



OSA Review Of Economic Assumptions

Matt Smith, FCA, EA, MAAA
State Actuary



Office of the State Actuary

"Securing tomorrow's pensions today."

August 14, 2007

Overview

- Preview
- Explanation
- Your role
- Next steps



Current Economic Assumptions

- Investment return
- Inflation
- Salary increases
- Growth in system membership
- All prescribed in statute



Purpose Of Economic Assumptions

- Estimate future amounts
 - Pension payments
 - Contribution requirements
- Each individual assumption serves a specific purpose

Rate Of Investment Return

- Reflects anticipated returns on plan's current and future assets
- AKA the "valuation" or "discount" rate
- Used to calculate "present value" of future benefits and salaries



Rate Of Inflation

- General economic inflation, typically measured as price changes over the whole economy
- Used for two purposes
 - Projecting future compensation
 - Projecting future post-retirement COLAs



Rate Of General Salary Increases

- Represents rate of change in an individual's compensation
 - Inflation
 - Productivity growth
- Focus here is not merit-based pay increases
- Also used to project future compensation
- Part of many actuarial cost and amortization methods

Growth In System Membership

- Represents rate of change in number of active members covered under retirement system
- Used under current PERS 1 and TRS 1 amortization methods



Selecting Economic Assumptions

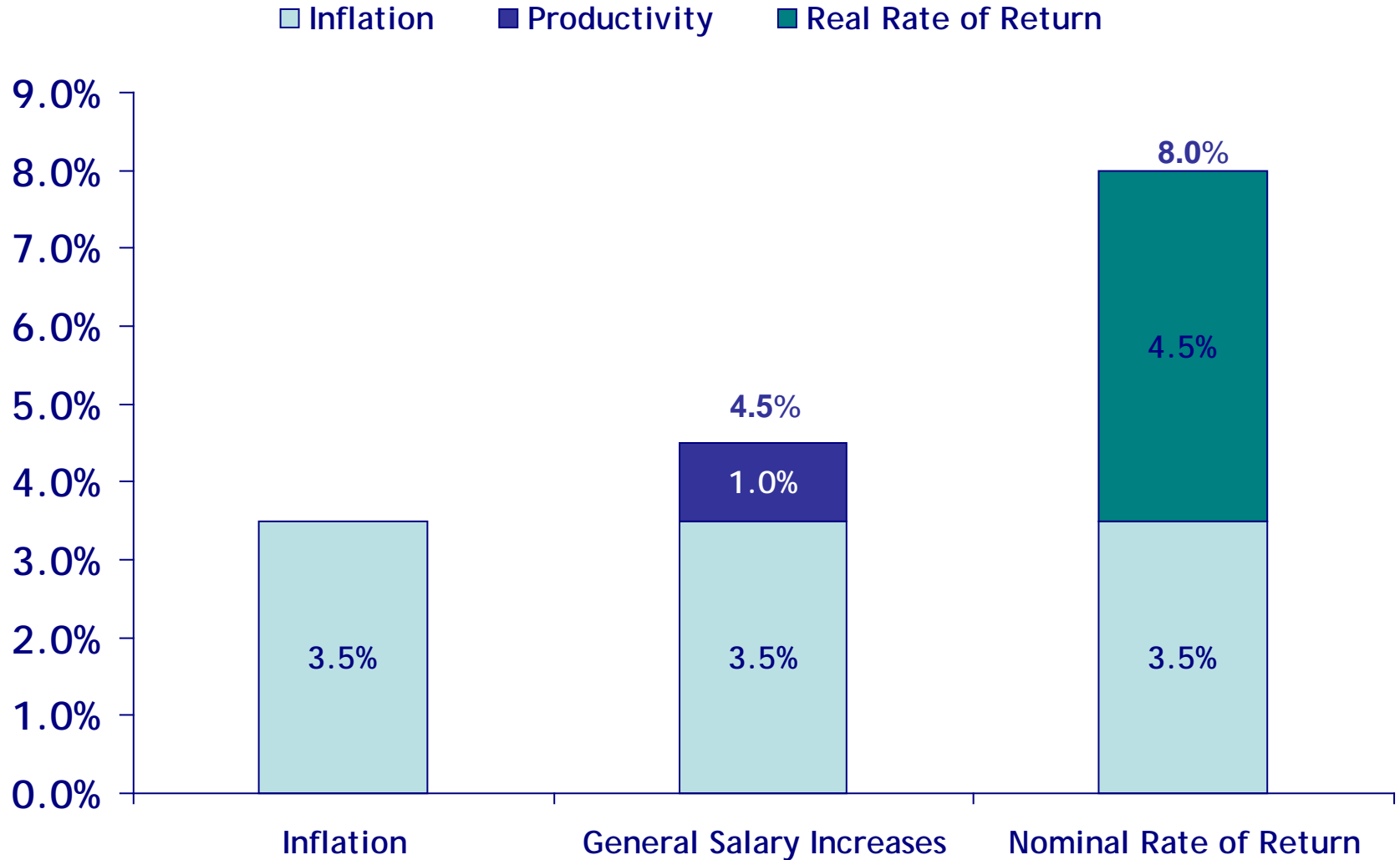
- No one knows what the future holds
- Actuaries use professional judgment to estimate future outcomes
- Judgment based on past experience and future expectations
- The recent past not necessarily the best indicator of the future
- Economic assumptions typically applied over very long-term periods (50+ years)
- Entire set of economic assumptions should be consistent

