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The conversion of traditional defined benefit pension plans to cash balance plans has caused considerable controversy. The primary points of contention have been the reduction in future benefits that older workers had expected and whether cash balance plans violate age discrimination laws. This analysis places the trend toward cash balance plans in the large context of a movement away from traditional defined benefit plans. For the past, 30 years employers have been terminating defined benefit plans and adopting defined contributions while the movement toward cash balance plans has been occurring over the past 15 or 20 years. The paper examines why employers and employees now tend to prefer defined contribution and cash balance plans thus placing these trends in an economic framework. A clear distinction is made between starting new plans where no pension previously existed and the conversion of existing plans. Winners and losers in the conversion process are identified. Throughout the analysis of the distributional effects of plan conversions, it is important to consider what might happen if the conversion was not made. Possible outcomes include the termination of the plan with no new plan established, layoffs, or even bankruptcy of the company. Thus, the impact of plan conversions cannot be determined by simply comparing the expected benefits under the old plan conditional on it continuing and the worker remaining with the firm. In summary, the paper concludes that cash balance plans represent a reasonable choice for some firms and some workers while other firms and some workers will prefer traditional defined benefit plans or defined contribution plans. Allowing workers and firms to select from these alternatives will have a higher social benefit than restricting pension choices to a single plan type.

Disciplines

Economics

**Pension Plan Options:
Preferences, Choices, and the Distribution of Benefits**

Robert L. Clark

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Pension Research Council

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The conversion of traditional defined benefit pension plans to cash balance plans has caused considerable controversy. The primary points of contention have been the reduction in future benefits that older workers had expected and whether cash balance plans violate age discrimination laws. This analysis places the trend toward cash balance plans in the large context of a movement away from traditional defined benefit plans. For the past, 30 years employers have been terminating defined benefit plans and adopting defined contributions while the movement toward cash balance plans has been occurring over the past 15 or 20 years. The paper examines why employers and employees now tend to prefer defined contribution and cash balance plans thus placing these trends in an economic framework. A clear distinction is made between starting new plans where no pension previously existed and the conversion of existing plans. Winners and losers in the conversion process are identified. Throughout the analysis of the distributional effects of plan conversions, it is important to consider what might happen if the conversion was not made. Possible outcomes include the termination of the plan with no new plan established, layoffs, or even bankruptcy of the company. Thus, the impact of plan conversions cannot be determined by simply comparing the expected benefits under the old plan conditional on it continuing and the worker remaining with the firm. In summary, the paper concludes that cash balance plans represent a reasonable choice for some firms and some workers while other firms and some workers will prefer traditional defined benefit plans or defined contribution plans. Allowing workers and firms to select from these alternatives will have a higher social benefit than restricting pension choices to a single plan type.

Pension Plan Options: Preferences, Choices, and the Distribution of Benefits

Robert L. Clark

The value of participation in a pension plan is a function of career choices, rates of growth in annual earnings, risk preferences, tax rates, and retirement ages. Typically, employers offer only one or more pension plans to newly hired employees that are part of the basic compensation package. Thus, workers must select a job and the types of compensation that are offered by that employer.¹ Employers offer pensions to help attract, retain, motivate, and then retire workers. Both employers and employees are interested in the cost of providing the pension compared to the expected value of retirement benefits. Therefore, administrative and regulatory cost will directly affect the value of participation each type of pension plan.

In a free labor market, workers find the firm and the compensation package that best fits their needs while companies use pensions (or the lack thereof) to entice individuals with the desired employment characteristics to become part of their workforce. Workers who expect to frequently change employers will desire jobs that have a higher percentage of total compensation in earnings and pensions that are portable while employees who believe that they will remain with a company for their entire working career will be satisfied with pensions based on their final earnings. Companies that offer noncompetitive compensation packages will tend to have more difficulty hiring and retaining quality workers. Employers must attempt to provide the compensation package that provides the greatest value to workers per dollar of cost.

Over time, events can change the pension plan that workers and firms find most desirable. Changes in regulatory costs, shifts in labor demand, and the changing composition of the labor force will affect the type of pension that provides the highest value per dollar of cost to workers. In response, companies may (1) transform traditional defined benefit plans to cash

balance plans, (2) terminate the defined benefit plan and establish a defined contribution plan, or (3) terminate the defined benefit plan and offer no pension plan. Any of these changes will have an impact on current workers and in general, the change in pension plan type will make some workers better off while having an adverse impact on others. Determining the characteristics of winners and losers in plan changes is one of the key objectives of this paper.

This paper examines the three general choices of pension plans that are currently available in the U.S. labor market. The basic premise is that some workers and some firms will prefer traditional defined benefit plans while other workers and firms will find greater value in defined contribution and cash balance plans. The primary objective of the analysis is to illustrate the value to workers of having three possible types of pension plans that can be provided and to determine what types of workers will place a higher value on participation in each type of plan. Central to the discussion are two questions: (1) what type of plan would workers prefer when first employed and (2) what is the impact on the pension wealth of workers when a traditional defined benefit plan is converted into a cash balance plan or a new defined contribution plan. Our analysis begins with a discussion of basic pension economics. This is followed by a brief comparison of the types of pension plans and their implied accrual rates. Next, we present a model for individual choice of a plan type. Finally, we assess the difficult issues surrounding the conversion of a traditional defined benefit plan to a cash balance plan.

