Commission on Government Forecasting and Accountability

703 Stratton Ofc. Bldg., Springfield, IL 62706

SPECIAL PENSION BRIEFING

STATE RETIREMENT SYSTEMS OVERVIEW
Julie Bae, Pension Analyst
Jerry Lazzara, Pension Analyst

CGFA staff has reviewed the State-funded retirement systems' FY 2017 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 $128.9 billion on June 30, 2017, led by the Teachers' Retirement System (TRS), whose unfunded liabilities amounted to $73.4 billion. As the largest of the State systems, TRS accounts for approximately 57% of the total assets and liabilities of the five State systems combined. The State Employees' Retirement System (SERS) had unfunded liabilities of $30.1 billion, approximately 23.4% of the total unfunded liabilities of the five systems, followed by the State Universities Retirement System (SURS) with unfunded liabilities of $23.3 billion, which represents 18.1% 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.

TABLE 1

Summary of Financial Condition FY 2017 State Retirement Systems Combined Assets at Actuarial Value / With Asset Smoothing (P.A. 96-0043) ($ in Millions)			
System	Accrued Liability	Actuarial Assets	Unfunded Liability	Funded Ratio
TRS	$122,904.0	$49,467.5	$73,436.5	40.2%
SERS	$46,701.3	$16,558.9	$30,142.5	35.5%
SURS	$41,853.3	$18,588.9	$23,264.5	44.4%
JRS	$2,649.3	$943.0	$1,706.3	35.6%
GARS	$370.8	$55.1	$315.7	14.9%
TOTAL	$214,478.7	$85,613.3	$128,865.4	39.9%

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 $129.1 billion on June 30, 2017. TRS, whose unfunded liabilities amounted to $73.5 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 2017 State Retirement Systems Combined Assets at Market Value / Without Asset Smoothing (P.A. 96-0043) ($ in Millions)			
System	Accrued Liability	Market Assets	Unfunded Liability	Funded Ratio
TRS	$122,904.0	$49,375.7	$73,528.4	40.2%
SERS	$46,701.3	$16,530.2	$30,171.2	35.4%
SURS	$41,853.3	$18,457.6	$23,395.8	44.1%
JRS	$2,649.3	$941.8	$1,707.5	35.5%
GARS	$370.8	$54.3	$316.4	14.7%
TOTAL	$214,478.7	$85,359.5	$129,119.2	39.8%

The funded ratios of the respective systems may be compared to the aggregate funded ratio. The combined funded ratio based on both the actuarial and market value of assets for FY 2017 is approximately 40% as showed in Tables 1 and 2 (the 10-year history of the systems'

cumulative funded ratio is shown in Chart 5). GARS has the poorest funded ratio, followed by SERS and the Judges' Retirement System (JRS). 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 2017.

The aggregate unfunded liability has been growing significantly over the past decade. One of the main drivers continues to be actuarially insufficient State contributions determined by the current pension funding policy under P.A. 88-0593. (More information on P.A. 88-0593 is discussed on page 6.) Other reasons for an increase in unfunded liability would be results of actuarial assumptions changes, including the assumed investment rates, mortality rates, economic and demographic assumption changes, or poor investment performance. Further details on the main factors affecting unfunded liability can be found be in Charts 3 and 4.

CHART 1

STATE RETIREMENT SYSTEMS COMBINED
UNFUNDED LIABILITY HISTORY
FY 2003 - FY 2017
($ in Billions)
All figures based upon the market value of assets.

Year	Unfunded Liability
2003	$43.1
2004	$35.1
2005	$38.6
2006	$40.7
2007	$42.2
2008	$54.4
2009	$77.8
2010	$85.6
2011	$83.1
2012	$96.8
2013	$97.5
2014	$104.6
2015	$111.0
2016	$129.8
2017	$129.1
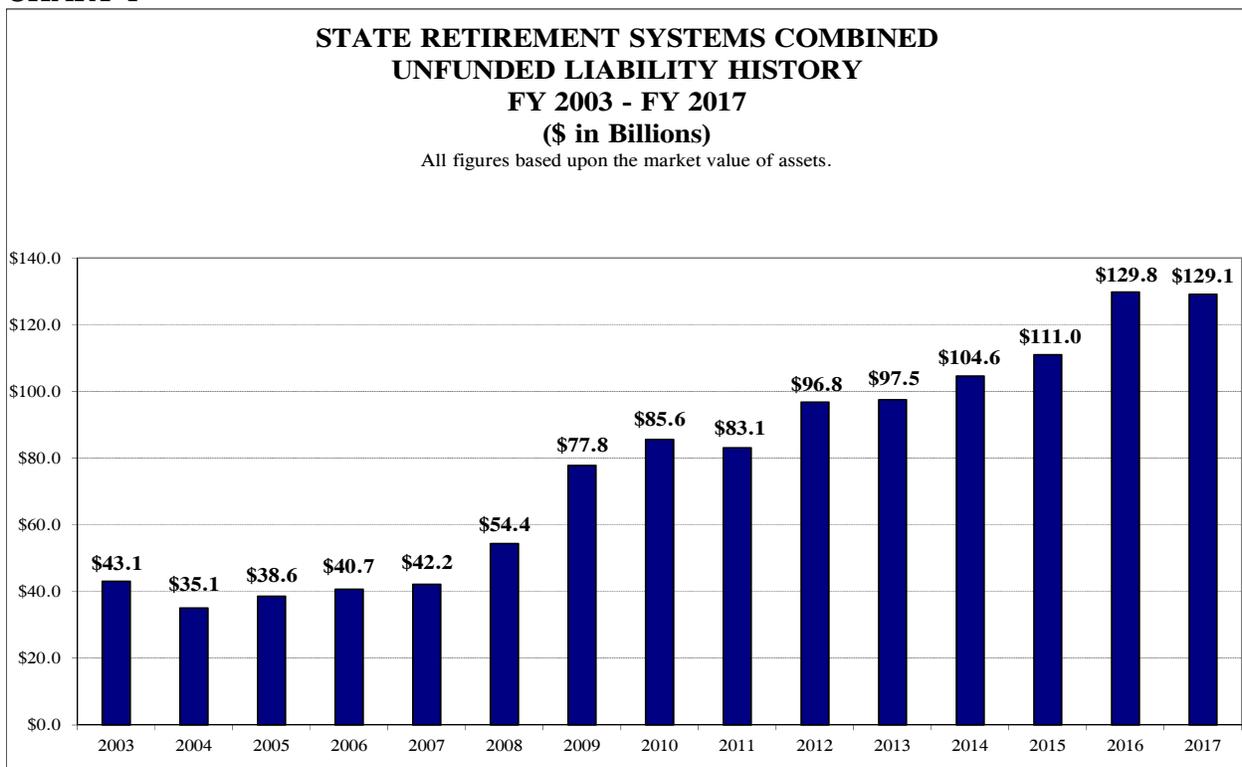
From FY 2004 through FY 2007, the unfunded liability had gradually increased. The historic investment losses sustained by the systems in FY 2009 were the main reason for the significant jump in unfunded liabilities over FY 2008. In FY 2010, SURS, SERS, JRS, and GARS scaled back their respective investment return assumptions, 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 – poor investment returns, TRS' assumed interest rate reduction 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. A decrease in investment assumption rates by TRS, SERS, and SURS and actuarially insufficient contributions by the State led to the significant increase in unfunded liability in FY 2014 despite strong investment returns by all the systems.