Building Block Approach

- Start with inflation
- Inflation is a component of two assumptions
 - Nominal rate of return
 - General salary increases



Building Block Example - Current Assumptions



Analysis Of Inflation

- 3.5% to 3.8% average annual U.S. inflation from 1950 to 2006
- Average annual inflation lower over last 10 and 20 years
- “Consensus” estimate for near-term U.S. inflation (15 years) in the range of 2.5% per year
- Additional uncertainty when applied to 50-plus year timeframe
- Seattle-Tacoma-Bremerton region has experienced higher inflation relative to national average
- Attachment A

Analysis Of General Salary Growth

- 5.5% average annual salary growth from 1984 to 2006
 - All retirement systems combined
- Actual retirement system data
 - Includes all sources of pay increases
 - Merit-based increases will be studied separately
- Average annual salary growth lower over last 5 and 10 years
- Emerging impact of collective bargaining at state level
- Attachment B



Analysis Of Growth In System Membership

- Average annual system growth from 1980 to 2006
 - 2.3% in LEOFF
 - 2.4% in PERS+SERS+PSERS
 - 1.4% in TRS
- All retirement plans combined for each system
- Average annual system growth lower over last 5 and 10 years
- OFM projects declining growth in State population
 - 2% declining to 0.9% in 2030
- Attachments C,D



Analysis Of Investment Return

- 12.4% average annual ROR from 1982 to 2007
 - Total WSIB performance period
- 9.7% average annual ROR from 1926 to 2007
 - Estimated WSIB returns prior to 1982
- WSIB simulated rates of future return over next 50 years:
 - 75% of simulated returns below 8.8%
 - 25% of simulated returns below 6.4%
 - Expected return of 7.6%
- Achieving returns in the future that rival the past will be a challenge
- Attachments E,F,G



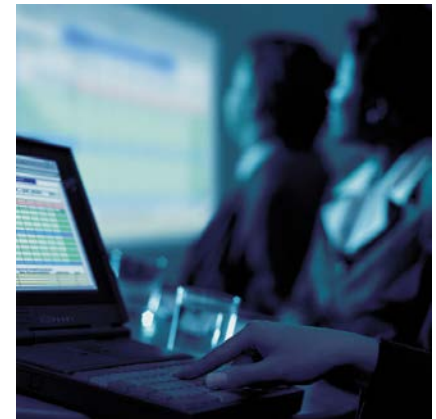
OSA Preliminary Recommendation

Current Assumptions

- 3.5% inflation
- 4.5% general salary growth
- 8% rate of return
- 1.25% membership growth
(0.9% in TRS)

Recommended Assumptions

- 3.25% inflation
- 4.25% general salary growth
- 7.75% rate of return
- 0.9% membership growth (all systems)

