

# Active Versus Passive Investment Management Of State Pension Plans: Implications For Personal Finance

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*There are 19 million workers and retirees and \$3 trillion of assets in state pension plans. However, questions have arisen about the long-run ability of the plans to pay promised benefits to retirees. Consequently, proposals have been made to reduce promised pension payments or alter other terms of the pension contracts. Yet another heretofore unexplored alternative is to reduce state pension plan management fees by moving from actively managed portfolios to low-fee passively managed accounts. Using state pension plan data for the 2003-2012 decade and returns from three alternative low fee portfolios, it is found that all states could have increased after-fee earnings and improved their long-run ability to pay retirees by moving to the low-fee investment accounts. While clearly relevant for workers and retirees in state pension plans, the findings also have implications for all investors regarding the ongoing debate between active and passive investment management strategies.*

*Keywords: active management, investment strategies, passive management, state pensions*

## Introduction

Pension plans for state and local public employees are a key part of the nation's retirement system. In 2011 these plans covered 19 million active and retired workers and had a total asset value of \$3 trillion (U.S. Census Bureau, 2012, 2013). While many private pension plans have shifted from defined benefit to defined contribution systems in recent years, state pension plans have overwhelmingly remained as defined benefit plans (Snell, 2009). Such plans—which specify the pension amount received based on the worker's salary and years of service—place the risk for meeting the liabilities on the state as opposed to the worker.

Recent studies suggest state pension plans may face a crisis in fulfilling their promises to enrollees. Plans typically discount future liabilities (payments to retirees) using an 8% discount rate (Congressional Budget Office, 2011). In the current environment of very low interest rates on low-risk investments, critics argue the 8% rate is much higher than a generally accepted low-risk discount rate, thereby masking future payment problems state pension plans will face (Munnell, Aubry, Belbase, and Hurwitz, 2013). To make the payments to retirees, critics say the plans will require additional contributions from state funds. Such contributions could be significant, totaling \$163 billion in present value terms for the next 30 years (Novy-Marx & Rauh, 2014).

This looming underfunding of state pension plans has prompted some state pension directors to attempt to increase

their investment returns by allocating more funds to potentially higher return—yet riskier—investment categories (Walsh, March 2010). This idea raises some fundamental questions about state pension funds. State pension plans hire professional investment firms to actively manage the pension funds. The funds pay substantial fees to the firms for their services (Hooke & Walters, 2013). Could state pension funds earn the same—or superior—rates of return by following a passive investment management strategy using low-cost mutual funds? And if so, how would a shift from an active investment strategy to a passive investment strategy for state pension funds help the plans address their potential future payment shortfalls?

Using data measuring the investment performance of state pension funds over the 2003-2012 decade, this paper provides answers for these two important questions. Since the relative performance of active and passive investment strategies is also an issue for individual investors, the paper's analysis has implications for financial planners and counselors in their efforts to educate individuals about investment principles (Finke, Huston, and Winchester, 2011; Grinstead, Mauldin, Sabia, Koonce, and Palmer, 2011; Prawitz & Cohart, 2014; Robb & Woodyard, 2011).

The paper is divided into several sections. The next section reviews the longstanding debate between active and passive investment management strategies and summarizes the empirical research addressing the debate. Following is a

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section discussing the state pension fund data collected for the analysis as well as the three alternative passive management investment strategies used in the comparisons. The fourth section presents the empirical results from comparing actual state pension fund investment returns to the returns from alternative passive management portfolios. The fifth section uses the results from the active versus passive management comparison to estimate what a shift to a passive investment management strategy using low-fee mutual funds could mean for ameliorating potential future state pension payment shortfalls. The final section offers conclusions.

### **Active Versus Passive Investment Management**

The debate over the relative merits and performances of active investment management and passive investment management strategies has occupied both investors and academics for decades. Active investment managers use their skill and knowledge to attempt to choose and alter the investment portfolio toward a goal of outperforming an investment market index. In short, active investment management attempts to “beat the market.” In contrast, passive investment managers believe it is extremely difficult to consistently beat a passive strategy if markets are efficient. Therefore, passive investment managers often assemble a portfolio that mimics the overall investment market and maintain that portfolio over time, thus employing a “buy and hold” strategy.

