



**Massachusetts Bay
Transportation Authority**

MBTA Retirement Fund

May – June 2017



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June 26, 2017**



**Massachusetts Bay
Transportation Authority**

MBTA Retirement Fund

FMCB Update

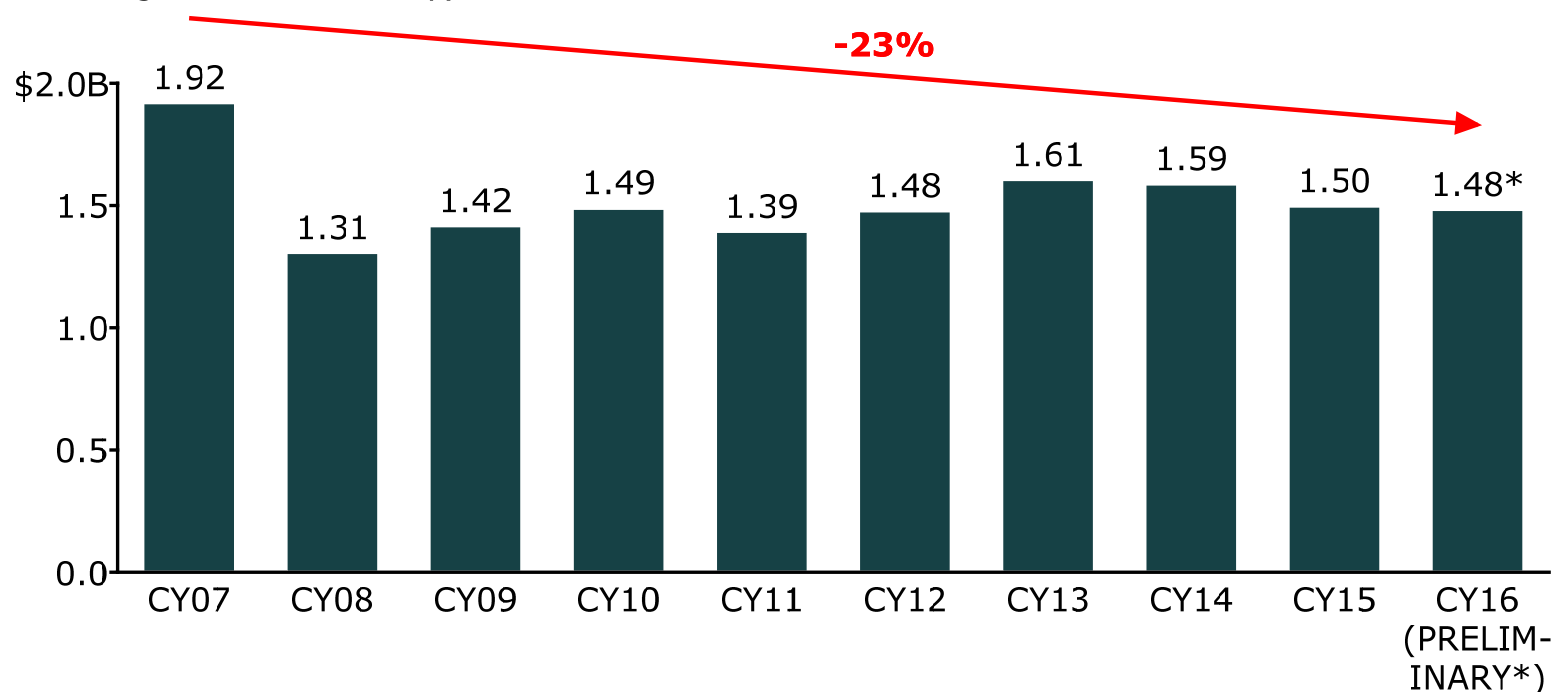
May 2017



MBTA pension assets have declined by 23% over last 10 years...

PRESENTED AT FMCB
JUNE 2016

Year-end MBTARF Net Assets: Market Value
(not including unfunded liability)



**Market
Funded % 92%**

58%

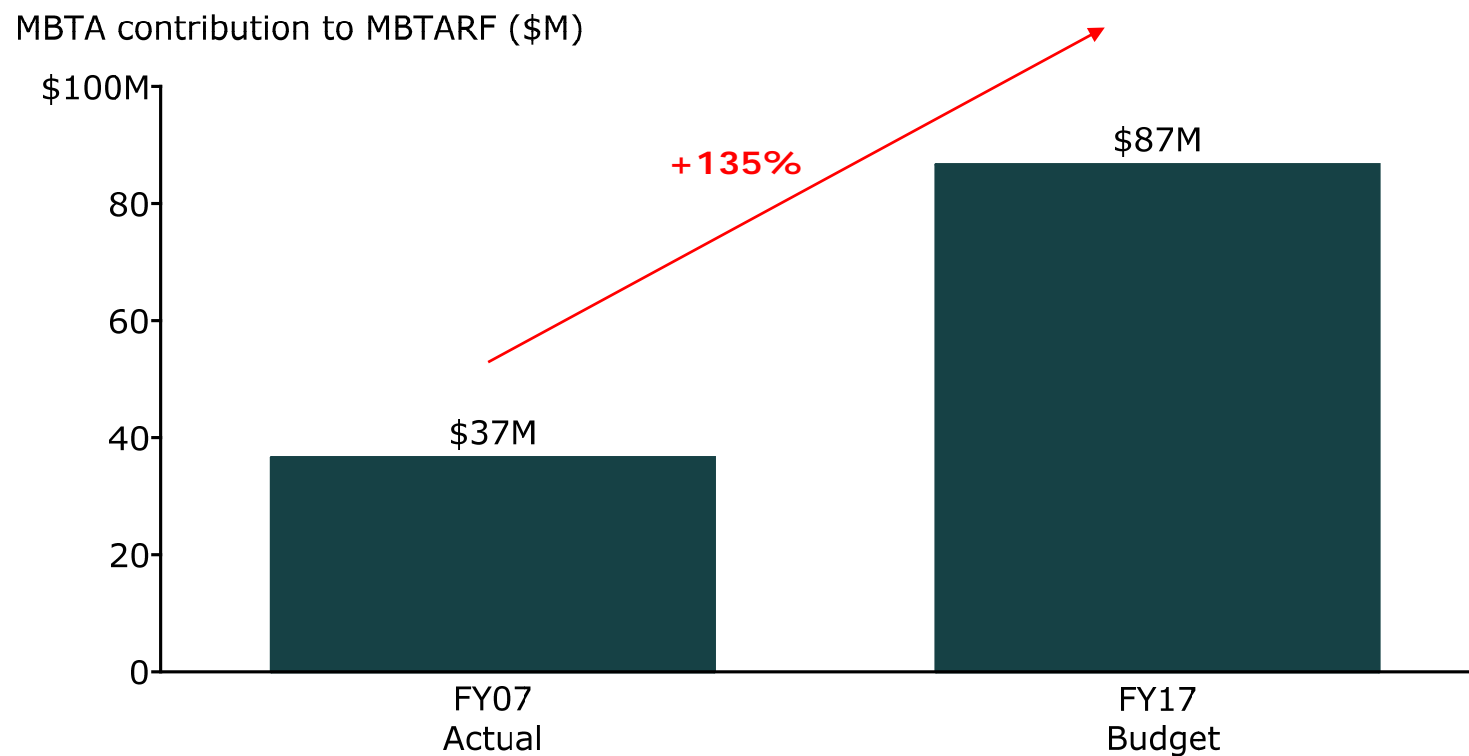
*Preliminary estimates as of 5/1/2017

Source: MBTA Pension Fund Data; MBTARF Annual Reports

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... while MBTA contributions have grown 135% over the last 10 years



Note: \$7.0M in contributions during FY07 were retroactive 'catch-up' payments for previous years in which not enough had been contributed compared with contractual obligations; these have been removed

Source: MBTA Financials

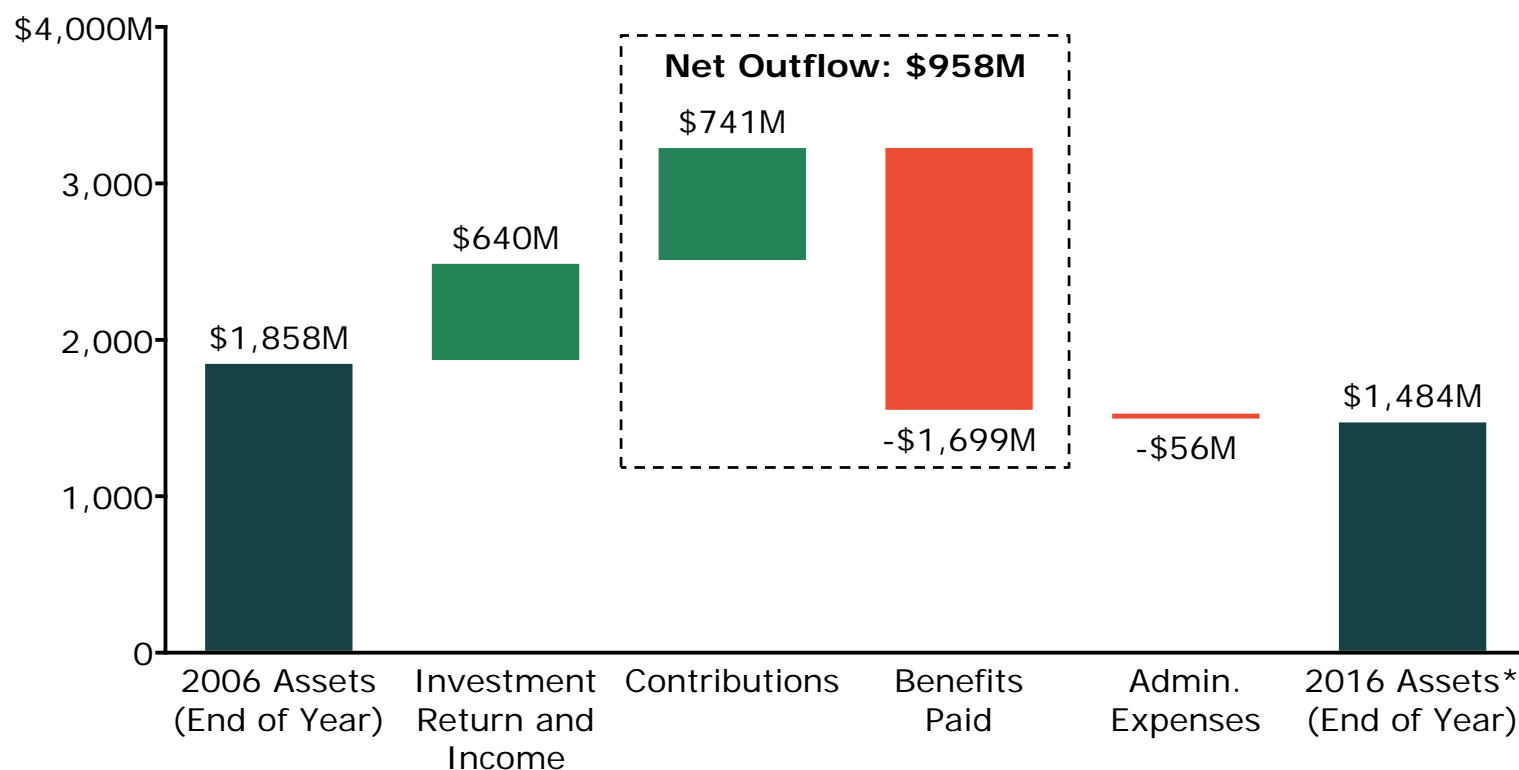
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Nearly \$1B in net outflows over past decade

PRELIMINARY 2016

Total Additions and Deductions from the MBTARF, 2006-2016



*2016 number preliminary until Actuarial Valuation complete, latest as of 5/1/2017

