Overview

This report is divided into the following sections:

- **Pension Funding Basics:** This section is designed for those who are less familiar with pensions. A short review of fundamentals establishes a vocabulary and framework for our financial risk analysis.
- **Twenty-Year Look-Back:** This section summarizes what we found when we looked back over the past twenty years. We used the look-back to learn more about where we are today and how we got here. We also used this analysis to inform the development of a new risk model.
- **Possible Future Outcomes:** We built a new model to quantify the likelihood and magnitude of financial outcomes the retirement systems could face in the future. This helps us better understand the dynamics of risk for the pension systems. The model can also show us how future outcomes change if policies change. The goal of this section is to illustrate how the model works and how it can be used by policy makers.
- **OSA's Findings, Conclusions, and Recommendations:** This section summarizes OSA's most high-level findings and conclusions from the risk assessment and includes several recommendations for next steps.

Pension Funding Basics

Pension Plan Income Depends on the Financing Plan

Pensions are funded by contributions and investment returns.

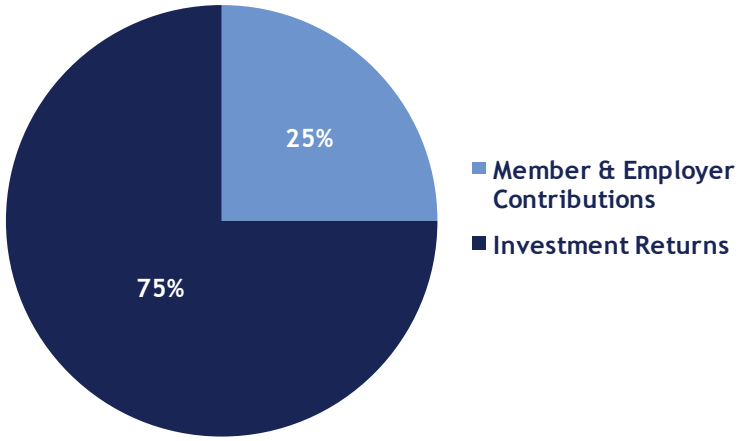
Pensions are a promise today to pay a lifetime benefit in the future. Because of the long time horizon between the promise and the payout, there is an opportunity to take advantage of the time value of money.

Contributions to the pension fund come from two sources: public employers (taxpayers) and retirement system members (employees). Pension contributions are collected as a percentage of each employee paycheck and regularly deposited into a trust fund. The allocation of pension costs between employers and employees depends on the cost-sharing policy for the pension plan.

Through the power of investing, the assets of the trust fund earn additional income. Over time, this expected income covers roughly 75 percent of pension costs.

Figure 1.1

Pension Contributions by Funding Source



Funding policy drives how much income is received from contributions.

In Washington State, the Legislature ultimately decides how much will be contributed to pensions. We call the result "funding policy." Many of the guidelines for pension funding are codified in state law, both in the actuarial funding chapter and in specific plan provisions.

The Legislature has delegated certain responsibilities to the Pension Funding Council (PFC). The PFC adopts contribution rates and makes recommendations on funding policy, subject to revision by the Legislature. The PFC considers advice from the State Actuary, input from the actuarial audit, and recommendations from the Select Committee on Pension Policy (SCPP). Also one pension plan, Law Enforcement Officers' and Fire Fighters' (LEOFF) Plan 2, has a board of trustees with authority to make decisions about funding policy for that plan.

The Legislature makes most pension funding decisions as part of its biennial budgeting process. The amount of revenue available to budget writers can influence how much the Legislature contributes to pensions. Local governments follow

statewide funding policy for pensions, but because of differences in funding sources, they can face different revenue challenges.

Investment policy drives how much income is derived from investments.

The Washington State Investment Board (WSIB) decides how to invest the contributions that are regularly deposited into the pension trust fund. Using the authority delegated to it from the Legislature, WSIB decides how to maximize investment returns at a prudent level of risk. We call the result "investment policy."

The PFC adopts the long-term annual rate of return assumption for investments. This "economic assumption" is found in statute and is subject to revision by the Legislature. The assumption is used to calculate contribution rates for the plans. As such, it becomes the investment "target" for the WSIB.

The current long-term annual rate of return assumption for investments is 8 percent. RCW 41.45.035(1)(c). WSIB's goal is to meet the investment return target set in statute while maintaining a prudent level of risk.

WSIB strategically allocates the pension trust fund assets among different classes of investments, such as stocks, bonds, real estate, and cash in order to meet the investment target. In deciding the trade-off between risk and return, WSIB can take advantage of the long time horizon of the pension financing plan.

The long time horizon for investing means that as a general matter, WSIB does not need to match pension liabilities with the short-term ups and downs in the market. Instead, WSIB can take more investment risk and seek higher expected returns over the long-term. The result is lower contribution rates for members and employers.

Figure 1.2 illustrates how the assumed annual rate of return affects pension contribution rates. A lower assumed annual rate of return requires higher contribution rates from members and employers. Conversely, a lower rate of return calls for higher pension contribution rates. Although the assumed rate of return dictates how we calculate contribution rates in the short-term, the actual investment returns will determine how much of pension costs must be covered by contributions in the long-term.

Figure 1.2

Example of Contribution Rate Calculations Under Different Investment Return Assumptions*

		PERS		TRS		SERS
	Interest Assumption	Plan 1	Plan 2/3	Plan 1	Plan 2/3	Plan 2/3
Member	7 Percent	6.00%	7.70%	6.00%	7.68%	7.04%
	8 Percent	6.00%	4.45%	6.00%	3.96%	3.51%
	9 Percent	6.00%	1.63%	6.00%	0.75%	0.43%
Employer (Normal Cost)**	7 Percent	7.81%	7.81%	8.45%	8.45%	8.04%
	8 Percent	4.56%	4.56%	4.73%	4.73%	4.51%
	9 Percent	1.74%	1.74%	1.52%	1.52%	1.43%
Employer (Plan 1 UAAL)**	7 Percent	5.64%	5.64%	9.34%	9.34%	5.64%
	8 Percent	4.48%	4.48%	6.94%	6.94%	4.48%
	9 Percent	3.41%	3.41%	4.73%	4.73%	3.41%
Total Employer	7 Percent	13.45%	13.45%	17.79%	17.79%	13.68%
	8 Percent	9.04%	9.04%	11.67%	11.67%	8.99%
	9 Percent	5.15%	5.15%	6.25%	6.25%	4.84%

**Rates shown for illustration only. They are not intended for rate-setting purposes and exclude minimum rates and rate ceilings where applicable.*

***Normal cost is the ongoing costs of the open plans. UAAL is the unfunded past cost of the closed plans.*

Pension Plan Payouts Depend on the Benefits Promised

Benefits policy drives how much is paid to plan members.

The Legislature decides the benefits structure and plan design for pensions. We call the result "benefits policy." Plan design influences cost --the more generous the benefits, the more costly the plan. The benefits for each plan are mostly determined when the plan opens, although benefits can also be added throughout the life of the plan. When benefits are added, costs are added.

Benefit improvements can be prospective or retroactive. When new benefits are prospective, or apply to future service credit only, there are opportunities to fund the benefit increases over the working lifetimes of affected employees. This policy promotes fairness across generations, or "intergenerational equity." The current generation pays for benefits for employees whose service occurs in the current generation.

When new benefits are retroactively granted based on past and future service, then intergenerational equity can be compromised. This is because the current generation must pay not only for the benefits of their own generation, but also for the benefits of past generations.

While benefits policy is ultimately decided by the Legislature, policy makers receive recommendations from the SCPP, the LEOFF Plan 2 Retirement Board, and many stakeholder groups representing active members, retired members, and employers.

In Washington, pension benefits are usually treated like contractual rights. This means that employees generally expect employers to pay pension benefits according to the plan or plans that covered them during their public employment.

Both public and private pension plans have rules that prevent employers from arbitrarily reducing employees' pension benefits. In the private sector, the rule is known as the "anti-cutback rule" and derives from federal legislation known as the Employee Retirement Income Security Act (ERISA).

In the public sector similar protections are found in state and local laws, state constitutions, and/or case law. In Washington, these principles have been recognized in the 1956 Washington Supreme Court case entitled *Bakenhus v. City of Seattle*.

Other Economic Variables Affect Pensions

Changes in annual revenue growth can add or reduce financial pressures on pensions.

Some variables affecting pensions are not fully controlled by legislators, investment board trustees, or other policy makers. Still, these factors can affect pensions by adding or reducing financial pressures on the plans.

As part of the 2010 risk assessment, we chose to examine how one of those variables, annual changes in revenue growth, affects pensions. We added this component to our study because available revenues affect funding and benefits policies.

Where Are Washington's Pension Plans Today?

All plans are healthy except Public Employees' Retirement System (PERS) Plan 1 and the Teachers' Retirement System (TRS) Plan 1.

There are several indicators to consider as we evaluate the current health of Washington's pension plans. One is "funded status." Funded status indicates the relationship between assets and liabilities at a single point in time. If the funded status is 100 percent, then there is one dollar in actuarial assets for each dollar of accrued liability (earned benefits). For 2009 the total funded status for all state-administered plans combined is 99 percent.

The funded status varies for each plan. Washington has plans that are open to new employees (Plans 2 and 3) and older plans that are closed to new employees (Plans 1). The funded status of all of Washington's open plans is above 100 percent. This funded status was measured as of June 30, 2009.

Figure 1.3

Calculation of 2009 Funded Status*										
(Dollars in millions)	PERS		TRS		SERS	PSERS	LEOFF		WSPRS	All
	Plan 1	Plans 2/3	Plan 1	Plans 2/3	Plans 2/3	Plan 2	Plan 1	Plan 2	Plans 1/2	Plans
Accrued Liability	$13,945	$15,701	$10,838	$5,213	$2,162	$54	$4,477	$4,325	$758	$57,473
Valuation Assets	$9,776	$18,260	$8,146	$6,160	$2,503	$69	$5,612	$5,564	$900	$56,991
Unfunded Liability	$4,169	($2,560)	$2,692	($947)	($341)	($15)	($1,135)	($1,239)	($143)	$481
Funded Ratio	**70%**	**116%**	**75%**	**118%**	**116%**	**128%**	**125%**	**129%**	**119%**	**99%**

**Source: OSA 2009 Actuarial Valuation.*

The funded status fluctuates over time. The 2009 funded status is 70 percent for PERS 1 and 75 percent for TRS 1. Both of these plans are projected to have a funded status below 60 percent in the future.

Like most public plans, Washington "smooths out" asset gains and losses when calculating contribution rates and reporting funded status. This helps limit fluctuations in these measures that would otherwise arise from the short-term ups and downs of the market, or market volatility.

Washington uses up to an eight-year smoothing period, depending on the size of the gain or loss. For example, one-eighth of 2008-2009 asset losses were initially recognized due to the asset smoothing method. This means that losses will continue to put downward pressure on the funded status of all plans for seven more years as the remainder of 2008-2009 losses are recognized.

Another indicator of plan health is the amount of unfunded past liabilities for benefits already earned. We refer to these liabilities as "legacy costs." They are also known as Unfunded Actuarial Accrued Liabilities or UAAL. In PERS 1 and TRS 1, the legacy costs for both plans combined were approaching $7 billion as of June 30, 2009. These costs are projected to increase as we recognize all the asset losses from 2008-2009.

In Washington's state-administered plans, employees do not pay pension contributions for legacy costs. Legacy costs are spread among employers, including employers for the open plans (Plans 2/3). The plan administrator (the Department of Retirement Systems or DRS) regularly collects these payments from employers as a percentage of employee pay.

Employers are facing steep increases in contribution rates.

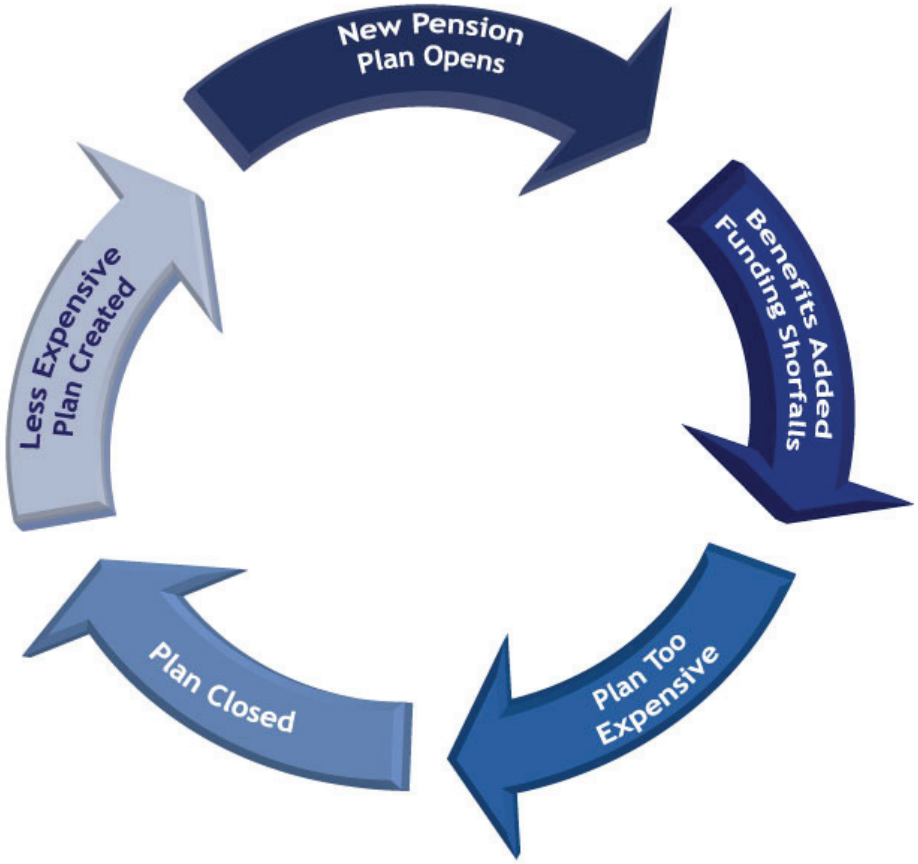
Adequate and affordable contribution rates are also indicators of plan health. As we described earlier in this section, contributions from members and employers provide the regular payments over time that keep the pension fund stable.

As pension plans become more expensive, contribution rates must increase to offset the additional unfunded liabilities. Underfunding, investment losses, legacy costs, benefit improvements, and any combination thereof can trigger the need for contribution rate increases. Also, economic conditions can add pressures that make it more difficult to increase contributions when they are most needed.

As contribution rates increase, they begin to take a larger percentage of budget dollars. History shows that plan sponsors may decide to close a pension plan when contribution rates become unsustainable. This happened when Washington closed the Plans 1 and opened new, less expensive plans in 1977 (the Plans 2).

Figure 1.4

Typical Pension Plan Life Cycle



Today, required contribution rates and GF-S contributions are nearly doubling from the 2009-2011 Biennium to the 2011-2013 Biennium. What is driving these increases? How long will they continue? Are they affordable? Is there a risk that the pension life cycle will be repeated? How do our funding and benefits policies respond to varying economic environments? Do they support the long-term financing plan for pensions? The next two sections of this report will provide information to help answer these questions.

Twenty-Year Look-Back

We studied the period from 1989 to 2009 to shed light on the present and to better understand where the state's pension plans might be going. We started with a twenty-year look-back at pension income and pension costs. We wanted to see how investments, funding policy, and benefit improvements were affecting assets and liabilities, so we gathered twenty years of data on these policies. We also gathered data on available state revenue during the period, as we thought it might be relevant to funding history.

After we saw the data, we looked for relationships. Some of the questions we asked were: How did investment volatility relate to state revenue volatility? How did funding and benefit policies respond to the changing economic environments? What role did Plan 1 legacy costs play? The relationships we saw helped provide insights about the kind of tools we would need to evaluate the pension systems and the risks they face in the future.

Why twenty years? First, this period provides sufficient data for setting actuarial assumptions. Second, this period corresponds to the Legislature's application of "systematic actuarial funding," a policy adopted in 1989 and codified in the actuarial funding chapter. You can see a list of the Legislature's funding goals for pensions in RCW 41.45.010.

