



The Origins and Severity of the Public Pension Crisis

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February 2011

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Contents

Executive Summary	1
Introduction.....	2
The Impact of the Economic Crisis on Pension Fund Assets.....	2
Projecting Future Pension Returns	4
The Size of the Public Pension Shortfall in Context.....	10
Conclusion	15
References.....	16

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Acknowledgments

Alan Barber, Hye Jin Rho, Kris Warner, and Nicole Woo gave helpful comments on earlier drafts of this paper.

Executive Summary

There has been considerable attention given in recent months to the shortfalls faced by state and local pension funds. Using the current methodology of assessing pension obligations, the shortfalls sum to nearly \$1 trillion. Some analysts have argued that by using what they consider to be a more accurate methodology, the shortfalls could be more than three times this size. Based on these projections, many political figures have argued the need to drastically reduce the generosity of public sector pensions, and possibly to default on pension obligations already incurred.

This paper shows:

- Most of the pension shortfall using the current methodology is attributable to the plunge in the stock market in the years 2007-2009. If pension funds had earned returns just equal to the interest rate on 30-year Treasury bonds in the three years since 2007, their assets would be more than \$850 billion greater than they are today. This is by far the major cause of pension funding shortfalls. While there are certainly cases of pensions that had been underfunded even before the market plunge, prior years of under-funding is not the main reason that pensions face difficulties now. Another \$80 billion of the shortfall is the result of the fact that states have cutback their contributions as a result of the downturn.
- The argument that pension funds should only assume a risk-free rate of return in assessing pension fund adequacy ignores the distinction between governmental units, which need be little concerned over the timing of market fluctuations, and individual investors, who must be very sensitive to market timing.

This argument also fails to recognize the fact that over a long period, future stock returns are inversely related to current price-to-earnings (PE) ratios. If the current PE ratio is relatively low, as is now the case, then the assumption that the market will provide below average returns implies a further decline in the PE ratio, given the generally accepted growth projections for the economy. As a practical matter, the stock market has provided an average real return of more than 8 percent for 30-year periods when the PE ratio at the start was under 15 to 1.

It is worth noting that if pension funds stop investing in equities, as some have advocated, this would imply higher taxes and/or lower benefits for public employees. It would also mean that other investors could expect to see higher future returns on their stock holdings.

- The size of the projected state and local government shortfalls measured as a share of future gross state products appear manageable. The total shortfall for the pension funds is less than 0.2 percent of projected gross state product over the next 30 years for most states. Even in the cases of the states with the largest shortfalls, the gap is less than 0.5 percent of projected state product.

It is also worth noting that some of this shortfall has likely already disappeared as a result of the recent rise in the stock market. If this rise is not subsequently reversed, then a substantial portion of the funding shortfall has already been eliminated.

In sum, most states face pension shortfalls that are manageable, especially if the stock market does not face another sudden reversal. The major reason that shortfalls exist at all was the downturn in the stock market following the collapse of the housing bubble, not inadequate contributions to pension funds.

Introduction

In recent months, there has been a considerable effort by many political actors to promote fears over the size of public pension shortfalls. While many, if not most, public pensions do face shortfalls, much of the discussion has been misleading about both the origins of the shortfall and its severity. This paper tries to put these issues in a clearer perspective. The first part examines the origins of the shortfall by noting the extent to which pensions have lost value due to the recent economic crisis. The second section discusses the appropriate rate of return to assume on pension fund assets. The third section puts projected pension fund shortfalls in perspective by projecting their size relative to future state income. This is followed by a brief conclusion.

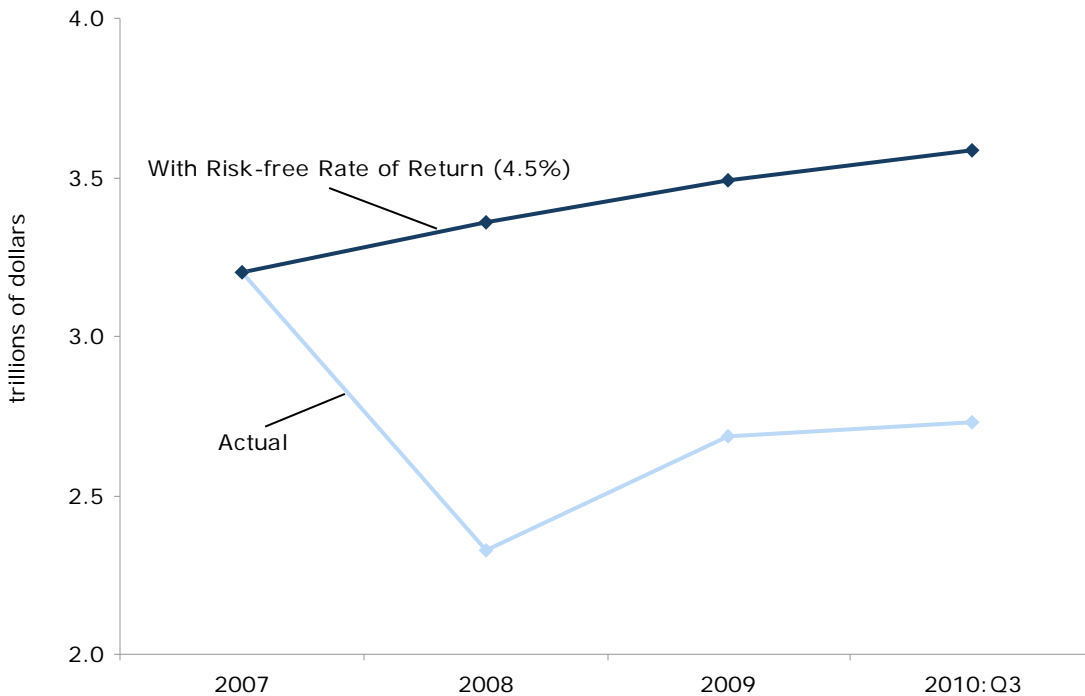
The Impact of the Economic Crisis on Pension Fund Assets

