

## Chapter 2

# **Benefits and Productivity**

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Private sector employees now receive over one-quarter of their entire compensation in the form of employee benefits, and in large firms the fraction is even higher. The generosity and structure of these benefit programs influences workers' productivity in numerous ways. One reason is that workers are heterogeneous in terms of their willingness to trade wages for benefits. As a result, any given firm's benefit package will attract and retain a nonrandom group of workers. Another reason is that employee benefits can alter lifetime earnings profiles. As a consequence, they can be used to alter employee retention rates and vary worker incentives for retirement.

This chapter discusses how two of the most prominent employer-provided benefits — pensions and health insurance plans — influence productivity. In particular we investigate how pension plan design and the availability of employee or retiree health insurance influence workforce selection, retention, retirement behavior, and worker effort. Drawing from available evidence, we examine trends in these benefits, and explore how they might alter future workplace patterns.

### **Changes in Pension Structure and Design**

In the North American labor market, employers offer several different types of pension plans. Defined benefit (DB) plans generally promise a life annuity at retirement, the amount of which usually depends on earnings, years of service, and some generosity rate. For example, a DB plan could provide a benefit equal to 1 percent of final average salary per year of service, where final average salary is computed using the worker's three highest years of earnings. DB plans have minimum service and/or age requirements for the immediate receipt of benefits on departure for the firm. For example, a plan might require that the worker be either sixty-five years of age or have at least thirty years of service. If a worker does not satisfy the age and

#### 44 William E. Even and David A. Macpherson

service requirements for full benefits, the plan may allow the worker to collect reduced benefits for an early retirement (see Mitchell this volume).

In a defined contribution (DC) plan, the employee usually contributes a percentage of salary into a pension plan, and the employer may provide a match. The pension assets may be managed by a pension fund manager, or may be self-directed by the employee. On vesting, the plan participant earns a legal right to the plan balance. In the subset of plans known as 401(k) pensions, participants may elect how much of their salary they want to contribute to the pension. Relative to traditional DC plans, 401(k)s have the advantage of giving employee the ability to contribute pretax dollars to the plan.

In recent years a newer form of pension has been devised in the United States, known as a cash balance plan, sometimes referred to as a “hybrid.” This has both DB and DC features, since the employee is credited with a fixed percentage of pay annually and guaranteed a rate of return on the account balance. The cash balance plan is similar to a DC plan since a participant’s return is generally linked to a market-based prevailing interest rate (such as the Treasury bond rate). On the other hand, all employee contributions are pooled into a single investment account, and employees have a claim on the fund equal to prior contributions plus investment returns promised by the plan. As a result, the plan has a DB-like feature: at any given point in time, the plan could be over- or underfunded.

#### The Changing Composition of Pension Offerings

In the last two decades, DB plans have become much less popular in the United States, while DC plans, particularly the 401(k) plan, are increasingly common (Mitchell this volume; EBRI 2001). Several explanations for this shift have been offered, including higher administrative costs in DB plans; employment shifts across industries and from large to small firms; a decline in unionism; the rise of 401(k) plans; workers’ interests in having more portable pensions; and firms’ interests in having pensions encourage later retirement.

Several analysts have investigated whether employment shifts can account for the long-term shift in the United States from DB to DC plans (Gustman and Steinmeier 1992; Clark, McDermed, and Trawick 1993; Kruse 1995; and Ippolito 1995). The preponderance of the evidence suggests that about half of the shift can be accounted for by economic restructuring — that is, by industrial shifts in employment, the decline in unionism, and the movement from large to small firms. It also appears that most of the shift during the 1980s was not the result of DC plans being formed to replace terminated DB plans. Rather, most new DC plans emerged at firms that did not previously offer a pension plan. During the 1990s, however, it appears that terminated DB plans were replaced by 401(k) and other DC plans (Papke 1999).

One reason that 401(k) plans took off was that clarifying regulations were

issued by the Treasury Department in 1981 permitting their growth. Over the last twenty years, they continued to grow because they allow employees to contribute pretax dollars. Moreover, evidence now suggests that 401(k) plans have better-targeted selection and retention effects than other pension types (Ippolito 1997), a point we return to below.