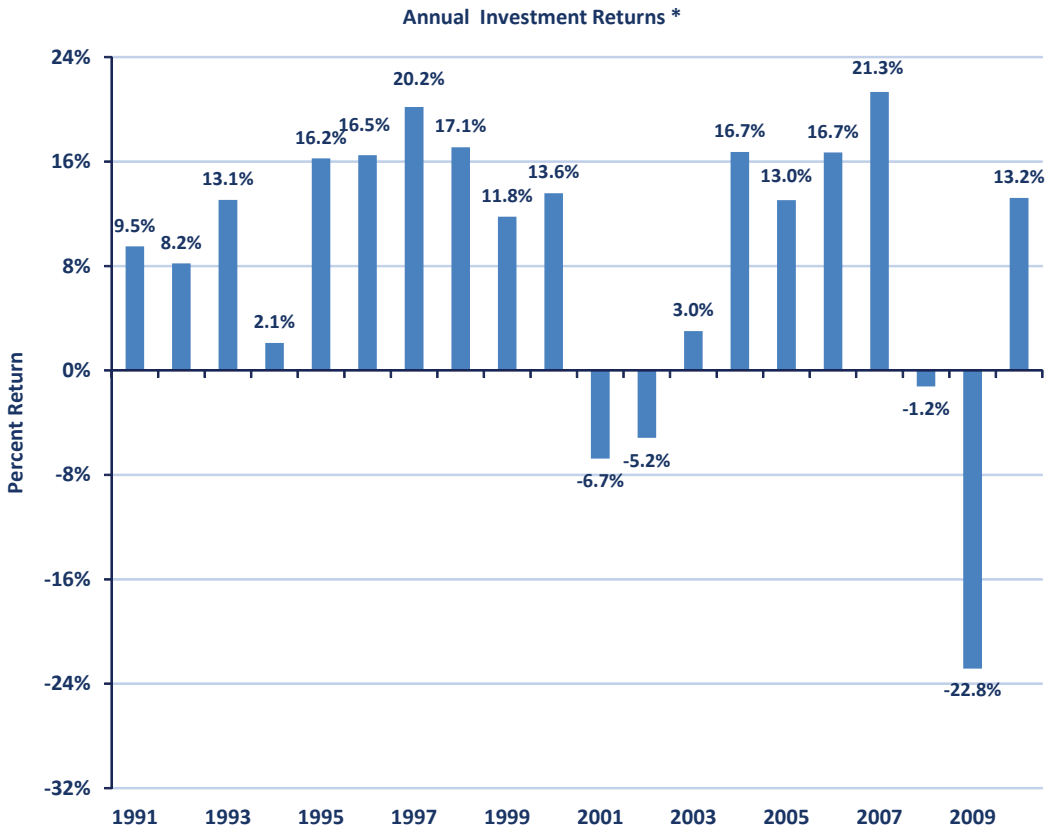
The Track Record Was Mixed

Investment income was on track.

As we mentioned in our discussion of pension basics, the current long-term financing plan for pensions has a target for investments. Returns need to hit or exceed the statutory long-term rate of return assumption of 8 percent per year for the financing plan for pensions to work as intended. Over the past twenty years, investment returns have been right at this benchmark.

Figure 2.1 shows the annual investment rate of return from the Commingled Trust Fund (CTF) by fiscal year. Over the twenty-year period, the average annual return was 8.23 percent. There were no negative returns in the first decade. Annual returns decreased and were more volatile in the second decade of the twenty-year period.

Figure 2.1



Notes:

Fiscal year, time-weighted returns. Dollar-weighted returns vary by plan.

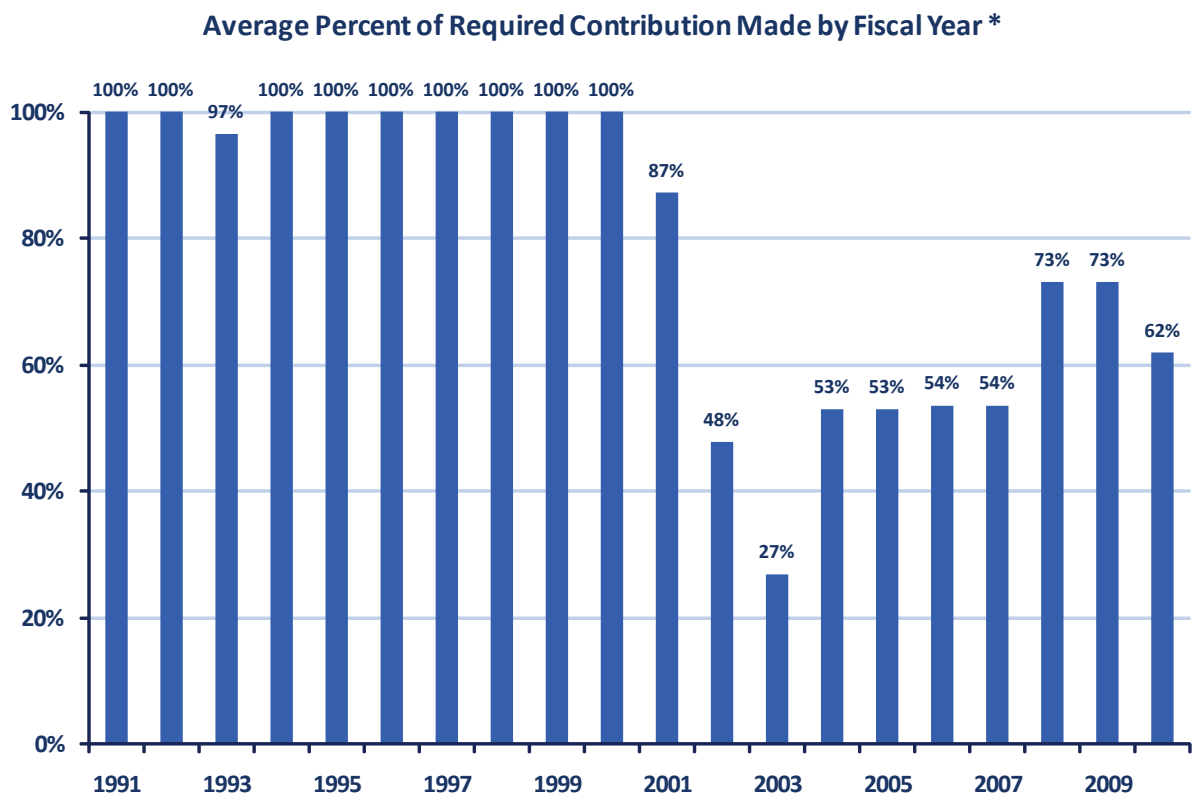
The Commingled Trust Fund (CTF) was created in 1993. Returns for 1993 and later are for the CTF as reported by WSIB. Returns prior to 1993 are total fund returns reported by the Department of Retirement Systems' Comprehensive Annual Financial Report.

Underfunding decreased pension income.

Over the past twenty years, the largest pension plans received about 80 percent of the pension contributions needed.

This graph shows the average annual percent of the required contribution made over the twenty-year period for PERS, TRS, and SERS combined. We used the results of the applicable actuarial valuation for the budgeting period to determine the required contributions. We then compared those results to the actual contributions. For the period, contributions were at or close to 100 percent throughout the first decade, and well below the required amounts during the second decade.

Figure 2.2



For PERS, TRS, and SERS combined.

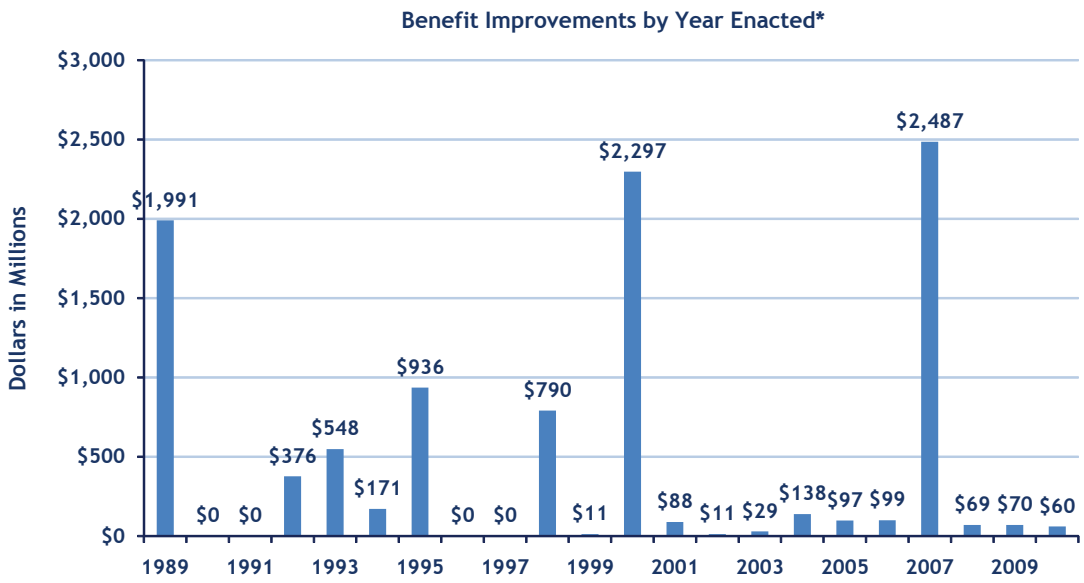
Benefit improvements increased pension costs.

Turning to pension costs, we reviewed benefit improvements over the past twenty years to see how changes to the plan design might be adding to plan liabilities. **Figure 2.3** summarizes what we found.

This history shows a series of smaller benefit improvements that occurred fairly regularly (benefits "creep") throughout the entire twenty-year period. We also observed much larger benefit improvements that occurred less frequently. We refer to these improvements as "spikes." There were not enough data points to statistically correlate the spikes to any other economic variables.

Benefits improvements increased liabilities by 0.45 percent annually in the largest plans. The combination of creep and spikes had a multi-billion dollar impact on long-term pension costs. While we did not observe a huge difference between the first decade and the second decade, there were some differences. During the first decade the spike events were smaller and the creep events were larger. During the second decade, the spike events were larger and the creep events, while more frequent, were smaller.

Figure 2.3



**Adjusted present value of liability increases in 2010 dollars based on an 8.0% discount rate. Excludes the following:*

1) Impacts of Plan 3 gain-sharing prior to 2008 gain-sharing event.

2) Savings from repealing future gain-sharing (cost of future gain-sharing not recognized previously).

3) Benefit improvements where the fiscal note did not report the amount of the liability increase. This includes years showing zero liability increase.

Key to Benefit Spikes

1989 - Plan 1 Age 65 COLA after 40% loss of purchasing power from age 65.

1995 - Plan 1 Uniform COLA.

1998 - Plan 1 Gain-Sharing (excludes cost of future Plan 1 gain-sharing benefits).

2000 - Plan 2/3 subsidized early retirement reduction factors with 30 years of service.

2007 - Gain-sharing replacement benefits.

The absence of small "creep" events during the first decade is partly explained by a change in fiscal note practices at OSA. Past OSA practices did not identify and report an increase in plan liabilities if the increase was insufficient to increase supplemental contribution rates. See RCW 41.45.070.

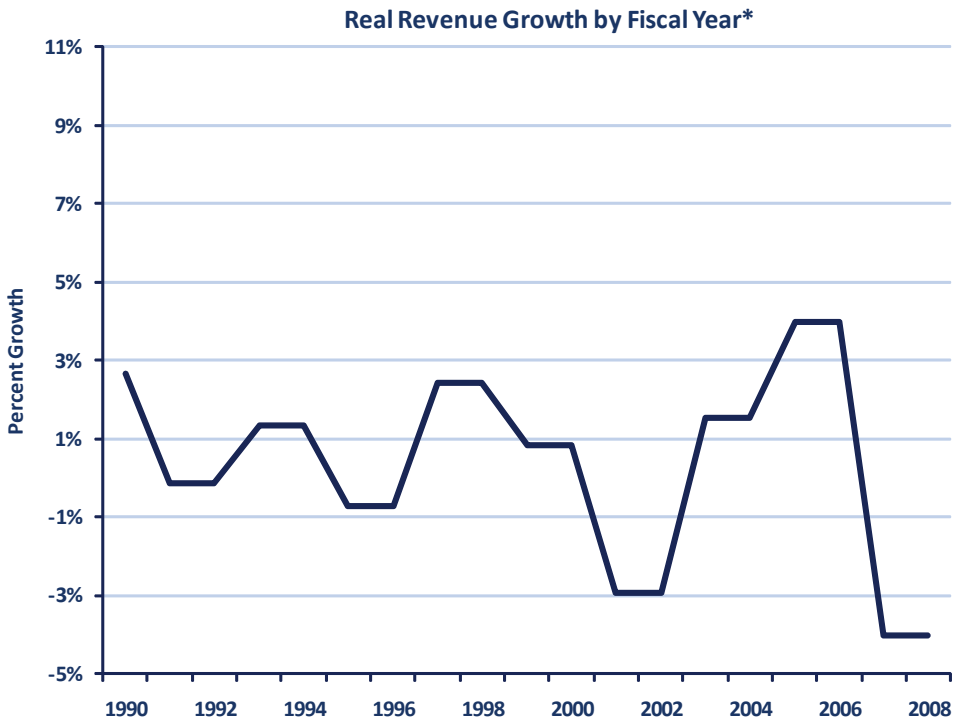
State Revenue and Investments Moved Together

Next we gathered data on state revenue growth because it is relevant to the state's ability to make pension contributions. The following graph shows real revenue growth over the twenty-year period. Real revenue growth is economic growth over and above inflation and population growth (also referred to as productivity growth).

We see from **Figure 2.4** that state general fund revenues were more stable during the first decade of the twenty-year period. During the second decade, state revenues became more volatile, with much larger increases and decreases in real revenue growth.

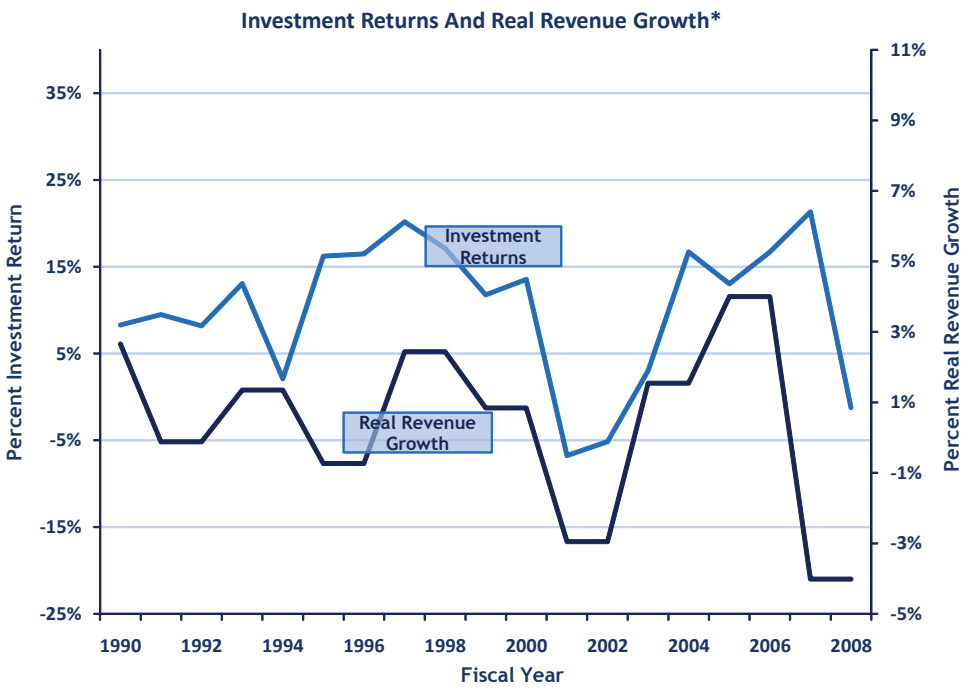
We noticed that this picture was very similar to our earlier picture of annual investment returns, so we looked at them more closely to see if they were correlated. **Figure 2.5** shows how real revenue growth and investment returns moved together over the twenty-year period.

Figure 2.4



Adjusted for inflation and population growth. Complete data for the 2009-2011 Biennium was not available at the time of publication.

Figure 2.5



Real revenue growth is revenue growth over and above inflation and population growth. Complete data for the 2009-2011 Biennium was not available at the time of publication.

Again, the first decade was marked by more stability. The second decade was marked by a significant increase in volatility, both positive and negative, for both investments and revenue.

Long-Term Investment Policy Expects Volatility

As we pointed out in the "Pension Funding Basics" section, WSIB uses a long time horizon for investing. A long time horizon means that WSIB does not need to match pension liabilities with the short-term ups and downs of the market.

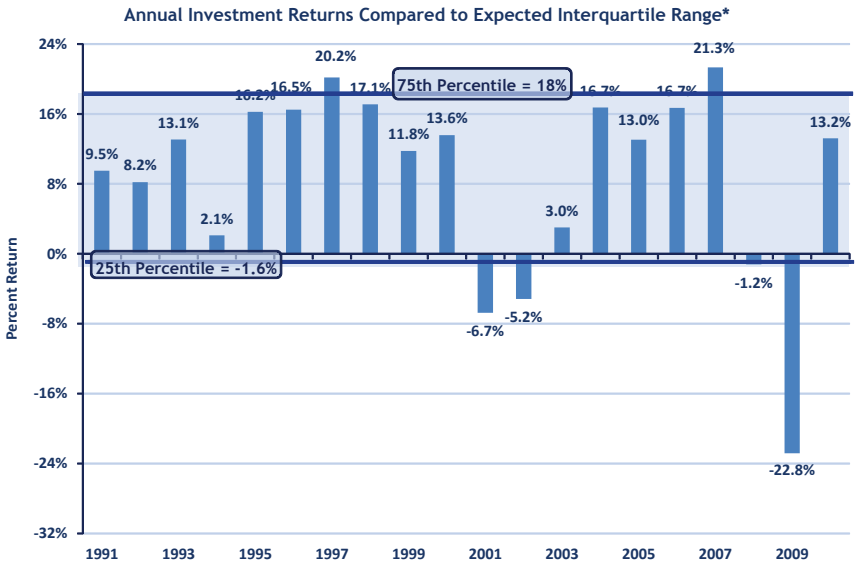
A long time horizon allows WSIB to take more risk. Higher-risk portfolios have more volatility (more ups and downs) in their annual returns, but can achieve higher returns over the long term. This means lower pension contribution rates over the long term. Lower-risk portfolios have lower volatility in their returns, but expected returns are less. This means more of long-term pension costs must be covered by contributions.