It is important to recognize that the main contributor to the current funding problem facing public pension funds was the collapse of the housing bubble and the subsequent downturn in the economy and the stock market. The plunge in the stock market led to a sharp decline in the value of pension fund assets. **Figure 1** below projects pension fund assets if pensions had continued to earn on average a 4.5 percent nominal rate of return in the period since the end of 2007. Under this assumption, state and local pension fund assets would have been \$857 billion higher at the end of the third quarter of 2010.

The economic fallout from the collapse of the housing bubble has also led to budget shortfalls in state and local governments across the country. One result of these shortfalls is that governments reduced payments in pension funds. In the period since the beginning of the recession, annual payments into state and local pension funds have averaged \$6.9 billion less than withdrawals. By contrast, in the three years prior to the downturn, payments averaged \$18.4 billion *more* than withdrawals.¹ If state and local governments had continued to contribute to their pensions at the same rate as they had in the prior three years, then the total assets of these funds would be \$77 billion higher than was reported at the end of the third quarter of 2010. Adding this to the \$857 billion figure above results in an additional \$934 billion in pension funds, a figure far higher than most estimates of the size of state and local government shortfalls.

¹ The data for these calculations are taken from the Federal Reserve Board, Flow of Funds, Table F.119, Line 3.

FIGURE 1
Change in Public Pension Assets Since the Recession



While state and local government pensions should be funded at levels that allow them to weather the impact of cyclical downturns, it is important to recognize that the current downturn is by far the longest and deepest of the post-war period. The managers of these funds obviously failed to recognize the housing bubble and the dangers it posed to the economy, but this was true of the vast majority of economic and business analysts at the time. Certainly state and local pension funds were not well served by the professional managers who advised them. It might be reasonable to ask why financial experts, who were often highly compensated for their services, failed to see such an obvious threat to the economy and the stock market as the collapse of a housing bubble.² However, this is an issue of the failings of the financial industry, not the failings of state and local governments, except insofar as they exercised poor judgment in buying the industry's services.

It is also worth noting that at the end of 2007 – the start of the recession – the stock market was not hugely out of line with its long-term trends. It had already fallen 5.4 percent from its value at the end of the third quarter and it was down by more than 10 percent from the peaks hit at the end of the first quarter of 2000, seven and a half years earlier. The price-to-earnings (PE) ratio for the market as a whole was 14.5 – roughly even with its long-term average.³ In short, it might have been reasonable to expect some market turbulence at the end of 2007, given the impending collapse of the housing bubble, but market valuations were no longer at the extraordinary levels of the stock bubble years.

² It was easy to recognize the housing bubble and the potential dangers it posed to the economy and the stock market (see Baker, 2002 and Baker, 2007).

³ These calculations are taken from the Federal Reserve Board's Flow of Funds, Table L.213, Line 19. The price-to-earnings ratio uses after tax corporate earnings based on all corporate profits, including foreign earnings (Table 1.7.5, Line 17), minus taxes (Table 1.14, Line 12).

Projecting Future Pension Returns

There has been a recent effort to argue that public pension funds should assume only the risk-free Treasury bond rate of return (Novy-Marx and Rauh, 2009). The nature of the argument is that a state or local government is no better situated to deal with risk than an individual investor.

Such an argument is problematic for obvious reasons. An individual investor (or family) is unlikely to have diverse sources of income that can sustain him/her through difficult periods. A serious illness or prolonged period of unemployment is likely to cause the loss of most of an individual investors' income. If the market is down at a point when a sharp loss of income necessitates relying on savings, then an individual investor will suffer considerably as a result of taking on risk.

By contrast, it is difficult to envision plausible events that could lead state and local governments to experience comparable declines in income. Even the sharp downturn in revenue that followed in the wake of the collapse of the housing bubble led to declines in government revenue of less than 10 percent even in the most hard hit states.

Individual investors must also be concerned about market fluctuations since they only retire once. Much of the savings of individual investors are focused on retirement. If the market is depressed at the point where they choose to or are forced to retire, then they could have a substantially lower income over the rest of their lifetimes than if they managed to retire when the market was on an upswing. However, state and local governments don't generally invest with an endpoint in mind. In principle, state and local governments will exist into perpetuity, so a period in which the market is depressed need not be of great consequence.

Nonetheless, it is important that returns assumed by pension funds reflect the actual expected value for money invested in the stock market. This will depend in turn on the current price-to-earnings ratios in the stock market.