Note: Administrative Expenses includes Refunds

Source: MBTARF Annual Reports

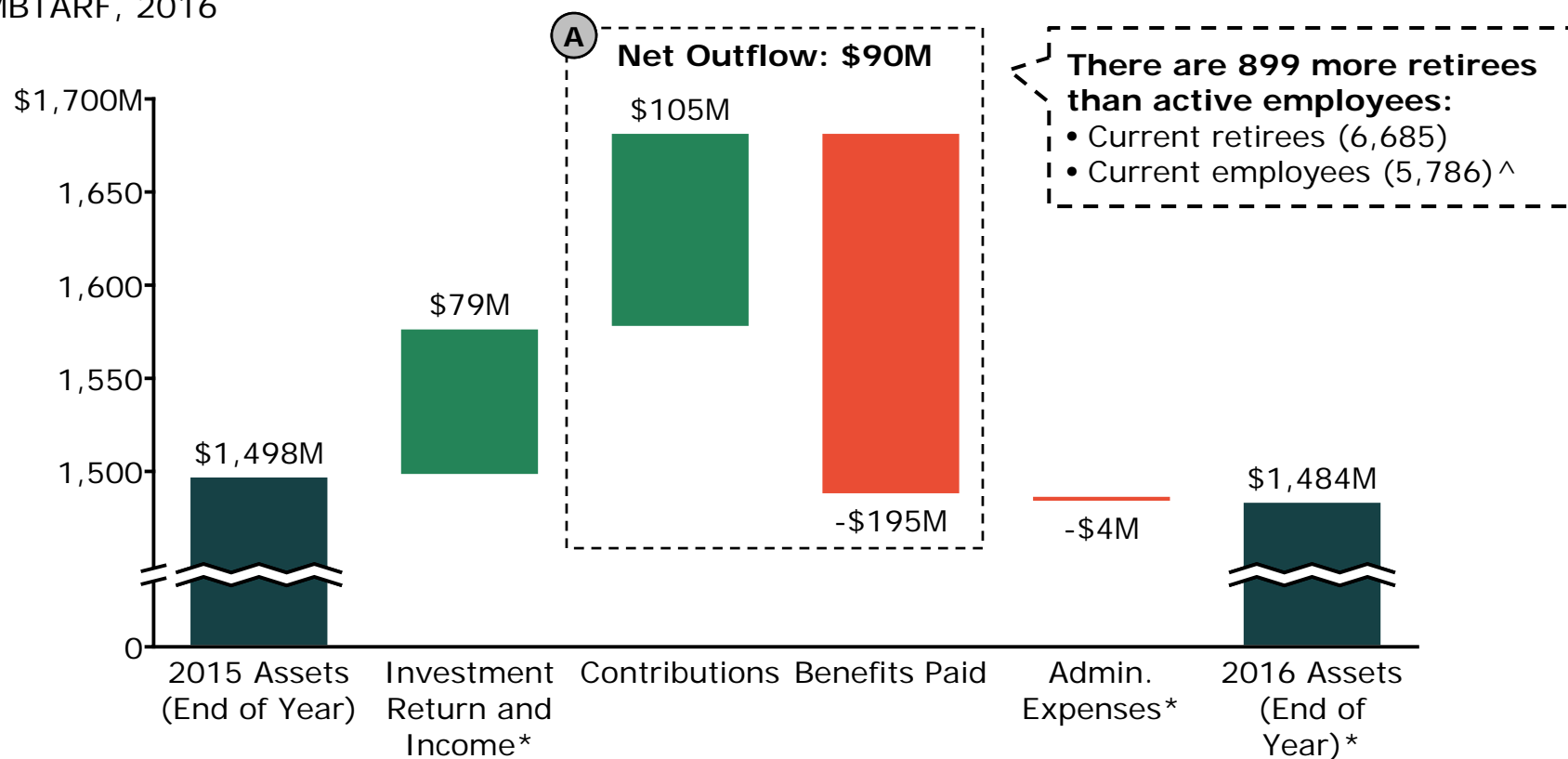
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Annual benefit payments now nearly double contributions

PRELIMINARY 2016

Total Additions and Deductions from the MBTARF, 2016



*Preliminary estimates as of 5/1/2017

^Current retiree and active employee counts are preliminary, will be confirmed by 12/31/16 valuation when complete

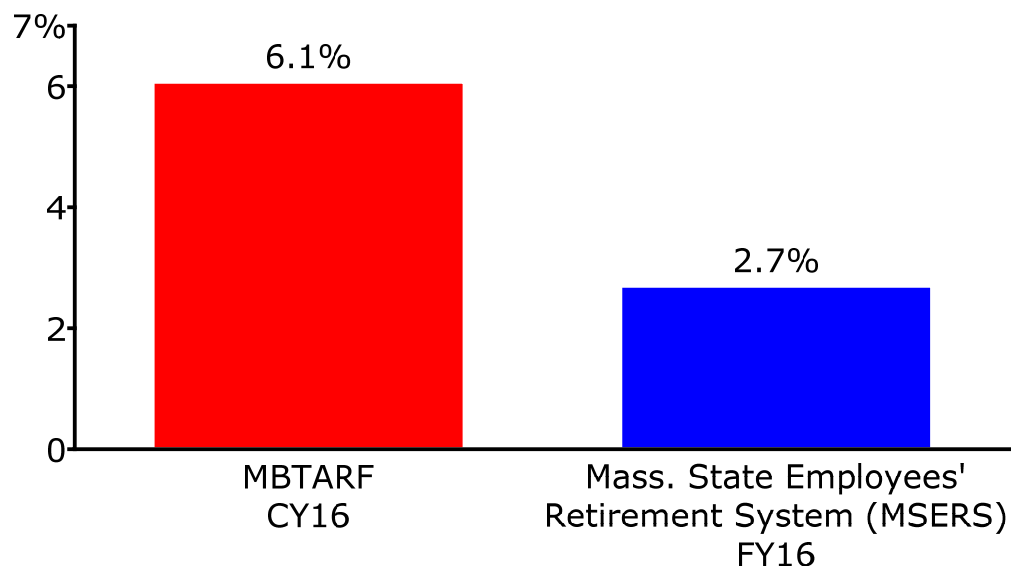
Source: MBTA Pension Fund Data; MBTARF Annual Reports

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MBTARF asset balance will decline in any year in which returns fall below 6.1% (net outflow %)

Net outflow as a % of total assets
(not including investment return)



- **MBTARF has net outflow of \$90M on net assets of \$1.5B in CY16** before investment returns
- **MSERS had net outflow of \$642M on assets of \$23.7B in FY16** before investment returns

$$\text{Net Outflow as a \% of net assets} = \frac{\text{Net Outflow}}{\text{Total Fund Assets}}$$

Note: PRIM invests multiple retirement systems' assets
Source: MBTA Pension Fund Data; PRIM Annual Report

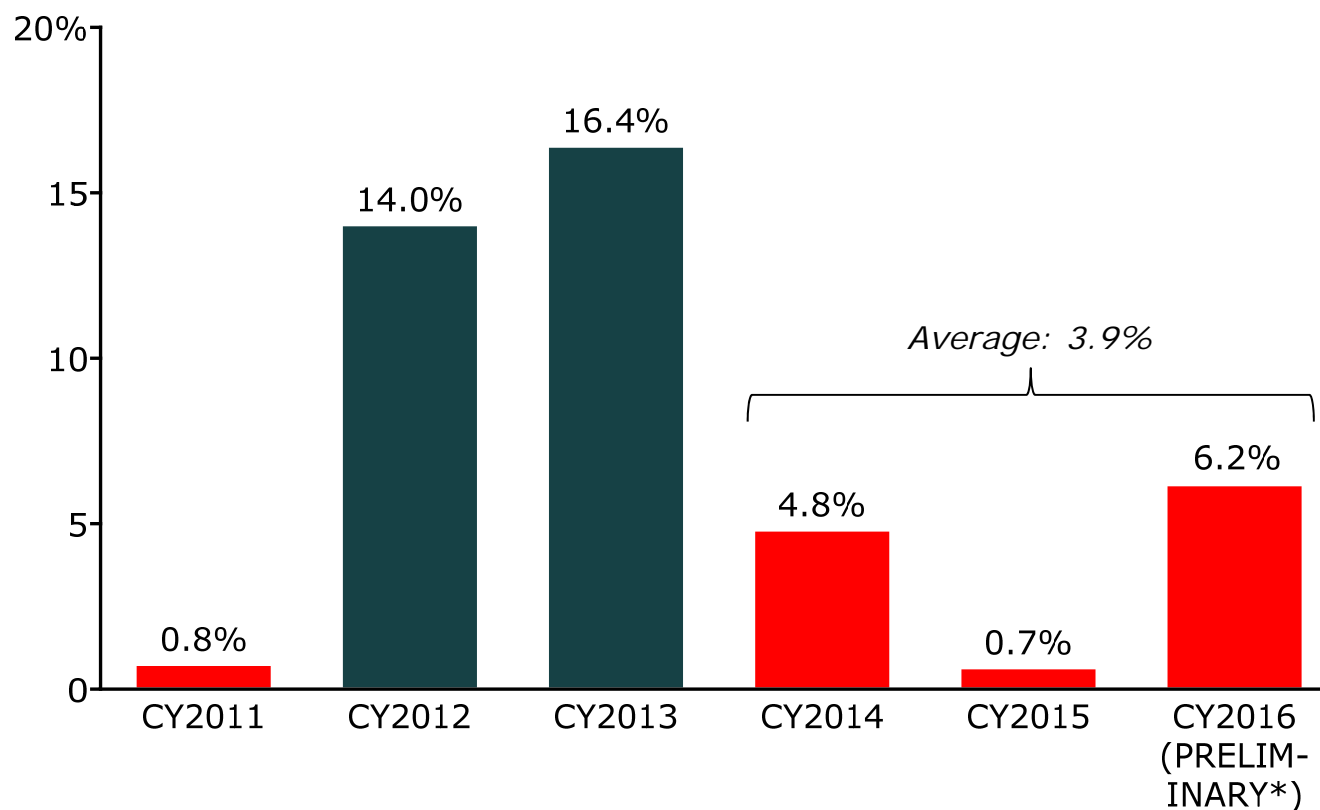
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Investment returns will not be adequate to rescue the fund

PRELIMINARY 2016

Main Fund Annual Rate of Net Return



*Preliminary estimates as of 5/1/2017

Source: MBTA Pension Fund Data; MBTARF Annual Reports

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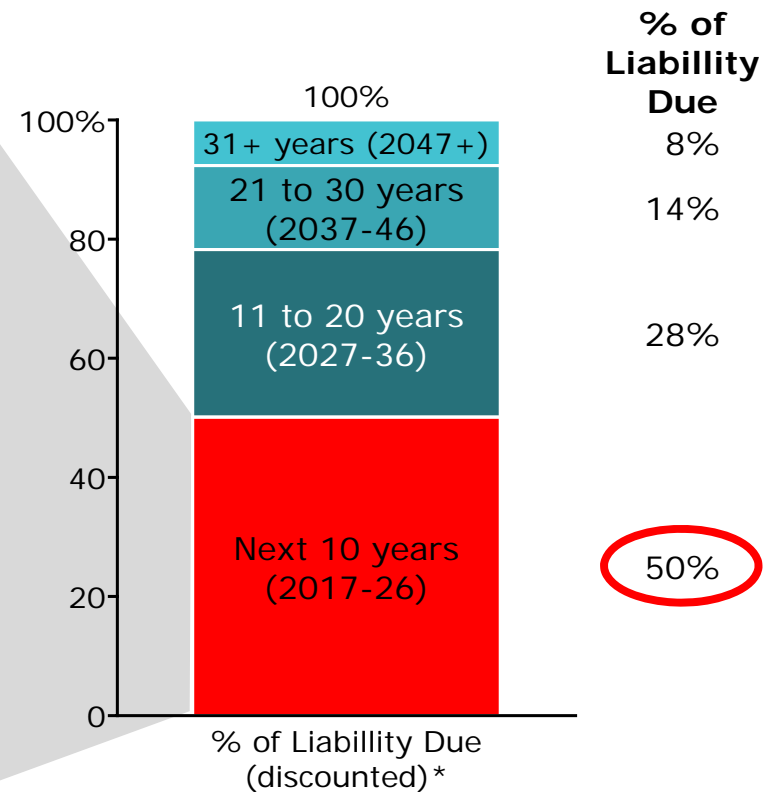
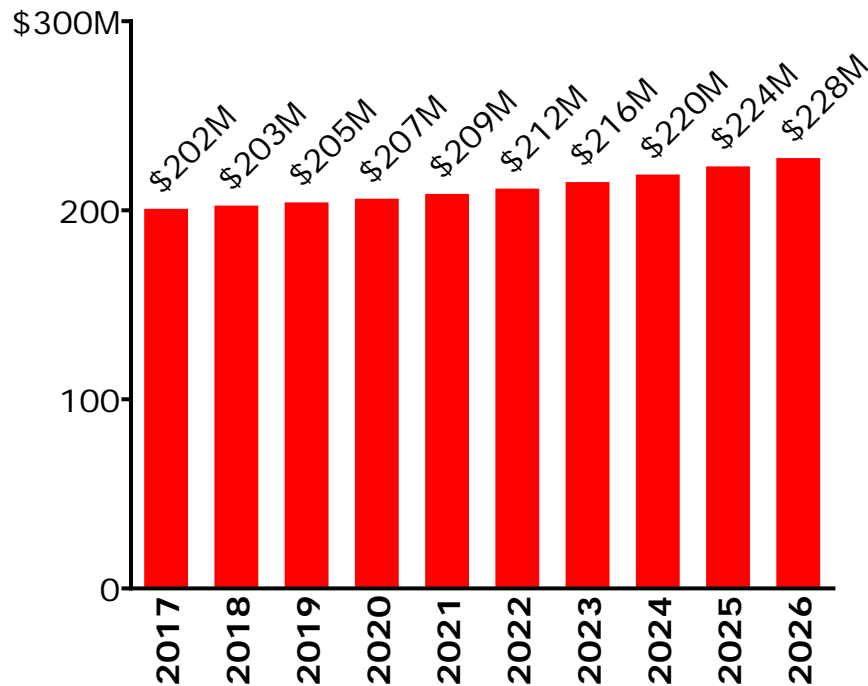