See **Figure 1.2** for a comparison of how contribution rates look with a 7 percent, 8 percent, and 9 percent annual rate of return. Washington has chosen the path of an 8 percent expected annual rate of return. This target comes with a certain amount of expected volatility. The policy is based on a long-term view. We measure whether the annual rate of return target has been met over a long period of time, allowing the ups and downs to balance each other out.

Investment Volatility Was Less Than Expected Over the Past Twenty Years

Even though the picture of investment volatility was very different from the first decade to the second, the amount of volatility over the twenty-year period was well within WSIB's long-term expectations.

Figure 2.6



Notes:
Fiscal year, time-weighted returns. Dollar-weighted returns vary by plan.
The Commingled Trust Fund (CTF) was created in 1993. Returns for 1993 and later are for the CTF as reported by WSIB. Returns prior to 1993 are total fund returns reported by the Department of Retirement Systems' Comprehensive Annual Financial Report.
Fifty percent of returns expected to occur between 25th and 75th percentile.

In **Figure 2.6,** the shaded area between the 25th and 75th percentiles indicates where half of investment returns were expected to fall over the twenty-year period. The other half of the investment returns were expected to fall outside of the shaded area.

How did experience compare to expectations? Three-quarters of actual investment returns fell inside the expected "interquartile range" and only one-fourth of the actual investment returns fell outside of the expected range. Even the five events that were outside of the expected range were anticipated by WSIB's modeling, including the one-in-one-hundred-year event that occurred at the end of the period (-22.8 percent annual rate of return).

What's more striking about the two-decade period is the contrast between the first decade and the second. The first decade experienced extended upward volatility. There were no negative returns and significant positive returns, especially in the latter part of the decade.

In contrast, the second decade was marked by much larger increases and decreases in returns. And the second decade included one extremely negative event. The fact that investments were still on target for the period even after such a negative event speaks to how positive much of the period was.

Still, pensions were funded at the rate of 80 percent for the period. What would explain this? Was there something more we could learn about funding dynamics?

We decided to explore the relationship of underfunding to investment volatility. Also, since we saw many changes in funding policy during the period, we wanted to look more closely at the effects.

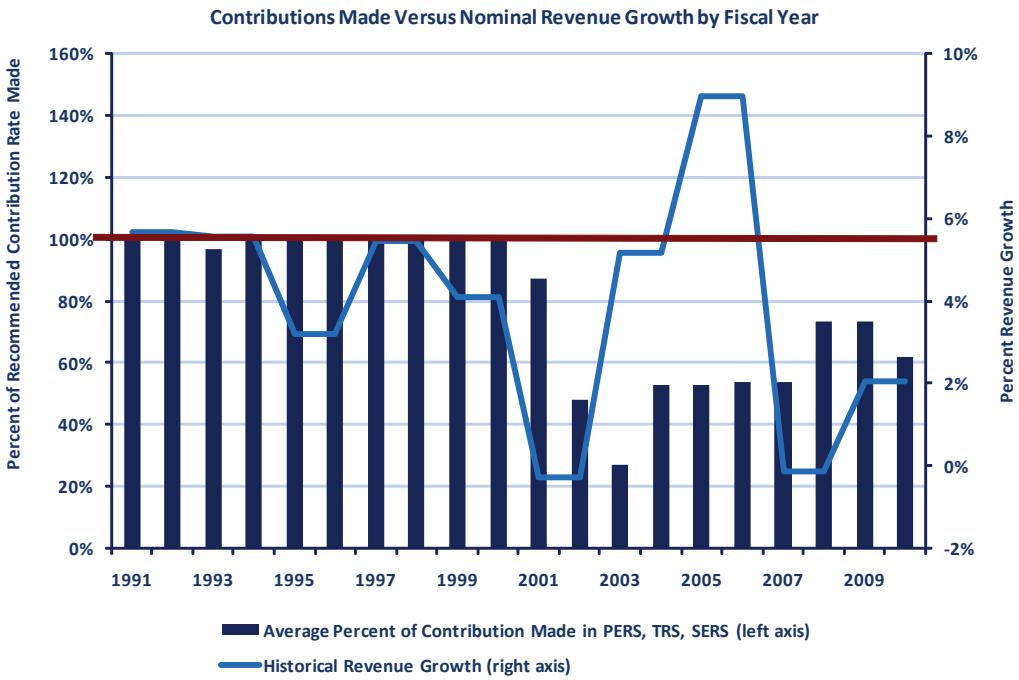
Underfunding Was Correlated to Volatility

During the first decade of the twenty-year period, funding policy was right on track. With one slight exception, all required contributions were made. This was the decade with no negative investment returns and extended upward volatility. State revenues were also strong for most of that decade.

Funding policy seemed to react to the increased volatility (both positive and negative) during the second decade of the twenty-year period. Contributions to the largest plans were missed in both good times and bad. **Figure 2.7** compares nominal revenue growth (which includes the effects of inflation) to contributions made. We used nominal revenue growth as opposed to real revenue growth (which excludes the effects of inflation) because budgets are typically built using nominal dollars.

We observed that weak economic environments were correlated to weak investment returns. Lower investment returns created the need for increased contributions at a time when employers and members could least afford them.

Figure 2.7



Also, we saw that the likelihood of required contributions being made was less when the previous year's contributions were already lower than what had been required. Contribution rates were at their lowest early in the second decade. Even when revenue growth peaked in the middle of the decade, contributions were still roughly half of what was required.

Once dollars are budgeted away from pensions, it may be difficult to move them back. We saw in the twenty-year look-back that the process of restoring contributions to higher budget levels took longer than it took for investment returns and revenue growth to improve.

Over the past twenty years we saw that when asset returns were low

and there was pressure to increase contribution rates, revenue growth was also low, making it very difficult for policy makers to respond to the pressure. We noted that if fully funding pensions did not or could not occur when there were economic downturns, then there were implications for long-term financial risk. Moreover, if underfunding still occurred when revenues and asset values were trending up, there was even more risk to consider.

Short-Term Funding Policies Also Resulted in Underfunding

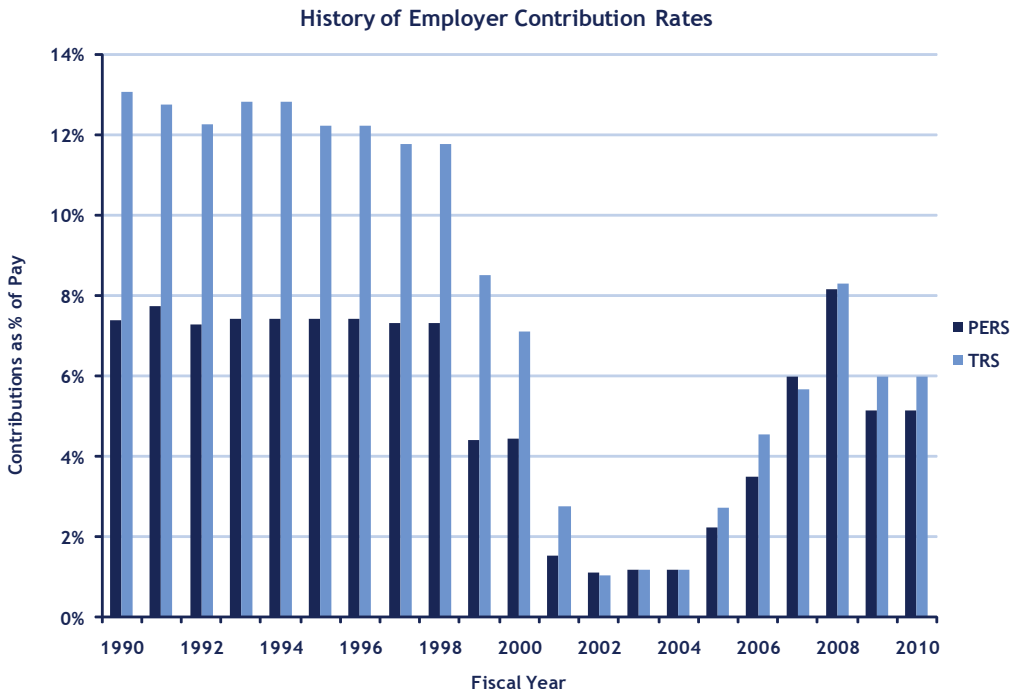
Another part of the funding story involves the timing of certain changes to actuarial methods and assumptions. We observed that asset gains from positive investment returns were captured early, and subsequent asset losses were deferred. These changes resulted in lower contribution rates, which led to underfunding for the twenty-year period.

Here are some of the major changes to funding policy that resulted in accelerating gains and deferring losses.

- **1993:** Change from a six-year contribution rate-setting cycle to a two-year cycle. This occurred during a bull (upward trending) market, allowing gains to be captured over a two-year rather than six-year period, and led to an immediate decrease in contribution rates.
- **2001:** Change from a 7.5 percent to an 8 percent assumed rate of investment return. This change occurred at the end of an extended bull market and increased the amount of future income expected from investment returns, which lowered expected pension costs. Again, the change was accompanied by an immediate decrease in contribution rates.
- **2001:** Change from a three-year to a four-year asset smoothing period. This change occurred right after a bull market and allowed subsequent market losses to be smoothed over a longer period of time. The previous three-year method was also relatively short and contributed to the accelerated recognition of gains.
- **2003:** Change from a four-year to an eight-year asset smoothing period. This change occurred during a bear (downward trending) market and had a similar effect to the 2001 change to a longer smoothing period because of its timing. Losses were deferred, resulting in contribution rate relief. (Later this method change contributed to added rate stability as gains from 2004-2007 were deferred over a longer period.)
- **2000 and 2003:** Adopting contribution rates decreases in certain off-cycle years. This practice allowed for gains to be captured earlier than they would have been, resulting in faster decreases in contribution rates than would have otherwise occurred.

Figure 2.8 applies to PERS and TRS, and shows the effects of capturing past gains early and of deferring losses. The result was a period of very low contribution rates in the early part of the second decade of the twenty-year look back. This period is often referred to as the "happy valley."

Figure 2.8



Again, **Figure 2.8** illustrates the contrast between the first decade and the second decade of the twenty-year period. After rates reached their lowest levels they never returned to historic levels (except briefly for PERS).

What if funding policies had been different over the past twenty years?

Next we used "what if" illustrations in order to better understand pension funding dynamics over the past twenty years and how they might affect the present. We applied these to TRS because it is a large system, has both open and closed plans, and it has not had "spin-offs" into additional plans as in the case of PERS (which has the School Employees' Retirement System, or SERS, and the Public Safety Employees' Retirement System, or PSERS, as spin-off plans).

We wanted to see how TRS would look today if funding policy had been more consistent over the past twenty years. We also wanted to know what the effects would have been if certain funding policy safeguards had been implemented at the beginning of the period and remained in place over two decades. We asked three questions:

1. What if contribution rates had been stable and 1990 contribution rates had been paid into the plans each year?
2. What if today's asset smoothing method and minimum contribution rates had been adopted in 1990 and applied each year?

Note: The asset smoothing method and minimum contribution rate requirements are described in Chapter 41.45 RCW, the actuarial funding chapter of state law.

3. What if 100 percent of actuarially required contributions had been made over the entire twenty-year period?

Results from these illustrations are summarized in **Figure 2.9**. The table shows the hypothetical impacts on funded status in the closed plan, TRS 1, and in the open plans, TRS 2/3.

Figure 2.9

Effects of Funding Policies on Funded Status Today		
	TRS 1	TRS 2/3
What if …	*(Without / With)*	*(Without / With)*
… 1990 rates paid into plans for 20 years.	75% / 99%	118% / 153%
… today's asset smoothing method and minimum rates.	75% / 89%	118% / 137%
… all required contribution rates.	75% / 80%	118% / 123%

These results show that the funded status of the plans would be better today if long-term funding policies had been in place. Instead, short-term reactions to expected volatility contributed to underfunding, which negatively impacted the health of the plans.

Benefits Policy Reacted to Volatility

We saw that funding policy reacted to investment and revenue volatility over the twenty-year period. What about benefits policy? Did it react to volatility? While most benefit spikes did not have a statistical correlation to other variables, gain-sharing was a significant benefit improvement that was designed to occur in periods of positive investment volatility.

Gain-sharing was implemented in 1998 after a long run of very positive investment returns. It was designed to provide benefit increases to members of the Plans 1 in PERS and TRS, and the Plans 3 in PERS, TRS, and SERS. These increases were contingent upon the occurrence of "extraordinary gains."

Extraordinary gains were deemed to have occurred whenever the compound average of investment returns on pension fund assets exceeded 10 percent for the previous four fiscal years. This trigger resulted in increases to the Uniform Cost of Living Adjustment (U-COLA) in the Plans 1 and lump sum distributions into members' defined contribution accounts in the Plans 3. Plan 2 members did not participate in gain-sharing.

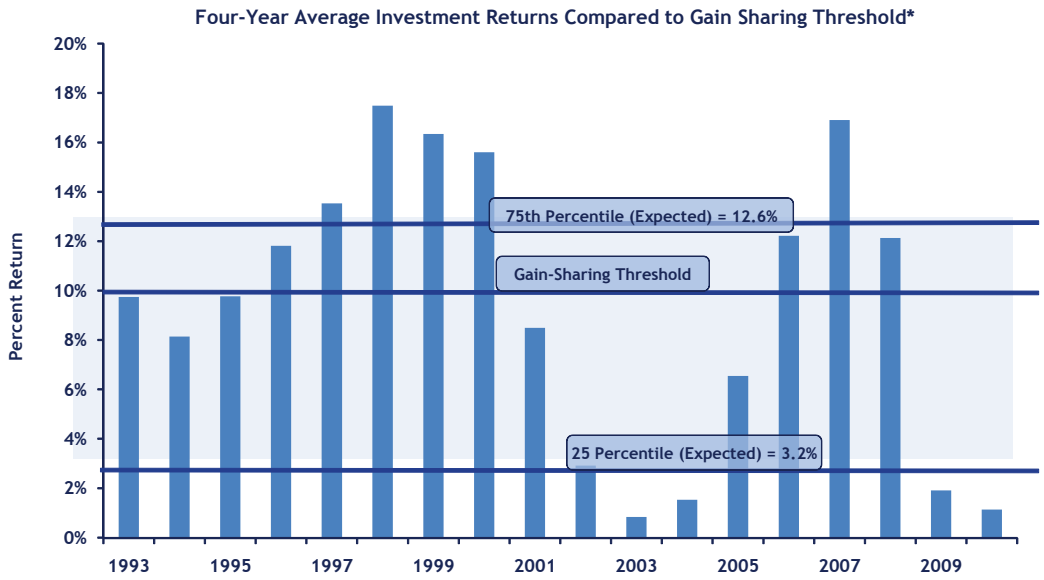
The long-term cost of this benefit was not recognized in advance, and the cost was not prefunded. The idea was to take a portion of asset gains in good times and distribute them to members. However this meant that the amounts distributed would not be available to later offset investment losses that were expected as part of the long-term financing plan for pensions.

You can learn more about gain-sharing here: http://www.leg.wa.gov/SCPP/Documents/2005/Gain-sharing_Subgroup/Final_Gain-Sharing_Report.pdf.

Note: Gain-sharing was identified by the Legislature as a non-contractual right. In 2007 the Legislature repealed gain-sharing. Immediately thereafter, certain stakeholders filed a lawsuit in the King County Superior Court. The suit challenges the repeal and asks for reinstatement of the gain-sharing benefit. As of the date of this report, the lawsuit is ongoing and its outcome is unknown.

We looked more closely at whether the asset returns that triggered gain-sharing were "extraordinary." **Figure 2.10** illustrates that gain-sharing was triggered even when economic events were well within the expected volatility of the long-term investment policy currently in place. Half of the expected four-year rates of investment return fall between 3.2 and 12.6 percent. The 10 percent trigger for gain-sharing lands at the 64th percentile. In other words, there was a 36 percent chance that four-year investment returns would exceed 10 percent.