Pension fund assumptions on stock returns were certainly not consistent with plausible assumptions on the growth of corporate profits and share prices during the 90s stock bubble. Many pension funds assumed that stocks would provide their historic rate of return even when PEs were in the high 20s or even 30s. For stocks to provide their historic rates of return at such high PEs, it would be necessary for PEs to rise even higher, hitting levels of well over 100 to 1 before the middle of the century (see Baker 1997; Diamond, 2000; Baker, Krugman, DeLong, 2005; and Weller and Baker, 2005).

The correct long-term assumption on stock returns must be derived from dividend yields and the projected growth rate of corporate profits. This is a simple exercise. The current PE is approximately 13.1.⁴ In the first three quarters of 2010, firms paid out \$728.4 billion in dividends, roughly 61.0 percent of the after-tax corporate profits.⁵ This is very close to the average share of

⁴ This is based on the \$15.7 trillion market value of domestic corporations at the end of the 3rd quarter of 2010 (Flow of Funds Table, L.213, Line 23) divided by corporate profits minus taxes for the first three quarters \$1,194.2 billion (NIPA Table 1.12 line 42 minus line 44).

⁵ Net stock purchases should be added to dividend payments since share buybacks are effectively an alternative way for firms to transfer earnings to their shareholders. In 2010, net share purchases were -\$7.6 billion (Flow of Funds, Table F.4, Line 12).

corporate profits paid out as dividends over the last two decades, which means that 2010 was not atypical. This implies a dividend yield of 4.0 percent.

Corporate profit growth tracks GDP growth reasonably well over the long-term. This means that the projected returns would simply be the sum of the dividend yield, plus net share buybacks, and the average growth rate of GDP over the period in question. This is shown for the next 30 years in **Table 1** below. The first column shows the projected capitalization of the U.S. market assuming that stock prices rise on average in step with corporate profits (i.e. the PE ratio remains constant) and that corporate profits increase at the same rate as the economy. The second column shows the annual dividend yields plus share buybacks, under the assumption that after-tax profits rise in step with GDP growth and the share of profits paid back to shareholders remains fixed. The third column shows the total return on stocks. This is the sum of the dividend and the capital gain. Over the period from 2011 to 2041, the average capital gain is projected to be 4.4 percent based on the Congressional Budget Office's (CBO) projection for the nominal growth rate in the economy. This gives an average nominal return of 8.4 percent from stock holdings.

The fourth column projects the nominal return for the pension portfolio as a whole. The calculations assume that two-thirds of pension assets are held in equities or assets that might be expected to give a comparable return, such as hedge funds. It assumes that the other third is invested in long-term Treasury bonds (National Association of State Pension Fund Administrators 2010, Figure J). It projects an average interest rate of 5.0 percent for 30-year Treasury bonds (roughly a half percentage point higher than the current rate), following CBO's projection that interest rates will rise back to more normal levels in the next few years.

These assumptions imply an average return of 7.3 percent. While this is somewhat lower than the 8.0 percent return that is commonly assumed by pension funds, it is worth noting that the inflation assumption in this calculation is considerably lower than what most pension funds use in their projections. Most pension funds assume an inflation rate of between 2.5 to 3.0 percent, compared to the 2.0 percent inflation assumption in this analysis. This means that the slightly lower assumption on returns would be offset by the lower assumption on costs due to a lower rate of inflation.

TABLE 1
Projected Stock and Pension Fund Returns, 2011-2041

	Market Capitalization (billions of \$)	Dividend Payout (billions of \$)	Stock Return (percent)	Pension Fund Return (percent)
2011	16,156.1	643.7	19.0	14.4
2012	17,060.8	679.7	9.6	8.1
2013	18,016.2	717.8	9.6	8.1
2014	19,025.1	758.0	9.6	8.1
2015	20,090.5	800.4	9.6	8.1
2016	20,994.6	836.4	8.5	7.3
2017	21,939.4	874.1	8.5	7.3
2018	22,926.6	913.4	8.5	7.3
2019	23,958.3	954.5	8.5	7.3
2020	25,036.5	997.4	8.5	7.3
2021	26,088.0	1039.3	8.2	7.1
2022	27,183.7	1083.0	8.2	7.1
2023	28,325.4	1128.5	8.2	7.1
2024	29,515.1	1175.9	8.2	7.1
2025	30,754.7	1225.3	8.2	7.1
2026	32,046.4	1276.7	8.2	7.1
2027	33,392.4	1330.3	8.2	7.1
2028	34,794.8	1386.2	8.2	7.1
2029	36,256.2	1444.4	8.2	7.1
2030	37,779.0	1505.1	8.2	7.1
2031	39,365.7	1568.3	8.2	7.1
2032	41,019.1	1634.2	8.2	7.1
2033	42,741.9	1702.8	8.2	7.1
2034	44,537.0	1774.3	8.2	7.1
2035	46,407.6	1848.9	8.2	7.1
2036	48,356.7	1926.5	8.2	7.1
2037	50,387.7	2007.4	8.2	7.1
2038	52,504.0	2091.7	8.2	7.1
2039	54,709.1	2179.6	8.2	7.1
2040	57,006.9	2271.1	8.2	7.1
2041	59,401.2	2366.5	8.2	7.1
Average 2012-2041			8.4	7.3

Source: Federal Reserve Board and Bureau of Economic Analysis.