The conversion of traditional DB plans to cash balance plans has attracted a good deal of media and legislative attention in recent years. The cash balance plan was first created by Bank of America in 1985 (Clark and Schieber 2000). Initially, only a few companies copied this new type of pension, but by 1997, 6 percent of workers covered by DB plans in the private sector were in cash balance plans (Ippolito 2001). While this is a relatively small fraction of all covered workers, it was nearly double the coverage rate for cash balance plans found two years earlier. Since cash balance plans are virtually identical to DC plans, some of the explanations for the growth of DC plans can be used to explain why a firm would want to convert to a cash balance plan (i.e., increased portability and encouraging later retirement). An important question is why a firm would convert its DB plan to a cash balance plan instead of starting a new DC plan. One explanation is that terminating a DB plan and replacing it with a DC plan could have tax consequences that could be avoided by conversion to a cash balance plan (Ippolito 2001). Legislation passed in 1986 imposed a 10 percent excise tax on a reversion of assets from an overfunded DB plan, a tax rate increased to 15 percent in 1988, and to 50 percent in 1990. If a firm has an overfunded DB plan and wanted to switch to a DC plan, it would now have to pay the 50 percent reversion tax when it terminated the DB plan. On the other hand, if it simply converted to a cash balance plan, there would be no reversion of excess assets, yet now the firm has essentially established a DC plan and avoided the reversion tax.

#### Effects of Changing Pension Design on Selection and Retention

We illustrate how the switch from DB to DC plans affects various dimensions of productivity; the time path of wealth accrual in the two plans types may be compared. In a DB plan, the pension value at a particular age can be computed as the present value of the life annuity that the worker would receive if she terminated employment with the firm at that age. In a DC plan, the value of the pension at a particular age is simply the account balance determined by prior contributions plus accumulated interest. Given specific assumptions regarding plan parameters, these values can be computed explicitly. Following the U.S. Department of Labor (1999) data for medium and large establishments, we note that 95 percent of DB plans offer an early retirement option, with an average early retirement reduction factor of 4.9 percent per year. The most popular normal and early retirement ages are 65 and 55, respectively, and the average generosity rate is 1.5 percent

#### 46 William E. Even and David A. Macpherson

per year of service. We use these parameters for our benchmark DB plan. In addition, the benchmark worker is assumed to begin employment with the firm at age 35 at a starting salary of \$30,000. Both the nominal interest and wage growth rates are assumed to equal 6 percent. Under these assumptions, the contribution rate required in a DC plan to create an identical amount of wealth at normal retirement age is 14.6 percent.

Pension wealth is plotted for this hypothetical worker between ages 50 and 75 in our benchmark DB and DC plans in Figure 1. Since the contribution rate of the DC plan is chosen to generate the same level of pension wealth in the DB plan at age 65, the DB and DC wealth lines intersect at age 65. For a departure at any age other than 65, DB wealth is lower than DC wealth. This emphasizes the fact that, relative to DC plans, DB plans penalize early or late retirements.

An alternative way of comparing the incentives in DB and DC plans is to examine the rate at which pension wealth accumulates over time. We define pension accrual as the increase in pension wealth from one year to the next, subtracting out interest that is earned on the prior year's balance. Then the pension accrual rate is computed by dividing pension accrual by the worker's salary in that year. Figure 2 compares the pension accrual rates in our benchmark DB and DC plans. The accrual pattern in the DC plan is flat, as it equals the contribution rate assumed fixed over the worker's career. By contrast, in the DB plan, the accrual rate starts out low, rises until the normal retirement age, and then drops after the normal retirement age. In this particular comparison, the accrual rate in the DB plan is less than that in the DC before age 55 and after age 65. After age 55 and before age 65, the DB has the higher accrual rate.

