



Commission on Government Forecasting and Accountability

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SPECIAL PENSION BRIEFING

STATE RETIREMENT SYSTEMS OVERVIEW

Julie Bae and Jerry Lazzara, Pension Analysts

CGFA staff has reviewed the State-funded retirement systems' FY 2016 actuarial reports, which were issued prior to November 1st, pursuant to P.A. 97-0694, the State Actuary Law. Under the State Actuary Law, the systems must annually submit a proposed certification for the following fiscal year prior to November 1st of the current calendar year. The State Actuary then must issue a preliminary report concerning the systems' proposed certification by January 1st. The State Actuary's report must identify any recommended changes in actuarial assumptions based upon the review of the retirement systems' actuarial assumptions.

Using the actuarial (smoothed) value of assets, the total unfunded liabilities of the State systems totaled \$126.5 billion on June 30, 2016, led by the Teachers' Retirement System (TRS), whose unfunded liabilities amounted to \$71.4 billion. As the largest of the State systems, TRS accounts for approximately 56% of the total assets and liabilities of the five State systems combined. The State Employees' Retirement System (SERS), the second largest system, has unfunded liabilities of \$29.9 billion, approximately 23.6% of the total unfunded liabilities of the five systems, followed by the State Universities Retirement System (SURS) with unfunded liabilities of \$23.2 billion, which represents 18.4% of the total unfunded liabilities. Table 1, on the following page, provides a summary of the financial condition of each of the five State retirement systems, showing their respective liabilities and assets as well as their accumulated unfunded liabilities and funded ratios.

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SPECIAL PENSION BRIEFING:
State Retirement Systems Overview

TABLE 1

Summary of Financial Condition FY 2016				
State Retirement Systems Combined				
Assets at Actuarial Value / With Asset Smoothing (P.A. 96-0043)				
(\$ in Millions)				
System	Accrued <u>Liability</u>	Actuarial <u>Assets</u>	Unfunded <u>Liability</u>	Funded <u>Ratio</u>
TRS	\$118,629.9	\$47,222.1	\$71,407.8	39.8%
SERS	\$45,515.4	\$15,632.6	\$29,882.8	34.3%
SURS	\$40,923.3	\$17,698.3	\$23,225.0	43.2%
JRS	\$2,546.4	\$870.9	\$1,675.6	34.2%
GARS	\$363.3	\$50.8	\$312.5	14.0%
TOTAL	\$207,978.3	\$81,474.7	\$126,503.6	39.2%

A more realistic valuation of the true financial position of the State retirement systems would be based upon the market value of the assets, as shown in Table 2 below. Based upon the market value of assets, the combined unfunded liabilities of the State systems totaled \$129.8 billion on June 30, 2016. TRS, whose unfunded liabilities amounted to \$73.4 billion, again represents approximately 57% of the combined total unfunded balance. Table 2 provides a summary of the financial condition of each of the five State retirement systems, showing their respective liabilities and assets as well as their accumulated unfunded liabilities and funded ratios.

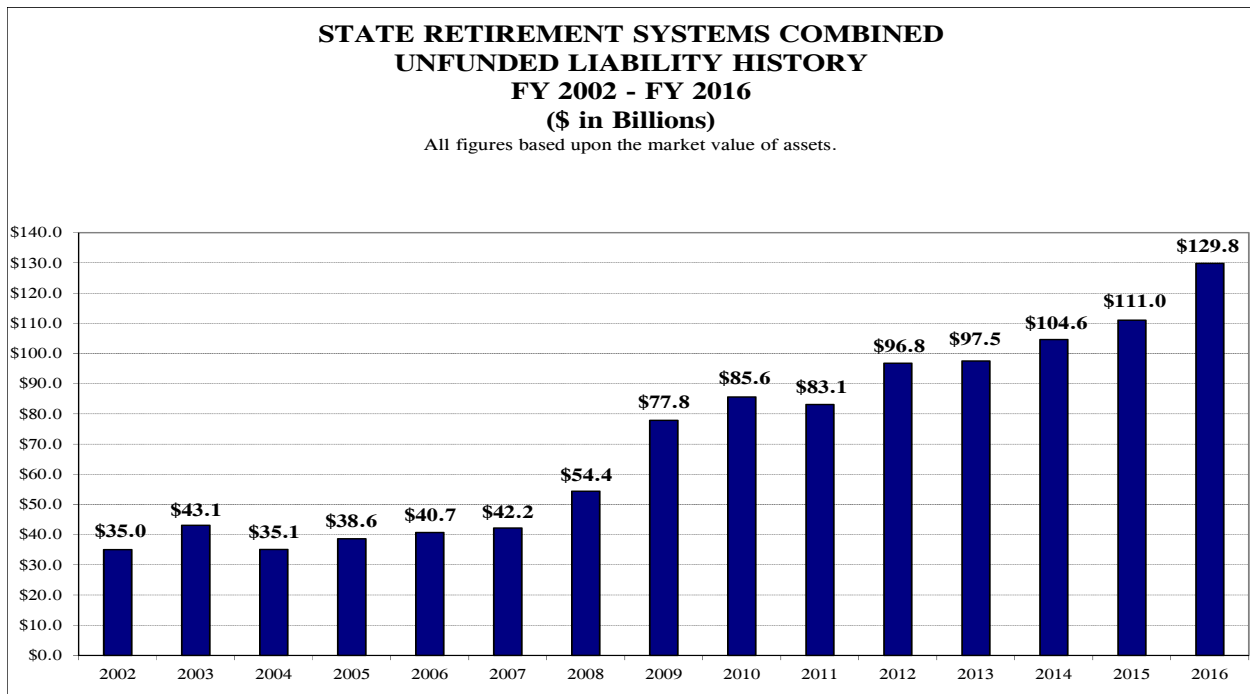
TABLE 2

Summary of Financial Condition FY 2016				
State Retirement Systems Combined				
Assets at Market Value / Without Asset Smoothing (P.A. 96-0043)				
(\$ in Millions)				
System	Accrued <u>Liability</u>	Market <u>Assets</u>	Unfunded <u>Liability</u>	Funded <u>Ratio</u>
TRS	\$118,629.9	\$45,251.0	\$73,378.9	38.1%
SERS	\$45,515.4	\$15,038.5	\$30,476.8	33.0%
SURS	\$40,923.3	\$16,981.5	\$23,941.8	41.5%
JRS	\$2,546.4	\$840.3	\$1,706.2	33.0%
GARS	\$363.3	\$49.1	\$314.3	13.5%
TOTAL	\$207,978.3	\$78,160.3	\$129,818.0	37.6%

The funded ratios based on the market value of assets for each of the five State retirement systems may be compared to the aggregate funded ratio of 37.6% for the five systems combined. Although the General Assembly Retirement System (GARS) has the poorest funded ratios, followed by the Judges' Retirement System (JRS) and SERS, GARS and JRS systems are much smaller and their respective unfunded liabilities are thus more manageable than the three larger systems. Chart 1 below shows a 15-year history of the cumulative unfunded State pension liability and is based upon calculations performed by the retirement systems' actuaries using the market value of assets for all years, including FY 2016. The historic investment losses sustained by the systems in FY 2009 were the main reason for the significant jump in unfunded liabilities over FY 2008.