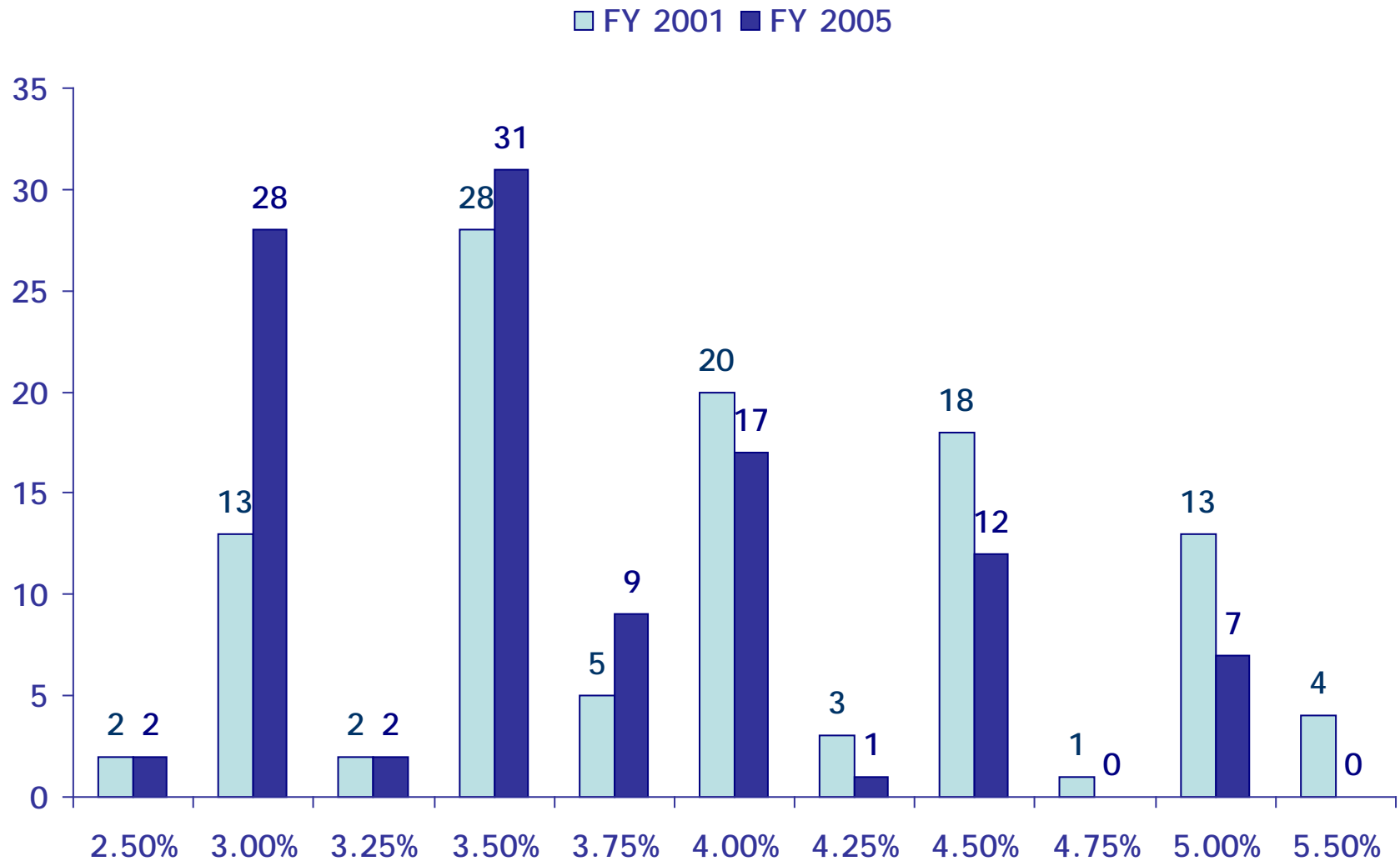


Preliminary OSA Recommendation

- Currently prescribed assumptions are reasonable
- Preliminary recommendation is my “best estimate”
- OSA recommendation represents a consistent “set” of economic assumptions
 - Consider as a whole
- Assumption changes impact the timing of future pension costs
 - Actual costs emerge with actual experience

