

Douglas J. Elliott
The Brookings Institution
April 15, 2010

The Financial Crisis' Effects on the Alternatives for Public Pensions

The recent financial crisis dramatically changed the situation of public pension plans and the alternatives available to them going forward. Most obviously, the funding levels of these plans are considerably worse now than during the bubble. Asset values have declined substantially, even taking account of the sharp rebound in the financial markets since March of 2009. At the same time, reported liabilities have gone up as well, principally as a result of the passage of time bringing the remaining pension payments closer to the present day.

However, the crisis did not just create a one-time adjustment in values and funding levels. The investment alternatives for plans look different now than they did a few years ago. This is partly because they *have* changed and partly because we have learned lessons, or sometimes relearned them, about risks and returns from individual asset classes and about overall asset-liability management.

This paper reviews the various changes affecting public pension plans and draws some conclusions for their future¹. The key changes are in the following areas:

- Lower asset values
- Higher pension liabilities
- Widening pension deficits
- Higher perceived risks on investments
- Larger risk premiums available on investments

Lower asset values

Public pension plans, like private ones, lost a substantial part of their value during the financial crisis. It appears that the public plans in the aggregate suffered investment losses of about 25% of total assets from September 2007 through March 2009. A large chunk of these losses were erased by the rebound in the markets since March 2009, but the net losses were still equal to about 15% of September 2007 assets as of the latest reported figures, which are for September 2009². Financial markets have recovered somewhat further since then, but the dramatic gains in the rebound were already in place by

¹ The author gratefully acknowledges the support of the Pew Retirement Security Project for this work. The views expressed here, however, are his own, as are any mistakes.

² These figures are calculated by the author from the Census Bureau's "Quarterly Summary of Selected State and Local Government Employee Retirement Systems," which covers the top 100 plans by size, representing about nine-tenths of the assets of all such plans. Investment losses were estimated by taking the total change in the market value of assets and adjusting for the net pension payments over and above the level of contributions into the funds.

September of last year, so these figures are reasonable rough estimates of the effects of the financial crisis.

The situation is even worse than those figures show on the surface, because pension funds are essentially walking on a treadmill. They need to earn an expected return each year in order to stay standing in place, since the value in today's dollars of the pensions they have promised to pay goes up each year as those payouts come closer in time. The situation is analogous to inflation. The public pension funds may have lost 15% over two years on a "nominal" basis, but, if their target return was 8% a year³, they lost 31% compared to their targeted level of investment value, excluding the effects of contributions and pension payments.

For illustration, Table 1 shows the composition of the investment losses for a typical portfolio, from the stock market's peak in October 2007.

Table 1: Composition of losses for a typical portfolio, since October 2007

Investment class	% of total assets	Loss to March 2009	Loss as % of total assets	Cumulative Loss to March 2010	Loss as % of total assets	Shortfall against target 8% annual return
Common stock ¹	55%	52%	28.6%	23%	12.7%	
Bonds and loans ²	30%	18%	5.4%	6%	1.8%	
Alternative invest. ³	7%	25%	1.8%	15%	1.1%	
Real estate owned	3%	30%	0.9%	40%	1.2%	
Other	5%	30%	1.5%	20%	1.0%	
Total	100%		38.2%		17.8%	38%

1. Includes convertible instruments and other securities based on common stock, including stock mutual funds
2. Includes non-convertible preferred stock
3. Includes hedge funds, private equity, and similar investments

The great bulk of the losses were due to the decline in the stock market, since this was by far the largest single asset class and underwent a particularly sharp fall. In contrast, the value of bond holdings fell initially, but have actually risen cumulatively since 2007 as the negative effects of the financial crisis diminished.

The movements in bond prices were the result of three factors that partially cancelled each other out. First, specific credit losses directly reduced the value of the associated bonds. Second, fear of future credit losses caused "credit spreads" to increase as the financial crisis hit home. These spreads represent the return being demanded by bond investors to compensate for the chance that they will not get their

³ A report by the Pew Charitable Trusts entitled "The Trillion Dollar Gap," issued in February of 2010, shows that a target return of 8% is the most common choice by state funds and is roughly in the middle of the range of chosen values.

money back as promised. They are calculated by subtracting the yield on a bond at market prices from the yield on a safer bond, usually a Treasury bond since they are considered to carry no credit risk. Higher spreads mean higher yields, all else equal, and higher yields demanded by the market mean a lower market price for a given bond. So, higher credit spreads pushed yields up and prices down. Third, working in the other direction by increasing the value of bond holdings, yields on Treasuries went down sharply as a result of a slowing economy, a flight to safety, and Federal Reserve (Fed) policy actions. The net effect for bond prices now versus 2007 is a modest increase in price, as a result of the decline in Treasury yields more than offsetting an increase in credit spreads on corporate bonds.

