

How Will the Stock Market Crash Affect the Choice of Pension Plans?

Abstract - For the past three decades, there has been a significant movement away from defined benefit pension plans in the private sector toward greater use of defined contribution plans, especially 401(k) plans. In contrast, retirement plans in the public sector remain primarily defined benefit plans. The stock market crash of 2008 had a dramatic effect on pension balances across all types of plans; private defined benefit, private defined contribution, and state and local plan assets all fell by more than 25 percent in 2008. This paper examines the trends in plan type up to 2008, the impact of the crash on pension holdings, and the likely responses by employers and employees to the current economic climate.

INTRODUCTION

For the past three decades, there has been a significant movement away from defined benefit (DB) pension plans in the private sector toward a greater use of defined contribution (DC) plans, especially 401(k) plans. In contrast, retirement plans in the public sector remain primarily defined benefit plans. An important policy question facing American workers is how will the recent adverse economic events, especially the sharp decline in equity prices, affect pension coverage and the choice of pension plans by employers and employees in both the public and private sectors of the economy.

The sharp decline in the value of pension funds resulting from the stock market crash may have short and long run implications on worker preferences for individual retirement savings accounts such as 401(k) and 403(b) plans, their willingness to reduce current consumption to contribute to these accounts, and their investment strategies. At the same time, reductions in revenues and profits affect the ability of employers to provide matching contributions to 401(k) plans. However, the same trend may also further erode employer willingness to assume the funding liabilities that accompany DB pension plans. The fall in plan assets and the accompanying decline in funding ratios require employers to reconsider funding levels and whether the need for additional pension contributions will result in lower future wages or reductions in benefit formulas.

The primary objective of this analysis is to examine how the 2008 stock market crash may eventually alter the desire of

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workers to participate in, and employers to offer, certain types of pension plans. We begin with a review of pre-crash trends in U.S. pension coverage. The analysis includes a discussion of incentives facing employers and employees when they decide on whether a pension will be part of compensation, what type of plan to establish, and how economic and regulatory changes might alter pension choices. We then look closely at the distribution of coverage across several population dimensions that are important for analyzing the outlook for pensions. In particular, we use household-level survey data to measure coverage across the public and private sectors and by earnings levels.

In the third section, we present some preliminary findings about how the stock market crash of 2008 affected aggregate pension plan finances. Private sector DB plans, private sector DC plans, and state and local pension plans have all suffered declines of over 25 percent of their 2007 values, but that is simply another way of stating that the three types of plans (in aggregate) had basically the same portfolio composition at the end of 2007. The one exception is the federal government's civilian retirement plan, which (for the DB portion) is similar to Social Security insofar as the investments are completely in non-marketable government debt issues.

In the fourth section, we analyze the likely effects of the crash on future outcomes for participants across the various types of pension plans and sectors of the economy. To date the most immediate effects of the stock market crash have been on DC participants planning to retire in the next few years. However, all DC participants observe, when reading their quarterly statements or checking on-line balances, that they have incurred dramatic losses. We use household data from the 2007 Survey of Consumer Finances to put the decline in asset values in perspective, focusing first on how actual portfolio

allocations differ across groups, and then on the relationship between stock market losses and labor market earnings for those close to retirement.

DB plan financial statements also show substantial declines in total assets and funding ratios; however, these plans have sufficient assets to pay promised benefits to those retiring in the next few years as well as current retirees. Thus, the problem for most DB plans is the need to improve their funding in the coming years to restore their financial status. Relative to underlying contributions, DB plans were actually hit much harder than DC plans. Prior to the stock market crash DB plans were generally considered well funded. The extent to which additional funding or benefit reductions are needed depends on the extent to which the stock market recovers and how recent experience affects future investment decisions. An important result of the crash in equity prices is that it illustrates that workers also bear some of the long term investment risk associated with DB plans especially when declines in equity prices result in terminations and freezing of DB plans.

PENSIONS BEFORE THE CRASH

This section begins with a brief history of the evolution of public and private retirement plans in the United States. Pension coverage initially relied on DB plans in both sectors, but there has been substantial movement toward DC plans in the private sector over the past three decades while DB plans have remained dominant in the public sector. There are also important differences in the level of pension coverage by earnings, but those differences have been fairly stable for at least the last three decades. Both trend and level differences can be explained in terms of employer and employee preference about whether to redirect compensation towards a pension in the first place, and

then which type of coverage is preferable given the expected benefits and risks associated with each type of plan.

A Brief History of U.S. Pension Coverage

The development of employer-provided retirement plans in the private sector began in the late nineteenth century. The spread of these plans was rather slow, so that by the middle of the twentieth century only about 15 percent of the labor force participated in pension plans. However, between the mid-1940s and 1975, coverage expanded rapidly until approximately half the labor force was covered by a pension plan. During this time, the vast majority of pension participants were covered by DB plans. This spurt of coverage was driven by increasing tax rates, wartime wage and price controls, and changes in collective bargaining rules that allowed pensions to be a subject of bargaining. In addition, due to increased costs of hiring and training workers, employers found it in their interest to have higher retention rates and developed human resource and compensation policies to alter worker behavior.

The relative importance of traditional DB plans peaked in the mid-1970s. After the passage of the Employee Retirement Income Security Act in 1974 (ERISA), the incidence of DB plans began to decline and DC plans increasingly became the plan of choice. Studies by Clark and McDermed (1990), Gustman and Steinmeier (1992), and Ippolito (1995) attempted to estimate the determinants of the shift towards DC plans. ERISA substantially increased the cost of offering a DB plan relative to a DC plan, thus lowering the retirement benefit per dollar of pension cost, especially for smaller DB plans. Changes to the tax code

allowing pre-tax contributions by employees to DC plans provided a further impetus to the growth in DC plans, especially 401(k) plans. Also, shifts in the composition of the economy away from firms that traditionally offered DB plans, declines in unionization, and a more mobile work force reduced the demand for and supply of DB plans. The dominance of DC plans in the private sector continued to grow up to the 2008 stock market crash.

Pension coverage in the public sector is a much different story; DB plans remain the dominant type of plan offered by federal, state and local governments. Teachers, municipal police officers, and firefighters were the first state or local public employees to be covered by employer-provided pension plans.¹ Initially, these plans were developed at the local level, typically by large municipalities. The development of teacher pension plans in the twentieth century included the establishment of pension plans for teachers in every state, along with the merger of teacher plans with those for other state employees in some states.

The first state retirement plan for (non-teacher) civil service employees was established in Massachusetts in 1911. The establishment of public sector retirement plans continued at a slow pace. By 1934, only nine states had retirement systems for general state employees (Social Security Board, 1937). Recognition of the need to move elderly state employees out of public service employment, along with sincere concerns for their retirement income, became more acute with the onset of the Great Depression. Over the next two decades or so, almost every state passed legislation creating a retirement plan for general state employees. By 1961, 45 states had established pension plans with only Idaho, Nebraska, North Dakota,

¹ Retirement plans for military personnel were the first public sector pension plans in the United States (Clark, Craig, and Wilson, 2003).