Next 10 years of returns are critical

MBTA TO PAY \$2.1B IN BENEFITS TO RETIREES OVER NEXT TEN YEARS

\$2.1B IN BENEFITS OVER NEXT TEN YEARS COMPRISES HALF THE TOTAL ACCRUED LIABILITY OF THE MBTARF

Annual Projected MBTARF Benefits
(2017-2026, Undiscounted)



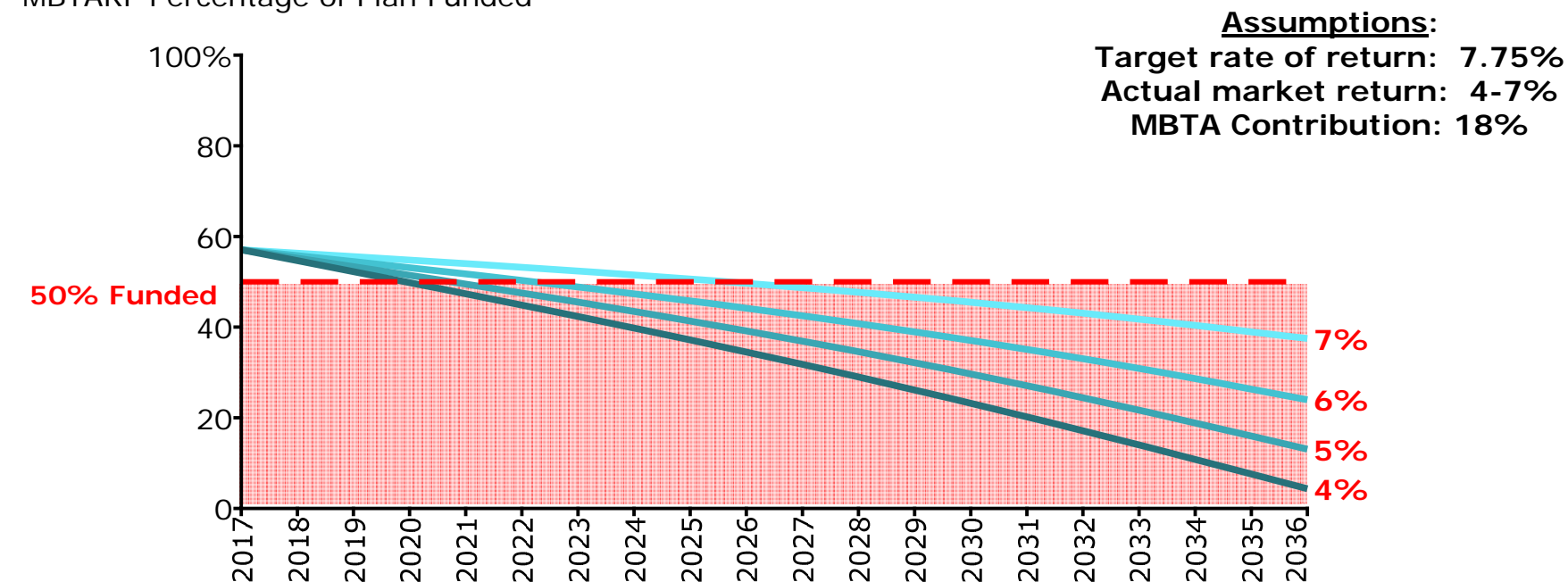
*Based on a 7.75% rate for discounting



If MBTARF continues to generate only 4%-5% returns, funding level likely to fall below 50% within 5 years

ESTIMATED MBTARF FUNDING PERFORMANCE WITH CONSTANT CURRENT CONTRIBUTION RATE

MBTARF Percentage of Plan Funded



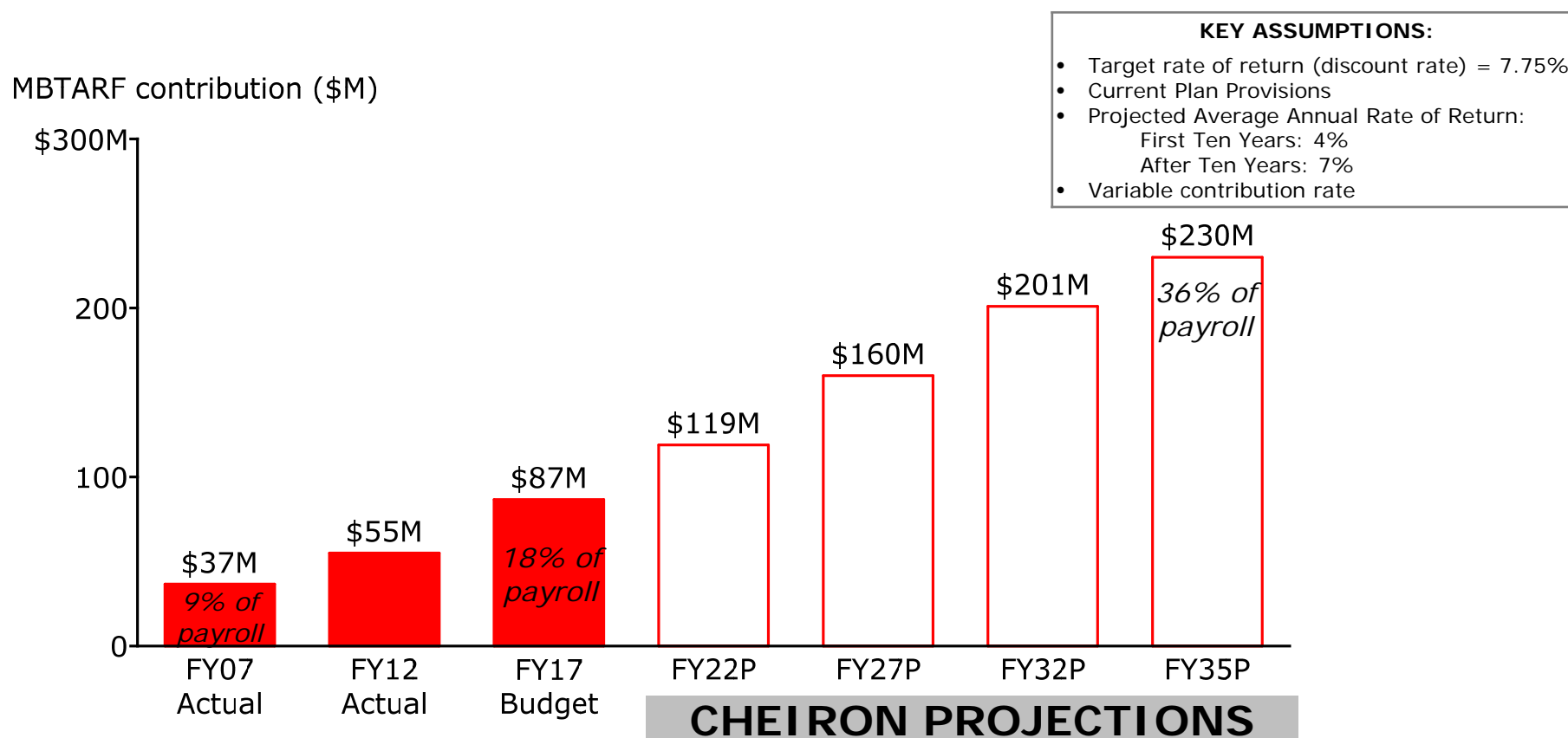
KEY ASSUMPTIONS:

- Employer Contribution Rate = 18%
- Employee Contribution Rate = 6%
- 2016 Preliminary Return = 6.2
- Target rate of return (discount rate) = 7.75%
- Current Plan Provisions
- Funded ratios shown were based upon market value of assets

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Without action, the MBTA annual contribution could grow to \$200M+ and consume 36% of payroll



Note: \$7.0M in contributions during FY07 were retroactive 'catch-up' payments for previous years in which not enough had been contributed compared with contractual obligations; these have been removed

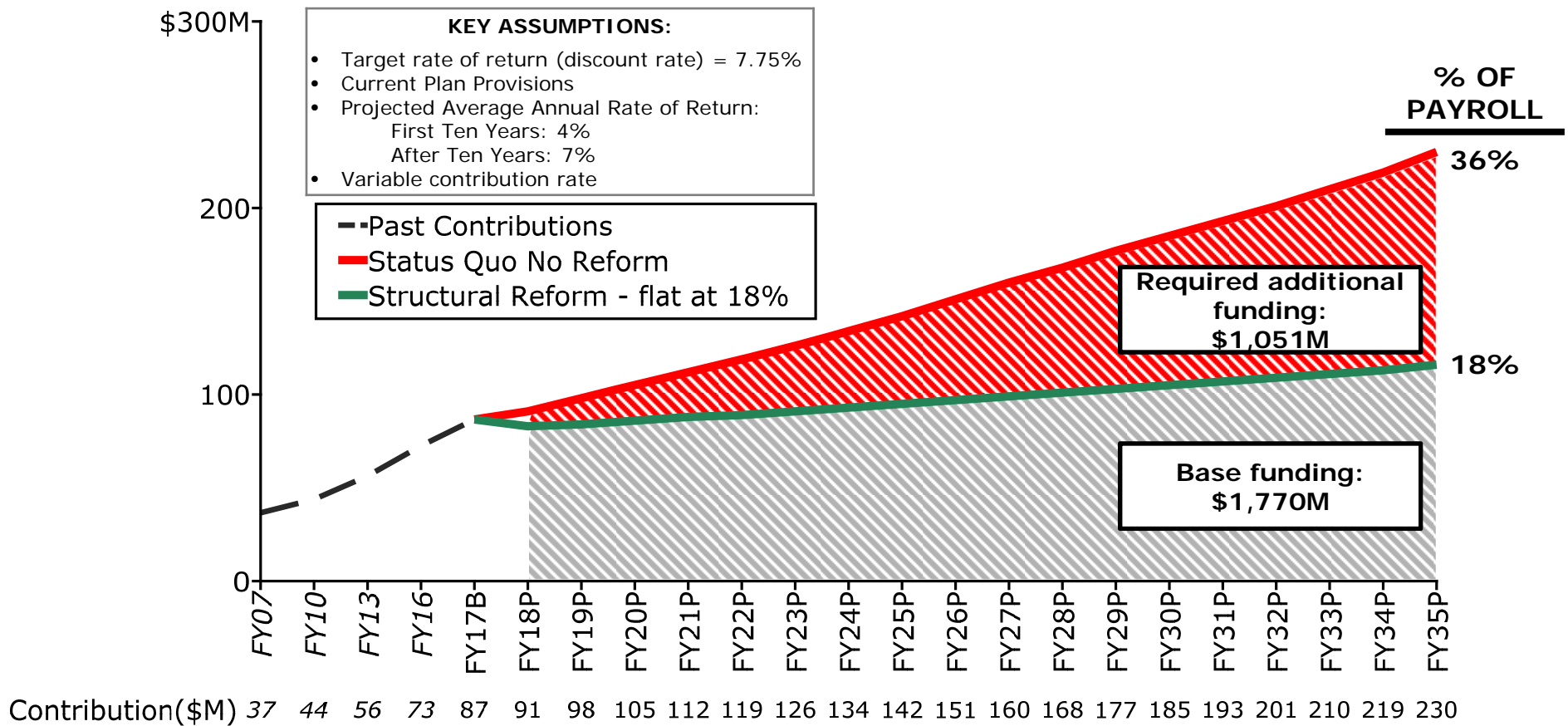
Source: MBTA Financials; Cheiron Projections