Asset smoothing was implemented as of the FY 2009 actuarial valuation reports of the state systems with the adoption of P.A. 96-0043. It is a technique that averages the annual fluctuation in investment performance over a period of 5 years. FY 2013 was the last fiscal year that investment losses from the 2008 financial crisis were "smoothed" in the retirement systems' annual actuarial valuations. The actuarial value of assets in FY 2016, overall, reflects the cumulative effects of smoothing past gains despite the fact that FY 2016 experienced an investment loss, along with poor investment experience in FY 2012 and FY 2015. With the investment losses of FY 2012, FY 2015, and FY 2016 now subject to smoothing, this has resulted in a cumulative actuarial (smoothed) value of assets that is now higher than the market value of assets, and therefore the funded ratio using the actuarial (smoothed) value of assets is higher than the funded ratio using the market value of assets.

CHART 1



SURS, SERS, JRS, and GARS scaled back their respective investment return assumptions in FY 2010, and this change, along with actuarially insufficient contributions by the State, served to drive up the combined FY 2010 unfunded liability to \$85.6 billion. The systems

experienced exceptionally strong investment returns in FY 2011, which caused the unfunded liability to drop slightly to \$83.1 billion. Three factors accounted for the significant spike in unfunded liabilities in FY 2012 – investment returns that fell far short of actuarial assumptions, TRS’ assumed interest rate reduction from 8.5% to 8.0%, and actuarially insufficient contributions by the State. Strong investment returns in FY 2013 accounted for the relatively small growth in unfunded liability from FY 2012 to FY 2013 despite State contributions which continued to be actuarially insufficient.

In FY 2014, TRS voted to reduce its assumed investment rate of return from 8.0% to 7.5%, and SERS and SURS both reduced their respective rates of return from 7.75% to 7.25%. Although investment performance far exceeded actuarial expectations in FY 2014, the rate of return assumption changes helped contribute heavily to an increase in total accrued liability, and hence, the significant increase in unfunded liability of \$7.1 billion, in FY 2014.

TRS adopted several actuarial recommendations in FY 2015 based on the three-year experience study including updating mortality rates and lowering the average salary increase assumption. Although lowering the average salary increase assumption significantly reduced unfunded liability, changes in the actuarial assumptions increased unfunded liability by \$586.5 million. SURS updated mortality rates as well, which is one of the main factors that caused an increase in the system’s FY 2015 unfunded liability of \$973 million. All five systems’ assumed rates of investment return remained unchanged in FY 2015. Overall, the total unfunded liability increased by \$6.4 billion in FY 2015.

All the systems but SURS lowered their respective assumed investment rate assumptions in FY 2016, among several other actuarial changes. The actuarial assumption changes led to a significant increase in the combined actuarial accrued liability by \$9.67 billion, accounting for 71% of the \$13.61 billion increase over the combined FY 2015 accrued liability. TRS and SERS reduced their assumed rates of return to 7.0% from 7.5% and 7.25% respectively, and JRS and GARS both reduced their assumed rate of return to 6.75% from 7.0%. Table 3 on the following page shows the historical change in the investment return assumptions for each system. In addition to the significant assumption changes, the systems all experienced poor investment returns in FY 2016, well below 1.0% returns.

