



## **RETIREE BENEFITS IN PUBLIC PENSION SYSTEMS**

### **APPENDICES**

*Revised December 21, 2012 to correct calculations in Appendix D.*

## APPENDIX A: LEGISLATIVE STUDY DIRECTION

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The Washington State Institute for Public Policy was directed to “conduct an evaluation of the benefits provided in the pension plans offered by public employers in the state” including an examination of:

- (i) “The level of benefits offered by the state retirement plans and retirement plans sponsored by local government employers relative to the benefits provided in other states;
- (ii) The adequacy of pension benefits provided to public employees, including barriers to retirement;
- (iii) Barriers to the portability of retirement benefits between public employers in the state, including opportunities to improve benefit portability and compatibility; and
- (iv) The treatment of overtime earnings in public employee retirement plans relative to the treatment of earnings in other states, including the impact of excess compensation on state retirement system contribution rates with a particular emphasis on agencies that operate on a 24-hour basis, such as the state patrol, ferry system, and state prisons.”

*Supplemental Operating Budget § 606 (13), 2012 Wash. Sess. Laws 2225*

## APPENDIX B: FEATURES OF STATE PUBLIC PENSION PLANS

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Washington's retirement systems are structured similar to many public pension plans in the United States. This appendix provides details on other states plans, including:

- Benefit type (DB, DC, or Hybrid)
- Vesting rules
- Retirement ages
- Experience requirements
- Contribution rates
- Benefit calculation factors
- Cost of living adjustments (COLAs)
- Rules related to overtime and "excess compensation"

*How were plans selected for comparison?* The design of public retirement systems is complex. Each plan has its own eligibility criteria, retirement ages, contribution rates, benefit calculation factors, and distribution methods. To compare like-plans to like, we limit our review to open state public pension plans that:

- cover general state employees, teachers, and/or law enforcement and fire fighters;
- are the most recently opened plan in the state; and
- allow members to pay into Social Security in addition to state retirement plans (as Washington State employees do).<sup>1</sup>

We selected general state employees and teachers because they represent two of the largest systems (PERS and TRS). We examined law enforcement and firefighter plans separately because they tend to have lower retirement ages. We did not collect comparative information for other retirement systems in WA because we had a short time frame for the study.

- Exhibit B1 lists the general state employee and teacher plans and provides details on the pension benefit structure for each plan.
- Exhibit B2 provides the same information for firefighters and law enforcement.
- Exhibit B3 lists excess compensation provisions for general state employee and teacher plans.
- Exhibit B4 lists excess compensation provisions for firefighters and law enforcement.

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<sup>1</sup> It is important to note that Washington members of LEOFF and WSPRS plans have the option to choose whether to contribute in to Social Security, and most do not. Likewise, in many state plans, such as California STRS, most employees opt out of Social Security; they are included in our analysis because individuals can choose to opt in.

## Key to Exhibits

### Employee type: Exhibit B1

S = State Employees  
L = Local Employees  
T = Teachers  
SE = School Employees

### Employee type: Exhibit B2

S= State Police  
FF= Firefighters  
L= Local Police  
LE = Law Enforcement  
CO = Corrections Officers

### Plan type

DB = Defined benefit  
DC = Defined contribution  
H = Hybrid

### General

COLA = Cost-of-living Adjustment  
AFC = Average Final Compensation  
SCY = Service Credit Years

Because many contribution rates are determined actuarially and can vary year to year, we present the most recent contribution rate for each plan.

**Exhibit B1**  
**General State Employee and Teacher Plans Provisions**

Plan	Plan Name	Emp. Type	Plan Type	Age/Exp. For Norm. Ret.	Vesting Period	Age/Exp. For Early Ret.	% Reduction/ Year Early Ret.	Employee Contr.	Employer Cont.	Average Final Comp. Years	Multiplier	Automatic COLA?
<b>Alabama - ERS</b>	Employees' Retirement System	S, L	DB	any/25; 60/10	10	None		7.5%	11.07%	3	2.01%	No - Ad hoc
<b>Alabama - TRS</b>	Teachers' Retirement System	T	DB	any/25; 60/10	10	None		7.5%	11.71%	3	2.01%	No - Ad hoc
<b>Arizona - ASRS</b>	Arizona State Retirement System	S, L, T	DB	55/30; 60/25; 62/10; 65/any	10	50/5	5.0%	11.14%	11.14%	5	2.10%	Yes - Fixed 2.5%
<b>Arkansas - APERS</b>	Arkansas Public Employees' Retirement System	S, L	DB	any/28, 55/35; 65/5	5	any/25; 55/10	6.0%	5.0%	12.46%	3	2.22%	Yes - Fixed 3%
<b>Arkansas - ATRS</b>	Arkansas Teacher Retirement System	T	DB	any/28; 60/5	5	any/25; under age 60	5.0%	6.0%	14.00%	3	2.15%	Yes - Fixed 3%
<b>California - CalPERS 2</b>	California Public Employees' Retirement System - Tier 2	S, T	DB	65/5	5	50/5	1.5%	8.0%	8.00%	1	1.25%	Yes - Based on CPI. Capped at 2%
<b>California - CalSTRS</b>	California State Teachers' Retirement System	T	DB	60/5	5	50/30; 55/5	6.0%	8.0%	8.25%	1	2.40%	Yes -Fixed 2%
<b>Connecticut - SERS 3</b>	Connecticut State Employees Retirement System - Tier 3	S, T	DB	any/25; 65/10	10	58/10	6.0%	2.0%	9.00%	5	1.33%	Yes - Minimum of 2% Capped at 7.5%
<b>Delaware - SEPP</b>	State Employees' Pension Plan	S, T	DB	any/30; 60/15; 62/5	5	any/25; 55/15	2.4%	3.0%	8.90%	3	1.85%	No - Ad hoc

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**General State Employee and Teacher Plans Provisions**

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<b>Florida - FRS</b>	Florida Retirement System Pension Plan	S, L, T	DB	58/33; 65/8	8	any/below 30	5.0%	3.0%	5.18%	8	1.60%	Yes - Fixed 3%
<b>Georgia - GSEPS</b>	Georgia's State Employees' Pension and Savings Plan	S	H	any/30; 60/10	10	any/25	7.0%	DB: 0%, DC: 1.3%	DB: 12%, DC: 0%	2	1.00%	No - Based on investment earnings
<b>Georgia - TRS</b>	Teachers' Retirement System of Georgia	T	DB	any/30; 60/10	10	any/25	7.0%	6.0%	11.41%	2	2.00%	Yes - Fixed 3%
<b>Hawaii - ERS Hybrid</b>	Employees' Retirement System - Hybrid Plan	S, L	DB	60/30; 65/10	10	55/20	5.0%	8.0%	15.0%	5	1.75%	Yes - Fixed 1.5%
<b>Idaho - PERSI</b>	Public Employee Retirement System of Idaho	S, L, T	DB	65/5, R90	5	55/5	3.0%	6.45%	10.44%	3.5	2.00%	Yes - Fixed 1% with investment based increase. Capped at 6%
<b>Illinois - SERS 2</b>	State Employees Retirement System - Tier 2	S	DB	67/10	10	62/10	6.0%	4.00%	34.19%	8	1.67%	Yes - Lesser of 3% or half of CPI
<b>Indiana - PERF</b>	Public Employees' Retirement Fund	S, L	H	55/30; 60/15; 65/10	10	50/15	5.0%	DB: 0%, DC: 3%	DB: 10%, DC: 0%	5	1.10%	No - Ad hoc
<b>Indiana - TRF</b>	Teachers' Retirement Fund	T	H	55/30; 60/15; 65/10	10	50/15	5.0%	DB: 0%, DC: 3%	DB: 7.5%, DC: 0%	5	1.10%	No - Ad hoc

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**General State Employee and Teacher Plans Provisions**

Plan	Plan Name	Emp. Type	Plan Type	Age/Exp. For Norm. Ret.	Vesting Period	Age/Exp. For Early Ret.	% Reduction/ Year Early Ret.	Employee Contr.	Employer Cont.	Average Final Comp. Years	Multiplier	Automatic COLA?
<b>Iowa - IPERS</b>	Iowa Public Employees' Retirement System	S, L, T	DB	62/20; 65/any; R88	4	55/4	6.0%	5.78%	8.67%	3	2.00%	Yes - Based on CPI. Capped at 1.5%
<b>Kansas - KPERS 2</b>	Kansas Public Employees' Retirement System - Tier 2	S, L, T	DB	60/30; 65/5	5	55/10	5.8%	6.0%	9.37%	5	1.75%	No COLA
<b>Maryland - ETPS</b>	Employees' and Teachers' Pension System - Contributory	S, L, T	DB	65/10; r90	10	55/15	6.0%	7.0%	16.92%	5	3%	Yes - Based on CPI. Capped at 2.5%
<b>Michigan - PPRP</b>	Pension Plus Retirement Plan	SE	H	60/10	10	55/15	5.0%	DB: 0%, DC: 2%	DB: 0%, DC: 1%	5	1.50%	Yes - Fixed 2%
<b>Michigan - SERS</b>	State Employees' Retirement System - 401k	S	DC	60/4	4	before 59.5/4	10.0%	3.0%	7.0%			
<b>Minnesota - GERP</b>	General Employees' Retirement Plan	S	DB	65/any; R90	5	55/5	4.6%	5.0%	5.0%	5	1.70%	No - Ad hoc
<b>Minnesota - TRA 2</b>	Teachers Retirement Association - Tier 2	T	DB	65/3	3	55/3	4.9%	6.0%	6.0%	5	1.90%	No - Ad hoc
<b>Mississippi - PERS 4</b>	Public Employees' Retirement System of Mississippi -Tier 4	S, L, T	DB	any/30; 60/8	8	None		9.0%	14.26%	4	2.00%	Yes - Fixed 3%

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<b>Missouri - MSEP 2011</b>	Missouri State Employee's Plan 2011	S	DB	67/10; R90	10	62/10	6.0%	4.0%	14.45%	1	1.70%	Yes - Based on CPI. Capped at 5%
<b>Montana - DCRP</b>	Defined Contribution Retirement Plan	S, L, T	DC	59.5	Immediate			7.9%	4.19%			
<b>Montana - PERS</b>	Public Employees Retirement System	S, L	DB	65/5; 70/any	5	any/25; 55/5	6.0%	7.9%	7.17%	5	1.50%	Yes - Fixed 3%
<b>Montana - TRS</b>	Teachers' Retirement System	T	DB	any/25; 60/5	5	50/5	6.0%	7.15%	2.49%	3	1.67%	Yes - Fixed 1.5%.
<b>Nebraska - SPP</b>	School Pension Plan	T	DB	65/any; R85	5	any/35; 60/5	3.0%	8.28%	9.08%	3	2.00%	Yes - Based on CPI. Capped at 2.5%
<b>New Jersey - PERS 5</b>	Public Employees' Retirement System Tier 5	S, L, T	DB	65/any	10	any/30	3.0%	7.5%	11.2%	5	1.67%	Suspended
<b>New Jersey - TPAF 5</b>	Teachers Pension And Annuity Fund Tier 5	T	DB	65/10	10	any/30	3.0%	6.5%	14.1%	5	1.67%	Suspended
<b>New Mexico - NMERB</b>	Education Retirement Board	T	DB	any/30; 67/5; R80	5	under 60/less than 35	7.2%	9.15%	11.15%	5	2.35%	Yes - Based on CPI. Capped at 4%



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<b>New Mexico - PERA 3</b>	Public Employees Retirement Association State Plan 3	S, L	DB	any/30; 67/5; R80	5	None		10.67%	13.34%	3	3.00%	Yes - Fixed 3%
<b>New York - NYSTRS 6</b>	New York State Teachers Retirement System - Tier 6	T	DB	63/10	10	55/10	6.5%	3.0%	11.11%	5	2.00%	Yes - Based on CPI. Capped at 3%
<b>New York - PERS 6</b>	Public Employees Retirement System - Tier 6	S, L	DB	63/10	10	55/10	6.5%	3.0%	9.4%	5	2.00%	Yes - Based on CPI. Capped at 3%
<b>North Carolina - TSERS</b>	Teachers and State Employees Retirement System	S, T	DB	any/30; 60/25; 65/10	10	50/20; 60/10	3.0%	6.0%	13.12%	4	2.00%	No - Ad hoc
<b>North Dakota - NDPERS</b>	North Dakota Public Employees Retirement System	S, L	H	65/3; R85	3	55/3	6.0%	DB: 0%, DC: 5%	DB: 6%, DC: 0%	3	2.00%	No - Ad hoc
<b>North Dakota - TFFR 2</b>	Teachers Fund for Retirement - Tier 2	T	DB	65/5; R90	5	55/5	8.0%	9.75%	10.75%	5	2.00%	No - Ad hoc
<b>Oklahoma - PERS</b>	Oklahoma Public Employees Retirement System	S, L	DB	62/6; R90	6	55/10	5.7%	3.5%	15.5%	3	2.00%	No - Ad hoc
<b>Oklahoma - TRS</b>	Oklahoma Teachers Retirement System	T	DB	62/5; R80	5	55/5	5.6%	7.0%	8.55%	5	2.00%	No - Ad hoc

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<b>Oregon - OPSRP</b>	Oregon Public Service Retirement Plan	S, L	H	58/30; 65/any	5	55/5	8.0%	DB: 0%, DC: 6%	DB: 6%, DC: 0%	1 LAST	1.50%	Yes - Based on CPI. Capped at 2%
<b>Pennsylvania - PSERS</b>	Public School Employees Retirement System	T	DB	any/35; 60/30; 62/1	5	55/25	3.0%	7.5%	7.5%	3	2.50%	No - Ad hoc
<b>Pennsylvania - SERS</b>	State Employees Retirement System	S	DB	any/35; 60/3	5	any/5	4.5%	6.25%	7.29%	3	2.00%	No - Ad hoc
<b>Rhode Island - ERSRI</b>	Employees' Retirement System of Rhode Island	S, T	H	65/5	5	None		DB: 3.8%, DC: 5%	DB: 0%, DC: 1%	5	1.00%	Suspended
<b>South Carolina - SCORP</b>	South Carolina Optional Retirement Plan	S, L, T	DC	59.5	Immediate			7.0%	5.0%			
<b>South Carolina - SCRS 3</b>	South Carolina Retirement System - Class 3	S, L, T	DB	65/8; R90	8	60/8	5.0%	7.0%	15.0%	5	1.82%	Yes - Based on CPI. Capped at 2%
<b>South Dakota - SDRS</b>	South Dakota Retirement System Class A	S, L, T	DB	65/3	3	55/3	3.0%	6.0%	6.0%	3	1.70%	Yes - Based on CPI. Capped at 3.1%
<b>Tennessee - TCRS</b>	Tennessee Consolidated Retirement System Contributory	T	DB	any/30; 60/5	5	55/10	4.8%	5.0%	8.88%	5	1.50%	Yes - Based on CPI. Capped at 3%