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Without action, MBTARF could require \$3B in taxpayer funding over next 20 years

MBTARF Contribution Scenarios

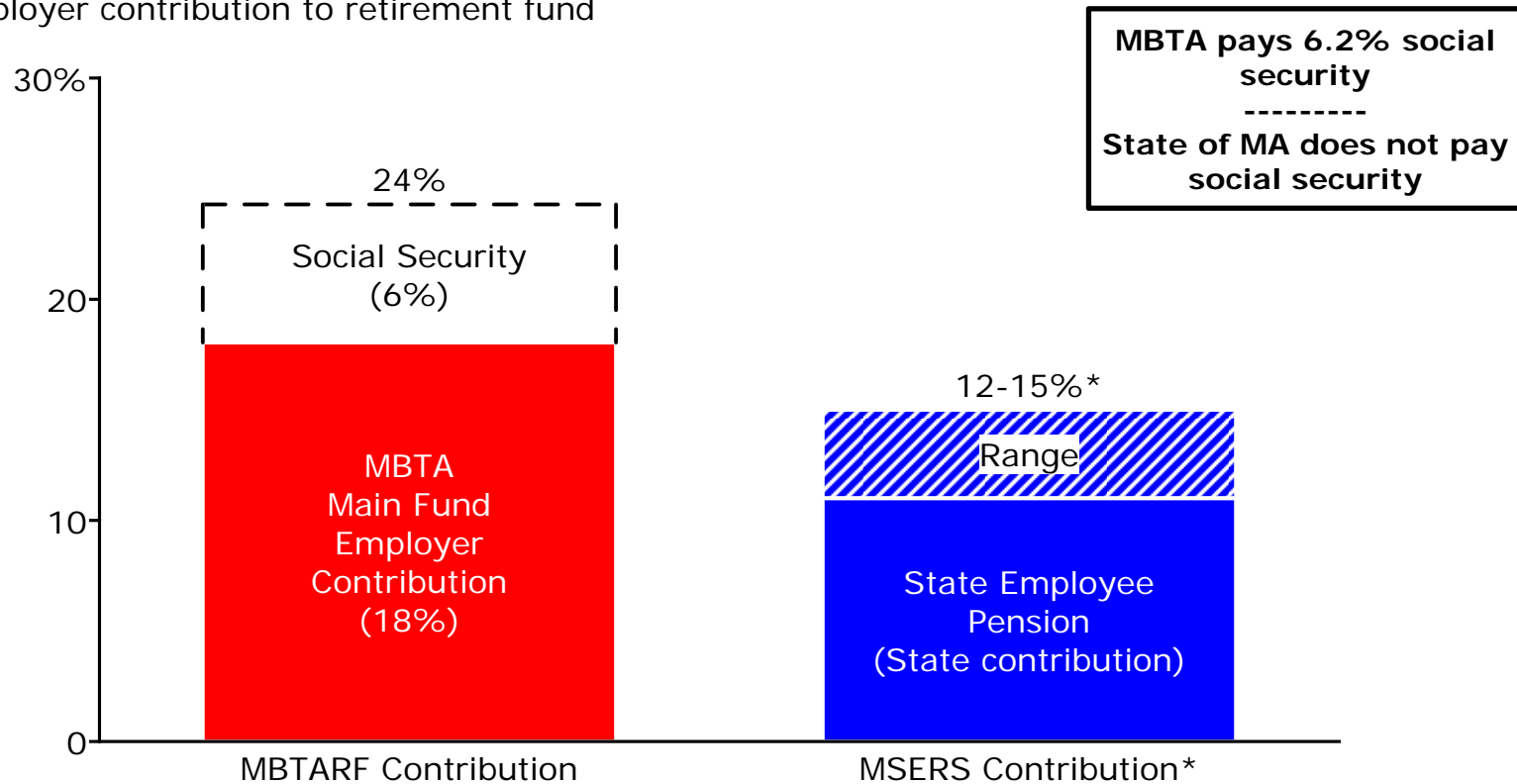


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Unlike other state employees and teachers (who don't receive social security), MBTA employees receive both a full pension and social security

FY17 employer contribution to retirement fund



*High range of state employer contribution calculated for MBTA by ANF, Low side of range from 12/15/16 Boston Globe article 'Report proposes major overhaul of retirement benefits for new MBTA Employees'; Estimated amount based on allocation of total lump sum pension payment by Commonwealth to PRIM for state employees varies based on calculation method

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MBTARF plan design provides added incentive to retire young

Years of service x Annual Multiplier = Pension % of Highest Wages

<u>Years of service</u>	<u>Age at retirement</u>	<u>Employer</u>	<u>Annual multiplier*</u>	<u>Pension % of highest wages</u>
25	55	MBTA	2.46%	61.5%
		State	N/A—min age 60	N/A—min age 60
25	60	MBTA	2.46%	61.5%
		State	1.45%	36.3%
25	65	MBTA	2.46%	61.5%
		State	2.20%	55.0%
32	67	MBTA	2.46%	75% ^
		State	2.50%	80%



Because MBTA pension multiplier does not grow with age, benefits for early retirees are significantly higher than those for state employees

*Uses age rates for state employees hired after 4/2/2012

^Calculation produces result >75%, which is adjusted down to maximum benefit

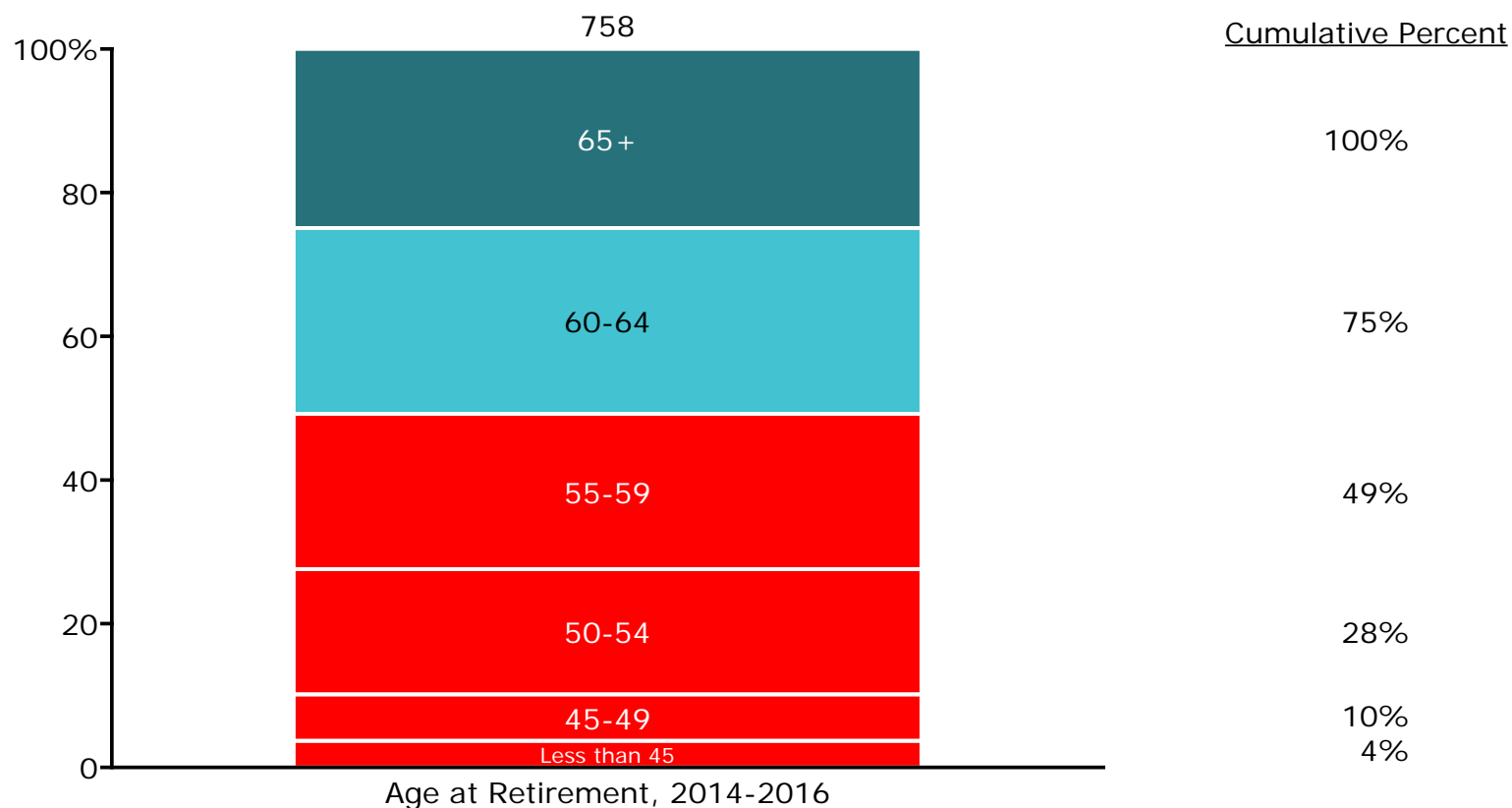
Note: MBTARF benefits do not get automatic COLAs; retirees in State systems do (those covered by Chapter 32)

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Unsustainable Plan Design: Half of MBTA employees retire and begin drawing pension benefits in their 50s

Retired MBTA employee count, 2014-2016





MBTA employees earn significantly more in post-retirement pension benefits than state employees and teachers at all ages

EXAMPLE: FINAL AVERAGE EARNINGS \$80,000 | 25 YEARS OF SERVICE

COMPARISON OF MBTA PENSION BENEFIT WITH STATE AND TEACHERS BENEFIT

AGE AT RETIREMENT	TEACHERS AND STATE EMPLOYEES (HIRED SINCE 4/2012)	MBTARF MULTIPLIER (2.46%)	SOCIAL SECURITY	TOTAL RETIREMENT BENEFIT (SS+MBTARF)
60	\$29,000	\$49,200		\$49,200 (\$66,600 at Age 62)
61	\$32,000	\$49,200		\$49,200 (\$66,600 at Age 62)
62	\$35,000	\$49,200	+\$17,400	\$66,600
63	\$38,000	\$49,200	+\$18,600	\$67,800
64	\$41,000	\$49,200	+\$19,800	\$69,000
65	\$44,000	\$49,200	+\$20,700	\$69,900
66	\$47,000	\$49,200	+\$22,300	\$71,500
67	\$50,000	\$49,200	+\$23,800	\$73,000

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“Status Quo” is not an option:
Retirees are at risk without pension reform

1. The MBTA Retirement Fund is in crisis and without significant external financing it is on track to run out of money
2. Market returns are not likely to rescue the pension, and one bad investment year would be crippling
3. MBTA cannot afford the financial burden of uncontrolled pension contribution growth
4. The longer that action is deferred, the worse the choices will get for MBTA/State



Next steps

- Seek input from a broad array of stake-holders on ideas for putting the MBTA RF on a sustainable path for current employees and retirees
- Meet with Carmen's Union to begin discussions on their ideas for a path forward – collaboration between the Union and MBTA will be critical to any workable solution
- Vet and report publicly on all ideas and proposals, using a third-party to quantify and validate potential scenarios