Basic Pension Economics

Economic theory implies that employers are willing to pay workers the value of their services to the firm. The implication is that total labor compensation is directly related to the worker's productivity and the revenue it generates for the firm.² If workers are paid more than the value of their productivity, the company will quickly go out of business as costs will exceed

revenues. Compensation consists of cash earnings, pension contributions, health insurance and any other employee benefits. If worker behavior is unaffected by the composition of total compensation, the firm can be viewed as a neutral seller of these benefits. In this case, employers will provide any combination of cash and benefits their workers desire.³ The key point is that companies can provide more value to workers per dollar of cost by giving them the types of compensation they prefer. This concept is the theory of compensation wage differentials.

However, certain employee benefits and any increase in their value with additional years of service may alter worker behavior. As a result, these benefits can influence labor productivity by reducing turnover, decreasing absenteeism, increasing effort, and raising investment in company-specific skills (Dorsey, Cornwell, and Macpherson, 1998). If the change in behavior due to participation in a pension plan reduces other labor costs, then a dollar of extra benefits would not require a dollar reduction in cash compensation. Employment contracts can be viewed as short term or as long-term contracts. In short-term or spot market contracts, compensation should equal worker value in each period. However, in long-term contracts, the expected present value of total compensation should equal the present value of productivity during the entire employment period (Lazear, 1979; Hutchens, 1989).

Employers offer pension plans to their employees because they help in the management of human resources including attracting, retaining, motivating, and eventually retiring older workers. Retirement policies are integral components of long-term employment contracts. They can be used to alter worker behavior and provide a designated termination point to the implied relationship.

Some individuals will seek out firms that provide pension plans and alter their careers to remain with these employers, while other workers have a higher preference for current income and will select employers who do not provide deferred compensation. Thus, individuals with low rates of time preference will be more likely to accept pension-covered jobs and then remain with the company until retirement in order to receive the deferred pension payments.⁴ In addition, traditional defined benefit plans impose financial penalties on workers who leave “too early” and thus these firms will tend to have even lower turnover rates than companies with defined contribution and cash balance plans. Some pension plans have significant retirement incentives at particular ages and thus are able to influence the timing of retirement.

The key point of this discussion is the impact of pensions on the value of compensation that companies provide. Firms with a defined benefit typically offer the same plan to all workers. Employers will pick the level of generosity and plan characteristics that they think best fits the preferences of the average worker that they are trying to attract. This benefit is then “paid for” by a reduction in wages of all employees. Thus, the compensating differential is lower current pay in exchange for deferred retirement income. The cost is applied uniformly to all workers. As a result, workers with low rates of time preferences who prefer more generous pensions will find this type of compensation attractive while persons with higher rates of time preference will tend to find this price (lower wages in the presence of the pension) to be too high. Those with the higher rates of time preference will tend to look elsewhere for employment (Samwick, 2000).

Types of Pension Plans

Pension plans have traditionally been divided into two basic types: defined benefit and defined contribution plans; however, in the past decade many large employers have converted

their traditional defined benefit plans into cash balance plans.⁵ These three plan types differ substantially in the manner in which benefits are determined, their methods of funding, who bears the investment risk associated with the pension portfolio, the portability of benefits from one company to another, and the regulatory status of the two types of plans. In general, defined benefit plans promise a specified benefit based on years of service, average earnings over the last three or five years of employment, and a generosity parameter chosen by the firm.⁶ These plans typically provide significant retirement benefits to career employees but award much smaller benefits to employees who remain with the company for a shorter period.

In defined contribution plans, employers and employees make periodic contributions into individual accounts for each worker. Workers own these accounts and make investment choices. Benefits from defined contribution plans are based on the size of these accounts at retirement. Cash balance plans are legally defined benefit plans but have many characteristics of defined contribution plans. Specifically, the benefit in these plans is specified as a lump sum that workers may claim when they leave the firm. Each type of plan has advantages and disadvantages for workers and for the plan sponsor. Which plan type is best for employees? The optimal plan for a worker will depend on individual risk preferences and expected lifetime work patterns. None of the three plan types dominates the other two for all workers. Some workers and firms will be better off with traditional defined benefit plans while others will have greater lifetime income if they participate in a defined contribution or cash balance plan. It is important to recognize these distributional differences and how they impact the choice of a pension plan.

Defined benefit plans are usually considered to be good for workers because they provide a specified retirement benefit that typically is a function of final annual earnings. Pension coverage in companies offering defined benefit plans is universal among qualified, full-time

workers. Employees do not face the investment risk associated with managing a retirement account. The plan sponsor must make adequate contributions and bears all the investment risk.⁷ Benefits are paid in the form of life annuities with current government regulations requiring that the first option for the pension be a joint and survivor's annuity to protect the financial interests of the spouse of the worker. These annuities provide insurance against retirees and their spouses outliving their retirement savings.

The major disadvantage to workers of participation in defined benefit plans is the lack of portability of the pension benefits. Workers who change jobs frequently will have significantly lower benefits than those that remain with a single firm throughout their careers. Lower total retirement benefits are the result of final pay benefit formulas. Final earnings for workers who leave before retirement are not indexed to prices or future wage growth. Individuals who leave a pension-covered job relatively early in their careers will have retirement benefits from their first jobs based on average earnings many years in the past.⁸

A key point for policy makers to understand is that defined benefit plans systematically provide greater benefits to senior workers with long years of service while providing only minimal benefits to younger workers who expect to remain with the company for only a few years. Advocates that argue that traditional defined benefit plans are the “best” type of pension tend to ignore the limited benefits that these plans provide to mobile workers. The more frequent transitions of working women means that they are most vulnerable to suffering repeated losses in potential pension wealth throughout their working careers.

A major disadvantage of defined benefit plans is that the cost of federal regulation is more burdensome than that imposed on defined contribution plans (Hustead, 1998). These regulatory costs have proven to be especially high for small firms. Research studies indicate that

the cost of complying with these regulations is the primary reason that few employers with less than one hundred workers now offer defined benefit plans (Clark and McDermed, 1990).