**Exhibit B1**  
**General State Employee and Teacher Plans Provisions**

Plan	Plan Name	Emp. Type	Plan Type	Age/Exp. For Norm. Ret.	Vesting Period	Age/Exp. For Early Ret.	% Reduction/ Year Early Ret.	Employee Contr.	Employer Cont.	Average Final Comp. Years	Multiplier	Automatic COLA?
<b>Texas - ERS</b>	Employees Retirement System	S	DB	60/5; 65/10; R80	5	50/12; 55/10	5.0%	6.5%	6.0%	3	2.30%	No - Ad hoc
<b>Utah - PERS 2</b>	Tier 2 Hybrid Retirement System	S	H	any/35; 65/4	4	62/10	7.0%	DB: 0%, DC: 0%	DB: 8%, DC: 1.59%	5	1.50%	Yes - Fixed 2.5%
<b>Utah - PERS 2 (DC)</b>	Tier 2 Defined Contribution Plan	S	DC	59.5/4	4			0.0%	10.0%			
<b>Vermont - VSERS F</b>	Vermont State Employees' Retirement System - Group F	S	DB	any/30; 62/5	5	55/5	6.0%	6.4%	17.11%	3	1.67%	Yes - Based on CPI. Capped at 5%
<b>Vermont - VSTRS C</b>	Vermont State Teachers' Retirement System - Group C	T	DB	any/30; 62/any	5	55/5	6.0%	5.0%		3	1.67%	Yes - Based on CPI. Capped at the lesser of 5%, or 50% of CPI
<b>Virginia - VRS 2</b>	Virginia Retirement System Plan 2	S, L, T	DB	65/5; R90	5	60/5	6.0%	5.0%	6.58%	5	1.70%	Yes - Based on CPI. Capped at 5%
<b>Washington - PERS 2</b>	Public Employees Retirement System Plan 2	S	DB	65/5	5	55/30	5.0%	4.64%	7.21%*	5	2.00%	Yes - Based on CPI. Capped at 3%
<b>Washington - PERS 3</b>	Public Employees Retirement System Plan 3	S	H	65/5	5; 10	55/30	5.0%	DB: 0%, DC: 5%	DB: 7.21%*, DC: 0%	5	1.00%	Yes - Based on CPI. Capped at 3%

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**General State Employee and Teacher Plans Provisions**

Plan	Plan Name	Emp. Type	Plan Type	Age/Exp. For Norm. Ret.	Vesting Period	Age/Exp. For Early Ret.	% Reduction/ Year Early Ret.	Employee Contr.	Employer Cont.	Average Final Comp. Years	Multiplier	Automatic COLA?
<b>Washington - SERS 2</b>	School Employees' Retirement System Plan 2	SE	DB	55/20; 65/5	5	55/30	5.0%	4.09%	7.58%*	5	2.00%	Yes - Based on CPI. Capped at 3%
<b>Washington - SERS 3</b>	School Employees' Retirement System Plan 3	SE	H	65/10	5; 10	55/30	5.0%	DB: 0%, DC: 5%	DB: 7.59%*, DC: 0%	5	1.00%	Yes - Based on CPI. Capped at 3%
<b>Washington - TRS 2</b>	Teacher Retirement System Plan 2	T	DB	65/5; 55/20	5	55/30	5.0%	4.69%	8.04%*	5	2.00%	Yes - Based on CPI. Capped at 3%
<b>Washington - TRS 3</b>	Teacher Retirement System 3	T	H	55/10; 65/5	5; 10	55/30	5.0%	DB: 0%, DC: 5%	DB: 8.05%, DC: 0%	5	1.00%	Yes - Based on CPI. Capped at 3%
<b>West Virginia - PERS</b>	Public Employees Retirement System	S, L	DB	60/5; R80	5	55/10		4.5%	14.0%	3	2.00%	No - Ad hoc
<b>West Virginia - TRS</b>	Teachers Retirement System	T	DB	any/35; 60/5	5	before 55/between 30-35		6.0%	15.0%	5	2.00%	No - Ad hoc
<b>Wisconsin - WRS</b>	Wisconsin Retirement System Defined Benefit Plan	S, L, T	DB	65/any; R87	5	55/5	4.8%	6.0%	11.3%	3	1.60%	No - Ad hoc
<b>Wyoming - PEPP 2</b>	Public Employee Retirement Plan 2	S, L, T	DB	65/4; R85	4	55/4	5.0%	7.0%	7.12%	5	2.00%	Suspended

\* The employer contributions for Washington Plans 2 and 3 include amounts for Plans 1 unfunded liability.

**Exhibit B2**  
**Police and Firefighter Plans Provisions**

Plan	Plan Name	Emp. Type	Plan Type	Age/Exp. For Norm. Ret	Vesting Period	Age/Exp. For Early Ret.	% Reduction/Year Early Ret.	Employee. Cont.	Employer Cont.	Average Final Comp. Years	Multiplier	Automatic COLA?
<b>Alabama - AERS</b>	Alabama Employees' Retirement System	S	DB	any/25; 52/10	10	None		10.0%	29.92%	3	2.88%	No - Ad hoc
<b>Alabama - AERS</b>	Alabama Employees' Retirement System	CO, LE, FF	DB	any/25; 60/10	10	None		8.5%	9.42%	3	2.50%	No - Ad hoc
<b>Arizona - PSPRS 2</b>	Public Safety Personnel Retirement System	S, L, FF	DB	52.5/25; any/25	5	any/less than 25	4.0%	7.65%	20.89%	5	2.50%	No - Contingent on investment earnings.
<b>Arkansas - ASPRS 2</b>	Arkansas State Police Retirement System - Tier II Non-Contributory	S	DB	any/30; 65/5	5	55/less than 30	6.0%	non-contributory	22.0%	4	2.48%	Yes - Fixed 3%
<b>California - CalPERS 2</b>	Public Employees Retirement System - Tier 2	S, FF, LE	DB	65/10	10	55/10	6.0%	non-contributory	10.82%	3	2.50%	Yes - Based on CPI. Capped at 2%
<b>Connecticut - HDP 2A</b>	Hazardous Duty Plan - Tier 2A	S, L, FF	DB	any/20	5	55/10	3.0%	4.0%	6.89%	3	2.00%	Yes - Minimum of 2% Capped at 7.5%
<b>Florida - FRS</b>	Florida Retirement System - Special Risk Class	S, L, FF	DB	60/8; any/30	8	less than 60/8	5.0%	3.0%	17.0%	8	3.00%	Yes - Fixed 3%
<b>Georgia - GERS</b>	Georgia Employees' Retirement System	S	H	55/10; any/30	10	any/25	7.0%	DB: 0%; DC: 1.3%	DB: 8.07%; DC: 1.25%	2	1.00%	No - Ad hoc
<b>Hawaii - ERS</b>	Employees' Retirement System - Contributory Plan	S, FF	DB	60/10	10	55/25	1.7%	14.2%	19.7%	5	2.25%	Yes - Fixed 1.5%
<b>Idaho - IPERS</b>	Idaho Public Employees' Retirement System	S, FF	DB	60; R80	5	50/5	3.0%	7.7%	10.44%	3.5	2.30%	Yes - Fixed 1%

**Exhibit B2**  
**Police and Firefighter Plans Provisions**

Plan	Plan Name	Emp. Type	Plan Type	Age/Exp. For Norm. Ret	Vesting Period	Age/Exp. For Early Ret.	% Reduction/Year Early Ret.	Employee. Cont.	Employer Cont.	Average Final Comp. Years	Multiplier	Automatic COLA?
<b>Illinois - SERS 2</b>	State Employees' Retirement System - Tier 2	S, FF	DB	60/20	10	None		12.5%	27.98%	8	2.50%	Yes - Lesser of 3% or half of CPI
<b>Indiana - POFP</b>	Police Officers & Firefighters' Pension	S, FF	DB	52/20	20	50/20	7.0%	6.0%	19.7%	1	1.00%	No - Ad hoc, based on investment returns
<b>Iowa - PERS</b>	Public Employee Retirement System - Special Service Class	L, FF	DB	55/any; any/4	4	None		6.84%	10.27%	3	2.73%	No - Ad hoc, based on reserves from a separate account
<b>Kansas - KPF 2</b>	Kansas Police & Fire Fighters - Tier 2	S, FF	DB	50/25; 55/20; 60/15	15	50/20	4.8%	7.0%	16.43%	3	2.50%	No COLA
<b>Kentucky - SPRS</b>	State Police Retirement System	S	DB	any/20; 55/5	5	50/15	6.50%	8.0%	30.07%	5	2.50%	Yes - Based on CPI. Capped at 5%
<b>Maryland - LEOPS</b>	Law Enforcement Officers Pension System	LE	DB	50/any; any/25	10	None		7.0%	46.81%	5	2.00%	Yes - Based on CPI. Capped at 5%
<b>Maryland - SPRS</b>	State Police Retirement System	S	DB	50/any; any/25	10	None		8.0%	61.21%	3	2.55%	Yes - Based on CPI. Capped at 2.5%
<b>Minnesota - CERP</b>	Correctional Employees' Retirement Plan	CO	DB	55/5	5	50/5	2.4%	6.0%	8.5%	5	2.40%	Yes - Fixed 3%

**Exhibit B2**  
**Police and Firefighter Plans Provisions**

Plan	Plan Name	Emp. Type	Plan Type	Age/Exp. For Norm. Ret	Vesting Period	Age/Exp. For Early Ret.	% Reduction/Year Early Ret.	Employee. Cont.	Employer Cont.	Average Final Comp. Years	Multiplier	Automatic COLA?
<b>Minnesota - PERA</b>	Public Employee Retirement Association, Police and Fire Fund	L, FF	DB	55/10; 65/1	10	50/10; any/30	6.0%	9.75%	14.0%	5	3.00%	Yes - Fixed 1%
<b>New Mexico - SPAC</b>	State Police and Correctional	S, CO	DB	any/20	5	None		10.85%	21.85%	3	3.00%	Yes - Fixed 2%. Capped at 4%
<b>New York - PFRS 5</b>	Police and Firemen's Retirement System - Tier 5	S, FF	DB	62/10; any/20	10	55/10	3.0%	4.5%	21.6%	5	2.22%	Yes - Based on CPI. Capped at 3%.
<b>New York - SRS 5</b>	State and Local Retirement System: State Police Tier 5	S	DB	62/10; any/20	10	55/10	50% of AFC	3.0%	22.0%	3	2.50%	Yes - Fixed 2%
<b>North Carolina - SLEO</b>	State Law Enforcement Officers	LE	DB	55/10; any/30	10	50/15	other	6.0%	13.12%	4	1.85%	Yes - Fixed 1%
<b>North Dakota - NDPERS</b>	ND National Guard, Police and FF Retirement System	S, L, FF	H	55/3	3	50/3	6.0%	DB: 0%; DC: 4%	DB: 7.64%; DC: 0%	3	2.00%	No - Ad hoc
<b>Ohio - PERS</b>	Public Employees' Retirement System: Law Enforcement Division	S, L, FF	DB	48/25; 62/15	5	52/15	Reduced benefit factor of 1.5%	12.1%	17.4%	3	2.50%	Yes - fixed 3%
<b>Oklahoma - PPRS</b>	Police Pension and Retirement System	L	DB	50/any; any/20	10	None		8.0%	13.0%	1.5	2.50%	Yes - Based on CPI. Capped at 2%

**Exhibit B2**  
**Police and Firefighter Plans Provisions**

Plan	Plan Name	Emp. Type	Plan Type	Age/Exp. For Norm. Ret	Vesting Period	Age/Exp. For Early Ret.	% Reduction/Year Early Ret.	Employee. Cont.	Employer Cont.	Average Final Comp. Years	Multiplier	Automatic COLA?
<b>Oregon - PSRP</b>	Public Service Retirement Plan	S, L, FF	H	60/5	5	50/5	8.0%	DB: 0%; DC: 6%	DB: 8.52%; DC: 0%	3	1.35%	Yes - Based on CPI. Capped at 2%
<b>Pennsylvania - SERS</b>	State Employees' Retirement System: Classes A-3, A-4	S	DB	60	10	any	50% AFC	5.0%	8.43%	1	2.50%	No - Ad hoc
<b>Rhode Island - SPRBT</b>	State Police Retirement Benefit Trust	S	DB	55/5	5	52/5	50% AFC	8.75%	14.45%	5	2.00%	Yes - Fixed 2%. Capped at 2%
<b>South Carolina - PORS</b>	Police Officers Retirement System	S	DB	55/8; any/27	8	None		7.3%	10.0%	3	2.14%	Yes - Based on CPI. Capped at 2%
<b>South Dakota</b>	Class B - Public Safety	LE	DB	55/3	3	45/3	3.0%	8.0%	8.0%	3	2.00%	Yes - Based on CPI. Capped at 3.1%
<b>Tennessee - TCRS</b>	Tennessee Consolidated Retirement System Non-Contributory	LE	DB	60/5; any/30	5	55/10	4.0%	non-contributory	5.0%	5	1.50%	Yes - Based on CPI. Capped at 3%
<b>Texas - LECOS</b>	Law Enforcement & Custodial Officers' Supplemental Plan	LE	DB	50/20; R80		any/20	3.0%	7.0%	5.5%	3	2.80%	No - Ad hoc
<b>Utah - PSFRS 2</b>	Tier 2 Hybrid Retirement System	S, FF	H	65/4; 62/10; 60/20; any/25	4	60/<25	7.0%	non-contributory	DB: 1.59%; DC: 8.41%	5	1.50%	Yes - Fixed 1.5%



**Exhibit B2**  
**Police and Firefighter Plans Provisions**

Plan	Plan Name	Emp. Type	Plan Type	Age/Exp. For Norm. Ret	Vesting Period	Age/Exp. For Early Ret.	% Reduction/Year Early Ret.	Employee. Cont.	Employer Cont.	Average Final Comp. Years	Multiplier	Automatic COLA?
<b>Utah - PSFRS 2 DC</b>	Tier 2 Defined Contribution Plan	S, FF	DC	59.5	4	None		non-contributory	12.0%			
<b>Vermont - VSERS C</b>	Vermont State Employees' Retirement System - Group C	S, LE	DB	55/5	5	50/20	No reduction	8.28%	17.11%	2	2.50%	Yes - Based on CPI. Capped at 5%
<b>Virginia - SPORS 2</b>	State Police Officers' Retirement System 2	S	DB	60/5; 50/25	5	50/5	6.0%	5.0%	21.16%	5	1.85%	Yes - Fixed 3%
<b>Virginia - VaLORS 2</b>	Virginia Law Officers' Retirement System 2	LE	DB	60/5; 50/25	5	50/5	6.0%	5.0%	13.09%	5	2.00%	No - Based on investment returns
<b>Washington - LEOFF 2</b>	Law Enforcement Officers & Fire Fighters Plan 2	S, FF	DB	53/5	5	50/20	5.0%	8.46%	5.24%**	5	2.00%	Yes - Based on CPI. Capped at 3%
<b>Washington - PSERS 2</b>	Public Safety Employees Retirement System Plan 2	S, FF	DB	65/5; 60/10	5	53/20	5.0%	6.36%	8.87%*	5	2.00%	Yes - Based on CPI. Capped at 3%
<b>Washington - WSPRS 2</b>	Washington State Patrol Retirement Services 2	S	DB	55/any; any/25	0 (active); 5 (inactive)	55/5; 60/5	5.0%	6.59%	8.07%*	5	2.00%	Yes - Based on CPI. Capped at 3%
<b>Wisconsin - WRS</b>	Protective Employees' in SS	S, L FF	DB	53/25; 54/<25;	5	50/5	4.8%	6.65%	9.75%	3	2.00%	No - Ad hoc
<b>Wyoming - LEP</b>	Law Enforcement Plan	LE	DB	60/4; any/20	4	None		8.6%	8.6%	3 HC	2.50%	No - Ad hoc. Capped at 2%

\* The employer contributions for Washington Plans 2 and 3 include amounts for Plans 1 unfunded liability.