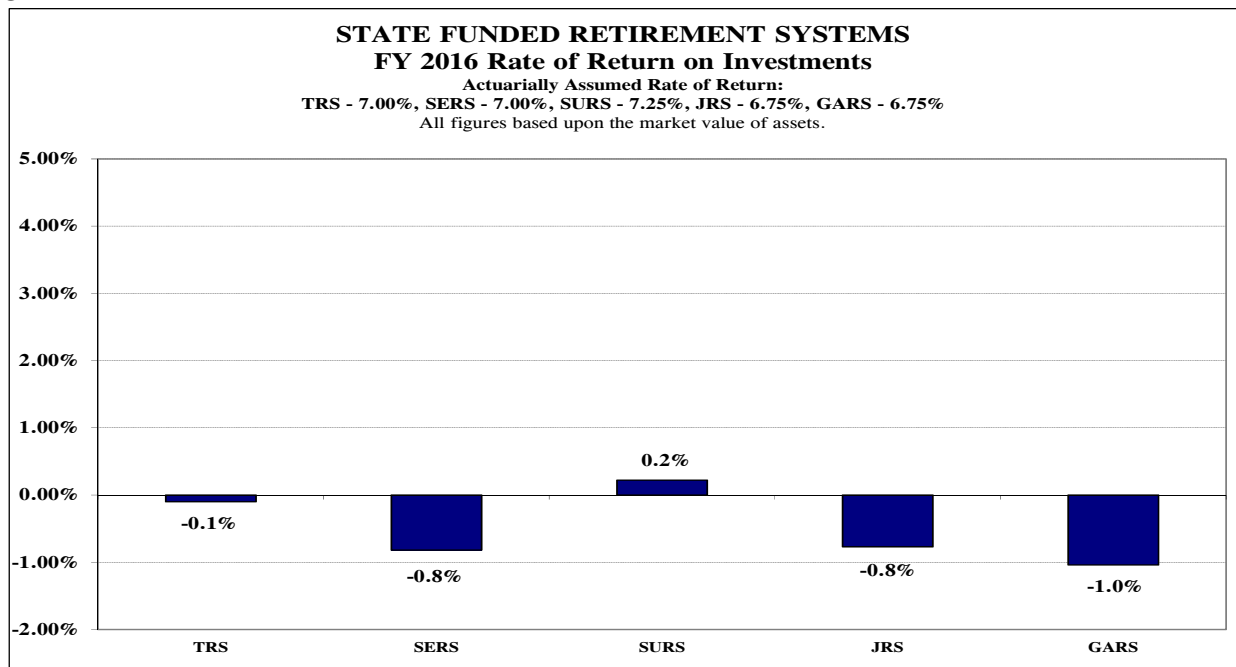
TABLE 3

Historical Change in Investment Rate Assumptions					
System	Prior to FY 10	FY 10	FY 12	FY 14	FY 16
TRS	8.50%	8.50%	8.00%	7.50%	7.00%
SERS	8.50%	7.75%	7.75%	7.25%	7.00%
SURS	8.50%	7.75%	7.75%	7.25%	7.25%
JRS	8.00%	7.00%	7.00%	7.00%	6.75%
GARS	8.00%	7.00%	7.00%	7.00%	6.75%

NOTE: The years associated with investment rate assumption changes above reflect the actuarial valuation year, not the fiscal year in which the State contribution was calculated using the new rate.

Chart 2 below shows market investment return rates experienced by each of the systems in FY 2016. All systems had significantly lower market investment return rates than their actuarially assumed rates of return. Even with smoothing the past two years of investment gains in FY 2013 and FY 2014, all systems experienced actuarial investment losses under the asset smoothing method because systems' recognized investment returns in FY 2016 were lower than the systems' respective assumed rate of return.

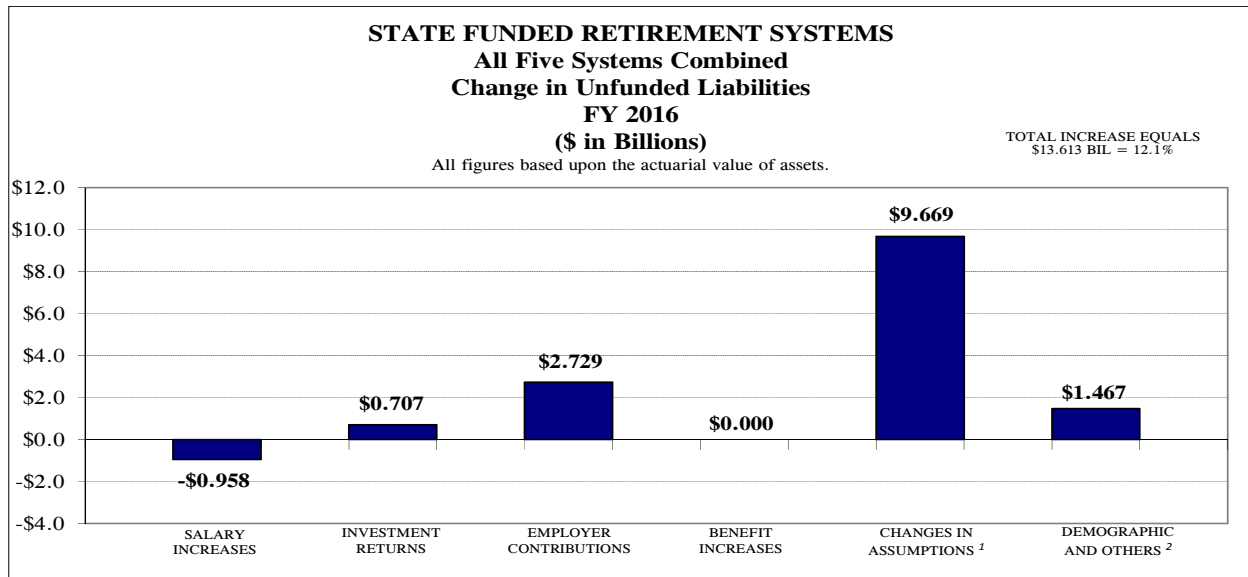
CHART 2



Charts 3 and 4 on the following page show the factors that have caused the unfunded liability to change over a given period of time. Chart 3 outlines the growth in the unfunded liability for FY 2016 only, whereas Chart 4 shows the growth in unfunded liability since the enactment of

P.A. 88-0593 in FY 1996, which created the 50-year funding policy that governs annual State contributions to the five State systems.

CHART 3



¹ Reflects several actuarial assumptions changes such as assumed rate of return, enacted by TRS, SERS, JRS, and GARS.

² The combined actuarial accrued liability increased by approximately \$1 billion due to TRS. Of \$1 billion, \$0.737 billion was incurred primarily due to a change in TRS software/actuary, which, according to TRS, falls into a reasonable range for a system the size of TRS.