Figure 2.10



Notes:
Four-year (fiscal), time-weighted returns. Dollar-weighted returns vary by plan.
The CTF was created in 1993. Returns for 1993 and later are for the CTF as reported by WSIB. Returns prior to 1993 are total fund returns reported by the Department of Retirement Systems' Comprehensive Annual Financial Report.

We also considered where TRS would be today if there had been no gain-sharing. We measured the effects on funded status for both the open and closed plans. If there had been no gain-sharing, today's 2009 funded status for TRS 1 would increase from 75 to 78 percent, and the 2009 funded status for TRS 2/3 would increase from 118 to 130 percent. The *long-term* TRS employer contribution rate would be 274 basis points lower.

To summarize, another key take-away from the look-back is that benefits policy created short-term reactions to positive investment volatility. This volatility was an expected part of the long-term financing plan for pensions.

The gain-sharing benefit added significantly to plan costs. Even though gain-sharing was subsequently repealed, its long-term effects remain. Employers are still paying for the cost of past gain-sharing events. Employers and Plan 2 members are also paying for the costs of certain gain-sharing replacement benefits that were enacted when gain-sharing was repealed in 2007.

Plan 1 Legacy Costs Persisted

Over the past two decades, while benefits were increasing plan costs and underfunding and short-term funding policies were reducing income, employers were also paying for PERS 1 and TRS 1 legacy costs -- even though these two plans were closed in 1977. Employers were paying (and still pay) legacy costs in addition to their portion of the ongoing costs for the open plans (Plans 2/3).

All PERS, TRS, SERS, and PSERS employers (Plans 1, 2, and 3) share in the legacy costs; members do not pay for them. Plan 1 legacy costs are a big part of required employer contribution rate increases we see today.

Figure 2.11

Employer Contribution Rates for Unfunded Plan 1 "Legacy" Costs*			
	Current	2011-12	2012-13
PERS	1.14%	3.75%	4.44%
TRS	1.85%	6.50%	6.85%
SERS	1.14%	3.75%	4.44%
PSERS	1.14%	3.75%	4.44%
LEOFF	0.00%	0.00%	0.00%
WSPRS	0.00%	0.00%	0.00%

**Source: OSA 2009 Actuarial Valuation.*

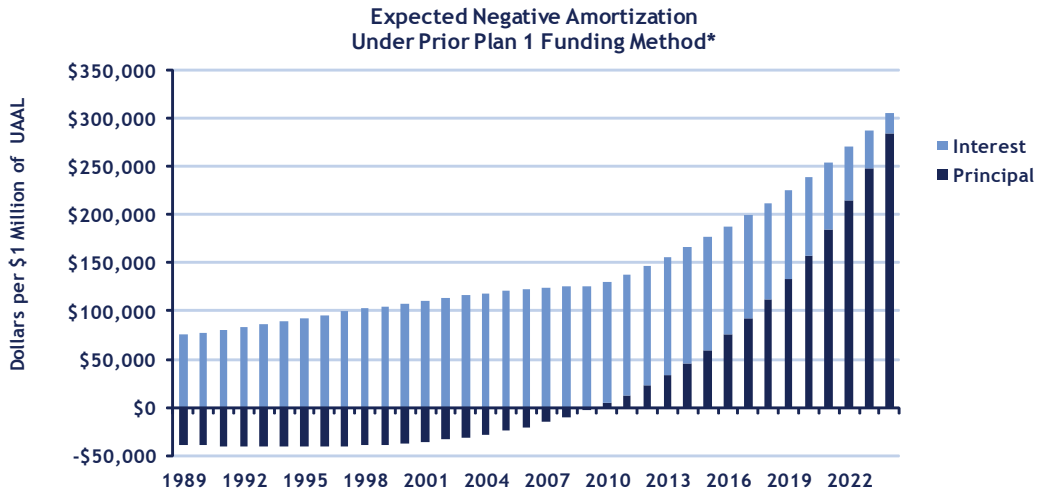
Where did these costs come from? Plan 1 legacy costs are the result of underfunding and retroactive benefit improvements in the Plans 1. However, these Unfunded Actuarial Accrued Liabilities (UAAL) were made worse by the prior Plan 1 funding method.

Negative amortization increased legacy costs.

The funding method that was in place for PERS 1 and TRS 1 included "negative amortization." What does this mean? From 1989 until the Plan 1 funding method was restructured in 2009 (SSB 6161, C 561, L 2009), the annual payments for legacy costs were actually less than the annual interest charge on the debt. The following bar chart illustrates the back-loaded nature of the prior financing plan.

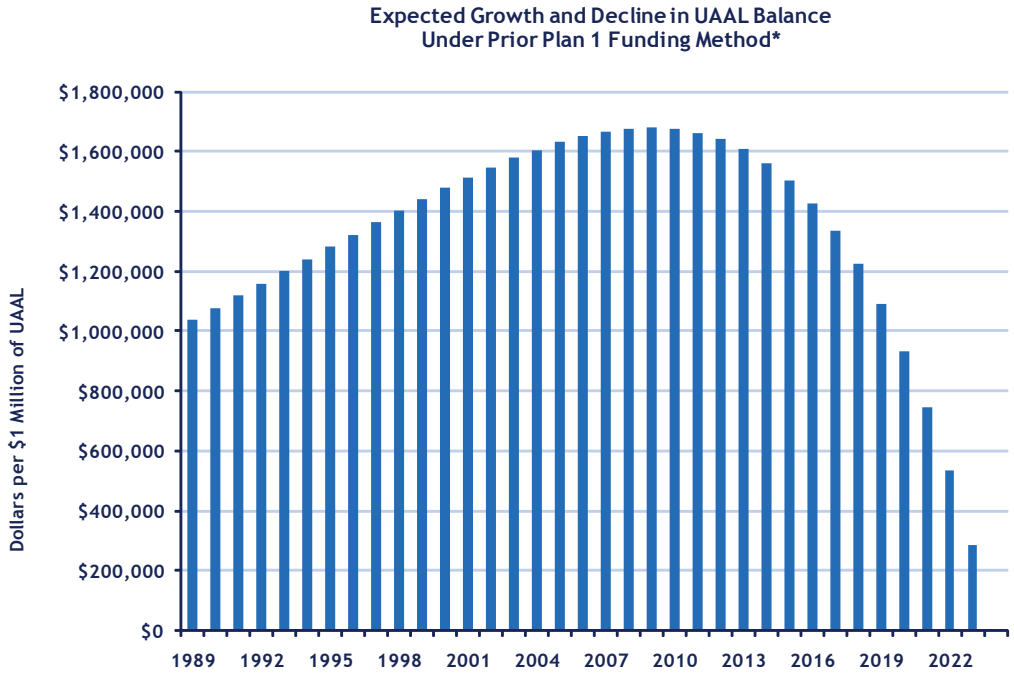
This type of payment plan comes with a cost. It was actually designed to increase unfunded liabilities substantially (to the tune of about $5 billion) before paying off the principal in the final years of the plan. The final pay-off date was scheduled as 2024.

Figure 2.12



**For illustration only. Expected annual payments towards interest and principal per $1 million of UAAL.*

Figure 2.13

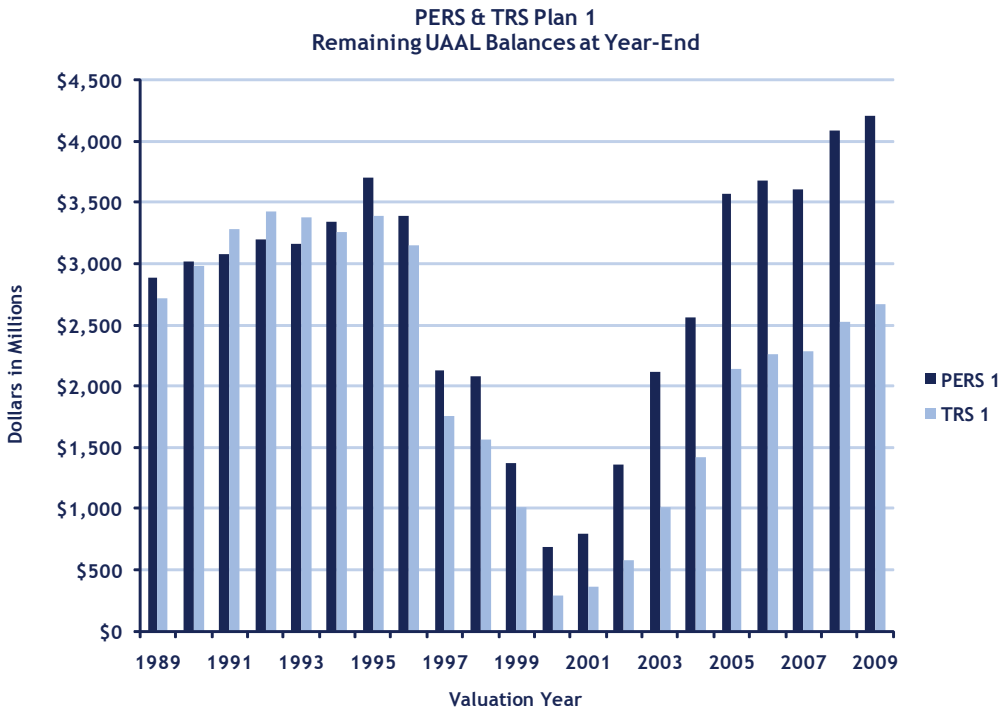


**For illustration only. Expected year-end balance per $1 million of UAAL.*

Having a target payoff date with a back-loaded financing plan greatly increases financial risk. For example, a significant downturn in the market that occurs close to the final pay-off date does not allow time for plan asset values to recover. This means that the chance of running out of money prematurely will increase significantly as the pay-off date for a closed plan approaches.

If a plan runs out of money prematurely then benefits must be paid from annual operating budgets on a pay-as-you-go basis (contributions made as benefits come due). These payments are in addition to normal pension costs. We refer to this as "pay-go" risk. While small pay-go amounts can usually be accommodated at the very end of a plan's life, significant pay-go amounts create challenges for employer budgets.

Figure 2.14



Changing short-term economic conditions can also affect legacy costs. When markets are strong and returns are higher than the long-term expectation, UAAL balances decline. This can lead to a false sense of security. **Figure 2.14** shows how UAAL balances followed a similar path to employer contributions for PERS and TRS generally. The "happy valley" of low UAAL balances in the late 1990s and early 2000s was accompanied by missed payments for legacy costs.

A general "reconciliation" of financial events affecting legacy costs helps explain why legacy costs persist today. Negative amortization, missed contributions and benefit improvements increased legacy costs over the last two decades. There were some offsetting decreases during the past twenty years as well, including investment experience gains.*

** Note: Investment experience gains are returns in excess of the investment target of 8 percent.*

We mentioned earlier that investments were on track and the average annual rate of return was 8.23 percent over the past twenty years. That measure was on a "time-weighted" basis - a common practice for measuring and reporting the returns for an investment portfolio. In this case, it represents a measurement of investment performance for the CTF for all the plans.

For this reconciliation, we measured returns on a "dollar-weighted" basis. This allowed us to account for investment gains and losses on the annual cash flows of each individual plan. Since each plan has different cash flows, the rate of return will vary for each plan.

Dollar-weighted returns for PERS 1 and TRS 1 exceeded 8.23 percent for the twenty-year period due to the fortunate timing of each plan's cash flow. These plans started the twenty-year period with their largest asset base, which coincided with the period of most favorable investment performance. The Plan 1 UAAL would be much higher today if this were not the case.

Figure 2.15 summarizes major sources of change in PERS 1 and TRS 1 legacy costs (UAAL) over the past twenty years.

Figure 2.15

Reconciliation of UAAL Changes*

(Dollars in millions)	PERS	TRS
Starting Balance (6/30/1990)	$3,000	$3,000
Negative Amortization	3,000	1,900
Investment Experience Gains	(4,400)	(3,700)
Funding Shortfall	500	500
Benefit Improvements	2,000	1,400
Liability / Other	100	(400)
Ending Balance (6/30/2009)	$4,200	$2,700

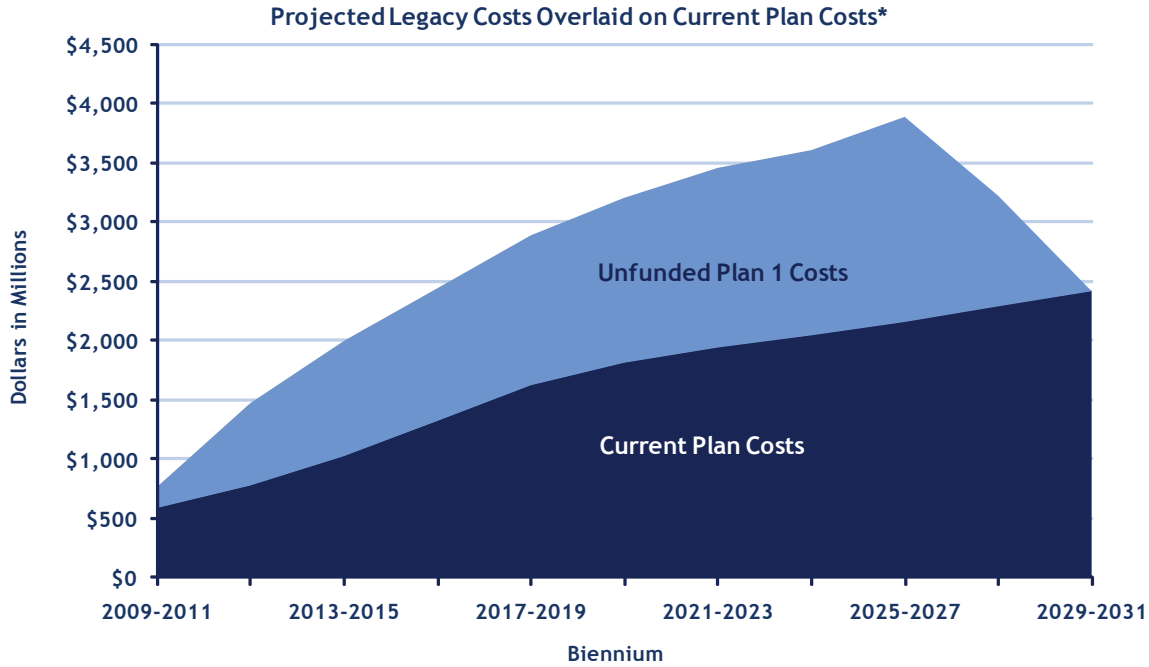
**Results rounded to nearest $100 million.*

Today, the remaining legacy costs are helping to drive large contribution rate increases. Part of the restructuring of the Plan 1 funding method in 2009 was to manage the very large spikes in Plan 1 UAAL contribution rates that would have been necessary to pay off the Plan 1 legacy costs by 2024.

The new PERS 1 and TRS 1 funding method eliminated negative amortization - if all required contributions are made. Still, it will take about two decades for the legacy costs to be retired. And in the meantime, those costs will continue to overlay current plan costs.

To summarize, we observed that risks for closed plans are different than risks for plans with an unlimited time horizon. In particular, large spikes in contribution rates and pay-go risk are more of a concern in Washington's closed plans. Our review of PERS 1 and TRS 1 legacy costs showed how significantly these costs are affecting employer costs today. It also shed light on the importance of a funding policy for closed plans that supports the long-term financing plan for pensions.

Figure 2.16



Based on the OSA 2008 Actuarial Valuation and projected under the expected investment scenario.

Recap of Past Twenty Years

We reviewed the past to gain insight about where we are today. First we looked at pension income. We saw that investments were on track over the twenty-year period. On the other hand, underfunding decreased pension income while benefit improvements increased plan costs.

We looked at state revenue growth to gain more insight into underfunding. We saw significant volatility, especially in the most recent decade of the past twenty years. This volatility was very similar to investment volatility and in fact, the two moved together over the period. Still, the investment volatility was not unexpected but was anticipated by long-term investment policy. And for the twenty-year period, investment volatility was less than expected.

The second (most recent) decade of the period was the most volatile. This was also the decade that was marked by underfunding. When investments were down, revenues were also down, making contributions more difficult to make. Also it was more difficult to make required contributions when the previous year's contributions had been lower than required.

Even when revenue growth peaked in the middle of the second decade, contributions were still roughly half of what was required. And even after the positive track record of the first decade, pension contributions were only enough to fund the largest state-administered plans (on a total plan basis) at an average rate of 80 percent for the twenty-year period.

Meanwhile, benefit improvements during the entire twenty-year period added significant liabilities. One of the most significant improvements, gain-sharing, was a short-term reaction to positive investment volatility.

Finally, overlaying the financing plan for pensions during the past twenty years was a second financing plan for PERS 1 and TRS 1 legacy costs. This overlay was based on negative amortization. Negative amortization provided what appeared to be a manageable extended payment plan, but shifted payment of the principal liabilities to the end of the payment period.

The previous financing plan for legacy costs produced spiking contribution rate requirements following the asset losses from 2008-2009 and exacerbated the pay-go risk for PERS 1 and TRS 1. In 2009 the Plan 1 funding method was revised to eliminate negative amortization and remove spiking contributions. Still, these legacy costs persist and remain a significant liability today.