\*\* The state also contributes 3.38% in addition to this employer contribution for cities, counties, and fire districts.

**Exhibit B3**  
**General State Employee and Teacher Plans' Excess Compensation Provisions**

Plan	Plan Name	Overtime included in AFC?	% benefit cannot exceed AFC	Monetary cap on AFC (if lower than \$250,000)	Other benefit level provisions
<b>Alabama - ERS</b>	Employees' Retirement System	No	100%		
<b>Alabama - TRS</b>	Teacher's Retirement System		60%		
<b>Arizona - ASRS</b>	Arizona State Retirement System	Yes - under strict conditions			Pensionable salary changes are capped at 10%+CPI
<b>Arkansas - APERS</b>	Arkansas Public Employees' Retirement System	No	80%		
<b>California - CalPERS 2</b>	California Public Employees' Retirement System - Tier 2	No	100%		
<b>California - CalSTRS</b>	California State Teachers' Retirement System	Yes	60%		
<b>Delaware - SEPP</b>	State Employees' Pension Plan	No	100%		Paid time off not included in AFC
<b>Florida - FRS</b>	Florida Retirement System Pension Plan	No	80%		
<b>Georgia - TRS</b>	Teachers' Retirement System of Georgia	No	80%		AFC cannot include compensation that exceeds the average of the two preceding years by more than 10%, with exceptions (changes in position, number of hours worked). Pensionable salary growth capped at 10%.
<b>Georgia - GSEPS</b>	Georgia's State Employee's Pension and Savings Plan	No	70%	\$200,000	AFC includes sick leave payout
<b>Hawaii - ERS Hybrid</b>	Employees' Retirement System - Hybrid Plan	Yes			Pensionable salary growth capped at 10%
<b>Illinois - SERS 2</b>	State Employees Retirement System - Tier 2	No	100%	\$106,800	AFC does not include severance pay, or lump sum payments for unused sick leave or vacation

**Exhibit B3**  
**General State Employee and Teacher Plans' Excess Compensation Provisions**

Plan	Plan Name	Overtime included in AFC?	% benefit cannot exceed AFC	Monetary cap on AFC (if lower than \$250,000)	Other benefit level provisions
<b>Indiana - PERF</b>	Public Employees' Retirement Fund				Unused paid leave is included in AFC, with a maximum of \$2,000 given for unused sick leave and paid time off
<b>Indiana - TRF</b>	Teachers' Retirement Fund	No			Unused sick leave is included in AFC
<b>Iowa - IPERS</b>	Iowa Public Employees' Retirement System	No	100%		
<b>Kansas - KPERS 2</b>	Kansas Public Employees' Retirement System - Tier 2	No	100%		260 days of unused sick leave converts to 1 SCY, and counts towards a member's AFC
<b>Maryland - ETPS</b>	Employees' and Teachers' Pension System - Contributory	Yes	60%		
<b>Michigan - SERS</b>	State Employee's Retirement System - 401k Defined Contribution	Yes	60%		
<b>Michigan - PPRP</b>	Pension Plus Retirement Plan				Includes unused sick leave in AFC
<b>Mississippi - PERS 4</b>	Public Employees' Retirement System of Mississippi - Tier 4	Yes	80%		
<b>Missouri - MSEP 2011</b>	Missouri State Employee's Plan 2011	No			Includes unused sick leave in AFC
<b>Montana - PERS</b>	Public Employees Retirement System	Yes	120%	\$22,000	
<b>Montana - TRS</b>	Teachers' Retirement System	No	80%		No unused sick leave or vacation is included in AFC
<b>Nebraska - SPP</b>	School Pension Plan	No	75%		
<b>New Jersey - PERS 5</b>	Public Employees' Retirement System Tier 5	Yes			10% salary growth cap in AFC calculation

**Exhibit B3**  
**General State Employee and Teacher Plans' Excess Compensation Provisions**

Plan	Plan Name	Overtime included in AFC?	% benefit cannot exceed AFC	Monetary cap on AFC (if lower than \$250,000)	Other benefit level provisions
<b>New Jersey - TPAF 5</b>	Teachers Pension And Annuity Fund Tier 5	No		\$40,000	
<b>New Mexico - PERA 3</b>	Public Employees Retirement Association State Plan 3	No	100%		
<b>New Mexico - NMERB</b>	Education Retirement Board				Unused sick leave contributes to AFC 10 days of sick leave counts as 1 SCY
<b>New York - PERS 6</b>	Public Employees Retirement System - Tier 6	No			AFC cannot exceed a member's highest 3 years' average salary
<b>New York - NYSTRS 6</b>	New York State Teachers Retirement System - Tier 6	Yes			OT is counted in AFC as the average of OT a member does across 6 years.
<b>North Carolina - TSERS</b>	Teachers and State Employees Retirement System	No			Unused sick leave is calculated in AFC, with a maximum of up to 240 hours
<b>North Dakota - NDPERS</b>	North Dakota Public Employees Retirement System		100%		
<b>Rhode Island - ERSRI</b>	Employees' Retirement System of Rhode Island	No	94.5%		
<b>South Carolina - SCORP</b>	South Carolina Optional Retirement Plan	No		\$110,100	
<b>South Dakota - SDRS</b>	South Dakota Retirement System Class A	No			Paid vacation, sick leave, and holidays are counted towards AFC
<b>Texas - ERS</b>	Employees Retirement System	No			AFC does not include severance pay, or lump sum payment for unused sick leave or vacation
<b>Utah - PERS 2 (DC)</b>	Tier 2 Defined Contribution Plan	No		\$110,100	
<b>Utah - PERS 2</b>	Tier 2 Hybrid Retirement System	Yes			AFC is 90% of highest monthly salary. 5% salary growth cap in AFC calculation. If it is higher, the employee will be charged for compensation. Members make contributions on overtime.

**Exhibit B3**  
**General State Employee and Teacher Plans' Excess Compensation Provisions**

Plan	Plan Name	Overtime included in AFC?	% benefit cannot exceed AFC	Monetary cap on AFC (if lower than \$250,000)	Other benefit level provisions
<b>Vermont - VSTRS C</b>	Vermont State Teachers' Retirement System - Group C		75%	\$106,800	AFC includes unused sick leave; employer pays any salary increase that exceeds 6% of AFC. Employers pay for additional sick days granted within last 4 yrs of SCY that increases service credit
<b>Washington - SERS 2</b>	School Employees' Retirement System Plan 2	Yes			If AFC is more than 200% of the last year's salary, employers must make increased contributions (determined by state actuary). Unused sick leave not calculated in AFC. Members make contributions on OT.
<b>Washington - PERS 2</b>	Public Employees Retirement System Plan 2	Yes			If AFC is more than 200% of the last year's salary, employers must make increased contributions (determined by state actuary). Employer is liable for any extra retirement costs in lieu of excess compensation. Members make contributions on OT.
<b>Washington - TRS 2</b>	Teacher Retirement System Plan 2	No			If AFC is more than 200% of the last year's salary, employers must make increased contributions (determined by state actuary). Members make contributions on OT.
<b>Washington - SERS 3</b>	School Employees' Retirement System Plan 3	Yes			If AFC is more than 200% of the last year's salary, employers must make increased contributions (determined by state actuary).
<b>Washington - PERS 3</b>	Public Employees Retirement System Plan 3	Yes			If AFC is more than 200% of the last year's salary, employers must make increased contributions (determined by state actuary). Employer is liable for any extra retirement costs in lieu of excess compensation.
<b>Washington - TRS 3</b>	Teacher Retirement System 3	No			If AFC is more than 200% of the last year's salary, employers must make increased contributions (determined by state actuary). A cash out of any form of leave other than annual is excess compensation to the extent they are included in the calculation of the member's retirement benefit.
<b>West Virginia - PERS</b>	Public Employees Retirement System		100%	\$50,000	

**Exhibit B3**  
**General State Employee and Teacher Plans' Excess Compensation Provisions**

Plan	Plan Name	Overtime included in AFC?	% benefit cannot exceed AFC	Monetary cap on AFC (if lower than \$250,000)	Other benefit level provisions
<b>West Virginia - TRS</b>	Teachers Retirement System	No			AFC does not include vacation payouts
<b>Wisconsin - WRS</b>	Wisconsin Retirement System Defined Benefit Plan	No			Pensionable salary growth capped at 7.5%.
<b>Wyoming - PEPP 2</b>	Public Employee Retirement Plan 2				Unused sick leave is included in AFC

**Exhibit B4**  
**Law Enforcement and Firefighter Plans Excess Compensation Provisions**

State	Plan name	Overtime included in AFC?	% not allowed to exceed AFC	Monetary cap on AFC (if lower than \$250,000)	Other benefit level provisions
<b>Alabama - AERS</b>	Alabama Employees' Retirement System (State Police)		97%		
<b>Alabama - AERS</b>	Alabama Employees' Retirement System (CO, LE, FF)	No			Pensionable salary increases capped at 15%. Members are paid for up to 300 hours of annual leave upon retirement
<b>Arizona - PSPRS 2</b>	Public Safety Personnel Retirement System	Yes	80%		Pensionable salary increases capped at 15%.
<b>Arkansas - ASPRS 2</b>	Arkansas State Police Retirement System - Tier II Non-Contributory		85%		
<b>California - CalPERS 2</b>	Public Employees Retirement System - Tier 2	Yes	90%		Unused sick leave and vacation are not included in AFC
<b>Connecticut - HDP 2A</b>	Hazardous Duty Plan - Tier 2A	Yes	80%		
<b>Florida - FRS</b>	Florida Retirement System - Special Risk Class	No			Pensionable salary changes are capped at 10%+CPI
<b>Georgia - GERS</b>	Georgia Employees' Retirement System	No	95%		
<b>Hawaii - ERS</b>	Employees' Retirement System - Contributory Plan	No	94.50%		
<b>Illinois - SERS 2</b>	State Employees' Retirement System - Tier 2	No	80%	\$106,800	Unused sick leave and vacation are included in AFC
<b>Indiana - POFP</b>	Police Officers & Firefighters' Pension	No	70%		
<b>Iowa - PERS</b>	Public Employee Retirement System		82%		
<b>Kentucky - SPRS</b>	State Police Retirement System	Yes			
<b>Maryland - LEOPS</b>	Law Enforcement Officers Pension System		60%		
<b>Maryland - SPRS</b>	State Police Retirement System		50%		Unused sick leave is included in AFC. 22 days converts to 1 month of service credit
<b>Minnesota - CERP</b>	Correctional Employees' Retirement Plan	No	80%		

**Exhibit B4**  
**Law Enforcement and Firefighter Plans Excess Compensation Provisions**

State	Plan name	Overtime included in AFC?	% not allowed to exceed AFC	Monetary cap on AFC (if lower than \$250,000)	Other benefit level provisions
<b>New Mexico - SPAC</b>	State Police and Correctional	Yes	80%	\$106,800	Unused sick leave and vacation are not included in AFC
<b>New York - PFRS 5</b>	Police and Firemen's' Retirement System - Tier 5	Yes	80%	\$62,000	The maximum pension payable to Tier 2, 3, 5 and 6 members is the benefit payable on completion of 32 years of service
<b>New York - SRS 5</b>	State and Local Retirement System: State Police Tier 5	Yes			
<b>Ohio - PERS</b>	Public Employees' Retirement System: Law Enforcement Division		90%		
<b>Oklahoma - PPRS</b>	Police Pension and Retirement System	No		\$179,000	
<b>Oregon - PSRP</b>	Public Service Retirement Plan	No			Salary changes are capped at 10%+CPI
<b>Rhode Island - SPRBT</b>	State Police Retirement Benefit Trust	Yes	65%		
<b>South Carolina - PORS</b>	Police Officers Retirement System	No	60%		
<b>South Dakota - Class B - Public Safety</b>	Class B - Public Safety	Yes			
<b>Tennessee - TCRS</b>	Tennessee Consolidated Retirement System Non-Contributory	No	50%	\$110,000	Unused sick leave and vacation are not included in AFC
<b>Texas - LECOS</b>	Law Enforcement & Custodial Officers' Supplemental Plan	No	50%	\$110,000	AFC limit is based on the annual maximum wage for Social Security deductions, \$110,000. Base salary does not include fringe benefits, OT, or severance pay. Employers are charged for excess compensation over the annual limit
<b>Utah - PSFRS 2</b>	Tier 2 Hybrid Retirement System	No			Unused sick leave is included in AFC to a limit of 1 service credit year maximum
<b>Virginia - VaLORS 2</b>	Virginia Law Officers' Retirement System 2	Yes			
<b>Washington - LEOFF 2</b>	Law Enforcement Officers & Fire Fighters Plan 2	Yes			If AFC is more than 200% of the last year's salary, employers must make increased contributions (determined by state actuary).



**Exhibit B4****Law Enforcement and Firefighter Plans Excess Compensation Provisions**

State	Plan name	Overtime included in AFC?	% not allowed to exceed AFC	Monetary cap on AFC (if lower than \$250,000)	Other benefit level provisions
<b>Washington - PSERS 2</b>	Public Safety Employees Retirement System Plan 2				If AFC is more than 200% of the last year's salary, employers must make increased contributions (determined by state actuary).
<b>Washington - WSPRS 2</b>	Washington State Patrol Retirement Services 2	No	75%		If AFC is more than 200% of the last year's salary, employers must make increased contributions (determined by state actuary).
<b>Wisconsin - WRS</b>	Protective Employees' in SS	Yes	65%		Does not include severance pay, separation bonuses, expense allowances or fringe benefits
<b>Wyoming - PFP Plan B</b>	Paid Firefighters Plan B		75%		

## APPENDIX C: COMPARATIVE BENEFIT LEVELS BY PUBLIC PENSION PLAN

To conduct an “apples-to-apples” comparison of benefit levels across public pension plans, we constructed long-term earnings histories for two hypothetical public employees, one age 65 at retirement, with 30 years of service, and one age 55, also with 30 years of service. Assumptions about earnings levels for these two employees were based on data from Washington State’s Department of Retirement Systems (DRS). The structure of this dataset is described in Appendix E.

Our measure for comparability of benefits across plans was a basic measure of “income replacement.” That is, of the final salary earned by the employee, what percentage will be earned by the employee from their public pension plan in the first year after retirement? It is crucial to note that in our computations of income replacement, we did *not* factor in income from Social Security, savings, or private investments, nor did we include estimations of taxes that may need to be paid on retirement income or the provision of health benefits.