Another disadvantage of defined benefit plans is that the method of benefit accrual and the value of benefits are more difficult to understand compared to the value of individual accounts under defined contribution plans. Managers report that workers often do not understand the difference between the current and future value of these pensions, the annual gain in value or cost associated with the plans, and the impact of job changes on ultimate retirement benefits (Clark and Munzenmaier, 2000).

The difficulty in communicating the value of defined benefit plans has led many employers to conclude that their employees do not give them sufficient credit for the costs of defined benefit pensions. This implies that workers do not correctly assess the cost and value of defined benefit plans. Managers often give this as a reason for converting traditional defined benefit plans to cash balance plans with individual accounts that are easier to explain to their workers (Clark, Haley, and Schieber, 2001).

The retirement benefit for participants in defined contribution plans depends on the size of employer and employee contributions throughout the work life and the returns to the investments made with the pension funds. Under these plans, the value of the pension at any point in time is the account balance. If contributions are made at a relatively even rate throughout a worker's career, the value of the account will grow more proportionately than under a defined benefit plan of comparable generosity. An important advantage of these pension plans is that the benefits are portable and can be taken with the workers when they change jobs. Comparing similar workers covered by the two plan types, workers who move from job to job

will accumulate higher retirement benefits if they participate in defined contribution plans than if they were enrolled in defined benefit plans.

Potential disadvantages of defined contribution plans for employees are contributions are often voluntary, workers bear the investment risk of these plans, and the benefits are typically paid in the form of lump sum distributions. Many defined contribution plans require workers to decide if they will make a pension contribution. Employer contributions may be contingent on employee contributions. Workers who are myopic or have relatively high discount rates may decide not to make pension contributions early in their careers. As a result, they will accumulate relatively low retirement accounts.

In defined contribution plans, workers generally must make decisions concerning how to invest their funds. Some participants may invest too conservatively while others may make more risky choices that affect the size of their ultimate retirement accounts. Receipt of retirement monies in a lump sum requires that individuals decide how to manage these funds for the rest of their lives. It creates the possibility that the pension monies will be exhausted before the worker or his or her spouse dies.

Employers find defined contribution plans advantageous because the funding of benefits is more straightforward and the benefit structure is easier to explain to employees. The liability to the plan sponsor is to provide the promised contribution and the firm does not have to worry about future funding nor is it required to purchase insurance against the inability to pay future benefits. The cost of complying with government regulations is lower enabling the firm to provide higher benefits for the same cost. Employers report that workers find defined contribution plans easier to understand and give the firm more credit for providing these plans compared to a defined benefit plan.

Primary policy concerns with the growing incidence of defined contribution plans include their reliance on worker decisions on when to participate and the level of contributions, the financial market risk that the worker must bear, and use of lump sum distributions. Thus, workers may start contributing late in their working lives and accumulate relatively low retirement benefits, they may contribute too little and thus have only small retirement accounts, or they may make bad investment choices that could dramatically lower retirement benefits. The lack of annuitization also raises the possibility that workers and spouses could outlive their retirement income.

In the past decade, many large employers have increasingly converted traditional defined benefit plans into cash balance plans (Brown et al., 2000).⁹ In many regards, the conversion of traditional defined benefit plans into cash balance plans by employers is an attempt to offer workers a pension plan that combines desirable features of both defined benefit and defined contribution plans. Cash balance plans are legally defined benefit plans but they contain many of the features of defined contribution plans that workers seem to prefer. The basic characteristics of defined benefit plans, defined contribution plans, and cash balance plans are shown in Schieber (2003).

In cash balance plans, all qualified workers are covered by the plan and the firm typically makes all of the contributions into the pension fund. The firm is responsible for insuring that sufficient monies are in the pension account to pay all promised benefits and the plans are regulated as defined benefit plans. Benefits are specified as an account balance similar to defined contribution plans. Upon leaving the firm, the worker receives the full value of the pension account. The account grows each year from new contributions and from the crediting of a specified return on the existing monies in the account. All benefits are paid as lump sums to

departing workers similar to the distributions under a defined contribution plan. In addition, cash balance plans tend to be more age neutral in their retirement incentives compared to defined benefit plans.

Compared to traditional defined benefit plans, cash balance plans provide the advantage of distributing benefits more equally across years of service, are easier to explain to workers, and provide portable benefits to mobile workers. Compared to defined contribution plans, cash balance plans typically provide universal coverage to qualified workers, keep the investment risk with the employer, and offer a choice of an annuity or a lump sum distribution.

Given the differences in plan characteristics and how they affect ultimate retirement benefits, it is easy to see why some workers and firms will prefer each type of pension plan. Consider an economy where employer-based pensions were previously banned. Now let this legal restriction be eliminated and assume that firms could choose to establish a traditional defined benefit plan, a cash balance plan or a defined contribution plan. It is likely that we would observe a distribution of plan types that would reflect the human resource objectives of firms and the preferences of their workers. Plan choices would maximize the well being of workers and their employers.

Now consider an economy much like that prevailing in the United States prior to 1975 in which defined benefit plans dominated. The economic, demographic, and regulatory environment are changed. Congress imposes significant new government regulations, there are major changes in the composition and growth rate of the labor force, domestic employers face increased global competition, and in response, we observe that implicit long-term labor contracts are now less frequently used by large firms. In such a changing economic environment, it is not surprising that workers and firms seek a new pension contract that often entails a change in the

basic structure of the pension plan. In the past three decades, workers and firms have turned increasingly to defined contribution and cash balance plans. These shifts provide choices to workers just entering the labor market but also have important implications for current employees who have been participants in existing defined benefit plans.