Returns on “alternative investments” ran the gamut from extremely poor to quite good, since they represented a range of extremely different investments and investment strategies. Private equity funds tended to suffer worse than the stock market as a whole, since the underlying investments were usually in highly levered companies which were hit particularly badly by the recession and related credit crunch. Hedge fund returns for their part ranged widely. Some of the classic hedge funds that tried to avoid taking systematic market risk were not hit too badly. However, many other funds had quite a large exposure to the overall market implicit in their strategies and therefore suffered considerable equity losses, although usually not as bad as the overall market indices, with some exceptions which showed extremely poor performance. A few hedge funds that had stock market exposure were primarily taking short positions and therefore made money from the market falls. And, of course, many hedge funds were primarily focused on debt or currency or commodity markets, producing a range of results too wide to usefully discuss here.

Real estate ownership by pension funds did poorly, as nearly every real estate market was hit hard by the collapse of a major bubble in both residential and commercial real estate. Residential property fell 30% or more from the peak, even after a modest recent recovery. Commercial real estate was hit even harder. It appears to be down closer to 40% on average from the peak. Both these figures were magnified somewhat for the pension funds because the underlying investments sometimes contained at least modest financial leverage. Finally, “other” assets comprised an extremely wide range of investments from very safe to risky and running the gamut of investment instruments. As a result, the loss estimates shown in the table for this category are very rough approximations.

The actual investment losses at each fund could differ quite significantly from the benchmark shown in Table 1, both because the proportions in different asset categories varied, but also because the investment performances of different asset managers often differed considerably. Pew’s “Trillion Dollar Gap” report showed investment losses for 2008 for thirteen funds that ranged from 13% to 29%. In addition to investment performance, asset levels went up or down based on the balance of other inflows and outflows. Pension funds received contributions from their sponsors to cover service over the period, as well as, in some cases, catch-up contributions to pay for a portion of existing pension deficits. Over the same period, cash flowed out to make pension payments and for operating expenses, although such operating expenses are generally a relatively small factor, excluding fees and expenses paid to investment managers which were already included in the earlier investment return analyses. Census

Bureau figures for the 100 largest plans show that aggregate contributions from October 2007 to September 2009 of \$207 billion failed to fully offset pension payments of \$337 billion.

Overall, according to the Census Bureau figures, public pension funds lost considerable ground after the bubble burst, especially compared to the level of assets they needed to reach based on their required investment return to stay in the same position relative to their liabilities. Assets fell over two years by about 18% rather than rising by the roughly 16% target, leaving assets about a third lower than they would have been if they had reached their targeted investment level and if contributions had fully offset pension payments.

Higher pension liabilities

The liabilities owed by public pension funds went up considerably over the same period that the funds were losing money on the investment side. The great bulk of pension payments remain in the future and we are now several years closer to the time when those payments will be made. Therefore, the value in today's dollars of those remaining payments is noticeably higher solely due to the passage of time.

The process works as follows. Calculating the financial health of pension plans requires a way of putting the value of the assets and the liabilities on the same basis. We generally have a good estimate of the value of the assets as of the date of the calculation, since we can look at market values. However, by far the largest liability of a pension fund is the promise to pay future pensions out over the course of many years. We cannot simply add up all the future payments and treat that as the liability, because that would dramatically overstate the level of assets needed today to make those future payments. In fact, a substantial chunk of those future payments will be met through investment income earned on the assets that exist today and the compounding effect of earning income on accumulated future investment income. In order to account for this, pension funds are required to "discount" their future pension obligations by using an interest rate known as the "discount rate." If we knew of a certainty that the pension assets would earn 5% per year, then we would reduce each dollar of promised future pension payments by 5% for each year between now and the date of payment, using compounded interest.

According to rules promulgated by the Government Accounting Standards Board (GASB), state and local pension funds use their expected future investment return as the discount rate for their liabilities. For example, if they have 60% of their investments in common stock and expect a 10% return on those assets and the other 40% in bonds with a 5% expected return, then they have an expected return for the whole portfolio of 8% (60% times 10% plus 40% times 5%.)