Active and passive investment management strategies have been argued at both conceptual and empirical levels. The conceptual basis for passive investment strategies is the efficient-market hypothesis (EMH), of which there are three versions (Fama, 1965, 1970). The weak form states investment values always reflect all relevant publicly known information. The semi-strong form says investment values incorporate all relevant publicly known information and these values instantly change to accommodate new public information. The strong form adds to the stipulations of the semi-strong form that investment values also instantly change to include new non-public, or insider, information. Followers of EMH do not deny that actively managed funds can beat passively managed funds; however, this would only occur through short-term luck and could not be consistently achieved, especially net of investment and trading costs. For example, Bollen and Busse (2005) examined 230 mutual funds between 1985 and 1995 and found any superior performance disappeared after one year. Carhart (1997) found the same result for 1900 mutual funds studied between 1962 and 1993. Henriksson (1984) looked at 116 mutual funds between 1968 and 1980 and found an even stronger result—the better

performance of any mutual fund disappeared after one month. Porter and Trifts (2014) took a different approach and tracked 1800 mutual funds managers over the 1928 to 2008 period. For managers with a tenure of at least a decade, the likelihood of inferior performance was just as great as the likelihood of superior performance. The essential point for passive investment strategies is that readily available information about investments is quickly acted upon by investors and incorporated into investment values, thereby leaving little opportunity for profit opportunities.

There are several seminal publications supporting passive investment strategies. Treynor (1965) pioneered the idea of measuring and incorporating risk in the calculation of investment returns. Sharpe (1966) and Jensen (1968) performed the early tests of comparing the returns of active mutual fund managers to the returns from a broad passively managed portfolio, such as based on the Dow-Jones Industrial Average. Sharpe (1966) concluded actively managed portfolios yielded no consistently superior performance after deducting management costs. Jensen’s (1968) results were even bolder—actively managed funds could not provide superior returns even if management fees were zero. Fama and French (2010) extended Sharpe’s general findings for more recent mutual funds. Malkiel (2011) has touted passive investment strategies by showing how a diversified mix of investments representing all major economic sectors yields higher after-cost returns over long investment periods. Asebedo and Grable (2004) found that paying for active management through mutual funds with higher fees yielded inferior performance compared to the returns from funds with low fees.

Conceptual criticisms of passive investment strategies, and thus implied conceptual support for active management, focus on four areas: the need for some investors to pursue above-average returns, the standards of information access, the implication of low transactions costs, and the assumption of investor rationality. Passive investment strategy critics say it is ironic the approach denies the ability to consistently earn superior returns, yet at the same time relying on investors pursuing and earning such returns—albeit temporarily—for the approach to work (Lo & MacKinlay, 1999, pp. 6-8). Complete and instant access to information is also needed for a successful passive investment strategy, but critics say some markets, especially those in foreign countries, may not have such informational access (Grossman & Stiglitz, 1980). Investors can also face significant transactions costs in the buying and selling of investments necessary to make

the adjustments required by the efficient markets hypothesis and assumed by the passive investment approach (Grossman, 1976). If the transactions costs exceed the perceived investment benefits, then such adjustments may not be made. Lastly, behavioral economics research (Shiller, 1981, 2003; Shiller & Perron 1985) suggests that sometimes emotion, rather than economic fundamentals, may drive investor decisions and lead to both speculative bubbles and busts that are disconnected from the economic reality emphasized by passive investment strategies. Supporters of active investment strategies say each of these factors detract from consistently efficient investment markets and open possibilities for managers with special insights and knowledge to earn above-average investment returns, even on a risk-adjusted basis.

Empirical support for an active management strategy has come from Shiller (1981, 1990), who calculated that actual market movements are too volatile to be consistent with efficient markets. Shiller and Campbell (1988) showed a predictable link between real earnings and stock prices. In a series of publications, Lo & MacKinlay (1988, 1990, 1998) also rejected efficient markets and passive investment strategies by illustrating predictable patterns in investment returns that occur even without the assumption of the market over-reaction posited by Shiller. Kaushik (2013) demonstrated investing in international equities may benefit from active investment management, Morningstar (2012) argued active investment strategies may be necessary to include the benefits of private equity and hedge fund investments, and Li (2010) found active investment management generated superior returns in bear markets before adjusting for risk, but higher risk-adjusted returns in bull markets and in specific sectors such as communications, metals, and currencies.