CHART 4

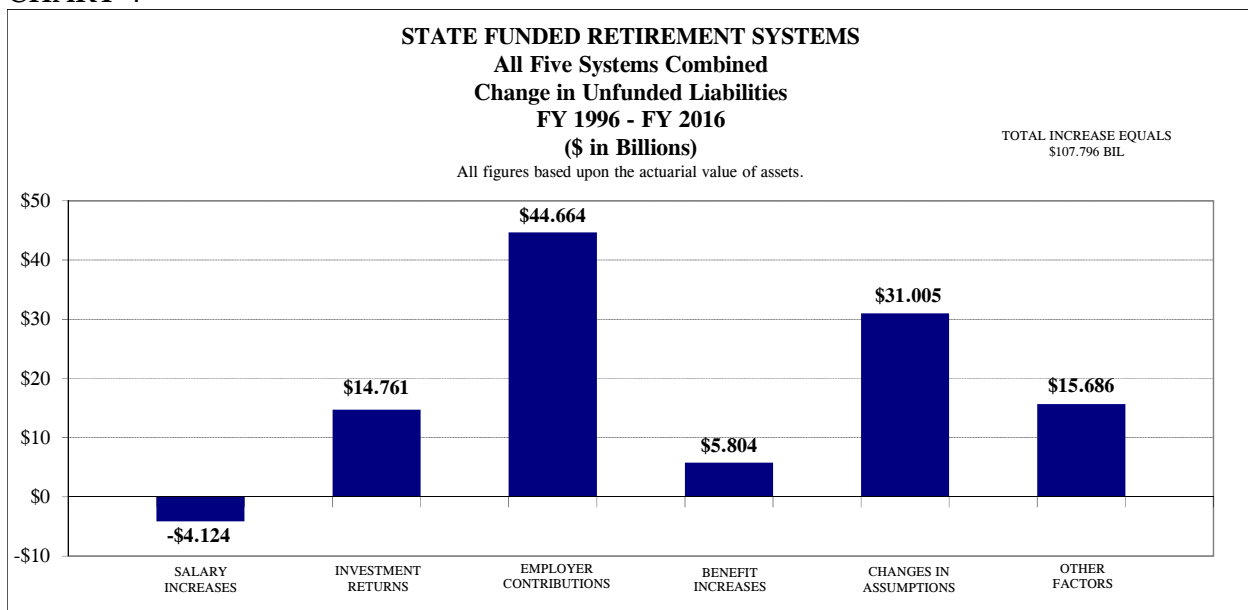
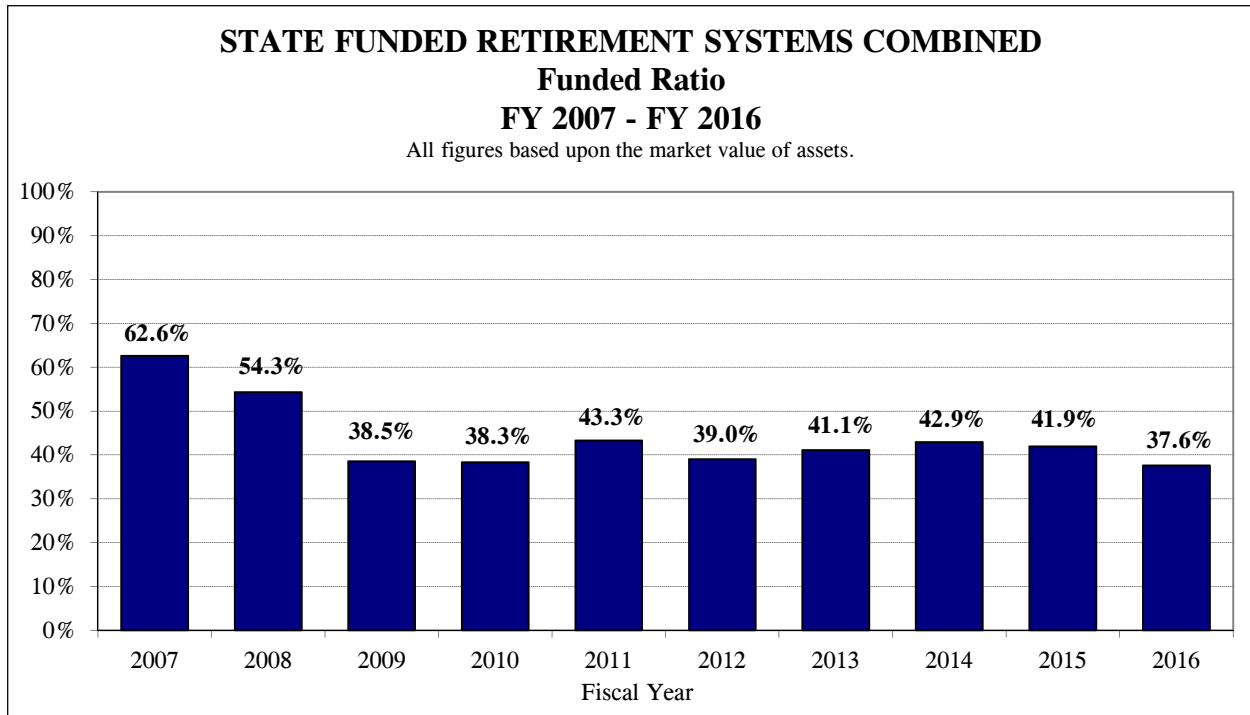


CHART 5



As the actuaries for the State retirement systems have noted in the respective annual actuarial valuation reports, the funding plan under P.A. 88-0593 produces employer (State) contributions that are actuarially insufficient, meaning if all other actuarial assumptions are met, unfunded liabilities will increase due to the State contributing an amount that is not sufficient to stop the growth in the unfunded liability. Hence, there is a distinction between contributions that are statutorily sufficient and contributions that are considered actuarially sufficient (the annual reports of the State Actuary have noted this distinction as well).

The funded ratio at any single point in time is less important than the trend over time. In FY 2004, the State sold \$10 billion in pension obligation bonds and used part of the proceeds to pay all of the contributions for FY 2004. The bond sale generated \$7.3 billion to reduce unfunded liabilities of the state-funded retirement systems. In the wake of the bond sale, the funded ratio remained relatively stable from FY 2004 through FY 2007. In FY 2008 and FY 2009, the funded ratio fell significantly due to much lower than expected investment revenues and actuarially insufficient employer contributions. The funded ratio remained relatively stable in FY 2010 due in large part to higher-than-expected investment returns. FY 2011 also saw exceptionally strong investment returns, which caused the funding ratio to increase.

However, these gains were largely erased by poor investment returns in FY 2012. As previously mentioned, actuarially insufficient State contributions and TRS' change in investment return assumption from 8.5% to 8.0% played a significant role in lowering the FY 2012 cumulative funded ratio of the five State systems to 39%. Higher-than-expected investment returns were the largest driver of the slight uptick in the funding ratio from FY 2012 to FY 2013. Despite the change in investment return assumptions, favorable

investment returns by the systems and lower salary increases than assumed led to an increase in the funded ratio from 41.1% to 42.9% in FY 2014.

In FY 2015, losses resulting from actuarially insufficient employer contributions and changes in assumptions such as mortality rates exceeded gains resulting from the actuarial investment income and lower-than-expected salary increases. Therefore, the FY 2015 funded ratio decreased to 41.9% from 42.9%. The FY 2016 combined funded ratio dropped to 37.6% due to the recent actuarial assumptions changes by TRS, SERS, JRS, and GARS including lowering their respective investment rates of return as well as lower-than-projected investment returns and actuarially insufficient employer contributions to cover the employer portion of normal cost and interest incurred on the unfunded liability.

Table 4 below shows FY 2017 State contributions and FY 2018 projected State contributions to the five systems. FY 2018 projected State contributions were certified by the boards of trustees of the five systems and based on the FY 2016 preliminary actuarial valuation reports reflecting the aforementioned actuarial assumptions changes adopted by TRS, SERS, JRS, and GARS.