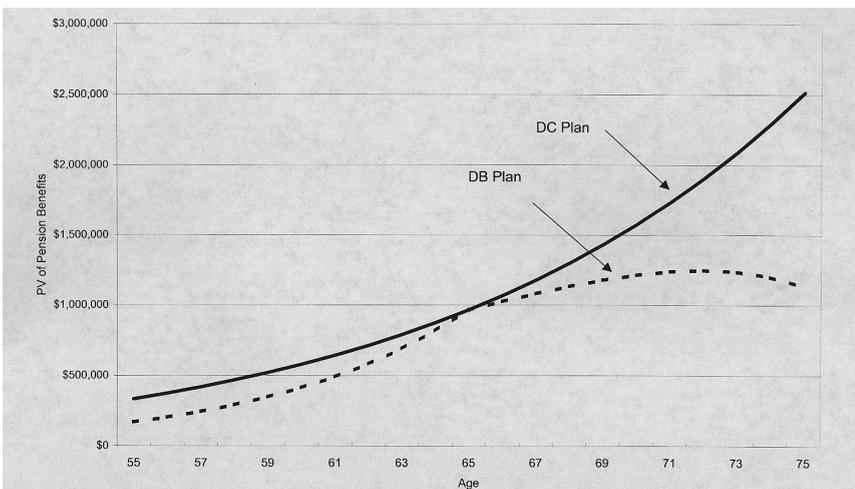


Figure 1. Stylized pension wealth patterns, defined benefit and defined contribution plans. Source: author's calculations.

If the worker leaves at any age other than age 65, he has less pension wealth accumulated in a DB than a DC plan. The difference between DB and DC wealth at a particular age has thus been referred to as a “capital loss” in the literature (Gustman and Steinmeier 1995). Early retirement provisions can reduce the capital loss for early retirees. The capital loss for the DB plan, with and without an early retirement provision, is illustrated in Figure 3. Here the DB plan capital loss rises from zero at age 35, to its peak at slightly over 1.5 times salary at age 51. Between age 51 and age 65, the capital loss drops to zero. After age 65, the capital loss begins to rise again.

Because the DB and DC plans generate such different wealth accumulation profiles, they have the potential to affect workforce productivity in several ways. Specifically, relative to the DC plan (or a cash balance plan), the DB backloads pay and thus penalizes workers that leave prior to retirement. This has selection, retention, and direct productivity effects (Gustman, Mitchell, and Steinmeier 1994). The selection effects of a pension refer to the effect of the pension on the type of workers that are drawn to the firm. Retention effects refer to the impact of the pension on the chance that the worker quits.

Compared to a DC plan, a backloaded DB plan will be more attractive to workers who expect to stay with the firm for a long period of time. For example, women with below-average quit rates tend to work at firms with pension plans (Even and Macpherson 1990). Also firms with a pension (particularly a DB plan) are more attractive to workers with low discount rates, compared to firms without any pension.<sup>1</sup> The fact that pensions may attract low discounters suggests that they can attract workers who have

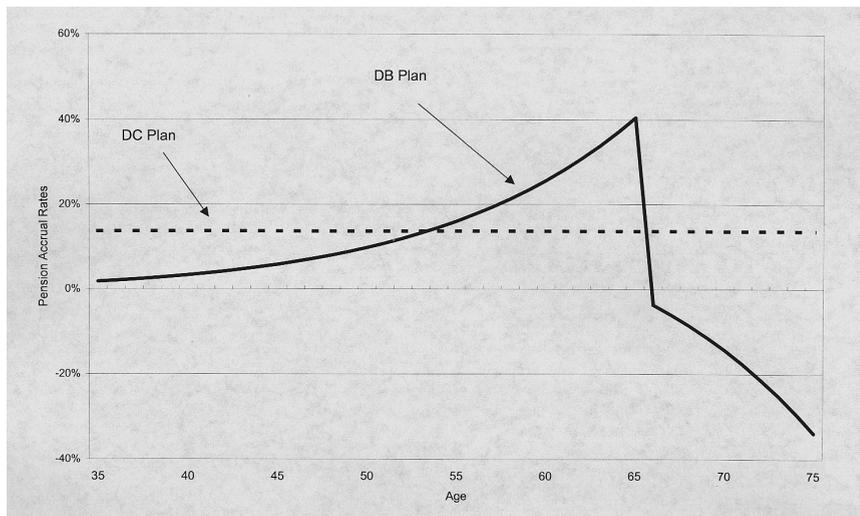


Figure 2. Stylized pension accrual rates, defined benefit and defined contribution plans. Source: authors' calculations.

#### 48 William E. Even and David A. Macpherson

a greater chance of being promoted, receive higher job performance ratings, and are less likely to call in sick (Ippolito 1997).

