, Sept. 1981, 801-824.
- GAO, "Implications of Conversions to Cash Balance Plans,"GAO/HEHS-00-185, 2000.

- Geisel, J. "Cash Balance Combines Best of Defined Benefit, Defined Contribution Plans," Business Insurance, November 19, 1990, 3.
- Goodwin, N.H. and Key, J.G. "An overview of cash balance pension plans," Journal of Pension Planning and Compliance, Summer 2000, 58-70.
- Holland, R.G. and Sutton, N.A. "The Liability Nature of Unfunded Pension Obligations Since ERISA," The Journal of Risk and Insurance, Vol. LV, No. 1, March, 1988, 32-58.
- Ifflander, A.J. and Martin, L. "Informational Content of Disclosure of Pension Liabilities According to FASB No. 36," Journal of Midwest Finance Association, Vol. 11, 1982, 59-74.
- Ledolter, J. and Power, M.L. "A Study of ERISA's Impact on Private Retirement Plan Growth," The Journal of Risk and Insurance, Vol. L1, No. 1, June 1984, 225-243.
- Lyons, J. L. vs. Georgia Pacific Corporation Salaried Employees Retirement Plan, United States Court of Appeals, August 11, 2000.
- Niehaus, G. and Yu, T. "Cash Balance Plan Conversions: Evidence on the Influence of Excise Taxes and Breaching Implicit Contracts," Working Paper, September 2003, 1-36.
- PBGC, "PBGC Becomes Trustee of US Airways' Pension Plan for Pilots," April 1, 2003, www. Pbgc.gov/usairways.
- Peterson, M.A. "Pension Reversions and Worker-Stockholder Wealth Transfers," The Quarterly Journal of Economics, August 1992, 1033-1056.
- Peterson, M.A. "Cash flow variability and firm's pension choice: A role for operating leverage," Journal of Financial Economics, Vol. 36, No 3, December 1994.
- Power, M.L. "An Analysis of the Growth in Defined Benefit and Defined Contribution Retirement Plans," Benefits Quarterly, Vol. III, No. 3, Third Quarter 1987, 49-56.
- Power, M. L., Dark, F, and Singh, A. "Politics, Insurance Regulation, and Unfunded Pension Liabilities," Risk Management and Insurance Review, Spring 2000, V. 3, No. 1, 29-44.
- Power, M.L., Ralston, A. and Kielkopf, T. "The Effect of Reagan Era Public Policy on Private Retirement Plan Growth," Journal of Insurance Issues, Fall 1995, VXIX, No. 1, 66-79.
- Schultz, E. "How a Single Sentence From IRS Paved Way to Cash Balance Plans," Wall Street Journal, January 18, 2000.
- Schultz, E. "Pension Rulings Roil Hundreds of Business," Wall Street Journal, August 4, 2003, A3, A6.

- Seburn, P.W. "Evolution of employer-provided defined benefit pension," Monthly Labor Review, December, 1991, 16-23.
- Sharpe, M.W. "Corporate Pension Funding Policy," Journal of Financial Economics, Vol. 36, No. 1 (March, 1981), 1-13.
- Sher, L. "A Workable Alternative to Defined Benefit Plans," Contingencies American Academy of Actuaries, September/October 1999.
- Sher, L. "Survey of cash balance conversions," Benefits Quarterly, First Quarter 2001, 19-26.
- Stewart, C. and Yaffe, D. "Cash Balance Pension Plans Benefit Employers, Employees," Health Care Financial Management, Vol. 43, No 3, March 1989, 92-93.
- Thomas, P.B. "Cash Balance Pension Plans: The Role of Accounting," Unpublished Working Paper, April, 2000.
- UAW Research Department, "Cash Balance Pension Plans," Jobs, Paychecks, and the Economy, March/April 2000.
- Woodruff, T.C. "Pension Plan Growth: What Can We Expect?" What is the future for defined benefit pension plans? EBRI/PBGC Roundtable. Washington, DC: EBRI, 1989, 125-128.