TABLE 4

FY 2017 Pension Appropriation by Fund			
(\$ in Millions)			
Appropriations made via P.A. 99-0524 (stopgap budget) and via continuing appropriation authority pursuant to P.A. 88-0593.			
System	GRF	Other State Funds	Total
TRS	3,986.6	\$0.0	\$3,986.6
SURS	1,481.4	\$190.0	\$1,671.4
SERS	1,363.3	\$734.1	\$2,097.4
GARS	21.7	\$0.0	\$21.7
JRS	131.3	\$0.0	\$131.3
Total	\$6,984.4	\$924.1	\$7,908.5
<i>*SERS total FY 2017 appropriation includes a total of \$82.97 million in 2003 Pension Obligation Bonds debt service. Of this amount, according to SERS, \$53.93 million comes from GRF and \$29.04 million comes from OSF.</i>			
FY 2018 Estimated Pension Appropriation by Fund			
(\$ in Millions)			
System	GRF	Other State Funds	Total*
TRS	\$4,565.0	\$0.0	\$4,565.0
SURS	\$1,563.7	\$190.0	\$1,753.7
SERS	\$1,568.7	\$844.7	\$2,413.3
GARS	\$26.7	\$0.0	\$26.7
JRS	\$146.8	\$0.0	\$146.8
Total	\$7,870.8	\$1,034.7	\$8,905.4
<i>* The amounts shown above in the "Total" column reflect the State systems' preliminary FY 2018 certification pursuant to P.A. 97-0694, the State Actuary Law. This chart is meant to be an estimate only insofar as the FY 2018 appropriation by fund is concerned. SERS' FY 2018 estimated appropriation includes a total of \$85.70 million in 2003 POB debt service. Of this amount, according to SERS, \$55.70 million comes from GRF and \$29.99 million comes from OSF. The SERS "Other State Funds" amount is based upon an assumption that 65% of SERS' FY 2018 appropriation will come from GRF, while 35% will come from Other State Funds. The SURS "Other State Funds" amount assumes that SURS will receive an FY 2018 appropriation from the State Pension Fund in the same amount that SURS is expected to receive from the State Pension Fund in FY 2017. SURS' historical appropriation from the State Pension Fund varies from year to year.</i>			
Total FY 2017 Pension Appropriation: \$ 7,908.4 Million			
Total FY 2018 Pension Appropriation: \$ 8,905.4 Million			
Total Increase, FY 18 over FY 17: \$ 997.0 Million			
Total GRF Increase, FY 18 over FY 17: \$ 886.4 Million			

The following pages include pension funding projections for the five State retirement systems based on the respective retirement systems' FY 2016 actuarial valuations. These projections were generated by the retirement systems' respective actuaries.

FUNDING PROJECTIONS FOR THE STATE RETIREMENT SYSTEMS All Five Systems Combined Projections Based on the Retirement System's FY 2016 Actuarial Valuation (\$ in Millions)								
Fiscal Year	Annual Payroll	Total State Contribution	State Contribution as a % of Payroll	Total Employee Contribution	Accrued Liabilities	Actuarial Value of Assets	Unfunded Liabilities	Funded Ratio
2017	19,928.0	7,959.3	39.9%	1,588.0	214,853.0	83,621.9	131,231.1	38.9%
2018	19,668.1	8,905.4	45.3%	1,481.3	221,685.4	87,743.6	133,941.8	39.6%
2019	20,166.0	9,188.5	45.6%	1,515.2	228,454.1	90,887.3	137,566.8	39.8%
2020	20,684.2	9,447.6	45.7%	1,550.6	235,141.1	94,572.3	140,568.9	40.2%
2021	21,219.1	9,784.2	46.1%	1,588.5	241,721.6	99,345.0	142,376.6	41.1%
2022	21,755.8	10,084.3	46.4%	1,625.1	248,182.9	104,226.1	143,956.8	42.0%
2023	22,309.2	10,329.1	46.3%	1,662.9	254,503.8	109,153.9	145,349.9	42.9%
2024	22,884.7	10,567.0	46.2%	1,703.2	260,666.8	114,118.9	146,547.9	43.8%
2025	23,475.6	10,816.6	46.1%	1,743.6	266,644.7	119,124.3	147,520.4	44.7%
2026	24,088.8	11,098.5	46.1%	1,786.4	272,415.9	124,201.8	148,214.1	45.6%
2027	24,725.9	11,395.3	46.1%	1,830.3	277,964.0	129,373.4	148,590.6	46.5%
2028	25,376.2	11,681.0	46.0%	1,874.8	283,273.0	134,633.5	148,639.5	47.5%
2029	26,060.0	11,985.9	46.0%	1,922.2	288,328.1	140,011.7	148,316.4	48.6%
2030	26,770.3	12,288.9	45.9%	1,971.2	293,111.1	145,512.2	147,598.8	49.6%
2031	27,505.5	12,608.3	45.8%	2,022.4	297,596.9	151,160.6	146,436.2	50.8%
2032	28,263.8	12,961.8	45.9%	2,076.3	301,827.0	158,568.9	144,759.1	52.5%
2033	29,044.0	13,348.5	46.0%	2,130.6	305,734.8	164,821.0	142,493.8	53.9%
2034	29,851.1	14,471.5	48.5%	2,187.2	309,317.8	172,166.4	138,826.5	55.7%
2035	30,687.8	14,880.0	48.5%	2,245.3	312,559.7	179,933.4	134,408.2	57.6%
2036	31,549.7	15,300.3	48.5%	2,305.9	315,462.4	188,192.7	129,179.7	59.7%
2037	32,441.4	15,735.3	48.5%	2,368.4	318,041.0	197,034.2	123,066.8	62.0%
2038	33,355.3	16,181.0	48.5%	2,432.2	320,270.5	206,508.6	115,994.9	64.5%
2039	34,285.0	16,635.7	48.5%	2,497.9	322,170.2	216,711.9	107,888.3	67.3%
2040	35,242.4	17,102.3	48.5%	2,565.3	323,751.7	227,742.2	98,659.5	70.3%
2041	36,203.0	17,570.1	48.5%	2,633.0	325,055.9	239,717.6	88,238.3	73.7%
2042	37,180.1	18,045.5	48.5%	2,702.4	326,128.3	252,769.2	76,536.1	77.5%
2043	38,175.3	18,530.9	48.5%	2,771.7	327,037.1	267,051.2	63,467.9	81.7%
2044	39,192.0	19,025.5	48.5%	2,843.1	327,865.7	282,743.0	48,939.8	86.2%
2045	40,207.1	19,519.8	48.5%	2,913.0	328,677.7	295,811.0	32,866.7	90.0%

