MEMORANDUM

Montana Board of Investments
Department of Commerce
2401 Colonial Drive, 3rd Floor
Helena, MT 59601 (406) 444-0001

To: Board Members

From: Carroll South, Executive Director

Date: August 11, 2009

Subject: Pensions and Investments

The state administers nine defined benefit retirement systems (Systems). This report focuses on the Public Employees' and Teachers' Retirement Systems (PERS/TRS) – the two largest and most mature Systems. The report discusses the implications of negative cash flows on the Systems, the theoretical and practical application of normal cost calculations, and the impact of the recent financial market trauma on the Systems. These issues all have important implications for the long term viability of the Systems. All benefit, contribution, and demographic statistics are extracted from the June 30, 2008 actuary valuations of the Systems. The June 30, 2009 actuarial valuations will not be completed until later this year. All references to years in the report refer to the state fiscal year, beginning July 1 and ending June 30.

What is a Defined Benefit Retirement System?

A defined benefit retirement System "defines" or sets the level of retiree lifetime benefits. Defined benefit retirees are not at risk of "outliving" their benefits and their benefit payments are not impacted by financial market volatility. The employer assumes all funding risks for a defined benefit system. By contrast, a defined "contribution" plan sets the contribution levels of employees and employers but does not set or guarantee benefits upon retirement. The level of benefits employees enrolled in a defined contribution plan will receive is entirely dependent upon the level of contributions and the investment earnings on those contributions. New employees in the PERS may choose either a defined benefit or defined contribution plan.

Who Manages the Defined Benefit Retirement Systems?

Four state entities share responsible for managing the defined benefit Systems. The **Public Employees' Retirement Board** administers eight of the nine Systems, while the **Teachers' Retirement Board** administers the TRS. The Retirement Boards are responsible for the day-to-day management of the Systems, collecting contributions, paying benefits, accepting new employers in the Systems, and resolving conflicts/issues that may occur. They also determine the assumptions that are used by the actuaries to calculate the soundness of the Systems and are responsible for recommending revisions to the legislature that may be necessary to maintain the actuarial soundness of the Systems. The assets of the defined benefit Systems are a part of the Unified Investment Program created by the state constitution and are invested solely by the **Board of Investments.** The **Legislature** plays a major role

in driving the costs and actuarial soundness of the Systems by setting the benefit formulas and establishing the employee/employer contribution rates necessary to fund the benefits.

How is a Defined Benefit Retirement System Funded

Benefits are funded from employee/employer contributions plus investment income from System assets. Employee/employer contributions are set by law as a percentage of salaries and may only be changed by the legislature. Future contributions to the Systems are estimated by applying the approved percentage of salaries to the projected growth of the payroll in each System. Future cash flow from investment income is estimated as an annual percentage of System assets.

How Are Defined Benefit Retirement System Assets Generated?

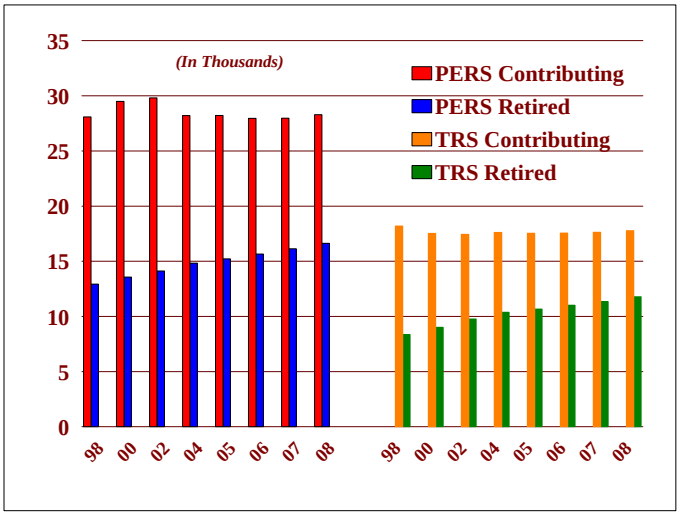
Defined benefit System assets are generated by "positive" cash flow – the excess of contributions received over benefits/expenses paid – plus investment income not used to pay benefits. When a defined benefit retirement system is created, the employer and employees begin contributing to the system and since there are no retirees drawing benefits in the early years, the contributions accumulate and are invested. Even after the original employees begin to retire there will be positive cash flow because there will be more contributing employees than retirees collecting benefits. The positive cash flow will continue to build the assets into a "nest egg" used to pay benefits for employees not yet retired. As long as contributions exceed benefits paid, the income on the assets are reinvested and add to the growth of the assets. However, as defined benefit systems mature, the ratio of retirees to contributing employees increases and the positive cash flow eventually turns "negative" – benefit payments exceed contributions. When this occurs, a portion of investment income must be used to pay benefits and is not available for reinvestment in the pool of assets.

How Does Negative Cash Flow Impact the Systems?