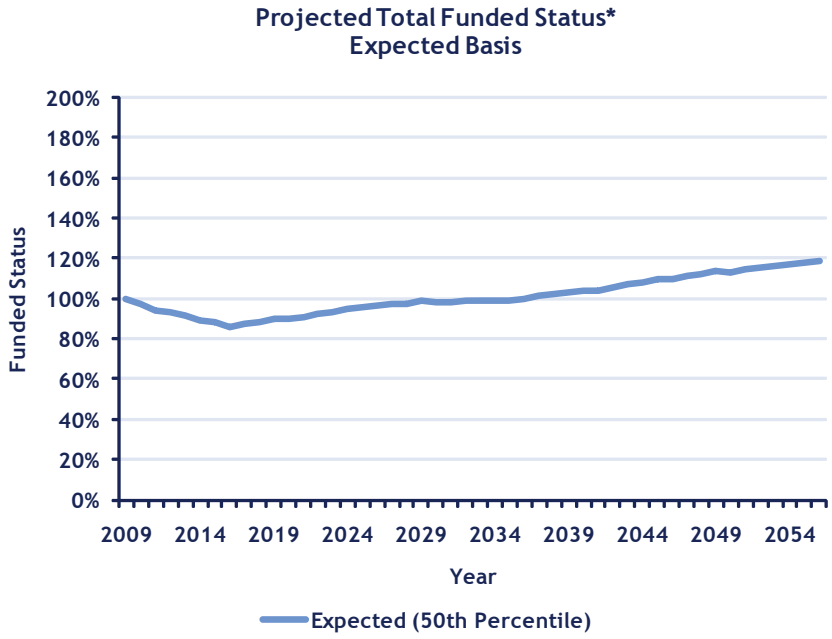
Possible Future Outcomes

This section of the report looks at where the pension plans are headed. This section also introduces OSA's new model. The model can show us not only expected outcomes, but also a full range of possible future outcomes. We used the model to explore outcomes that could occur if policy makers continue to manage the state's pension enterprise according to past patterns or "past practices." We also looked at how outcomes could change if policies or practices change.

Traditional Analysis Can Show Where Plans Are Headed

For many years Washington has used funded status as an indicator of pension plan health. The graph on the following page is an example of how we have traditionally projected the total funded status for the plans. Notice that there is only one line on this graph. This line represents our best estimate of what we expect the funded status to be in the future. In the words of the actuarial profession, our traditional projections have been "deterministic."

Figure 3.1

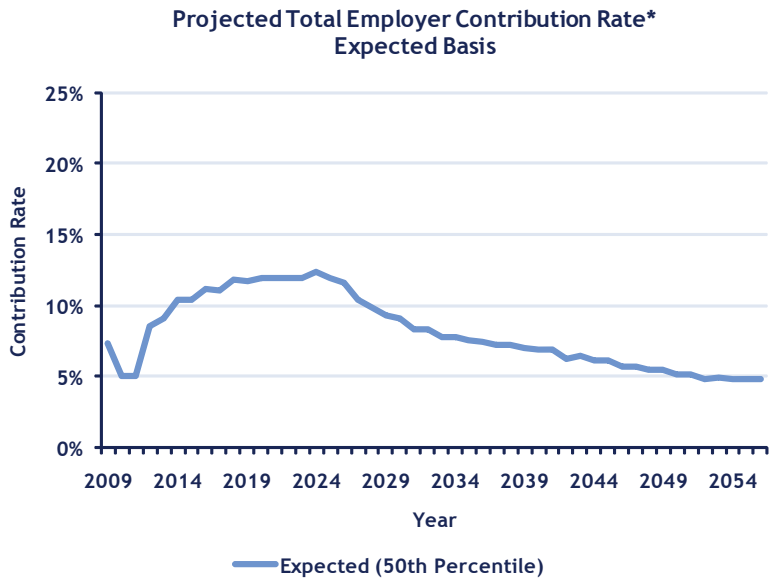


**Total funded status for illustration only. Actual funded statuses vary by plan.*

Figure 3.1 shows that we expect the total funded status for the state-administered retirement systems to decline in the near term with a return to full funding in 2036. This decline is due to the recognition of deferred asset losses from 2008-2009. The deferral occurs because of our asset smoothing method.

We also project future contribution rates to help policy makers plan ahead for future budgets. Projected contribution rates give cues about the future affordability of pensions. **Figure 3.2** is an example of a traditional projection of the expected total employer contribution rate for the plans. Again, there is only one line representing our best estimate of what we expect the total contribution to be in the future.

Figure 3.2



Total contribution rate for illustration only. Actual contribution rates vary by plan.

Figure 3.2 shows the expected total employer contribution rates peaking at 12.37 percent in 2024 and then gradually declining over the long term.

Neither figure (3.1 or 3.2) informs the user about the likelihood or magnitude of other possible outcomes. Some of these outcomes create risks that might jeopardize the health of pensions, or challenge employer budgets in ways that might be very difficult to accommodate.

New Model Shows Possible Future Outcomes in More Detail

As part of the risk assessment, we wanted to do more than project expected future funded status and contribution rates. While these projections are helpful, they do not fully describe the long-term funding dynamics of pensions. Also, they don't tell the whole story because they don't identify many of the financial risks that pension plans face.

We wanted to look at how the plans behave over time and how they respond to changes in their environment. Of particular concern to us was looking more extensively at pension risks. We wanted to identify, quantify, and communicate the risks, especially those directly impacting pension costs.

We also wanted to learn more about the risks or variability that Washington's pension plans could face over the long-term. Traditional actuarial analysis focuses on what we *expect* to see in the future. However, there are also risks associated with what we *don't expect*. To evaluate the unexpected, we would need to see a full range of possible future outcomes.

OSA expanded its analysis.

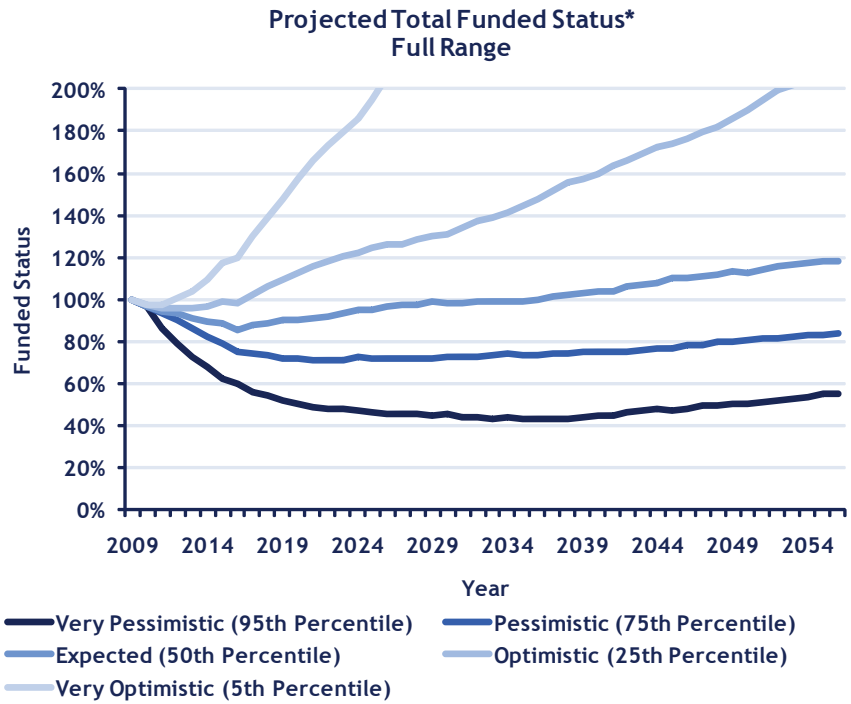
We considered whether our existing tools would fully accommodate this goal, and decided to enhance our analysis by developing a new actuarial model with a stochastic component. The "stochastic" or "probabilistic" component is the part of the model that randomly generates thousands of fifty-year economic paths, allowing us to view a complete range of possible outcomes - including even the most unexpected events.

While we have performed some stochastic analysis related to pensions in the past, the focus has been mostly on investment outcomes and not on funding or benefits policy. Also, we have not included revenue growth as a factor in our stochastic projections until now.

We also used dynamic modeling so we could see the potential reactions to outcomes generated by the stochastic component. Dynamic modeling shows us how a change in one area of interest or concern can affect outcomes in other areas. This approach can provide policy makers with more data about the consequences of various risk management strategies.

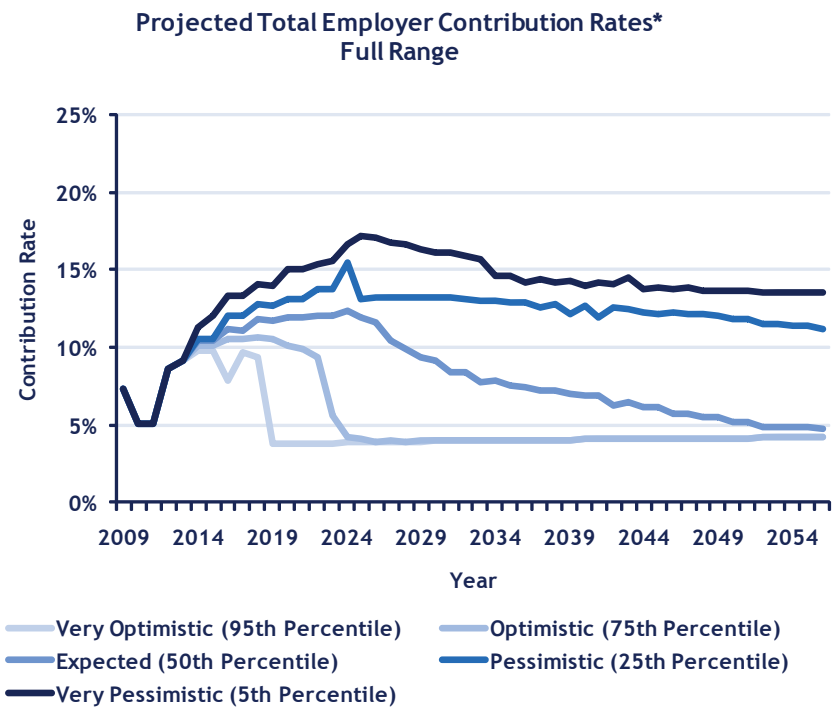
Figures 3.3 and **3.4** illustrate the kind of output that such a model can produce.

Figure 3.3



Total funded status for illustration only. Actual funded statuses vary by plan.

Figure 3.4



Total contribution rate for illustration only. Actual contribution rates vary by plan.

Key Considerations for Building the New Model

The annual rate of investment returns is a key assumption.

Earlier in this report we mentioned that investment returns generate roughly 75 percent of the income to the pension trust fund, and thus cover about the same percentage of pension costs. This being the case, the assumption we make about investment returns is very important to the model and the results it generates.

We used the 8 percent annual rate of return assumption adopted by the Legislature in RCW 41.45.035 to model pension costs. We also used the WSIB capital market assumptions to model asset returns, and to estimate the annual volatility we can expect to see around the long-term average rate of return. You can read more about these assumptions in the Appendix.

We set two new assumptions about behavior.

Traditional actuarial analysis determines funding requirements at a particular valuation date based on current law. To do that, it makes fundamental and implicit assumptions about pension plans:

1. Required contributions will always be made.
2. Benefits will not be improved.

As demonstrated by our twenty-year look-back, actual plan experience tells a different story. What does this mean for systematic actuarial funding? Plan costs will be higher than what we've projected if this mismatch between assumptions and experience continues.

To model the effects of continuing past practices, we used twenty years of historical data to create new assumptions about funding policy and benefits policy. We set assumptions for each based on this data. The model allows us to turn these assumptions on and off. By looking at different scenarios for the future we see how risk behaves and can compare the effects of different actions or policies.

To model a continuation of past practices, we assumed the Legislature would not always make required contributions.

In order to set assumptions about the rate at which contributions would be made, we considered plan experience since 1989. We chose that date because that's when pension funding reform was enacted to establish a new procedure for adopting contribution rates. We reviewed historical records to compare the actuarially required contribution rates with the actual contribution rates adopted.

We found a history of underfunding during the last two decades. For the largest plans in the state retirement systems, the Legislature set contribution rates at about 80 percent of what was recommended in the applicable actuarial valuations for the period. See **Figure 2.2.** For more information about this assumption please see the Appendix.

To model a continuation of past practices, we assumed that the Legislature would improve benefits.

In order to set an assumption about the rate at which benefit improvements would be made, we again looked to plan experience. We examined historical records since 1989 - again using the date of the Pension Funding Reform Act - to determine what benefit improvements had passed the Legislature and how much they cost.

We found a history of improving benefits, including the ongoing smaller increases we called "creep," and the occasional but significant benefit increases we called "spikes." This history is summarized in **Figure 2.3** (in the previous section of this report), and identifies the most significant benefit improvements during the period.

Generally, we assumed that benefit improvements would increase overall plan liabilities by 0.45 percent per year for the largest plans. We did not have enough data to statistically correlate the large spikes with other events or assumptions. We simply raise the issue that such spikes have existed in the past and might exist again in the future. For more details on the behavioral or response variables related to benefits policy, see the Appendix.

We have the ability to turn these behavioral assumptions on and off when projecting future outcomes. We can also modify these assumptions and look at the change in outcomes. Thus the model can show us what the range of outcomes could be if the responses of the past continue, and what the outcomes could be if the responses are deliberately changed.

The annual change in revenue growth is another important economic variable.

We included revenue growth assumptions in the model in order to observe how the annual change in revenue might be tied to other pension variables or assumptions, including investment returns. We also modeled future levels of revenue to evaluate the affordability of pension in the future.

The building blocks of revenue growth are population growth, inflation, and productivity or "real" growth. (Productivity growth is economic growth over and above inflation and population growth.) You can observe the correlation between real revenue growth and investment returns in **Figure 2.5**. You can also view the details of how we developed our assumptions about revenue growth in the Appendix.

To summarize our key considerations in building the new model, we incorporated assumptions about investment returns and revenue growth, and how the two interacted. We also set new behavioral or response variables in two areas: 1) the rate of underfunding due to missed contributions; and, 2) the rate at which benefit improvements add liabilities to the plans. These new assumptions helped us model how continuing past practices could affect possible future outcomes.

The model also incorporates statutory assumptions from the actuarial funding chapter of state law as well as WSIB's capital market assumptions. Please see the Appendix for a discussion of all the other assumptions we incorporated into the model, including assumptions normally used to perform annual valuations for the pension systems. We highlighted particular stochastic assumptions in this report because of their unique contributions to this risk assessment.

We will continue to monitor the assumptions we made for the model to see if they are consistent with experience over time. In the meantime, it is important for our audience to know that results can change if assumptions change. To better disclose this point, we illustrate what can happen to our results if our assumptions are too optimistic or too pessimistic. We call this "sensitivity analysis," and included it in the Appendix.

What Are the Future Outcomes from Continuing Past Practices?

We used the model to evaluate future outcomes for pensions based on continuing the policies and practices of the past. We included this analysis because it gives us insights into the risks inherent in the system as it is now managed. Also, it serves as a point of comparison for outcomes that can occur if future policies or responses change.

We used affordability and risk measures to summarize our results.

We developed a **pension score card** to summarize and evaluate outcomes from the model. The purpose of the score card is not to grade the pension systems. Instead, the score card is simply a summary of results from the model. The goal is to facilitate users' ability to see and compare scores from other scenarios.

The scores are relative, not absolute - they simply show how risk measures change from one scenario to the next. It is more important how each score compares to scores from other scenarios than whether the score is high or low.

To arrive at a score, we selected measures that reflect affordability for pensions and measures that reflect risk. We included both types of measures because we know policy makers must balance financial risk with affordability. We describe the measures in more detail below.

Future score cards could add another dimension of measures for policy makers to balance, such as measures related to benefit adequacy. For the purpose of this report, however, we decided to focus on just two categories of measures, with three measures for affordability and five measures for risk.

We also assigned a weight to each measure. A different score card could be developed with different measures and/or different weights depending on the values of the user. Also, different weights could be assigned to reflect the values of different users.

The score card in **Figure 3.5** applies to the pension systems as a whole. (We provide plan-specific measures in the Appendix.) The measures in this score card summarize results from the model based on continuing the practices we observed from the twenty-year look-back. An explanation for each category follows.

