

How Have Public Sector Pensions Responded to the Financial Crisis?

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Abstract

State and local government pension funds lost nearly \$1 trillion in net assets in 2007-08. Average pension funding levels fell from 85 percent in 2007 to 77 percent in 2009. We analyze these patterns by looking at target asset allocations for 29 large public sector plans covering over half of all public pension assets. On average, the standard deviation of target portfolio returns increased slightly and 14 of the 29 plans surveyed increased risk by more than 0.3 percentage points and 8 increased risk by more than one percentage point. Few plans seem to have retreated from risk-taking, while a small number appears to have embraced more risk than before.

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Roughly four out of five employees of state and local governments in the United States are covered by a defined benefit pension (DB) plan, versus only around one in five private sector workers. Prior to the financial market disruptions of recent years, public sector pensions were well funded, at least according to their own accounting conventions.¹ As of 2007, the average public pension plan was 84.6 percent funded. In 2009, by contrast, the average public pension plan was only 77.1 percent funded.²

This decline in pension health was largely due to a precipitous decline in pension assets. These plans had increasingly invested in equities, rising from roughly one third of pension portfolios prior to the mid-1980s, to around two thirds of assets prior to the financial crisis.³ While higher expected returns on equities allowed states to reduce pension funding from around 6 percent of state budgets through the mid-1980s to around 3 percent prior to the crisis⁴, the downside is higher sensitivity to annual market returns. According to the Federal Reserve, state and local pension assets declined by nearly \$1 trillion from 2007-2008 and have yet to regain their former value.

Since public pension plans generally assume an 8 percent return on assets, this implies that, even today, plan assets are more than 25 percent below levels projected as of 2007. Indeed, even if public plans returned 11.5 percent annually going forward, it would take them until 2020 to catch up to asset levels projected prior to the financial crisis. This raises the question of how public sector pensions have reacted to such changes. As a matter of law and general plan stewardship, many plans have increased contributions for employers and/or participants, helping assets catch up more quickly with projected liabilities. Such changes have been the subject of

political debate in many states and localities. A number of states have attempted to reduce the generosity of benefits, principally for newly-hired employees but, in some cases, for current employees and retirees through reductions in post-retirement Cost of Living Adjustments (Pew 2011). Public plan changes for current employees are often legally problematic, and it is likely that many will be settled in court.

Here, however, we focus on investment practices to ask whether public pensions altered their investment plans since the financial crisis, and if so, how? One hypothesis is that public pensions, with their focus on longer time horizons, would make few changes to their investment practices in response to the large market shifts. Alternately, either increased or decreased risk-taking are also plausible. Following the financial crisis and the increased attention to the differences in risk between public pension assets and liabilities, some plans might reduce the risk profile of their pension investments. Yet, other underfunded pensions might seek to recoup their losses by taking even more investment risk. This could be portrayed as an irrational reaction, similar to a gambler ‘doubling down’ on risk, to make up for prior losses. Different plans in different circumstances could react in different ways.

To assess the direction of such possible changes, we first analyze how public pension actual asset allocations changed between 2007, prior to the financial crisis, to 2009. These changes will be due both to choices made by plan managers and, more importantly, relative increases and decreases in the values of various asset classes. Second, we analyze changes to plan *target* asset allocations from 2007 to 2010. While these allocations may not yet be fully realized, the targets reflect the mix of risk and return that plan managers seek to achieve and thus may be a better measure of managerial intentions. Third, we estimate the risk of target portfolios

in 2007 and 2010 to analyze how plans' desired mix of investment risk and return may have changed in response to the financial crisis and other factors.

Data employed

We use several sources of data to examine public plan financing and investments. For information on the funding status of plans and changes in plans' actual portfolio allocations, we use the Center for Retirement Research's (CRR) Public Plans Database, which covers 126 plans over the period 2001 through 2009. However, the CRR dataset does not include information on plan target portfolios. To obtain this information, we surveyed the annual reports of 29 large public pension plans, obtaining target asset allocations for 2007 and 2010. In a small number of cases, data were obtained through direct contact with plans. In cases in which 2010 data were not available, we relied on plan 2009 target allocations. While not a comprehensive sample, the combined assets held by these 29 plans comprise roughly 50 percent of total public pension holding as of 2010.