Benefit Accruals in Traditional Defined Benefit Plans

A defined benefit pension plan promises a stream of future income in exchange for the current labor of plan participants. In this analysis, the present value of the future benefits in retirement under a defined benefit plan will be called pension wealth. The change in pension wealth with continued employment will be referred to as pension compensation or the benefit accrual. When employees leave the firm or the company terminates a pension plan, the plan sponsor is legally required to pay workers the value of all vested benefits based on the existing benefit formula, earnings to date, and their years of service.

This legal benefit can be evaluated using the following benefit formula:

$$B(t) = b * Y(t) * E(t)$$

where, $B(t)$ = the annual retirement benefit based on service up to time t ,

b = the generosity parameter for the plan, say 0.015,

$Y(t)$ = years of service with the company at time t , and

$E(t)$ = final average earnings for the specified period at time t .

This is the benefit that would be paid when the worker reaches the normal retirement if she were to quit the company today. In the case of a plan termination, this is the benefit that the firm is legally required to pay the worker at the normal retirement age. The firm could also meet its obligations by paying workers lump sums equal to their vested present value of these benefits when they leave the firm.

Using an approved interest rate, the present value of a life annuity beginning at the normal retirement age discounted back to the current age or the termination date can be found. This is the present value of the leave pension accrued to date. Changes in this value with continued employment represent annual benefit accruals. It is easily shown that the accrued benefit rises with increases in years of service, increases in annual earnings, and as the age of retirement approaches. The present value of vested benefits rises a proportion of earnings as the individual remains with the firm and approaches retirement.

A worker who remains with the firm with a traditional defined benefit plan will see pension wealth and pension compensation grow rapidly with continued employment. A worker who quits loses the opportunity to achieve this higher pension at older ages. An alternative method of examining the economics of pension coverage was proposed by Ippolito (1985). This model or economic theory of a long-term employment contract compares the legal or “leave” pension benefit to that based on the notion that the worker will remain with the firm until retirement. Thus, a distinction can be drawn between the benefits to which workers are legally entitled based on the formal pension contract and earnings to date and the benefits that they could expect to receive if they remained with the firm until retirement based on projected earnings at retirement.

This concept assumes that the worker and the firm have agreed to an implicit long-term employment contract under which the firm promised to provide a pension based on final earnings and that the worker could remain with the firm until retirement. If the firm reneges on this contract by canceling the pension plan, workers could argue that the benefit that they had earned to date was the stay pension and not simply the legal or leave pension. The difference between the present value of the expected benefit (the stay pension) and the legal benefit (the leave

pension) is the loss associated with early departure from the firm or termination of the plan. The loss in pension wealth with job changes increases with age and job tenure until the worker qualifies for early retirement.

The stay pension is shown by:

$$B'(t) = b * Y(t) * E'(t)$$

where, $B(t)$ = the annual retirement benefit earned at time t but based on expected earnings just prior to retirement,

b = the generosity parameter for the plan,

$Y(t)$ = years of service with the company at time t , and

$E'(t)$ = final expected average earnings at retirement.

Using this model, retirement benefits earned to date increase only with increases in years of service as expected average final earnings do not change with continued employment. Thus, annual benefit accruals are smoother compared to accruals using the first model.

Economists have argued that the stay pension is based on the concept of long-term contracts that workers and firms implicitly negotiate while the legal pension is based on current federal regulations. In other words, the value of the pension based on the implicit economic contract is the stay pension not the leave pension. At each moment, the present value of the stay pension and the leave pension can be determined. The difference in the two values is what the worker gives up by departing early. Note that if the earnings used to determine deferred vested benefits were indexed to real wage growth these two values would be the same. The difference between these two values also disappears when retirement benefits are based on career average earnings instead of final average earnings.

In a typical defined benefit plan with a benefit formula based on final average pay, legal pension wealth is zero until the individual has been employed long enough to have become vested in the pension, usually five years. Therefore, pension wealth is zero for each year of employment until the worker has completed five years of service. After the fifth year, the worker becomes vested and has a legal claim on benefits based on service to date. At this point, there is a sharp spike in pension wealth from zero to a benefit based on five years of service. Thus, there is a large benefit accrual for this year of employment. Each additional year of service produces further benefit accruals that progressively increase in absolute value and as a percent of annual compensation. This pattern of benefit accrual is often called “backloading” and is the reason that defined benefit plans provide higher benefits to workers who remain with a single company compared to more mobile workers who change jobs throughout their careers.¹⁰

The accrual pattern using the long-term contract model of a stay pension is much smoother over the career of the worker and the value of the implied stay pension exceeds the value of the leave pension at all ages. The general argument for this relationship in labor economics is that the prospect of the loss in pension benefits binds the worker to the firm and this departure penalty is part of the implied contract. Workers who quit, leave knowing that they are violating the terms of the contract and thus are willing to bear the cost of the pension penalty.

The shift to cash balance plans has sometimes been characterized as plan sponsors reneging on the implied contract. If the company simply provides workers with the legal or leave pension in such a conversion, the workers will suffer the same pension loss as if they had broken the implied contract themselves. Thus, the firm would reap a one-time gain from changing its defined benefit plan and workers would lose the promised pension benefits they believed they had earned under the provisions of the prior plan. In most conversions to cash

balance plans that have taken place the plan sponsors have used a combination of grandfathering and other transition provisions to eliminate or reduce the extent to which workers are adversely affected by plan changes. There is still an open question, however, of whether the implied contract applies only to benefits earned up to the point of conversion or whether it means that workers once covered under a plan should continue to be covered under the same pre-conversion provisions until they terminate their employment (Mitchell and Mulvey, 2003).