Figure 3.5

Pension Score Card - Continue Past Practices		
Category *(Dollars in Billions)*	**Value**	**Score**
Affordability		
Chance Pensions will Consume More than 8% of GF-S[1]	18%	37
5% Chance GF-S[1] Consumption will Exceed	9.9%	39
5% Chance Employer Contribution Rate will Exceed	20.1%	44
Risk		
Chance of PERS 1, TRS 1 in Pay-Go[2]	41%	19
Chance of Open Plan in Pay-Go[2]	13%	47
5% Chance Annual Pay-Go Cost[3] in PERS 1, TRS 1 Exceed	$1.7	38
5% Chance Annual Pay-Go Cost[3] in Open Plans Exceed	$4.0	11
Chance of Total Funded Status Below 60%	34%	24
Total Weighted Score		**33**

[1] *Currently 2.7% of GF-S.*

[2] *When today's value of annual cost exceeds $50 million.*

[3] *Pay-Go costs on top of normal pension costs.*

What affordability measures did we focus on? First, we know that employer contributions to pensions now consume approximately 2.7 percent of the state's General Fund-State (GF-S) expenditures. For more information on the state's budget, see "*A Citizen's Guide to the Washington State Budget*" at the following link: http://www.leg.wa.gov/Senate/Committees/WM/Documents/Publications/BudgetGuides/2010/CGTB2010Final_3.pdf.

We set our first affordability measure to answer the following question:

- What is the probability that pensions will consume more than 8 percent of the GF-S budget?

We felt that an increase from 2.7 percent to 8 percent of the GF-S was significant enough to be of concern to policy makers.

Finding: If past practices continue, there is an 18 percent chance that the portion of employer contributions allocated to pensions will exceed 8 percent of the GF-S budget.

For our second and third affordability measures, we wanted to identify outcomes that have a one-in-twenty or 5 percent chance of occurring. We applied our own risk tolerance, using 5 percent to reflect a probability that is significant enough that we think policy makers might want to consider it or take it into account. In other words, outcomes with a 5 percent probability of happening are statistically significant, or not highly improbable. We respect that different users may have different values or risk tolerances, and the scoring could be adjusted to reflect those.

Our second affordability measure answers the following question:

- Based on outcomes that have a 5 percent chance of occurring, what percentage of the GF-S budget will employer contributions consume?

Finding: If past practices continue, there is a 5 percent chance that employer contributions to pensions will consume in excess of 9.9 percent of the GF-S budget.

Our third affordability measure focuses on contribution rates. It answers the following question:

- Based on outcomes that have a 5 percent chance of occurring, employer contribution rates will exceed what percentage of employee pay?

Finding: If past practices continue, there is a 5 percent chance that employer contribution rates will exceed 20.1 percent of employee payroll. In contrast, the current total employer contribution rate for the state administered plans is 7.37 percent of employee payroll.

Note: This is a total plans measure and is not plan specific. For a plan by plan summary, please see the Appendix.

Next we turn to risk measures. We identified several measures focused on pay-go risk. These measures help us understand the chance of an open plan running out of money; or in the case of a closed plan, the chance of running out of money prematurely. In a closed plan, running out of money prematurely means the plan's trust fund is exhausted before the ongoing benefit payments are so small that they can reasonably be accommodated within annual operating budgets. According to our risk measure, a plan runs out of money prematurely when the trust fund can no longer pay benefits with a present value that exceeds $50 million.

We assumed that employers would want to avoid paying significant non-discretionary amounts for pensions out of their annual operating budgets, as this would cause a significant jump in annual government expenditures. Thus, we felt that premature pay-go risk was something that all employers would want to avoid, especially since most pension obligations are contractual and not easily repealed or reduced.

To address pay-go risk, we used measures that would answer the following questions:

- What is the chance that PERS 1 or TRS 1 will prematurely run out of money?
- What is the chance that an open plan will run out of money?
- Based on outcomes that have a 5 percent chance of occurring, how much is the PERS 1 or TRS 1 pay-go cost in today's dollars?
- Based on outcomes that have a 5 percent chance of occurring, how much is the open plan pay-go cost in today's dollars?

Findings: We found that if past practices continue, there is a 41 percent chance that PERS 1 or TRS 1 will prematurely become pay-go, and a 13 percent chance that an open plan will prematurely become pay-go.

Findings: There is a 5 percent chance that the annual pay-go cost in PERS 1 or TRS 1 will exceed $1.7 billion. There is a 5 percent chance that the annual pay-go cost in any open plan will exceed $4.0 billion.

Finally, we included a measure related to the plans' "funded status." Funded status measures the actuarial assets on hand for paying the "earned" liabilities of a pension plan at a particular point in time. If the plan has a funded status of 100 percent, then there is a dollar of actuarial assets for every dollar of accrued liability ("earned" benefits) as of that date.

When a plan's funded status drops below 60 percent, we consider the plan to be "at risk." To put this threshold into context, we reviewed federal requirements for qualified private sector pension plans. We noted that a single employer plan with a funded status of below 60 percent is subject to strict regulations, including a requirement that future benefit accruals cease.

Private sector plans calculate their funded status based on market value measures of both assets and liabilities. We use the actuarial value with longer asset smoothing and a long-term interest rate assumption. If we were to calculate the funded status for our public plans the same way that private plans do, our current funded status would be much lower.

We also noted another federal law applicable to these private sector plans. They are prohibited from increasing benefits if the funded ratio would be less than 80 percent after the plan is amended, *unless* the employer immediately contributes the full value of the amendment to the pension fund. The goal is to prevent insolvency and, ultimately, takeover by the Pension Benefit Guarantee Corporation, an

independent agency of the United States government. Our state-administered public pension plans are not subject to these kinds of federal laws or restrictions, nor is there an opportunity to transfer liability to another entity.

With this context in mind, we chose a risk measure for funded status that would answer the following question:

- How likely is it that total funded status for all plans will drop below 60 percent (or become "at risk")?

Finding: If past practices continue, there is a 34 percent chance that the total funded status for all plans will drop below 60 percent.

We scored each measure, applied the weighting, and came up with an overall pension score. The overall pension score card for the scenario we call "Continue Past Practices" is 33. As we mentioned earlier in our description of the score card, the overall pension score is not as important as how the score compares to scores from other scenarios.

The **risk/affordability comparison** is another way to view the results from the pension score card at a glance. We know that risk can be reduced or eliminated if enough money is spent, but that cost may not always be affordable. Policy makers often have to balance financial risk and affordability.

Figure 3.6

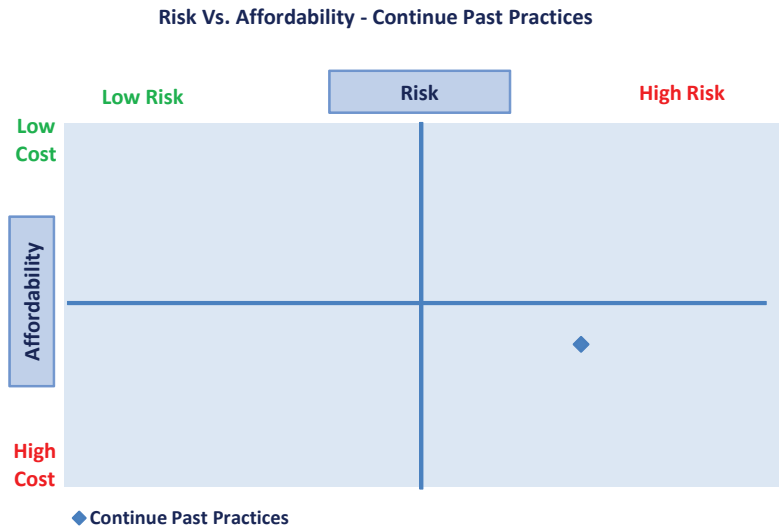
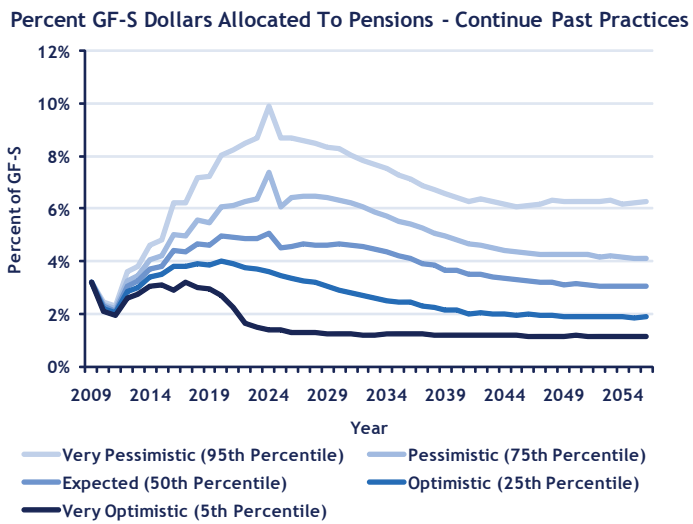


Figure 3.6 shows the balance between risk and affordability based on the measures and scoring we just discussed as elements of the pension score card. A scenario will have the most positive effects (lowest financial risk and most affordability) when the indicator is in the northwest quadrant.

We are displaying the risk/affordability comparison for continuing past practices. The blue diamond is in the southeast quadrant. Why? As we mentioned earlier, the total funded status for the plans is declining. Also, outcomes from the risk model showed significant pay-go risk in the Plans 1 as well as affordability challenges for all plans, especially in the near term.

We also developed a visual summary of fifty years of outcomes for the percent of **GF-S dollars consumed by pensions**. We presented five lines ranging from very optimistic (5th percentile) to very pessimistic (95th percentile). **Figure 3.7** shows that if past practices continue, there will be steep increases in the short-term with amounts starting to level out after about year 2024. Note that future pension costs would return to where they are today only under optimistic and very optimistic outcomes.

Figure 3.7



Finally, we visually summarized the likelihood and magnitude of **future pay-go risk** in any state-administered plan, excluding LEOFF 1. In **Figure 3.8**, the left axis is the probability or percentage chance of a plan prematurely running out of money. We used the shaded area to track the probability of pay-go risk over time. The area shaded in blue represents PERS 1 and TRS 1 (both closed to new entrants) and the area shaded in brown represents the open plans.

The right axis is the present value of annual pay-go costs in the event that a plan runs out of money. We used the blue and brown lines to track this value for the closed and open plans.

If past practices continue, pay-go risk looks like this:

Figure 3.8

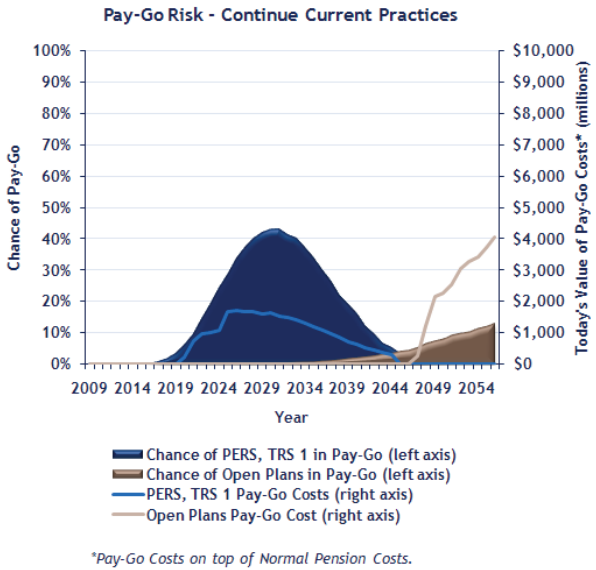


Figure 3.8 shows a 41 percent probability that PERS 1 or TRS 1 will reach pay-go status around 2030. Within the next several decades, the annual Plan 1 pay-go costs could exceed $1.7 billion in today's dollars. These are the same risk measures we used in the pension score card. Also, as we described earlier in this report, this risk reflects the effects of Plan 1 legacy costs.

Pay-go risk does not start to come into the picture for the open plans for several decades. The risk is 13 percent by the end of the fifty-year period. Should that occur, the annual costs could exceed $4.0 billion in today's dollars.

The pay-go dollars identified in **Figure 3.8** are *in addition to* on-going pension costs. Most of the pay-go risk in the open plans is driven by the TRS 2 member maximum contribution rate. RCW 41.45.061(1). When the maximum member rate is triggered, employers must absorb the excess, which drives employer rates even higher. All pay-go risk is borne by employers in this case, not members.

In the Appendix, we have included graphic summaries of output from the model for each plan. We did not include this information in the main body of the report because we wanted to manage the report's length. Please note that the Appendix includes an additional affordability measure for members. This measure was more appropriate for individual plans than for the aggregate summaries we used in the full report.

There Are Significant Financial Risks to Continuing Past Practices

Based on our observations of future outcomes from modeling a continuation of past practices, we found the following:

1. Pension contribution rates are increasing. We can expect to see contribution rates well above historical maximums in most plans.
2. Pensions will consume a greater portion of GF-S revenues in the future.
3. The total funded status for the plans is declining.
4. Past funding and benefit policies have created significant short- and long-term affordability challenges.
5. There is a significant pay-go risk for the PERS 1 and TRS 1 within the next three decades, and a lesser but significant pay-go risk for TRS 2/3 beginning in about three decades.

Figure 3.9 is our complete summary of possible future outcomes based on continuing past practices, and using the risk measures we selected for this report.

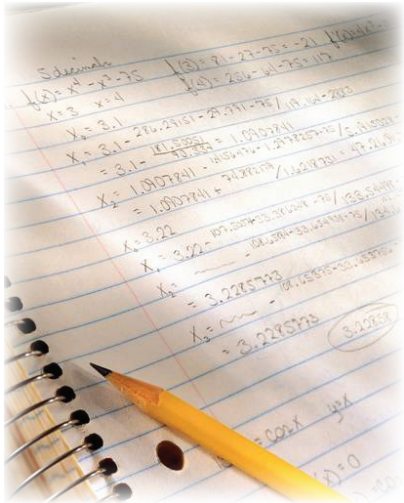


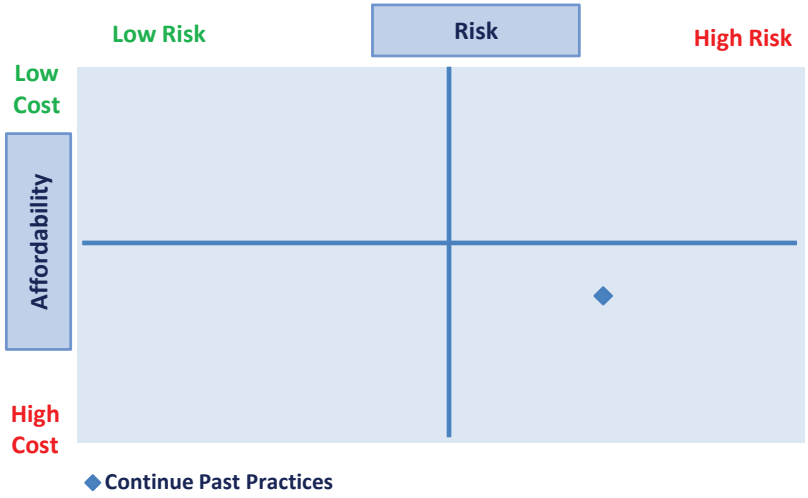
Figure 3.9
Risk Measures: Continue Past Practices

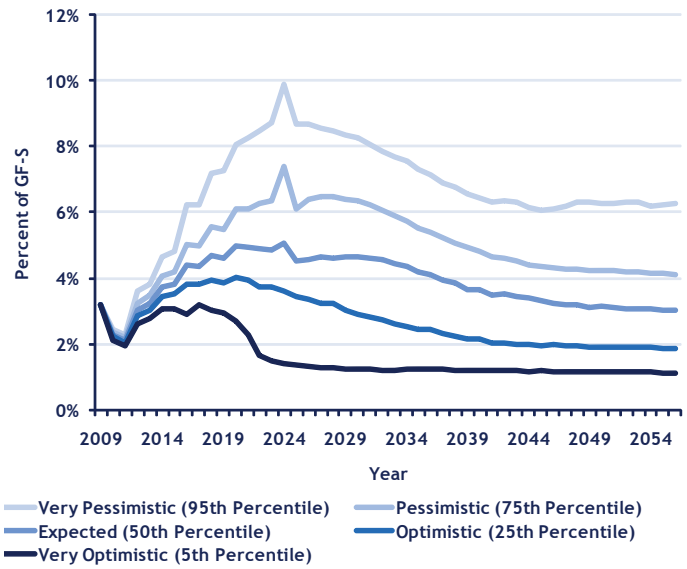
Pension Score Card		
Category *(Dollars in Billions)*	**Value**	**Score**
Affordability		
Chance Pensions will Consume More than 8% of GF-S[1]	18%	37
5% Chance GF-S[1] Consumption will Exceed	9.9%	39
5% Chance Employer Contribution Rate will Exceed	20.1%	44
Risk		
Chance of PERS 1, TRS 1 in Pay-Go[2]	41%	19
Chance of Open Plan in Pay-Go[2]	13%	47
5% Chance Annual Pay-Go Cost[3] in PERS 1, TRS 1 Exceed	$1.7	38
5% Chance Annual Pay-Go Cost[3] in Open Plans Exceed	$4.0	11
Chance of Total Funded Status Below 60%	34%	24
Total Weighted Score		**33**

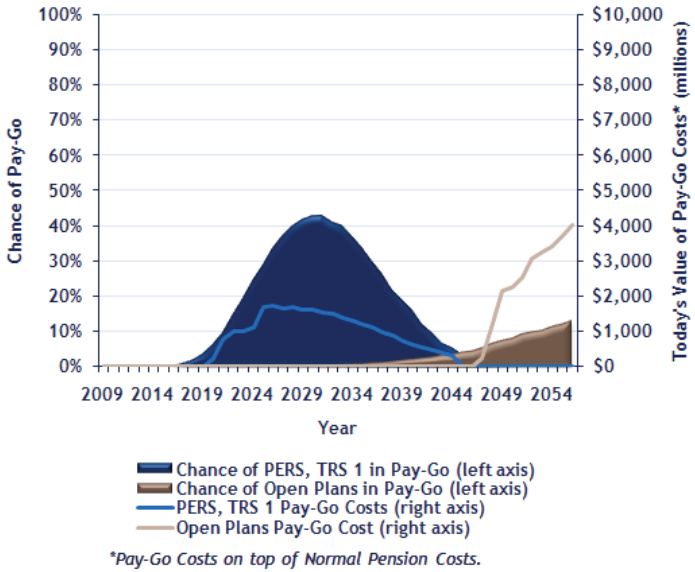
[1] *Currently 2.7% of GF-S.*

[2] *When today's value of annual cost exceeds $50 million.*

[3] *Pay-Go costs on top of normal pension costs.*







Other "Scenarios" Shed Additional Light on Future Outcomes

Next we observed how future outcomes for the pension systems might change under several scenarios. Scenarios are simply hypothetical events or policy changes. We did not choose these scenarios to predict the future or recommend solutions, but rather to help our audience visualize the dynamics of financial risk. We also wanted to illustrate how policy makers might use the risk model.