In FY 2015, TRS and SURS changed several actuarial assumptions, such as rates of salary increases, mortality rates, retirement rates, etc. These changes resulted in a hike in unfunded liability, along with continued actuarially insufficient State contributions. All the systems but SURS changed their actuarial assumptions in FY 2016, including lowering their respective assumed investment rates, and these changes led to a significant increase in the combined unfunded liability of $9.67 billion, accounting for 71% of the $13.61 billion increase over the combined FY 2015 unfunded liability. The combined unfunded liability based on the market value of assets slightly decreased for the first time in the past 6 years in FY 2017, mainly caused by outstanding investment returns from all the systems. Actuarial assumptions remained unchanged for all the five State systems in FY 2017. Details on the factors affecting the unfunded liability in FY 2017 can be found in Chart 3.

Table 3 below shows the historical change in the investment return assumptions for each system. None of the State systems changed their assumed investment rates in FY 2017.

TABLE 3

Historical Change in Investment Rate Assumptions					
System	Prior to FY 10	FY 10	FY 12	FY 14	FY 16 to Current
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 on the following page shows market investment return rates experienced by each of the systems in FY 2017. All the five systems experienced strong investment returns exceeding their actuarially assumed investment rates.

CHART 2

STATE FUNDED RETIREMENT SYSTEMS
FY 2017 Rate of Return on Investments
Actuarially Assumed Rate of Return:
TRS - 7.00%, SERS - 7.00%, SURS - 7.25%, JRS - 6.75%, GARS - 6.75%
All figures based upon the market value of assets.

System	Rate
TRS	12.4%
SERS	12.2%
SURS	12.2%
JRS	11.6%
GARS	10.5%
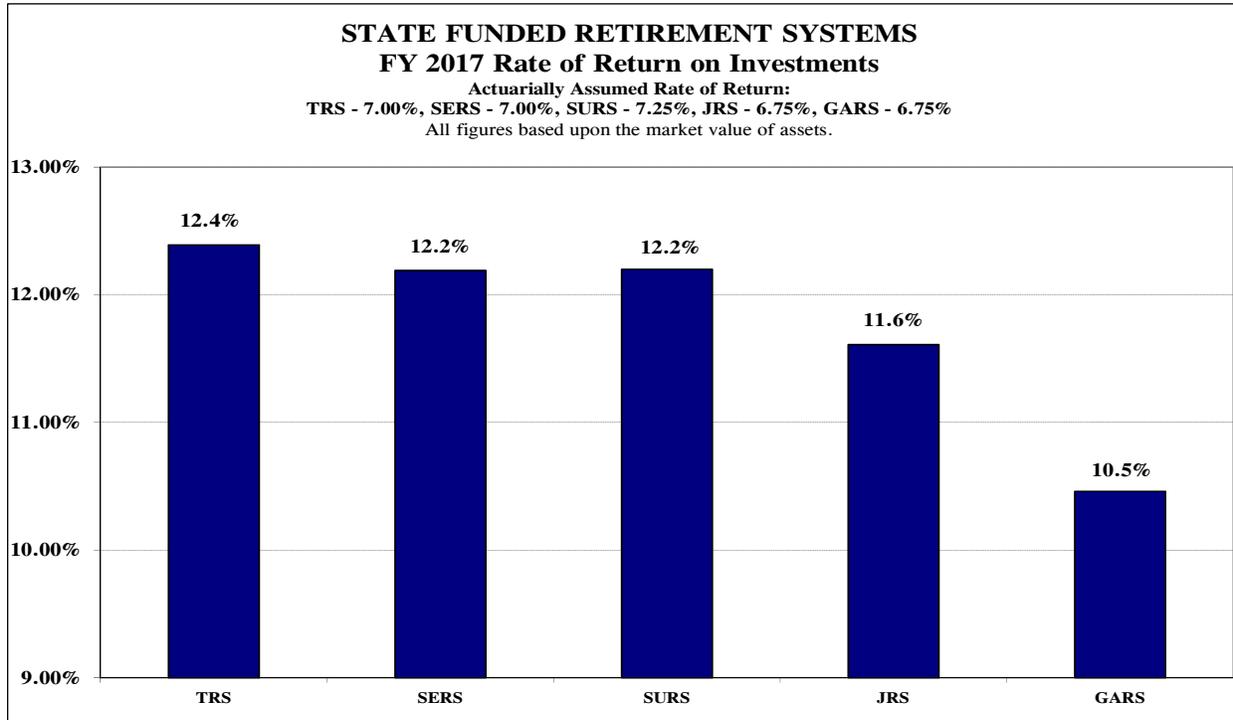
To reduce the impact of volatile investment performance from year-to-year, asset smoothing was implemented as of the FY 2009 actuarial valuation reports of the state systems with the adoption of P.A. 96-0043. Asset smoothing is a technique that averages the annual fluctuation in investment performance over a period of 5 years. Actuarial assumption smoothing, a somewhat similar technique, was implemented pursuant to P.A. 100-0023, effective July 6, 2017. (Details on assumption smoothing are discussed on page 9.)