Investment portfolios. The financial turmoil of recent years would play havoc with any investor's portfolio, requiring active rebalancing in order to maintain a given asset allocation. Most public plans rebalance only gradually, allowing accumulation differences in relative returns across classes to alter portfolio allocations. In particular, poor returns on stocks have shifted the equity share of portfolios downward over time.

Figures 1 and 2 show the percentage of public pension portfolios allocated to different asset types for the years 2007 and 2009, based on CRR data for approximately 125 plans in each year. The data points represent median values while the bottom and top of the bars represent the 10th and 90th percentiles of the distribution.

Figures 1 and 2 here

Due to data limitations, asset classes are aggregated. For instance, domestic and international equities are treated as a single class. From 2007 through 2009, the percentage of public pension assets held in equities declined significantly, from a 2007 median of 60 percent in equities to 52 percent in 2009. Similarly, the share of pension portfolios held in bonds grew from 2007 through 2009, from a median of 24 percent of portfolios to 26 percent. Real estate remained constant at a median value of 6 percent of assets, as did cash at 1 percent. Alternate investments increased from a median value of zero in 2007 to two percent in 2009. The ‘other’ asset class grew from a median value of 1 percent to 6 percent. From an examination of a number of plan reports, it appears that ‘other’ investments often include assets that could be termed as alternate investments, meaning that this data may understate the uptick in alternative investment shares from 2007 through 2009.

Perhaps most striking is the increased range of portfolio allocations, meaning greater heterogeneity in asset allocations from plan to plan. In every asset class, the range from the 10th to 90th percentiles increased from 2007 through 2009. For instance, for equities, it grew from 21 percentage points in 2007 to 26 percentage points in 2009; for bonds it grew from 16 to 21 percentage points; and for real estate from 11 to 15 percentage points. For alternate investments, the range grew from nine to 14 percentage points, while for ‘other’ the range grew from 12 to 20 percentage points.

Target portfolios. It should be borne in mind that the changes in asset allocations shown above were not primarily the result of manager choice. Rather, changing market values caused an involuntary change in most public plan portfolio allocations. To learn more about how intentions regarding asset management changed since the beginning of the financial crisis, next we turn to

public pension *target* asset allocations. The boards of most public sector plans set and disclose a target asset allocation that they will seek to reach and maintain over a period of time. How these targets change over time reveals changing management attitudes to different asset classes and to the overall risk profile that the plan seeks to maintain.

To gather information on target portfolio allocations, we focused on the 2007 and 2010 Comprehensive Annual Financial Reports (CAFRs) of 29 large public pension funds, with assets representing around half of total public funds under management. For each plan, we found the target allocation as printed in the CAFR, then tabulated those targets into five broad categories: equities, bonds, alternative investments, real estate and cash. The results are displayed in Figure 3.

Figure 3 here

In 2007, almost six of 10 dollars in the median public pension portfolio was invested in equities, with differing allocations to domestic and international shares.⁵ Bonds made up about one dollar in four, and alternative investments – private equity, hedge funds, and the like – made up around one dollar in 10. Real estate made up around 6 percent of the average portfolio, and cash constituted the remaining small amount. Yet portfolio allocations were not uniform across plans. The difference between the 90th and 10th percentile asset shares for equities was 19 percentage points; for bonds, 16 percentage points; for alternative investments, 14 percentage points; for real estate, 11 percentage points; and for cash, one percentage point.

By 2010, target asset allocations had shifted significantly. Equities fell from a median target share of 58 percent to 52 percent, while bonds and real estate remained essentially even. The largest increase was for alternative investments, which rose from 9 percent of the median target allocation in 2007, to 13 percent in 2010. In effect, the fall in equities was largely replaced

by increased allocations to alternative investments. Moreover, heterogeneity in target portfolios between plans also increased. The gap between the 10th and 90th percentile portfolio shares increased for equities (from 19 to 24 percentage points) while remaining more or less steady for bonds (from 16 to 17 percentage points). The largest increase again came for alternative investments, where the difference in asset shares between the 10th and 90th percentiles grew to 24 percent, a very high level given that the median plan holds only 13 percent of its assets in alternative investments (and the mean plan only 17 percent.)