In order to make the report manageable we summarized only the key results from each scenario. We focused on outcomes related to affordability and risk and placed the results into the four formats we described earlier for the scenario we called "Continue Past Practices." These formats allow readers to quickly compare the outcomes from each scenario. The goal is to see whether the risk and affordability measures improve or get worse, and how much they change as policies change.

The scenarios in this report are just a sample of what we can model. Policy makers can identify other scenarios based on their priorities. We can generate results for specific plans or for all state-administered plans. And as previously stated, we can use different risk measures and apply different weighting and scoring according to the needs and values of various users.

We included results from the following additional scenarios in this report:

- **Contribute 100 Percent of ARC:** What if past practices continue, but 100 percent of Actuarially Required Contributions (ARC) are made in the future?
- **Eliminate Future Benefit Improvements:** What if past practices continue, but there are no benefit improvements in the future?
- **Contribute 100 Percent ARC and Eliminate Future Benefit Improvements:** What if 100 percent of ARC is made *and* no benefit improvements are passed by the Legislature in the future? This combination of assumptions is similar to the assumptions used in a traditional "current law projection." (Current law projections assume that the benefits structure currently in statute will never change and that all actuarially required contributions will be made every year. However current law projections do not show a full range of possible future outcomes.)

Making all required contributions significantly reduces risk, but affordability challenges remain.

Our twenty-year look-back revealed that the largest pension plans were funded at a rate of about 80 percent (or underfunded at a rate of about 20 percent). In contrast, we wanted to see how future outcomes could change if 100 percent of actuarially required contributions are made in the future. This scenario assumes that past practices in the area of benefit improvements continue, and isolates the effects of changing just the past funding policies.

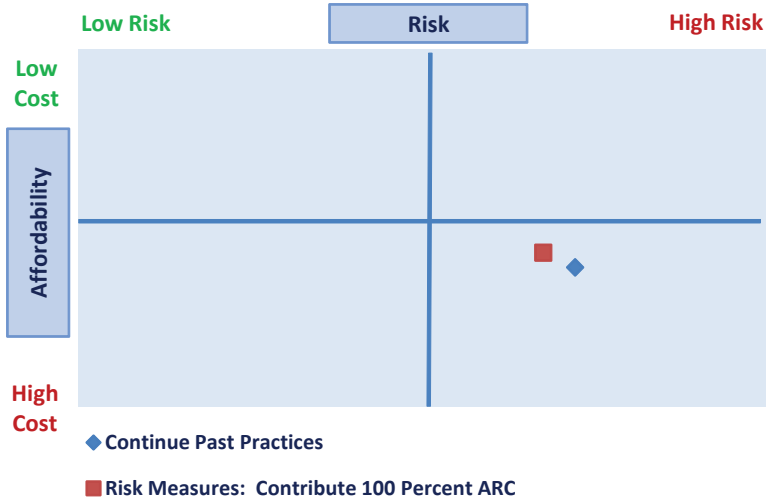
Figure 3.10
Risk Measures: Contribute 100 Percent ARC

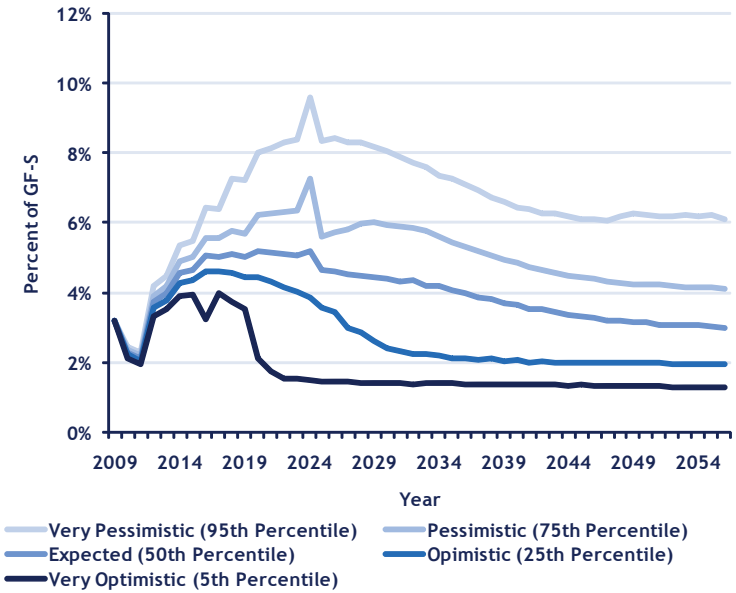
Pension Score Card		
Category *(Dollars in Billions)*	**Value**	**Score**
Affordability		
Chance Pensions will Consume More than 8% of GF-S[1]	16%	43
5% Chance GF-S[1] Consumption will Exceed	9.6%	43
5% Chance Employer Contribution Rate will Exceed	19.8%	45
Risk		
Chance of PERS 1, TRS 1 in Pay-Go[2]	29%	31
Chance of Open Plan in Pay-Go[2]	12%	48
5% Chance Annual Pay-Go Cost[3] in PERS 1, TRS 1 Exceed	$1.7	38
5% Chance Annual Pay-Go Cost[3] in Open Plans Exceed	$3.9	13
Chance of Total Funded Status Below 60%	29%	33
Total Weighted Score		**38**
Past Practice's Weighted Score		**33**

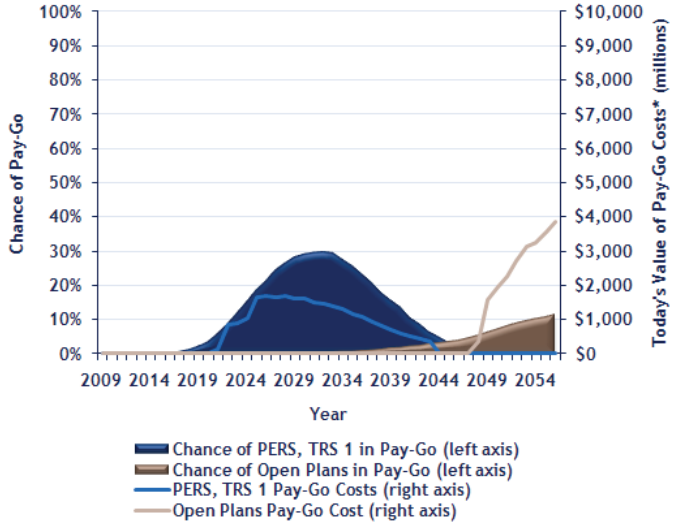
[1] *Currently 2.7% of GF-S.*

[2] *When today's value of annual cost exceeds $50 million.*

[3] *Pay-Go costs on top of normal pension costs.*







Pay-Go Costs on top of Normal Pension Costs.

The biggest improvement from making 100 percent of the ARC is the reduction in the chance of pay-go risk in the closed plans. If 100 percent of the ARC is made in the future, the chance of PERS 1 and TRS 1 pay-go risk is reduced from 41 percent to 29 percent.

Under this scenario, the total score improves (from 33 to 38). Risk is reduced. The red square shows movement in a northwesterly direction, but it is still in the southeast quadrant. There are small improvements in near-term affordability, but long-term affordability is largely unchanged.

Eliminating future benefit improvements stops pay-go risk in the open plans.

Earlier we described how benefits policy over the last twenty years included small on-going improvements ("creep"), along with random and less frequent large improvements ("spikes"). This particular scenario explores future pension outcomes based on a benefits policy that would not allow any increases going forward.

We show this scenario simply to isolate the effects of past practices in the area of benefit improvements and show how risk and affordability measures for possible future outcomes are affected. For this scenario, we assume that past funding practices continue (that is, that 80 percent of required contributions are made).

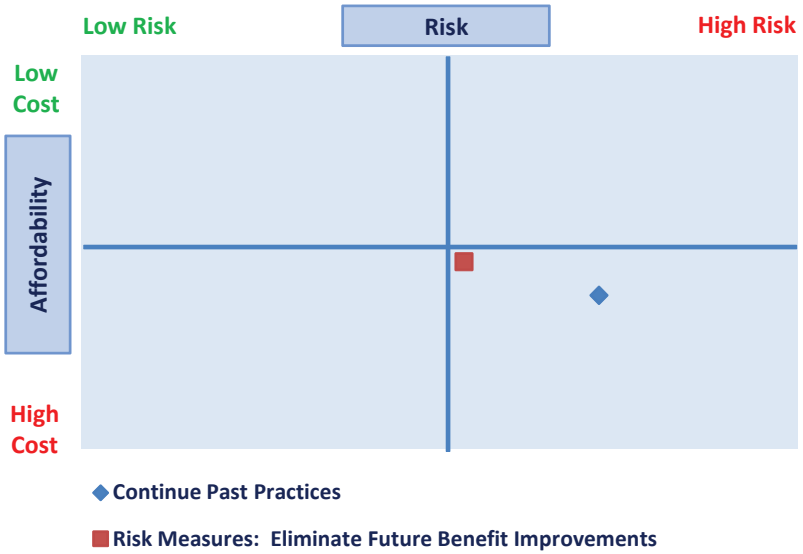
Figure 3.11
Risk Measures: Eliminate Future Benefit Improvements

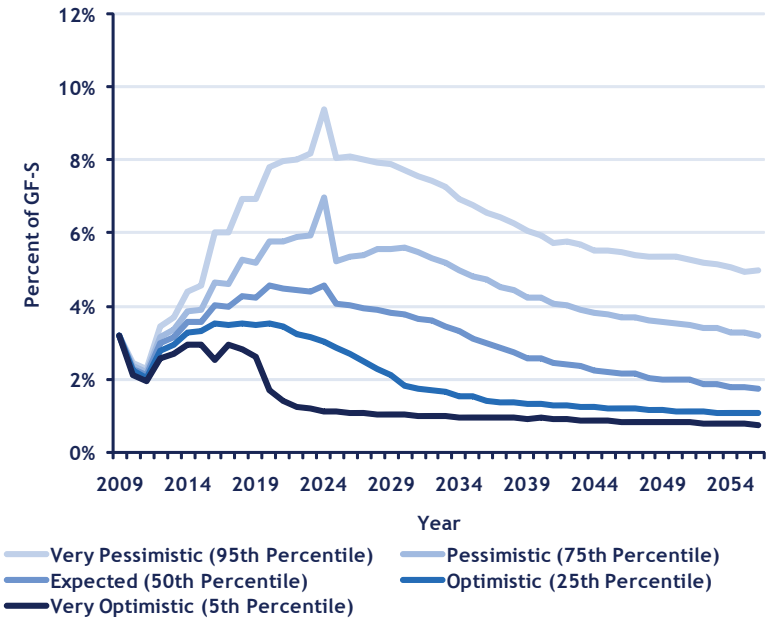
Pension Score Card		
Category *(Dollars in Billions)*	**Value**	**Score**
Affordability		
Chance Pensions will Consume More than 8% of GF-S[1]	14%	49
5% Chance GF-S[1] Consumption will Exceed	9.4%	45
5% Chance Employer Contribution Rate will Exceed	18.7%	49
Risk		
Chance of PERS 1, TRS 1 in Pay-Go[2]	26%	34
Chance of Open Plan in Pay-Go[2]	1%	59
5% Chance Annual Pay-Go Cost[3] in PERS 1, TRS 1 Exceed	$1.4	41
5% Chance Annual Pay-Go Cost[3] in Open Plans Exceed	$0.0	57
Chance of Total Funded Status Below 60%	23%	42
Total Weighted Score		**47**
Past Practice's Weighted Score		**33**

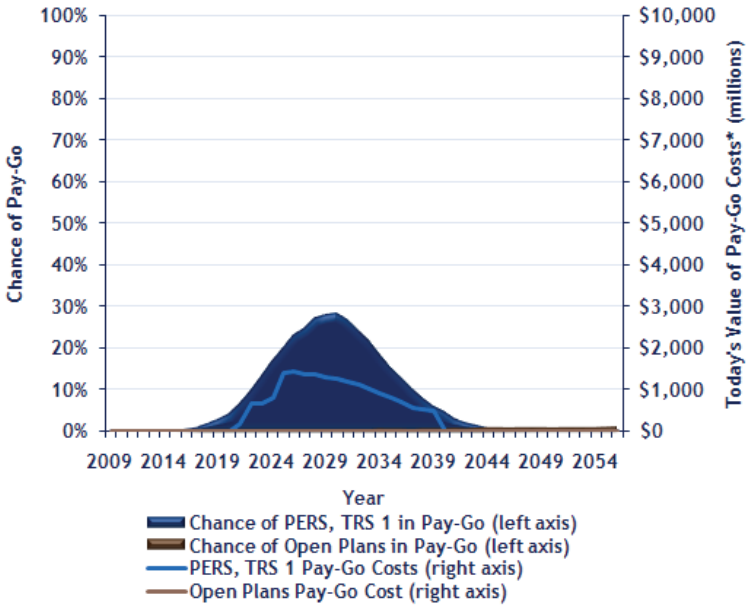
[1] *Currently 2.7% of GF-S.*

[2] *When today's value of annual cost exceeds $50 million.*

[3] *Pay-Go costs on top of normal pension costs.*







**Pay-Go Costs on top of Normal Pension Costs.*

Adopting no benefit improvements in the future would almost eliminate pay-go risk in the open plans, dropping it from 13 percent under past practices to one percent under this scenario. In the closed plans, this scenario reduces pay-go risk for PERS 1 and TRS 1 from 41 percent to 26 percent. Again, the total score improves (from 33 to 47).

This scenario slightly improves affordability, especially in the long run. Most short-term affordability challenges remain, although there is a slight improvement. Still, the red square showing the balance between risk and affordability is not in the northwest quadrant.

Making 100 percent of the ARC and eliminating future benefit improvements improves the risk/affordability balance.

Under this scenario, 100 percent of required contributions would be made and future benefit improvements would be eliminated. This combination is similar to what has traditionally been known as a "current law projection." Such projections typically assume that the same benefits structure currently in statute will continue into the future, and that all actuarially required contributions will be made each year.