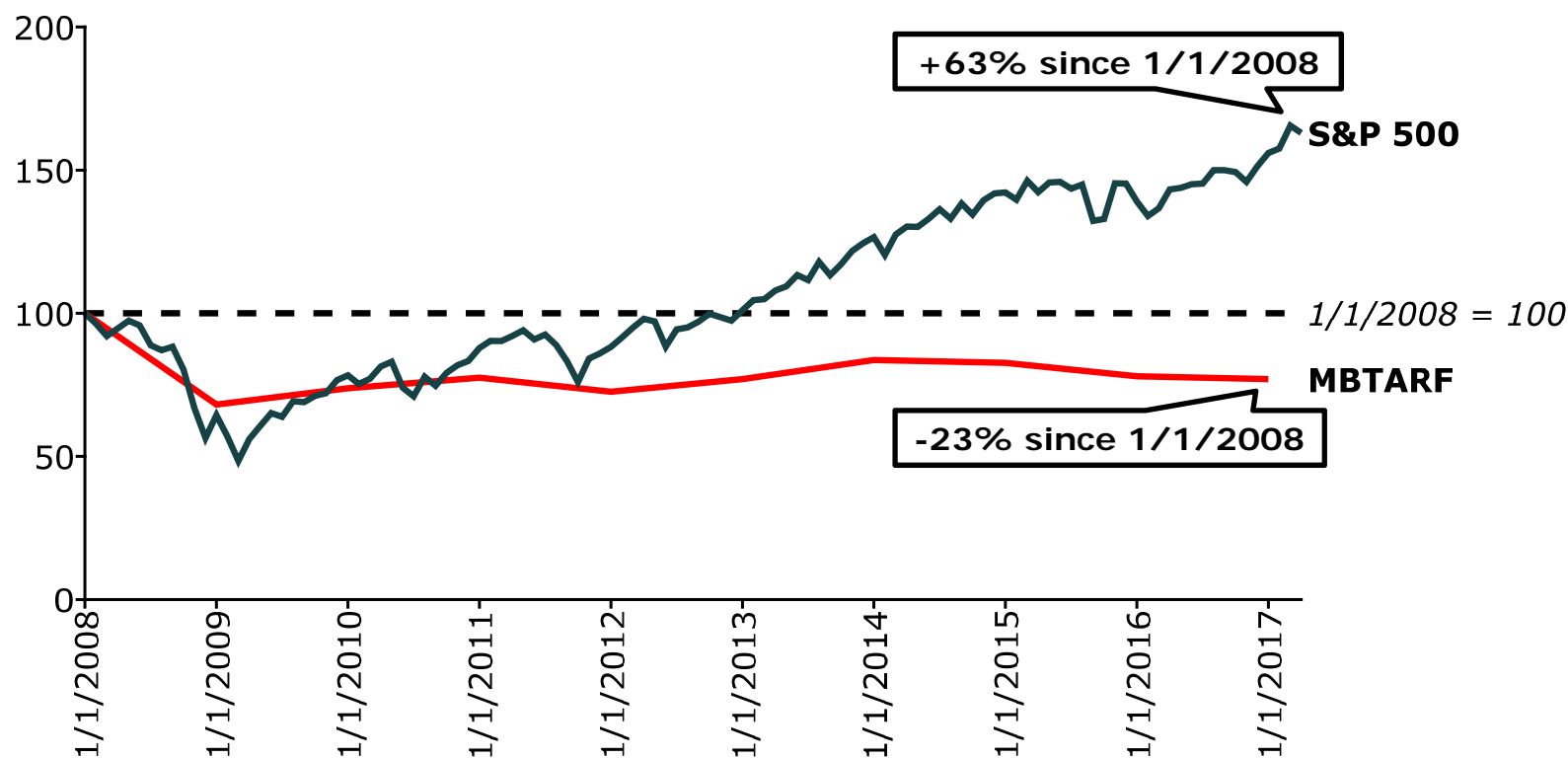


Appendix



While the broader market has recovered from the 2009 downturn, the MBTARF portfolio has failed to keep pace

S&P 500 and MBTARF valuations



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MBTARF return expectations: Fund should ensure sustainability with returns of 4% over the next 10 years

CONSERVATIVE EVALUATION OF MBTARF PORTFOLIO ESTIMATES 4% RETURN OVER 10 YEARS

EQUITY	Source	% Alloc	Geometric Return	Volatility	Arithmetic Return
Domestic - Large	RA	18%	2.60%	14.3%	3.62%
Domestic - Small	RA	7%	2.40%	19.0%	4.21%
International	RA	11%	7.30%	16.9%	8.73%
Emerging	RA	2%	8.90%	23.2%	11.59%
Global	BNY	5%	6.40%	16.5%	7.76%
FIXED INCOME					
Core	RA	8%	2.70%	3.8%	2.77%
TIPS	RA	3%	3.00%	6.2%	3.19%
Mortgage	BNY	3%	2.70%	2.5%	2.73%
Multi-sector	BNY	8%	2.57%	10.4%	3.10%
Bank Loans	RA	2%	3.90%	8.1%	4.23%
Real Estate Debt	BR	1%	3.15%	8.8%	3.54%
Cash	BNY	2%	1.50%	0.0%	1.50%
ALTERNATIVES					
Hedge Funds	BNY	10%	4.30%	6.3%	4.50%
Real Estate	BNY	9%	4.00%	5.0%	4.13%
Private Equity	BNY	8%	7.90%	17.8%	9.48%
Risk Parity	Est	3%	5.00%	10.0%	5.50%
Estimated Portfolio		100%	4.46%	11%	5.07%
Uncertainty for Alternatives			-0.30%		
Net Expected Geometric Return			4.16%		

Notes: 100 bps reduction for alternative risk;
BNY net of fees, RA gross of fees

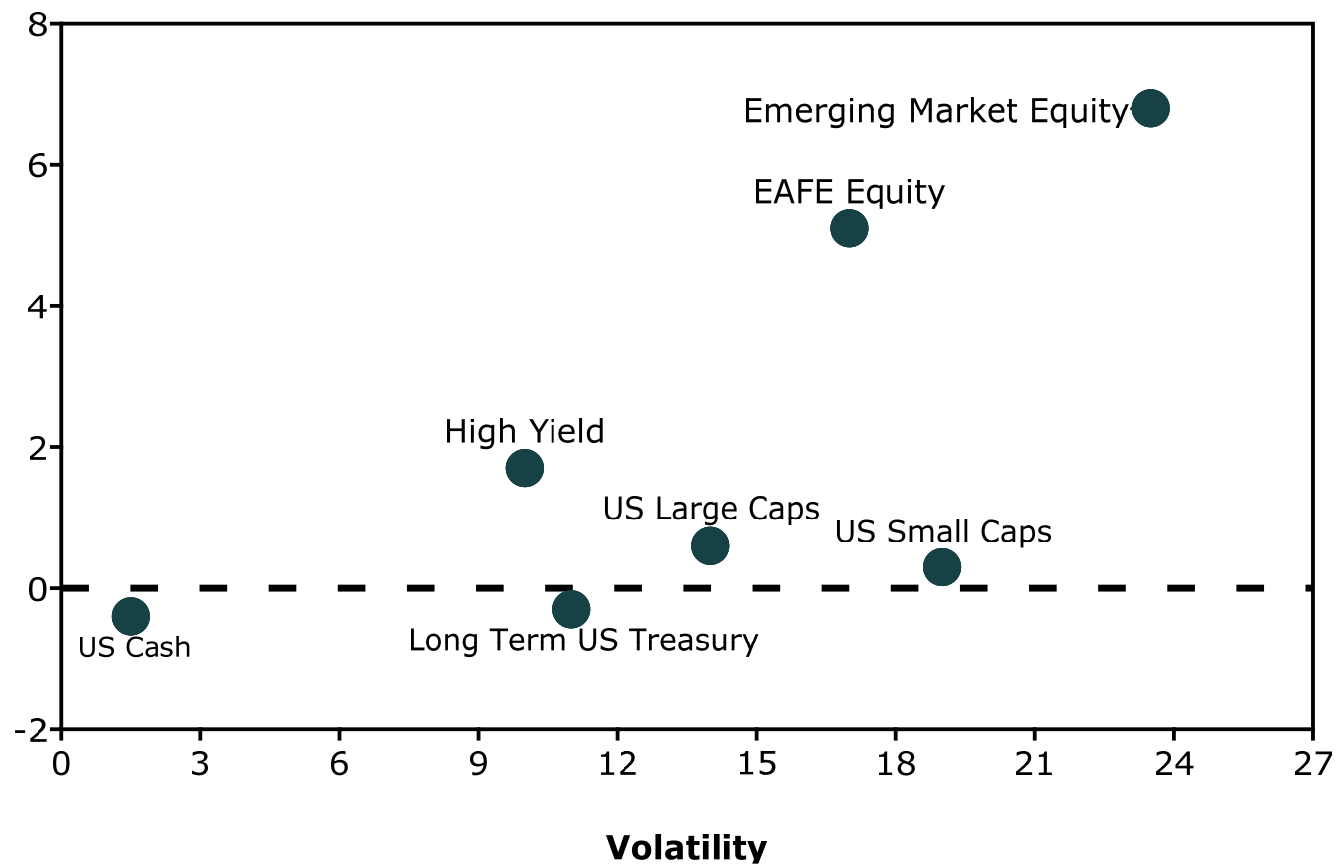
EXPERT RECOMMENDS ASSUMING 4% RETURN FOR NEXT TEN YEARS, BUT ENSURING SUSTAINABILITY AT EVEN LOWER RETURNS

- Due to high benefit liability (50% of total) due over the next ten years, returns over that period are critical for determining future funding levels
- A reasonable annual return expectation for MBTARF over the next 10 years is 4-5%
- Optimistic forecasts results in an expectation of 5.2% over 10 years
- Lower returns are possible and full sustainability would require that the plan survive returns lower than 4% in the next 10 years.
- **Recommended that the baseline evaluation of MBTARF use 4% returns for the next 10 years to stress test the fund under various scenarios and develop a rescue strategy**



Global Investing: 10-year outlook poor for most asset classes

10-Year Real Expected Returns



Source: Barron's—May 15, 2017, "Global Investing: Taking a Long View", projections from Research Affiliates

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June 26, 2017



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FMCB Update

6/19/2017



Sensitivity Analysis



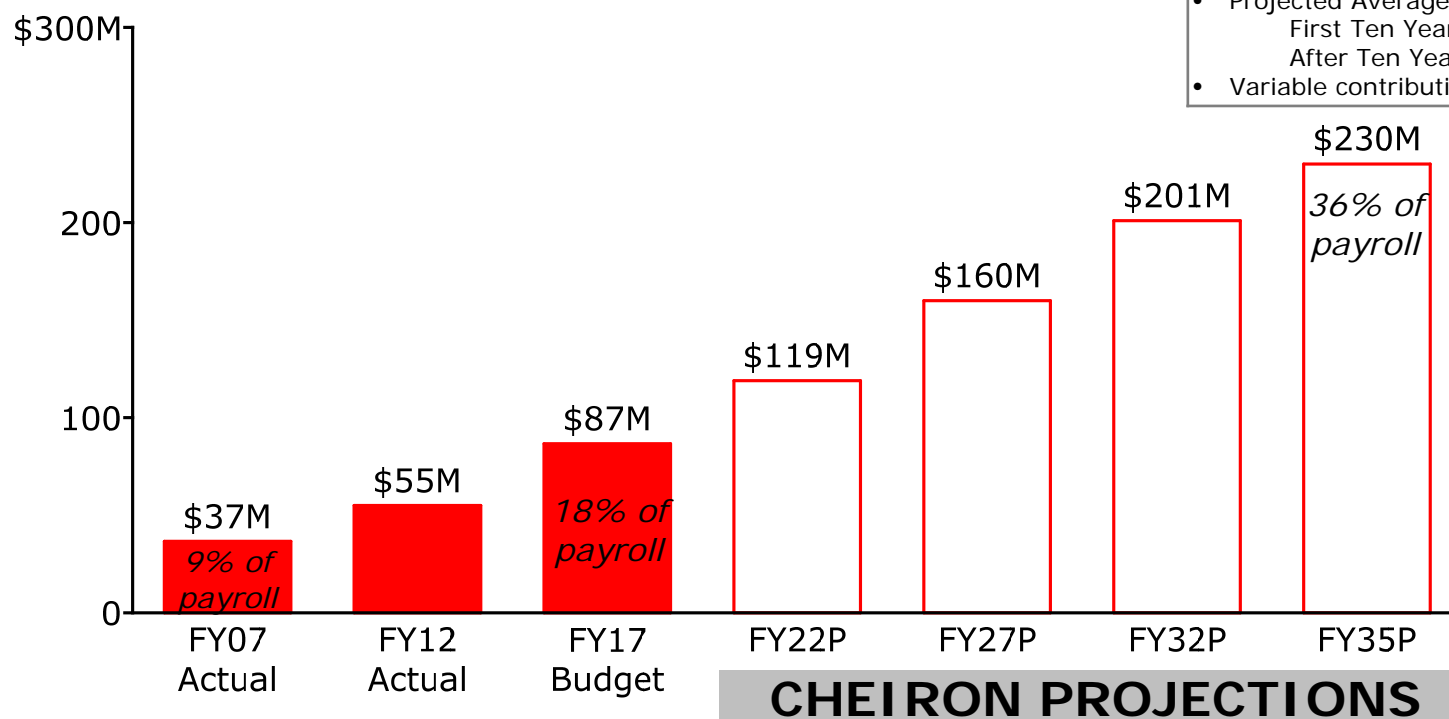
Without action, the MBTA annual contribution could grow to \$200M+ and consume 36% of payroll