Evidently, target asset allocations changed rather markedly since the financial crisis, with pension fund managers indicating a rising interest in alternative investments. Given the poor returns on equities in recent years and pressures to maintain expected returns going forward, the shift into alternate investments may be understandable. What is unclear from the above data, however, is how this shift altered the level of risk that plans take on. To help answer that question, next we estimate the risk of plan portfolios for 2007 and 2010.

Risk of target asset allocations. Pension manager attitudes toward risk may have changed due to adverse market performance in various ways. For instance, chastened by over-exposure to equities, some might shift assets toward fixed income investments, thinking more along the lines of asset/liability management or liability-driven investment. Others might seek to win it back losses by retaining or even increasing their risk exposure. Further, some might opt to ‘double down.’

To our knowledge, no public plans publish their target portfolio risk in their annual reports or actuarial valuations. This constitutes a significant omission that makes it difficult for policymakers and the public to understand the contingent liabilities that they face. But with certain simplifying assumptions, we can estimate the risk of pension portfolios using projections

from Wilshire Consulting (2011) regarding the mean returns, variances and covariances of a number of asset classes.

Table 1 shows Wilshire's projected risk and return for the asset classes included in our tabulations. Wilshire's projections are available in more detail than shown here, but due to limitations on target portfolio data provided by plans, it is necessary to treat assets at a more aggregated level.⁶ It is noteworthy that Wilshire's projected returns are lower than those used by most public plans. The typical public plan projects annual returns of around 8 percent while Wilshire projects a median return of only around 6.5 percent.

Table 1 here.

Table 2 reports a correlation matrix for pension asset classes. Using these figures and Wilshire's projections of annual asset risk, we calculate the expected standard deviation of future portfolio returns for each plan. For consistency, we use the same risk and correlation assumptions for both 2007 and 2010 target portfolios.

Table 2 here.

Table 3 reports summary statistics on these calculations. In 2007, the mean public pension target portfolio had a projected standard deviation of annual returns of 12.2 percent; for 2010, the mean standard deviation had risen to 12.8 percent. (Medians for 2007 and 2010 were 12.2 and 12.5 percent, respectively.) In 2007, the 10th to 90th percentile range was 10.8 to 13.5 percent, a spread of 2.7 percentage points, while for 2010, the range was 11.5 to 14.2 percent, a spread that also equaled 2.7 percentage points. Yet, the standard deviation of portfolio standard deviations increased from one to 1.2 percentage points. Thus, while there was some widening of the differences in risk taken by plans, the more important trend seemed to be a simple shift upwards.

Table 3 here.

This increase in average plan risk-taking would be anticipated to boost expected returns by approximately 0.15 percentage points, assuming that portfolios were on the efficient frontier. From 2007 through 2009 (the most recent year for the CRR's Public Plans Database), the average projected nominal return increased by 0.03 percentage points, from 7.91 percent in 2007 to 7.94 percent in 2009. This change was the net of a -0.03 percentage point reduction in assumed inflation and a 0.06 percentage point increase in assumed real returns. One potential explanation is that plans were taking more risk, not just to increase expected returns, but merely to maintain the returns they had already projected. This increase in plan risk is likely to be significant given the investment losses that plans suffered, and the increased policy focus on asset-liability management and on the market valuation of pension liabilities. Indeed, the typical 2010 target allocation involved more risk than almost two-third of plans had in of 2007.

The largest increases in portfolio risk were for the South Carolina Retirement System (increase in standard deviation of 2.61 percentage points), Illinois Teachers (2.59 percent) and Pennsylvania Employees (2.14 percentage points). The largest *reductions* in target portfolio risk were for California State Teachers (-0.78 percentage points), Missouri Public Schools (-0.68 percentage points) and the Florida State Retirement Board (-0.47 percentage points).

Figure 4 details changes by plan. Eleven of the 29 plans in the sample had essentially unchanged risk, meaning a change of less than 0.3 percentage points. Fourteen plans increased risk by more than 0.3 percentage points, while four plans reduced risk by more than 0.3 percentage points.