We used the DRS data to compute the median final salary for all retirees in the dataset who retired from Washington State service at age 65 between January 1, 2009 and June 30, 2012. The median final salary was \$55,075. We also had data on individuals’ salaries covering the 10 years before retirement. We selected all employees for whom salary data from their retirement year and for 10 years prior were available (n=2,045). From that group, we identified all those workers whose final salaries fell between the 40<sup>th</sup> percentile and the 60<sup>th</sup> percentile (n=409), and computed mean nominal earnings at each year to approximate salary growth for employees earning around the median Washington State salaries. We then imputed a linear annualized growth rate (2.99%) and assumed the same growth rate back to when our hypothetical employees began working, 30 years prior to their retirement.

As DRS data did not have a sufficient sample of retirees at age 55 to conduct a parallel analysis for age 55 retirees in Washington, we assumed the same salary level for our age 55 hypothetical retiree as our 65-year-old retiree. The resulting stream of nominal wages (annual salary) is represented in Exhibit C1.

**Exhibit C1**  
**Projected Annual Salaries for Retiree Profiles**

Years experience	Age (retire at 65)	Age (retire at 55)	Annual salary
0	35	25	\$22,750
1	36	26	\$23,430
2	37	27	\$24,131
3	38	28	\$24,853
4	39	29	\$25,596
5	40	30	\$26,362
6	41	31	\$27,150
7	42	32	\$27,962
8	43	33	\$28,798
9	44	34	\$29,660
10	45	35	\$30,547
11	46	36	\$31,461
12	47	37	\$32,402
13	48	38	\$33,371
14	49	39	\$34,369
15	50	40	\$35,397
16	51	41	\$36,456
17	52	42	\$37,546
18	53	43	\$38,669
19	54	44	\$39,825
20	55	45	\$41,017
21	56	46	\$42,243
22	57	47	\$43,507
23	58	48	\$44,808
24	59	49	\$46,148
25	60	50	\$47,529
26	61	51	\$48,950
27	62	52	\$50,414
28	63	53	\$51,922
29	64	54	\$53,475
30	65	55	\$55,075

To compare benefit levels across public pension plans we made a number of key assumptions regarding annuity purchases, fund growth rates, and life expectancy.

**Fund Growth Rates.** For DC and Hybrid plans we also had to assume a rate of growth for plan funds. We set that rate at 7.9% based on assumptions adopted by the Washington State Pension Funding Council.<sup>2</sup> To compute an income replacement rate in the year after retirement, we converted the DC portion of benefits (in DC or Hybrid plans) into an annual payout to the employee in the form of a single-life annuity.

**Annuity Purchases.** We assumed that employees participating in defined contribution (DC) or Hybrid plans would purchase an increasing, single-life annuity with their accumulated investments. This is an assumption that may not accurately represent the behavior of most retirees,<sup>3</sup> but was necessary in order to compare these plans to the traditional defined benefit (DB) plan.

**Life Expectancy.** We used the state actuary's projection<sup>4</sup> of an 84-year life expectancy for 65-year old retirees and assumed these retirees would purchase an annuity with a 4.76% growth rate<sup>5</sup> at the time of their retirement. This annuity would continue paying out until age 84. The annuity would guarantee income for the 19-year term, and we used the first-year payout to determine income replacement in the year following retirement. Likewise, we anticipated an 82-year life expectancy for the 55-year old retiree, and assumed that these retirees would purchase an annuity that would pay out for 27 years.

**Exhibit C2**  
**Assumptions on Pension Benefit Payouts for DC and Hybrid Plans**

Benefit factor	Assumption
Nominal growth of pension plan funds	7.9% per year
Method of disbursement for DC plans	Increasing, single-life annuity purchased at retirement
Term of annuity (for age 65 retiree)	19 years, based on actuarial life expectancy of age 84.
Term of annuity (for age 55 retiree)	27 years, based on actuarial life expectancy of age 82.
Nominal growth of annuity	4.76% per year

To determine income replacement for DB retirement benefits, the computation is:

$$\begin{aligned} &\text{Average final compensation (AFC) *} \\ &\quad \text{Service credit years (SCY) *} \\ &\quad \text{Benefit multiplier} \end{aligned}$$

<sup>2</sup> [http://osa.leg.wa.gov/Actuarial\\_Services/Actuarial\\_Information/assumptions.htm](http://osa.leg.wa.gov/Actuarial_Services/Actuarial_Information/assumptions.htm)

<sup>3</sup> Available evidence suggests that DC plan retirees often choose lump-sum distribution of their accumulated benefits rather than purchasing annuities. See, for example, Beshears, J., Choi, J. J., Laibson, D., Madrian, B. C., & Zeldes, S. P. (2012). What Makes Annuitization More Appealing?. *Update*, 10, 17; Clark, S., Morrill, M., & Vanderweide, D. (2012). Defined benefit pension plan distribution decisions by public sector employees. Previous version circulated under the title "The Reverse Annuity Puzzle: The Choice of Lump Sum Distributions among Separating Public Sector Workers." (Working Paper No. 18488). Retrieved from National Bureau of Economic Research website: <http://www.nber.org/papers/w18488>.

<sup>4</sup> [http://osa.leg.wa.gov/Actuarial\\_Services/Actuarial\\_Information/Life\\_Expect\\_tables.htm](http://osa.leg.wa.gov/Actuarial_Services/Actuarial_Information/Life_Expect_tables.htm)

<sup>5</sup> Plan 3 retirees in Washington have the option to purchase a Total Allocation Portfolio (TAP) Annuity, authorized by RCW 41.34.060, with funds managed by the Washington State Investment Board. This annuity product offers an automatic 3% annual cost of living adjustment, and currently is assumed to grow at the Pension Funding Council rate of 7.9%. Therefore, to approximate the first annual payout, we have computed the annual growth rate as:  $(1.079 / 1.03) - 1$ , or approximately 4.76%.

For DC benefits, we used the assumptions described above to estimate the total accumulated benefit by age of retirement. We assumed the employee would purchase an annuity for remaining years of life expectancy and draw down increasing, regular benefits on that purchase. In the hypothetical situation illustrated in Exhibit C4, an annuity purchased for \$170,679 with a fixed rate of 4.76% and a 19-year term (age 65 retiree) would provide an initial annual benefit of \$13,845. The same annuity purchased for a 27-year term (age 55 retiree) would provide an initial annual benefit of \$11,358.

Assumptions about annuity growth rates strongly impact estimated income replacement in retirement. The Total Allocation Portfolio (TAP) annuity product available to Washington State Plan 3 retirees provides 7.9% growth and an automatic 3% COLA.<sup>6</sup> Retirees electing to purchase annuities in the private market may not receive COLAs and might expect lower rates of growth in their accumulated contributions<sup>7</sup>. An Institute synthesis of current (11/30/12) annuity quotes<sup>8</sup> for age 65 retirees in Washington State with \$170,679 in accumulated value yielded a mean rate of 1.89% growth with a fixed payment (no COLA) (Exhibit C4).

<sup>6</sup> The Plan 3 Annuity Guide is available online at: <http://www5.icmarc.org/xp/pubs/code/processRequest.jsp?RFID=C1108>

<sup>7</sup> The TAP annuity investments are managed by the Washington State Investment Board, which has access to investments in private equity that are not available to a typical investor or mutual fund. Other DC and Hybrid plans may not offer options with this type of professional investment management, and may experience lower fund growth rates.

<sup>8</sup> We obtained quotes from <http://www.immediateannuities.com/> for men and women aged 65 in Washington State for a single life annuity. Monthly payments were converted to an annual sum. We used the life expectancies of men and women in WA (83 and 85 respectively) to estimate an annuity term, and imputed a growth rate for each quote. We then computed the mean growth rate.

**Exhibit C3**  
**Projected Accumulation of DC Plan Benefits**  
**for Hypothetical PERS 3 Retiree**

Years experience	Annual salary	Accumulated plan worth <sup>9</sup>
0	\$22,750	\$0
1	\$23,430	\$1,137
2	\$24,131	\$2,399
3	\$24,853	\$3,795
4	\$25,596	\$5,337
5	\$26,362	\$7,039
6	\$27,150	\$8,913
7	\$27,962	\$10,975
8	\$28,798	\$13,240
9	\$29,660	\$15,725
10	\$30,547	\$18,451
11	\$31,461	\$21,436
12	\$32,402	\$24,702
13	\$33,371	\$28,274
14	\$34,369	\$32,176
15	\$35,397	\$36,436
16	\$36,456	\$41,085
17	\$37,546	\$46,153
18	\$38,669	\$51,676
19	\$39,825	\$57,692
20	\$41,017	\$64,241
21	\$42,243	\$71,367
22	\$43,507	\$79,117
23	\$44,808	\$87,543
24	\$46,148	\$96,699
25	\$47,529	\$106,646
26	\$48,950	\$117,447
27	\$50,414	\$129,173
28	\$51,922	\$141,899
29	\$53,475	\$155,705
30	\$55,075	\$170,679

<sup>9</sup> PERS 3 is a Hybrid plan, so these DC benefits make up only a portion of the total retirement benefits. This hypothetical employee contributed 5% toward his or her DC plan at the end of each year in a single annual contribution. Five percent is the mandatory default contribution rate for PERS 3.

**Exhibit C4**  
**Comparison of DC Plan Benefits under Different Assumptions (Age 65 Retiree)**

	TAP	Private market
Accumulated DC benefits (time of retirement)	\$170,679	\$170,679
Annuity annual growth rate	7.9%	1.89%
COLA	3% per year	0%
Annual payout in first year after retirement	\$13,845	\$10,776

TAP is an optional annuity product provided by the Washington State Department of Retirement Systems.

The following tables display the results for the state pension plans reviewed.

**Exhibit C5**  
**Income Replacement for General State Employee and Teacher Plans**

Plan	Type of employees covered	Type of plan	Income replacement: Age 65	Income replacement: Age 55
Alabama ERS	State, Local, and Police	DB	59%	59%
Alabama TRS	Teachers	DB	59%	59%
Arizona ASRS	State, Local and Teachers	DB	59%	59%
Arkansas APERS	State and Local	DB	65%	65%
Arkansas ATRS	Teachers	DB	63%	47%
California CalPERS 2	State, Teachers, Public Agency	DB	38%	32%
California CalSTRS	Teachers	DB	72%	36%
Connecticut SERS 3	State, Teachers	DB	38%	38%
Delaware SEPP	State and Teachers	DB	54%	54%
Florida FRS	State, Local and Teachers	DB	43%	37%
Georgia GSEPS	State	Hybrid	42%	40%
Georgia TRS	Teachers	DB	59%	59%
Hawaii ERS Hybrid	State, Local, Police, Firefighters	DB	50%	37%
Idaho PERSI	State, Local and Teachers	DB	58%	27%
Illinois SERS 2	State	DB	45%	0%
Indiana PERF	State and Local	Hybrid	46%	44%
Indiana TRF	Teachers	Hybrid	46%	44%
Iowa IPERS	State, Local and Teachers	DB	58%	23%
Kansas KPERS 2	State, Local and Teachers	DB	50%	35%
Maryland ETPS	State, Local and Teachers	DB	42%	17%
Michigan PPRP	School Employees	Hybrid	58%	44%
Michigan SERS	State	DC	50%	41%
Minnesota GERP	State and Local	DB	48%	26%
Minnesota TRA 2	Teachers	DB	54%	27%
Mississippi PERS 4	State, Local and Teachers	DB	57%	57%
Missouri MSEP 2011	State	DB	45%	51%
Montana DCRP	State, Local and Teachers	DC	62%	51%
Montana PERS	State and Local	DB	42%	42%
Montana TRS	Teachers	DB	49%	49%

**Exhibit C5**  
**Income Replacement for General State Employee and Teacher Plans**

Plan	Type of employees covered	Type of plan	Income replacement: Age 65	Income replacement: Age 55
Nebraska SPP	Teachers	DB	58%	58%
New Jersey PERS 5	State, Local, Teachers	DB	47%	33%
New Jersey TPAF 5	Teachers	DB	47%	33%
New Mexico NMERB	Teachers	DB	67%	67%
New Mexico PERA 3	State and Local	DB	87%	87%
New York NYSTRS 6	Teachers	DB	57%	27%
New York PERS 6	State and Local	DB	57%	27%
North Carolina TSERS	State and Teachers	DB	57%	57%
North Dakota NDPERS	State and Local	Hybrid	83%	79%
North Dakota TFFR 2	Teachers	DB	57%	11%
Oklahoma PERS	State and Local	DB	58%	35%
Oklahoma TRS	Teachers	DB	57%	35%
Oregon OPSRP	State, Local	Hybrid	74%	58%
Pennsylvania PSERS	Teachers	DB	73%	62%
Pennsylvania SERS	State Employees, Police, Judicial	DB	58%	45%
Rhode Island ERSRI	State and Teachers	Hybrid	58%	25%
South Carolina SCORP	State, Local and Teachers	DC	60%	49%
South Carolina SCRS 3	State, Local and Teachers	DB	52%	0%
South Dakota SDRS	State, Local and Teachers	DB	50%	50%
Tennessee TCRS	Teachers	DB	42%	42%
Texas ERS	State	DB	67%	67%
Utah PERS 2	Public Employees	Hybrid	50%	7%
Utah PERS 2 - DC	Public Employees	DC	50%	41%
Vermont VSERS F	State	DB	49%	49%
Vermont VSTRS C	Teachers	DB	49%	49%
Virginia VRS 2	State, Local and Teachers	DB	48%	0%
Washington PERS 2	State	DB	57%	28%
Washington PERS 3	State	Hybrid	53%	35%
Washington SERS 3	School Employees	Hybrid	53%	35%
Washington SERS2	School Employees	DB	57%	28%
Washington TRS 3	Teachers	Hybrid	53%	35%
Washington TRS2	Teachers	DB	57%	28%
West Virginia PERS	State and Local	DB	58%	58%
West Virginia TRS	Teachers	DB	57%	57%
Wisconsin WRS	State, Local and Teachers	DB	47%	42%
Wyoming PEPP 2	State, Local and Teachers	DB	57%	57%