Presented to FMCB 5/22/17

KEY ASSUMPTIONS:

- Target rate of return (discount rate) = 7.75%
- Current Plan Provisions
- Projected Average Annual Rate of Return:
 - First Ten Years: 4%
 - After Ten Years: 7%
- Variable contribution rate

MBTARF contribution (\$M)



Note: \$7.0M in contributions during FY07 were retroactive 'catch-up' payments for previous years in which not enough had been contributed compared with contractual obligations; these have been removed

Source: MBTA Financials; Cheiron Projections

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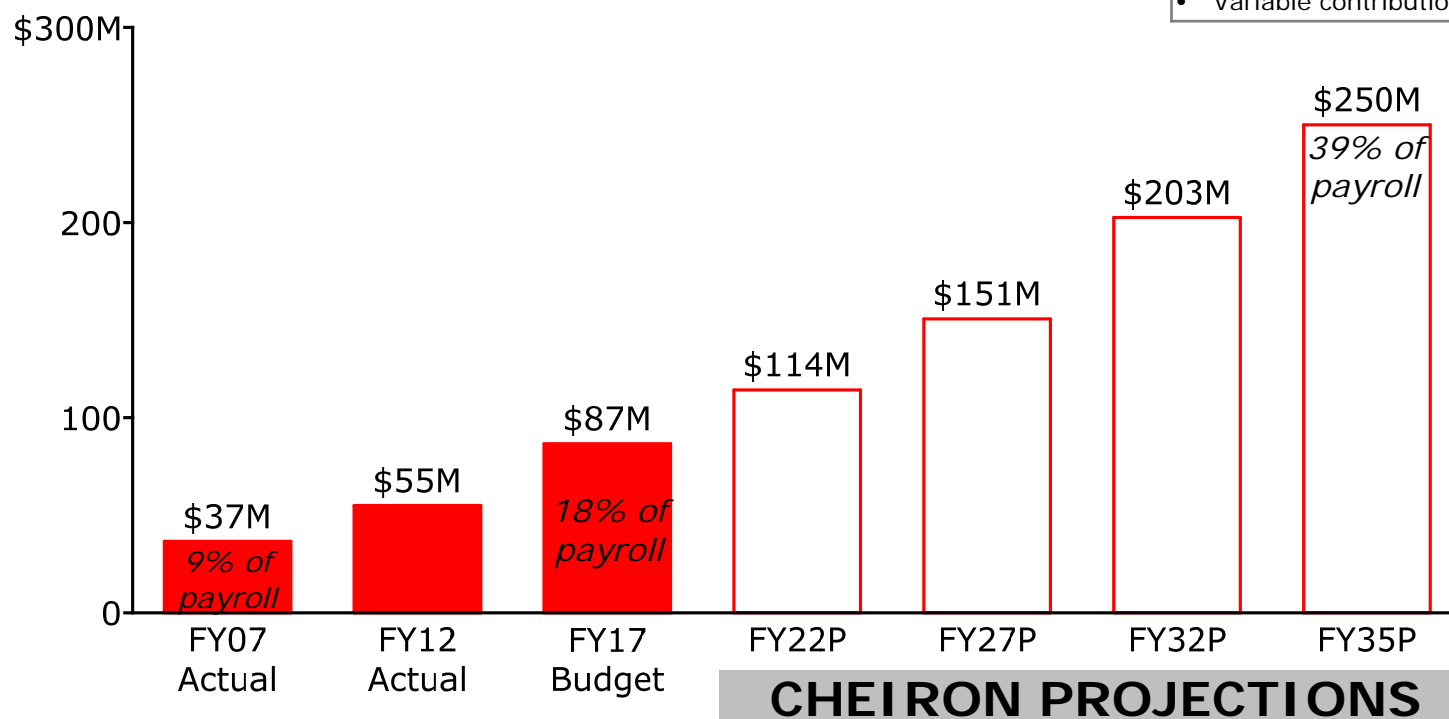


MBTA Required Contribution at 5% market returns 39% of payroll

KEY ASSUMPTIONS:

- Target rate of return (discount rate) = 7.75%
- Current Plan Provisions
- Projected Average Annual Rate of Return = 5%
- Variable contribution rate

MBTARF contribution (\$M)



Note: \$7.0M in contributions during FY07 were retroactive 'catch-up' payments for previous years in which not enough had been contributed compared with contractual obligations; these have been removed

Source: MBTA Financials; Cheiron Projections

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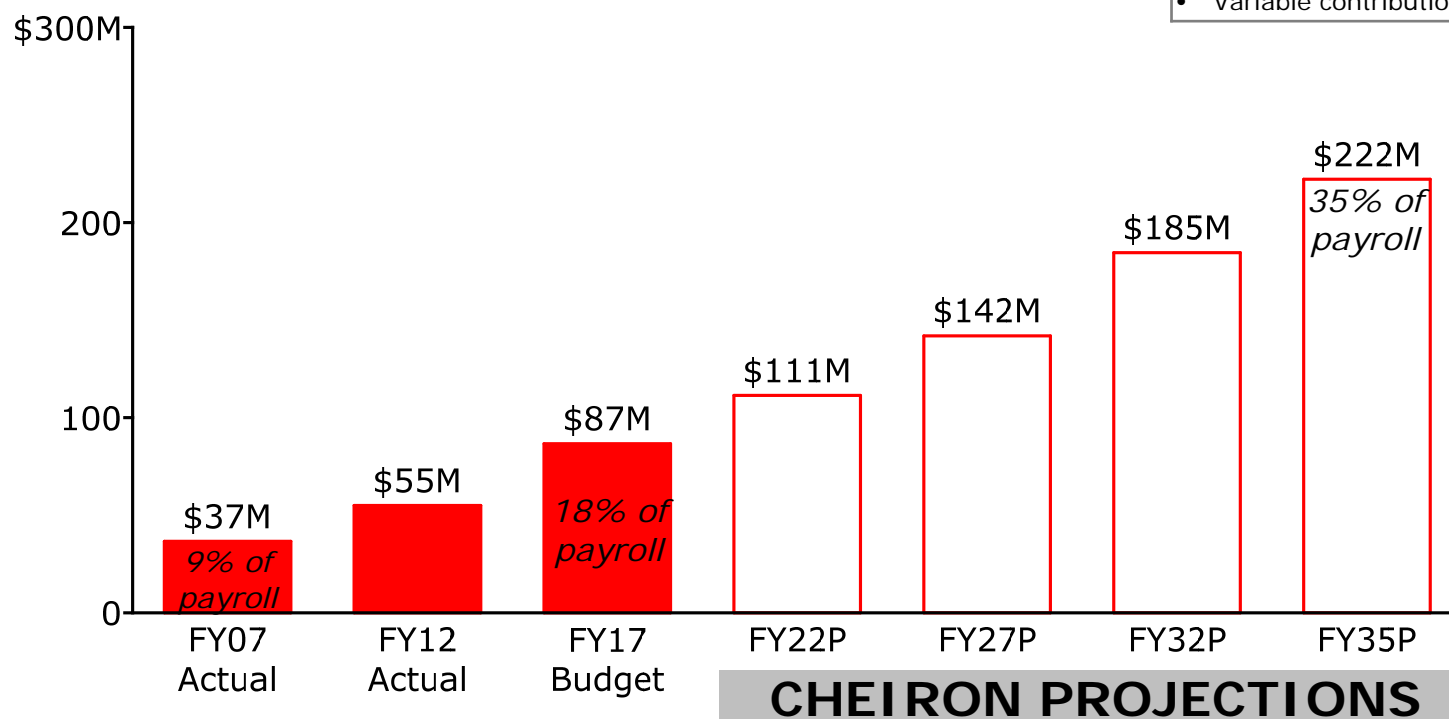


MBTA Required Contribution at 6% market returns 35% of payroll

KEY ASSUMPTIONS:

- Target rate of return (discount rate) = 7.75%
- Current Plan Provisions
- Projected Average Annual Rate of Return = 6%
- Variable contribution rate

MBTARF contribution (\$M)



Note: \$7.0M in contributions during FY07 were retroactive 'catch-up' payments for previous years in which not enough had been contributed compared with contractual obligations; these have been removed

Source: MBTA Financials; Cheiron Projections

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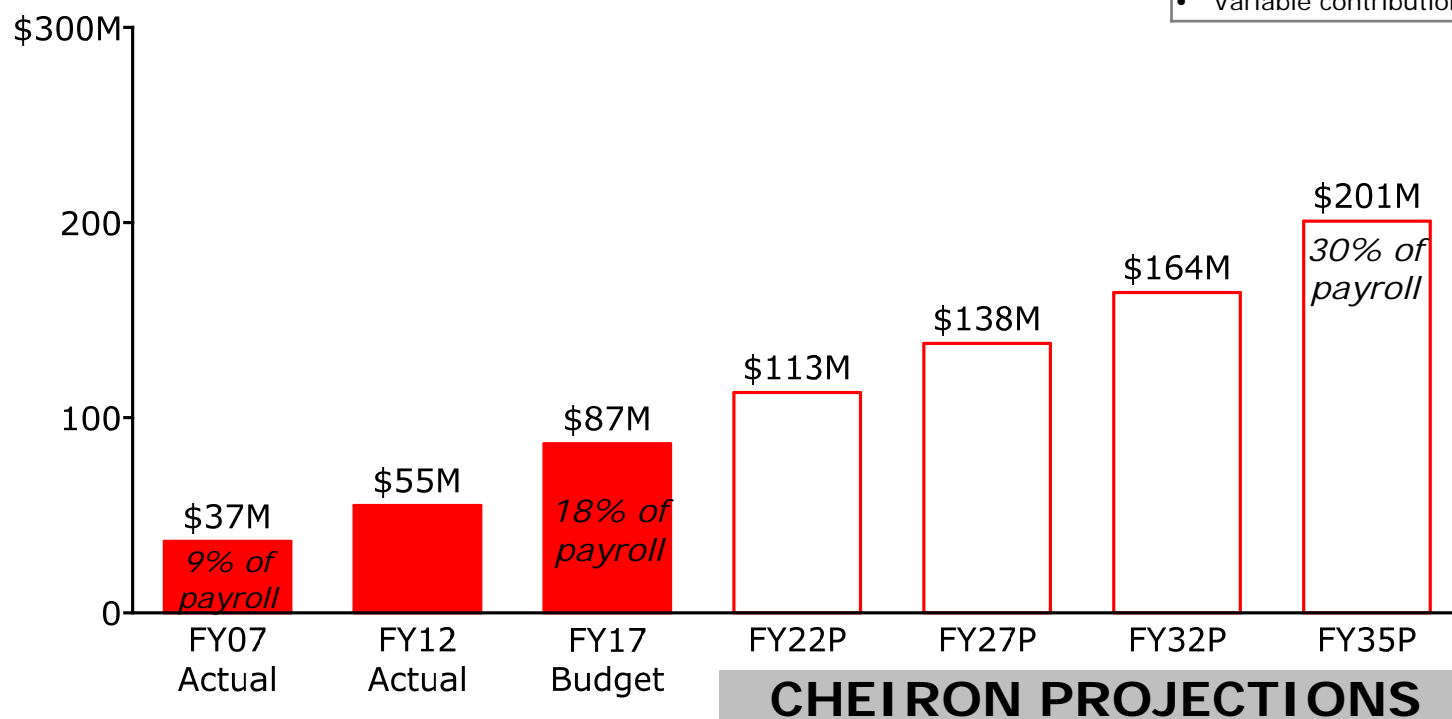