Figure 4 here

It is difficult to tell why certain plans took the paths they did. For instance, there is no simple correlation between the decline in a plan's funding ratio from 2007 through 2010 and its changed target portfolio risk. Of course, if some plans reacted to funding declines differently than others – some taking a more conservative route while others doubled down – such a pattern would be difficult to discern from the data available.

Conclusion

The financial crisis and the subsequent recession generated significant losses to pension assets, along with declines in plan funding rates. To date, no comprehensive analysis has been conducted of how public DB plans reacted to the volatility of markets since the financial crisis. We have analyzed three aspects of pension funding: shifts in asset allocations due to changes in market values; shifts in target asset allocations due to decisions undertaken by plan managers; and estimates of the risk of plan target portfolios in 2007 and 2010. We have also sought to analyze how risk-taking by public pensions has changed over time.

Though equity price declines reduced the share of plan investments held in stocks, plan target asset allocations have tended to increase risk, often via a broader acceptance of alternative investments in public plan portfolios. The typical pension plan in 2010 targeted a level of risk that exceeded the rate of two thirds of pensions in 2007. While the increased risk taken by the median public sector pension was modest, a small number of plans did significantly increase their target portfolio allocations, making more plausible the view that some plans may boost risk as a means to recover from market declines over the past several years. Nevertheless, risk is a double-edged sword. Pension managers should carefully consider the investment risk they are

taking and make it explicit in pension reports. Otherwise policymakers and the public will not be aware of the contingent liabilities they face.

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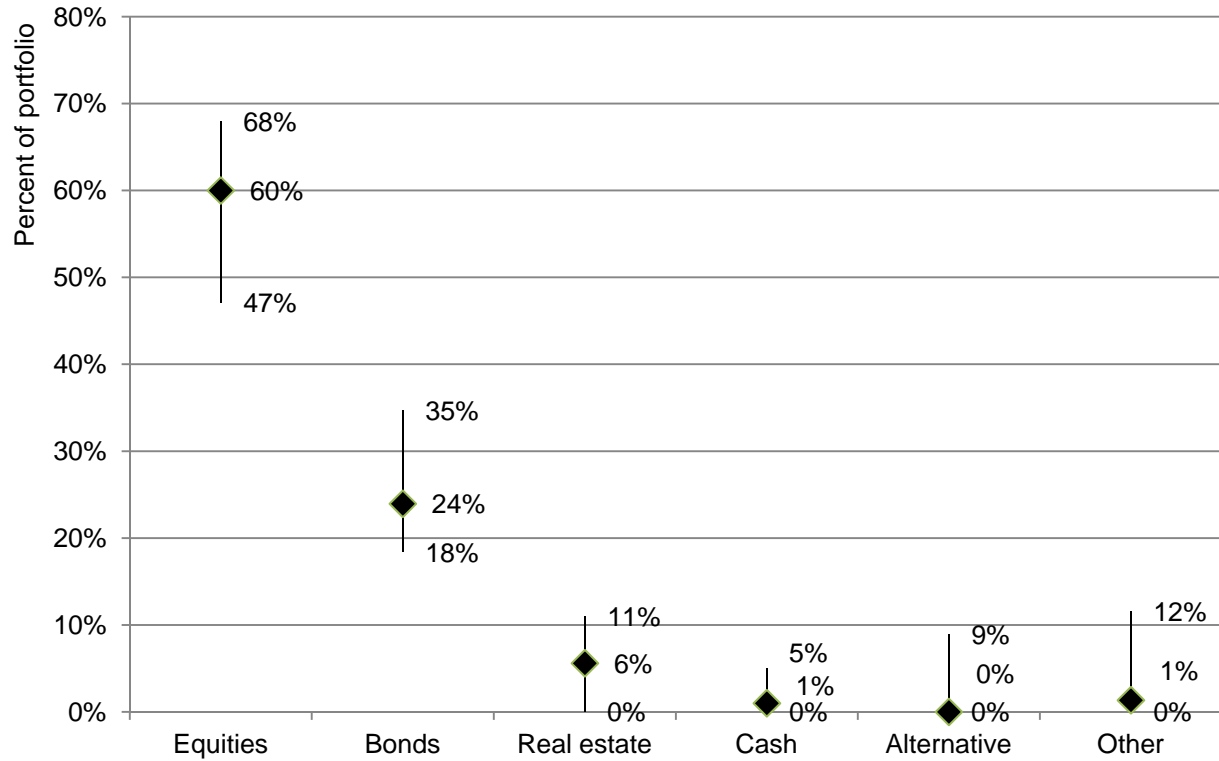


Figure 1 Median public pension asset allocations, with 10th and 90th percentiles: 2007.
Source: Author's calculations from Center for Retirement Research data (CRR 2011).