Table 1

Descriptive Statistics of Firms Converting from Defined Benefit to Cash Balance Pension Plans and Matched Control Firms Retaining Defined Benefit Plans

The unit of observation for the controls line is the mean of all controls identified for each converter as described in the text. N is the number of converter-mean control pairs with data. Paired difference *t* statistic and signed rank (SR) test *p*-value appear in parentheses.

_

_

	Panel A: Pension Plan Characteristics					
	Ν	Mean: Converter/ Controls (Paired <i>t</i>)	Median: Converter/ Controls (SR <i>p</i>)	Minimum: Converter/ Controls	Maximum Converter/ Controls	Std.Dev.: Converter/ Controls
Pension Plan Assets (\$ Million)	74	3424 1688 (1.97*)	606 443 (0.53)	4.500 8.773	60,076 22,811	9448 3792
Pension Plan Assets to Total Assets (%)	74	18.874 14.632 (1.20)	11.111 13.030 (1.00)	0.481 0.531	105.911 79.359	21.634 13.770
Pension Overfunding Ratio (% of Accumulated Benefit Obligation)	59	31.640 43.700 (-0.10)	22.606 32.747 (0.03*)	-15.152 -20.498	335.328 503.108	52.0521 69.593
Net Period Pension Cost to Sales (%)	77	0.489 0.376 (1.50)	0.403 0.394 (0.31)	-1.603 -1.556	3.818 2.461	0.795 0.450
Net Period Pension Cost to Total Assets (%)	77	0.438 0.301 (1.20)	0.215 0.168 (0.80)	-1.583 -0.859	3.290 1.977	0.765 0.419
Pension Service Cost to Sales (%)	68	0.596 0.583 (0.28)	0.556 0.496 (1.00)	0.000 0.059	1.732 1.869	0.344 0.350
Pension Earnings to Sales (%)	51	0.283 0.284 (-0.94)	0.104 0.162 (0.53)	-1.218 -0.306	2.850 1.948	0.594 0.432
Pension Earnings to Total Assets (%)	51	0.202 0.180 (-0.85)	0.056 0.098 (0.53)	-1.323 -0.220	2.816 1.291	0.543 0.262
Net Period Pension Cost Growth Rate (Year –1 to –4, not Annualized)	67	-29.629 113.679 (-1.76)	89.264 113.886 (0.04*)	-5400.0 -616.75	740.741 586.617	718.409 141.422
Growth Rate of (Net Period Pension Cost ÷ Sales) (Year -1 to -4)	67	-1.480 -0.007 (-1.97*)	-0.229 0.035 (0.01**)	-48.418 -4.914	4.986 3.973	6.192 1.095

Table 1 Continued

	Ν	Mean:	Median:	Minimum:	Maximum	Std.Dev.:
		Converter/	Converter/	Converter/	Converter/	Converter/
		Controls	Controls	Controls	Controls	Controls
		(Paired <i>t</i>)	$(\operatorname{SR} p)$			
Total Assets	83	29,828	6088	60.942	716,937	86,022
(Book, \$ Million)		20,350	5115	31.731	219,919	39,354
		(1.02)	(0.001*)			
Log of Total Assets (Book)	83	8.715	8.714	4.110	13.483	1.841
		8.507	8.430	3.457	12.298	1.799
		(3.39**)	(0.000 * *)			
Log of Assets (Market)	79	9.161	9.034	4.024	13.661	1.790
		8.876	8.960	3.593	12.481	1.802
		(2.23*)	(0.002^{**})			
Log of Sales	83	8.043	8.027	3.410	11.315	1.494
		7.786	7.753	3.606	10.176	1.311
		(5.23**)	(0.000 **)			
Log of Employees	77	2.574	2.442	-0.952	5.596	1.428
		2.260	1.985	-1.194	5.106	1.296
		(1.39)	(0.25)			
Employees per	77	4.621	4.326	0.729	15.024	2.791
Million \$ Sales		4.735	4.540	1.609	16.181	2.413
		(-0.75)	(0.10)			
Workforce Growth Rate	68	0.186	0.060	-0.846	1.428	0.447
(Year –1 versus–4,		0.128	0.067	-0.444	1.472	0.286
not Annualized)		(0.95)	(1.000)			
Long-Term Assets	76	0.248	0.087	0.017	1.381	0.327
per Employee		0.272	0.102	0.019	1.827	0.372
(\$ Million)		(0.00)	(0.704)			
Long Term Assets	82	0.653	0.449	0.008	2.379	0.584
to Sales		0.735	0.471	0.077	2.034	0.602
		(-0.47)	(0.027*)			
Capital Expenditures	65	0.028	0.014	0.000	0.264	0.040
per Employee		0.021	0.013	0.000	0.074	0.020
(\$ Million)		(1.32)	(0.672)			
Capital Expenditures	69	0.055	0.050	0.000	0.164	0.037
to Assets		0.043	0.044	0.000	0.122	0.029
		(0.75)	(0.590)			
Capital Expenditures	69	0.077	0.056	0.000	0.320	0.070
to Sales		0.066	0.049	0.000	0.220	0.055
		(0.78)	(0.281)			
		(-0.69)	(1.000)			