**Exhibit C6**  
**Income Replacement for Law Enforcement and Firefighter Plans**

Plan	Type of employees covered	Type of plan	Income replacement: Age 65	Income replacement: Age 55
Alabama AERS	State, Local Police & Firefighters	DB	59%	59%
Alabama AERS	State Police	DB	84%	84%
Arizona PSPRS 2	State and Local Police & Firef.	DB	71%	71%
Arkansas ASPRS 2	State Police	DB	71%	71%
California CalPERS 2	Law Enforcement, Firefighters	DB	73%	73%
Connecticut HDP 2A	State, Local Police, Firefighters	DB	58%	58%
Florida FRS	State, Local Police, Firefighters	DB	81%	81%
Georgia GERS	Public Safety	Hybrid	42%	40%
Hawaii ERS	Police and Firefighters	DB	64%	64%
Idaho IPERS	Police & Firefighters	DB	67%	67%
Illinois SERS 2	Police & Firefighters	DB	68%	0%
Indiana POFP	Police & Firefighters	DB	70%	70%
Iowa PERS	Local Police, Firefighters & others	DB	80%	80%
Kansas KPF 2	Police and Firefighters	DB	73%	73%
Kentucky SPRS	State Police	DB	71%	71%
Maryland LEOPS	State Law Enforcement	DB	57%	57%
Maryland SPRS	State Police	DB	74%	74%
Minnesota CERP	Correctional officers	DB	68%	68%
Minnesota PERA	Local Police, Firefighters & others	DB	85%	85%
New Mexico PERF	State Police, Correctional Officers	DB	87%	87%
New York PFRS 6	State Police & Firefighters	DB	63%	63%
New York SRS 5	Correctional Officers	DB	73%	73%
North Carolina SLEO	State Law Enforcement	DB	53%	53%
North Dakota NDPERS	National Guard, Police, FF	Hybrid	78%	75%
Ohio PERS	State, Local Police, Firefighters	DB	73%	73%
Oklahoma PPRS	Municipal Police	DB	74%	74%
Oregon PSRP	State, Local Police, Firefighters	Hybrid	70%	64%
Pennsylvania SERS	State Police - Class AA	DB	75%	38%
Rhode Island SPRBT	State Police	DB	57%	57%
South Carolina PORS	State Police	DB	61%	61%
South Dakota Class B	State Law Enforcement	DB	58%	58%
Tennessee TCRS	Law Enforcement	DB	42%	42%
Texas LECOS	Law Enforcement	DB	82%	82%
Utah PSFRS 2	Police and Firefighters	Hybrid	85%	77%
Utah PSFRS 2 DC	Police and Firefighters	DC	42%	35%
Vermont VSERS C	State Police & Law Enforcement	DB	74%	74%
Virginia SPORS 2	State Police	DB	52%	52%
Virginia VaLORS 2	State Law Enforcement	DB	57%	57%
Washington LEOFF 2	Law enforcement/fire fighters	DB	57%	57%
Washington PSERS 2	Public safety officers	DB	57%	48%
Washington WSPRS 2	State Patrol	DB	57%	57%
Wisconsin WRS	State & Local Police, Safety	DB	58%	58%
Wyoming WRS	Firefighters	DB	82%	82%

## APPENDIX D: BENEFIT PORTABILITY ANALYSIS

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To illustrate how retirement benefits are impacted by job mobility, we estimated benefit levels comparing two hypothetical workers with similar earnings profiles: one who stays in the same job (Employee A) and the other who is mobile (Employee B). Employee A stays in the same job for 30 years, whereas Employee B changes jobs over the course of their career. We compare pension benefits at the time of retirement for each of these workers.

We compare four types of plans:

- Defined Benefit (DB)
- Defined Contribution (DC)
- Hybrid (half DB/half DC)
- Defined Benefit with portability provisions (described below)

We use the income replacement for our metric using the same methods described in Appendix C.

### Assumptions:

- **Employee A** stays in the same job for 30 years
- **Employee B** changes jobs at years 7, 10, and 22
- Both employees' salaries grow at approximately 3% per year (based on the salary profiles in Appendix C)
- For each job change, Employee B's salary increases by an additional five percent, and they cash out and spent their contributions if they change jobs before the vesting period ends
- Public employers in all the jobs have the same pension rules:
  - For our defined benefit examples:
    - **Average final salary** period of three years;
    - **Benefit multiplier** of 2% for defined benefit plans and 1% for Hybrid plans;
    - **Vest** at five years (for DB and Hybrid plans).
  - For our defined contribution plans:
    - The **nominal growth** is assumed to be 7.9%;
    - **Contribution rates:** 8% from the employer (goes to the DB portion only in the Hybrid plan) and 5% from the employee (goes to DC portion only in the Hybrid plan).
    - **Annuitization assumptions:** retirees purchase a TAP annuity (see Appendix C for details) with a 7.9% growth rate and automatic 3% COLA.

### Portability Provisions

- Employees are eligible to retire if the years of service combined across jobs meets the minimum (e.g., age 60 with 30 years of experience)
- The highest average final salary across jobs can be used to calculate benefits for each pension plan (up to 65% salary replacement).



Exhibit D1 summarizes our findings. Exhibits D2 through D5 provide details on how these estimates were developed.

**Exhibit D1**  
**Summary of Annual Pension Benefits for a**  
**Hypothetical Stable vs. Mobile Employee**

	Employee A (stable)	Employee B (mobile)
<b>Defined Benefit Plan</b>		
Estimated annual benefit	\$32,094	\$25,232
% salary replacement	58%	38%
<b>Defined Contribution Plan</b>		
Estimated annual benefit	\$37,073	\$39,690
% salary replacement	67%	60%
<b>Hybrid Plan</b>		
Estimated annual benefit	\$29,431	\$27,881
% salary replacement	53%	42%
<b>Defined Benefit Plan with portability</b>		
Estimated annual benefit	\$32,094	\$33,854
% salary replacement	58%	51%

To test how sensitive these estimates are to some of our assumptions, we ran the same analysis for ten different scenarios using various combinations of assumptions about vesting periods, investment returns, and years of service at each job for employee B (the mobile worker). Varying the assumptions changes the relative magnitude of benefits but not the overall findings:

- mobile workers have lower income replacement than stable workers
- DC plans (including the DC portion of Hybrid plans) have smaller differences in income replacement for mobile vs. stable workers
- Washington State's portability rules reduce the differences in come replacement in mobile vs. stable workers

The largest impacts on income replacement for mobile employees are longer vesting periods in defined benefit and Hybrid plans. Assumptions around contribution rates and investment returns impact DC and Hybrid plan income replacement.

**Exhibit D2**  
**Pension Benefits for Stable (“A”) versus Mobile (“B”) Employee:**  
**Defined Benefit Plan**

Age	Year Working	Annual Salary		Average Final Salary		Years of Service		Annual Pension Benefits		Increment per year of service		DC Contributions (cumulative)	
		A	B	A	B	A	B	A	B	A	B	A	B
30	1	\$23,430	\$23,430										
31	2	\$24,131	\$24,131										
32	3	\$24,853	\$24,853										
33	4	\$25,596	\$25,596										
34	5	\$26,362	\$26,362										
35	6	\$27,150	\$27,150										
36	7	\$27,962	\$29,320		\$27,611		7		\$3,865		\$552		
37	8	\$28,798	\$30,196										
38	9	\$29,660	\$31,100										
39	10	\$30,547	\$33,585		\$31,627		3		No benefit (not vested)				
40	11	\$31,461	\$34,590										
41	12	\$32,402	\$35,624										
42	13	\$33,371	\$36,690										
43	14	\$34,369	\$37,787										
44	15	\$35,397	\$38,917										
45	16	\$36,456	\$40,082										
46	17	\$37,546	\$41,280										
47	18	\$38,669	\$42,515										
48	19	\$39,825	\$43,786										
49	20	\$41,017	\$45,096										
50	21	\$42,243	\$46,444										
51	22	\$43,507	\$50,156		\$47,232		12		\$11,336		\$945		
52	23	\$44,808	\$51,656										
53	24	\$46,148	\$53,201										
54	25	\$47,529	\$54,793										
55	26	\$48,950	\$56,431										
56	27	\$50,414	\$58,119										
57	28	\$51,922	\$59,857										
58	29	\$53,475	\$61,648										
59	30	\$55,075	\$66,574	\$53,491	\$62,693	30	8	\$32,094	\$10,031	\$1,070	\$1,254		

**Exhibit D3**  
**Pension Benefits for Stable (“A”) versus Mobile (“B”) Employee:**  
**Defined Contribution Plan**

Age	Year Working	Annual Salary		Average Final Salary		Years of Service		Annual Pension Benefits		Increment per year of service		DC Contributions (cumulative)	
		A	B	A	B	A	B	A	B	A	B	A	B
30	1	\$23,430	\$23,430									\$3,046	\$3,046
31	2	\$24,131	\$24,131									\$6,424	\$6,424
32	3	\$24,853	\$24,853									\$10,162	\$10,162
33	4	\$25,596	\$25,596									\$14,292	\$14,292
34	5	\$26,362	\$26,362									\$18,848	\$18,848
35	6	\$27,150	\$27,150									\$23,867	\$23,867
36	7	\$27,962	\$29,320									\$29,387	\$29,564
37	8	\$28,798	\$30,196									\$35,453	\$35,825
38	9	\$29,660	\$31,100									\$42,109	\$42,698
39	10	\$30,547	\$33,585									\$49,407	\$50,437
40	11	\$31,461	\$34,590									\$57,400	\$58,918
41	12	\$32,402	\$35,624									\$66,147	\$68,204
42	13	\$33,371	\$36,690									\$75,711	\$78,362
43	14	\$34,369	\$37,787									\$86,160	\$89,465
44	15	\$35,397	\$38,917									\$97,568	\$101,592
45	16	\$36,456	\$40,082									\$110,015	\$114,828
46	17	\$37,546	\$41,280									\$123,588	\$129,266
47	18	\$38,669	\$42,515									\$138,378	\$145,005
48	19	\$39,825	\$43,786									\$154,487	\$162,153
49	20	\$41,017	\$45,096									\$172,024	\$180,825
50	21	\$42,243	\$46,444									\$191,105	\$201,148
51	22	\$43,507	\$50,156									\$211,858	\$223,559
52	23	\$44,808	\$51,656									\$234,420	\$247,936
53	24	\$46,148	\$53,201									\$258,939	\$274,439
54	25	\$47,529	\$54,793									\$285,574	\$303,242
55	26	\$48,950	\$56,431									\$314,497	\$334,534
56	27	\$50,414	\$58,119									\$345,897	\$368,518
57	28	\$51,922	\$59,857									\$379,972	\$405,413
58	29	\$53,475	\$61,648									\$416,942	\$445,454
59	30	\$55,075	\$66,574									\$457,040	\$489,300

**Exhibit D4**  
**Pension Benefits for Stable (“A”) versus Mobile (“B”) Employee:**  
**Hybrid Plan**

Age	Year Working	Annual Salary		Average Final Salary		Years of Service		Annual Pension Benefits		Increment per year of service		DC Contributions (cumulative)	
		A	B	A	B	A	B	A	B	A	B	A	B
30	1	\$23,430	\$23,430									\$1,172	\$1,172
31	2	\$24,131	\$24,131									\$2,471	\$2,471
32	3	\$24,853	\$24,853									\$3,908	\$3,908
33	4	\$25,596	\$25,596									\$5,497	\$5,497
34	5	\$26,362	\$26,362									\$7,249	\$7,249
35	6	\$27,150	\$27,150									\$9,180	\$9,180
36	7	\$27,962	\$29,320		\$27,611		7		\$1,933		\$276	\$11,303	\$11,371
37	8	\$28,798	\$30,196									\$13,636	\$13,779
38	9	\$29,660	\$31,100									\$16,196	\$16,422
39	10	\$30,547	\$33,585		\$31,627		3		No benefit (not vested)			\$14,485	\$19,003
40	11	\$31,461	\$34,590									\$22,077	\$22,661
41	12	\$32,402	\$35,624									\$25,441	\$26,232
42	13	\$33,371	\$36,690									\$29,120	\$30,139
43	14	\$34,369	\$37,787									\$33,138	\$34,410
44	15	\$35,397	\$38,917									\$37,526	\$39,074
45	16	\$36,456	\$40,082									\$42,314	\$44,165
46	17	\$37,546	\$41,280									\$47,534	\$49,718
47	18	\$38,669	\$42,515									\$53,222	\$55,771
48	19	\$39,825	\$43,786									\$59,418	\$62,366
49	20	\$41,017	\$45,096									\$66,163	\$69,548
50	21	\$42,243	\$46,444									\$73,502	\$77,365
51	22	\$43,507	\$50,156		\$47,232		12		\$5,668		\$472	\$81,484	\$85,984
52	23	\$44,808	\$51,656									\$90,162	\$95,360
53	24	\$46,148	\$53,201									\$99,592	\$105,553
54	25	\$47,529	\$54,793									\$109,836	\$116,632
55	26	\$48,950	\$56,431									\$120,961	\$128,667
56	27	\$50,414	\$58,119									\$133,037	\$141,738
57	28	\$51,922	\$59,857									\$146,143	\$155,928
58	29	\$53,475	\$61,648									\$160,362	\$171,329
59	30	\$55,075	\$66,574	\$53,491	\$62,693	30	8	\$16,047	\$5,015	\$535	\$627	\$175,785	\$188,192

**Exhibit D5**  
**Pension Benefits for Stable (“A”) versus Mobile (“B”) Employee:**  
**Defined Benefit Plan with Portability Provisions Applied**

Age	Year Working	Annual Salary		Average Final Salary		Years of Service		Annual Pension Benefits		Increment per year of service		DC Contributions (cumulative)	
		A	B	A	B	A	B	A	B	A	B	A	B
30	1	\$23,430	\$23,430										
31	2	\$24,131	\$24,131										
32	3	\$24,853	\$24,853										
33	4	\$25,596	\$25,596										
34	5	\$26,362	\$26,362										
35	6	\$27,150	\$27,150										
36	7	\$27,962	\$29,320		\$27,611		7		\$8,777		\$1,254		
37	8	\$28,798	\$30,196										
38	9	\$29,660	\$31,100										
39	10	\$30,547	\$33,585		\$31,627		3		No benefit (not vested)				
40	11	\$31,461	\$34,590										
41	12	\$32,402	\$35,624										
42	13	\$33,371	\$36,690										
43	14	\$34,369	\$37,787										
44	15	\$35,397	\$38,917										
45	16	\$36,456	\$40,082										
46	17	\$37,546	\$41,280										
47	18	\$38,669	\$42,515										
48	19	\$39,825	\$43,786										
49	20	\$41,017	\$45,096										
50	21	\$42,243	\$46,444										
51	22	\$43,507	\$50,156		\$47,232		12		\$15,046		\$1,254		
52	23	\$44,808	\$51,656										
53	24	\$46,148	\$53,201										
54	25	\$47,529	\$54,793										
55	26	\$48,950	\$56,431										
56	27	\$50,414	\$58,119										
57	28	\$51,922	\$59,857										
58	29	\$53,475	\$61,648										
59	30	\$55,075	\$66,574	\$53,491	\$62,693	30	8	\$32,094	\$10,031	\$1,070	\$1,254		

## APPENDIX E: OVERTIME AND EXCESS COMPENSATION— ANALYSIS OF WASHINGTON DATA

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### Organization of this Appendix

This appendix begins with a description of the data used in our analyses. We then show information about Washington State public retirees between 2009 and June 2012, including the number of retirees, which state pension plan they retired from, as well as their average AFC, retirement age, cash-outs, excess compensation, and overtime hours.

We use two stylized examples to illustrate how overtime hours concentrated at the end of a career impact pensions differently than persistently high overtime.

Finally, this appendix includes details about our multivariate regression test, using individual-level Washington State data, of the extent to which end-of-career increases in hours among recent Washington retirees are related to pension benefit incentives.