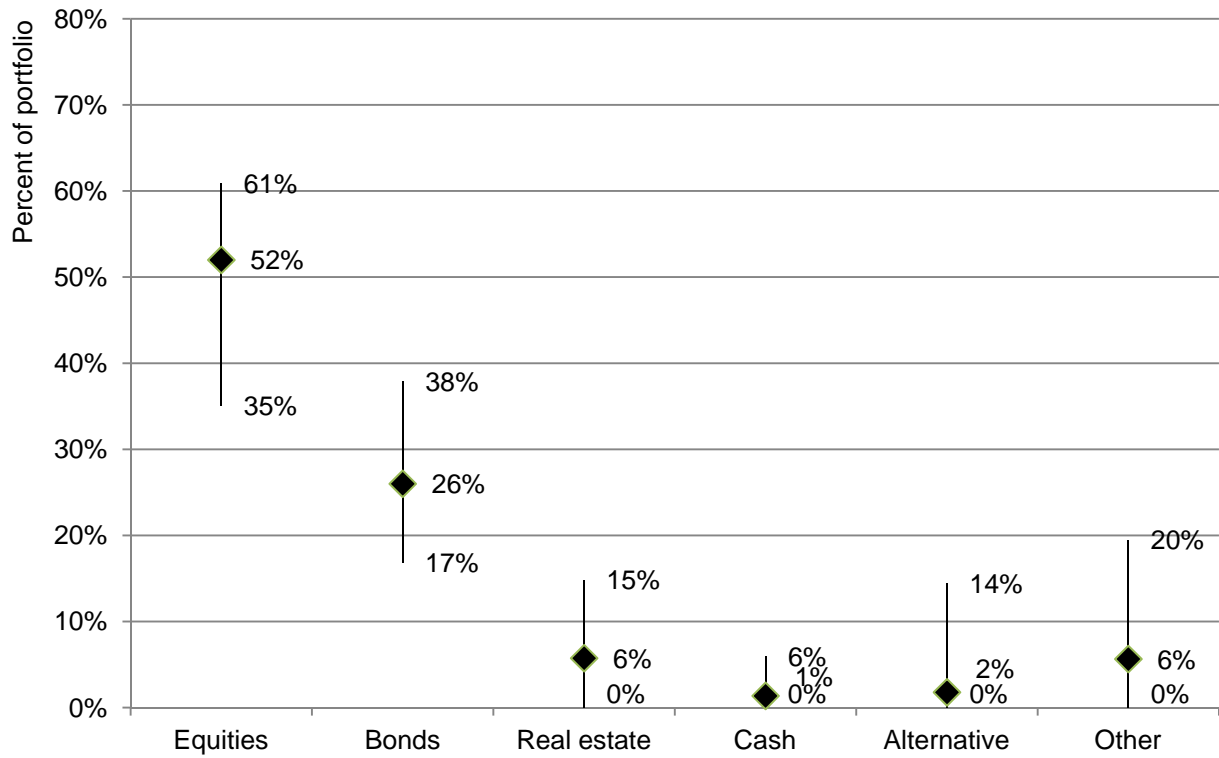


Figure 2 Median public pension asset allocations, with 10th and 90th percentiles: 2009.
Source: Author's calculations from Center for Retirement Research data (CRR 2011).