The TRS actuary writes this about negative cash flow in the 2008 actuarial valuation:

> ***"The fundamental equation for funding a retirement system is that benefits and administrative expenses must be provided for by contributions (past and future) and investment income. When a retirement system matures, benefits and administrative expenses often exceed contributions. In this case we say the system has a "negative cash flow." Mature systems are characterized by negative cash flows and large pools of assets. This is natural. Actuarial funding is designed to accumulate large pools of assets which will in turn provide investment income and finance negative cash flows when systems mature. If the fund is looked at as a whole, investment income is usually larger than the difference between contributions and benefit payments. The retirement system's investment strategy should maximize potential returns at a prudent level of risk while providing for needed cash flows."***
>
> ***"In the year ended June 30, 2008, the System's benefits and administrative expenses exceeded contributions by $63 million. At the current contribution rates, benefits and administrative expenses are projected to continue to exceed contributions in future years, and this deficit is projected to increase to $151 million for the year ending June 30, 2018. As long as the System had a positive cash flow, there was no need to plan where the funds would come from to pay benefits since benefits could be paid by incoming contributions. A negative cash flow, as defined above, requires planning what funds will be used to pay the difference between benefits and contributions. We are providing these projections to aid in developing the investment strategy for the System's assets.***

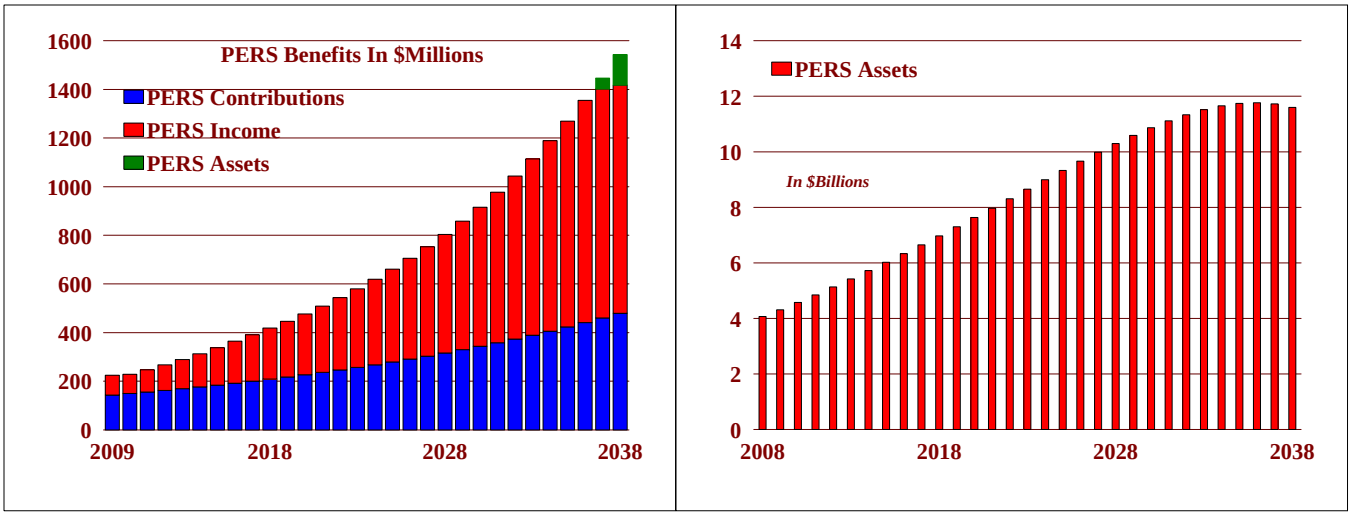
Negative cash flow will continue to grow as the Systems mature and the ratio of retirees to contributing employees increases. During the last 11 years, the number of active employees has remained fairly constant in both Systems, while the number of retirees has increased steadily. The number of PERS retirees increased nearly 29 percent, while TRS retirees drawing benefits increased 41 percent as depicted in the adjacent chart. During the past eight years, PERS benefit payments have increased at an annual rate of 7.62 percent. TRS benefit payments increased 7.31 percent annually.



Once systematic negative cash flow begins, the only revenue available to "grow" the assets is income generated by the assets. If the negative cash flow continues to grow at a faster rate than investment income, at some point in the future all investment income will be used to pay benefits. Once negative cash flow exceeds investment income, assets will have to be sold to pay benefits and the pool of assets will begin to shrink as will the income generated by the assets.

The projections in the charts below are based on the following assumptions for the PERS

- Actuarial assets of $4.0653 billion as calculated in the June 30, 2008 actuarial valuation
- Payroll growth of 4.25% annually as adopted in the actuarial valuation
- Contributions as set by the 2007 Legislature at 14.03% of payroll
- Investment earnings of 8.0% annually
- Benefit/administrative cost growth of 6.87% annually



The left chart shows the PERS projected benefit/administration costs and the sources used to fund them. By 2037, all available asset income would be used to pay benefits, at which time it would be necessary to begin liquidating assets. The right chart depicts the projected growth in the PERS assets during the same period. The asset pool growth slows each year as an increasing amount of income is used to pay benefits and is not reinvested. While these charts are based on assumptions that project far into the future, they are intended to show that if negative cash flow continues to grow at a faster rate than income

earned on the assets, it is only a matter of time until all asset income is used to pay benefits. Once this occurs, assets must be sold to pay benefits and the will begin to shrink along with the investment income. The premise on which a mature system is based is that the pool of assets should be of sufficient size to generate income adequate to fund that portion of benefits not paid for by contributions. However, if historical contributions rates have been too low to adequately fund future benefits, the pool of assets built by the contributions may be insufficient.

Eventually, the Board's asset allocation process will likely be impacted by long-term negative cash flow. Currently, the asset allocation process is driven by the annual return assumptions adopted by the retirement boards; 8.0 percent for the PERS and 7.75 percent for the TRS. The Board's consultant conducted an asset/liability study of both plans to determine the optimal asset mix to meet the return assumptions. The asset mix was based on projected "total rate of return," which includes income and price appreciation/depreciation. While this calculation measures how well the Board is meeting the assumption targets and permits comparisons to Board peers, retirement benefits cannot be paid with "total return." Benefits are paid from reliable, predictable cash deposited in the System accounts, most of which will be derived from interest and dividends. At some point in the future, the need for cash will require that the Board increasingly consider liquidity and cash income as well as total rate of return.