FUNDING PROJECTIONS FOR THE TEACHERS RETIREMENT SYSTEM
Projections Based on the Retirement System's FY 2016 Actuarial Valuation
Actuarially Assumed Rate of Return: 7.00%
(\$ in Millions)

Fiscal Year	Annual Payroll	Total State Contribution*	State Contribution as a % of Payroll	Total Employee Contribution	Accrued Liabilities	Actuarial Value of Assets	Unfunded Liabilities	Funded Ratio
2017	10,541.2	3,986.6	37.8%	1,034.3	122,501.5	49,289.3	73,212.3	40.2%
2018	10,441.3	4,565.0	43.7%	939.7	126,377.2	51,401.7	74,975.5	40.7%
2019	10,740.0	4,700.5	43.8%	966.6	130,252.7	52,851.2	77,401.6	40.6%
2020	11,047.5	4,847.7	43.9%	994.3	134,124.4	54,700.5	79,423.9	40.8%
2021	11,363.1	5,043.3	44.4%	1,022.7	137,981.7	57,370.9	80,610.9	41.6%
2022	11,673.7	5,217.2	44.7%	1,050.6	141,825.9	60,152.0	81,673.9	42.4%
2023	11,993.0	5,352.2	44.6%	1,079.4	145,651.2	63,007.9	82,643.3	43.3%
2024	12,323.1	5,479.2	44.5%	1,109.1	149,452.0	65,932.9	83,519.1	44.1%
2025	12,663.3	5,613.8	44.3%	1,139.7	153,217.2	68,933.3	84,283.8	45.0%
2026	13,014.0	5,770.1	44.3%	1,171.3	156,929.9	72,027.1	84,902.7	45.9%
2027	13,376.1	5,933.4	44.4%	1,203.8	160,570.7	75,218.1	85,352.6	46.8%
2028	13,741.8	6,085.4	44.3%	1,236.8	164,126.1	78,495.2	85,630.9	47.8%
2029	14,123.1	6,247.3	44.2%	1,271.1	167,580.3	81,868.0	85,712.3	48.9%
2030	14,519.4	6,404.1	44.1%	1,306.7	170,915.9	85,331.1	85,584.9	49.9%
2031	14,928.9	6,570.2	44.0%	1,343.6	174,112.8	88,892.1	85,220.6	51.1%
2032	15,351.3	6,760.3	44.0%	1,381.7	177,154.0	92,579.5	84,574.5	52.3%
2033	15,785.6	6,972.5	44.2%	1,420.7	180,018.4	96,417.6	83,600.8	53.6%
2034	16,229.9	7,879.2	48.5%	1,460.7	182,693.0	101,152.0	81,541.0	55.4%
2035	16,689.2	8,102.2	48.5%	1,502.0	185,160.4	106,121.1	79,039.2	57.3%
2036	17,163.2	8,332.3	48.5%	1,544.7	187,417.9	111,359.4	76,058.5	59.4%
2037	17,656.4	8,571.8	48.5%	1,589.1	189,473.0	116,919.1	72,554.0	61.7%
2038	18,160.9	8,816.7	48.5%	1,634.5	191,288.5	122,809.9	68,478.6	64.2%
2039	18,671.3	9,064.4	48.5%	1,680.4	192,866.1	129,080.6	63,785.5	66.9%
2040	19,197.3	9,319.8	48.5%	1,727.8	194,198.9	135,780.0	58,418.9	69.9%
2041	19,720.5	9,573.8	48.5%	1,774.8	195,302.8	142,968.8	52,334.0	73.2%
2042	20,246.5	9,829.2	48.5%	1,822.2	196,197.7	150,715.8	45,481.9	76.8%
2043	20,779.7	10,088.0	48.5%	1,870.2	196,928.0	159,116.8	37,811.2	80.8%
2044	21,323.8	10,352.2	48.5%	1,919.1	197,557.3	168,288.2	29,269.1	85.2%
2045	21,860.9	10,612.9	48.5%	1,967.5	198,129.6	178,316.6	19,813.0	90.0%

* Pursuant to TRS' preliminary FY 2018 certification letter dated October 28, 2016, the FY 2018 required State Contribution includes \$0.7 million for minimum retirement benefits.

FUNDING PROJECTIONS FOR THE STATE EMPLOYEES' RETIREMENT SYSTEM
Projections Based on the Retirement System's FY 2016 Actuarial Valuation
Actuarially Assumed Rate of Return: 7.00%
(\$ in Millions)

Fiscal Year	Annual Payroll	Total State Contribution*	State Contribution as a % of Payroll	Total Employee Contribution	Accrued Liabilities	Actuarial Value of Assets	Unfunded Liabilities	Funded Ratio
2017	4,706	2,127	45.2%	255	47,269	15,221	32,048.0	32.2%
2018	4,468	2,413	54.0%	241	49,010	16,533	32,477.0	33.7%
2019	4,567	2,498	54.7%	245	50,733	17,856	32,877.0	35.2%
2020	4,666	2,552	54.7%	249	52,430	19,184	33,246.0	36.6%
2021	4,769	2,609	54.7%	254	54,091	20,513	33,578.0	37.9%
2022	4,872	2,665	54.7%	258	55,705	21,840	33,865.0	39.2%
2023	4,978	2,723	54.7%	262	57,262	23,160	34,102.0	40.4%
2024	5,088	2,783	54.7%	267	58,752	24,470	34,282.0	41.6%
2025	5,200	2,845	54.7%	271	60,166	25,769	34,397.0	42.8%
2026	5,320	2,910	54.7%	276	61,500	27,061	34,439.0	44.0%
2027	5,446	2,979	54.7%	281	62,756	28,356	34,400.0	45.2%
2028	5,577	3,051	54.7%	286	63,930	29,657	34,273.0	46.4%
2029	5,719	3,128	54.7%	292	65,025	30,977	34,048.0	47.6%
2030	5,868	3,210	54.7%	298	66,044	32,326	33,718.0	48.9%
2031	6,025	3,296	54.7%	305	66,984	33,715	33,269.0	50.3%
2032	6,187	3,384	54.7%	313	67,845	35,153	32,692.0	51.8%
2033	6,354	3,475	54.7%	320	68,628	36,654	31,974.0	53.4%
2034	6,529	3,571	54.7%	328	69,339	38,234	31,105.0	55.1%
2035	6,711	3,671	54.7%	336	69,976	39,909	30,067.0	57.0%
2036	6,898	3,773	54.7%	345	70,541	41,691	28,850.0	59.1%
2037	7,090	3,878	54.7%	354	71,039	43,601	27,438.0	61.4%
2038	7,288	3,986	54.7%	363	71,478	45,661	25,817.0	63.9%
2039	7,489	4,097	54.7%	373	71,867	47,894	23,973.0	66.6%
2040	7,693	4,208	54.7%	383	72,215	50,324	21,891.0	69.7%
2041	7,898	4,320	54.7%	393	72,534	52,974	19,560.0	73.0%
2042	8,105	4,433	54.7%	404	72,833	55,874	16,959.0	76.7%
2043	8,314	4,548	54.7%	414	73,125	59,051	14,074.0	80.8%
2044	8,525	4,663	54.7%	425	73,418	62,533	10,885.0	85.2%
2045	8,736	4,779	54.7%	435	73,721	66,350	7,371.0	90.0%