Defined benefit plans also have additional spikes in legal benefit accruals when employees reach the age and service requirements for early and normal retirement. Prior to reaching these “magic” dates, benefit accruals are increasing due to additional years of service and increases in average earnings. In addition, if the worker leaves the firm prior to early retirement, future benefits are based on the normal retirement formula, not the early retirement formula. As a result, the worker does not receive any of the early retirement subsidies imbedded in many defined benefit plans. The key element in the early retirement subsidy is that employees can retire at an earlier age than that specified as the normal retirement age and that benefits are not actuarially reduced to reflect the added period of receiving benefits that result from early retirement. In other words, the present value of pension wealth is greater under the early retirement formula compared to the normal retirement formula.

After the worker satisfies the requirements for early or normal retirement, further employment may continue to increase future benefits; however, the participant must give up a year of benefits in order to remain on the job. Foregoing current benefits results in a sharp decline in benefit accrual and may actually result in negative accruals for some workers where continued employment actually decreases the present value of pension wealth.

Virtually all traditional defined benefit plans have subsidized early retirement provisions. These plan characteristics have been an integral component of company retirement policies since the 1960s or 1970s and have been used to encourage workers to retire at specified ages. The economic expansion of the 1990s was accompanied by a slowing in the growth the labor force. The twin forces of rapid economic growth accompanied by very low unemployment rates and a relatively slow growth in the labor force meant that many firms were having difficulty attracting the desired number of young, quality workers. These same companies observed that they had in place policies that encouraged skilled older workers to retire. In response, many large companies converted their traditional defined benefit plans to cash balance plans that do not have these early retirement incentives (Clark and Schieber, 2002).

An Economic Model of Pension Choice: Employees

The basic characteristics of traditional defined benefit plans, defined contribution plans, and cash balance plans are shown in Schieber (2003). Because of the differences in these plan provisions, the expected value of retirement benefits will vary across individuals depending on their personal characteristics, their risk preferences, and their career patterns. In a world without risks, a new employee could calculate the value of participating in the defined benefit plan by selecting the length of the working career and the age to begin receiving retirement benefits. Using this information plus projected earnings over the working career and the plan benefit formula, the individual could determine a future annual retirement benefit and its present value.

Similarly, the value of participating in the defined contribution plan could be calculated by estimating future contributions as a function of projected earnings and annual rates of return on pension investments. These calculations would produce an account balance at various ages. The expected account balance produced by the defined contribution plan could be compared to

the present value of retirement benefits under the defined benefit plan. Participants in a cash balance plan also can determine the value of being in such a retirement plan by considering the annual credits to their individual accounts and the promised rate of return on these accounts. In each case, the value of enrollment is a function of earnings growth. The individual would then select the pension that yielded the greatest value.

In this risk-free world, several predictions can be made concerning how workers would choose which plan to enroll in. First, the value of participation in the defined benefit plan as a percent of compensation increases with age. Annual contributions to defined contribution plans and credits to individual accounts in cash balance plans are not typically a function of age but tend to be a constant fraction of earnings. Therefore, employees hired at older ages who plan to complete their careers with this employer should be more likely to select the defined benefit plan. Secondly, since defined benefit plans are required to provide the same annual benefits to men and women, the value of these plans will be greater for women because, other things equal, they have a greater life expectancy. Thus, women should be significantly more likely to enroll in a defined benefit plan.

However, the future is not known, and various types of risk have different effects on expected retirement benefits under traditional defined benefit plans, cash balance plans, and defined contribution plans. Sources of risk that affect future retirement benefits include those associated with changing jobs, financial market fluctuations, uncertainty surrounding the retirement date, variation in the growth rate of real earnings, and inflation before and after retirement. Participants in defined benefit plans who change jobs suffer significant losses in the expected present value of retirement benefits. Thus, the risk associated with job mobility is borne by the employee in these plans. Employees in defined contribution plans and cash balance

plans can usually change employers without the loss of any retirement benefits. Thus, workers who do not expect to complete their careers with this employer will want to enroll in a defined contribution or a cash balance plan. Mobility expectations will depend on personal preferences, potential opportunities, and anticipated performance rewards in terms of promotions and salary growth.

Most defined benefit plans calculate benefits based on final average earnings over the last three to five years of employment. Therefore, the rate of salary growth will have a significant effect on the retirement benefit from a defined benefit plan whereas the influence of salary growth should not be as important for defined contribution plans. As a result, other things constant, employees whose salaries are expected to rise rapidly throughout their careers will be inclined to select a defined benefit plan.

Other risks facing pension participants include variations in rates of return on pension investments, the potential decline in real after-retirement benefits with inflation, and changes in nominal earnings prior to retirement in response to inflation. Participants in traditional defined benefit and cash balance plans do not bear investment risk while those in defined contribution plans do. Thus, employees with a high degree of risk aversion toward financial investments will tend to favor defined benefit and cash balance plans. Real retirement benefits decline with inflation unless nominal retirement benefits rise. Many government pension plans provide for regular increases in retirement benefits to offset declines in purchasing power caused by inflation. The extent of this risk to participants in cash balance and defined contribution plans that take lump sum distributions depends on how the funds in the retirement account are invested during the retirement period.

The choice by workers among the three types of plans depends on the relative risk-free value of participation in the traditional defined benefit plan compared to the defined contribution plan and cash balance plan, the existence of certain types of risk, and the individual's aversion to risk.¹¹ Let the expected value of enrolling in a defined benefit plan be

$$E[V(\text{db})] = f[\text{CV}(\text{db}), r(\text{m}), r(\text{f}), r(\text{w})],$$

where $\text{CV}(\text{db})$ is the certainty value of enrolling in the defined benefit plan based on the plan formula, age at employment, desired retirement age, and assumed rates of wage growth and inflation. Plan choice is also influenced by mobility risk, $[r(\text{m})]$; the potential for a decline in the real value of benefits due to inflation, $[r(\text{f})]$; and variation in the rate of wage growth, $[r(\text{w})]$.