### **State Pension Fund Performance and Alternative Portfolios**

Data were collected on the investment performance of state pension funds for three time periods, two five-year periods (2003-2007 and 2008-2012), and one ten-year period (2003-2012). The source of the data was either the state's *Comprehensive Annual Financial Report* or the state pension fund's *Annual Financial Report*. For each of the three periods, the average annualized after-fee rate of return was reported for the state pension fund. The annualized rates of return were reported separately for the 41 states using a July 1 to June 30 fiscal year and the five states using a calendar (January 1 to December 31) fiscal year. Four states (Alabama, Michigan, New York, and West Virginia) either use an alternative fiscal year or did not have readily available data. They are omitted

from the analysis. The analysis was performed separately for the 41 states using the July 1 to June 30 fiscal year and for the 5 states using the January 1 to December 31 fiscal year.

Table 1 shows the annualized after-fee rates of return for the three time periods for the states using the July 1-June 30 fiscal year, and Table 2 shows the same for the states using the calendar (January 1- December 31) fiscal year. The two time periods (2003-2007 and 2008-2012) represent distinct investment periods. The annualized rates of return are highest during the 2003-2007 period. This was a time of economic growth, led by a rebound following the 2001 recession and substantial gains in the real estate market. In contrast, annualized rates of return are low in the 2008-2012 period. This five-year span included the Great Recession, when most investment markets suffered, as well as the initial years of the slow recovery from the Great Recession. The equity markets declined until early 2009 and then sharply rebounded. The real estate market dropped and then make a modest recovery. Interest rates plunged early in the period and remained at historic lows. The ten-year 2003-2012 encompasses both periods and therefore shows performance over years spanning economic expansions and contractions. Table 3 compares the investment conditions in the time periods as measured by the percentage change in the S&P 500 Stock Index, the percentage point change in the 10-year (constant maturity) Treasury note rate, and the percentage change in the S&P Case-Shiller housing price index.

Three alternative passive management portfolios were constructed to compare to the investment returns achieved by the states' active management. The first is termed the "Lazy Man's" portfolio (Bogle 2007, 2010, 2011; Larimore, Lindauer, Ferri, & Dogu 2009). Inspired by John Bogle, founder of the Vanguard Group of mutual funds, the portfolio consists of a 60% stock, 40% bond split in three categories: domestic stocks (42% of total portfolio), international stocks (18% of portfolio), and bonds (40% of portfolio). The division of the stock investment between domestic and foreign follows findings that such a combination gives enhanced benefits from diversification (Bhargava, Konku, & Malhotra 2004). The focus on only stocks and bonds reflects the viewpoint that the division between these two categories is the major investment decision (Siegel, 2002).

The second alternative package is the "Gone Fishin'" portfolio (Green, 2008). It includes ten investment categories designed to span a variety of uncorrelated asset classes and therefore give higher risk-adjusted returns. Specifically, the portfolio

**Table 1. Annualized After-Fee Rates of Return for State Pension Plans for States Using a July 1-June 30 Fiscal Year (%).**

State	2003-2007	2008-2012	2003-2012
Alaska	11.5	0.9	6.1
Arizona	11.0	1.8	6.3
Arkansas	12.1	1.0	6.8
California	12.7	-0.1	6.1
Connecticut	11.1	1.3	6.1
Delaware	11.4	3.9	7.6
Florida	11.5	1.6	6.4
Georgia	8.5	2.9	5.7
Hawaii	10.1	1.5	5.7
Idaho	12.8	2.1	7.3
Illinois	10.8	0.2	5.2
Indiana	11.8	0.2	5.8
Iowa	11.6	3.2	7.3
Kansas	12.3	1.9	6.9
Kentucky	8.5	2.6	5.5
Louisiana	12.4	2.4	7.3
Maine	11.3	1.5	6.3
Maryland	11.3	0.8	5.9
Massachusetts	14.3	0.6	7.2
Minnesota	11.9	2.3	7.0
Mississippi	11.4	1.3	6.2
Missouri	13.3	31.0	8.1
Montana	11.0	1.2	6.0
Nebraska	14.0	1.5	7.6
Nevada	10.0	2.5	6.2
New Hampshire	10.4	1.8	6.0
New Jersey	10.5	2.5	6.4
New Mexico	11.7	-0.3	5.5
North Carolina	10.3	2.6	6.4
North Dakota	13.3	0.3	6.6
Oklahoma	10.9	2.8	6.8
Oregon	13.4	1.8	7.4
Rhode Island	11.7	1.2	6.3
South Carolina	8.6	1.5	5.0
South Dakota	13.8	2.0	7.7
Tennessee	8.3	3.1	5.7
Texas	11.5	2.1	6.7
Vermont	11.1	2.3	6.6
Virginia	12.8	0.8	6.6
Washington	13.1	1.2	7.0
Wisconsin	12.3	2.1	7.1