E1. Data Sources

E2. Washington State Retiree Information

E3. Stylized Examples

E4. Test for Hours Increases Related to Pension Rule Incentives

### E1. DATA SOURCES

#### Department of Retirement Systems Data

The Washington State Department of Retirement Systems (DRS) provided data for all individuals retiring from one of the state plans during a three and a half year period: January 1, 2009 to June 30, 2012. The DRS data include information on 26,799 pension system members. Two types of DRS data are provided: retiree summary and earnings history.

**Retiree Summary Data.** The retiree summary data include the following information about each retiree:

- demographics (gender, date of birth, age at retirement)
- employer
- pension system and plan
- retirement date
- average final compensation (AFC)
- cash-out portion of AFC
- excess compensation portion of AFC

**Earnings History Data.** The earnings history data include compensation and hours worked histories for about 20,500 retirees for up to ten years prior to retirement. These data are monthly and span the period from January 1999 to June 2012. Monthly compensation includes earnings, lump sum payments and cash-outs.

The main limitation with these data is that overtime earnings are not reported separately. Job classification and title are also not reported.

## **Human Resource Management System (HRMS) Data**

The HRMS provides information on earnings components, including overtime. These data are available only since July of 2006. The Office of Financial Management (OFM) extracted HRMS data for the retirees in our analysis of DRS data (members who retired from January 2009 to June 2012). HRMS only includes data for state agency employees.

### **Data Exclusions and Restrictions**

Since the month prior to retirement is often atypical, it is excluded in the analysis of earnings and hours trends. The analysis relies on hours as reported to the DRS. Members with no earnings during the 6 months prior to retirement are excluded from the analysis.

The following hours exclusions were imposed in the analysis. Monthly observations were excluded if:

- hours = 0
- hours < 60 per month (less than 15 hours per week)
- hours > 640 (excludes only 20 monthly observations)

The analysis was limited to those members with sufficient AFC and pre-AFC monthly observations.

- Plan 1 members with fewer than 18 observed AFC months were excluded.
- Plan 2/3 members with fewer than 36 observed AFC months were excluded.
- Members with fewer than 36 observed pre-AFC months were excluded.
- LEOFF1 members with fewer than 10 observed AFC months were excluded (LEOFF1 AFC is determined by final salary)

The results are not overly sensitive to these restrictions.

The regression analysis further restricted observations to normal retirements, excluding disability and other types. Normal retirement accounts for 94 percent of all retirements. Note that earnings typically decline in cases of disability.

## E2. WASHINGTON STATE RETIREE INFORMATION

### Exhibit E1

#### Retirees, Average Final Compensation and Age at Retirement by System and Plan

Retirements from January 2009 to June 2012

System & Plan	Retirees	Average AFC	Average Retirement Age
LEOFF1	229	\$8,543	61
LEOFF2	1,161	\$7,388	56
PERS1	4,868	\$5,108	62
PERS2	10,152	\$4,467	64
PERS3	984	\$4,829	63
SERS2	1,802	\$2,476	65
SERS3	1,710	\$2,564	64
TRS1	2,596	\$5,993	62
TRS2	1,055	\$5,148	64
TRS3	2,123	\$5,473	63
WSPRS1	119	\$7,725	53
<b>Total</b>	<b>26,799</b>	<b>\$4,771</b>	<b>63</b>

Notes: Data did not include WSPRS2 retirees. There were very few retirees from JRS1 and PSERS2. Plans 1 are closed.

### Exhibit E2

#### Cash-Out Compensation Included in AFC

Retirements from January 2009 to June 2012

System & Plan	Retirees	# with cash-outs > 0	% receiving cash-outs	Avg where cash-outs > 0	Avg across all retirees	Total Payments
PERS1	4,868	2,691	55.3%	\$318	\$176	\$856,439
TRS1	2,596	465	17.9%	\$266	\$48	\$123,812
WSPRS1	119	88	73.9%	\$554	\$410	\$48,751

Notes: Cash-outs include leave balances. Leave cash-outs are excluded from plans 2/3. No cash-out compensation was reported for LEOFF.



**Exhibit E3**  
**Excess Compensation**  
Retirements from January 2009 to June 2011

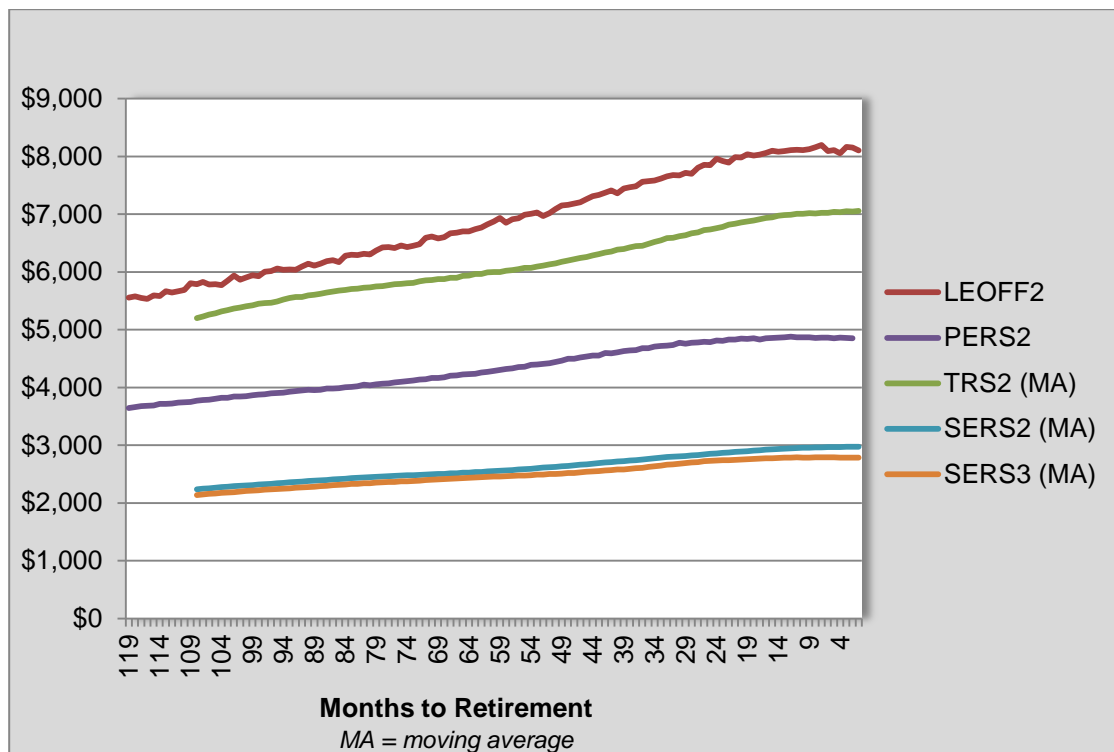
System & Plan	Retirees	# with amount > 0	% having excess comp	Avg where excess comp > 0	Avg across all retirees
<b>PERS1</b>	4,868	885	18.2%	\$324	\$59
<b>PERS2</b>	10,152	7	0.1%	\$551	\$0
<b>PERS3</b>	984	3	0.3%	\$133	\$0
<b>SERS2</b>	1,802	2	0.1%	\$894	\$1
<b>TRS1</b>	2,596	284	10.9%	\$28	\$3
<b>Total</b>	20,402	1,181	5.8%	\$255	\$15

Notes: Employers are charged the present value of the benefit stream generated by these amounts. No excess compensation was reported for LEOFF1, LEOFF2, SERS3, TRS2, TRS3, and WSPRS1. Many (88%) of the PERS1 retirees with excess compensation are employed by cities, counties and utility districts. The N is lower than in Exhibit E1 because LEOFF plans are excluded.

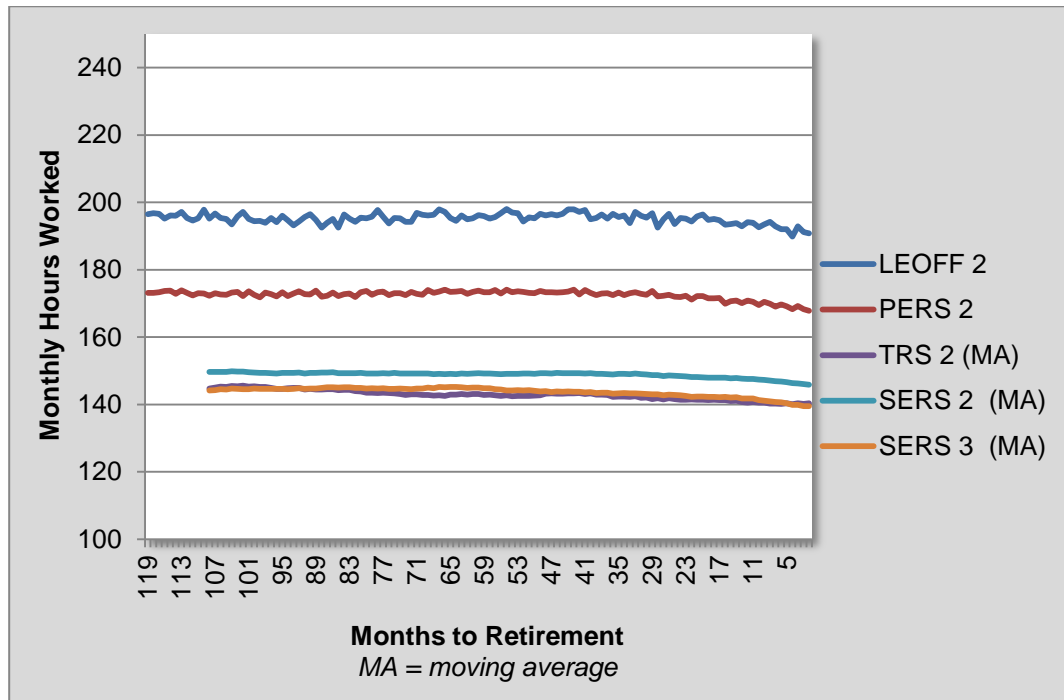
The degree to which earnings increase with tenure varies across systems and plans (Exhibits E4 and E6). Note that earnings vary dramatically by month for SERS and TRS members, so the chart uses 12-month moving averages (MA) for these members.

**Exhibit E4**  
**Average Earnings Profiles for Open Plans with Recent Retirees**  
**(Earnings per month)**

Retirements from January 2009 to June 2012



**Exhibit E5**  
**Average Hours Profiles for Open Plans with Recent Retirees**  
**(Hours per month)**  
Retirements from January 2009 to June 2012



We do not observe systematic increases in average hours worked, as reported to DRS, in AFC periods (Exhibits E5 and E7). Increases in average earnings per hour largely drive the overall increases in earnings with tenure. However, the number of average hours worked varies across plans, and this variation contributes to differences in the overall level of earnings.

**Exhibit E6**  
**Average Monthly Earnings Before and During AFC Period**  
Retirements from January 2009 to June 2012

Plan/System	N	Avg. Earnings Pre-AFC	Avg. Earnings AFC	Avg. Increase	% Increase
LEOFF1	109	\$6,811	\$8,458	\$1,647	24.2%
LEOFF2	731	\$6,149	\$7,633	\$1,484	24.1%
PERS1	3577	\$4,287	\$5,088	\$801	18.7%
PERS2	6182	\$3,946	\$4,672	\$726	18.4%
PERS3	158	\$4,201	\$4,991	\$789	18.8%
SERS2	1115	\$2,345	\$2,756	\$411	17.5%
SERS3	251	\$2,254	\$2,616	\$362	16.1%
TRS1	1968	\$6,031	\$7,142	\$1,111	18.4%
TRS2	558	\$5,631	\$6,674	\$1,043	18.5%
TRS3	258	\$5,276	\$6,282	\$1,006	19.1%
WSPRS1	99	\$6,190	\$7,348	\$1,158	18.7%
PERS2: FERRIES	52	\$4,417	\$5,156	\$738	16.7%
PERS1: CORRECTIONS	93	\$4,017	\$4,693	\$676	16.8%
PERS2: CORRECTIONS	324	\$3,522	\$4,157	\$635	18.0%

Note: Reference periods vary by plan. Plans 1: AFC periods include the 24 months prior to retirement (12 months prior for LEOFF1). Pre-AFC periods can include up to 96 months. Plans 2/3: Pre-AFC and AFC periods both include up to 60 months for the open plans.

**Exhibit E7**  
**Average Monthly Hours Before and During AFC Period**  
Retirements from January 2009 to June 2012

Plan/System	N	Avg. Hours Pre-AFC	Avg. Hours AFC	Difference	Std Dev AFC Avg.
LEOFF1	109	186.3	182.9	-3.40	21.8
LEOFF2	731	195.4	194.9	-0.50	26.1
PERS1	3,577	170.2	169.3	-0.90	18.8
PERS2	6,182	173.0	172.1	-0.90	17.8
PERS3	158	171.1	169.0	-2.10	20.1
SERS2	1,115	147.2	146.1	-1.10	28.0
SERS3	251	143.0	140.8	-2.20	26.9
TRS1	1,968	153.1	154.1	1.00	18.7
TRS2	558	143.6	141.3	-2.30	14.1
TRS3	258	141.0	139.1	-1.90	18.3
WSPRS1	99	180.3	177.2	-3.10	9.7
PERS2: FERRIES	52	178.5	179.5	1.00	13.6
PERS1: CORRECTIONS	93	179.0	176.3	-2.70	10.2
PERS2: CORRECTIONS	324	180.0	179.1	-0.90	16.7
<b>Total</b>	<b>15,475</b>	<b>167.3</b>	<b>166.5</b>	<b>-0.79</b>	<b>19.2</b>

Exhibits E8 and E9 provide additional detail for employer types within PERS 2.