Oklahoma, and South Dakota failing to develop a retirement plan (Mueller 1961), and these states subsequently developed plans for their employees.

Despite the 30-year trend among private sector employers away from DB plans and toward a greater emphasis on DC plans, DB plans remain the dominant type of retirement plan in the public sector. In 2007, the U.S. General Accounting Office reported that with the exception of Alaska and Michigan, all states offered DB plans as their primary retirement plan for general state employees.² In addition, two states, Indiana and Oregon, had adopted primary plans that included components of both DB and DC plans, and Nebraska had established a cash balance plan for its employees.

The contrast between public and private plans sheds light on the history of public plans in the past few decades. Clark and McDermed (1990) argue that much of the early movement away from DB plans in the private sector was caused by two factors: the cost of government regulations imposed by ERISA and the structural changes in the economy that resulted in shifts away from industries that had traditionally used DB plans as an important human resource policy. These trends simply did not have the same effect on public sector employers. Munnell, Haverstick, and Soto (2007) attribute the staying power of DB plans in the public sector to differences in the labor force and regulatory environment facing public employers. Furthermore, they argue that the workforce in the public sector is older, more risk averse, less mobile, and more unionized than the private sector labor force. In addition, state and local governments do not face the same pres-

ures on administrative costs and other requirements associated with government regulation of pensions in the private sector.³

The Distribution of Pension Coverage

Despite these major changes in coverage by plan type, overall pension coverage rates have remained relatively constant for the last three decades. Data from the March Current Population Surveys (CPS) between 1979–2007 illustrate the overall relative stability in the proportion of the labor force covered by a pension plan. There are important differences in pension coverage across sectors and by earnings level—which are important for thinking about the outlook for pensions in the wake of the stock market crash—but even those differences have remained relatively stable over time.

The first observation from the CPS is that public sector employees are much more likely to be covered by a pension plan than private sector workers, but the coverage rates within each sector have not changed much over time. Focusing on wage and salary workers with significant labor force attachment, Figure 1 indicates that the pension coverage rate for public employees has remained at about 90 percent of the full-time labor force while the rate for full-time private sector employees has fluctuated around 60 percent.⁴

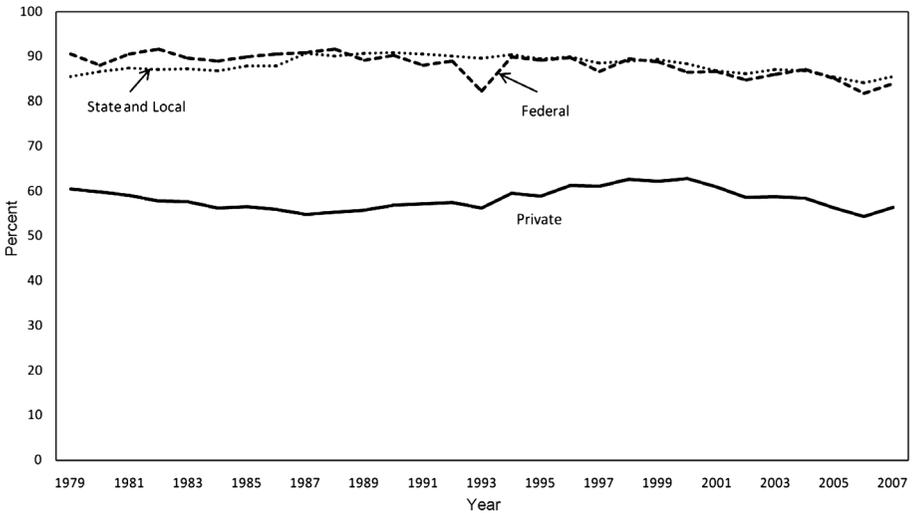
Pension coverage also varies substantially by earnings, with higher income workers being much more likely to be in jobs with employer-provided pension plans. For example, in the top quintile the pension coverage rate for full-time employees is approximately 80 percent, while in the bottom quintile the coverage

² In 1999, the U.S. GAO (1999) reported that 21 of the 48 states with defined benefit plans had considered terminating their defined benefit plan and replacing it with a defined contribution plan. However, eight years later, the GAO (2007) found only two states with defined contribution plans.

³ Also see Munnell and Soto (2007).

⁴ To be considered full-time, employees must work more than 19 hours per week and 25 weeks per year.

Figure 1. Trends in Pension Coverage by Sector, 1979–2007
(Wage and Salary Workers, Age 21–64, Hours>19 and Weeks>25)



Source: March Current Population Survey

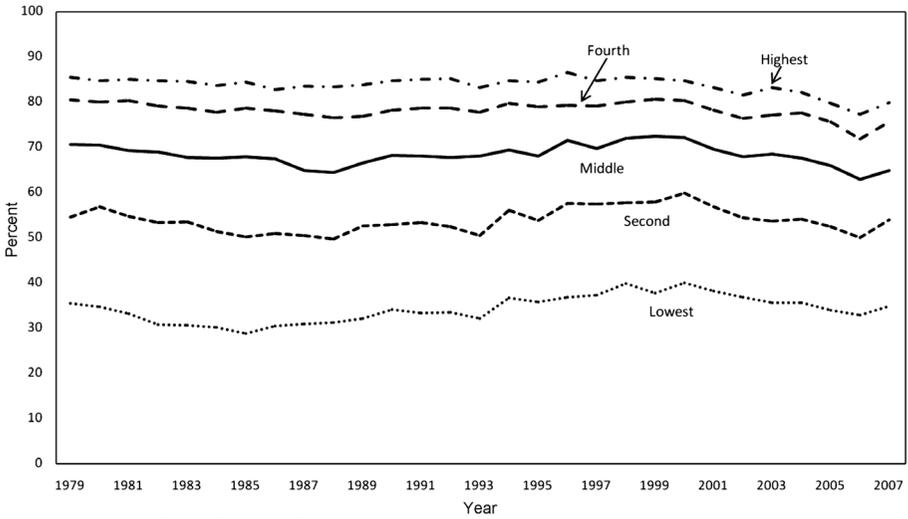
rate has ranged from 30-35 percent (Figure 2). These differences can be explained, at least in part, by differences in tax rates and Social Security replacement rates. For example, the Congressional Budget Office (2008) reports that the overall median Social Security replacement rate at the normal retirement age (as defined by the Social Security Administration) is currently about 40 percent, but that falls from about 65 percent for the lowest quintile of lifetime earners to about 20 percent for the highest quintile. Those differences in Social Security replacement rates across earnings groups have been in place for several decades (although benefits are more progressive now than when the program was created), which is consistent with the observed stability in pension coverage across workers.