Pension funds can reasonably assume the returns projected in the table for the portion of their assets held in equity. Lower returns would require one or more of the three following assumptions:

- 1) Economic growth will be substantially lower than the Congressional Budget Office and other forecasters predict;
- 2) The profit share of output will experience a sustained fall over the next three decade; and/or
- 3) There will be a sustained decline in PE ratios.

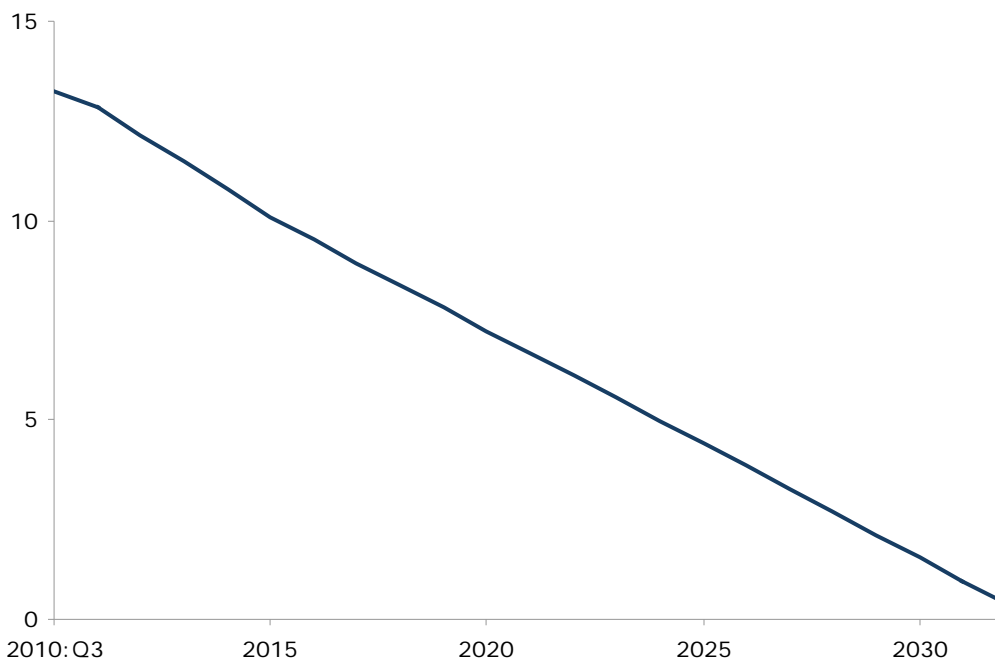
Any of these three assumptions would be an extraordinarily strong assertion about the future course of the economy and financial markets. While any or all of these projections for the future are possible, there should at least be an argument as to why one or more of these assumptions is likely. To date, those advocating that public pensions assume a lower rate of return on equity have not given an argument as to why their view of the future of the economy and financial markets differs from the consensus. In short, they are asking pension funds to depart from the economic consensus without providing either a theoretical argument or evidence to support their differing view of the future.

To see that this projected path of returns is more plausible than assuming the risk-free rate, it is worth considering the implication for future PE ratios, if stock returns over the next 30 years are only equal to the risk-free rate. The calculations assume that the overall economy follows the same projected growth path.⁶ If the returns on stock are just equal to the returns on Treasury bonds, then the PE ratio will have to continually decline. This is necessary because the dividend yield is already almost as high as the yield on Treasury bills. This means that the price can only rise a very small amount, much less than the growth rate of profits, in order to keep the return equal to that on government bonds. As the PE falls, the dividend yield rises (firms are still paying the same share of their profits as dividends), which means that the PE must fall more rapidly.

Figure 2 shows the PE ratios over the next three decades on the assumption that the yield on stocks is the same as the yield on Treasury bonds. As can be seen, this assumption would yield the absurd result that stock prices would have to turn negative. In short, unless there is an economic collapse, there is not a plausible story where stock returns over any long period will be equal or less than the Treasury bond rate.

⁶ It is of course possible that the economy will perform markedly worse than most projections assume, in which case low returns in the stock market may not be as implausible. However, there have been few sharp turns in growth paths in the post-war period (there was a slowdown in growth from the mid-70s to the mid-90s and a speed up since the year 1995), so it seems reasonable to plan as though a sharp turn is not a likely event. Furthermore if growth fell far enough below its projected pace, then even government bonds may not prove to be risk-free, since the federal government may find it too costly to meet its debt obligations and consider a partial restructuring.

FIGURE 2
Projected Price-to-Earnings Ratios (Risk-free Rate of Return)



Source: Federal Reserve Board, Bureau of Economic Analysis, and author's calculations.