Chart 3 on the following page outlines the factors that have caused the unfunded liability to change for FY 2017 only.

CHART 3

STATE FUNDED RETIREMENT SYSTEMS
All Five Systems Combined
Change in Unfunded Liabilities
FY 2017
($ in Billions)
All figures based upon the actuarial value of assets.

TOTAL INCREASE EQUALS
$2.365 BIL = 1.9%
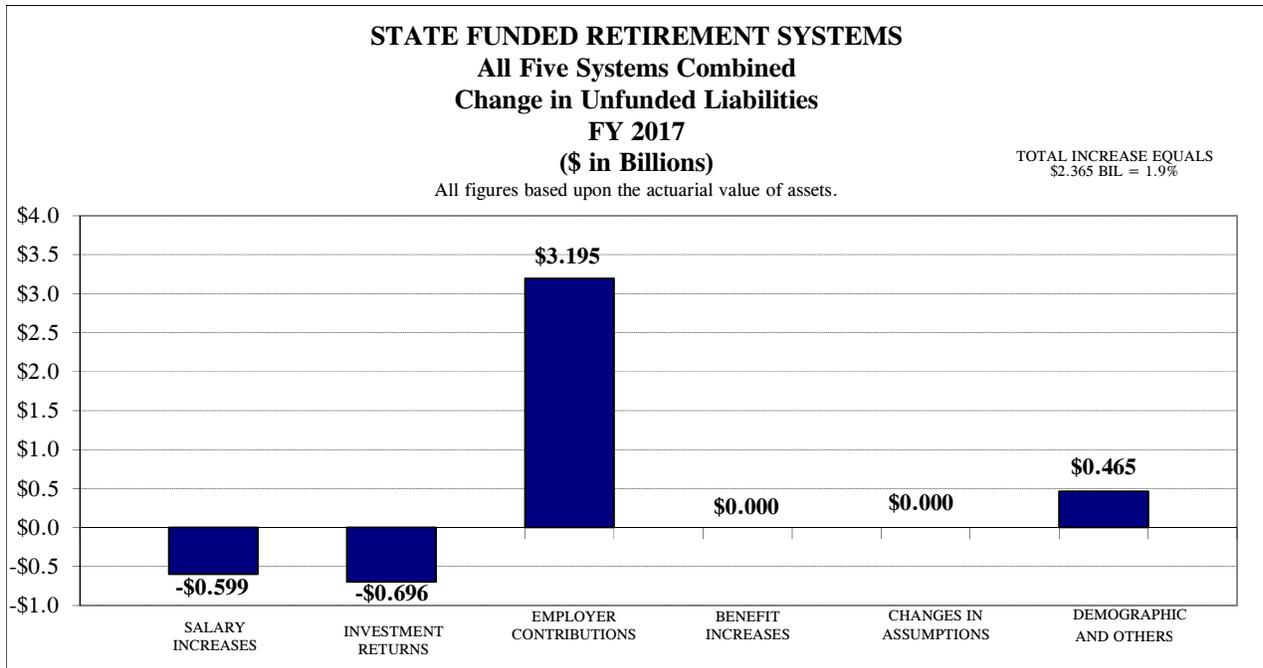
At the end of FY 2016, the aggregate unfunded liability based on the actuarial value of assets was $126.500 billion. The unfunded liability based on the actuarial value of assets stood at $128.865 billion as of the end of FY 2017. It grew by $2.365 billion during FY 2017, an increase of 1.9% over FY 2016. The primary reason for the increase was, again, actuarially insufficient State contributions, which increased the unfunded liability by $3.195 billion. The other actuarial loss resulted from demographic and other factors, bringing the unfunded liability up by $0.465 billion. However, actuarial gains from two factors helped lessen the effect of actuarial losses: less-than-expected salary increases and higher-than-expected investment returns declined the unfunded liability by $0.599 billion and 0.696 billion, respectively.

Chart 4 on the following page shows the change in the 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.

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).

CHART 4

STATE FUNDED RETIREMENT SYSTEMS
All Five Systems Combined
Change in Unfunded Liabilities
FY 1996 - FY 2017
($ in Billions)
All figures based upon the actuarial value of assets.

TOTAL INCREASE EQUALS
$110.153 BIL

	Value
SALARY INCREASES	-$4.722
INVESTMENT RETURNS	$14.057
EMPLOYER CONTRIBUTIONS	$47.859
BENEFIT INCREASES	$5.804
CHANGES IN ASSUMPTIONS	$31.005
DEMOGRAPHIC AND OTHERS	$16.151

From FY 1996 through FY 2017, the unfunded liability increased by $110.153 billion to $128.865 billion. Actuarially insufficient State contributions contributed the most to the increase in unfunded liability, accounting for approximately 43.4% of the total increase of $110.153 billion. Assumption changes caused a $31.005 billion increase, or 28.1% of the total increase. "Demographic and other factors" and investment returns that didn't meet assumed rates were the next factors that served to worsen the unfunded liability over time. The only factor resulting in an actuarial gain was salary increases being less than assumed.