Source: State Comprehensive Annual Financial Reports; Annual Financial Reports of State Retirees' Pension Plans.

**Table 2. Annualized After-Fee Rates of Return for State Pension Plans for States Using a January 1-December 31 Fiscal Year (%)**

State	2003-2007	2008-2012	2003-2012
Colorado	14.5	2.6	8.4
Ohio	13.9	2.8	8.2
Pennsylvania	17.5	0	8.4
Utah	13.8	3.0	8.3
Wyoming	11.5	1.9	6.6

Source: State Comprehensive Annual Financial Reports; Annual Financial Reports of State Retirees' Pension Plans.

**Table 3. Investment Conditions during the 2003-2007, 2008-2012, and 2003-2012 Periods**

	2003-2007	2008-2012	2003-2012
Percentage Change in S&P 500 Index	35.6	-19.3	9.4
Percentage Point Change in 10-Yr. T-Note Rate	0.2	-2.1	-1.9
Percentage Change in S&P Case-Shiller House Price Index	26.3	0.8	27.3

Source: Federal Reserve Bank of St. Louis, Federal Reserve Economic Data (FRED). Beginning value is measured on January of the beginning year, and ending value is measured on December of the ending year.

has 15% of the funds invested in a broad domestic stock market collection, 15% in a domestic small cap (capitalization) stock collection, 10% in an emerging market stocks, 10% in European stocks, 10% in Pacific country stocks, 10% in high-yield corporate bonds, 10% in short-term investment grade bonds, 10% in inflation-protected securities, 5% in real estate investments, and 5% in precious metals and mining investments.

The third portfolio can be viewed as a combination of the first two. Recommended by long-time investment analyst and economist Burton Malkiel (2011), author of the book *A Random Walk Down Wall Street*, there are five components. Three of the five components are bonds (33% of total portfolio), domestic stocks (27% of total portfolio), and developed foreign country stocks (14% of total portfolio). These three components mirror the Lazy Man portfolio. The other two components borrow from the Gone Fishin' portfolio, with 14% devoted to stocks from emerging market countries and 12% to real estate.

The three passive strategy portfolios were operationalized using low-fee mutual funds from the Vanguard Group. Where available for a specific fund, Vanguard's lowest fee funds for large investment amounts, termed Admiral Funds, were utilized. These fees are typically one-tenth of the average management fees paid by state pension funds (Hooke & Walters, 2013). Otherwise, Vanguard's standard fees were subtracted. Table 4 gives the names of the funds for each portfolio as well as the funds' share allocations. It is assumed

the share allocations are maintained each year, meaning portfolios are rebalanced quarterly to keep the designated allocations. Without rebalancing, the allocation to each investment class can deviate from the desired allocation, thereby reducing the specified diversification among asset classes.

Annualized after-fee rates of return for each of the three alternative portfolios were calculated individually for the two fiscal year categories. For the July 1 to June 30 fiscal year, annual returns are defined from the 3rd quarter in the first year of the fiscal year through the 2nd quarter in the second year of the fiscal year; for example, the annual return for fiscal year 2003 is based on 3rd quarter of 2002 through 2nd quarter of 2003. For the January 1 to December 31 fiscal year, annual returns are simply based on the calendar year.

### State Pension Fund Returns versus Passive Investment Strategy Portfolio Returns

Table 5 gives the results comparing the performance of state pension funds to the performance of the alternative passive investment strategies for states using the July 1 to June 30 fiscal year, and Table 6 reports the same comparisons for states using the calendar year as their fiscal year. It is important to note the comparisons are not adjusted for the risk levels of the portfolios, as the information necessary to calculate standard risk measures (Sharpe's ratio, beta) were not available from the state pension plans.