It is also worth noting that if we look back historically at the years in which the PE ratio was below 15 to 1, then the real return has averaged well over 7.0 percent. **Table 1A** shows the return on stocks for the 30 years subsequent to a year in which the PE ratio was under 15 to 1. The average real return for the 18 years between 1949 and 1980 in which the PE ratio was below this level was 8.2 percent. The lowest return was 4.8 percent.⁷

It could be the case that governments would simply move away from holding stock as an asset for their pension funds if the assumed returns for assessing pension fund adequacy was the same as for government bonds. However, if governments went this route, it would mean that, on average, their pension funds would actually have worse returns, since the expected return on holding equity will in almost all circumstances be higher than the expected return from holding government debt.

⁷ The PE ratio is taken from the Economic Report of the President, 2010, Table B-95. The capital gain is taken as the rise in the S&P 500, deflated with the GDP deflator. The dividend yield is assumed to be the yield in the first year. The capital gain assumption probably understates slightly the gain from a full mix of stocks since it excludes newer fast-growing companies. The dividend yield assumption may overstate slightly the return, because re-invested dividends may get a somewhat lower yield if stock prices have risen. On the other hand, a fund that is regularly rebalanced would not invest in stocks if their price rose at a pace that exceeded the rate of growth of the economy.

TABLE 1A
Historic Stock Returns, 30-year Averages (percent)

	Dividend Yield	Real Appreciation	Total Return
1949	6.6	2.7	9.3
1950	6.6	2.3	8.9
1951	6.1	1.8	7.9
1952	5.8	1.1	6.9
1953	5.8	2.0	7.8
1954	5.0	1.3	6.3
1955	4.1	0.7	4.8
1956	4.1	1.1	5.2
1957	4.4	1.9	6.3
1970	3.8	5.3	9.1
1973	3.1	3.3	6.4
1974	4.5	5.0	9.5
1975	4.3	5.3	9.6
1976	3.8	5.1	8.8
1977	4.6	5.7	10.4
1978	5.3	5.3	10.6
1979	5.5	4.4	9.9
1980	5.3	5.2	10.5
Average	4.9	3.3	8.2

There are two main consequences from a decision by public pension funds to forego ownership of equity. The first would be higher taxes and/or lower benefits, since the same level of benefits for workers would require more financing from the government. Higher returns from investments are a direct tradeoff with additional financing from the government. If actual returns drop as a result of holding government bonds in place of equities, then governments will have to pay more money to support the same level of benefits. Alternatively, governments can cut pension benefits for their workers, but even a lower level of benefits could be financed at lower cost to governments if pension funds were invested in equities.

The other effect of pulling state and local pensions out of equities should be a somewhat higher rate of return on these assets. If a substantial pool of money, like state and local pension funds, were withdrawn from equity markets, it would mean that the remaining investors would get higher returns. Pension fund investment in stock markets can be seen as a way in which taxpayers share in the high yield available to equity investors. If pension funds are effectively excluded from equity markets, then it would leave a larger funding burden for the taxpaying public, while providing a higher return for those remaining in equity markets. The latter group is primarily wealthy investors. In effect, the result of forcing pension funds to divest themselves of equities would be a redistribution of income from the taxpaying public as a whole to wealthy investors.

The Size of the Public Pension Shortfall in Context

There have been numerous media accounts in recent months warning of large shortfalls in public pension funds. Conventional estimates have placed the shortfall at around \$1 trillion, while some analyses have put the shortfall as high as \$3.2 trillion using a discount rate that implies pension funds will only earn the risk-free rate of return (Novy-Marx and Rauh, 2009). While there are important measurement issues in determining the size of the shortfall, it is also important that the number be placed in some context. Most people, including those involved in policy debates, will not have a good basis for assessing the meaning of a shortfall measured in the trillions of dollars that must be filled over an indefinite period in the future. The relevant context is the size of the projected shortfalls relative to the size of the state economies.⁸

Before going through this exercise, it is worth noting that the size of the shortfall in many of these funds has likely already been reduced as a result of the fact that the stock market has continued to recover from its downturn in 2008 and 2009. On July 1, 2010, the S&P 500 was already more than 11 percent higher than its July 1, 2009 level (from 987 on July 1, 2009 to 1101 on July 1, 2010). Most funds use the stock market's closing value at the end of the fiscal year as the basis for determining the valuation of their assets. Of course they also use an average, so the valuation would not simply reflect the market value at the end of the fiscal year. However, with the market having already risen substantially from its low (the S&P 500 had risen another 19 percent to 1293 by January 10, 2011), it is likely that pension valuations based on current and future market levels will show smaller shortfalls. In other words, a substantial portion of the shortfalls that were reported based on 2009 valuations have likely already been eliminated by the rise in the market.

Table 2 shows funding levels and liabilities for most of the major state pension funds. The data are taken from the National Association of State Pension Fund Administrators (2010, Appendix B). The cumulative shortfall in funding as calculated in the table is \$647 billion. Column 5 shows this shortfall expressed as a share of discounted future state output over the next 30 years, the assumption being that this would be roughly the period over which the shortfall needs to be closed. The calculations use a 3.0 percent real discount rate and assume that each state grows at the same rate as the overall economy.⁹

⁸ It is also reasonable to compare the size of the pension fund shortfalls to state budgets over the relevant time frame (see Lav and McNichol, 2011 and Munnell et al 2010)

⁹ Novy-Marx and Rauh (2009) perform similar calculations and come up with somewhat larger numbers. This analysis is based on 2008 estimates of underfunding. It is also possible that this analysis includes a more complete set of state pension funds.