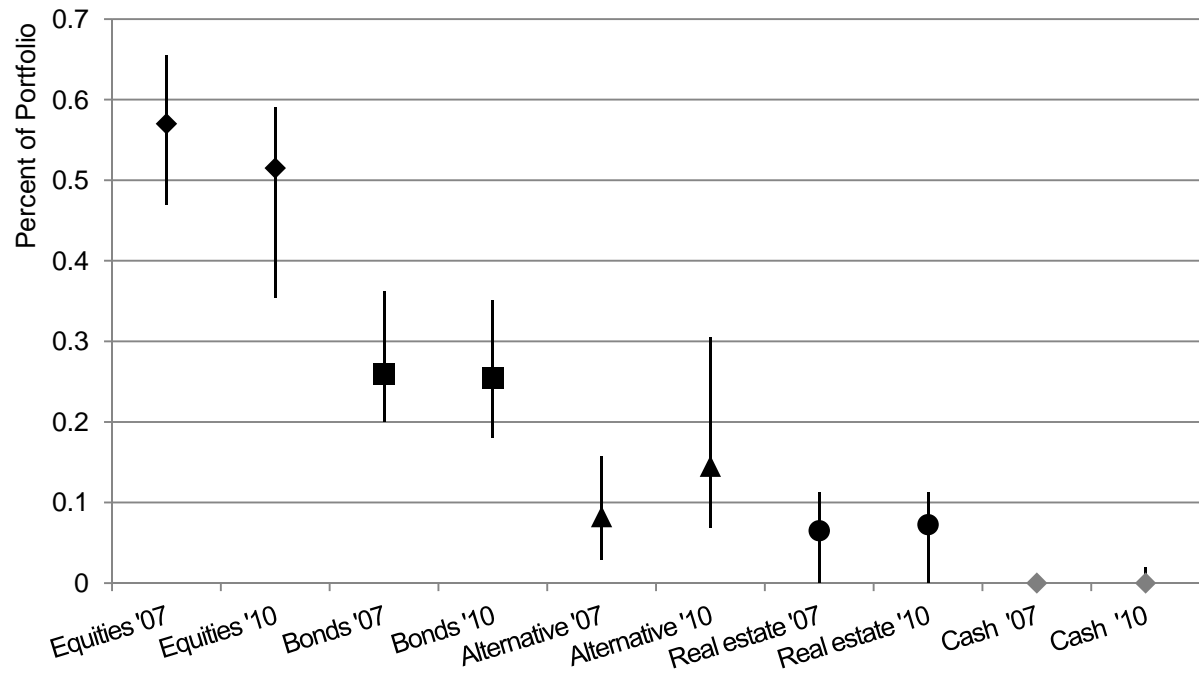


Figure 3 Median target asset allocations, with 10th and 90th percentiles: 2007 vs. 2010.
Source: Author's calculations from plan data.