**Table 4. Alternative Low-Fee Investment Portfolios**

Fund (Vanguard ticker symbol)	Lazy-Man	Gone-Fishin'	Malkiel
<b>Stocks</b>			
Total Stock Market Index (VTSMX)	42%	15%	27%
Total International Stock Index (VGTSX)	18%		
Small Cap Index (NAESX)		15%	
Emerging Markets Stock Index (VEIEX)		10%	14%
European Stock Index (VEURX)		10%	
Pacific Stock Index (VPACX)		10%	
Developed Markets Index (VDMIX)			14%
<b>Bonds</b>			
Total Bond Market Index (VBMFX)	40%		33%
High-Yield Corporate Fund (VWEHX)		10%	
Short Term Investment Grade Fund (VFSTX)		10%	
<b>Alternatives</b>			
Inflation Protected Securities (VIPSX)		10%	
Real Estate Investment Trust (VGSIX)		5%	12%
Precious Metals and Mining (VGPMX)		5%	

**Table 5. Comparative Public Pension Performance for States Using a July 1 – June 30 Fiscal Year (41 States)**

	2003-2007	2008-2012	2003-2012
<b>Annualized Rate of Return</b>			
State average	11.50%	1.70%	6.50%
Lazy-Man	9.30%	2.20%	5.60%
Gone-Fishin'	17.10%	1.10%	8.60%
Malkiel	14.50%	2.00%	7.90%
State average – Lazy-Man	2.2% pts.	-0.5% pts.	0.9% pts.
State average – Gone Fishin'	-5.6% pts.	0.6% pts.	-2.1% pts.
State average – Malkiel	-3% pts.	-0.3% pts.	-1.4% pts.
# States Beating Lazy-Man (% in parentheses)	37 (90%)	13 (32%)	37 (90%)
# States Beating Gone-Fishin' (% in parentheses)	0 (0%)	30 (73%)	0 (0%)
# States Beating Malkiel (% in parentheses)	0 (0%)	16 (39%)	1 (2%)

During the growing economy of the 2003-2007 period, the Lazy-Man portfolio performed poorly against the state pension funds' returns, underperforming the average state return by over 2% points in both fiscal year categories. Ninety percent of the states using the July 1- June 30 fiscal year beat the Lazy-man portfolio during this period, and the success rate was 80% for states using the calendar fiscal year. However, the returns from the more complex Gone-Fishin' and Malkiel portfolios beat the state pension funds during the same time span. The average return from the Gone Fishin' portfolio beat the states' average return by over 5% points in both fiscal

year classifications, and for the Malkiel portfolio the winning margin was 3% points for the July 1- June 30 fiscal year states and 1% point for the calendar fiscal year states. None of the states following the July 1- June 30 fiscal year had average annualized returns better than the Gone-Fishin' or Malkiel portfolios, none of the states using the calendar fiscal year beat the Gone-Fishin' portfolio, and only one such state beat the Malkiel portfolio.

The comparisons are more complex for the 2008-2012 period, when the economy was experiencing the Great Recession and

**Table 6. Comparative Public Pension Performance for States Using a January 1-December 31 Fiscal Year (5 States)**

	2003-2007	2008-2012	2003-2012
Annualized Rate of Return			
State average	14.30%	2.10%	8.00%
Lazy-Man	11.90%	2.80%	7.10%
Gone-Fishin'	19.60%	2.40%	10.50%
Malkiel	15.50%	2.70%	8.70%
State average – Lazy-Man	2.4% pts.	-0.7% pts.	0.9% pts.
State average – Gone Fishin'	-5.3% pts.	0.3% pts.	-2.5% pts.
State average – Malkiel	-1.2% pts.	-0.6% pts.	-0.7% pts.
# States Beating Lazy-Man (% in parentheses)	4 (80%)	1 (20%)	4 (80%)
# States Beating Gone-Fishin' (% in parentheses)	0 (0%)	3 (60%)	0 (0%)
# States Beating Malkiel (% in parentheses)	1 (20%)	2 (40%)	0 (0%)