What is an Unfunded Liability?

An unfunded liability exists when the Systems' actuaries calculates that the present value of liabilities exceeds the assets available to fund the liabilities. State law defines this status in 19-2-303(48), MCA:

> ***"Unfunded actuarial liabilities" or "unfunded liabilities" means the excess of a defined benefit retirement plan's actuarial liabilities at any given point in time over the value of its cash and investments on that same date."***

For the Systems to be considered actuarially sound the unfunded liability must be amortized by a stream of contributions in 30 years or less as defined in 19-2-405(4) (a), MCA:

> ***'The unfunded liability contribution rate, which is entirely funded by a portion of the required employer contributions to the retirement plan, must be calculated as the level percentage of current and future defined benefit plan members' salaries that will amortize the unfunded actuarial liabilities of the retirement plan over a reasonable period of time, not to exceed 30 years, as determined by the board."***

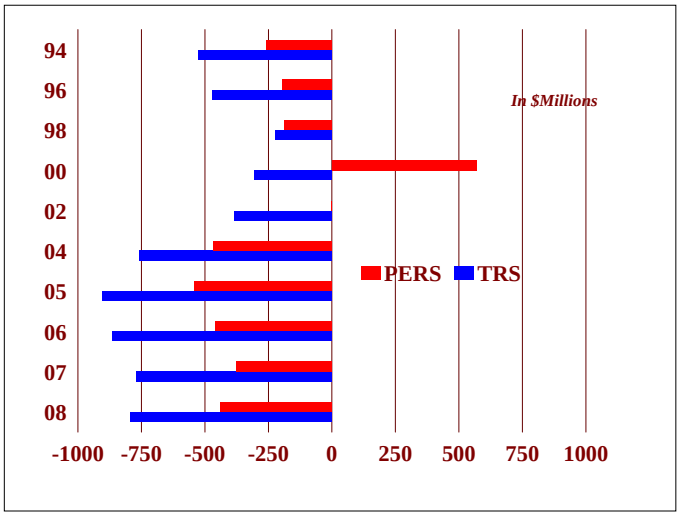
The adjacent table shows the unfunded liabilities for the PERS/TRS in millions as of June 30, 2008 and the contribution rates as of July 1, 2009. Basing the System's actuarial soundness on the estimated time required to amortize any unfunded liability is problematic for two reasons.

Unfunded Liability	**PERS**	**TRS**
Unfunded Liability	439.40	794.60
Years to Amortize	24.80	31.30
Contribution Rates		
Employers *	7.17%	7.47%
Employees	6.90%	7.15%
General Fund *		2.49%
Total	**14.07%**	**17.11%**
Normal Cost	12.13%	10.87%
Unfunded Liability	1.90%	6.24%
Education	0.04%	
Total	**14.07%**	**17.11%**

* General Fund assists local entities in the PERS.

First, the unfunded liability is a moving target that changes annually based on revised liabilities and investment results. Second, the portion of contributions allocated to amortize the unfunded liability may change annually as the Systems' actuaries revise future liabilities. If the actuary increases the normal cost rate, the contribution allocated to amortizing the unfunded liability will be reduced, thereby increasing the time required to amortize the unfunded liability – even if the unfunded liability is unchanged.

It appears that liabilities have been historically understated based on the relationship of unfunded liabilities to the investment return on assets. From June 30, 1994 through June 30, 2008, the return on assets in both Systems was in excess of the actuarial assumptions but yet the unfunded liabilities grew during the period as depicted in the adjacent chart. The growth occurred despite the fact that the legislature appropriated $150 million to TRS and $25 million to PERS to increase the pool of assets. One anomaly in the chart is the PERS actuarial "surplus" in 2000 – a surplus that would soon disappear as a result of benefit enhancements and a stock market meltdown. Between 2000 and 2004 the "surplus" turned to an unfunded "liability," with a change of more than $1 billion, which represented 36 percent of PERS assets in 2000.



What are Normal Cost Calculations?

An employer creating a defined benefit retirement system must first set benefit levels and then calculate the level of contributions required to fund the future benefits. In actuarial terms this contribution level is called the "normal cost." The simplest way to explain normal cost is to envision an employer creating a new defined benefit system that is limited to only the employees working for the firm at the time the plan is created (a closed system). After the benefit levels are set, the contributions required to fund the benefits are calculated as a percentage of employee salaries that must be set aside each payday and invested to fund future benefits. In theory, if the "normal cost" calculation is correct, after the last benefit payment to the last survivor in the closed system, the invested assets would be completely liquidated.

The PERS actuary writes this about normal cost in the 2008 actuarial valuation:

> ***"A fundamental principle in financing the liabilities of a retirement program is that the cost of its benefits should be related to when they are earned, rather than when they are paid. There are a number of methods in use for making a determination. The funding method used in this valuation is the Entry Age Cost Method. Under this method the actuarial present value of projected benefits for each individual member included in the valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this actuarial present value allocated to a valuation year is called the Normal Cost."***

State law defines the normal cost calculation as follows in 19-2-405(3), MCA.