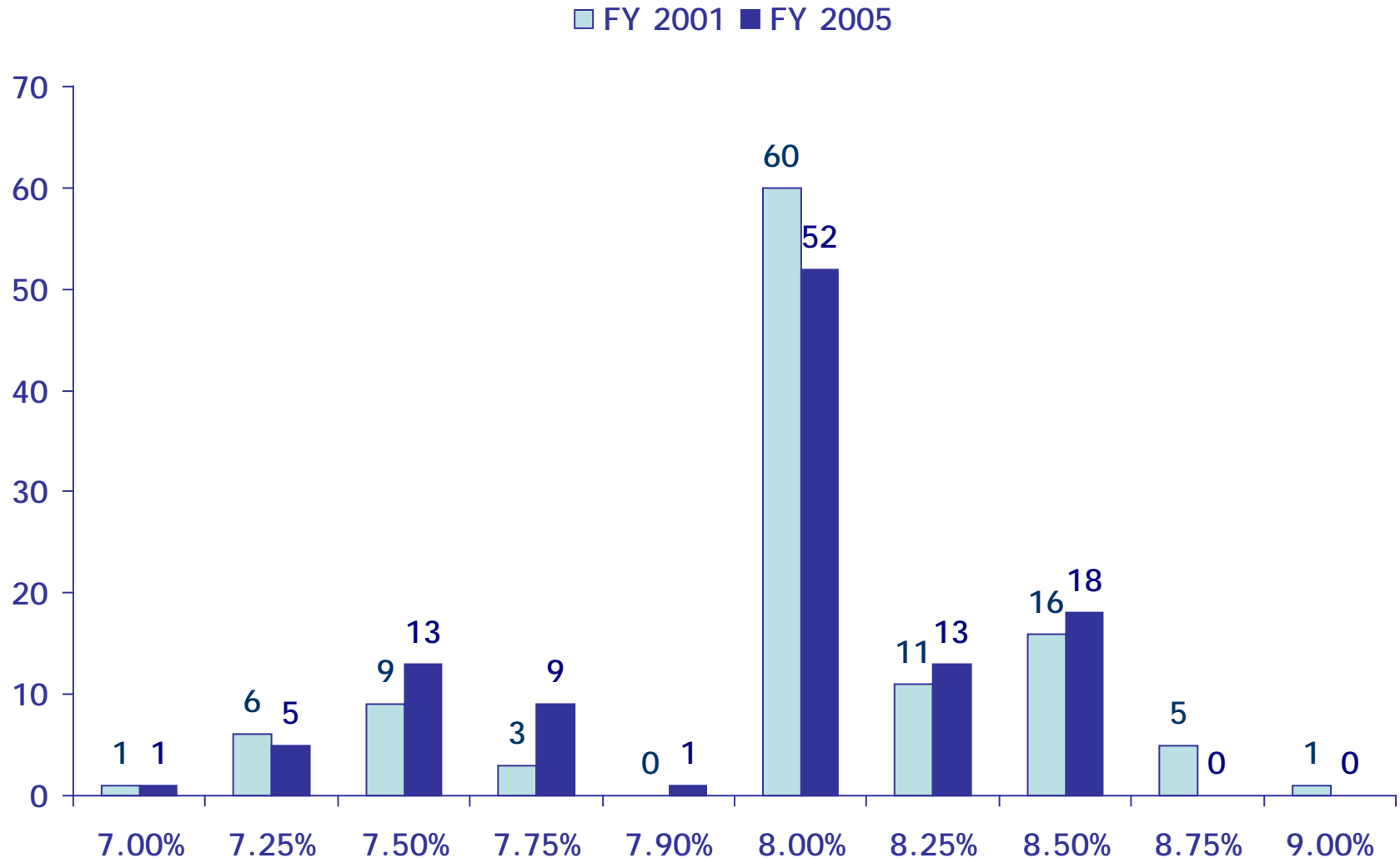


Inflation Assumptions In U.S. Public Plans*



* Source: NASRA, Public Fund Survey

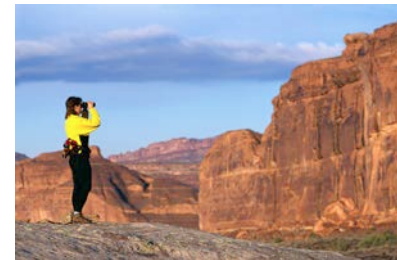
Investment Return Assumptions In U.S. Public Plans*



* Source: NASRA, Public Fund Survey

Next Steps

- OSA to finalize recommendation
- OSA recommendation to Pension Funding Council (PFC) by September 1
- PFC may adopt changes to the economic assumptions by October 31