TABLE 2
Funding Levels and Liabilities for Major State Pension Funds

State	Plan	Actuarial Funding Ratio (percent)	Actuarial Value of Assets (thousand \$)	Liabilities (thousand \$)	Unfunded Accrued Liability (thousand \$)	Unfunded Liability as a percent of Future State Income	Latest Actuarial Valuation Date
AL	Alabama Teachers	74.7	20,582,348	27,537,400	6,955,052	0.14%	9/30/2009
AL	Alabama ERS	72.2	9,928,104	13,756,176	3,828,072	0.08%	9/30/2009
AK	Alaska PERS	78.8	7,210,772	9,154,282	1,943,510	0.15%	6/30/2008
AK	Alaska Teachers	70.2	3,670,086	5,231,654	1,561,568	0.12%	6/30/2008
AR	Arkansas Teachers	75.7	10,617,000	14,019,000	3,402,000	0.12%	6/30/2009
AR	Arkansas PERS	78.0	5,413,000	6,938,000	1,525,000	0.05%	6/30/2009
AZ	Arizona SRS	79.0	27,094,000	34,290,000	7,196,000	0.10%	6/30/2009
AZ	Arizona Public Safety PRS	70.0	5,445,497	7,778,394	2,332,897	0.03%	6/30/2009
CA	California PERF	86.9	233,272,000	268,324,000	35,052,000	0.06%	6/30/2008
CA	California Teachers	78.2	145,142,000	185,683,000	40,541,000	0.07%	6/30/2009
CO	Colorado School	69.2	21,054,910	30,412,815	9,357,905	0.13%	12/31/2009
CO	Colorado State	67.0	13,382,736	19,977,217	6,594,481	0.09%	12/31/2009
CO	Colorado Municipal	76.2	2,932,628	3,850,821	918,193	0.01%	12/31/2009
CO	Colorado Affiliated Local	89.2	1,855,493	2,081,304	225,811	0.00%	1/1/2009
CO	Colorado Fire & Police	101.0	856,090	847,821	-8,269	0.00%	1/1/2009
CT	Connecticut Teachers	70.0	15,271,000	21,801,000	6,530,000	0.10%	6/30/2008
CT	Connecticut SERS	51.9	9,990,200	19,243,400	9,253,200	0.14%	6/30/2008
DC	DC Police & Fire	100.7	3,048,400	3,027,900	-20,500	0.00%	10/1/2009
DC	DC Teachers	92.2	1,445,000	1,567,500	122,500	0.00%	10/1/2009
DE	Delaware State Employees	98.8	6,744,050	6,827,006	82,956	0.00%	6/30/2009
FL	Florida RS	87.1	118,764,692	136,375,597	17,610,905	0.08%	7/1/2009
GA	Georgia Teachers	91.9	54,354,284	59,133,777	4,779,493	0.04%	6/30/2008
GA	Georgia ERS	85.7	13,613,606	15,878,022	2,264,416	0.02%	6/30/2009
HI	Hawaii ERS	68.8	11,380,961	16,549,069	5,168,108	0.27%	6/30/2008
IA	Iowa PERS	81.2	21,123,980	26,018,594	4,894,614	0.12%	6/30/2009
ID	Idaho PERS	73.7	8,646,000	11,732,200	3,086,200	0.20%	7/1/2009
IL	Illinois Teachers	52.1	38,026,044	73,027,198	35,001,154	0.19%	7/1/2009
IL	Illinois Municipal	83.2	22,754,804	27,345,113	4,590,309	0.03%	12/31/2009