> ***"The normal cost contribution rate, which is funded by required employee contributions and a portion of the required employer contributions to each defined benefit retirement plan, must be calculated as the level percentage of members' salaries that will actuarially fund benefits payable under a retirement plan as those benefits accrue in the future."***

The normal cost calculation is complicated by several factors. First, the employer must assume the level of annual investment income the contributions will generate until they are needed to pay benefits. Second, an assumption must be made as to how long employees will work before they retire and how long they will draw benefits after retirement. Third, an assumption must be made for salary increases

employees will receive during their working career. Salary increases not only impact contributions made during the employee's career but will also impact benefit levels since they are usually based on the higher salary levels prior to retirement.

Normal Cost Contributions		
Year	**PERS**	**TRS**
2004	12.08%	10.34%
2005	12.12%	10.35%
2006	12.17%	10.37%
2007	12.22%	10.40%
2008	12.13%	10.87%

These calculations will never be exact because future experience cannot be accurately predicted. However, each additional year of actual experience permits the actuary to fine tune the calculation. Since 2004, the percentage of payroll required to fund normal cost as calculated by the actuaries has been revised each year as depicted in the adjacent table. Changes in normal cost calculations will also impact the time it takes to amortize any unfunded liability. For the System to be considered actuarially sound the unfunded liability must by amortized by a stream of contributions in 30 years or less. The contribution levels set by law are based on a maximum percentage of salaries and do not distinguish between the portion of the contribution allocated to normal cost and the portion allocated to amortizing the unfunded liability. If the annual actuarial valuation increases the normal cost, it will simultaneously reduce the portion of the contribution available to amortize the unfunded liability, thereby increasing the time required to amortize the liability.

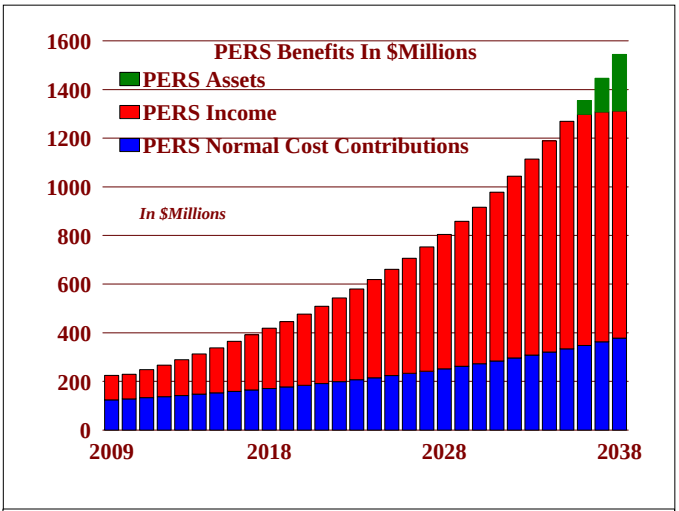
Conceptually, in defined benefit systems, benefit costs should be related to when they are earned, rather than when they are paid. The PERS actuary writes: ***"The purpose of an actuarial valuation is to provide a timely best estimate of the ultimate costs to allocate them to the appropriate generation of members and taxpayers."*** In theory, the normal cost contributions made today on behalf of current employees would be set aside and invested until the employees retire at which time they would begin drawing down the accumulated assets. But in practice, that is not how it works. Contributions and investment income are deposited in the same account and once deposited, each loses its identity. Benefits are paid from cash in the account without regard to the source.

It is possible, however, to ascertain what role the "normal cost" contribution would play in the cash flow of the Systems if it could be isolated from the remainder of the contribution allocated to amortizing the unfunded liability. The preceding graphs depicted the implications of negative cash flow on the PERS using the maximum contribution rate approved by the legislature and projected benefit payments. The same cash flow analysis can be calculated based on the "normal cost" contribution rate if the System were considered to be "fully funded" as of June 30, 2008. This would permit the maximum contribution to be set at the normal cost rate projected by the actuary in the 2008 valuation and would remove from the future cash flow calculation any consideration of an unfunded liability and the contributions required to amortize it.

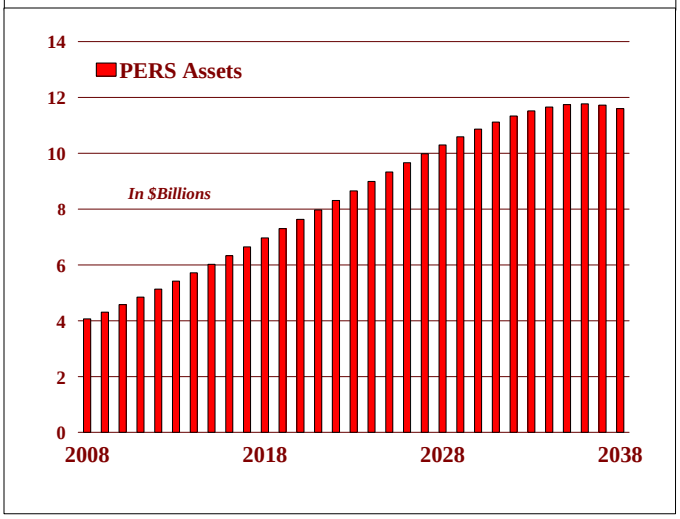
The projections in the following charts are based on the following assumptions for the PERS

- Actuarial assets at the fully funded level of $4.5047 billion as calculated in the June 30, 2008 actuarial valuation
- Payroll growth of 4.25% annually as adopted in the actuarial valuation
- Normal cost contributions as estimated by the PERS actuary gradually declining from 12.099% of payroll to 11.052% of payroll during the 30-year period
- Investment earnings of 8.0% annually
- Benefit/administrative cost growth of 6.87% annually.