the subsequent economic recovery. First, the margins between the portfolios are much narrower than in the earlier period, with all the differences being under 1% point. The average returns from the Lazy-Man and Malkiel portfolios were better than the state pension funds' average return in both fiscal year classifications, while the opposite was the case for the Gone-Fishin' portfolio. This translates into 32% of the states using a July 1- June 30 fiscal year having returns beating the Lazy-Man portfolio, 73% having returns beating the Gone-Fishin' portfolio, and 39% with returns besting the Malkiel portfolio. The comparisons are similar for states using the calendar fiscal year: 20% of states beat the Lazy-Man portfolio, 60% of states beat the Gone-Fishin' portfolio, and 40% of states bested the Malkiel portfolio.

The comparisons for the entire 2003-2012 period are a composite of the results for the two five-year periods. Because the margins between the portfolios are much greater for the 2003-2007 period compared to the 2008-2012 period, the results for the earlier five-year period dominate the findings for the entire ten-year time span. The state pension funds' returns beat the returns from the Lazy-Man portfolio by 0.9% points in both fiscal year classifications. Conversely, the Gone-Fishin' portfolio's average returns beat the state pension average returns by approximately 2% points in both fiscal year classifications, and the margin for the Malkiel portfolio was near 1% point in the two fiscal year categories. These results meant 90% of the state pension funds' average returns exceeded the average return from the Lazy-Man portfolio for the ten-year period in the July 1-June 30 fiscal year

comparison and 80% beat the Lazy-Man portfolio in states using the calendar fiscal year, but none of the states bested the Gone-Fishin' return and only 1 of the 5 states using the calendar July 1- June 30 fiscal year beat the Malkiel return.

There are three general conclusions from this analysis. First, the investment returns of state pension funds fared better against the simpler Lazy-Man portfolio but not as well against the more diversified Gone-Fishin' and Malkiel portfolios. One explanation for this result might be the latter two portfolios' greater exposure to higher risk and higher return investments in emerging and developing markets, high-yield corporate bonds, real estate, and metals. Second, the state pension funds did better against the alternative passive investment strategies in the 2008-2012 period (which included the Great Recession) than in the 2003-2007 period. This conclusion is consistent with the general finding that investment fund performances differ during periods of economic growth and periods of economic decline (Ewing and Malik 2000). The conclusion is also compatible with the specific findings that active investment management may add value during periods dominated by economic recessions (Fortin and Michelson, 2002; Moskowitz, 2000). But overall, investing in a broad, diversified set of low-fee investments like those in the Gone-Fishin' and Malkiel portfolios provided better returns than those from the actively-managed investments of state pension funds.

## Passive Management and Long-Run Public Pension Viability

Novy-Marx and Rauh (2014) recently presented a sobering assessment of the long-run financial viability of state public pension plans. Using a model that projected the future revenues and liabilities (payments to retirees) of the plans, and assuming no policy changes to the plans, Novy-Marx and Rauh found that all states would require new revenues above those projected in order to fully fund their liabilities over the next 30 years. For all states, the new revenues averaged 1.2% of GSP (gross state product) and translated to \$1385 per household in real present-value terms. However, there was a significant range among states, between a high of 1.9% of GSP and \$2250 per household and a low of 0.3% of GSP and \$329 per household.

In developing their forecasts, Novy-Marx and Rauh assumed state pension fund investments would grow at a real (after-inflation) annual rate of 1.7% (the 21 year coupon TIPS yield on December 2010). With an average annualized inflation rate of 2.5% from 2003 to 2012 (U.S. Bureau of Labor Statistics 2014), the results in Tables 5 and 6 suggest both higher real rates for all four portfolios as well as higher real rates from the Gone-Fishin' and Malkiel portfolios than from the actual state performance over the 2003-2012 time period. Indeed, using the results for the 2003-2013 period from the 41 states in Table 5, the implied average real rate return for the Gone-Fishin' portfolio exceeds the real rate from the state average by a factor of 1.5 (6.1% compared to 4.0%), and for the Malkiel portfolio the factor is 1.4 (5.4% compared to 4.0%). These findings suggest that one benefit of moving state pension funds to low-fee, diversified passive investment plans such as those represented by the Gone-Fishin' and Malkiel portfolios might be a reduced need to provide additional revenues to meet future pension liabilities.