TABLE 2
Funding Levels and Liabilities for Major State Pension Funds

State	Plan	Actuarial Funding Ratio (percent)	Actuarial Value of Assets (thousand \$)	Liabilities (thousand \$)	Unfunded Accrued Liability (thousand \$)	Unfunded Liability as a percent of Future State Income	Latest Actuarial Valuation Date
IL	Illinois Universities	54.3	14,282,000	26,316,200	12,034,200	0.07%	6/30/2009
IL	Illinois SERS	43.5	10,999,954	25,298,346	14,298,392	0.08%	6/30/2008
IN	Indiana PERF	97.5	9,293,952	9,034,573	-259,379	0.00%	7/1/2008
IN	Indiana Teachers	48.2	9,034,048	18,750,063	9,716,015	0.13%	6/30/2008
KS	Kansas PERS	58.8	11,827,619	20,106,787	8,279,168	0.23%	12/31/2008
KY	Kentucky Teachers	63.6	14,885,981	23,400,426	8,514,445	0.19%	6/30/2009
KY	Kentucky County	70.6	7,402,277	10,491,358	3,089,081	0.07%	6/30/2009
KY	Kentucky ERS	46.7	5,297,114	11,332,961	6,035,847	0.13%	6/30/2009
LA	Louisiana Teachers	59.1	13,500,766	22,839,411	9,338,645	0.16%	6/30/2009
LA	Louisiana SERS	60.8	8,499,662	13,986,847	5,487,185	0.09%	6/30/2009
MA	Massachusetts Teachers	63.0	21,262,462	33,738,966	12,476,504	0.12%	1/1/2010
MA	Massachusetts SERS	76.5	19,019,062	24,862,421	5,843,359	0.06%	1/1/2010
MD	Maryland Teachers	66.0	20,600,000	31,200,000	10,600,000	0.13%	6/30/2009
MD	Maryland PERS	63.8	11,800,000	18,500,000	6,700,000	0.08%	6/30/2009
ME	Maine State and Teacher	74.0	8,631,558	11,668,033	3,036,475	0.21%	6/30/2008
ME	Maine Local	112.7	2,201,653	1,953,629	-248,024	-0.02%	6/30/2008
MI	Michigan Public Schools	83.6	45,677,000	54,608,000	8,931,000	0.08%	9/30/2008
MI	Michigan SERS	82.8	11,403,000	13,766,000	2,363,000	0.02%	9/30/2008
MI	Michigan Municipal	75.0	6,245,500	8,321,900	2,076,400	0.02%	12/31/2008
MN	Minnesota Teachers	77.4	17,882,408	23,114,802	5,232,394	0.07%	7/1/2009
MN	Minnesota PERF	70.0	13,158,490	18,799,416	5,640,926	0.08%	6/30/2009
MN	Minnesota State Employees	85.9	9,030,401	10,512,760	1,482,359	0.02%	6/30/2009
MO	Missouri Teachers	79.9	28,826,075	36,060,121	7,234,046	0.10%	6/30/2009
MO	Missouri State Employees	83.0	7,876,079	9,494,807	1,618,728	0.02%	6/30/2009
MO	Missouri Local	80.0	3,330,663	4,161,775	831,112	0.01%	2/28/2009
MO	Missouri PEERS	80.7	2,792,182	3,458,044	665,862	0.01%	6/30/2009
MO	Missouri DOT and Highway	47.3	1,471,497	3,113,394	1,641,897	0.02%	6/30/2009
MS	Mississippi PERS	67.3	20,597,581	30,594,546	9,996,965	0.36%	6/30/2009
MT	Montana PERS	83.5	4,002,212	4,792,819	790,607	0.08%	6/30/2009

TABLE 2
Funding Levels and Liabilities for Major State Pension Funds

State	Plan	Actuarial Funding Ratio (percent)	Actuarial Value of Assets (thousand \$)	Liabilities (thousand \$)	Unfunded Accrued Liability (thousand \$)	Unfunded Liability as a percent of Future State Income	Latest Actuarial Valuation Date
MT	Montana Teachers	63.8	2,762,200	4,331,000	1,568,800	0.15%	7/1/2009
NC	North Carolina Teachers and	99.3	55,127,658	55,518,745	391,087	0.00%	12/31/2008
NC	North Carolina Local	99.6	17,100,739	17,173,975	73,236	0.00%	12/31/2008
ND	North Dakota Teachers	77.7	1,900,300	2,445,900	545,600	0.06%	7/1/2009
ND	North Dakota PERS	85.1	1,617,100	1,901,200	284,100	0.03%	6/30/2009
NE	Nebraska Schools	86.6	7,007,582	8,092,339	1,084,757	0.04%	7/1/2009
NH	New Hampshire Retirement	58.3	4,937,320	8,475,052	3,537,732	0.21%	6/30/2009
NJ	New Jersey Teachers	65.0	34,708,001	53,418,429	18,710,428	0.13%	6/30/2009
NJ	New Jersey PERS	64.9	28,879,176	44,470,403	15,591,227	0.11%	6/30/2009
NJ	New Jersey Police & Fire	70.7	22,937,838	32,442,101	9,504,263	0.07%	6/30/2009
NM	New Mexico PERF	84.2	12,575,142	14,932,624	2,357,482	0.11%	6/30/2009
NM	New Mexico Teachers	67.5	9,366,300	13,883,300	4,517,000	0.21%	6/30/2009
NV	Nevada Regular Employees	73.4	19,158,282	26,087,621	6,929,339	0.19%	6/30/2009
NV	Nevada Police Officer and	68.9	4,813,594	6,987,537	2,173,943	0.06%	6/30/2008
NY	NY State & Local ERS	107.3	128,916,000	120,183,000	-8,733,000	-0.03%	4/1/2008
NY	New York State Teachers	106.6	88,254,700	82,777,500	-5,477,200	-0.02%	6/30/2008
NY	NY State & Local Police &	108.0	22,767,000	21,072,000	-1,695,000	-0.01%	4/1/2008
OH	Ohio PERS	75.3	55,315,148	73,466,166	18,151,018	0.13%	12/31/2008
OH	Ohio Teachers	60.0	54,902,859	91,440,955	36,538,096	0.27%	6/30/2009
OH	Ohio School Employees	82.0	9,723,000	14,221,000	4,498,000	0.03%	6/30/2009
OH	Ohio Police & Fire	65.1	9,309,000	14,307,000	4,998,000	0.04%	1/1/2008
OK	Oklahoma Teachers	49.8	9,439,000	18,950,900	9,511,900	0.22%	6/30/2009
OK	Oklahoma PERS	66.8	6,208,245	9,291,458	3,083,213	0.07%	7/1/2009
OR	Oregon PERS	80.2	43,520,600	54,259,500	10,738,900	0.23%	12/31/2008
PA	Pennsylvania School	86.0	60,922,100	70,845,600	9,923,500	0.06%	6/30/2008
PA	Pennsylvania State ERS	84.4	30,205,000	35,797,000	5,592,000	0.04%	12/31/2009
RI	Rhode Island ERS	56.2	6,231,411	11,083,014	4,851,603	0.35%	6/30/2007
RI	Rhode Island Municipal	90.3	1,064,615	1,179,233	114,618	0.01%	6/30/2007
SC	South Carolina RS	69.3	24,699,678	35,663,419	10,963,741	0.24%	7/1/2008