Attachment A

Inflation Data

Year	Seattle-Tacoma-Bremerton, WA CPI-W	U.S. City Average CPI-W	GDP Deflator for Personal Consumption Expenditures	Annual % Change		
				Seattle CPI-W	U.S. CPI-W	GDP PCE
1950	70.3	72.1	16.675	1.4%	1.0%	1.2%
1951	75.7	77.8	17.805	7.7%	7.9%	6.8%
1952	77.6	79.5	18.169	2.5%	2.2%	2.0%
1953	78.6	80.1	18.416	1.3%	0.8%	1.4%
1954	78.6	80.5	18.585	0.0%	0.5%	0.9%
1955	79.0	80.2	18.676	0.5%	-0.4%	0.5%
1956	80.0	81.4	19.059	1.3%	1.5%	2.1%
1957	83.3	84.3	19.639	4.1%	3.6%	3.0%
1958	85.2	86.6	20.117	2.3%	2.7%	2.4%
1959	86.8	87.3	20.432	1.9%	0.8%	1.6%
1960	87.9	88.7	20.767	1.3%	1.6%	1.6%
1961	89.3	89.6	20.985	1.6%	1.0%	1.0%
1962	90.6	90.6	21.232	1.5%	1.1%	1.2%
1963	92.1	91.7	21.479	1.7%	1.2%	1.2%
1964	93.4	92.9	21.786	1.4%	1.3%	1.4%
1965	94.5	94.5	22.103	1.2%	1.7%	1.5%
1966	97.1	97.2	22.662	2.8%	2.9%	2.5%
1967	100.0	100.0	23.237	3.0%	2.9%	2.5%
1968	104.1	104.2	24.151	4.1%	4.2%	3.9%
1969	109.2	109.8	25.255	4.9%	5.4%	4.6%
1970	114.0	116.3	26.448	4.4%	5.9%	4.7%
1971	116.4	121.3	27.574	2.1%	4.3%	4.3%
1972	119.7	125.3	28.528	2.8%	3.3%	3.5%
1973	127.5	133.1	30.081	6.5%	6.2%	5.4%
1974	141.5	147.7	33.191	11.0%	11.0%	10.3%
1975	155.8	161.2	35.955	10.1%	9.1%	8.3%
1976	164.5	170.5	37.948	5.6%	5.8%	5.5%
1977	177.6	181.5	40.410	8.0%	6.5%	6.5%
1978	193.8	195.3	43.248	9.1%	7.6%	7.0%
1979	214.6	217.7	47.059	10.7%	11.5%	8.8%
1980	249.1	247.0	52.078	16.1%	13.5%	10.7%
1981	276.1	272.3	56.720	10.8%	10.2%	8.9%
1982	294.0	288.6	59.859	6.5%	6.0%	5.5%

Attachment A

(Continued)

Inflation Data

Year	Seattle-Tacoma-Bremerton, WA CPI-W	U.S. City Average CPI-W	GDP Deflator for Personal Consumption Expenditures	Annual % Change		
				Seattle CPI-W	U.S. CPI-W	GDP PCE
1983	293.2	297.4	62.436	-0.3%	3.0%	4.3%
1984	302.8	307.6	64.795	3.3%	3.4%	3.8%
1985	309.1	318.5	66.936	2.1%	3.5%	3.3%
1986	311.3	323.4	68.569	0.7%	1.5%	2.4%
1987	318.6	335.0	70.947	2.3%	3.6%	3.5%
1988	329.1	348.4	73.755	3.3%	4.0%	4.0%
1989	344.5	365.2	76.972	4.7%	4.8%	4.4%
1990	369.0	384.4	80.498	7.1%	5.3%	4.6%
1991	389.4	399.9	83.419	5.5%	4.0%	3.6%
1992	403.2	411.5	85.824	3.5%	2.9%	2.9%
1993	415.2	423.1	87.804	3.0%	2.8%	2.3%
1994	430.4	433.8	89.654	3.7%	2.5%	2.1%
1995	442.9	446.1	91.577	2.9%	2.8%	2.1%
1996	457.5	459.1	93.547	3.3%	2.9%	2.2%
1997	471.7	469.3	95.124	3.1%	2.2%	1.7%
1998	484.1	475.6	95.978	2.6%	1.3%	0.9%
1999	499.1	486.2	97.575	3.1%	2.2%	1.7%
2000	517.8	503.1	100.000	3.7%	3.5%	2.5%
2001	536.2	516.8	102.094	3.6%	2.7%	2.1%
2002	545.9	523.9	103.542	1.8%	1.4%	1.4%
2003	553.6	535.6	105.597	1.4%	2.2%	2.0%
2004	562.3	549.5	108.373	1.6%	2.6%	2.6%
2005	579.3	568.9	111.493	3.0%	3.5%	2.9%
2006	600.9	587.2	114.552	3.7%	3.2%	2.7%
Geometric Averages:						
All years				3.86%	3.77%	3.46%
Last 30 years				4.41%	4.21%	3.75%
Last 20 years				3.34%	3.03%	2.60%
Last 10 years				2.76%	2.49%	2.05%

Data sources: Department of Labor, Bureau of Labor Statistics (BLS) and Department of Commerce, Bureau of Economic Analysis (BEA)