The GASB approach is distinctly different and less conservative than the approach required by the Financial Accounting Standards Board (FASB) which sets rules for the private sector. It is also contrary to the views of the vast majority of financial economists. FASB requires the use of the interest rate on a corporate bond with a high level of safety, while most economists suggest using the government bond rate. In both cases, the discount rate would be considerably lower than the expected rate of return used by state and local pension funds. Most such pension money is invested in the stock market, which will

always have an expected investment return significantly higher than a safe bond would, because investors need to be paid for the substantially higher risk associated with stocks. Stocks do not always outperform bonds, in fact they often do not, but investors buy them solely because they *expect* over time to earn a higher return on average than on safe bonds.

The assumed investment return that is used varies across public pension funds, although within a relatively narrow range across the state plans. According to Pew⁴, 22 states use 8.0%, another 14 states use a rate within 0.25% of that figure, and the remainder all fall within a range from 7.25% to 8.50%.

Thus, all else equal, a state pension fund would see its liabilities rise in value by roughly 8% a year. However, several other factors modify this general result. First, pension payments are made each year, reducing the remaining liability as well as the remaining assets. Second, new liabilities are accrued based on employee service over the same period.

Finally, estimates of pension liabilities also depend on actuarial assumptions such as life expectancies and the number of years that current employees will keep working before they retire. Life expectancies have generally been lengthening, increasing the expected cost to pension funds of making payments for the life of the retiree. Adjustments to actuarial tables are used to attempt to adjust for a continuation of this trend in the future, but these adjustments have not always captured the full effect, forcing later increases in the estimates of pension liabilities. Economic conditions can also cause an increase or decrease in early retirements. Many pension formulas effectively subsidize early retirement by not reducing the annual pension by enough to fully offset the greater number of years that the pensioner will be collecting the payments. Thus, if a government pushes employees towards early retirement during an economic downturn, this can harm the pension fund even if it helps the overall economic condition of the state or municipality by reducing salary and other costs.

The changes in liabilities year-over-year are generally dominated by the effect of the simple passage of time bringing the bulk of the pension payments one year closer to payment. Expected rates of return on investments are seldom changed and, when they are, are usually moved in small increments. Similarly, other changes in assumptions are generally small, although there will be occasional shocks when a new study may find that life expectancy has gone up considerably more than expected or some other important variable has changed greatly. The final two components, the reduction in liabilities due to pension payments during the year, and the increase in liabilities due to service performed during the year, work in offsetting directions and generally do not have as large an effect in the aggregate as the impact of the passage of time on existing liabilities.

Widening pension deficits

The main causes of widening deficits at public pension funds are the factors affecting asset and liability values discussed in the preceding two sections. However, it is important to note that the absolute value of pension deficits tends to increase over time unless sufficiently strong corrective action is taken. If a

⁴ See the Trillion Dollar Gap report, page 35.

pension plan started 2007 with \$8 billion of assets and \$10 billion of liabilities and miraculously managed to raise the value of its assets over the last three years by the same 20% that its liabilities increased, it would still face a wider pension deficit. Assets would now be at \$9.6 billion, but liabilities would have risen even more to \$12 billion, widening the deficit to \$2.4 billion from \$2.0 billion. In a more realistic example it might have lost 20%, reducing assets to \$6.4 billion and causing the deficit to balloon to \$5.6 billion.

Higher perceived risks

Pension investment and funding decisions are based not just on the true underlying risk/return trade-offs, which can only be estimated, but on perceptions of risk and reward as well. Many analysts, including the author, believe that a major underlying cause of the recent financial crisis was a reduced perception of risk in the financial markets combined with a diminished fear of taking those risks that were recognized to exist. The financial markets enjoyed a very good run for 25 years from 1982 to 2007, with the stock market going up by a factor of about 18 times from a trough on the Dow of roughly 800 to a peak of over 14,000. Many other markets, including the housing market, also showed very attractive returns over this time period. There were bad spots in the markets during that quarter century, but they tended to be short and generally not as severe as in other periods during the twentieth century as a whole, and thus could be ridden out by investors. People of all stripes “learned” that it was okay to take more risk than the textbooks advised and that if things turned against you, the right answer was just to hold on, because markets would eventually come roaring back.