Though theory suggests that DB plans do more to retain employees than DC plans, this has proven difficult to show empirically. Thus in practice, workers with DB and DC plans have virtually identical turnover (Gustman and Steinmeier 1995; Even and Macpherson 1996). One explanation is that firms offering pensions might pay above-market or so-called “efficiency wages,” so the high wages might dominate the backloading effect of DB plans. An alternative explanation for the DC effect on mobility might be that DC plans attract low discounters and low discounters are less likely to quit. The fact that new employees who do not participate in their company’s 401(k) plan are more likely to quit supports this view (Kusko, Poterba, and Wilcox 1994; Ippolito 1997; Even and Macpherson 2001). This is consistent with Ippolito’s (1997) theoretical model, which indicates that firms offering DB plans do a better job of stopping high discounters from accepting employment at the firm. Firms with DC plans do a better job of encouraging high discounters who are hired, to eventually quit.

Compared to traditional DC plans, a 401(k) pension has the potential to create yet distinct selection and retention effects. For example, in a traditional DC plan the employer contributes a fixed percentage of pay into the plan, whereas in a 401(k) plan the employee chooses how much to contribute and the employer provides a matching contribution. The 401(k) plan will be more successful at encouraging high discounters (less productive) workers to leave the firm since they will not value employer matching contributions. As a consequence, even though the firm may not be aware of

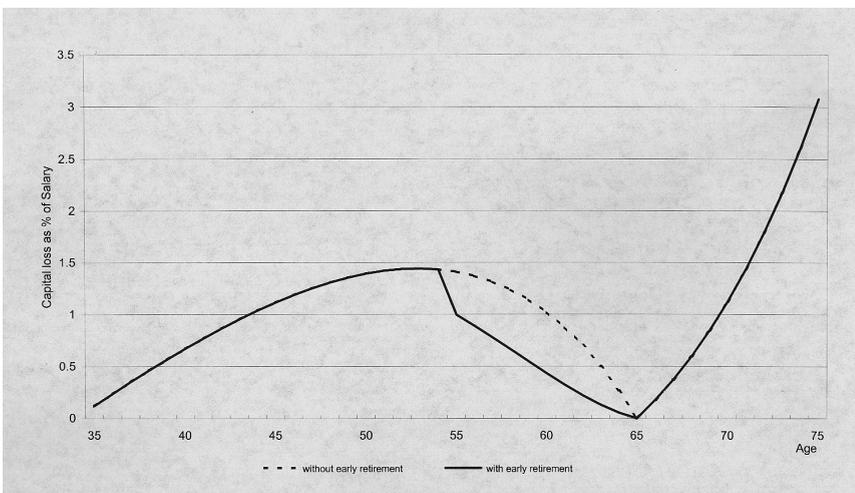


Figure 3. Capital loss in defined benefit plans with and without early retirement incentive feature. Source: authors' calculations.

which workers are actually high discounters, it is able to pay them less and encourage them to leave.

In addition to selection and retention effects, the switch to DC plans can also affect worker productivity by influencing monitoring costs and worker effort. For instance Lazear (1979) proposes that backloaded pay may be used to conserve on monitoring costs, arguing that workers shirk less when they are subject to a pension capital loss if they are dismissed. The evidence does support this view, in that DB plans appear to enhance productivity by 5 to 8 percentage points more than DC plans (Dorsey, Cornwell, and Macpherson 1998).

DC plans can also have other effects, potentially enhancing productivity by using company stock to tie worker compensation to firm profitability. There are numerous ways to make company stock part of the DC plan (Wiatrowski 2000). Employee stock ownership plans (ESOPs) are the most obvious mechanism, but employers also do this in other ways by providing matching contributions in 401(k) plans that take the form of company stock. Alternatively, a company can give employees the option to choose how their pension funds are invested and make company stock one of the choices. Yet another possibility is to include a stock purchase plan that allows employees to purchase company stock at a discount, or to provide a stock option plan, in either a qualified or nonqualified vehicle.

Two areas of research shed light on the extent to which employee stock ownership can enhance productivity: ESOP and executive compensation studies. In studies comparing ESOP with non-ESOP firms, most research reports finding the ESOP firms averaging 6.2 percent higher productivity (Blasi, Conti, and Kruse 1996). However, there is some evidence that such productivity effects are relatively small for larger companies, potentially reflecting free-rider problems. There is also a substantial body of research studying executive compensation in the United States, where much of the deferred compensation takes the form of company stock or stock options. The CEOs of the largest 500 industrial companies received approximately 35 percent of their compensation in the form of stock options in 1996; this was nearly 10 percentage points higher than observed four years previously (Murphy 2000). Several studies report positive effects of executive stocks or stock options on company performance, indicating that companies offering long-term incentive plans exhibited greater increases in return on equity than those without these plans (Leonard 1990; Murphy 1999; Abowd and Kaplan 1999).