Similarly, let the expected value of enrolling in the defined contribution plan be

$$E[V(\text{dc})] = f[\text{CV}(\text{dc}), r(\text{I}), r(\text{f}), r(\text{w})],$$

where $\text{CV}(\text{dc})$ is the certainty value of participating in the defined contribution with known contribution rates and expected rates of return. Other factors influencing the value of the defined contribution plan include the rate of return risk on pension investments, $[r(\text{I})]$; the responsiveness of the retirement portfolio to fluctuations in inflation, $[r(\text{f})]$; and the rate of real wage growth, $[r(\text{w})]$.

Finally, let the expected value of enrolling in a cash balance plan be

$$E[V(\text{cb})] = f[\text{CV}(\text{cb}), r(\text{cr}), r(\text{f}), r(\text{w})],$$

where $\text{CV}(\text{cb})$ is the certainty value of participating in the cash balance plan with known rates of benefit accrual and credited rates of return on the individual's account balance. Other factors influencing the value of the cash balance plan include fluctuations in the credited rate of return, $[r(\text{cr})]$; the responsiveness of the retirement portfolio to fluctuations in inflation, $[r(\text{f})]$; and the rate of real wage growth, $[r(\text{w})]$.

This basic model of plan choice highlights the factors that affect worker choices among the three types of pension plans. The model illustrates how different individual characteristics influence the value of participation in each plan type. Workers who find jobs with a plan type that is not their first choice will receive less total value than if the firm offered the optimal type of plan. Mismatches between plan type and worker preferences have adverse effects on the firm. Thus, in a dynamic world, we should observe both workers and firms moving toward those plans that provide the highest value.

Establishing New Pension Plans

It is hard to determine why anyone would oppose limiting the choice of pension plan types that are available to workers and firms provided that they are consistent with broad national retirement objectives and federal regulations (Johnson and Steurle, 2003). The preceding analysis has shown how each of the three plan options provides value to workers; however, workers with different characteristics will benefit more or less under various plan options. Individuals who remain with a single firm for many years, especially those that stay with the company until they retire are the big winners in traditional defined benefit plans. In contrast, more mobile workers accumulate far less benefits and are the big losers in defined benefit plans.

The trend toward greater use of defined contribution plans and the transition toward cash balance plans clearly indicates changes in the composition of the labor force and the emergence of workers who do not expect to remain with the same company over their entire career. In addition, workers are now leery about accepting the implicit promise of lifetime employment that many larger firms formerly offered. In the past, many workers employed by large industrial corporations thought they had lifetime jobs and were willing to accept benefits that were based

on that premise. With the recent history of significant layoffs of senior workers, many of these corporate giants have lost their traditional aura as companies where workers, even highly productive ones, can expect to spend an entire career. Thus, workers are much less willing to participate in defined benefit plans and are much more likely to demand cash balance plans or defined contribution plans.

In fact, it is not the establishment of new cash balance plans that has spawned the rebellion against these plans. Instead, worker criticism and the demand for policy actions to restrict the use of cash balance plans has been the result of companies converting existing defined benefit plans into cash balance plans. It is in the conversions where winners and losers are most clearly identified. One can only wonder why critics have focused on conversions to cash balance plans while devoting much less attention to the termination of defined benefit plans followed by the establishment of defined contribution plans. All of the issues are the same concerning the lost opportunities to earn future pension benefits based on final earnings and how starting values or termination benefits are determined. Yet for almost 30 years, the trend away from defined benefit plans toward defined contribution plans went basically unchallenged while the more recent movement toward cash balance plans has been aggressively opposed.

Pension Values After Plan Conversions

The level and composition of labor compensation are the products of worker preferences and the desire of firms to attract and retain quality workers. Changes in the labor market and other economic conditions can alter the equilibrium level of compensation and the characteristics of employee benefits. In recent years, there has been a dramatic shift away from traditional defined benefit plans as many companies have terminated their existing plans and established new defined contribution plans or transform the old defined benefit plans into cash balance

plans. We now turn to the impact of plan conversions on real and expected pension benefits and identify the winners and losers in the plan conversion process.

There are two major questions associated with the conversion of pension plans: (1) How is the opening balance in the new accounts for current employees determined? and

(2) Are current workers, especially senior employees, given an option to continue in the old plan until they retire?

When all workers are given a choice of remaining in the old plan or shifting to the new plan, there typically is little opposition or objection to plan conversions.¹² However, this option implies that the company may have to continue to manage the old plan for as much as 40 years into the future. In actuality, most young workers with relatively few years of experience are likely to opt for the new cash balance plan or a new defined contribution plan because the expected value of participation in these plans will be greater than continued coverage by the traditional defined benefit plan. While relatively few employers have given all workers a choice, many companies have given this option to senior workers who are close to the normal retirement age in the plan. Depending on the age and service requirements associated with this option, companies can avoid most objections to the plan conversion; however, this does require the continued management of the plan for 10 to 20 additional years.