These experiential lessons led the public, as well as institutional investors, to put on more financial leverage and to buy more stocks and real estate than portfolio theory suggested they should. Not surprisingly, it also became attractive to politicians and pension fund managers to increase the risk in pension portfolios as well. Sometimes this consisted of adding more stocks, at the expense of bonds, and sometimes it involved moving more into “alternative” investments. In either case, it considerably increased the swelling of pension deficits resulting from the bursting of the bubble, since, at least in retrospect, bonds performed much better than other major asset categories.

There was a very clear political attraction to increasing exposure to risky assets such as equities, since such assets should theoretically provide a higher average return. That expectation of a higher average return could be used to justify a pension funding plan with lower annual contributions. In some cases, this was taken to the extreme of borrowing externally to fund the pension plan, effectively counting on equities to produce a higher return than the cost of the borrowing. To the extent this worked, it would be “free money,” leading to lower total pension costs for the taxpayer. It should be noted that a portion of the expected gain really was “free money,” since the borrowing costs of states are effectively partially subsidized by federal taxpayers. This is the result of the exclusion from federal income taxes of income earned on state and municipal bonds, as long as they are issued for a public purpose, such as supporting pension contributions. This tax exemption leads taxable investors to reduce the interest rate they demand on such bonds.

Moving to a greater proportionate investment in stocks, even on an effectively levered basis, can be a valid choice, as long as there is a clear recognition of the increased risk, a recognition that is often absent in the public explanations. Unfortunately, too many people have accepted too unquestioningly the theory that equity returns become less risky the longer the investor's holding period. There are aspects of this that are true, which is why an investor should not play the stock market with money that they will need relatively soon. However, the reasoning cannot sensibly be extended to the belief that someone with a holding period of 20 years will always be better off in stocks than in bonds or cash. Not only is this wrong in theory, as will be explained shortly, but it has already been wrong in practice. Those who bought into the peak of the stock market in 1929 did not break even until 25 years later, in 1954, excluding dividends⁵. Government bonds, of course, paid a substantially positive return over the same 25 years.

Financial economists, virtually without exception, do not believe that the total level of equity risk declines with the length of the holding period. Rather, they believe that the expected cumulative return would continue to climb faster than in a safer investment, but that the downside cases get worse and worse in an offsetting fashion. That is, one is gambling in a game with a higher expected payoff than investing in bonds, but with a chance of achieving a terrible result, much worse than bonds would provide with the same probability. This is not purely a theoretical argument. There are examples of individual stocks, and even industries, in the U.S. that went relentlessly down over the years. There are also examples of entire stock markets in other countries that crashed permanently, sometimes through expropriation of the companies whose stocks traded on the exchanges. For these and other reasons, financial markets charge significantly more for options to protect against longer-term stock price declines than they do against shorter-term movements.

Moving to a less extreme, but more recent example, money market funds outperformed the stock market as a whole over the last decade, as a result of the Tech Crash in the early part of the decade followed by the recent financial crisis and ensuing crash. The degree of outperformance of safe investments is less marked after the unprecedented stock market recovery since March of 2009, but it still remains the case that owning stocks was not a good "buy and hold" strategy over the last 10 years.

A major question, therefore, is whether the public's perceptions of risk, which are likely to have considerable influence on politicians and fund managers, have changed permanently in a way that discourages the taking of equity risk in pension funds to the extent that pension funds have done in recent decades. The answer is at yet unclear. Most investors were in a state of shock after the severe declines in the stock market in 2008 and 2009 and corresponding declines in their home values and in the corporate bond market. Some pulled back from all investment risk, in a classic "flight to quality." Others, however, chose to hold on in the hopes that the stock market would recover from what seemed to them an insane plunge fueled by panic. Now that the latter camp has been rewarded by a substantial

⁵ The situation over that period was somewhat less bleak than it might sound, because a major bout of deflation made \$1 worth of stock more valuable a few years after the crash than it was beforehand. However, this benefit applied to both stock and bond investors and therefore does not affect a comparison between the two asset categories.

recoupment of their still major losses, it is difficult to tell whether the majority will expect a return to the former good times in the markets or whether caution will be the theme for a number of years.

If the public's reactions do not show a pronounced shift towards greater caution, then there may still be sufficient political incentive to remain a major risk-taker. Politicians responsible for making or overseeing investment strategy decisions would face a trade-off. Holding a high percentage of assets in riskier classes, such as equities, would allow a lower projected path of pension contributions, which would clearly be favorable in the short run. The odds are quite good that this would work out positively over the normal time-horizon for a politician, since it would take quite a steep fall in the stock market to derail the argument that there will be good years and bad years, which will average out. On the other hand, such a steep fall could occur as frequently as once a decade, although every couple of decades seems more likely. If the politician is unlucky enough to hit such a patch of severe bad news, it could be harmful enough to destroy his or her career.