To see how such a portfolio change could benefit state pension funds, the following procedure was used. Using the 2003-2012 period and an annual inflation rate of 2.5% (the average annual Consumer Price Index inflation rate for the 30 year period from 1983 to 2013), real annualized investment rates of return were calculated for each state's actual pension performance and for the Gone-Fishin' and Malkiel portfolios. The real rates of return for the Gone-Fishin' and Malkiel portfolios were averaged. The proportional difference between the averaged Gone-Fishin'/Malkiel real return to the state's real return was then calculated. This proportional difference—which was positive for each state—was used to adjust (increase) the Novy-Marx/Rauh 1.71% real return and

derive an estimated real return using the passive investment strategy portfolios. The new real return for each state was then used to derive estimates of the savings in GSP and household payments (from Novy-Marx/Rauh) necessary to meet 30-year obligations. Novy-Marx/Rauh provide required revenue increases by state based on their assumption of a 1.7% annual real rate of return. However, they provide aggregate revenue requirements for all states combined for other annual real returns, and the relationship between the total revenue needs and the annual real return is approximately linear. The results in Table 7 are based on this linear relationship.

The savings in Table 7 are given in two forms—the savings in the percent of GSP needed to supplement the state pension plan, and the percentage in the per household present value payment necessary to supplement the state pension plan. Recognizing the limitations behind making the thirty year projections—especially a projection based on a ten-year analysis—the results in Table 7 suggest use of a low-fee, diversified mutual fund portfolio would help, but not eliminate, the looming sustainability issue for most funds during the next three decades. All funds would require fewer new contributions from taxpayers in order to remain solvent. Using Novy-Marx/Rauh as the baseline, the necessary contribution measured as a percent of GSP would fall by an average of 0.23% points, and as measured by the present value of household tax payment, such payments would fall by an average of 22%. However, there is considerable variation by state, with the largest savings measured by GSP being 0.81% for South Carolina, and lowest at 0.02% for Missouri. Measured by the savings in household tax payments, taxpayers in South Carolina would see these payments fall by 62%, while those in Missouri would only enjoy a tax reduction of only 1.3%.

## Conclusions

State public pension plans are a key part of the nation's retirement system. Yet they face two crucial and interrelated issues. One is their record of investment management and investment returns. State pension plans must address the question of whether paying for an active investment strategy provides improved returns over a less costly strategy of passive investment management. The second issue is the apparent underfunding of pension liabilities in every state. The issues are interrelated because the investment rate of return earned by states clearly affects the level of pension liability underfunding. To the extent that states can earn a higher after-fee rate of return, pension liability underfunding is reduced.



**Table 7. Estimated Savings in Additional State Resources Needed to Meet 30-Year Pension Obligations from Using a Low-Fee Diversified Portfolio**

State	As % of GSP	As % Reduction in HH Taxes	State	As % of GSP	As % Reduction in HH Taxes
Alaska	0.23	28.8	Montana	0.28	30.8
Arizona	0.15	24.2	Nebraska	0.04	6.10
Arkansas	0.10	16.4	Nevada	0.18	26.1
California	0.42	28.2	New Hampshire	0.27	30.3
Colorado	0.12	9.50	New Jersey	0.31	22.4
Connecticut	0.26	28.6	New Mexico	0.76	42.3
Delaware	0.04	6.10	North Carolina	0.16	22.8
Florida	0.18	21.9	North Dakota	0.15	18.5
Georgia	0.30	37.6	Ohio	0.23	11.9
Hawaii	0.37	36.6	Oklahoma	0.13	16.7
Idaho	0.08	9.40	Oregon	0.15	7.80
Illinois	0.80	53.3	Pennsylvania	0.13	9.50
Indiana	0.11	35.0	Rhode Island	0.17	24.2
Iowa	0.06	9.0	South Carolina	0.81	62.2
Kansas	0.14	14.1	South Dakota	0.03	5.0
Kentucky	0.56	43.2	Tennessee	0.31	38.4
Louisiana	0.08	9.40	Texas	0.19	17.5
Maine	0.19	24.2	Utah	0.05	10.5
Maryland	0.20	32.9	Vermont	0.21	19.0
Massachusetts	0.08	10.2	Virginia	0.15	18.5
Minnesota	0.20	13.2	Washington	0.14	13.8
Mississippi	0.34	26.2	Wyoming	0.41	34.3
Missouri	0.02	1.30	Wisconsin	0.17	11.9
<b>Average</b>	<b>0.23</b>	<b>22</b>			

Source: Author's calculations using Novy-Marx/Rauh (2014) as the baseline.