While executives have long received compensation that is linked to company performance, the growth in DC plans now extends contingent compensation down to more levels of employees. Recent research indicates that if workers have company stock as an investment option in their 401(k) plan, approximately one-third of the assets were held in the form of company stock (VanDerhei, Holden, and Quick 2000). If the employer controlled the

**50 William E. Even and David A. Macpherson**

investment choice of at least part of the participant balances, slightly over one-half of the assets were held in company stock. In addition, stock option plans are now offered to rank-and-file employees, presenting yet another means of linking pay to company performance.

Nonmanagerial/nonprofessional employees are relatively unlikely to have stock option plans — available in only about 10 percent of publicly traded companies — but nearly one-half of the plans existing in 1998 were either expanded or added since 1996 (Lebow et al. 1999). These plans not only tie compensation to firm performance, but they also defer compensation by restricting the exercise date on the option to some point in the future. Of course a concern about linking pay and performance is that holding pension assets in employer stock reduces portfolio diversification and may subject employees to increased investment risk. In addition, if employees are heavily invested in company stock, companies may find it difficult to shed workers when profitability is low.

*Effects of Changing Pension Design on Retirement Outcomes*

Another way pensions can influence workforce patterns is via their retirement incentives. As the DC-covered worker approaches retirement, his pension accrual rate tends to be constant; by contrast in a DB plan, the accrual rate varies depending on the plan's early and normal retirement age provisions. Relative to a DC plan, a DB plan creates incentives to retire somewhere between the early and normal retirement age. The observed national switch to DC plans may therefore make it more difficult for firms to forecast labor force retirement patterns. Another issue is that of late, firms offering DB plans appear to have adjusted benefit formulas to reduce retirement incentives, relative to DC plans. For example, the fraction of percentage of DC-covered employees having a cost-of-living increase over the past five years dropped from 41 percent in 1985, to 4 percent in 1995 (U.S. Department of Labor various years). This decline might reflect the slowdown of inflation, but reduced cost-of-living adjustments do encourage workers to retire later.

Among DC plans, the growth of 401(k) plans might also influence retirement age patterns. One reason is that, relative to traditional DC plans, low-income workers save less in 401(k) plans, whereas middle and high income workers tend to be saving about the same (Even and Macpherson 1998). In addition, having 401(k) plans increased the variance of pension assets across workers, largely because of higher variance in contribution rates.<sup>2</sup> The greater variation in retirement asset accumulation will probably produce greater variation in retirement ages.<sup>3</sup>

Another important change in pension design is the effect of rate of return risk on the accumulation of pension assets. With DB plans, the rate of growth in pension assets is driven by variations in wage growth. In DC plans, variations in the rate of return on pension assets are important. In 401(k)

plans, workers are frequently given control over the asset allocation of their pension accounts. Holden and VanDerhei (2001) estimate that three-quarters of 401(k) assets are held, directly or indirectly, in equity securities. Since workers in DC and 401(k) plans are exposed to greater rate of return risk, retirement behavior may become more sensitive to the performance of equity markets. Thus if equity markets perform poorly, the resulting wealth loss could prompt workers to defer retirement. Moreover, if workers have invested heavily in their employers' stock, their retirement wealth becomes closely tied to the firm's performance. When the firm is faced with declining demand and profits, stock prices drop and workers are less able to retire. This makes it more difficult for firms to shed workers through voluntary retirements when profits are falling (Rappaport this volume).

### **Changes in Employee Health Insurance Offerings**

The percentage of U.S. workers with employer-provided health coverage has fallen in the last two decades, from 83 percent in 1980, to 71 percent in 2000. Additionally, workers with employer-provided health insurance are paying a larger share of the premium: covered workers who must pay some fraction of the premium rose from 56 percent in 1980, to 74 percent in 2000 (authors' tabulations of March Current Population Surveys). Additional evidence on employees of medium and large firms indicates that those having to pay part of the cost of single coverage rose from 36 percent to 69 percent between 1985 and 1997, and the percentage contributing toward the cost of family coverage rose from 56 to 80 percent over the same period (U.S. Department of Labor various years).