Attachment B

Growth in Salaries*

Year	LEOFF		PERS		SERS		TRS		WSP		All Systems	
	Average Salary	% Change	Average Salary	% Change	Average Salary	% Change	Average Salary	% Change	Average Salary	% Change	Average Salary	% Change
1984	30,420	6.79%	21,552	6.30%			27,361	8.75%	32,689	9.54%	23,860	7.17%
1985	31,754	5.45%	22,990	9.25%			28,667	5.97%	33,044	2.59%	25,197	7.82%
1986	33,298	6.13%	23,608	5.03%			29,576	4.85%	32,554	-1.59%	25,904	5.01%
1987	33,671	2.29%	24,668	6.49%			30,104	3.21%	34,711	6.98%	26,744	5.14%
1988	35,942	7.73%	25,336	4.59%			31,626	6.41%	34,908	3.75%	27,686	5.37%
1989	37,069	4.00%	26,356	5.98%			33,344	7.11%	36,219	4.89%	28,854	6.16%
1990	39,634	8.19%	27,917	7.93%			35,306	8.02%	37,838	6.09%	30,551	7.97%
1991	41,598	6.16%	29,931	9.45%			38,716	11.16%	42,886	14.13%	32,862	9.73%
1992	43,859	7.00%	30,611	5.12%			40,700	7.50%	43,790	4.17%	33,892	5.94%
1993	45,958	6.34%	31,421	5.78%			42,537	7.03%	43,971	5.19%	34,874	6.17%
1994	48,154	5.91%	31,640	3.17%			42,581	2.72%	44,752	3.78%	35,178	3.24%
1995	50,324	5.51%	32,487	4.23%			42,979	3.19%	46,405	5.21%	36,040	4.03%
1996	52,260	5.03%	33,564	4.97%			44,741	6.00%	49,490	8.24%	37,348	5.29%
1997	54,313	5.21%	34,458	4.14%			45,009	2.47%	54,157	9.88%	38,205	3.76%
1998	57,245	6.55%	35,209	3.82%			46,551	5.17%	56,414	6.85%	39,257	4.44%
1999	59,782	5.59%	36,354	5.05%			46,803	2.52%	59,937	7.80%	40,268	4.39%
2000	62,017	4.94%	42,265	5.49%			49,276	7.54%	60,800	3.19%	45,653	6.04%
2001	63,690	4.15%	43,456	4.60%			50,900	6.11%	61,024	3.41%	46,946	4.98%
2002	66,909	6.42%	45,307	6.07% **	22,705	6.64%	52,496	5.52%	62,075	4.72%	44,389	5.99%
2003	68,927	4.33%	46,457	3.73%	23,866	5.83%	53,589	6.42%	63,202	3.53%	45,752	4.70%
2004	71,401	4.82%	47,427	3.31%	24,278	2.95%	54,180	3.15%	62,630	0.64%	46,583	3.35%
2005	74,336	5.39%	48,674	3.63%	25,026	3.80%	55,500	4.03%	64,667	5.55%	47,908	3.93%
2006	77,448	5.07%	50,798	5.69%	25,713	4.05%	56,667	3.96%	68,792	7.10%	49,621	5.02%

Geometric Averages:

	LEOFF	PERS	SERS	TRS	WSP	All Systems
Total period	5.60%	5.37%	N/A	5.58%	5.41%	5.45%
Last 20 years	5.52%	5.15%	N/A	5.44%	5.72%	5.27%
Last 10 years	5.24%	4.55%	N/A	4.68%	5.24%	4.66%
Last 5 years	5.20%	4.48%	4.65%	4.61%	4.28%	4.59%

* Among those members active at least three years in a row. Excludes first year salary increase.

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 *† New system in 2000. The first measurement of members with at least 3 consecutive years' service was in 2002.