MBTA Required Contribution at 7% market returns 30% of payroll

KEY ASSUMPTIONS:

- Target rate of return (discount rate) = 7.75%
- Current Plan Provisions
- Projected Average Annual Rate of Return = 7%
- Variable contribution rate

MBTARF contribution (\$M)



Note: \$7.0M in contributions during FY07 were retroactive 'catch-up' payments for previous years in which not enough had been contributed compared with contractual obligations; these have been removed

Source: MBTA Financials; Cheiron Projections

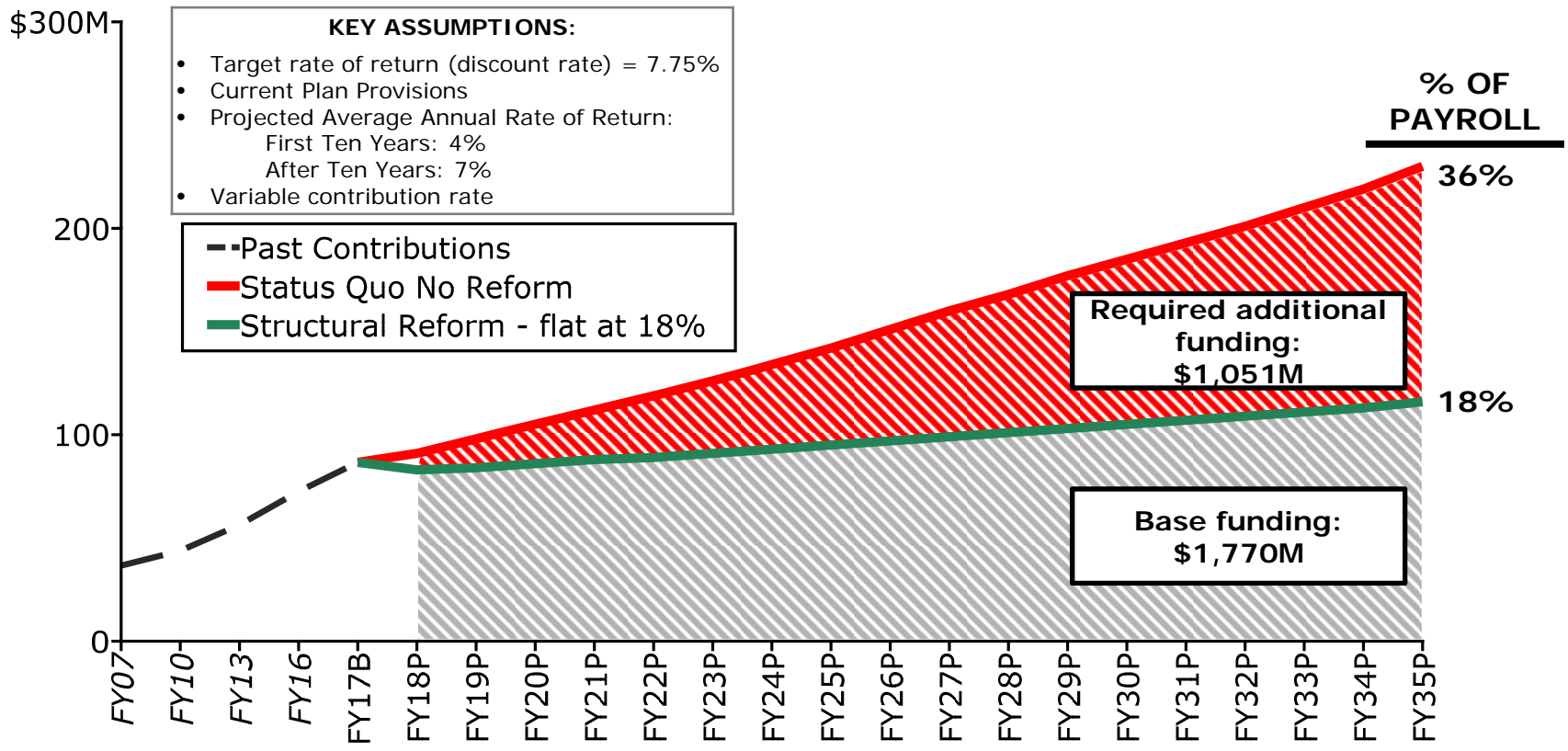
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Without action, MBTARF could require \$3B in taxpayer funding over next 20 years

Presented to FMCB 5/22/17

MBTARF Contribution Scenarios

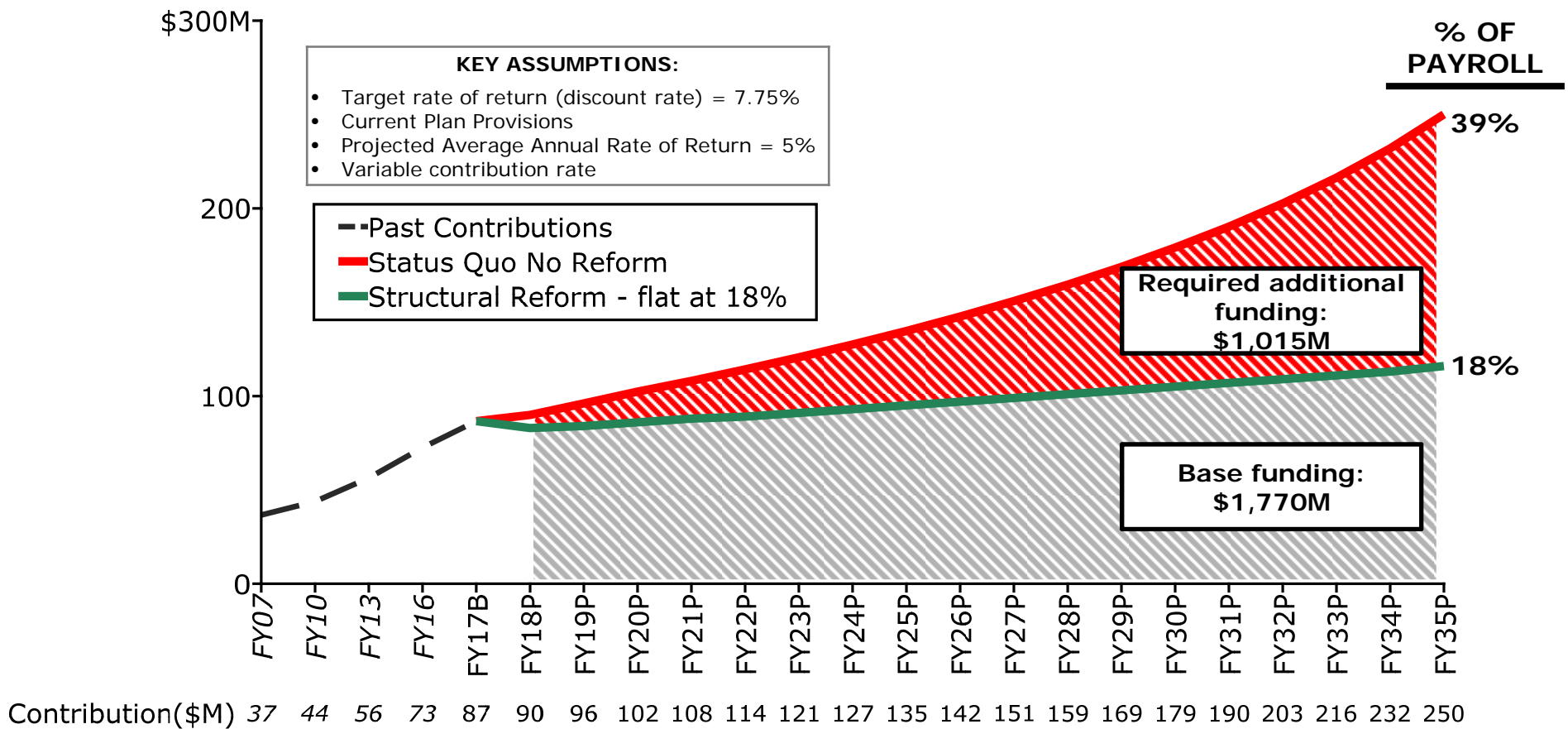


Contribution(\$M) 37 44 56 73 87 91 98 105 112 119 126 134 142 151 160 168 177 185 193 201 210 219 230



Required taxpayer funding at 5% market returns \$2.8B

MBTARF Contribution Scenarios

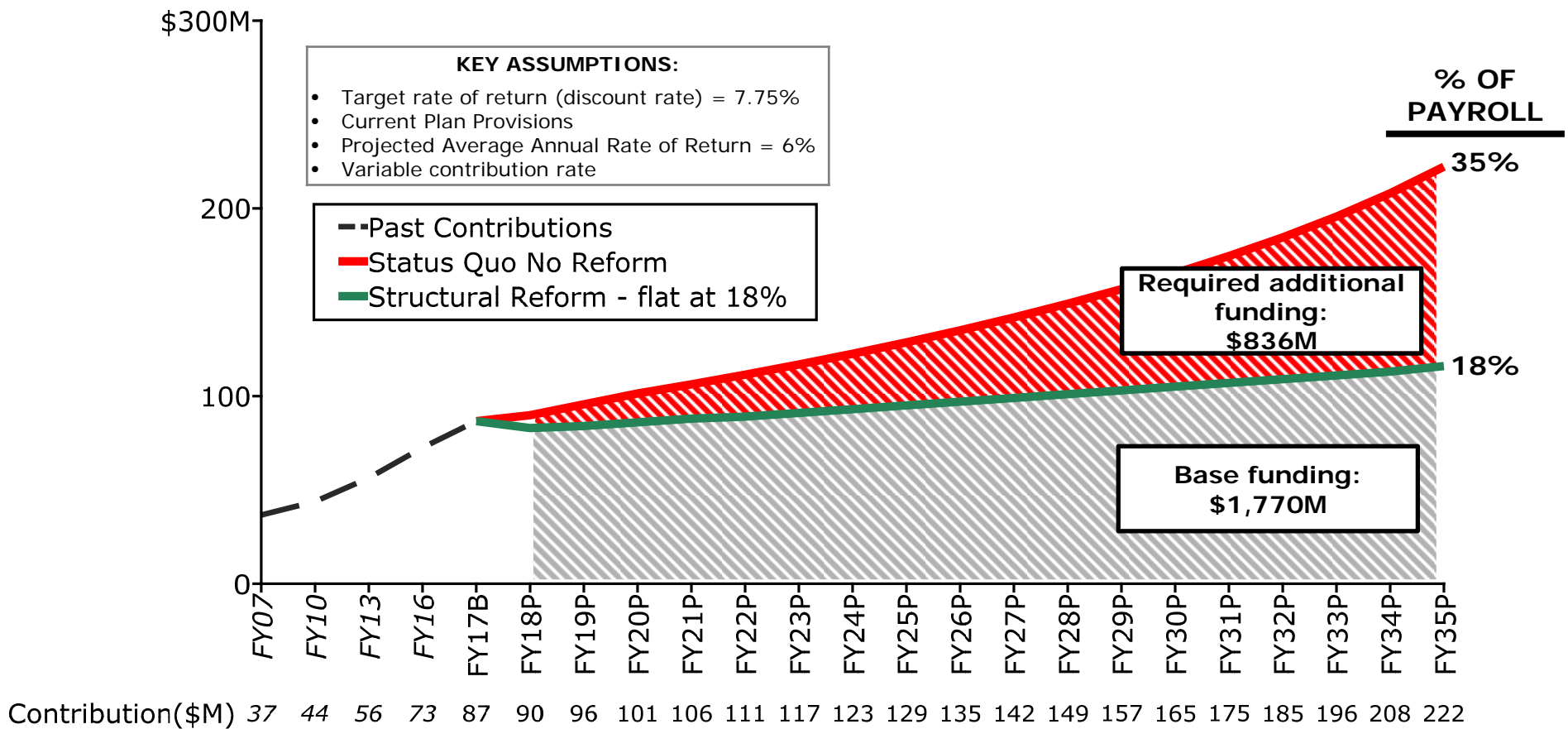


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Required taxpayer funding at 6% market returns \$2.6B