Pension history before the crash shows relative stability in the proportion of workers covered by any type of pension plan across earnings levels, but we also know there has been a major shift in the

private sector away from traditional DB plans. Before turning to our discussion about what may be underlying these trends in the next section, we explore two other questions related to the shift from DB to DC plans.

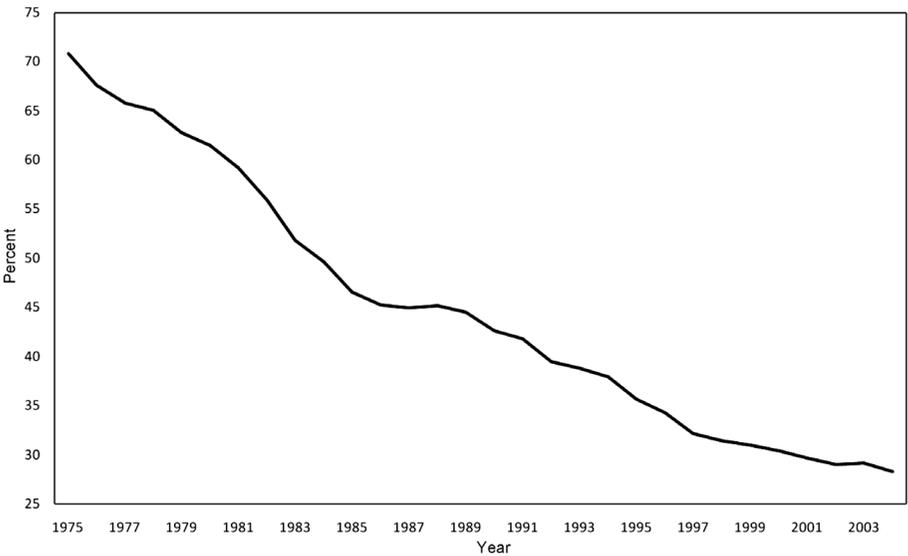
The first question pertains to timing: at what point in the last three decades did the shift from DB to DC plans occur? Unfortunately, the CPS data used to analyze trends in overall coverage lacks details about what type of coverage employees have. The only data available consistently over several decades is from annual employer reporting (through Form 5500) to the U.S. Department of Labor. Figure 3 shows the fraction of pension-covered workers with DB plans in the 5500 data since employer reporting began in 1975 (the year after ERISA was passed). The employer data indicate how many “active” participants have each type of coverage, but it is not possible to separate DB only from DC only and DB+DC, because the data are collected at the employer (not employee)

Figure 2. Trends in Pension Coverage by Earnings Quintile, 1979–2007
(Wage and Salary Workers, Age 21–64, Hours>19 and Weeks>25)



Source: March Current Population Survey

Figure 3. Trend in Proportion of Pension Participants Enrolled in Defined Benefit Plans



Source: U.S. Department of Labor Form 5500 Data

level. Thus, employees with both DB and DC coverage are included in both numerator and denominator.

Despite the inherent problems with using employer data, Figure 3 shows that the shift from DB to DC plans has been a steady process as far back as the data go. Although private sector DC plans are generally thought of as emerging in the early 1980s when clarifying regulations created the 401(k), in fact the shift was under way even before then. More importantly for the discussion to follow, it is noteworthy that there are no easily identifiable jumps in the fraction of pension participants covered by DB plans. For example, although the stock market crash of 2000 raised awareness about the potential financing problems in DB plans, there appears (if anything) a slowing in the rate of transition to DC plans after 2000. Some of this could be because the last ten years saw the emergence of cash balance plans within the DB sector; those plans are more like DC plans in terms of pension benefit accrual over the life cycle, though they do keep investment risk on the employer like a traditional DB plan.

In addition to the question of timing, it is also interesting to ask whether the shift from DB to DC plans has disproportionately affected low or high earners. Again, the March CPS does not collect

pension coverage by type, so we turn to another household survey (the Survey of Consumer Finances, or SCF) that shows the same patterns of overall pension coverage by earnings level for the last two decades, but also allows us to further investigate the details of the specific pension arrangement.

Table 1 shows pension coverage and inclusion by earnings quintile and type of pension in the 1989 and 2007 SCF data sets. Focusing first on the left side of Table 1, one observes that overall coverage and coverage by quintile in the SCF are very similar to the CPS (reported in Figure 2). The second observation is that pension coverage does not always imply pension inclusion; workers may report that their employer sponsors a plan, but that they themselves are not included because they are not qualified, or they choose not to participate. The third observation is that the ratio of included to covered workers rises with earnings, which is again consistent with the proposition that higher earners have more demand for retirement income to supplement Social Security benefits.

The right half of Table 1 addresses the question posed above about how the shift from DB to DC plans has been borne by different earners. Although overall pension coverage rates rise dramatically with earnings in all years, the shift from DB to

TABLE 1
PENSION COVERAGE, INCLUSION, AND TYPE IN THE SURVEY OF CONSUMER FINANCES
(Household Heads and Spouses with Wage Income, Age 21–64, Working 20 or More Hours Per Week)

Quintile of Household Earnings	Pension Coverage and Inclusion				Type of Coverage for Included Workers			
	Coverage		Inclusion		DB+DC or DB Only		DC Only	
	1989	2007	1989	2007	1989	2007	1989	2007
Lowest	41.3	42.5	21.6	19.0	13.6	7.4	8.0	11.6
Second	60.9	63.0	43.1	39.7	26.3	11.2	16.8	28.6
Third	74.5	73.8	63.1	60.0	41.6	19.9	21.5	40.0
Fourth	83.1	79.0	72.4	69.7	48.4	26.0	24.0	43.8
Highest	88.8	86.0	82.0	77.0	54.1	28.3	27.8	48.6
All	70.5	70.4	57.5	55.4	37.5	20.0	20.0	35.5

Source: Federal Reserve Board Survey of Consumer Finances

DC plans (at least since 1989) looks very similar across earnings quintiles, as each group saw the fraction of pension participants covered by DB only or DB+DC fall by roughly half. There is generally a corresponding increase in the fraction covered only by a DC plan, which is why overall coverage rates within quintiles did not change very much between 1989 and 2007. Thus, the significant point of our analysis of the trends in pension coverage is that the shift from DB to DC plans was not concentrated in any particular earnings group—the impact was across all earnings groups.