Larger risk premiums

The positive side of the decline in stock prices and the increases in risk premiums on almost all investments is that expected returns in the future could be higher than were reasonable to expect during the bubble. Robert Shiller, in his book *Irrational Exuberance*, does an excellent job of showing that stock market returns in the U.S. have historically been negatively correlated with past returns. A bull market often pushes the ratio of price to underlying earnings capacity to an excessively high level, making it quite difficult to earn substantial gains in the ensuing decade. On the other hand, a bear market tends to depress price to earnings ratios, leaving room for them to expand again, helping propel stock prices to the next bull market peak.

Essentially, Shiller and others believe that the stock market often displays a "regression to mean" behavior in terms of price/earnings ratios, appropriately measured. This is not consistent with pure "efficient market" theories, which hold that all public information that can be accessed at a reasonable cost is already incorporated into the price of stocks. A behavior as important and historically verifiable as Shiller suggests would certainly be arbitrated away according to efficient markets theories. That is, smart sellers would appear when price/earnings ratios got too high and smart buyers would appear when they got too low and the combination would smooth out the behavior of the market. Shiller, of course, has a whole book's worth of explanations as to why he believes institutional constraints and investor psychology combine to prevent these smoothing mechanisms from working consistently.

This debate between efficient markets and regression to mean theories of the stock market has very important implications for the appropriate investment mix for public pension funds. Efficient markets arguments suggest that pension funds ought to look at long-term norms for expected returns and volatility around those returns, because timing the market generally would not work. Regression to mean arguments suggest that the basic investment risk should probably be modified considerably as markets overshoot in one direction or the other, with smart investors moving money into low-risk investments as bull markets cause price to value ratios to go too high and moving in the opposite direction as bear markets overshoot. The degree to which a pension fund manager would swap money

among asset classes would, of course, depend on their willingness to accept volatility of results. Investing almost entirely in bonds with similar characteristics to the future pension payouts would always remain the lowest risk strategy from a technical, non-political, viewpoint.

If one does accept Shiller's arguments, it appears that a fund currently should probably be underweighted in stocks compared to its normal target portfolio. Despite the large declines in the stock market since the peak of the bubble, the author's calculations, using Shiller's methodology, suggest that stocks are trading above historical average valuation levels. This reflects the very considerable over-valuation by historical standards that the stock market exhibited in 2007 and, even more strongly, at the earlier peak of the Tech Bubble.

Conclusions

Public pension funds will almost certainly struggle with very stubborn pension deficits for years to come. The paper profits that they were earning in the stock market during the bubble have proven to be illusory. The bursting of the bubble has caused a significant fall in market values and, equally importantly, the loss of several year's worth of expected investment income. Nor does it appear likely that we will be entering a strong new bull market in stocks that magically make the deficits disappear.

Public pension funds are unlikely to consistently earn the 8% annual returns that most are targeting, unless we enter into a period of high inflation that reduces the "real" return hurdle considerably. However, even a period of high inflation might not rescue the funds, since the stock market could easily suffer another collapse if faced with such an inflationary period, or even the threat of it. Higher inflation can aid corporate revenues in nominal dollars, but it increases their costs as well and causes investors to discount future corporate earnings at a considerably higher interest rate. One of the reasons the stock market has recovered to the extent it has is the relatively low level of interest rates in the current environment.

This struggle to meet existing return targets will be even tougher to the extent that public pension funds choose to be more conservative about their investments, particularly by switching some of their stock investments into the bond market. This could easily be a prudent move, but it would considerably lower the probability that a bull market would reduce the pension fund's deficits.

My own view is that an 8% return target is unreasonably high in today's environment. Maintaining such a target level serves to mask the true extent of the pension deficits. Bad as those deficits look now, they would be significantly worse if the expected returns average 7% or 6%.

Politicians will ultimately make the decision as to when to own up to the extent of the public pension problem. It would probably be better to face the music now, when the public at least has the recent memory of the financial crisis to help them understand the existence of major pension deficits. Unfortunately, any action to deal with those problems will cause pain, through higher taxes or lower benefit payments. In that, it is very similar to the larger deficit problems that face our country. We will

be better off in the long run dealing with them, but it represents a great short-term risk for any politician to propose the necessary actions to deal with the problem.