Using data from state pension funds for the decade 2003 to 2012, this study finds that states could both improve their annualized after-fee rate of return and reduce prospective underfunding of pension commitments by shifting from managed portfolios to low-fee, diversified portfolios provided by mutual funds. However, this result only occurs for alternative portfolios that are broader than a standard stock/bond combination. The alternative portfolios need to be diversified to explicitly include geographic markets (such as emerging and Pacific) and sector markets (such as energy, real estate, and metals), therefore potentially implying greater risk than some state pension plans now take.

An added benefit of such a shift in investment strategy could be greater transparency for pension members and reduced chances of fraud or mismanagement of pension funds. In some states, public pension plan members have questioned

the availability of investment data, investment fees, and the relative benefits of paying for active management (Corkery, 2013; Morgenson, 2013; State Employees Association of North Carolina, 2014). Compared to the challenge of understanding the complex system of actively managed investments commonly used by state pension funds, a simplified investment portfolio of publicly known mutual funds could reduce such concerns, make it much easier for pension managers to be transparent, and enhance the ability of pension plan members to track performance and costs.

In other states officials involved in state pension fund management have been indicted for fraud, while questions have been raised in some states about the costs and ethics of public pension investment practices (Bleed, 2014; Walsh, August 2010; North Carolina Department of the Treasurer, 2013). The issue arises from the possibility of a linkage

between selection of professional pension fund managers and campaign contributions or other favors for pension fund directors. That is, an investment management firm selected to invest pension funds may—in turn—contribute to the elected public official's campaign or provide other paybacks. The use of low-fee mutual funds as pension fund investments could reduce the potential for such conflicts.

The findings reported in this paper should certainly not be considered a full test of the active versus passive management debate applied to state pension funds. It may be that directors of state pension funds have simply selected poor active investment managers. Or, it could be the case that legislated state restrictions on how state pension funds are invested inhibit the ability of investment managers to earn competitive returns. The time period of the analysis is one decade. Lengthening the time period of the analysis will reduce uncertainty about the relationship between the portfolio composition of state pension plans and rates of return by including market conditions that may not have been present during the 2003-2012 period. Lastly, the results do not account for the risk levels of the portfolios. All of these issues are topics for future investigation.

There are clear implications from the paper for workers and retirees covered by state pension funds. The paper certainly raises questions about how state pension fund investments are managed, and whether the current preference for active management is yielding the highest after-fee returns for workers. Therefore, it is in workers' and retirees' interests to understand the investment strategy of their state pension fund and to investigate alternative strategies that might provide improved long-run after-fee returns.

Although the paper's results apply to state pension plans, there are also implications for individual investors and financial planners and counselors. Like state pension fund managers, individual investors face the same issue about active versus passive investment strategies. The findings reported in this paper can be considered a test of these approaches during the volatile 2003-2012 period that both individuals and financial counselors can evaluate. Investment education programs (Grinstead, Mauldin, Sabia, Koonce, and Palmer, 2011; Prawitz & Cohart, 2014; Robb & Woodyard, 2011), especially those targeting individuals more likely to pay for financial advice like women and the elderly (Finke, Huston, and Winchester, 2011), can use the results of this study as evidence that active management did not beat passive management during the 2003-2012 period. For households preferring to

follow a passive management approach, the study can be used to highlight questions and issues (fees, ability to perceive turning points in the investment markets) that financial counselors should address with this approach.

As the nation's population ages and time in retirement expands, the financial condition of state public pension funds becomes more important. This paper has investigated one element of state pension funds—how they are invested. The findings support the arguments made by the passive investment management approach—that simple is better, and that aspiring to “beat the market” was unsuccessful from 2003 to 2012. Indeed, the public pension fund in Montgomery County, Pennsylvania has already decided to take the passive management approach by investing in diversified, low-cost mutual funds (Corkery and Grind, 2103). Yet, this is certainly not the last word on the topic.

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