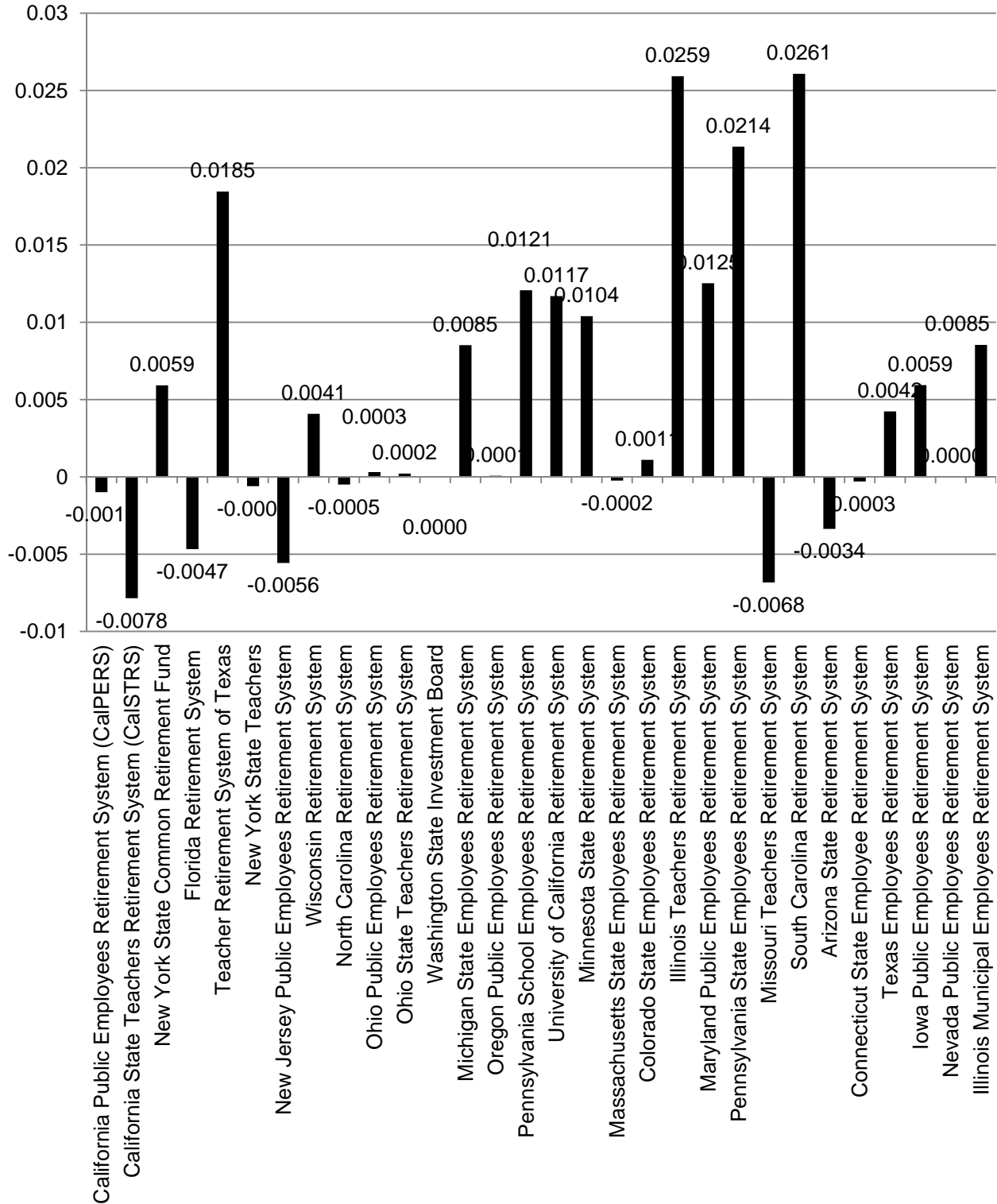


Figure 4 Change in standard deviation of target portfolio returns: 2007-2010. *Source:* Author's computations.

Table 1 Expected risk and return of pension asset classes (%)

Class	Annual volatility	Expected return
Equities	16.5	7.25
Bond	4.5	3.58
Alternatives	26	9.7
Real Estate	15	5.5
Cash	0	0

Source: Author's calculations using data from Wilshire Consulting (2011).

Table 2 Correlation matrix for pension asset classes

	Equities	Bonds	Alternatives	Real estate	Cash
Equities	1	0.29	0.75	0.35	0
Bonds	0.29	1	0.32	0.15	0
Alternatives	0.75	0.32	1	0.35	0
Real estate	0.35	0.15	0.35	1	0
Cash	0	0	0	0	1

Source: Author's calculations using data from Wilshire Consulting (2011).

Table 3 Summary statistics on public pension portfolio standard deviations (%): 2007 and 2010

	2007	2010
Mean	12.2	12.8
Median	12.2	12.5
10th	10.8	11.5
90th	13.5	13.5

Source: Author's calculations; see text.

Endnotes

¹ The so-called ‘market valuation’ critique of public pension accounting argues that discounting plan liabilities at the expected return on assets is misleading, as liabilities are intended to be and in most cases are guaranteed while assets are risky. Discounting at a risk-adjusted interest rate would reduce plan funding ratios by roughly one half and increase unfunded liabilities by a factor of around six. See Novy-Marx and Rauh (2009) and Biggs (2010).

² Derived by the author from the Center for Retirement Research Public Plans Database (CRR 2011).

³ Derived by the author from FRB (2011), Table L 119 (A).

⁴ As reported by Munnell, Aubry and Quinby (2010).

⁵ As above, due to data limitations we aggregate domestic and international equities into a single class. Breaking out international investments would have reduced the sample size.

⁶ For instance, we combine domestic and international equities into a single class, with a standard deviation of annual returns equal to the unweighted average of Wilshire’s projections for the two classes.