Undoubtedly, rapidly escalating health insurance costs are part of the explanation for declining health insurance coverage rates and increased employee contributions toward coverage. These changes in health insurance benefits will have selection and retention effects that could have both positive and negative effects on firm profits. Of course, employer-provided health insurance is likely to be most attractive to workers with health problems, risk averse workers, and workers with low discount rates. As yet, however, there is no empirical evidence demonstrating how the selection effects of employer-provided health insurance coverage might work, in terms of discount rates or risk aversion.

By contrast, there is a long literature establishing the fact that firms offering health insurance tend to draw less healthy workers (Cutler and Zeckhauser 2000). One interesting feature of employer-provided health insurance is that, like DB pensions, it provides a means to backload pay. If firms require all workers to contribute an identical dollar amount for health insurance (either implicitly or explicitly), they effectively reward older workers with a more valuable benefit. For example, data from three private insurance carriers reveals that the typical health insurance premium is 3.5

**52 William E. Even and David A. Macpherson**

to 4.0 times higher for a 60-year-old than for a 30-year-old, and the annual cost of the plans is between \$2,100 and \$3,500 higher for the 60-year-old (<[www.ehealthinsurance.com](http://www.ehealthinsurance.com)>). Health insurance coverage also rewards men and women differentially: at young ages, private insurance markets charge higher rates for women. At older ages, the reverse is true. Differential usage and differential premium charges also reward married and single people differentially: many employers charge employees less than the marginal cost of family coverage and thus favor married workers, particularly those with large families. If all employees contributed the same dollar amount for coverage, offering health insurance would select and retain older workers, workers with families, and workers without coverage from a spouse. Retention of unhealthy workers will be exacerbated by the fact that many insurance plans do not cover preexisting conditions, resulting in what has been called “job lock” in the literature. One study found that employer-provided health insurance cuts voluntary turnover by 25 percent (Madrian 1994).<sup>4</sup>

As the cost of health insurance has risen over time, these selection and retention effects will become more pronounced. Increased heterogeneity in the workforce, along the lines outlined by Riche (this volume), may also amplify the effects. For example, as the fraction of workers with spouses that also have coverage increases, workers will place less value on employer-provided subsidies for family care, and the firm will have greater difficulty in attracting and retaining such employees. If firms find these selection and retention effects of health insurance undesirable, they can dampen the effects by charging extra for family and/or individual coverage, which may explain the trend toward larger percentages of employees having to pay for health insurance costs, as noted above.

A new model recently arrived on the health insurance scene is the “defined contribution” health insurance plan as distinct from the traditional “DB” approach to health plans (EBRI 2000). In the old model, employers elected a health insurance plan and assumed the risk regarding premium fluctuations. In a DC health insurance model, the employer typically promises to contribute a fixed dollar amount toward the health plan, and the employee must pay for any cost in excess of the employer contribution. Employees are usually offered a menu of health insurance options to choose among. The DC health insurance plan can be designed so that the employer reduces the variance in its contribution for health insurance across employees. This, in turn, makes it less likely that the health insurance plan generates undesirable selection or retention effects.

**Changes in Retiree Health Insurance Offerings**

U.S. companies have also moved away from offering retiree health insurance coverage over time, as indicated in Table 1. Here we report the fraction

of full-time private sector workers with health insurance coverage, where the health insurance was also offered to retirees. In 1988, 45 (37) percent of workers were in plans that provided benefits to retirees under age 65 (Medicare eligible); this had fallen to 35 (34) percent by 1997. In addition, the percentage of employees having to pay part of the cost of retiree health insurance has also grown over time. Among workers with health insurance coverage for retirees under age 65, the share of workers with retiree health coverage completely paid for by the employer fell from 53 to 29 percent between 1988 and 1997. The corresponding figures for coverage for Medicare eligible retirees are 54 percent and 32 percent.