Panel B: Firm Size, Employment and Capital Intensity

	Panel C: Growth Opportunity Proxies					
	Ν	Mean:	Median:	Minimum:	Maximum	Std.Dev.:
		Converter/	Converter/	Converter/	Converter/	Converter/
		Controls	Controls	Controls	Controls	Controls
		(Paired <i>t</i>)	(SR p)			
Sales Growth Rate	73	0.539	0.238	-0.573	7.733	1.077
(Year –1 versus Year –4,		0.215	0.200	-0.441	0.818	0.224
not Annualized)		(2.20*)	(0.694)			
Intangibles to Assets	67	0.072	0.031	0.000	0.379	0.094
		0.083	0.041	0.000	0.381	0.089
		(-0.80)	(0.022*)			
R&D Expense to Assets	30	0.045	0.030	0.000	0.143	0.039
_		0.025	0.016	0.000	0.102	0.028
		(0.66)	(0.824)			
R&D Expense to Sales	30	0.041	0.034	0.000	0.125	0.034
		0.029	0.021	0.000	0.137	0.036
		(-0.69)	(1.000)			

Table 1 Continued

Table 1 Continued

	Ν	Mean:	Median:	Minimum:	Maximum	Std.Dev.:
		Converter/	Converter/	Converter/	Converter/	Converter/
		Controls (Paired t)	Controls (SP, n)	Controls	Controls	Controls
Operating Income before De	77	(raneu i)	(3Kp)	0.050	0.286	0.080
presistion to Veer 2 Agents	//	0.132	0.120	-0.039	0.280	0.080
preciation to Teat -2 Assets		(0.21)	(0.802)	-0.092	0.515	0.074
On anoting In a smach afana	77	(0.21)	(0.892)	0.060	0.202	0.094
Depression to Veer 2	//	0.139	0.127	-0.060	0.302	0.084
Depreciation to Year -2		(0.127)	0.120	-0.096	0.301	0.082
Non-cash Assets	~ •	(-0.01)	(0.497)			
Income before Extraordinary	82	0.037	0.036	-0.172	0.175	0.048
Items to Year –2 Assets		0.029 0.028		-0.183	0.162	0.047
		(0.57)	(1.000)			
1=Earnings per Share Below	78	0.436	0.000	0.000	1.000	0.499
Previous Year, 0 otherwise		0.419	0.402	0.000	1.000	0.305
		(0.57)	(1.000)			
1=Reported a Negative	86	0.163	0.000	0.000	1.000	0.371
Net Income, 0 otherwise		0.212	0.111	0.000	1.000	0.281
		(-0.32)	(0.002)			
ROA	83	0.038	0.035	-0.172	0.271	0.060
		0.029	0.030	-0.183	0.150	0.052
		(0.58)	(0.807)			
ROE	83	0.106	0.134	-2.147	1.402	0.412
		0.068	0.132	-2.248	0.381	0.346
		(0.32)	(0.142)			
Debt Ratio (Book)	82	1.778	0.454	0.000	44.233	5.493
		1.537	0.755	0.129	11.108	2.177
		(0.59)	(0.001**)			
Debt Ratio (Market)	79	0.150	0.123	0.000	0.755	0.132
		0.181	0.172	0.011	0.430	0.108
		(-2.48*)	(0.011*)			
Selling, General and	51	0.236	0.217	0.019	0.758	0.140
Administrative Expense		0.198	0.206	0.033	0.464	0.105
to Sales		(0.60)	(0.073)			
Marginal Tax Rate	64	0.284	0.350	0.000	0.460	0.136
(After Interest; from John R.		0.283	0.316	0.000	0.460	0.091
Graham's Database)		(0.48)	(0.001**)			
Coefficient of Variation of	75	30 072	23 073	3 479	115 959	20 704
Operating Income before		41.584	43.158	-170.48	135.598	34.764
Depreciation		(-2.63**)	(0.000**)			
Three-Year Buy-and-Hold	72	_0 394	-0.381	-9 343	2 689	1 466
Abnormal Stock Return		-0.539	-0.187	-8,481	1.120	1.500
		(-0.31)	(1.000)	551		
Residual Standard Deviation	78	0.016	0.015	0.008	0 044	0.006
of Stock Return	. 0	0.017	0.015	0.010	0.047	0.006
		(-1.48)	(0.056)		• •	