CHART 5

STATE FUNDED RETIREMENT SYSTEMS COMBINED
Funded Ratio
FY 2008 - FY 2017
All figures based upon the market value of assets.

| Fiscal Year	Funded Ratio
2008	54.3%
2009	38.5%
2010	38.3%
2011	43.3%
2012	39.0%
2013	41.1%
2014	42.9%
2015	41.9%
2016	37.6%
2017	39.8%
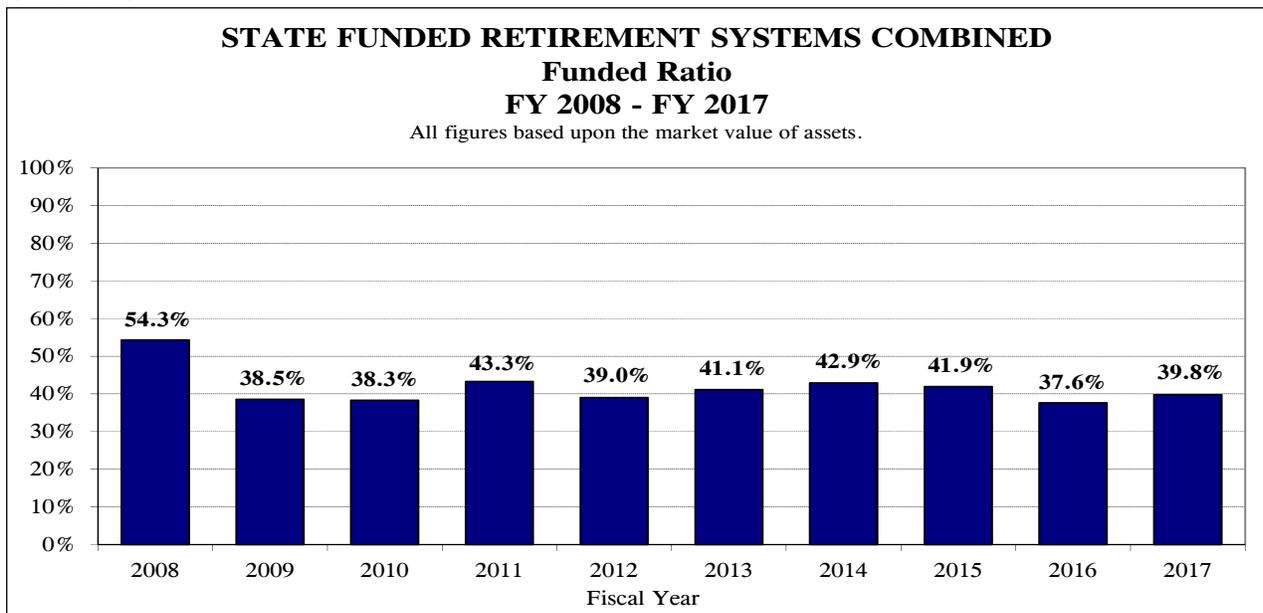
Chart 5 above shows the systems' funded ratio based on the market value of assets, without the asset smoothing method.

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 39.0%. 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 assumption changes such as mortality rates exceeded gains resulting from the favorable investment returns 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 actuarial assumptions changes by TRS, SERS, JRS, and GARS including lowering their respective assumed investment rates, along with lower-than-projected investment returns as well as actuarially insufficient employer contributions. Fortunately, all the systems experienced satisfactory investment performances in FY 2017, well above the respective systems' assumed rates of return. This actuarial gain helped to push the funded ratio up to 39.8% in spite of actuarially insufficient employer contributions as well as unfavorable actuarial experience from demographic and other factors.

Significant Legislative Changes in FY 2017

The following changes were made by P.A. 100-0023, effective July 6, 2017.

An Optional Tier 3 Hybrid Plan for TRS, SERS, and SURS

Current Tier 2 employees and newly hired employees who first begin participation on or after *the implementation date* of the hybrid plan are eligible to elect the Tier 3 hybrid plan. The optional hybrid plan consists of a Defined Benefit (DB) plan and a Defined Contribution (DC) plan. *The implementation date* is the earliest date on which eligible employees are allowed to begin to participate in the Tier 3 hybrid plan by the Board of respective systems. According to the systems' FY 2017 valuations, the Tier 3 hybrid plan under SERS and SURS would be expected to be available in FY 2020. TRS does not mention the exact implementation date in their FY 2017 actuarial valuation.

Assumption Smoothing

Any increase or decrease in State contributions due to actuarial assumption changes shall be smoothed over a 5-year period in equal annual amounts, *effective with FY 2018 State contributions*. For actuarial assumption changes that first affected State contributions before the FY 2018 State contributions, the equal annual amounts would be still calculated using the 5-year period but would apply *only to State contributions for FY 2018 and fiscal years thereafter*. In other words, the smoothed annual amount that would have applied to State contributions prior to FY 2018 would be disregarded, and the smoothing period will be operative as if assumption smoothing had been in place at the time of the assumption change. For instance, actuarial assumption changes that occurred in the FY 2014 valuation increased State contributions in FY 2016. The increase in FY 2016 State contributions would be smoothed over a 5-year period in equal annual amounts, starting with FY 2018 State contributions since the assumption smoothing method is effective with FY 2018 State contributions. However, the equal annual amount by which FY 2016 and 2017 State contributions would have been reduced would be ignored. Therefore, the State contributions from FY 2018 to FY 2020 would be reduced by the equal annual amount, respectively.

FY 2018 Re-certification

All the systems were required to recertify FY 2018 State contributions as the State's funding policy was modified pursuant to P.A. 100-0023.

Table 4 on the following page shows the original FY 2018 State contributions before the enactment of P.A. 100-0023, FY 2018 re-certified State contributions pursuant to P.A. 100-0023, and the FY 2019 estimated State contributions to the five State-funded retirement systems. FY 2019 projected State contributions were certified by the boards of trustees of the five systems and based on the FY 2017 preliminary actuarial valuation reports.