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Attachment C

Growth in System Membership Data

Year	LEOFF		PERS		SERS		PSERS		PERS+SERS+PSERS		TRS	
	# of Active Members	Annual Growth	# of Active Members	Annual Growth	# of Active Members	Annual Growth	# of Active Members	Annual Growth	# of Active Members	Annual Growth	# of Active Members	Annual Growth
1980	8,813		110,744						110,744		46,247	
1981	8,912	1.12%	106,125	-4.17%					106,125	-4.17%	46,197	-0.11%
1982	8,975	0.71%	103,284	-2.68%					103,284	-2.68%	44,408	-3.87%
1983	9,187	2.36%	107,777	4.35%					107,777	4.35%	43,449	-2.16%
1984	9,374	2.04%	112,740	4.60%					112,740	4.60%	44,817	3.15%
1985	9,599	2.40%	117,112	3.88%					117,112	3.88%	45,687	1.94%
1986	9,720	1.26%	119,469	2.01%					119,469	2.01%	46,489	1.76%
1987	10,015	3.03%	125,581	5.12%					125,581	5.12%	47,210	1.55%
1988	10,454	4.38%	133,210	6.07%					133,210	6.07%	48,355	2.43%
1989	10,785	3.17%	139,146	4.46%					139,146	4.46%	49,189	1.72%
1990	11,260	4.40%	150,241	7.97%					150,241	7.97%	51,323	4.34%
1991	11,736	4.23%	165,008	9.83%					165,008	9.83%	52,779	2.84%
1992	11,979	2.07%	171,947	4.21%					171,947	4.21%	55,276	4.73%
1993	12,255	2.30%	174,576	1.53%					174,576	1.53%	56,571	2.34%
1994	12,725	3.84%	177,456	1.65%					177,456	1.65%	57,731	2.05%
1995	13,125	3.14%	178,833	0.78%					178,833	0.78%	59,103	2.38%
1996	13,420	2.25%	182,603	2.11%					182,603	2.11%	59,425	0.54%
1997	13,714	2.19%	186,440	2.10%					186,440	2.10%	60,815	2.34%
1998	13,856	1.04%	191,850	2.90%					191,850	2.90%	61,828	1.67%
1999	14,456	4.33%	196,382	2.36%					196,382	2.36%	62,684	1.38%
2000	14,632	1.22%	152,261	-22.47% *	47,725				199,986	1.84%	63,858	1.87%
2001	14,900	1.83%	152,936	0.44%	48,347	1.30%			201,283	0.65%	66,220	3.70%
2002	15,158	1.73%	154,185	0.82%	49,791	2.99%			203,976	1.34%	66,063	-0.24%
2003	15,551	2.59%	154,550	0.24%	49,214	-1.16%			203,764	-0.10%	66,075	0.02%
2004	15,602	0.33%	156,256	1.10%	49,854	1.30%			206,110	1.15%	66,634	0.85%
2005	15,891	1.85%	155,578	-0.43%	50,350	0.99%			205,928	-0.09%	67,270	0.95%
2006	16,314	2.66%	155,027	-0.35%	50,818	0.93% *	2,073		207,918	0.97%	67,736	0.69%

Geometric Averages:

Total period	2.31%								2.36%		1.42%
Last 20 years	2.62%								2.81%		1.90%
Last 10 years	1.97%								1.31%		1.32%
Last 5 years	1.83%								0.65%		0.45%

* New system.

Attachment D

Growth in Washington State Population - Historical and Projected*

Historical Growth			Projected Growth			Geometric Averages:	
Year	Count	Annual Growth	Year	Count	Annual Growth		
1980	4,132,156		2007	6,503,545	2.01%	Last 20 years	1.80%
1981	4,229,278	2.35%	2008	6,630,676	1.95%	Last 10 years	1.36%
1982	4,276,549	1.12%	2009	6,751,441	1.82%	Last 5 years	1.31%
1983	4,307,247	0.72%	2010	6,865,990	1.70%		
1984	4,354,067	1.09%	2011	6,975,055	1.59%	Next 5 years	1.81%
1985	4,415,785	1.42%	2012	7,077,871	1.47%	Next 10 years	1.58%
1986	4,462,212	1.05%	2013	7,175,504	1.38%	Next 20 years	1.34%
1987	4,527,098	1.45%	2014	7,270,759	1.33%		
1988	4,616,886	1.98%	2015	7,364,079	1.28%	All years	1.49%
1989	4,728,077	2.41%	2016	7,455,272	1.24%		
1990	4,866,692	2.93%	2017	7,546,113	1.22%		
1991	5,021,335	3.18%	2018	7,636,476	1.20%		
1992	5,141,177	2.39%	2019	7,726,254	1.18%		
1993	5,265,688	2.42%	2020	7,815,252	1.15%		
1994	5,364,338	1.87%	2021	7,903,178	1.13%		
1995	5,470,104	1.97%	2022	7,990,019	1.10%		
1996	5,567,764	1.79%	2023	8,075,689	1.07%		
1997	5,663,763	1.72%	2024	8,160,162	1.05%		
1998	5,750,033	1.52%	2025	8,243,392	1.02%		
1999	5,830,835	1.41%	2026	8,325,246	0.99%		
2000	5,894,121	1.09%	2027	8,403,249	0.94%		
2001	5,974,910	1.37%	2028	8,482,589	0.94%		
2002	6,041,710	1.12%	2029	8,560,671	0.92%		
2003	6,098,300	0.94%	2030	8,637,637	0.90%		
2004	6,167,800	1.14%					
2005	6,256,400	1.44%					
2006	6,375,600	1.91%					

*Source: Office of Financial Management. Additional computations have been performed to summarize data.