**Exhibit E8**  
**PERS2: Average Monthly Earnings Before and During AFC Period**

Employer Type	N	Avg. Earnings Pre-AFC	Avg. Earnings AFC	Avg. Increase	% Increase
City	506	\$4,272	\$5,144	\$873	20.4%
County	1,806	\$4,056	\$4,847	\$785	19.4%
State	2,593	\$3,864	\$4,517	\$653	16.9%
State Ed	906	\$3,263	\$3,847	\$584	17.9%
Utility	218	\$5,776	\$6,997	\$1221	21.1%

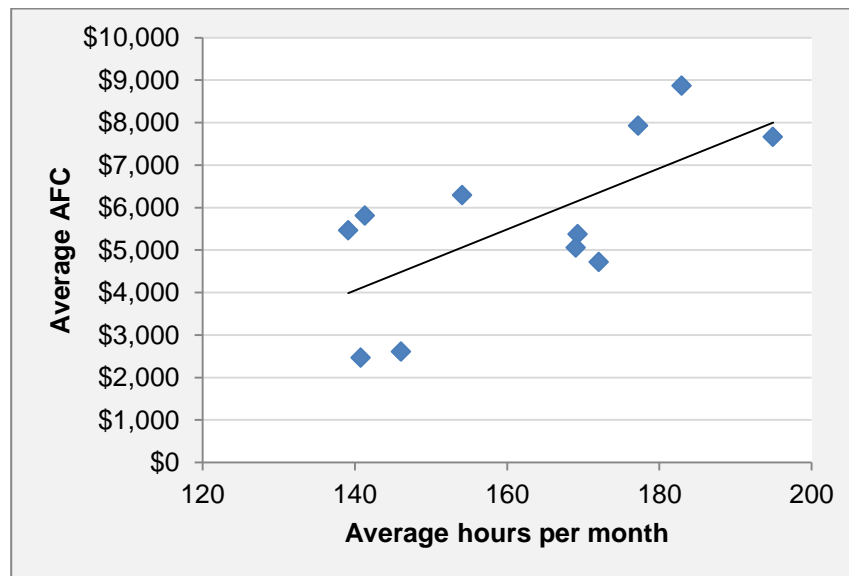
**Exhibit E9**  
**PERS2: Average Monthly Hours Before and During AFC Period**

Employer Type	N	Avg. Hrs Pre-AFC	Avg. Hours AFC	Std Dev AFC Avg.
City	506	173.3	172.6	15.9
County	1,806	172.1	171.4	20.3
State	2,593	174.4	173.2	13.2
State Ed	906	168.8	167.4	20.8
Utility	218	181.9	182.1	15.9

Notes: City includes Cities and First Class Cities. County includes Counties and County Subdivisions. State includes non-education state agencies. State Ed includes state colleges and universities. Utilities include Public Utility Districts and WA Public Utility Districts

Although AFC hours are not substantially higher than in pre-AFC periods, some groups of employees do work consistently higher hours throughout their careers. Average hours worked is relatively high, for example, among LEOFF and WSP members, and these higher hours contribute to higher AFCs. Exhibit E10 summarizes the relationship between average monthly hours worked and average monthly AFC levels across systems and plans. Each point in the exhibit represents average values for a plan.

**Exhibit E10**  
**Average Monthly Hours by Average Monthly AFC**



Plan	Average Hours	AFC
LEOFF1	183	\$8,867
WSPRS1	177	\$7,928
LEOFF2	195	\$7,664
TRS1	154	\$6,294
TRS2	141	\$5,814
TRS3	139	\$5,468
PERS1	169	\$5,379
PERS3	169	\$5,059
PERS2	172	\$4,719
SERS2	146	\$2,611
SERS3	141	\$2,464

Overall average hours worked does not tend to increase during AFC periods. Some members, however, do work longer hours toward the end of their careers; and there are cases where the increases are substantial. Across all plans, roughly 23 percent of retirees had some gain in average AFC hours. Note that 31 percent, on the other hand, worked fewer hours (Exhibit E11). The distribution of gains varies across plans (Exhibit E12).

**Exhibit E11**  
**Difference in average monthly hours in AFC and Pre-AFC Periods**  
All Systems & Plans January 2009-June 2012

Average Hours Worked Gain/Loss Pre- and Post-AFC	Retirees	Percent	Avg. hours Difference
Less by > 2 hours	4631	30.9%	-10.2
Near, -2 to <2 hours	6957	46.4%	-0.2
More, 2 to <10	2305	15.4%	5.0
More10 to <20	698	4.7%	13.9
More, 20+	415	2.8%	36.2

**Exhibit E12**  
**Hour Gain/Loss across Systems & Plans**  
Gain/Loss in Average Hours per Month

Plan	(1) <-2	(2) -2 to <2	(3) 2 to <10	(4) 10+
WSPRS1	52.53	40.4	5.05	2.02
PERS3	32.28	50.63	13.92	3.17
PERS2	26.79	56.83	10.79	5.59
PERS1	29.13	53.45	11.46	5.96
SERS3	39.84	31.87	21.51	6.78
TRS2	44.8	22.22	25.45	7.53
TRS3	41.09	24.42	25.19	9.3
SERS2	38.12	34.17	18.3	9.41
LEOFF2	36.39	31.46	20.52	11.63
TRS1	32.88	24.49	28.91	13.72

Exhibit E13 shows how many recent retirees worked more, less, or the same amount of hours before and during the AFC period, by plan. The shaded squares indicate the number of people who worked about the same amount of hours during the AFC as before. Below and to the left of the shaded squares are people who worked less during the AFC period, and above and to the right, those who worked more during the AFC period. For example, across all plans 7,151 worked a typical 40-hour week before and during the AFC period. Among those who worked about 40 hours a week before the AFC period, 413 worked a few hours less (35-38), and 357 worked a few hours more (42-45) during the AFC period.

**Exhibit E13**

**Number of Retirees by Average Hours before and During the AFC Period**

**All Systems & Plans**

**Average Monthly Hours: AFC Period**

	(1) <128 (15-29/wk)	(2) 128-149 (30-34/wk)	(3) 150-166 (35-38/wk)	(4) 167-179 (39-41/wk)	(5) 180-192 (42-45/wk)	(6) 193-214 (45-49/wk)	(7) 215+ (50+/wk)	Total
<b>Average Hours: Pre-AFC</b>								
(1) <128 (15-29/wk)	699	131	35	20	3	0	1	889
(2) 128-149 (30-34/wk)	240	1153	382	65	11	7	2	1860
(3) 150-166 (35-38/wk)	47	470	1189	369	32	5	9	2121
(4) 167-179 (39-41/wk)	29	107	413	7151	357	34	13	8104
(5) 180-192 (42-45/wk)	0	6	37	543	577	134	16	1313
(6) 193-214 (45-49/wk)	1	2	4	59	137	236	50	489
(7) 215+ (50+/wk)	0	0	0	14	15	36	165	230
Total	1016	1869	2060	8221	1132	452	256	15006

**LEOFF2**

**Average Monthly Hours: AFC Period**

	(1) <128 (15-29/wk)	(2) 128-149 (30-34/wk)	(3) 150-166 (35-38/wk)	(4) 167-179 (39-41/wk)	(5) 180-192 (42-45/wk)	(6) 193-214 (45-49/wk)	(7) 215+ (50+/wk)	Total
<b>Average Hours: Pre-AFC</b>								
(1) <128 (15-29/wk)	0	0	0	0	0	0	0	0
(2) 128-149 (30-34/wk)	0	0	0	0	0	0	0	0
(3) 150-<167 (35-38/wk)	0	0	9	4	2	2	1	18
(4) 167-<180 (39-41/wk)	0	0	2	180	40	2	1	225
(5) 180-<193 (42-45/wk)	0	1	0	53	126	28	4	212
(6) 193-<215 (45-49/wk)	0	0	0	11	24	93	23	151
(7) 215+ (50+/wk)	0	0	0	4	3	14	104	125
Total	0	1	11	252	195	139	133	731

**PERS1**

**Average Monthly Hours: AFC Period**

	(1) <128 (15-29/wk)	(2) 128-149 (30-34/wk)	(3) 150-166 (35-38/wk)	(4) 167-179 (39-41/wk)	(5) 180-192 (42-45/wk)	(6) 193-214 (45-49/wk)	(7) 215+ (50+/wk)	Total
<b>Average Hours: Pre-AFC</b>								
(1) <128 (15-29/wk)	125	22	8	8	1	0	0	164
(2) 128-149 (30-34/wk)	37	110	23	17	3	0	0	190
(3) 150-166 (35-38/wk)	9	35	161	95	7	0	2	309
(4) 167-179 (39-41/wk)	7	28	104	2275	81	6	3	2504
(5) 180-192 (42-45/wk)	0	1	6	127	117	36	4	291
(6) 193-214 (45-49/wk)	0	0	2	12	31	43	8	96
(7) 215+ (50+/wk)	0	0	0	3	2	7	11	23
Total	178	196	304	2537	242	92	28	3577

**Exhibit E13, continued**

**PERS2**

**Average Monthly Hours: AFC Period**

	(1) <128 (15-29/wk)	(2) 128-149 (30-34/wk)	(3) 150-166 (35-38/wk)	(4) 167-179 (39-41/wk)	(5) 180-192 (42-45/wk)	(6) 193-214 (45-49/wk)	(7) 215+ (50+/wk)	Total
<b>Average Hours: Pre-AFC</b>								
(1) <128 (15-29/wk)	147	20	13	11	2	0	0	193
(2) 128-149 (30-34/wk)	22	48	22	27	3	2	0	124
(3) 150-166 (35-38/wk)	9	36	260	146	8	0	1	460
(4) 167-179 (39-41/wk)	16	53	217	3983	195	20	3	4487
(5) 180-192 (42-45/wk)	0	3	15	295	279	54	5	651
(6) 193-214 (45-49/wk)	0	1	2	26	71	85	17	202
(7) 215+ (50+/wk)	0	0	0	5	10	12	38	65
Total	194	161	529	4493	568	173	64	6182

**SERS2**

**Average Monthly Hours: AFC Period**

	(1) <128 (15-29/wk)	(2) 128-149 (30-34/wk)	(3) 150-166 (35-38/wk)	(4) 167-179 (39-41/wk)	(5) 180-192 (42-45/wk)	(6) 193-214 (45-49/wk)	(7) 215+ (50+/wk)	Total
<b>Average Hours: Pre-AFC</b>								
(1) <128 (15-29/wk)	262	35	5	1	0	0	0	303
(2) 128-149 (30-34/wk)	81	132	33	7	1	0	0	254
(3) 150-166 (35-38/wk)	3	26	108	17	0	0	0	154
(4) 167-179 (39-41/wk)	1	4	18	305	17	1	1	347
(5) 180-192 (42-45/wk)	0	1	2	24	20	4	0	51
(6) 193-214 (45-49/wk)	1	0	0	3	1	1	0	6
(7) 215+ (50+/wk)	0	0	0	0	0	0	0	0
Total	348	198	166	357	39	6	1	1115

**TRS1**

**Average Monthly Hours: AFC Period**

	(1) <128 (15-29/wk)	(2) 128-149 (30-34/wk)	(3) 150-166 (35-38/wk)	(4) 167-179 (39-41/wk)	(5) 180-192 (42-45/wk)	(6) 193-214 (45-49/wk)	(7) 215+ (50+/wk)	Total
<b>Average Hours: Pre-AFC</b>								
(1) <128 (15-29/wk)	42	15	6	0	0	0	1	64
(2) 128-149 (30-34/wk)	40	386	263	9	3	4	2	707
(3) 150-166 (35-38/wk)	21	272	541	93	14	2	5	948
(4) 167-179 (39-41/wk)	0	11	46	113	20	3	5	198
(5) 180-192 (42-45/wk)	0	0	8	13	16	5	3	45
(6) 193-214 (45-49/wk)	0	0	0	3	0	2	0	5
(7) 215+ (50+/wk)	0	0	0	0	0	0	1	1
Total	103	684	864	231	53	16	17	1968

**Exhibit E13, continued**

**TRS2**

**Average Monthly Hours: AFC Period**

	(1) <128 (15-29/wk)	(2) 128-149 (30-34/wk)	(3) 150-166 (35-38/wk)	(4) 167-179 (39-41/wk)	(5) 180-192 (42-45/wk)	(6) 193-214 (45-49/wk)	(7) 215+ (50+/wk)	Total
<b>Average Hours: Pre-AFC</b>								
(1) <128 (15-29/wk)	29	20	1	0	0	0	0	50
(2) 128-149 (30-34/wk)	28	302	20	2	0	1	0	353
(3) 150-166 (35-38/wk)	1	68	54	5	0	0	0	128
(4) 167-179 (39-41/wk)	0	5	5	12	1	1	0	24
(5) 180-192 (42-45/wk)	0	0	1	0	0	0	0	1
(6) 193-214 (45-49/wk)	0	1	0	0	0	0	0	1
(7) 215+ (50+/wk)	0	0	0	1	0	0	0	1
Total	58	396	81	20	1	2	0	558

**LEOFF2 Retiree Detail**

This section provides additional detail for LEOFF2 retirees. Exhibit E14 summarizes variation in hours across OSA categories (law enforcement and firefighter classifications).

**Exhibit E14**

**LEOFF2 Retirees: Average Monthly Hours Before and During AFC Period**

Retirements from January 2009 to June 2011

	N	Avg Hrs Pre-AFC	Avg Hours AFC	Std Dev AFC Avg
All LEOFF2	731	195.4	194.9	26.1
<b>OSA Category</b>				
Law Enforcement Officer 1st Class City	125	184.90	183.46	13.24
Law Enforcement Officer Other City	174	185.50	184.30	13.98
Sheriff or Deputy Sheriff	136	184.28	183.84	17.13
Fire Fighter 1st Class City	102	209.26	208.08	20.95
Fire Fighter Other City	171	213.15	214.38	34.39

Note: AFC period includes the 60 months prior to retirement. Other OSA categories (not reported here due to small n) include fire fighter other (Port Authority), university police officer, port police officer, fish and wildlife enforcement officer.

We typically do not observe increases in overall average hours, as reported to DRS, during the AFC period. Some members, however, do increase hours significantly (Exhibit E15, next page).



**Exhibit E15**  
**LEOFF2 Retirees: Pre-AFC to AFC Gain/Loss in Average Hours**  
Retirements from January 2009 to June 2011

	Gain/Loss in Average Hours Per Month (% of Retirees)				n
	<-2	-2 to <2	2 to <10	10+	
All LEOFF2	36.39	31.46	20.52	11.63	731
<b>OSA Category</b>					
Law Enforcement Officer 1st Class City	40.8	37.6	16.8	4.8	125
Law Enforcement Officer Other City	35.6	36.8	23.6	4.0	174
Sheriff or Deputy Sheriff	33.8	33.1	23.5	9.6	136
Fire Fighter 1st Class City	29.4	32.4	27.5	10.8	102
Fire Fighter Other City	38.6	21.6	15.2	24.6	171

Note: Other OSA categories (not reported here due to small n) include fire fighter other (Port Authority), university police officer, port police officer, fish and wildlife enforcement officer.

### E3. STYLIZED EXAMPLES OF THE IMPACT OF OVERTIME

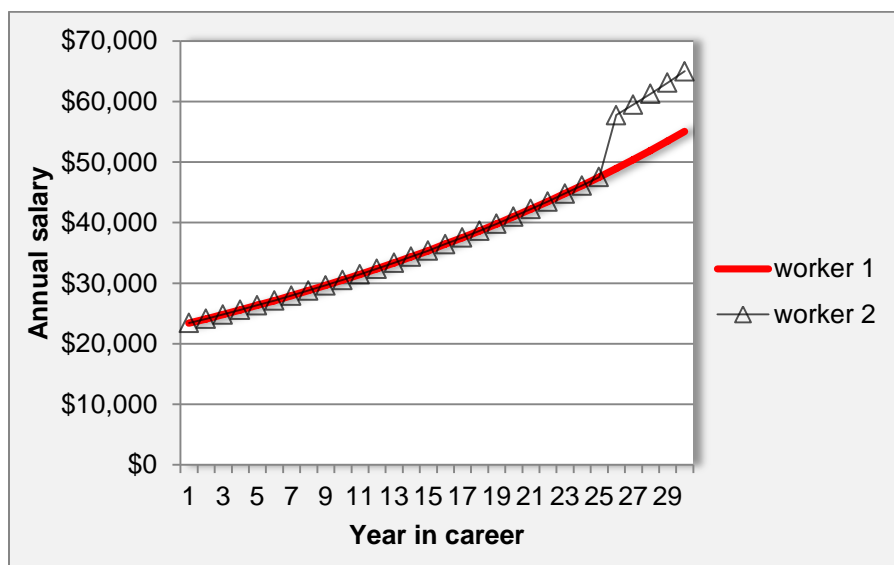
#### Stylized Example (1)

This example illustrates the fiscal implications of increased hours worked during the AFC period and the strong incentives to working more at the end of a career. It also demonstrates that the costs of the resulting extra pension benefits are not fully covered by worker or employer contributions.