Explaining Pension Trends in the Pre-Crash Era

Employers and employees generally agree that pension savings is a good idea, but that does not mean that everyone agrees about the particular level of compensation to be redirected to pension saving or the best way to set up the pension arrangement. DC plans are sometimes criticized as shifting investment risk to employees and introducing the possibility of poor decision making, but they also provide flexibility to employees in terms of how much of their compensation to direct towards retirement saving. DC plans are also portable across employers, because the accrued benefit is the account balance. DB plans offer potential economic benefits in terms of a backloaded implicit contract between employers and employees, but they also introduce a new set of risks for employees that may not be properly appreciated.⁵

One of the defining characteristics of a traditional DB plan is that benefit accrual rates generally increase with tenure. DB plans usually pay a benefit based on some measure of final average pay multiplied by some function of service years, which

means that the incremental value of remaining with the firm for an additional year increases as the employee nears retirement age. This rising benefit accrual rate provides an incentive for employees to perform well while early in their careers and thus be retained by their firm—an implicit contract that Allen, Clark, and McDermed (1993) and other authors refer to as “bonding.” The value of bonding in terms of improving economic efficiency is certainly related to the level and accumulation of specific human capital. However, there is also value to bonding in a highly cyclical industry where the firm desires to provide workers with an incentive to wait through a downturn for a resumption of normal economic activity.

The bonding feature of a DB plan can improve economic efficiency, but there are also important (and perhaps unappreciated) downside risks to employees in DB plans. The U.S. labor market is characterized by a tremendous amount of turnover, especially among low wage workers. Indeed, low benefit accrual at young ages and practices like five-year vesting imply that many workers may never get any return whatsoever from a DB plan in which they were “covered,” which is another way of saying there is redistribution from those workers who leave the firm to those who stay. This redistribution across employees may be cost-saving from the firm’s perspective because it allocates more compensation to the most productive. Still, it is easy to understand why young and mobile employees may prefer compensation in some other form.

This tension between the value of bonding and the cost of redistribution goes beyond the relative productivity of workers, however. When a firm sponsors a DB plan they are writing an explicit contract that pays off fully to long-tenured employ-

⁵ DB accrual rates are generally backloaded; cash balance plans are a notable exception within the class of DB plans.

ees, but implicitly they have retained the option to limit the payoff to accrued benefits at any time by freezing the plan (or entering bankruptcy, which amounts to the same thing from the worker's perspective, because the accrued liability is simply shifted to the Pension Benefit Guarantee Corporation). The extent to which a worker loses when a plan freezes is directly related to their career stage. If they are in the early to middle portion of their career and benefit accruals to date are low, they have much to lose relative to plan continuation. A similar loss of potential DB benefits occurs with voluntary job changes or termination of employment for any reason.

The decision to freeze a DB plan can be driven by either competitive pressures or poor performance on the pension fund's investments. Competitive cost pressure is probably the more important driver of a firm's decision to freeze or modify a plan—the high-profile changes in pension coverage during the last few decades almost certainly reflect industry as well as firm-specific trends rather than overall poor stock market performance. However, investment risk can lead to the same series of adverse outcomes from an employee's perspective. Even though the firm is nominally taking on investment risk when they sponsor a DB plan, the firm retains the option to freeze the plan at any time. Thus, an event like the recent stock market crash does not simply impose costs on firms because they are the ones obligated to fund accrued benefits—workers with low benefit accruals to date may have the most to lose if one takes a constant benefit accrual rate as the benchmark.

Like DB plans, DC pension arrangements also come with benefits and costs. The obvious benefits relative to DB plans from the employee's perspective are flexibility and portability, meaning they can choose how much to contribute and incur no losses if they separate from the firm for whatever reason. The two visible

costs to employees in DC plans are the direct burden of investment risk and the consequences of making poor investment decisions.

There is some evidence that employees make poor decisions in DC plans, which has led to steps by both employers and policy makers to improve DC plan outcomes. Given the choice, many employees forego participation in DC plans when offered, and many who do participate choose to defer salary at rates that some observers deem much too low. However, employers can improve participation through matches and other incentives, and there is a tremendous push (embodied in the Pension Protection Act of 2006) to use behavioral principles to encourage higher participation and saving through auto enrollment and other employer-initiated defaults. There is no set savings rate that is right for everyone. A DC plan does impose a significant decision-making burden on individuals, and it can be argued that many participants are not saving enough.

DC plans are often characterized as being riskier than DB plans because the burden of low investment returns is borne directly by the participant. This apparent difference between DB and DC plans is overstated because there is nothing inherent in the principle of DC plans that requires employees to bear the risk of equity investments—they can always invest in bonds that are timed to match their lifetime consumption goals with certainty. All pension investment decisions involve risk and return choices; in DB plans these investment decisions are made by the plan administrator while in DC plans they are made by the individual participant. However, there is not a fundamental difference in the plan investment between DB and DC plans. As noted above, when a DB plan takes on equity investment risk, young and mid-career participants are not necessarily insulated from that risk. DB plan

participants on the verge of retirement are protected from stock market fluctuations, but a DC participant can (and generally should) achieve the same protection by shifting their portfolio towards bonds as they get older.

Returning to the question that motivates our pre-crash analysis, does this fairly simple framework comparing benefits and risks explain observed differences in the choice of DB versus DC coverage across sectors and over time? One can explain the dominance of DB plans in the public sector, because long tenure is more likely and probably more efficient because of very specific human capital accumulation. Also, from the risk perspective, the general lack of competitive cost pressures in the public sector means that young and middle-age employees have not traded off those benefits against the risk of plan freezes. In terms of private sector trends, the DB plan approach probably still offers a potential human resources management advantage in some situations. However, given the overall risk-adjusted cost and benefit of DB plans, employers and employees have drifted gradually but persistently towards DC plans. Indeed, the most notable effect of the stock market crash on pension policy—across both public and remaining private sector DB plans—may be the increased realization that providing generous and certain pension benefits is an expensive proposition.

HOW DID THE MARKET CRASH AFFECT PENSION ASSETS?

Prior to the beginning of the recession, pension coverage seemed to be frozen at about 70 percent of the full-time labor

force, with just under 60 percent actually participating in employer-sponsored plans. Public and private DB plans were generally deemed well funded, so there was no immediate pressure to increase contributions or curtail benefits.⁶ Concerns about employee participation, contributions, and portfolio allocation in DC plans have also been addressed in both legislative and employer actions. However, the stock market crash of 2008 may lead to a major rethinking of pension policies by employers and employees as they come to see more clearly certain risks associated with both types of plans. What will be the impact of the stock market crash on pension policy and behavior as we move forward? This question is addressed in detail in the next section. In this section, we set the stage for that discussion by focusing on how different types of pension plans were affected by the crash.

The extent to which the 2008 stock market crash affected pension participants obviously depends on the extent to which those participants were invested in the stock market before the crash. We use data from the Federal Reserve Board's Flow of Funds Accounts to measure the aggregate change in pension assets across the four broad categories of plans: private sector DB, private sector DC, state and local, and federal civilian. Of these, all but the federal civilian employee plan were greatly exposed to the drop in equity prices. This distinction is reflected in the approach to funding pensions before 2008; all but the federal civilian plan relied on equity exposure to achieve funding targets, which allowed lower contribution rates.