Attachment E

Historical Plan Performance

Fiscal Year Ending June 30th	Investment Return
1982	2.50%
1983	47.30%
1984	-0.03%
1985	29.80%
1986	26.90%
1987	16.90%
1988	4.20%
1989	13.50%
1990	8.30%
1991	9.50%
1992	8.20%
1993	13.07%
1994	2.10%
1995	16.24%
1996	16.49%
1997	20.18%
1998	17.12%
1999	11.76%
2000	13.56%
2001	-6.75%
2002	-5.15%
2003	3.02%
2004	16.72%
2005	13.05%
2006	16.70%
2007	21.33%

Geometric Averages:

Total Period	12.42%
Last 20 Years	10.38%
Last 10 Years	9.73%

Source: Washington State Investment Board

Returns restated for 1993 and beyond.

Attachment F

Historical Investment Data

Investment		Investment		Investment		Investment	
Year	Return	Year	Return	Year	Return	Year	Return
1926	8.19%	1947	1.87%	1968	11.63%	1989	13.50%
1927	24.03%	1948	3.57%	1969	-10.60%	1990	8.30%
1928	27.35%	1949	13.81%	1970	4.52%	1991	9.50%
1929	-11.37%	1950	21.58%	1971	13.87%	1992	8.20%
1930	-15.60%	1951	11.15%	1972	11.88%	1993	13.07%
1931	-29.72%	1952	9.83%	1973	-11.99%	1994	2.10%
1932	0.43%	1953	-0.25%	1974	-15.33%	1995	16.24%
1933	51.03%	1954	36.83%	1975	30.50%	1996	16.49%
1934	7.87%	1955	17.84%	1976	27.27%	1997	20.18%
1935	31.46%	1956	1.45%	1977	1.20%	1998	17.12%
1936	29.26%	1957	-4.44%	1978	6.77%	1999	11.76%
1937	-25.42%	1958	29.44%	1979	14.87%	2000	13.56%
1938	22.05%	1959	7.69%	1980	20.45%	2001	-6.75%
1939	1.70%	1960	3.88%	1981	0.22%	2002	-5.15%
1940	-3.62%	1961	18.90%	1982	2.50%	2003	3.02%
1941	-6.18%	1962	-3.29%	1983	47.30%	2004	16.72%
1942	18.00%	1963	15.12%	1984	-0.03%	2005	13.05%
1943	27.85%	1964	13.11%	1985	29.80%	2006	16.70%
1944	19.61%	1965	12.87%	1986	26.90%	2007	21.33%
1945	32.02%	1966	-5.11%	1987	16.90%		
1946	-5.39%	1967	22.62%	1988	4.20%		

Actual investment return for fiscal years ending June 30, 1982 and thereafter. Returns restated for 1993 and beyond. Estimated investment return prior to 1982.

Geometric Averages:

Total Period	9.66%
Last 60 years	10.63%
Last 50 years	10.50%
Last 40 years	10.36%
Last 30 years	12.13%

Rolling 30-year Averages*:

Minimum	7.86%
Maximum	12.32%

* Starting in 1926. Last period ending 2007.

Assumptions*:

<u>Asset Class</u>	<u>Allocation</u>	<u>Return</u>
U.S. Equity	31%	S&P 500
Non-U.S. Equity	15%	S&P 500
Fixed Income	25%	Average of long-term corporate and government bond index
Private Equity	17%	U.S. small cap stock index
Real Estate	12%	Average of long-term corporate and government bond index

*Constant asset allocation from 1926 through 1981. Based on Washington State Investment Board's 2004 asset allocation.

Attachment G

WSIB Simulated Future Returns

Portfolio Statistics & Capital Market Assumptions

Asset Class	Target Allocation	Expected 1-Year Return
U.S. Equity	23%	8.50%
Non-U.S. Equity	23%	8.50%
Fixed Income	25%	5.25%
Private Equity	17%	12.50%
Real Estate	12%	8.50%
Cash	0%	3.75%
Total CTF	100%	

Simulated Future Returns

	Measurement Period	
	20 Years	50 Years
75th percentile	9.557%	8.827%
60th percentile	8.320%	8.048%
55th percentile	7.948%	7.813%
Expected Return	7.622%	7.598%
45th percentile	7.219%	7.352%
40th percentile	6.850%	7.119%
25th percentile	5.643%	6.352%

Source: Washington State Investment Board