A number of empirical studies have examined whether retiree health insurance influences retirement patterns, and the majority concludes there is a powerful effect. For instance Karoly and Rogowski (1994) find that men aged 55–62 with retiree health insurance coverage are 8 percentage points more likely to retire early over a two-year period, a change equal to 50 percent of the baseline probability. Other studies also find that older workers with retiree health coverage are more likely to retire early.<sup>5</sup> To the extent that retiree health insurance coverage is falling over time, this will reduce companies' ability to induce early retirement. This may be exacerbated to the extent that the Medicare program experiences financial shortfalls in years to come.

TABLE 1. Trends in Employee Participation in Company-Sponsored Medical Plans, by Provision for Coverage After Retirement

	<i>Participation rates (%)</i>					
	<i>1988</i>	<i>1989</i>	<i>1991</i>	<i>1993</i>	<i>1995</i>	<i>1997</i>
<i>Under Age 65</i>						
With employer-paid retiree health insurance coverage						
Retiree contribution	45	41	43	44	36	35
Employer pays all	21	21	23	27	25	22
Not determinable	24	18	16	13	9	10
	<1	1	4	4	4	3
<i>Age 65 and over</i>						
With employer-paid retiree health insurance coverage						
Retiree contribution	37	36	41	41	32	34
Employer pays all	16	18	20	23	22	20
Not determinable	20	17	17	14	6	11
	<1	1	4	4	4	3

Source: U.S. Department of Labor (various years). Includes full-time employees in medium and large private establishments.

## Conclusions

We have reviewed the theoretical and empirical literature on the impact of pensions and health insurance on assorted dimensions of employee productivity. As pensions continue to shift from DB to DC plans, we believe this will have predictable effects on selection, retention, and retirement patterns. First, since the DC is a more portable pension, employee retention rates could fall. Second, DC plans present employees with a different type of retirement income risk and may attract a different type of worker than a DB plan. Third, linking retirement to capital market performance will make retirement patterns more volatile, as they respond to stock market returns. Last, including company stock in DC portfolios can improve productivity by linking pay to company performance, but it also might make it more difficult to induce retirement during slow economic periods.

Changes in health insurance offerings will also have productivity effects. As health care inflation rises, due partly to population aging, this will continue to spur employers' interest in "defined contribution" health plans as distinct from the traditional defined benefit offerings. Some firms may pull back from offering health plans at all, since doing so attracts certain types of workers that may be problematic, the more heterogeneous the workforce becomes. Additional research on how benefit plans influence worker productivity would be most fruitful. For example, relatively little is known about the selection and retention effects of particular aspects of 401(k) design, including matching rates, use of company stock, investment education, and the like. It would also be interesting to better understand how the shift from DB to DC plans will affect future retirement patterns. Finally, if employers are less likely to offer, and pay for, active and retired worker health insurance, it will be important to investigate alternative models for coverage in the future.

## Notes

1. Curme and Even (1995) show that, controlling for other personal characteristics, the probability of coverage by a DB plan is 14 percentage points lower for workers who are borrowing-constrained than for those who are not. The effect of borrowing constraints on DC coverage is not statistically significant.

2. For an analysis of the adequacy of retirement savings for the typical household near retirement age, see Moore and Mitchell (2000).

3. Moreover, following the logic of Ippolito (1997), the high discounters (bad workers) will accumulate the least in their 401(k) plans and will be the least able to afford retirement at an early age. Offsetting this, however, is the fact that high discounters may be willing to retire with a lower pension balance since they place a lower value on their standard of living in the late years of life.

4. Gruber and Madrian (1994) imply that the "job-lock" associated with health insurance has been reduced by the 1985 Consolidated Omnibus Budget Reconciliation Act (COBRA). Prior to this act, more than twenty states had passed continuation of

coverage laws legislation mandating employers to provide departing workers the opportunity to purchase continued coverage for a limited period of time.

5. Blau and Gilleskie (1997) find that retiree health insurance increases the job exit rate by 26 percent to 80 percent of the baseline probability and Rogowski and Karoly (2000) report that the upper-bound effect of retiree health insurance on exit rates is 68 percent of the baseline probability. Using earlier data, Gustman and Steinmeier (1994) find a smaller impact of retiree health insurance; however, Rogowski and Karoly (2000) suggest that their study underestimates the effect of retiree health insurance due to measurement error in their eligibility for retiree health measure.

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**56 William E. Even and David A. Macpherson**

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**Benefits and Productivity 57**

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