Table 2 shows the initial Federal Reserve Board (March, 2009) estimates of how the

⁶ A good source for data on the funding status of private pension plans is the Watson Wyatt Worldwide *Insider* reports; see, for example, Watson Wyatt Worldwide (2008, 2009). Some would argue that the measures of funding status for public sector plans reflect their failure to acknowledge risk by using a higher discount rate than private plans; see, for example, Novy-Marx and Rauh (2008). Also, Giertz and Papke (2007) argue that strong equity returns led to changes in actuarial assumptions that reinforced the belief that public plans were fully funded.

How Will the Stock Market Crash Affect the Choice of Pension Plans?

TABLE 2
AGGREGATE PENSION FUND WEALTH, 2007Q4 TO 2008Q4

	2007Q4	2008Q4	Change, 2007Q4 to 2008Q4	
	(\$Billions)	(\$Billions)	(\$Billions)	(Percent)
All Household Sector Pension Reserves	10,809.6	8,180.9	-2,628.7	-24.3
Pension Funds				
Private Pension Plans	6,426.6	4,631.2	-1,795.4	-27.9
Private DB Plans	2,666.0	1,930.5	-735.6	-27.6
Private DC Plans	3,726.4	2,664.8	-1,061.6	-28.5
State and Local Pension Plans	3,185.7	2,328.5	-857.2	-26.9
Federal Government Pension Plan	1,197.2	1,221.2	23.9	2.0
Pension Reserves at Life Insurance Companies	2,437.8	2,099.1	-338.7	-13.9
Memo: Total Household Sector Net Worth	62,689.8	51,476.9	-11,213.0	-17.9

Source: Federal Reserve Board Flow of Funds Accounts

Notes: (1) Private pension plan total is slightly higher than the sum of DB and DC because the two sub-components are for financial assets only; tangible assets are in the total, (2) Flow of Funds State and Local does not include 457 plans; private DC does not include non-CREF 403(b).

stock market crash affected pension assets. The broad category of pension assets reported on the household balance sheet fell by \$2.6 trillion during 2008, or nearly one-fourth of the overall \$11.2 trillion drop in household net worth.⁷ Similarity is the most striking feature when looking at the decline in pension wealth across pensions by type and sector. All of the main types of pension plans except the federal employee system—private sector DB, private sector DC, and state and local—experienced declines of just over 25 percent. These are simply changes in balances—not capital losses—and do not adjust for inflows (contributions) and outflows (benefits paid). Net inflows are also obviously affecting the change in assets, but those flows are small relative to the effect of the market crash.

Table 3 shows the (perhaps obvious) reason that losses were uniform across the three main types of non-federal pensions, at least in aggregate. Portfolio composition right before the stock market crash was very similar when viewed in the broad

categories of cash and near-cash, credit market instruments, equities (including mutual fund shares), and miscellaneous categories specific to the various plans.⁸ Clearly, equity holdings dominated the portfolios of all three types of non-federal pensions. Table 3 shows that this was not always the case; some of the increase in the equity share is because of the booming stock market in the 1990s, but that market valuation effect was clearly not offset by plan rebalancing.

The problem with looking at contribution rates at any point in time is that the different types of pension systems tracked in the Flow of Funds data all have very different replacement rates, in large part because they have different levels of integration with Social Security. Social Security represents a contribution rate of 12.4 percent up to the taxable maximum between employers and employees, so any analysis of contributions for workers covered by Social Security should consider that as a base. Also, to the extent that earnings are relatively higher

⁷ That top-line pension category includes a \$339 million decline in variable annuity assets owned by households through life insurance companies, however, which (although the funds might have flowed out of pensions to begin with) are rightly excluded from our assessment of pension sector finances.

⁸ Insurance contracts in the private sector plans refer to the annuities underwritten by life insurance companies.

TABLE 3
 AGGREGATE PORTFOLIO COMPOSITION BY TYPE OF PENSION PLAN

	Percent Distribution, Fourth Quarter of Each Year				
	1985	1990	1995	2000	2005
Private Sector DB Plans, Total	100.0	100.0	100.0	100.0	100.0
Cash and Near Cash	7.1	7.5	6.0	4.5	2.3
Credit Market Instruments	31.7	38.9	31.4	21.6	20.5
Equities and Mutual Fund Shares	43.0	38.7	51.6	66.3	72.2
Insurance Contracts and Other Miscellaneous	18.2	14.9	10.9	7.6	5.0
Private Sector DC Plans, Total	100.0	100.0	100.0	100.0	100.0
Cash and Near Cash	12.0	12.0	6.1	5.1	4.5
Credit Market Instruments	17.8	15.7	10.4	7.8	7.4
Equities and Mutual Fund Shares	42.9	40.9	59.8	71.9	76.0
Insurance Contracts and Other Miscellaneous	27.3	31.4	23.8	15.2	12.2
State and Local Pension Plans, Total	100.0	100.0	100.0	100.0	100.0
Cash and Near Cash	5.5	3.8	3.5	2.8	1.8
Credit Market Instruments	62.8	55.1	38.4	32.4	25.5
Equities and Mutual Fund Shares	31.6	40.1	57.8	64.4	72.2
Miscellaneous	0.1	1.1	0.4	0.4	0.6
Federal Government, Total	100.0	100.0	100.0	100.0	100.0
Cash and Near Cash	0.0	0.0	0.0	0.0	0.0
Credit Market Instruments	0.0	2.2	4.3	4.4	7.1
Equities and Mutual Fund Shares	0.0	0.1	2.1	7.1	10.5
Non-Marketable Government Securities	100.0	97.7	93.6	88.5	82.4

Source: Federal Reserve Board Flow of Funds Accounts, Bureau of Economic Analysis National Income and Product Accounts

Note: Flow of Funds State and Local does not include 457 plans; private DC does not include non-CREF 403(b)

for most public sector workers, Social Security replacement rates are lower, and thus one would expect higher pension contributions.