TABLE 4

FY 2018 Pension Appropriation by Fund
($ in Millions)
The FY 2018 State Contributions were re-calculated and re-certified pursuant to P.A. 100-0023.

	Before P.A. 100-0023 [1]			After P.A. 100-0023 [2]		
System	GRF	Other State Funds	Total	GRF	Other State Funds	Total
TRS	$4,565.0	$0.0	$4,565.0	$4,095.3	$0.0	$4,095.3
SURS	$1,538.7	$215.0	$1,753.7	$1,414.3	$215.0	$1,629.3
SERS	$1,568.7	$844.7	$2,413.3	$1,374.9	$740.3	$2,115.3
GARS	$26.7	$0.0	$26.7	$21.2	$0.0	$21.2
JRS	$146.8	$0.0	$146.8	$136.0	$0.0	$136.0
Total	**$7,845.8**	**$1,059.7**	**$8,905.4**	**$7,041.7**	**$955.3**	**$7,997.0**

Reduction in FY 2018 Pension Appropriation by P.A. 100-0023: $ 908.4 Million.

[1] "Before P.A. 100-0023" shows the State systems' final FY 2018 contributions, determined pursuant to P.A. 88-593, before the enactment of P.A. 100-0023 (The Tier 3 Act of 2017).

[2] "After P.A. 100-0023" shows the State systems' FY 2018 recertifications pursuant to P.A. 100-0023 which amended the State's funding policy to smooth any changes in State contributions due to actuarial assumption changes over a 5-year period, created the Tier 3 plan, and required the systems to recertify the FY 2018 State contributions.

FY 2019 Estimated Pension Appropriation by Fund
($ in Millions)

System	GRF	Other State Funds	Total [3]
TRS	4,466.2	$0.0	$4,466.2
SURS	1,440.5	$215.0	$1,655.5
SERS	1,465.2	$788.9	$2,254.1
GARS	23.2	$0.0	$23.2
JRS	140.5	$0.0	$140.5
Total	**$7,535.6**	**$1,003.9**	**$8,539.5**

[3] The amounts shown above in the "Total" column reflect the State systems' preliminary FY 2019 certification pursuant to P.A. 100-0023. Also, pursuant to P.A. 97-0694, the State Actuary Law, the State Actuary is required to conduct reviews of the systems' actuarial assumptions/methods, used to perform actuarial valuations and to determine the State contributions, and then to recommend changes in the assumptions/method before finalizing the systems' certifications of the annual State contributions.

* This chart is meant to be an estimate only insofar as the FY 2019 appropriation by fund is concerned. The SURS "Other State Funds" amount assumes that SURS will receive an FY 2019 appropriation from the State Pension Fund in the same amount that SURS is expected to receive from the State Pension Fund in FY 2018. SURS' historical appropriation from the State Pension Fund varies from year to year. SERS' FY 2019 estimated appropriation includes a total of $88.26 million in 2003 POB debt service. Of this amount, according to SERS, $57.37 million comes from GRF and $30.89 million comes from OSF. The SERS "Other State Funds" amount is based upon the SERS' historical assumption that 65% of SERS' FY 2019 appropriation will come from GRF, while 35% will come from Other State Funds.

Total FY 2018 Pension Appropriation: $ 7,997.0 Million
Total FY 2019 Estimated Pension Appropriation: $ 8,539.5 Million
Total Estimated Increase, FY 2019 over FY 2018: $ 542.5 Million
Total Estimated GRF Increase, FY 2019 over FY 2018: $ 493.9 Million

The following pages include pension funding projections for the five State retirement systems based on the respective retirement systems' FY 2017 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 Systems' FY 2017 Actuarial Valuations ($ 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
2018	19,340.77	7,947.38	41.1%	1,466.58	221,186.51	89,464.63	131,721.88	40.4%
2019	**19,779.8**	**8,539.5**	**43.2%**	**1,497.5**	**227,848.7**	**92,439.1**	**135,409.6**	**40.6%**
2020	20,345.5	9,017.5	44.3%	1,526.8	234,430.6	96,298.8	138,131.8	41.1%
2021	20,902.5	9,500.6	45.5%	1,564.5	240,924.2	101,644.2	139,280.0	42.2%
2022	21,454.4	9,921.0	46.2%	1,602.2	247,290.8	106,410.7	140,880.2	43.0%
2023	22,004.2	10,104.9	45.9%	1,639.6	253,510.5	111,150.9	142,359.7	43.8%
2024	22,570.4	10,332.8	45.8%	1,678.3	259,567.7	115,908.2	143,659.5	44.7%
2025	23,161.6	10,572.1	45.6%	1,717.5	265,443.4	120,690.0	144,753.3	45.5%
2026	23,774.9	10,850.4	45.6%	1,759.3	271,111.5	125,531.2	145,580.3	46.3%
2027	24,408.5	11,141.4	45.6%	1,803.0	276,539.5	130,431.9	146,107.6	47.2%
2028	25,064.1	11,421.2	45.6%	1,846.9	281,728.3	135,402.8	146,325.5	48.1%
2029	25,753.7	11,720.9	45.5%	1,894.7	286,665.0	140,475.6	146,189.3	49.0%
2030	26,469.7	12,014.1	45.4%	1,943.3	291,328.2	145,647.2	145,681.0	50.0%
2031	27,214.8	12,326.6	45.3%	1,995.4	295,697.1	150,944.9	144,752.2	51.0%
2032	27,988.1	12,678.5	45.3%	2,048.4	299,752.5	156,430.3	143,322.2	52.2%
2033	28,790.4	13,082.4	45.4%	2,104.1	303,549.0	162,235.6	141,313.4	53.4%
2034	29,619.1	14,368.2	48.5%	2,161.2	307,026.2	169,261.2	137,765.0	55.1%
2035	30,479.3	14,783.7	48.5%	2,221.1	310,175.6	176,704.7	133,470.9	57.0%
2036	31,367.0	15,213.0	48.5%	2,282.8	312,997.9	184,633.6	128,364.3	59.0%
2037	32,292.0	15,660.4	48.5%	2,346.8	315,504.3	193,132.0	122,372.3	61.2%
2038	33,249.8	16,123.2	48.5%	2,413.4	317,807.1	202,292.2	115,514.9	63.7%
2039	34,230.8	16,597.0	48.5%	2,481.2	319,606.7	212,194.3	107,412.3	66.4%
2040	35,237.9	17,083.4	48.5%	2,551.5	321,225.4	222,946.2	98,279.2	69.4%
2041	36,262.3	17,576.2	48.5%	2,622.6	323,603.6	234,668.6	88,935.0	72.5%
2042	37,304.2	18,077.1	48.5%	2,695.8	323,791.9	247,498.0	76,293.9	76.4%
2043	38,369.3	18,586.6	48.4%	2,769.6	324,842.4	261,578.6	63,263.8	80.5%
2044	39,445.6	19,103.9	48.4%	2,845.1	325,823.7	277,070.8	48,752.9	85.0%
2045	40,522.8	19,615.6	48.4%	2,918.6	326,816.4	294,134.9	32,681.5	90.0%