The top chart shows the PERS projected benefit/administration costs and the sources used to fund them based on the normal cost contribution rate projected by the actuary. By 2036, all normal cost contributions and income generated by the assets would be used to fund benefits, at which time it would be necessary to begin liquidating assets. The bottom chart depicts the projected growth in the PERS assets during the same period. The asset growth slows each year as an increasing amount of income is used to pay benefits and is not reinvested.

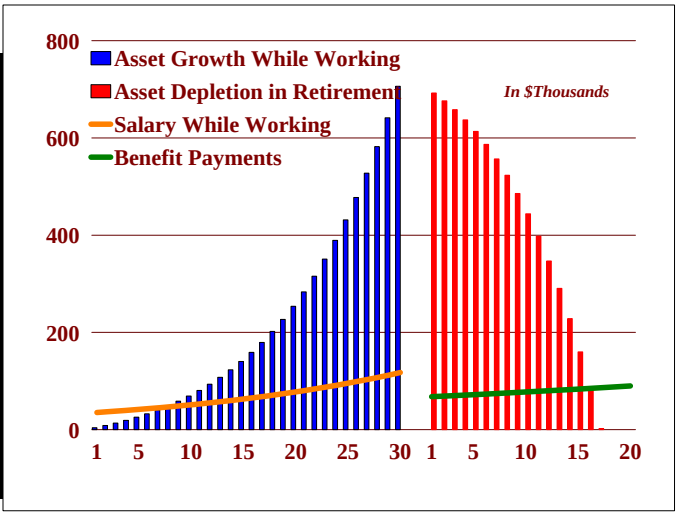


Another way to evaluate the reasonableness and sufficiency of a normal cost rate is to utilize the theoretical concept that the annual normal cost contributions made for average members of the system will be sufficient to fund their retirement benefits. In theory, this means that the next generation will not be paying the benefits for the last generation. The exercise provides an estimate of how many years average members could draw benefits as authorized by the legislature based solely on the normal cost contributions made on their behalf during a working career.



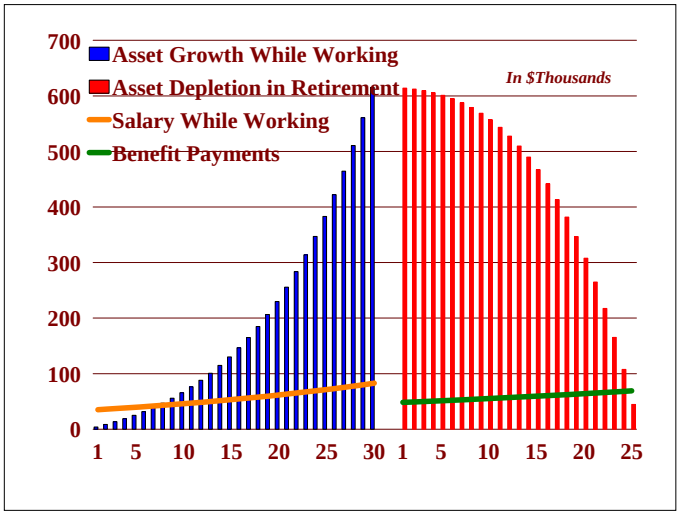
The following charts depict how the normal cost contributions would build a "theoretical" pool of assets during the members' working careers and then be utilized to pay their benefits upon retirement based on the benefit formula authorized by the legislature. The chart below depicts asset growth, asset draw down at retirement, career salary growth, and benefit payments after retirement based on 30 years of service. A normal cost rate of 11.02 percent as estimated by the PERS actuary for members hired after July 1, 2008 would provide sufficient assets at retirement to fund 17 years of benefit payments. Benefit payments are based on the highest 36 consecutive months of salary with a 1.5 percent annual increase as set by law.

Beginning Salary	**$**	**35,143**
Salary at Retirement		**117,502**
Salary Growth		**4.25%**
Normal Cost % of Payroll		**11.02%**
Years of Service		**30.00**
Net Return on Assets		**8.00%**
Assets at Retirement	**$**	**706,402**
Annual GABA		**1.50%**
Highest Average Salary	**$**	**112,777**
Beginning Annual Pension	**$**	**67,666**
Years Funded by Assets		**17**



Salary growth during a career makes a significant difference in the amount of time the accumulate assets would fund member benefits. The graph below depicts the same data with the only change being a 3.0 percent annual growth of salaries during a 30-year career, which would permit the accumulated assets to fund 25 years of benefits.

Beginning Salary	**$**	**35,143**
Salary at Retirement		**82,817**
Salary Growth		**3.00%**
Normal Cost % of Payroll		**11.02%**
Years of Service		**30.00**
Net Return on Assets		**8.00%**
Assets at Retirement	**$**	**615,057**
Annual GABA		**1.50%**
Highest Average Salary	**$**	**80,428**
Beginning Annual Pension	**$**	**48,257**
Years Funded by Assets		**25**