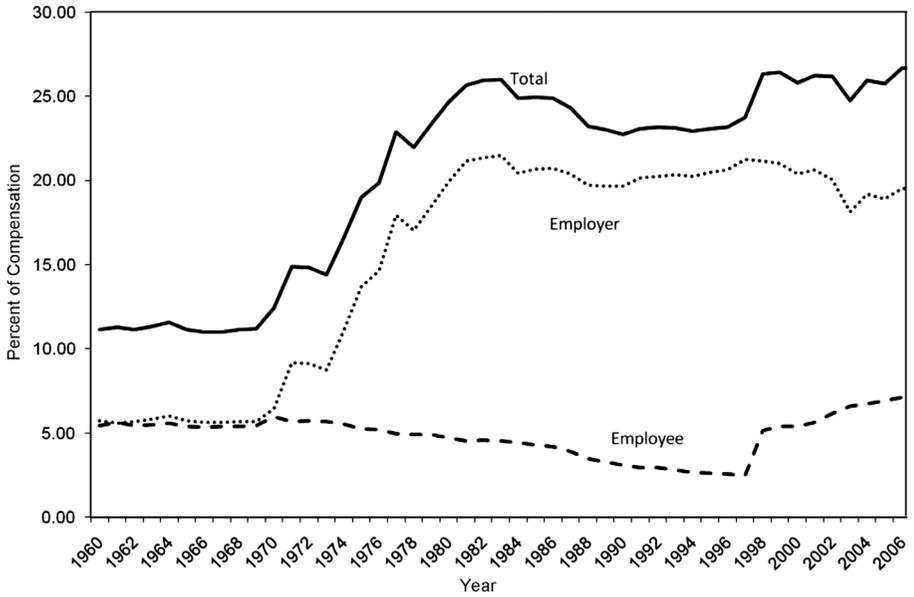
Although contribution levels alone can be a misleading indicator of pension funding, the trends in pension contributions do tell an important story. Figures 4–6 use a combination of National Income and Product Account (NIPA) and Form 5500 data to show contributions relative to compensation for federal civilian, state and local, and private sector workers. The differences in contribution rates at any point in time are first order in magnitude as shown by the maximum scale on the y-axis across Figures 4–6; the maximum scale on the y-axis is 30 percent for federal civilian pensions, 15 percent for state and local pensions, and 7.5 percent for private sector pensions. However, there is an important message about trends in plan financing: state and local plans and private sector DB plans both lowered con-

tribution rates dramatically in response to strong equity market performance in the 1980s and 1990s. In the private sector, it can be argued that the shift towards DC plans reduced the need to contribute, since prior to the required increases in contributions after the 2000 stock market crash less than one percent of private sector compensation was being directed to DB plans. The decline in employer contributions is also very evident in state and local DB plans, even though Clark and Craig (2009) show that those plans actually became more generous in recent decades.

PENSIONS AFTER THE CRASH

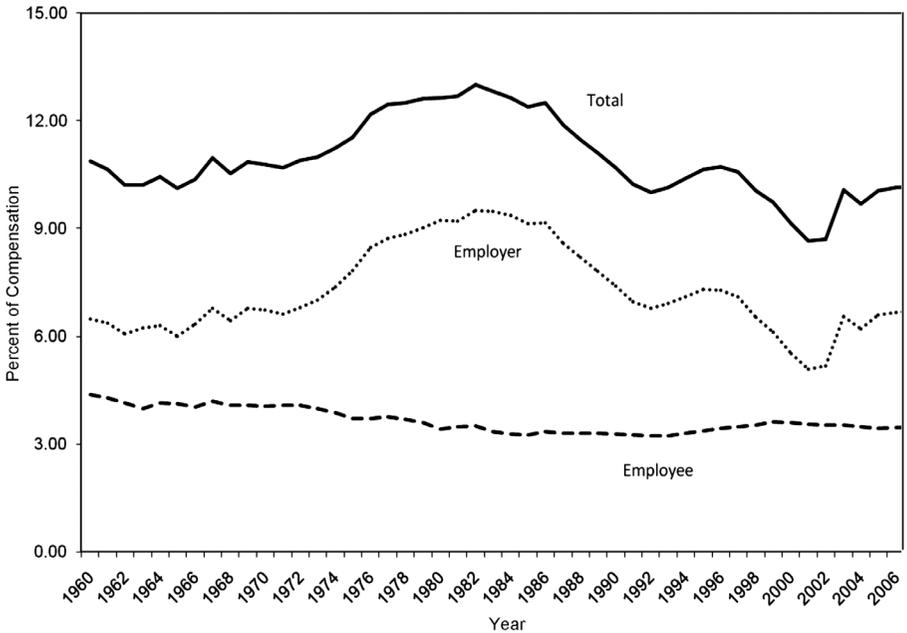
The stock market crash had equally devastating effects on private sector DB, private sector DC, and state and local pensions. The primary question of this paper is whether and how the effects of the stock market crash will alter pension choices and behavior within pensions going for-

Figure 4. Federal Civilian Pension Contributions as a Share of Compensation



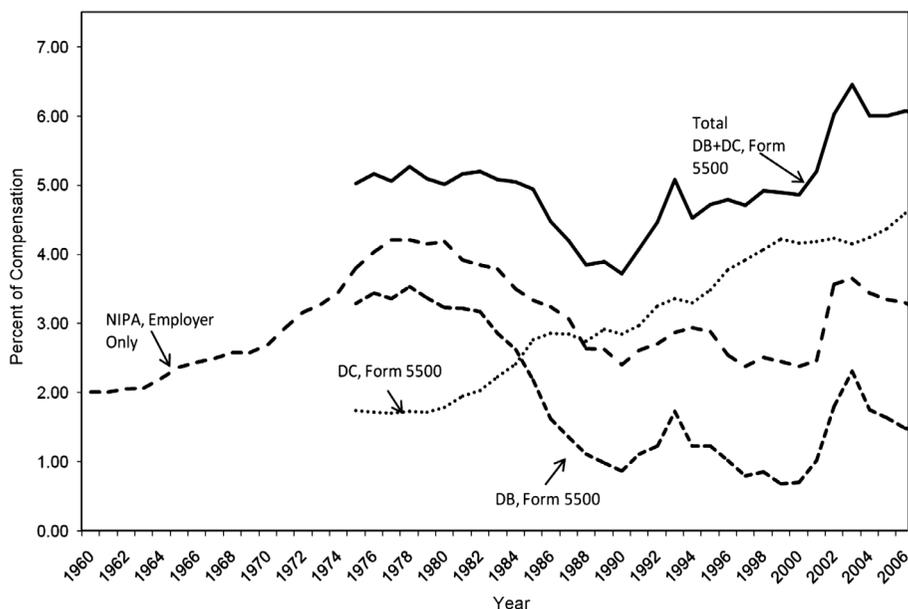
Source: National Income and Product Accounts

Figure 5. State and Local Pension Contributions as a Share of Compensation



Source: National Income and Product Accounts

Figure 6. Private Sector Pension Contributions as a Share of Compensation



Sources: National Income and Product Accounts and Form 5500

ward. The answer depends on a number of factors, beginning with a debate over whether the recent crash indicates that historical asset returns are perhaps insufficient for predicting future returns and variability. Given the fundamental uncertainty about future asset returns, however, the most important lesson for all types of plans may simply be that risk exposure in retirement saving should be matched more closely with liabilities.

If providing the currently expected level of retirement benefits with certainty is the goal of pension policy, then DB plans covering an aging workforce and DC plan participants approaching retirement should both be adjusting their portfolios toward safer investments. The alternative to increasing funding is lowering benefits—perhaps directly through benefit formulas or withdrawal rates—but more likely through participants working

longer and delaying the onset of benefit payouts. The choice between contributing more and working longer is an individual decision in the DC plan structure, while DB plans are generally much more constrained (especially in the public sector) because workers already in the system have a vested interest in maintaining the status quo. Many states are constrained by their constitution or statutes from reducing pension plans for current employees.