FUNDING PROJECTIONS FOR THE TEACHERS RETIREMENT SYSTEM
Projections Based on the Retirement System's FY 2017 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
2018	10,441.3	4,094.6	39.2%	939.7	126,777.5	51,615.9	75,161.6	40.7%
2019	**10,649.7**	**4,466.2**	**41.9%**	**958.5**	**130,655.7**	**53,303.5**	**77,352.3**	**40.8%**
2020	10,962.2	4,790.5	43.7%	986.6	134,532.2	55,555.5	78,976.7	41.3%
2021	11,283.3	5,061.6	44.9%	1,015.5	138,402.1	58,701.7	79,700.4	42.4%
2022	11,611.4	5,302.8	45.7%	1,045.0	142,254.3	61,540.3	80,714.0	43.3%
2023	11,933.5	5,409.8	45.3%	1,074.0	146,084.7	64,421.2	81,663.5	44.1%
2024	12,261.8	5,539.0	45.2%	1,103.6	149,887.9	67,369.0	82,518.9	44.9%
2025	12,600.0	5,675.7	45.0%	1,134.0	153,652.8	70,389.7	83,263.1	45.8%
2026	12,948.4	5,834.7	45.1%	1,165.4	157,365.0	73,503.5	83,861.5	46.7%
2027	13,305.6	5,999.4	45.1%	1,197.5	161,000.2	76,707.9	84,292.3	47.6%
2028	13,672.0	6,155.7	45.0%	1,230.5	164,547.1	79,997.6	84,549.5	48.6%
2029	14,050.2	6,320.0	45.0%	1,264.5	167,992.2	83,382.8	84,609.4	49.6%
2030	14,443.0	6,479.1	44.9%	1,299.9	171,319.9	86,859.4	84,460.5	50.7%
2031	14,850.1	6,648.4	44.8%	1,336.5	174,510.6	90,436.6	84,074.1	51.8%
2032	15,270.1	6,841.8	44.8%	1,374.3	177,549.6	94,144.1	83,405.5	53.0%
2033	15,701.2	7,057.9	45.0%	1,413.1	180,416.4	98,008.0	82,408.4	54.3%
2034	16,141.7	7,904.0	49.0%	1,452.8	183,100.9	102,695.1	80,405.8	56.1%
2035	16,596.7	8,128.2	49.0%	1,493.7	185,589.7	107,620.2	77,969.6	58.0%
2036	17,067.1	8,360.0	49.0%	1,536.0	187,881.7	112,820.5	75,061.2	60.0%
2037	17,556.5	8,601.1	49.0%	1,580.1	189,975.2	118,337.7	71,637.6	62.3%
2038	18,057.3	8,848.0	49.0%	1,625.2	191,871.5	124,219.3	67,652.2	64.7%
2039	18,564.4	9,097.9	49.0%	1,670.8	193,554.2	130,496.1	63,058.0	67.4%
2040	19,079.6	9,351.9	49.0%	1,717.2	195,024.5	137,219.1	57,805.4	70.4%
2041	19,594.1	9,605.6	49.0%	1,763.5	197,299.0	144,450.6	52,848.4	73.2%
2042	20,112.8	9,861.2	49.0%	1,810.2	197,402.8	152,263.3	45,139.4	77.1%
2043	20,640.8	10,120.1	49.0%	1,857.7	198,364.2	160,738.7	37,625.5	81.0%
2044	21,171.0	10,380.1	49.0%	1,905.4	199,231.8	169,972.9	29,258.9	85.3%
2045	21,682.2	10,630.7	49.0%	1,951.4	200,064.0	180,057.6	20,006.4	90.0%

* Pursuant to TRS' preliminary FY 2019 certification letter dated October 31, 2017, the FY 2019 required State Contribution includes $.6 million for minimum retirement benefits.