The closeout value from the old defined benefit plan and/or the starting balance in the new pension plan is a crucial component of any plan conversion. Companies can decide if they want to roll the closeout account balance from the old plan into the new plan or start the new account balance at zero. The lower limit for the closeout value is the legally accrued benefit as specified in the plan's benefit formula. In a typical, final pay plan, this would be the present value of

$$B(t) = b * Y (t) * E (t).$$

This is the benefit that would be paid when the worker reaches the normal retirement if she were to quit the company. In the case of a plan termination, this is the benefit that the firm is legally required to pay the worker at the normal retirement age. Using an appropriate interest rate, the present value of this annuity could be found. In the case of a plan termination, this lump sum could be offered to workers. Having determined the value of participation in the old defined benefit plan, firms could pay the workers this value or transfer it to individual accounts under the new cash balance or defined contribution plan. The closeout value and the start up amounts are at the heart of workers' views on whether they have been treated fairly.

Some critics of cash balance plans have argued that this form of evaluation imposes significant losses on senior workers and thus, should not be allowed. In effect, the argument is that once a firm establishes a traditional defined benefit pension plan it must guaranty all workers enrolled in this plan the right to remain in that plan until they retire as long as the company retains a defined benefit plan. Interestingly, few analysts question the right of firms to eliminate an existing defined benefit plan without instituting any new plan. Also, there have been few questions raised when companies have terminated a traditional defined benefit plan and established a new defined contribution plan. Why then has the animosity been aimed at almost exclusively at cash balance plans?

In fact, the conversion of a traditional defined benefit plan to a cash balance does impose "potential" losses on senior workers. These losses would occur if that the firm retained the pension plan and the worker stayed with the company until retirement age. Neither of these conditions is a certainty. First, some individuals may choose to quit their current job and move to another firm. In this case, they would receive only the legally required value of their pension.

Second, the company could terminate the worker due to adverse economic conditions or for cause. Once again, the worker would likely receive only the legally required benefit (of course, the company could offer a greater benefit through an early retirement plan). Third, the company could terminate the plan and not start a new plan. Here again, the worker would only be guaranteed the legally required benefit. All of these possibilities are legal and all have occurred throughout the American economy during the past three decades. It is important to remember that no company is required to offer a pension and once established, a company has the legal right to terminate the plan provided it pays all vested workers the benefits that they are legally owned.

If workers receive the amount that they are legally guaranteed, why do they feel that they have been unfairly treated. The answer follows from expectations concerning future employment, earnings growth, and the formula under the old defined benefit plan. Workers expectations are a function of the information provided by employers. Many employers may have provided their employees access to benefit calculators that show workers the retirement benefits that they could expect prior to the plan conversion. After a plan conversion, senior workers making the same type of conditional projections of future benefits would find that they can now expect smaller benefits if they remain with the company until retirement. Thus, some senior workers could easily reach the conclusion that they have been mistreated. The potential response by senior employees highlights the need for full and detailed communication with workers during the termination/conversions process.¹³ This assessment should also be a warning to companies that still provide traditional defined benefit plans that they should improve their communications to better illustrate retirement benefits conditional on staying with the firm and if the worker were to leave at various ages.

Of course, no worker is guaranteed employment until the specified retirement age and there is no promise of a specific rate of earnings growth. Obviously, employment conditions have been changed by the conversion of the pension plan. The real question is how should the value of participation in the pension in past years be determined. An alternative to the legal method of calculating the value of pension promises has been proposed by economists (Ippolito, 1985). Working for a company with a traditional defined benefit can be thought of as a long-term contract under which the worker and the firm make promises for work and compensation over the entire working career. This model suggests that the value of pension benefits accrued to date should be based on expected earnings at retirement and not simply earnings to date, or

$$B'(t) = b * Y(t) * E'(t)$$

As we noted earlier, this is the earned pension benefit based on an implicit long-term employment contract based on economic theory. It is arguably the real benefit that an employee has been promised based on earnings to date.

A key point in deciding on winners and losers in a plan conversion is what is the residual value of the pension benefit when the plan is terminated or converted. We have examined three choices. First, the legal benefit based on current government regulations. Second, a very new standard that would guaranty workers the right to remain in an existing defined benefit so long as any type of legal defined benefit is retained. (Notice that the argument is not made that firms should be denied the right to terminate the plan.) Third, the worker should receive a value based on benefits earned to date as part of the implicit contract under which they were hired.

Using the first standard of the legal benefit, studies by Clark and Schieber (2000, 2002, 2004 forthcoming) have shown that a large majority of workers under age 40 will ultimately have higher total benefits under a new cash balance plan. The primary reason for this is the

mobility risk described earlier and the prospect of a plan termination or layoff in the future. In general, the closer workers are to the early retirement age specified in the plan, the more likely they are to be losers after the plan conversion. This is primary reason that most companies have attempted to provide some additional benefits or choice to their senior workers. However, studies have shown that many senior workers also will gain from a transition to a cash balance because of the uncertainty of future employment with their career firm.

A final issue is that much of the potential loss in pension wealth for senior workers in a conversion to a cash balance plan occurs due to the elimination of early retirement subsidies. It should be noted that a company could eliminate these early retirement subsidy by requiring an actuarial reduction of benefits at early retirement. Thus, the existing defined benefit plan could be retained without a subsidized early retirement benefit. Clark and Schieber (2002) have shown that many cash balance conversion impose less severe reductions in benefits than if companies simply eliminated the early retirement subsidy.

Determining Winners and Losers in Plan Conversions

Calculating the impact of plans on the lifetime value of retirement benefits for specific workers requires a series of assumptions including: the probability that a worker will remain with the firm until retirement, the probability that the firm will remain in business, the rate of growth of future earnings, the probability that the current pension plan will be terminated at some future date, and the probability that the parameters of the current and/or the new plan will be changed in the future. In addition, we need to know the cost implications of the conversion process including: whether the firm is attempting to reduce its total pension cost or simply altering the distribution of pension benefits and whether the firm is attempting to reduce its total labor costs or restructuring expenditures away from pension contributions while increasing earnings, stock

options, or payments to health plans. Another key to understanding the impact of plan conversions on specific workers is whether the company provides transition benefits to some or all of its current workers to offset potential losses in pension wealth.