There will certainly be observers who argue that the recent stock market crash is no basis for changing current pension funding practices. Although pension funds lost 25 percent of their value during the crash, major stock market indices (as of May 2009) have already improved noticeably. The discussion that follows is not based on a specific estimate of how asset return dynamics may have changed; rather, we base these conclusions on the

widespread perception that the recent crash suggests some combination of lower expected returns as well as increased risk in equities going forward. Whether one thinks of this as a failure to recoup the recent losses or a lower equity premium in the future is second order.

Pension Losses in Perspective

Before considering the impact of the crash on particular types of plans, it is useful to add some flow perspective to the magnitude of the losses reported above. Although the effect of the stock market crash appears uniform across aggregate private and state and local pensions, the decline in asset values look very different when measured relative to underlying contributions. Table 4 shows the decline in assets (from Table 2) for all private, private DB and DC, and state and local pensions, but expressed relative to annual employer and overall (employer plus employee) annual contributions.⁹ These ratios have clear interpretations: the decline relative to contributions measures the number of

“contribution-years” that were lost when the stock market crashed.

Table 4 shows that pension losses in DB plans are much more significant relative to on-going contributions than in DC plans. The key factor underlying this finding is the more recent adoption of DC plans and their smaller total asset levels prior to the crash; private sector DC plans are relatively new, so accrued balances are low relative to annual contributions. Reinforcing this is the fact that accumulated DC plan balances tend to be rolled over into IRAs at retirement, and we are not measuring those losses to people who have already retired.

However, considering pension losses relative to underlying wage and contribution bases does help focus attention on how the impact of the stock market crash will be felt going forward across the various types of pension plans. In DB plans, there are many retirees and near-retirees who are in principle insulated from the decline in asset values, but that simply means someone else has to cover their share of the losses. The other parties could

TABLE 4
PENSION WEALTH LOSSES RELATIVE TO ANNUAL CONTRIBUTIONS

	2008	Relative to 2007 Contributions	
	Loss (\$Billions)	Employer Only	Employer and Employee
All Private and State and Local Pensions	2,652.6	9.9	5.3
Private Pension Plans	1,795.4	9.0	4.7
Private DB Plans	735.6	8.3	8.3
Private DC Plans	1,061.6	9.5	3.7
State and Local Pension Plans	857.2	12.4	8.2

Source: Federal Reserve Board Flow of Funds Accounts, Bureau of Economic Analysis National Income and Product Accounts, U.S. Department of Labor Form 5500

Note: Flow of Funds State and Local does not include 457 plans; private DC does not include non-CREF 403(b)

⁹ The contribution bases are from the National Income and Product Accounts (NIPA), as in Figures 4–6. The private sector employer contributions for DB and DC plans are from the NIPA annual compensation by industry tables. Private sector employee DB contributions are set to zero, because DOL 5500 data show that total contributions generally match NIPA employer contributions. Finally, private sector employee DC contributions are set to 1.6 times the employer contributions, which is based on the ratio of the DOL 5500 total to the NIPA employer piece for 2006, the last year for which the DOL 5500 are available.

be current working participants through higher explicit employee contributions or implicit salary reductions. Or, it could be plan sponsors, whether taxpayers (state and local) or shareholders (private).

In DC plans, individual losses are proportional to accrued balances after adjusting for equity exposure, and the post-crash responses will involve some combination of saving more, working longer, or consuming less in retirement. Along these lines, some household-level perspective on how the crash affected DC plan participants is shown in Tables 5–6. Table 5 shows the distribution of equity exposure by age of household head; there is no overwhelming tendency among older households to hold a smaller share of their portfolios in equities. About 30 percent of households headed by someone age 55–64 hold 75 percent or more of their retirement account balances in equities, and another 14 percent hold between 50–75 percent in equities.

Table 6 takes an even more direct look at how the drop in equity prices affected individuals (the decline was about 40 percent between the time the SCF survey was conducted and the end of 2008, which is the value used for the estimates in Table 6). The table shows the distribution of stock market losses relative to underlying annual earnings for individuals working full-time but close to retirement (age 55–64). This measure indicates how many work years are needed to cover the losses in retirement accounts that occurred when the stock market fell. The table shows that the likelihood of significant losses (relative to annual earnings) rises with earnings, because higher earners are likely to have retirement accounts in the first place, but also because they tend to be more exposed to fluctuations in equity returns. Looking across the earnings distribution, an important message is that 70 percent of those with retirement accounts lost less than half a year’s earnings when the stock market

TABLE 5
RETIREMENT ACCOUNT PORTFOLIO ALLOCATION BY AGE, 2007
(Heads and Spouses with Positive Retirement Account Balances)

Age	Percent Allocated to Equities				
	0%	1–24%	25–49%	50–74%	>74%
25–34	21.7	11.2	16.0	15.4	35.8
35–44	19.6	8.9	24.6	13.3	33.6
45–54	18.6	12.8	22.6	15.6	30.5
55–64	21.3	12.1	23.3	14.0	29.3
All	22.2	10.9	21.9	13.6	31.4

Source: Federal Reserve Board Survey of Consumer Finances

TABLE 6
DISTRIBUTION OF RETIREMENT ACCOUNT EQUITY LOSSES FOR NEAR-RETIREES,
SORTED BY ANNUAL EARNINGS QUINTILE
(Head and Spouse Wage and Salary Workers, Age 55–64, Hours>19 and Weeks>25)

Annual Earnings Quintile	Percent With No Retirement Account Balance	Ratio of Equity Losses to Annual Earnings for Those with Positive Balances				
		0	1–49%	50–100%	101–200%	200% or more
Lowest	59.6	41.1	36.5	7.6	8.1	6.7
Second	45.8	28.6	50.1	10.1	5.6	5.5
Third	38.6	29.3	50.4	13.4	4.0	2.8
Fourth	27.2	20.6	51.6	15.0	9.0	3.8
Highest	12.6	11.1	50.6	19.8	12.8	5.6
All Earners	33.6	22.0	49.5	15.1	8.7	4.7

Source: Federal Reserve Board Survey of Consumer Finances.

fell. There are significant losses for some individuals in all of the earnings groups, but that tends to be a small fraction of the population near retirement.