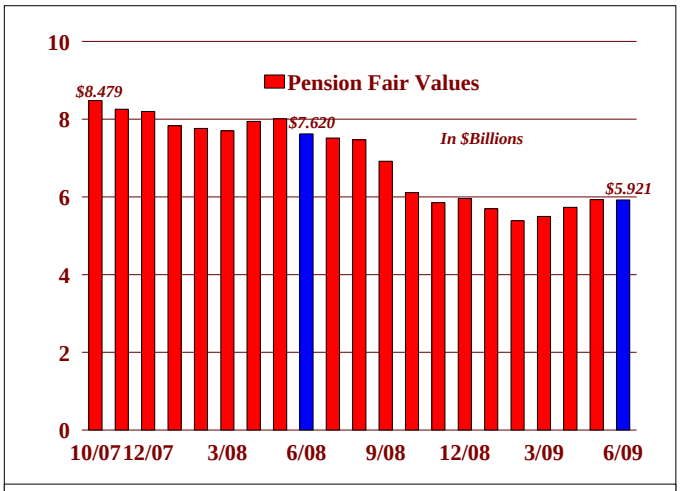
The number of years accumulated assets generated by normal cost contributions would fund members' benefits in retirement is sensitive to salary growth during a career. The preceding graphs depict straight-line salary growth which may be the exception, rather than the rule. The sufficiency of a normal cost rate is extremely sensitive to large salary increases during the last three years of a career on which benefit payments will be based. Using the same 3.0 salary growth as depicted in the preceding chart but increasing member salaries 10.0 percent during each of the last three years would reduce the number of years benefits would be funded by their theoretical assets from 25 to 19. While benefit levels are based on the higher salaries during the last three years, the normal cost contributions required to adequately fund the higher benefit level would not have been collected and invested during the first 27 years of the members' career. The normal cost contribution rate would not have been sufficient given the timing and size of actual salary increases.

Because the normal cost calculation is forward-looking and cannot be applied or collected retroactively, any benefit increases granted active members can only be funded by increasing normal costs for active members prospectively. The additional normal cost required to cover the increased benefit costs can only be collected during the remainder of their careers, when in theory it should have been collected from the date of hire to fully fund the increased benefit. If benefits are increased for retired members, the increased costs cannot be covered by the normal cost theory of funding benefits when they are earned rather than when they are paid. The normal cost contributions made during the working career of the retired members will not have paid for the increased benefit costs. If correct normal cost contributions are not collected from the date of hire, the pool of assets built by the contributions may be insufficient.

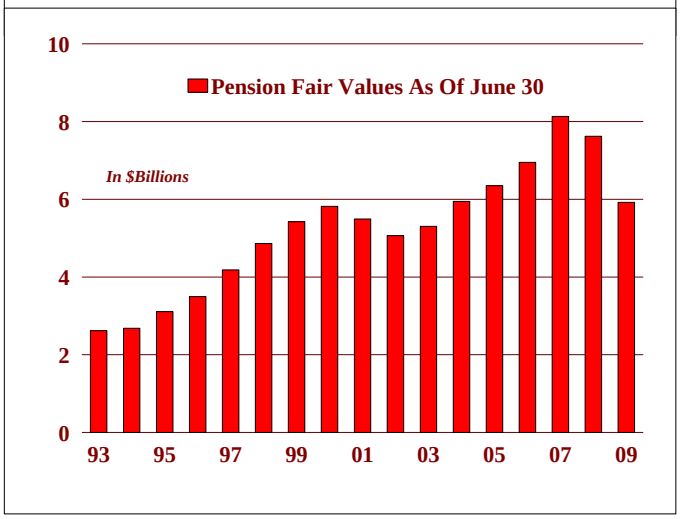
Because these are defined benefit Systems, regardless of the asset depletion shown in the preceding charts retirees will continue to receive benefits as long as they live. Normal cost calculations are based on the average member - some members may draw benefits after their theoretical normal cost assets are exhausted, while others may not. Also, when active members terminate and ask for refunds, only their contributions are returned with accrued interest, while the employer contributions made on their behalf remain in the pool of assets. Consequently, there will be some additional employer contributions available to address Systems shortfalls.

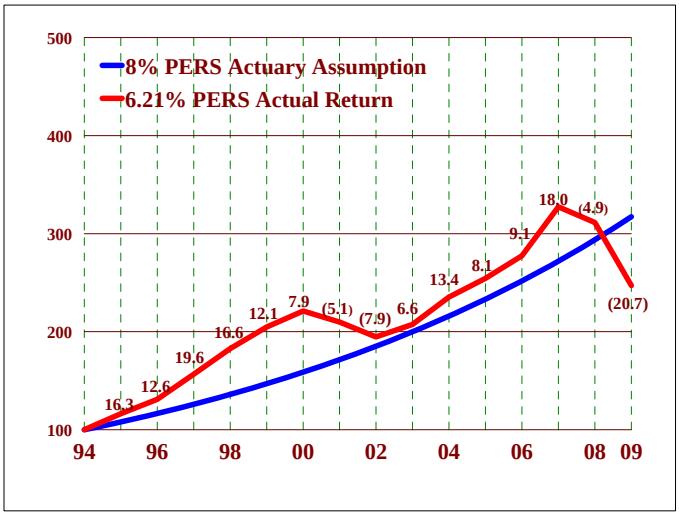
How Has the Financial Market Meltdown Impacted Retirement Assets?

The recent trauma in the financial markets, called the worst since the Great Depression, has taken its toll on the asset values of all public and corporate retirement plans. The fair value of the state's nine retirement funds reached an all time high of $8.5 billion in October 2007, but has dropped significantly since then as depicted in the top charts. The entire drop in value cannot be attributed to the financial markets alone because of the Systems' negative cash flow described earlier. The blue bars represent the "slice in time" values captured in the actuarial valuations.