Clark and Schieber (2002) examined 77 companies that converted traditional defined benefit plans to cash balance plans or another type of hybrid pension plan between 1985 and 2000. They simulated the impact of plan conversions on workers of different ages of first employment, age at the time of the conversion, and level of pay. Their underlying assumption was to assume that the company will remain in business for the working life of their employees, either the old plan would have remain unchanged until all current workers reached retirement or the new plan would remain unchanged during this period, and that earnings growth would be unaffected by changes in the economic climate or by the change in pension plan. They applied age-specific turnover probabilities that reflected the experience of large clients of Watson Wyatt.

The results of Clark and Schieber's analysis indicate that the vast majority of workers who quit or are laid off before age 55 could expect to receive greater benefits under the new cash balance or hybrid plans compared to their continued participation in the traditional defined benefit plans. Workers who remained on the job past age 55 would expect to receive considerably lower benefits under the new plan. Obviously, older workers at the time of the plan transition are more likely to anticipate that they would still be with the company at age 55. Thus, it is senior workers that are most likely to be adversely affected by the transition and most likely to oppose these changes in the employment contract.¹⁴

It should be noted that Clark and Schieber's analysis focuses solely on the mobility risk associated with these plans and ignored other risks associated with economic fluctuations such as significant declines in the number of workers needed by the company due to adverse economic

conditions, future changes in pension characteristics, and the possible termination of the pension plan at some future date. Explicitly modeling these risks would in most cases reduce any projected losses associated with converting a traditional defined benefit plan to a cash balance plan.¹⁵

While there have been relatively few studies of plan transitions and their impact on actual workers, the basic designs of the plan types have unmistakable implications for current and future workers. Adjusting for mobility risk, most newly hired workers will be better off working for companies with cash balance and defined contribution plans. Among existing employees, senior workers are more likely to be adversely affected while younger workers are likely to gain from plan conversions. Of course, all comparisons depend on the level of generosity that is provided by either the defined benefit plan or the cash balance plan.

The potential impact of plan conversions to cash balance plans or defined contribution plans is well known to both workers and firms. In recognition of this, many companies provide significantly higher benefits to senior workers. Such transition benefits reduce the potential loss in pension wealth associated with the plan conversion and typically, result in many fewer complaints. High quality human resource planning is a key to the plan conversion process.

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Endnotes

¹ Many firms offer supplemental pension plans in addition to their basic pension plan. These supplemental plans are almost always defined contribution plans.

² In economic terms, this theory implies that workers are paid according to the value of their marginal product. This concept has long been a central premise in microeconomics and the theory of the firm. The theory of marginal productivity provides the basic underpinning of modern labor economics and compensation theory.

³ The primary reason that workers usually prefer a portion of their total compensation in the form of pension income or other benefits is the favorable tax treatment given to these forms of compensation. The deferment of income tax liability enables workers to accumulate larger retirement funds through employer-provided pension plans than they could with equivalent dollars paid as current earnings. Pension contributions also are not subject to the payroll taxes for Social Security and Medicare. Other factors influencing the desire to have company provided benefits include group rates for insurance and economies of scale in the purchase of some benefits. Each of these factors tend to make the purchase of benefits from the employer with pretax dollars less expensive than buying them with after tax dollars.

⁴ Ippolito (1997) describes this sorting mechanism in considerable detail. Also see Salop and Salop (1976) for a theory of sorting in the labor market.

⁵ A comprehensive description of the characteristics of each of these plan types and the regulations federal regulations that qualified plans must meet is provided in McGill et al. (1996) and Schieber (2003).

⁶ Some plans have benefit formulas that specify benefits as a dollar amount per year of service. These formulas are most commonly found in plans that are part of collectively bargained contracts.

⁷ Some of the risk of insufficient funding in defined benefit plans is shifted to the public by requiring plan sponsors to purchase insurance against default from the Pension Benefit Guaranty Corporation.

⁸ The loss in pension benefits that workers face if they change jobs can be an important advantage of defined benefit plans to employers. Imposing such losses on workers who leave is one method that firms can use to reduce their turnover rates, i.e. workers who face a loss in their future retirement benefits will be less likely to leave. Thus, firms that have high costs of hiring and training workers will be more likely to adopt these types of plans in order to reduce these costs associated with turnover.

⁹ Cash balance plans are also referred to as hybrid pension plans because they have some characteristics of both defined benefit and defined contribution pension plans. Other plans with similar characteristics such as pension equity plans are also called hybrid pension plans.

¹⁰ The nature of this backloading is clearly described in a series of papers by Kotlikoff and Wise (1985, 1989).

¹¹ This model is adapted from Clark and Pitts (1999) who examined the choice of a pension plan between defined benefit plans and defined contribution plans.

¹² See Mitchell and Mulvey (2003) for a discussion of allowing all workers a choice of remaining in the old defined benefit plan or shifting to the new cash balance plan.

¹³ Communications with workers concerning the reasons for plan changes and the impact of these changes on worker benefits is essential to plan terminations and conversions. Clark, Haley, and Schieber (2001) and Clark and Munzenmaier (2001) examine the important role of communications in plan conversions.

¹⁴ Also see Clark, Haley, and Schieber (2001) and Clark and Schieber (2004) forthcoming.

¹⁵ Samwick and Skinner (2003) focus on the differences in financial market risks and earnings growth risks between defined benefit plans and 401(k) plans. They found that 401(k) plans are preferred to defined benefit plans by all workers, except those with the highest risk aversion.