FUNDING PROJECTIONS FOR THE STATE EMPLOYEES' RETIREMENT SYSTEM
Projections Based on the Retirement System's FY 2017 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
2018	4,274	1,942	45.4%	228	48,354	17,492	30,862	36.2%
2019	**4,367**	**2,254**	**51.6%**	**232**	**49,990**	**18,343**	**31,647**	**36.7%**
2020	4,462	2,311	51.8%	236	51,600	19,353	32,247	37.5%
2021	4,560	2,433	53.4%	240	53,177	20,670	32,507	38.9%
2022	4,658	2,552	54.8%	244	54,710	21,891	32,819	40.0%
2023	4,757	2,593	54.5%	248	56,187	23,085	33,102	41.1%
2024	4,860	2,641	54.3%	252	57,598	24,255	33,343	42.1%
2025	4,965	2,692	54.2%	255	58,934	25,398	33,536	43.1%
2026	5,077	2,752	54.2%	259	60,190	26,524	33,666	44.1%
2027	5,195	2,816	54.2%	264	61,363	27,635	33,728	45.0%
2028	5,318	2,879	54.1%	268	62,461	28,741	33,720	46.0%
2029	5,452	2,948	54.1%	274	63,481	29,850	33,631	47.0%
2030	5,592	3,018	54.0%	279	64,424	30,966	33,458	48.1%
2031	5,740	3,093	53.9%	286	65,291	32,100	33,191	49.2%
2032	5,894	3,172	53.8%	292	66,078	33,266	32,812	50.3%
2033	6,053	3,269	54.0%	299	66,788	34,480	32,308	51.6%
2034	6,219	3,602	57.9%	306	67,425	36,005	31,420	53.4%
2035	6,393	3,702	57.9%	314	67,990	37,626	30,364	55.3%
2036	6,570	3,805	57.9%	322	68,482	39,357	29,125	57.5%
2037	6,754	3,912	57.9%	330	68,909	41,220	27,689	59.8%
2038	6,948	4,024	57.9%	339	69,279	43,240	26,039	62.4%
2039	7,147	4,139	57.9%	348	69,600	45,440	24,160	65.3%
2040	7,352	4,258	57.9%	358	69,882	47,848	22,034	68.5%
2041	7,560	4,378	57.9%	368	70,135	50,489	19,646	72.0%
2042	7,769	4,499	57.9%	379	70,368	53,390	16,978	75.9%
2043	7,980	4,621	57.9%	389	70,593	56,581	14,012	80.2%
2044	8,192	4,745	57.9%	400	70,818	60,090	10,728	84.9%
2045	8,405	4,868	57.9%	410	71,053	63,948	7,105	90.0%

*Pursuant to P.A. 93-0589, the FY 2019 State Contribution includes $88.3 million for debt service for the 2003 Pension Obligation Bonds authorized by P.A. 93-0002. State contribution amounts shown for FY 2020 - 2045 do not include projected debt service as these amounts are not known until the annual SERS preliminary certification letters are issued purusant to P.A. 97-0694 (State Actuary Law).

FUNDING PROJECTIONS FOR THE STATE UNIVERSITIES RETIREMENT SYSTEM
Projections Based on the Retirement System's FY 2017 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
2018	4,454.42	1,753.69	39.4%	283.67	42,955.89	19,293.64	23,662.25	44.9%
2019	**4,593.5**	**1,655.5**	**36.0%**	**291.9**	**44,029.4**	**19,676.1**	**24,353.3**	**44.7%**
2020	4,751.5	1,748.1	36.8%	289.3	45,056.8	20,217.1	24,839.7	44.9%
2021	4,889.4	1,832.9	37.5%	293.9	46,042.3	21,028.3	25,014.0	45.7%
2022	5,014.8	1,889.0	37.7%	298.1	46,968.7	21,673.1	25,295.7	46.1%
2023	5,143.0	1,925.5	37.4%	302.6	47,833.3	22,281.8	25,551.5	46.6%
2024	5,277.2	1,975.6	37.4%	307.5	48,635.7	22,869.2	25,766.5	47.0%
2025	5,424.3	2,026.6	37.4%	313.2	49,377.7	23,439.8	25,937.9	47.5%
2026	5,576.0	2,085.0	37.4%	319.3	50,052.1	23,997.5	26,054.6	47.9%
2027	5,732.9	2,146.1	37.4%	325.7	50,653.6	24,542.8	26,110.8	48.5%
2028	5,897.5	2,206.0	37.4%	332.7	51,186.6	25,082.4	26,104.2	49.0%
2029	6,073.0	2,271.0	37.4%	340.2	51,654.2	25,628.5	26,025.6	49.6%
2030	6,253.9	2,334.1	37.3%	348.1	52,049.4	26,177.8	25,871.6	50.3%
2031	6,441.5	2,401.0	37.3%	356.3	52,369.2	26,736.5	25,632.7	51.1%
2032	6,637.9	2,477.6	37.3%	364.9	52,613.5	27,320.6	25,292.9	51.9%
2033	6,847.2	2,565.2	37.5%	374.1	52,853.5	28,018.9	24,834.6	53.0%
2034	7,066.1	2,664.6	37.7%	383.8	53,034.7	28,797.0	24,237.7	54.3%
2035	7,293.8	2,752.1	37.7%	394.0	53,159.8	29,654.8	23,505.0	55.8%
2036	7,530.3	2,843.0	37.8%	404.7	53,231.4	30,608.0	22,623.4	57.5%
2037	7,777.7	2,938.1	37.8%	415.9	53,253.9	31,675.5	21,578.4	59.5%
2038	8,036.4	3,037.6	37.8%	427.7	53,229.5	32,875.4	20,354.1	61.8%
2039	8,306.4	3,141.4	37.8%	440.1	53,166.3	34,232.0	18,934.3	64.4%
2040	8,588.5	3,249.8	37.8%	453.2	53,075.0	35,773.4	17,301.6	67.4%
2041	8,885.3	3,363.9	37.9%	467.3	52,968.2	37,530.7	15,437.5	70.9%
2042	9,193.9	3,482.3	37.9%	482.1	52,861.8	39,538.6	13,323.3	74.8%
2043	9,514.4	3,605.4	37.9%	497.6	52,767.1	41,828.7	10,938.5	79.3%
2044	9,845.5	3,732.4	37.9%	513.7	52,695.3	44,434.4	8,260.9	84.3%
2045	10,189.4	3,864.4	37.9%	530.4	52,658.2	47,392.3	5,265.8	90.0%

* State Contribution Only - Includes Self-Managed Plan (SMP) Contributions - Excludes estimated $46.5 Million In Federal Funds in 2018 and $46 Million for all following years.