*Pursuant to P.A. 93-0589, the FY 2018 State Contribution includes \$85.7 million for debt service for the 2003 Pension Obligation Bonds authorized by P.A. 93-0002. State contribution amounts shown for FY 2019 - 2045 do not include projected debt service as these amounts are not known until the annual SERS preliminary certification letters are issued pursuant to P.A. 97-0694 (State Actuary Law).

FUNDING PROJECTIONS FOR THE STATE UNIVERSITIES RETIREMENT SYSTEM
Projections Based on the Retirement System's FY 2016 Actuarial Valuation
Actuarially Assumed Rate of Return: 7.25%
(\$ in Millions)

Fiscal Year	Annual Payroll*	Total State Contribution**	State Contribution as a % of Payroll	Total Employee Contribution	Accrued Liabilities	Actuarial Value of Assets	Unfunded Liabilities	Funded Ratio
2017	4,504.8	1,672.4	37.1%	283.5	42,088.1	18,416.1	23,672.0	43.8%
2018	4,587.7	1,753.7	38.2%	285.5	43,224.2	19,033.3	24,190.8	44.0%
2019	4,688.0	1,796.7	38.3%	288.6	44,319.7	19,328.8	24,990.9	43.6%
2020	4,799.4	1,854.6	38.6%	292.4	45,369.6	19,764.6	25,604.9	43.6%
2021	4,915.8	1,938.9	39.4%	296.8	46,370.3	20,470.9	25,899.4	44.1%
2022	5,038.6	2,009.2	39.9%	301.5	47,318.1	21,181.1	26,136.9	44.8%
2023	5,166.0	2,060.5	39.9%	306.5	48,208.4	21,874.4	26,334.0	45.4%
2024	5,300.7	2,110.7	39.8%	311.9	49,039.4	22,549.9	26,489.6	46.0%
2025	5,438.5	2,163.0	39.8%	317.6	49,804.5	23,205.5	26,598.9	46.6%
2026	5,579.9	2,222.5	39.8%	323.5	50,502.4	23,850.4	26,652.1	47.2%
2027	5,727.5	2,285.3	39.9%	329.7	51,134.7	24,492.2	26,642.5	47.9%
2028	5,879.5	2,345.5	39.9%	336.3	51,702.5	25,133.7	26,568.9	48.6%
2029	6,038.0	2,409.5	39.9%	343.1	52,203.7	25,780.6	26,423.1	49.4%
2030	6,200.9	2,471.3	39.9%	350.0	52,634.0	26,431.6	26,202.4	50.2%
2031	6,367.1	2,535.7	39.8%	357.1	52,990.9	27,092.4	25,898.5	51.1%
2032	6,538.2	2,608.1	39.9%	364.3	53,333.0	27,836.0	25,497.0	52.2%
2033	6,714.1	2,688.3	40.0%	371.9	53,613.0	28,629.5	24,983.5	53.4%
2034	6,898.6	2,804.8	40.7%	379.7	53,835.0	29,521.6	24,313.4	54.8%
2035	7,090.4	2,886.4	40.7%	387.7	54,001.2	30,488.8	23,512.3	56.5%
2036	7,287.3	2,970.2	40.8%	395.9	54,113.7	31,544.9	22,568.8	58.3%
2037	7,489.7	3,056.1	40.8%	404.3	54,174.6	32,704.1	21,470.5	60.4%
2038	7,696.7	3,144.1	40.8%	413.0	54,187.7	33,983.1	20,204.7	62.7%
2039	7,910.4	3,234.9	40.9%	422.0	54,160.7	35,403.2	18,757.5	65.4%
2040	8,132.6	3,329.2	40.9%	431.3	54,102.4	36,988.6	17,113.8	68.4%
2041	8,359.9	3,425.4	41.0%	441.2	54,024.8	38,765.3	15,259.5	71.8%
2042	8,598.5	3,526.6	41.0%	451.5	53,944.5	40,766.8	13,177.7	75.6%
2043	8,845.7	3,631.5	41.1%	462.0	53,871.0	43,020.9	10,850.2	79.9%
2044	9,101.3	3,740.1	41.1%	472.7	53,815.5	45,558.2	8,257.3	84.7%
2045	9,362.2	3,851.0	41.1%	483.5	53,788.2	48,409.4	5,378.8	90.0%

* Payroll projections include SMP payroll - 30% of new SURS members are assumed to enter SMP

** State Contribution Only - Includes Self-Managed Plan (SMP) Contributions - Excludes Estimated \$46.7 Million in Federal Funds in All Years Shown

FUNDING PROJECTIONS FOR THE JUDGES' RETIREMENT SYSTEM
Projections Based on the Retirement System's FY 2016 Actuarial Valuation
Actuarially Assumed Rate of Return: 6.75%
(\$ in Millions)