TABLE 2
Funding Levels and Liabilities for Major State Pension Funds

State	Plan	Actuarial Funding Ratio (percent)	Actuarial Value of Assets (thousand \$)	Liabilities (thousand \$)	Unfunded Accrued Liability (thousand \$)	Unfunded Liability as a percent of Future State Income	Latest Actuarial Valuation Date
SC	South Carolina Police	77.9	3,363,136	4,318,955	955,819	0.02%	7/1/2008
SD	South Dakota PERS	91.8	6,778,500	7,387,400	608,900	0.06%	6/30/2008
TN	TN State and Teachers	96.2	26,214,995	27,240,151	1,025,156	0.01%	7/1/2007
TN	TN Political Subdivisions	89.5	4,897,974	5,475,620	577,646	0.01%	7/1/2007
TX	Texas Teachers	83.1	106,384,000	128,030,000	21,646,000	0.07%	8/31/2009
TX	Texas ERS	87.4	23,509,622	26,907,779	3,398,157	0.01%	8/31/2009
TX	Texas County & District	89.8	16,564,213	18,448,162	1,883,949	0.01%	12/31/2009
TX	Texas Municipal	75.8	16,305,700	21,525,100	5,219,400	0.02%	12/31/2009
TX	Texas LECOS	86.1	780,808	907,102	126,294	0.00%	8/31/2009
UT	Utah Noncontributory	85.6	16,622,548	19,429,734	2,807,186	0.09%	12/31/2009
VA	Virginia Retirement System	84.0	52,548,000	62,554,000	10,006,000	0.09%	6/30/2008
VT	Vermont Teachers	65.4	1,374,079	2,101,838	727,759	0.10%	6/30/2009
VT	Vermont State Employees	78.9	1,217,638	1,544,144	326,506	0.04%	6/30/2009
WA	Washington PERS 2/3	101.1	16,692,700	16,508,000	-184,700	0.00%	6/30/2008
WA	Washington PERS 1	70.9	9,852,900	13,901,000	4,048,100	0.04%	6/30/2008
WA	Washington Teachers Plan 1	76.8	8,262,300	10,753,900	2,491,600	0.03%	6/30/2008
WA	Washington Teachers Plan 2/3	107.9	5,681,000	5,263,800	-417,200	0.00%	6/30/2008
WA	Washington LEOFF Plan 1	128.0	5,592,500	4,367,700	-1,224,800	-0.01%	6/30/2008
WA	Washington LEOFF Plan 2	126.4	5,052,700	3,998,200	-1,054,500	-0.01%	6/30/2008
WA	Washington School Employees	104.3	2,302,600	2,207,300	-95,300	0.00%	6/30/2008
WI	Wisconsin Retirement System	99.8	78,911,300	79,104,600	193,300	0.00%	12/31/2009
WV	West Virginia PERS	79.7	3,930,701	4,930,158	999,457	0.05%	7/1/2009
WV	West Virginia Teachers	41.3	3,554,771	8,607,869	5,053,098	0.28%	6/30/2009
WY	Wyoming Public Employees	87.5	5,742,542	6,565,677	823,135	0.08%	1/1/2010
Total		79.8	\$2,561,175,228	\$3,208,469,565	\$647,294,337		

In most states the unfunded liabilities are well under 0.2 percent of future income. This implies that increased revenue equal to 20 cents of every \$100 of future output would be more than sufficient to eliminate the shortfall. Even in the states with largest shortfalls, the burden appears manageable. In Ohio, the shortfall is equal to 0.47 percent of future output, in Illinois it is 0.37 percent of future output, and in Mississippi and Rhode Island it is equal to 0.36 percent. Of course, this estimate of the size of the shortfall will be overstated or understated if a state has growth that exceeds or falls behind the national average. Some of the states with larger shortfalls, like Ohio and Mississippi, may lag the overall growth of the economy, which means that the burden of the unfunded pension liability would be greater than the calculations in Table 2 imply. Of course, since the valuation date for the pension funds was before the recent run-up in the stock market, some portion of this shortfall will be eliminated simply by the recovery of the stock market when the valuation is updated.

Conclusion

The shortfalls facing most state and local pension funds have been seriously misrepresented in public debates. The major cause of these shortfalls has not been inadequate contributions by state governments, but rather the plunge in the stock market following the collapse of the housing bubble. Given the low PE ratios in the stock market, pension fund assumptions on the future rate of return on their assets are consistent with most projections of economic growth and past experience. Furthermore, when expressed relative to the size of their economies, most states are facing shortfalls that appear easily manageable.

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