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

FUNDING PROJECTIONS FOR THE JUDGES' RETIREMENT SYSTEM
Projections Based on the Retirement System's FY 2017 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
2018	160.6	135.9	84.6%	14.0	2,725.1	1,006.8	1,718.3	36.9%
2019	**159.4**	**140.5**	**88.1%**	**14.0**	**2,797.2**	**1,058.8**	**1,738.4**	**37.9%**
2020	159.8	143.3	89.7%	13.8	2,863.7	1,112.9	1,750.8	38.9%
2021	160.0	147.2	92.0%	13.9	2,924.1	1,179.5	1,744.6	40.3%
2022	160.4	150.9	94.1%	13.9	2,979.1	1,237.6	1,741.5	41.5%
2023	161.2	150.8	93.6%	13.9	3,027.7	1,291.0	1,736.7	42.6%
2024	162.0	151.6	93.6%	14.1	3,070.0	1,340.8	1,729.3	43.7%
2025	163.0	152.5	93.6%	14.3	3,105.2	1,386.6	1,718.7	44.7%
2026	164.1	153.5	93.5%	14.6	3,133.9	1,428.8	1,705.1	45.6%
2027	165.5	154.6	93.4%	14.7	3,155.8	1,467.5	1,688.3	46.5%
2028	167.1	155.4	93.0%	14.6	3,171.1	1,502.3	1,668.8	47.4%
2029	169.1	156.6	92.6%	14.9	3,180.1	1,534.2	1,645.9	48.2%
2030	171.2	157.7	92.1%	15.3	3,182.8	1,563.2	1,619.5	49.1%
2031	173.5	159.1	91.7%	15.5	3,180.0	1,590.4	1,589.6	50.0%
2032	176.3	161.4	91.6%	16.1	3,171.4	1,616.9	1,554.4	51.0%
2033	179.1	164.4	91.8%	16.8	3,157.7	1,644.4	1,513.3	52.1%
2034	182.2	170.5	93.6%	17.5	3,139.2	1,676.7	1,462.5	53.4%
2035	185.6	173.7	93.6%	18.2	3,116.8	1,712.1	1,404.8	54.9%
2036	189.4	177.2	93.6%	18.9	3,091.0	1,751.6	1,339.4	56.7%
2037	193.3	180.9	93.6%	19.6	3,062.1	1,796.4	1,265.7	58.7%
2038	197.5	184.8	93.6%	20.4	3,030.8	1,847.7	1,183.1	61.0%
2039	202.0	188.9	93.6%	21.1	2,997.7	1,907.1	1,090.6	63.6%
2040	206.7	193.4	93.6%	21.8	2,963.4	1,975.8	987.6	66.7%
2041	211.6	198.0	93.6%	22.5	2,928.6	2,055.6	873.1	70.2%
2042	216.8	202.8	93.6%	23.2	2,894.0	2,147.9	746.1	74.2%
2043	222.2	207.9	93.6%	23.9	2,860.2	2,254.6	605.6	78.8%
2044	224.9	213.2	94.8%	24.6	2,827.8	2,377.2	450.6	84.1%
2045	233.7	218.7	93.6%	25.4	2,797.4	2,517.5	279.9	90.0%

FUNDING PROJECTIONS FOR THE GENERAL ASSEMBLY RETIREMENT SYSTEM
Projections Based on the Retirement System's FY 2017 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
2018	10.4	21.2	202.7%	1.2	374.0	56.2	317.7	15.0%
2019	**10.2**	**23.2**	**228.1%**	**1.2**	**376.4**	**57.8**	**318.6**	**15.3%**
2020	10.0	24.6	245.2%	1.2	377.9	60.4	317.6	16.0%
2021	9.8	26.0	264.1%	1.1	378.7	64.7	314.0	17.1%
2022	9.7	26.4	271.8%	1.1	378.7	68.7	310.0	18.1%
2023	9.6	25.9	271.0%	1.1	377.8	71.8	306.0	19.0%
2024	9.5	25.7	271.1%	1.1	376.1	74.3	301.8	19.7%
2025	9.4	25.3	270.0%	1.1	373.7	76.0	297.6	20.3%
2026	9.4	25.2	269.1%	1.1	370.6	77.4	293.2	20.9%
2027	9.4	25.4	268.8%	1.1	366.8	78.7	288.2	21.4%
2028	9.4	25.1	266.7%	1.1	362.5	79.5	283.0	21.9%
2029	9.5	25.2	265.6%	1.1	357.6	80.2	277.4	22.4%
2030	9.6	25.2	263.5%	1.1	352.1	80.8	271.3	23.0%
2031	9.6	25.2	261.5%	1.1	346.3	81.5	264.8	23.5%
2032	9.8	25.6	261.4%	1.1	340.0	82.7	257.4	24.3%
2033	9.9	25.8	261.9%	1.1	333.4	84.3	249.2	25.3%
2034	10.0	27.2	271.2%	1.2	326.5	87.5	239.0	26.8%
2035	10.2	27.7	271.2%	1.2	319.2	91.6	227.6	28.7%
2036	10.3	27.8	271.2%	1.2	311.8	96.5	215.3	31.0%
2037	10.5	28.3	271.0%	1.2	304.1	102.5	201.6	33.7%
2038	10.6	28.8	271.0%	1.2	396.3	109.8	286.5	27.7%
2039	11.0	29.7	271.0%	1.3	288.5	119.1	169.4	41.3%
2040	11.2	30.2	271.1%	1.3	280.6	130.0	150.7	46.3%
2041	11.3	30.8	271.2%	1.3	272.9	142.8	130.1	52.3%
2042	11.7	31.7	271.0%	1.4	265.3	158.1	107.2	59.6%
2043	11.9	32.2	271.1%	1.4	257.9	175.7	82.2	68.1%
2044	12.3	33.2	271.1%	1.4	250.8	196.3	54.5	78.3%
2045	12.5	33.8	271.1%	1.4	243.9	219.5	24.4	90.0%