Figure 3.12

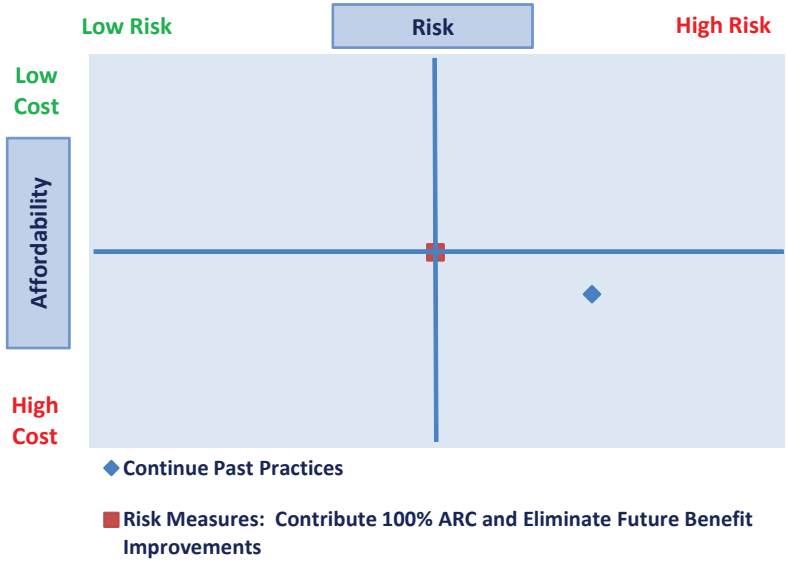
Risk Measures: Contribute 100 Percent ARC and Eliminate Future Benefit Improvements

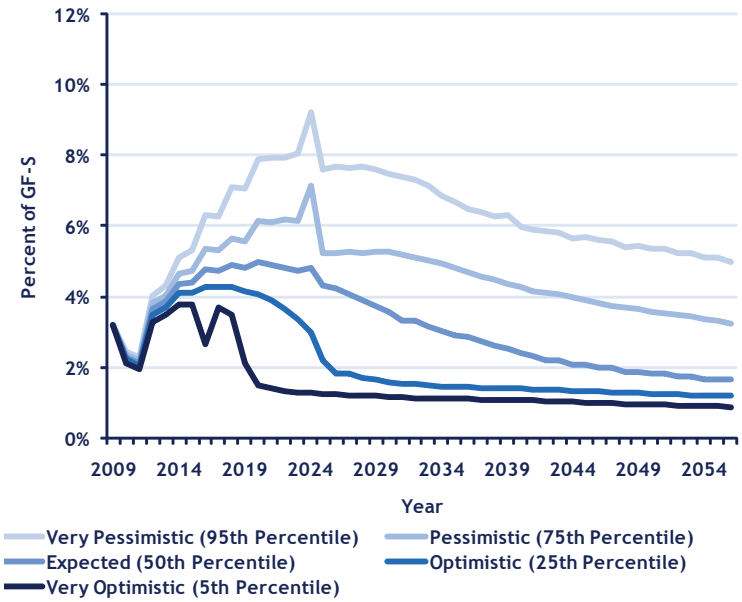
Pension Score Card		
Category *(Dollars in Billions)*	**Value**	**Score**
Affordability		
Chance Pensions will Consume More than 8% of GF-S[1]	14%	51
5% Chance GF-S[1] Consumption will Exceed	9.2%	48
5% Chance Employer Contribution Rate will Exceed	18.3%	51
Risk		
Chance of PERS 1, TRS 1 in Pay-Go[2]	16%	44
Chance of Open Plan in Pay-Go[2]	1%	59
5% Chance Annual Pay-Go Cost[3] in PERS 1, TRS 1 Exceed	$1.4	41
5% Chance Annual Pay-Go Cost[3] in Open Plans Exceed	$0.0	57
Chance of Total Funded Status Below 60%	17%	50
Total Weighted Score		**50**
Past Practice's Weighted Score		**33**

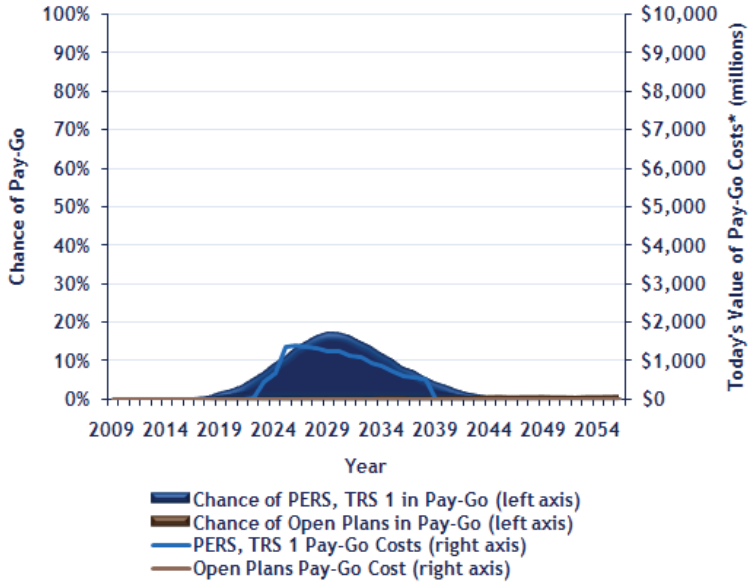
[1] *Currently 2.7% of GF-S.*

[2] *When today's value of annual cost exceeds $50 million.*

[3] *Pay-Go costs on top of normal pension costs.*







**Pay-Go Costs on top of Normal Pension Costs.*

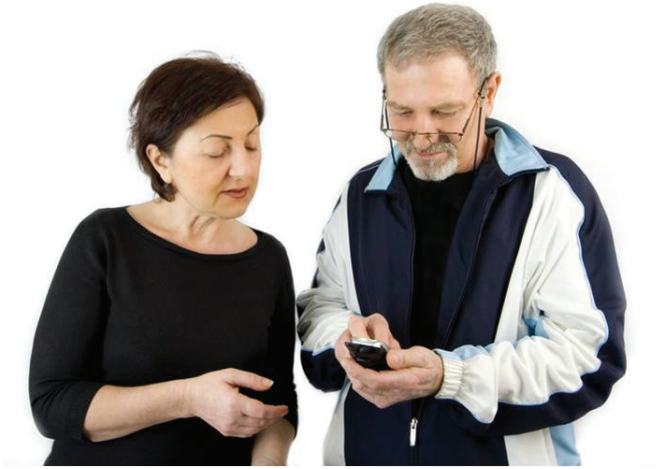
This scenario shows a better balance between risk and affordability. The total score improves (from 33 to 50). The red square moves just inside the northwest quadrant. Pay-go risk in the open plans is almost gone. And pay-go risk for the closed plans has been reduced from 41 percent to 16 percent.

Still there is a 5 percent (or one in 20) chance that pay-go costs for PERS 1 and TRS 1 will exceed $1.4 billion. These costs would be on top of normal pension costs. And there is still a 17 percent chance that the total funded status for the plans will drop below 60 percent, or into the "at risk" category. These risks prevent the red square from moving firmly into the northwest quadrant.

Affordability measures improve, but significant short-term challenges remain. And while long-term affordability looks better, there is still a 14 percent chance that pensions will consume more than 8 percent of the GF-S budget in the future. There is also a 5 percent chance that pensions will exceed 9.2 percent of the GF-S. Finally, there is a 5 percent chance that the total employer contribution rate for pensions will exceed 18.3 percent.

To summarize, results from the model show improvements in risk measures if 100 percent of all actuarially required contributions are made in the future and benefit improvements cease. Yet these courses of action may not be realistic. And significant risks and affordability challenges would still lie ahead.

Many of the challenges we face today are because of past responses and legacy costs. And we know from history that there can be significant external forces that can lead to future funding shortfalls and benefit improvements. So how does Washington move the red square firmly into the northwest quadrant? This is the challenge and opportunity for policy makers today.



The Next Step Is Risk Management

The drivers of financial health for pensions are investment policy, funding policy, and benefits policy. In the most fundamental sense, this is where the opportunities lie to improve risk and affordability measures for the pension enterprise.

Our analysis of the past two decades showed that investments have been on track. However, funding policy reacted to expected investment and revenue volatility in ways that resulted in underfunding. While this underfunding was occurring, benefit improvements added significant costs to the plans. The result is that the plans now face possible future outcomes that are marked by significant financial risk. Policy makers are also grappling with short-term affordability challenges in a very tough economic environment.

We observed that changing past practices improves the long-term outlook for pensions, but significant short-term affordability challenges remain. The new model provided quantitative rigor for our assessment, showing the likelihood and magnitude of future risks and their impacts on affordability.

We chose, scored, and weighted the risk measures we thought were most important. We focused on financial risk, our area of expertise. We reported on the areas of funding and benefits policy that we observed as having the most significant effects on financial risks today.

We also recognize that policy makers may have different values and priorities than ours. And they may be concerned about risks that we have not even identified in this report. Fortunately, the processes and tools we have created lend themselves well to custom analysis.

We encourage policy makers to consider what they most want to accomplish. What is success for the retirement systems? What risks would they like to avoid, reduce, eliminate, or transfer? We can then use the new tools to help evaluate strategies for changing possible future outcomes in ways that are consistent with their goals.

As we explored outcomes from the scenarios we just discussed, other possible risks to the pension systems came to light. The following are just some examples. We include these as possible areas for further discussion or exploration by policy makers.

There are litigation risks related to gain-sharing.

Gain-sharing was first implemented in 1998 to provide benefit increases to members of the Plans 1 in PERS and TRS. Later this benefit was added for the Plans 3 in PERS, TRS, and SERS. (Plan 2 members did not participate in gain-sharing.) These increases were contingent upon the occurrence of "extraordinary gains." Extraordinary gains were deemed to have occurred whenever the compound average of investment returns on pension fund assets exceeded 10 percent for the previous four fiscal years.

This trigger resulted in increases to the U-COLA in the Plans 1 and lump sum distributions into members' defined contribution accounts in the Plans 3.

The long-term cost of this benefit was neither recognized in advance nor pre-funded. Also, the benefit was identified by the Legislature as a non-contractual right. In 2007 the Legislature repealed gain-sharing and replaced it with other benefits. Immediately thereafter, certain stakeholders filed a lawsuit challenging the repeal and asking for reinstatement of the gain-sharing benefit.

The lawsuit is ongoing and its outcome is unknown as of the date of this publication. The plaintiffs seek to reinstate gain-sharing and retain the replacement benefits. This outcome would significantly reduce affordability and increase pay-go risk for the affected plans.

Member maximum contribution rates help drive pay-go risk.

When we examined outcomes from the model we saw that pay-go risk in the open plans was being driven largely by member maximum contribution rates. These plan features exist in TRS 2 and WSPRS.

When contribution rates increase to high enough levels under adverse economic conditions, the member maximums are triggered and the excess must be absorbed by employers. This drives employer rates even higher than they would be normally - and at times when they can least afford the increases. In these plans, all pay-go risk is borne by employers, not members.

There is pay-go risk and the potential for spiking contributions in LEOFF 1.

This risk may seem counter-intuitive since LEOFF 1 (a closed plan) has been well-funded for over a decade, and there were very few benefit improvements in this plan over the past twenty years. However, as we examined possible future outcomes for the percentage of GF-S allocated to pensions, we saw a spike around the year 2024. This spike is being driven by the funding method for LEOFF Plan 1.

The funding goal for LEOFF 1 has been to pay all unfunded past liabilities by 2024, the date by which all active members are expected to have retired. Beginning July 1, 2000, the Legislature suspended employer and member contributions - unless the most recent actuarial valuation indicates that the plan has unfunded liabilities.

The funding policy for LEOFF 1 is very basic. No contributions are made if the plan is fully funded. Actuarially required contributions must be made if the plan is not fully funded at any time prior to 2024.

The current funding policy does not fully address future pay-go risk because no contributions would be collected for the plan after 2024. There would be no active members to make contributions, and the funding policy assumes that employers would no longer make contributions either.

LEOFF 1 has a 41 percent chance of running out of money prematurely. There is a 5 percent chance that annual pay-go contributions could exceed $500 million in today's dollars starting in 2029. For more risk measures affecting LEOFF 1, please see the Appendix.

There are many other opportunities for further analysis.

OSA can analyze the risks we have discussed in this report in more depth if policy makers so choose. We also recognize that risk management is on-going. There will be a need to manage risks in many other areas of funding and benefits policy, even if they do not have as much financial impact on risk measures as those that we have included in this report.

On the benefits side, some examples of additional risks to manage are in areas of benefit adequacy, purchasing power, plan design, and plan complexity. Examples of such risks on the funding side are in the areas of contribution rate adequacy, rate stability, and rate affordability for employers and members. All of these can impact the optimum health of the pension systems.

Another area for proactive risk management is assumption risk. If the assumptions we use for the long-term financing plan are too optimistic, the result can be underfunding. If they are too pessimistic, the result can be overfunding. Some assumptions with the most significant implications for financial risk include the assumed annual investment rate of return, assumptions about retirement behavior, and assumed improvements in longevity.

Finally, we expect that policy makers will have many other ideas about risks they want to avoid and strategies or policy changes they'd like to evaluate. We look forward to sharing our expanded analysis, along with the new model. As we perform our future actuarial work, we will continue to monitor and update the model, quantify future risk, observe the balance between risk and affordability, and evaluate the consequences of risk management strategies.

We hope that these new tools contribute to increased understanding and improved risk management for the state's pension plans. Ultimately we hope to see Washington's pension plans return to optimum health, with a better balance between risk and affordability, and a red square in the northwest quadrant!

Findings, Conclusions, and Recommendations

Findings and Conclusions

1. Investment policy has met its long-term target of an 8 percent annual rate of return over the past twenty years.
2. Funding policy over the past twenty years resulted in pension contributions that were, on average, 20 percent less than what was actuarially required. Periods of expected investment and revenue volatility were marked by short-term adjustments to funding policy that accelerated the recognition of gains and deferred the recognition of losses.
3. Benefit improvements policy added significant costs to the plans at the same time that underfunding and short-term funding policies were decreasing income to the plans.
4. Past practices have created significant affordability challenges, especially in the short term. If past practices continue, there is an 18 percent chance that the portion of the GF-S budget allocated to pensions will increase from 2.7 percent today to in excess of 8 percent in the future. Even if polices change very quickly to modify those past practices, it will take time for risk and affordability measures to improve.
5. If past practices continue, there is a 41 percent chance that PERS 1 or TRS 1 will prematurely become pay-as-you-go plans. There is a 5 percent chance that annual pay-go cost will exceed $1.7 billion in today's dollars. Pay-go cost is in addition to normal pension costs and could significantly challenge future employer budgets.

6. There is a 41 percent chance that LEOFF 1 will run out of money prematurely. There is a 5 percent chance that annual pay-go cost in LEOFF 1 will exceed $500 million in today's dollars.
7. There is a 13 percent chance of an open plan running out of money. There is a 5 percent chance that the annual pay-go cost in an open plan will exceed $4 billion in today's dollars.

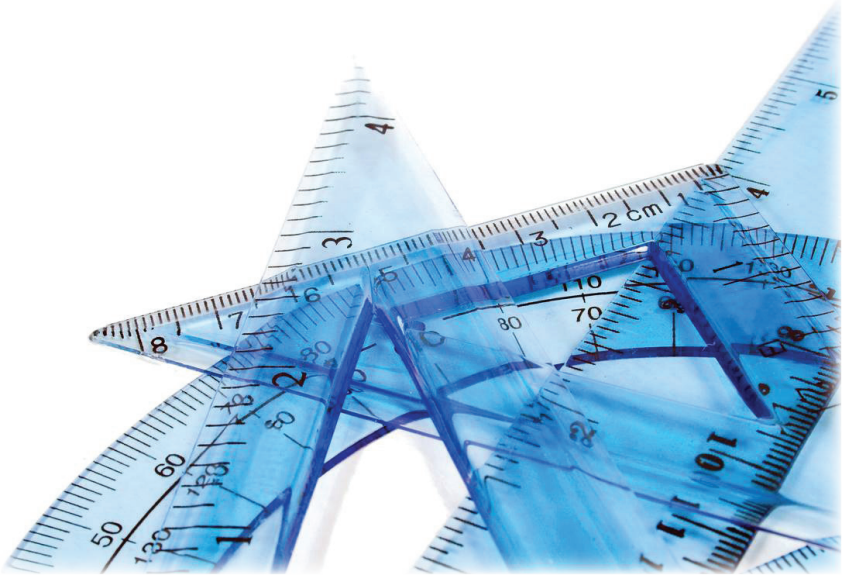
Recommendations

1. Make 100 percent of actuarially required contributions in the future. This includes adhering to the minimum contribution rates required to amortize unfunded past liabilities in PERS 1 and TRS 1.

2. Avoid large benefit improvements in the future until risk and affordability measures significantly improve. Develop new policies for adopting benefit improvements that balance the need to accommodate reasonable adjustments in benefits with the need for sustainable long-term funding.

3. Use risk modeling to further examine pay-go risk under LEOFF 1's current funding policy as well as in the open plans, especially in TRS 2/3 and WSPRS. Develop and implement strategies to mitigate or eliminate this risk.

4. Prepare for financial risks outside the control of the retirement systems. Use the model to explore how current policies could be amended to accommodate investment and revenue volatility, budget challenges, and changing economic conditions.



Indexes

Index of Acronyms

ARC	Actuarially Required Contributions
CTF	Commingled Trust Fund
DRS	Department of Retirement Systems
ERISA	Employee Retirement Income Security Act
GF-S	General Fund-State
LEOFF 2	Law Enforcement Officers' and Fire Fighters' Retirement System Plan 2
OSA	Office of the State Actuary
PERS	Public Employees' Retirement System
PFC	Pension Funding Council
PSERS	Public Safety Employees' Retirement System
RCW	Revised Code of Washington
SCPP	Select Committee on Pension Policy
SERS	School Employees' Retirement System
TRS	Teachers' Retirement System
UAAL	Unfunded Actuarial Accrued Liability
U-COLA	Uniform Cost of Living Adjustment
WSIB	Washington State Investment Board
WSPRS	Washington State Patrol Retirement System

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