Private Sector DB Plans

Based on the aggregate statistics, it would seem that the tradeoff between efficiency gains from employee bonding with the risk-adjusted costs and benefits of private sector DB plans shifted dramatically when the stock market crashed, and thus the new parameters might therefore suggest a further movement away from DB plans. This may be true, but the data suggest that stock market returns have generally not been the driving force in DB plan trends over time. The decline in the private sector DB plans probably has more to do with a growing understanding of the inherent idiosyncratic risk associated with particular industries or firms, and more importantly the inability to eliminate that risk. A young or mid-career worker has much to lose if their employer goes bankrupt or freezes a plan, they decide to change jobs, or they are fired or laid off. Participants may prefer that their otherwise healthy employer defers more of their compensation or lowers their benefits in order to adjust to the new realities about asset returns, but at some point the increased costs or lower benefits may become too large and they will prefer an alternative to the DB plans.

The most obvious and striking cases of idiosyncratic risks in DB pensions have been associated with specific industries; first steel, then airlines, and now (perhaps) autos. In addition to imposing losses on young and mid-career workers, these examples are all cases that involve a shift of costs to society at large. That occurred because these are all cases in which the accrued liabilities were not matched with assets: a DB plan covering a worker on the verge of retirement should be both fully funded and invested in assets appropriate

to those liabilities—the same principles we would expect from risk-averse individuals in DC plans. Thus, the future of private sector DB plans will hinge critically on whether young and mid-career workers are willing to accept the risks that come with tenure-based benefit accrual, but public policy should focus on the risks that firms impose on taxpayers when they fail to match assets and liabilities.

Private Sector DC Plans

The stock market crash revealed one key difference between private sector DB and private sector DC plans: all of the consequences of a mismatch between assets and accrued liabilities is borne directly by participants in a DC plan. In a DB plan, there is opportunity to shift costs to young and mid-career workers or even taxpayers, but DC plan participants have to live with the funding strategy they followed. Thus, when thinking about the future of DC plans, the first implication of the crash is that participants may change portfolio decision making along the risk/return dimension at any given saving level. The second implication is that participants may (or perhaps should) change their thinking about the appropriate level of retirement saving given goals for lifetime labor supply and consumption; that decision is of course inherently intertwined with the future of Social Security, which is the dominant source of income for most retirees.

The stock market crash of 2000 led to some changes in portfolio holdings in DC plans, and the most recent crash is likely to accelerate and perhaps further refine those changes. Most notably, there has been significant movement away from portfolios concentrated in employer stock, and the use of products like lifecycle funds has increased. Even many of those lifecycle products have significant equity exposure for near-retirees; however, there is likely to be some reformulation given perceived

changes in asset return dynamics. One other issue for near-retirees—pooling of longevity risk through life annuities—is also likely to receive more attention as a matter of public policy. However, there is still a significant lack of understanding about why people on the verge of retirement do not choose annuities when they are available. Indeed, many DB plan participants forego the longevity protection when offered, and take lump sums instead. In any case, the fundamental lesson of the stock market crash has to do with equity versus bond portfolios on the eve of retirement, not the decision to forego longevity insurance.

Many observers argue that the other important lesson of the stock market crash for DC plan participants is that we simply need to save more; in fact, the lack of coverage and low asset accumulation for the bottom half of the earnings distribution was a public policy concern even back when the stock market was booming. This concern was in some ways an outgrowth of the decline in DB plans, even though the evidence suggests that most low earners were never really covered by DB plans, and only well-off retirees ever received significant pension benefits. In any case, whether one has in mind new participants beginning to save or existing participants saving more, the principle is simply that more saving (at any given level of risk) leads to more retirement wealth. More retirement wealth in turn leads to some combination of more lifetime leisure (that is, earlier retirement) and higher post-retirement consumption.

Although there is widespread belief in the principle that more saving is always better, caution should be exercised when asserting the general “need” for increased saving in DC plans or even higher saving generally. The new asset return realities may indicate that workers need to either save more now or work longer in the future, but for many people the option

of working more may be the preferred choice. It is not obvious that someone stressing to make ends meet should divert more of their compensation to a plan that will give them some extra time in retirement. The stock market crash suggests that on a risk-adjusted basis the cost of future leisure went up because one needs more risk-adjusted saving to buy that unit of future leisure.

Public Sector DB Plans

Of all the different types of pensions, the effect of changes in asset return dynamics probably pose the largest difficulty for state and local public sector DB plans, because the possible range of responses is more limited. As described above, DC participants were forced to choose individually whether to respond by saving more, working more, or consuming less. Compensation of private sector DB plan participants is subject to market pressures, and when the risk adjusted costs and benefits of the DB plan became clear, they tended to either accept lower benefits or move towards DC plans. Analysis of state and local plans usually takes benefit formulas (at least for existing employees) as given, and therefore the only option available for responding to the crash seems to be increased funding. The debate over increased funding is likely to trigger a significant battle for resources between plan participants and taxpayers.

The estimates in Table 4 show that losses in state and local pension plans relative to underlying contributions are staggering; over eight years worth of combined employer and employee contributions were lost when the market crashed. In addition, Figure 5 shows that a significant fraction of compensation in the state and local sector already goes to pension contributions; about ten percent in total from employers and employees. The extent to which increased contribu-

tions are required going forward of course depends on the nature of changes in asset returns, but at first glance, an idea like doubling contributions for several years to make up recent losses would impose a huge (probably untenable) burden on taxpayers or employees.

The resolution will involve two steps. The first step is a negotiation between taxpayers and public-sector workers, because to the extent that overall compensation increases there is likely to be significant pushback from taxpayers. The second step involves redistribution within the public sector employees themselves. Holding fixed total compensation, older workers would prefer that a larger share of that compensation go to funding promised benefits. A worker on the verge of retirement prefers an increase in employee contribution rates over a benefit cut, but a younger worker may decide that is not such a good deal.

CONCLUSIONS

In some ways the stock market crash of 2008 simply confirmed a view of pensions held by some observers for many years. Failure to match the goal of pensions, which is usually taken to mean predictable retirement consumption, with funding strategy, is a recipe for unfulfilled dreams. In aggregate, this mismatch occurred across all the different types of plans, as participants in private DB, private DC, and state and local DB plans all chose to fund retirement through significant equity exposure. Even though the immediate implications of the stock market crash for DC plan participants may be most visible, the ability to change behavior in DC plans may provide the most flexibility going forward. The implications for private sector DB plan participants (plan termination) or public sector DB plan participants (a battle with taxpayers) may be much worse.

The fundamental reminder provided by the stock market crash of 2008 is that funding certain pension benefits is an expensive proposition. DB pensions do not eliminate that investment risk for workers; they just shift adverse asset return shocks away from current and near-retirees. DC plans are not inherently different in that regards, because participants can (and probably should) shift their portfolios towards bonds as they approach retirement and avoid equity exposure. Thus, the prescription for both types of plans is effectively the same, and involves matching assets with liabilities. To the extent that participants want a given benefit stream, they need to save more. To the extent they want to keep current consumption unchanged, they need to work more in the future. Those principles are first order, but have nothing to do with the exact nature of the pension itself.

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