Fiscal Year	Annual Payroll	Total State Contribution	State Contribution as a % of Payroll	Total Employee Contribution	Accrued Liabilities	Actuarial Value of Assets	Unfunded Liabilities	Funded Ratio
2017	164.82	148.16	89.9%	14.05	2,626.81	688.76	1,938.05	26.2%
2018	160.58	146.77	91.4%	13.92	2,703.21	761.35	1,941.86	28.2%
2019	160.78	163.75	101.8%	13.83	2,775.38	830.98	1,944.40	29.9%
2020	161.17	164.14	101.8%	13.75	2,842.24	897.23	1,945.01	31.6%
2021	161.43	164.41	101.8%	13.82	2,902.83	959.71	1,943.12	33.1%
2022	161.73	164.71	101.8%	13.86	2,958.09	1,018.67	1,939.42	34.4%
2023	162.50	165.50	101.8%	13.89	3,007.03	1,074.08	1,932.95	35.7%
2024	163.34	166.36	101.8%	14.11	3,049.80	1,126.13	1,923.67	36.9%
2025	164.36	167.39	101.8%	14.30	3,085.94	1,174.62	1,911.32	38.1%
2026	165.48	168.53	101.8%	14.57	3,115.42	1,219.95	1,895.47	39.2%
2027	166.85	169.93	101.8%	14.70	3,138.01	1,262.08	1,875.93	40.2%
2028	168.37	171.48	101.8%	14.68	3,154.01	1,301.31	1,852.70	41.3%
2029	170.25	173.39	101.8%	14.92	3,163.60	1,338.50	1,825.10	42.3%
2030	172.34	175.52	101.8%	15.32	3,166.96	1,374.37	1,792.59	43.4%
2031	174.68	177.90	101.8%	15.57	3,164.83	1,409.76	1,755.07	44.5%
2032	177.41	180.68	101.8%	16.22	3,156.86	1,445.54	1,711.32	45.8%
2033	180.20	183.52	101.8%	16.90	3,143.76	1,482.64	1,661.12	47.2%
2034	183.32	186.70	101.8%	17.60	3,126.06	1,522.24	1,603.82	48.7%
2035	186.73	190.17	101.8%	18.34	3,104.51	1,565.71	1,538.80	50.4%
2036	190.49	194.00	101.8%	19.03	3,079.54	1,614.23	1,465.31	52.4%
2037	194.44	198.03	101.8%	19.75	3,051.57	1,668.96	1,382.61	54.7%
2038	198.64	202.30	101.8%	20.47	3,021.20	1,731.29	1,289.91	57.3%
2039	203.11	206.86	101.8%	21.19	2,989.11	1,802.78	1,186.33	60.3%
2040	207.88	211.72	101.8%	21.89	2,955.82	1,884.91	1,070.91	63.8%
2041	212.82	216.75	101.8%	22.61	2,922.20	1,979.44	942.76	67.7%
2042	218.09	222.11	101.8%	23.32	2,888.59	2,087.93	800.66	72.3%
2043	223.51	227.63	101.8%	24.05	2,855.81	2,212.20	643.61	77.5%
2044	229.21	233.44	101.8%	24.78	2,824.53	2,354.17	470.36	83.3%
2045	235.12	239.46	101.8%	25.52	2,795.19	2,515.62	279.57	90.0%

FUNDING PROJECTIONS FOR THE GENERAL ASSEMBLY RETIREMENT SYSTEM
Projections Based on the Retirement System's FY 2016 Actuarial Valuation
Actuarially Assumed Rate of Return: 6.75%
(\$ in Millions)

Fiscal Year	Annual Payroll	Total State Contribution	State Contribution as a % of Payroll	Total Employee Contribution	Accrued Liabilities	Actuarial Value of Assets	Unfunded Liabilities	Funded Ratio
2017	11.14	25.09	225.2%	1.28	367.53	6.77	360.76	1.8%
2018	10.44	26.68	255.5%	1.20	370.81	14.14	356.67	3.8%
2019	10.18	29.51	289.9%	1.17	373.28	20.38	352.90	5.5%
2020	10.08	29.20	289.7%	1.16	374.93	25.92	349.01	6.9%
2021	9.86	28.58	289.9%	1.13	375.79	30.52	345.27	8.1%
2022	9.72	28.17	289.8%	1.12	375.86	34.30	341.56	9.1%
2023	9.65	27.95	289.6%	1.11	375.14	37.51	337.63	10.0%
2024	9.56	27.71	289.9%	1.10	373.53	39.99	333.54	10.7%
2025	9.46	27.42	289.9%	1.09	371.17	41.83	329.34	11.3%
2026	9.45	27.40	289.9%	1.09	368.19	43.40	324.79	11.8%
2027	9.54	27.64	289.7%	1.10	364.59	45.00	319.59	12.3%
2028	9.51	27.56	289.8%	1.09	360.35	46.31	314.04	12.9%
2029	9.58	27.77	289.9%	1.10	355.48	47.65	307.83	13.4%
2030	9.66	27.98	289.6%	1.11	350.13	49.20	300.93	14.1%
2031	9.84	28.51	289.7%	1.13	344.34	51.36	292.98	14.9%
2032	9.90	28.68	289.7%	1.14	338.17	53.90	284.27	15.9%
2033	10.08	29.22	289.9%	1.16	331.66	57.25	274.41	17.3%
2034	10.27	29.75	289.7%	1.18	324.76	61.45	263.31	18.9%
2035	10.45	30.29	289.9%	1.20	317.61	66.73	250.88	21.0%
2036	10.65	30.85	289.7%	1.22	310.27	73.24	237.03	23.6%
2037	10.84	31.41	289.8%	1.25	302.73	81.07	221.66	26.8%
2038	11.03	31.96	289.8%	1.27	295.05	90.37	204.68	30.6%
2039	11.22	32.52	289.8%	1.29	287.33	101.35	185.98	35.3%
2040	11.57	33.53	289.8%	1.33	279.62	114.64	164.98	41.0%
2041	11.77	34.11	289.8%	1.35	272.02	130.05	141.97	47.8%
2042	11.97	34.68	289.7%	1.38	264.57	147.74	116.83	55.8%
2043	12.34	35.75	289.7%	1.42	257.33	168.43	88.90	65.5%
2044	12.72	36.86	289.8%	1.46	250.39	192.41	57.98	76.8%
2045	12.93	37.46	289.7%	1.49	243.66	219.30	24.36	90.0%