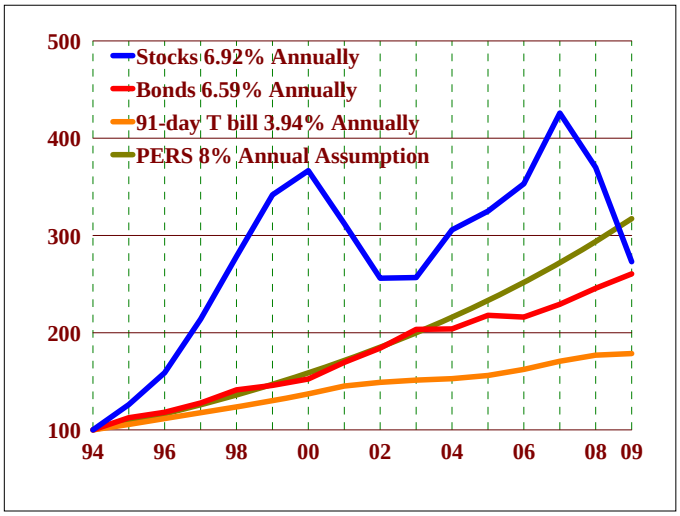
The bottom chart shows longer-term impacts of financial market performance on the nine retirement funds assets. During the 1990's, stock market performance increased assets, but they followed the stock markets down in 2001 and 2002. By 2004 the assets had recovered and began growing again. From the low point of 2002, there were five solid years of gains before the assets declined precipitously during the past two years. Regardless of the Systems' actuarial assumptions, asset values will follow financial market performance and volatility.



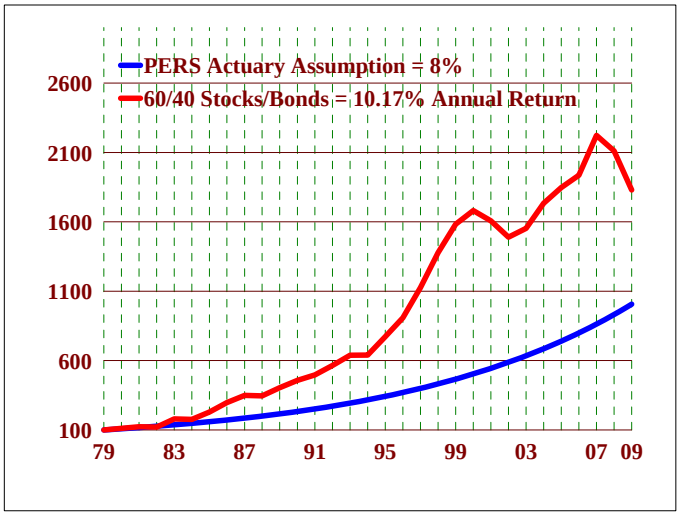


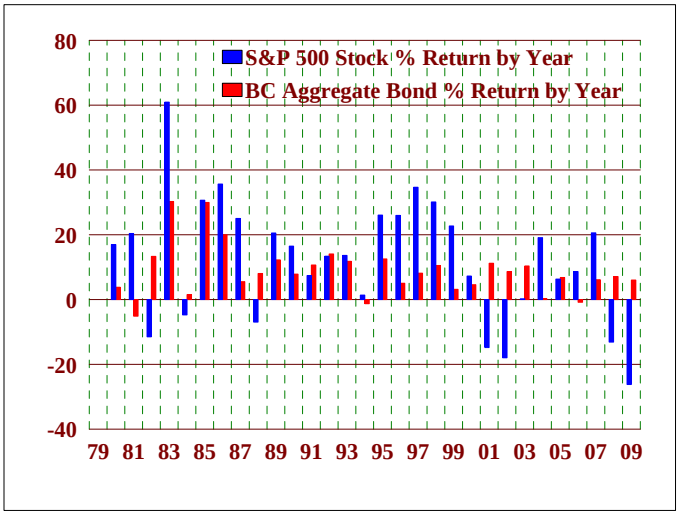
A more meaningful way to evaluate investment performance rather than absolute dollar value is to utilize a total rate of return calculation that ignores non-investment related cash flows. The Board has calculated total rates of returns since 1995. The red line in the adjacent chart depicts the actual total rate of return for the PERS from 1995 through 2009 as calculated by the Board's custodial bank. The blue line depicts the PERS return assumption of 8.0 percent. Despite the volatility of the actual returns, through 2008 the actual returns had exceeded the actuarial assumption. However, the negative 20.7 percent performance in 2009 significantly lowered the annual return during the 15-year period. While the assumptions expected an 8.0 percent annual return, the actual annual return during the period was 6.21 percent.

Was there anything the Board could have done differently during the period to meet the 8.0 percent actuarial assumption? The adjacent chart shows the returns for three major public asset classes during the period compared to the PERS actuarial assumption. Stocks are represented by the Standard & Poor's 500 Index, which tracks approximately 80.0 percent of the US stock market value. Bonds are represented by the Barclays Aggregate Index that tracks approximately 8,820 US Government, securitized, and domestic corporate bonds. The 91-day US Treasury Bill is considered to be the safest, least volatile investment. The actuarial assumption would not have been met investing in any combination of these assets during the period.



Because defined benefit retirement systems are long-term obligations and unfunded liabilities may be amortized over a 30-year period, it seems reasonable to review investment returns over the same time horizon. Although major asset class returns did not meet the actuarial assumptions during the last 15 years, their returns were well in excess of the assumptions during the past 30 years. The adjacent chart depicts the returns of an asset allocation comprised of 60.0 percent invested in the S&P500 Index and 40.0 percent invested in the Barclays Aggregate Index during the 30-year period ending June 30, 2009. This 60/40 asset mix would have returned 10.17 percent annually during the period.