**Exhibit E16**  
**Stylized Example Assumptions**

Growth in nominal earnings	3%
Regular hours per year	2080
Worker 1 overtime	0 hours
Worker 2 overtime	0 hours for years 1 - 25, 250 hours per year during last 5 years (roughly 5 hours OT per week)
AFC Period	5 years
Years of service	30
Years of retirement	19 (life expectancy of 84, age of retirement 65)
Pension benefit	$30 \times 0.02 \times \text{AFC}$
Contribution rates	
Member	4.6%
Employer	7.0%
Growth rate for value of contributions	7.9%
Discount rate	
Member perspective	$1\% = 1.04/1.03$
Employer perspective	$4.76\% = 1.079/1.03$
COLA	3%

**Exhibit E17**  
**Illustration of Late-career Salary Increases: Stylized Example (1)**



**Exhibit E18**  
**Summary of Impact of Stylized Example (1)**

	Worker 1	Worker 2
AFC	\$51,967	\$61,337
Annual Pension Benefit	\$31,180	\$36,802
PDV of Pension Benefits	\$537,116	\$633,951
Value of worker contributions at retirement	\$161,721	\$164,234
Value of employer contributions	\$246,098	\$249,921
Total contribution value at retirement	\$407,819	\$414,154
Extra contribution by Worker 2		\$2,512
Extra contribution by Employer 2		\$3,823
Total extra contributions		\$6,335
PDV of extra pension benefit (gain)		\$96,836

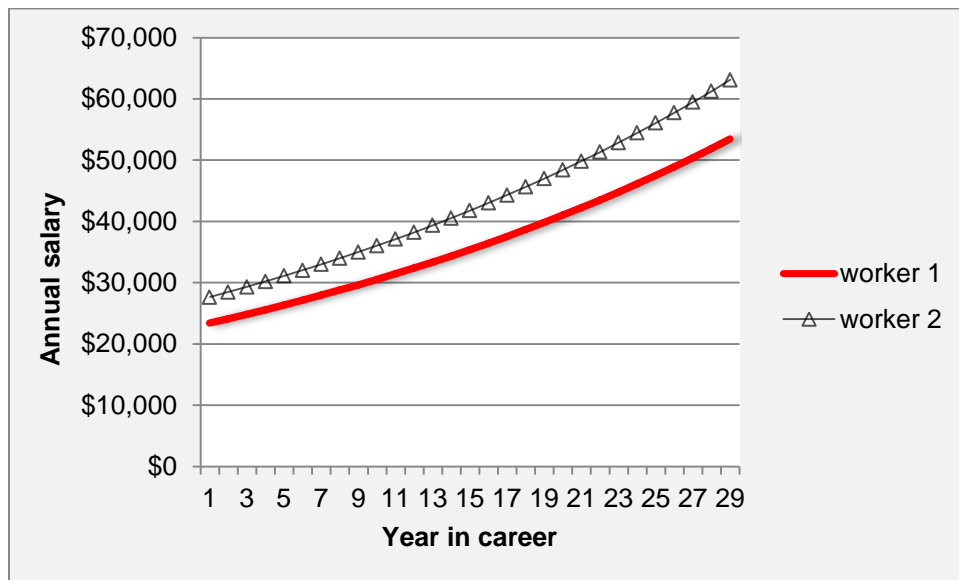
Worker 2 contributes an extra \$2,500 to the system and gets an extra \$97,000 in expected pension benefits. The worker and employer contributions combined cover only a small portion of the gain in benefits.

### Stylized Example (2)

This example demonstrates that a constant level of overtime increases pension benefit, but in this case the cost of the extra benefit is largely borne by worker and employer contributions.

All parameters are the same as in Example (1), except that Worker 2 works 250 overtime hours throughout their career.

**Exhibit E19**  
**Illustration of Career-long Salary Growth: Stylized Example (2)**



**Exhibit E20**  
**Summary of Impact of Stylized Example (2)**

	Worker 1	Worker 2
AFC	\$51,967	\$61,337
Annual Pension Benefit	\$31,180	\$36,802
PDV of Pension Benefits	\$537,116	\$633,951
Value of worker contributions at retirement	\$161,721	\$190,878
Value of employer contributions	\$246,098	\$290,467
Total contribution value at retirement	\$407,819	\$481,345
Extra contribution by Worker 2		\$29,157
Extra contribution by Employer 2		\$44,369
Total extra contributions		\$73,525
PDV of extra pension benefit (gain)		\$96,836

In this case, Worker 2 still receives an additional \$97,000 in NPV of pension benefit. The worker and employer, in this example, pay for much of the cost of the benefit increase.

#### **E4. TEST FOR HOURS INCREASES RELATED TO PENSION RULE INCENTIVES: PERS 1, 2, AND 3**

Among recent retirees in Washington's state pension systems, monthly hours tend to be stable throughout a worker's tenure, although there is a tendency for them to decline closer to retirement. In all of Washington's state-administered public pension systems, average monthly hours are not systematically higher during AFC periods.

As demonstrated earlier, some employees—23%—do work longer hours during AFC periods; three percent work more than 20 additional hours per month, in comparison with the pre-AFC period. Most (77%) work less or the same amount.

We do observe substantial AFC-period hour gains among some workers. But, it is not clear whether these gains are due to increased job responsibilities versus behavior intended to increase pensions. The following regression analysis attempts to gauge the extent to which pension plan rules—the time period included in AFC calculations—affect hours worked.

We exploit the 'natural experiment' that arises from differences in AFC periods across PERS1 (2 years) and PERS2/3 (5 years) plans. PERS1 members have an incentive to increase hours worked during the last 24 months prior to retirement. PERS2 members have an incentive to increase hours during the last 60 months prior to retirement. Importantly, from 60 to 24 months prior to retirement, the incentives operate only on PERS2/3 members. The regression analyses presented below estimate the extent to which hours deviate from trend during the 60 to 24 month period prior to retirement for PERS1 versus PERS2/3 members. We would expect hours gains to be higher during this period for PERS 2/3 members. Higher gains would indicate that members were responding to pension benefit incentives.

Fixed effects models were estimated. These models derive estimates by examining changes in hours over time for individual members. The method effectively controls for observed and unobserved member characteristics that do not change over time. Models with different functional forms were examined.

We first estimated a set of fixed effect regression models for all PERS retirees. We then estimated the same models focusing on employer groups within PERS where there appears to be more opportunity for overtime.

#### **Regressions for All PERS Members**

Observations include PERS1, 2 and 3 members retiring between January 2009 and June 2012.

The dependent variable is monthly hours worked.

Independent variables include:

Time (month 1 to 120)

Time squared

D60p1 (dummy variable = 1 in months 60 to 24 prior to retirement for PERS1 retirees, 0 otherwise)

D60p23 (dummy variable = 1 in months 60 to 24 prior to retirement for PERS2/3 retirees, 0 otherwise)

The difference in the estimated coefficients for D60p23 and D60p1 provide a measure of how hours respond to pension incentives.

Five models with different functional forms are estimated.

Model 1: Includes only the test period dummies (D60pi, D60p23).

Model 2: Adds a simple time trend (Time).

Model 3: Adds a nonlinear time trend (Time and Time squared).

Model 4: Allows the time trend coefficients to differ for PERS1 versus PERS2/3 members.

Model 5: Allows all estimated coefficients to vary for PERS1 versus PERS2/3 members (by estimating separate regressions for the plans).

**Exhibit E21**  
**Regression Models for All PERS Members**

	Model 1		Model 2		Model 3		Model 4	
N	1,084,566		1,084,566		1,084,566		1,084,566	
R-Square	0.528		0.529		0.529		0.530	
Independent Variables								
Parameter	Estimate	t Value	Estimate	t Value	Estimate	t Value	Estimate	t Value
Time			-0.021	-42.680	0.035	16.110	0.047	17.030
TimeSquared					0.000	-26.240	-0.001	-27.460
D60p1	0.615	11.190	1.139	20.250	0.614	10.280	0.629	9.380
D60p23	0.818	19.380	1.360	30.860	0.833	17.210	0.827	16.000
Time*PERS1							-0.031	-6.840
TimeSquared*PERS1							0.000	10.780
Estimated Incentive Effect	0.20		0.22		0.22		0.20	

Model 5 (Separate PERS1 - PERS2/3 regressions)				
<b>N</b>	402,514		682,052	
<b>R-Square</b>	0.535		0.525	
	<b>PERS1 Only</b>		<b>PERS2/3 Only</b>	
<b>Parameter</b>	<b>Estimate</b>	<b>t Value</b>	<b>Estimate</b>	<b>t Value</b>
<b>Time</b>	0.016	4.380	0.047	17.110
<b>Time Squared</b>	0.000	-7.410	-0.001	-27.600
<b>D60p1</b>	0.629	9.300		
<b>D60p23</b>			0.827	16.080
<b>Estimated Incentive Effect</b>	0.20			

### Implications for PERS2/3 Costs

The difference in the estimated coefficients for D60p23 and D60p1 suggest that PERS2/3 retirees, as a whole, increased monthly hours marginally in response to pension incentives—an average increase of 0.21 hours per month.

What does this modest increase in hours imply for PERS 2/3 pension costs? By assuming a wage rate of \$28 per hour, the annual AFC increases by about \$70 and lifetime pension benefits increase by about \$520.

Impact on monthly AFC (@ \$28 per hour)	\$5.88
Impact on annual AFC	\$70.56
Impact on Annual Pension Benefit	\$42.34
NPV of Pension Benefit Stream	\$522

Assumptions: 30 years of service, discount rate of 4.76%,  
19 years of retirement

We would expect the incentive effect to be greater among employers where overtime is more prevalent. We did not, however, find this to be the case; calling into question the robustness of our test.

## Employer Group Analysis

We identified employer groups where there appears to be more opportunity for overtime by examining 3 factors:

- (1) 'Normal' hours
- (2) Average hours per month
- (3) Variation in hours per month

**Normal Hours.** First, we examined the frequency distribution of monthly hours among PERS members. Most members work between 160 and 184 hours per month; 69% of monthly hours fall in this range, which corresponds to 37 - 42 hours per week. We looked for employers where larger shares of employees worked hours outside of the normal range.

**Average Hours.** Second, we examined the average hours per month across employers, looking for those with relatively high average monthly hours.

**Variation in Hours.** Third, we looked for employers with wide variation in hours worked among their employees.

Through these criteria, we identified the following employer groups within PERS where there appears to be greater opportunity for overtime. We estimated the regression models for these groups.

- Non-state agencies
  - Public Utility Districts (PUDs)
  - Ports
- State agencies
  - Department of Corrections
  - Department of Transportation (includes ferries)
  - Department of Agriculture
  - Eastern State Hospital

## Regression for Public Utility Districts and Ports Retirees

The average estimated impact incentive effect is 0.63 hours per month across PUD and Ports workers. Estimates in this case, however, are sensitive to functional form.

**Exhibit E22**  
**Regression Models for PUD and Ports in PERS**

	Model 1		Model 2		Model 3		Model 4	
N	58,011		58,011		58,011		58,011	
R-Square	0.405		0.405		0.406		0.406	
Independent Variables								
Parameter	Estimate	t Value	Estimate	t Value	Estimate	t Value	Estimate	t Value
Time			-0.010	-3.580	0.102	7.980	0.136	8.900
TimeSquared					-0.001	-9.000	-0.001	-9.920
D60p1	1.037	2.850	1.303	3.510	0.240	0.620	0.936	2.100
D60p23	2.061	8.720	2.330	9.400	1.264	4.600	0.971	3.360
Time*PERS1							-0.113	-4.050
TimeSquared*PERS1							0.001	4.340
Estimated Incentive Effect								
	1.02		1.03		1.02		0.04	

Model 5 (separate PERS1 - PERS2/3 regressions)				
<b>N</b>	17,166		40,845	
<b>R-Square</b>	0.341		0.424	
	<b>PERS1 Only</b>		<b>PERS2/3Only</b>	
<b>Parameter</b>	<b>Estimate</b>	<b>t Value</b>	<b>Estimate</b>	<b>t Value</b>
<b>Time</b>	0.022	1.050	0.136	8.560
<b>TimeSquared</b>	-0.0002	-1.400	-0.001	-9.530
<b>D60p1</b>	0.936	2.340		
<b>D60p23</b>			0.971	3.230
<b>Estimated Incentive Effect</b>			0.04	

## Regression for Selected State Agencies: Corrections, Transportation, Agriculture, and Eastern State Hospital

These agencies were selected because their employees appear to have more opportunity to engage in overtime. We expect hour gains to be greater for these retirees. In fact, the regression estimates suggest that PERS2/3 retirees from these agencies had relatively large hour gains during the 60 to 24 months prior to retirement. However, similar gains were also observed for the PERS1 retirees among these employers. The regressions, therefore, did not provide strong evidence of a response to pension incentives.

**Exhibit E23**  
**Regression Models for Selected State Agencies**

	Model 1		Model 2		Model 3		Model 4	
N	108,217		108,217		108,217		108,217	
R-Square	0.401		0.402		0.402		0.403	
Independent Variables								
Parameter	Estimate	t Value	Estimate	t Value	Estimate	t Value	Estimate	t Value
Time			-0.021	-12.980	0.054	7.500	0.073	8.420
TimeSquared					-0.001	-10.690	-0.001	-11.770
D60p1	1.246	6.420	1.771	8.940	1.074	5.150	1.262	5.330
D60p23	1.283	9.560	1.831	13.020	1.129	7.280	1.044	6.370
Time*PERS1							-0.060	-3.880
TimeSquared*PERS1							0.001	5.170
Estimated Incentive Effect	0.04		0.06		0.05		-0.22	

Model 5 (separate PERS1- PERS2/3 regressions)				
<b>N</b>	34,975		73,242	
<b>R-Square</b>	0.338		0.428	
	<b>PERS1 Only</b>		<b>PERS2/3 Only</b>	
<b>Parameter</b>	<b>Estimate</b>	<b>t Value</b>	<b>Estimate</b>	<b>t Value</b>
<b>Time</b>	0.014	1.090	0.073	8.350
<b>TimeSquared</b>	-0.0002	-1.870	-0.001	-11.680
<b>D60p1</b>	1.262	5.420		
<b>D60p23</b>			1.044	6.320
<b>Estimated Incentive Effect</b>			-0.22	

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