Panel D: Firm Financial Performance and Risk

Table 2

Logistic Regressions for Conversion from Defined Benefit to Cash Balance Pension Plan

The symbols * and ** indicate statistical significance of Wald χ^2 (for individual parameters) or
Likelihood Ratio χ^2 (for overall model) tests at the 5% and 1% levels, respectively.

	Moo	del 1	Moo	del 2	Model 3			
Effect	Parameter	<i>p</i> -value	Parameter	<i>p</i> -value	Parameter	<i>p</i> -value		
	Estimate	-	Estimate	-	Estimate	_		
Intercept	-2.18	0.002**	-2.17	0.001**	-1.87	0.001**		
Total Assets	0.01	0.015*	0.01	0.039*	0.01	0.028**		
DOL	1 40	0.007						
ROA	1.42	0.697						
Debt Ratio (Market)	-5.95	0.010**	-4.20	0.025*	-5.23	0.002**		
Intangible Asset Ratio	-2.56	0.281	-3.22	0.179				
CV of Operating Income before	-0.05	0.001**	-0.05	0.001**	-0.04	0.001**		
Depreciation								
Sales Growth Rate	0.90	0.001**	0.90	0.001**	0.83	0.001**		
Sules Growth Rule	0.90	0.001	0.90	0.001	0.05	0.001		
Long Term Assets per Employee	1 13	0.044						
Long Term Assets per Employee	1.13	0.044						
	0.00	0 114	0.040	0.207				
Employees per Million \$ Sales	0.08	0.114	0.049	0.307				
Pension Period Service	-98.83	0.154						
Cost to Sales								
Pension Plan Assets to	4.35	0.004**	2.72	0.014*	3.22	0.001**		
Total Assets								
Growth Rate of (Net Period Pen-	-0.01	0.682	-0.01	0.556	-0.01	0.537		
sion Cost to Sales)								
1=Pension Plan is Underfunded	1 53	0 008**	1 42	0 009**	0.96	0.060		
	1.00	0.000	1.12	0.009	0.90	0.000		
Pension Accounting Farnings	28 56	0.484	28.80	0 4 4 0	13 52	0 175		
to Sales	-28.50	0.404	-20.09	0.449	-45.52	0.175		
\tilde{R}^{2} (Max-Rescaled Coefficient	0.	25	0.	0.22		0.24		
of Determination)								
Likelihood Ratio Test <i>p</i> -value	0.005**		0.00	0.001**		0.001**		