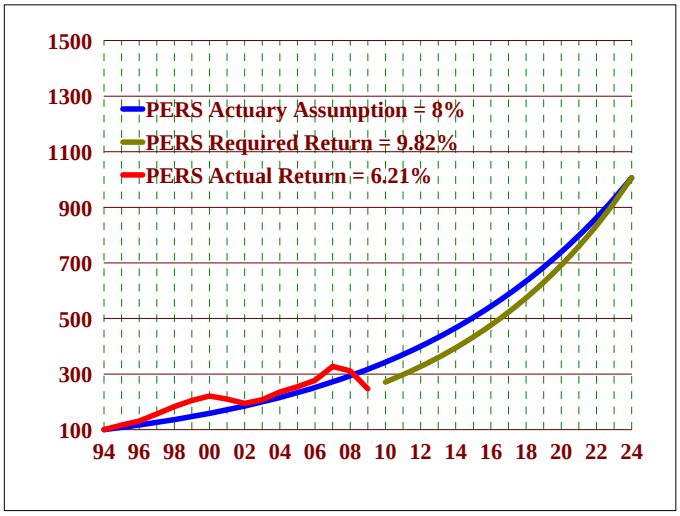




Future retirement fund investment return will be at the mercy of the financial markets. The peak-to-trough price decline in the S&P500 index of 56.8% during the recent bear market was the worst since the stock market decline of the Great Depression. Unless there is a healthy stock market recovery soon, it will be difficult to meet an 8.0 percent actuarial return assumption in any 30-year period that includes the recent market trauma. As the adjacent chart shows, some recovery has usually occurred within a year or two after negative performance but it is too early to predict when and how much the markets will rebound.

However, just gaining back the loss of the last two years, while helpful, will not get the Systems' assets back on track. The unfunded liabilities of the Systems are based on PERS assets earning 8.0 percent annually and TRS assets earning 7.75 percent annually. When they earn less, an "actuarial investment loss" occurs that increases the unfunded liabilities.

Can We Get There From Here?



Starting from the low point of June 30, 2009 it would require a future 9.8 percent annual return on PERS assets to meet the 8.0 percent actuarial assumption during the 30-year period beginning in 1995. A lower 9.4 percent annual return would be required for TRS due to its lower earning assumption. If there is sharp stock market rebound and the assets recover their two-year losses by June 30, 2010, an annual return of 8.4 percent on PERS assets would be required during the remaining period to get back on track.

The compounding that helps build assets when returns are positive does just the opposite when returns are negative. If the stock markets fall 50.0 percent, they must gain 100.0 percent to get back to their initial value. Even though the retirement fund actuaries "smooth" assets over several years to address the volatility of the financial markets, the significant "actuarial" investment losses of the past two years will linger for some time. The June 30, 2009 actuarial valuations will likely show a significant increase in unfunded liabilities, despite the smoothing.

Can we get back on track, and if so, how and when? Major domestic public asset class returns have been tracked by Morningstar from January 1926 through December 2008, a period that includes the Great Depression and most of the recent market meltdown. If history repeats and these long-term annual returns carry forward, a 60/40 stock/bond asset allocation would return just slightly more than 8.0 percent annually but would not compensate for the recent investment losses. Current forward-looking consultant estimates predict lower stock and bond returns than these historical numbers, making even an 8.0 percent return unlikely going forward with investments in only stocks and bonds.

Large Company Domestic Stock	9.6%
Small Company Domestic Stock	11.7%
Long-Term Corporate Bonds	5.9%
Long-Term Government Bonds	5.7%
Intermediate-Term Government Bonds	5.4%
US Treasury Bills	3.7%

The Board diversifies System assets beyond stock and bonds to increase returns while diversifying risk. The current ranges for different assets approved by the Board are:

- International large and small company stock 15-30%
- Domestic large, mid, and small company stock 30-50%
- Government/corporate bonds, high yield bonds, and foreign bonds 22-32%
- Private equity, including distressed debt 9-15%
- Private real estate, including core, value-added, and opportunistic 0-8%

Investment returns at or near the actuarial return assumptions of the Systems will only be achieved by maintaining a healthy allocation to international equity, private equity, and private real estate investments. The forward-looking estimated returns for these asset classes are in excess of the Systems' actuarial assumptions. It is important to understand that the return assumptions cannot be met without incurring investment risk and volatility. If the assumptions are not met, the unfunded liabilities will increase. A "risk free" portfolio of US Treasury Bills has returned only 3.7 percent annually since 1926, well short of the return assumptions of the Systems.

Summary

This report discusses the various "moving parts" that can affect the funding status of defined benefit Systems and highlights several issues that have important implications for the long term viability of the Systems.

1. Negative cash flows, defined as annual benefit payments in excess of annual contributions, will impact the PERS/TRS and may eventually impede the ability to accumulate and retain a sufficient pool of assets. A mature retirement system is expected to have a large pool of assets to be used for benefit payments when the plan eventually has negative cash flow. If historical contributions rates have been too low to adequately fund benefit liabilities, the pool of assets built by the contributions may be insufficient to cover ever-increasing negative cash flow.

2. Because normal cost contribution rates cannot be applied and collected retroactively, the rates may be insufficient to address the timing and size of late-career salary increases and benefit increases that can only be paid for "after the fact." Further, when the normal cost rate is increased by the actuaries based on another year of actual experience, less of the total contribution is available to "pay off" any unfunded liability.

3. The recent investment performance of the Systems' assets will have a major impact on the actuarial funded status of the plans. However, the actuarial return assumptions cannot be met without incurring prudent investment risks and the volatility that comes with the risk. If the actuarial return assumptions are not met, the unfunded liabilities will increase.