MBTARF Contribution Scenarios

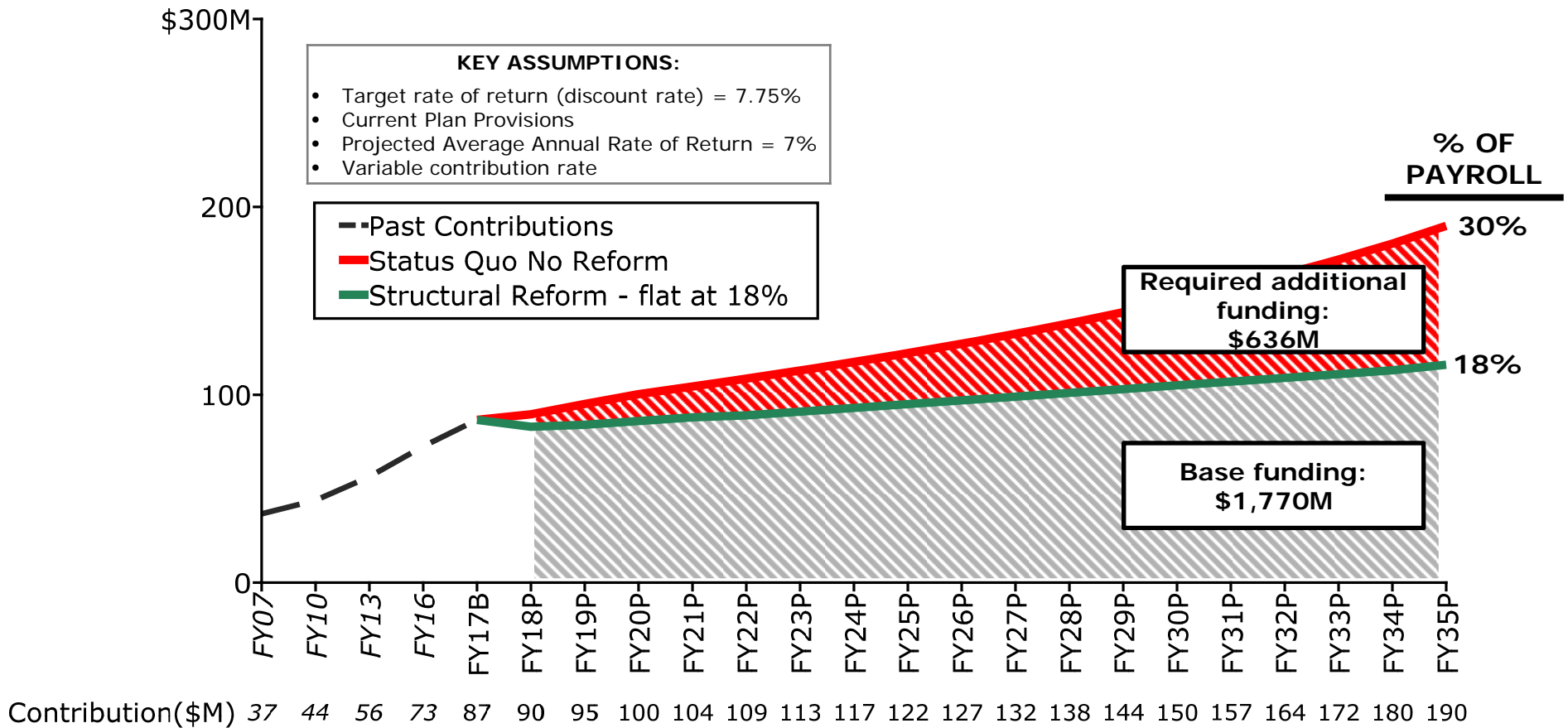


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Required taxpayer funding at 7% market returns \$2.4B

MBTARF Contribution Scenarios



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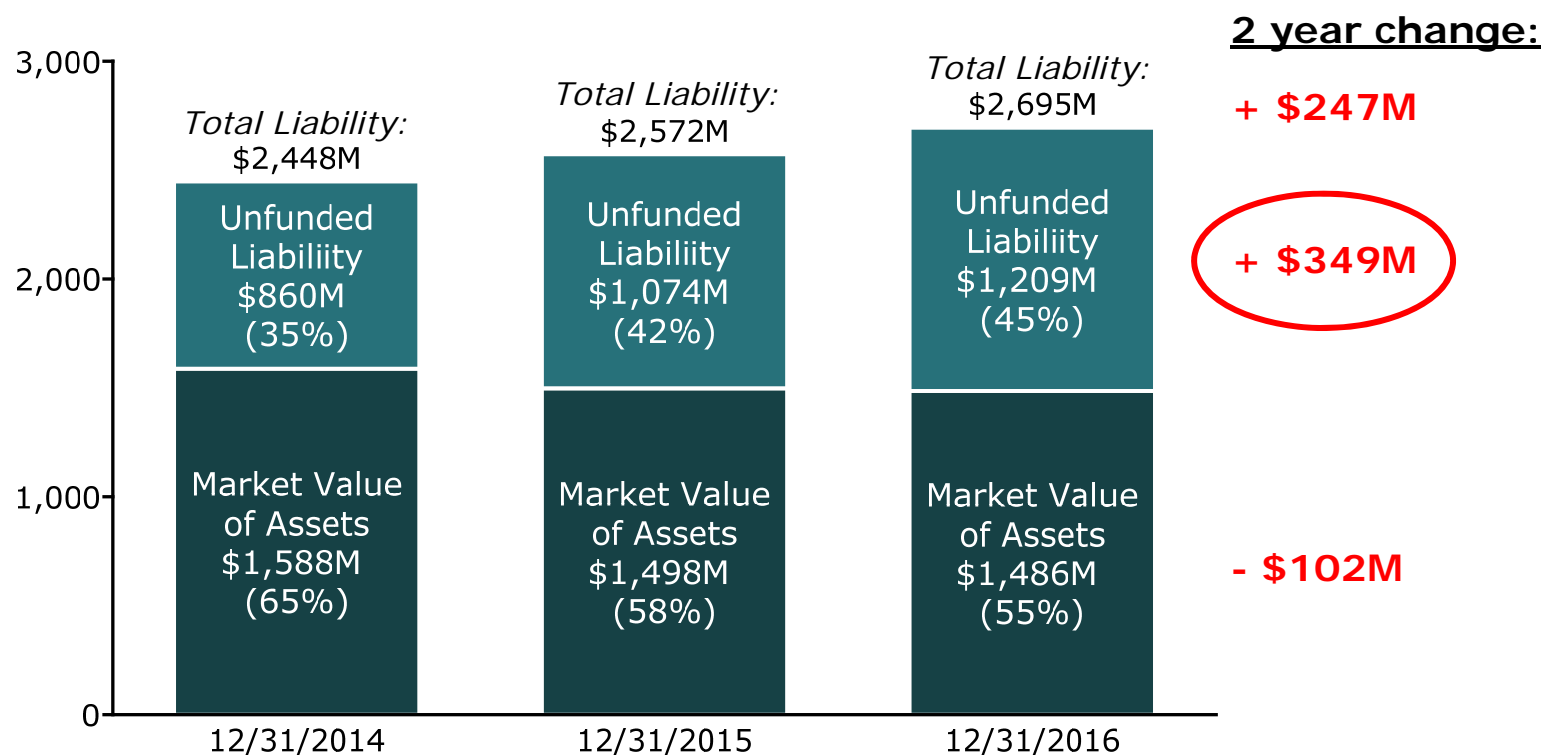
2016 Valuation Update



Measured on a market-value basis, unfunded liability has increased by \$349M since 12/31/2014

Preliminary as of 6/13/2017

Assets and Liabilities of the MBTARF, 2014 - 2016



Target Market Return	8.00%	7.75%	7.75%
Actual Market Return	4.8%	0.7%	6.2%
Underperformance	(-3.2%)	(-7.1%)	(-1.6%)

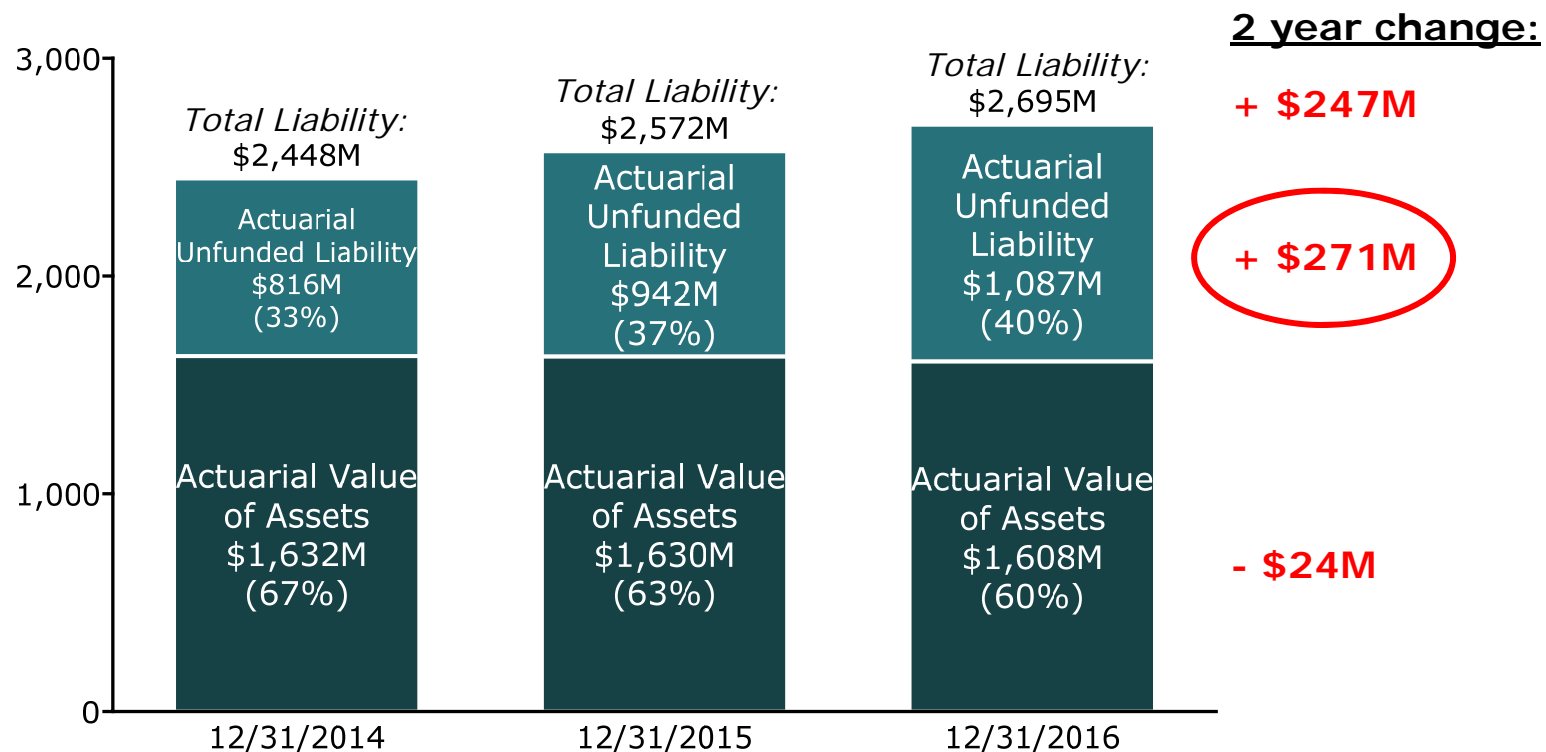
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Measured on an actuarial-value basis, unfunded liability has increased by \$271M since 12/31/2014

Preliminary as of 6/13/2017

Assets and Liabilities of the MBTARF, 2014 - 2016



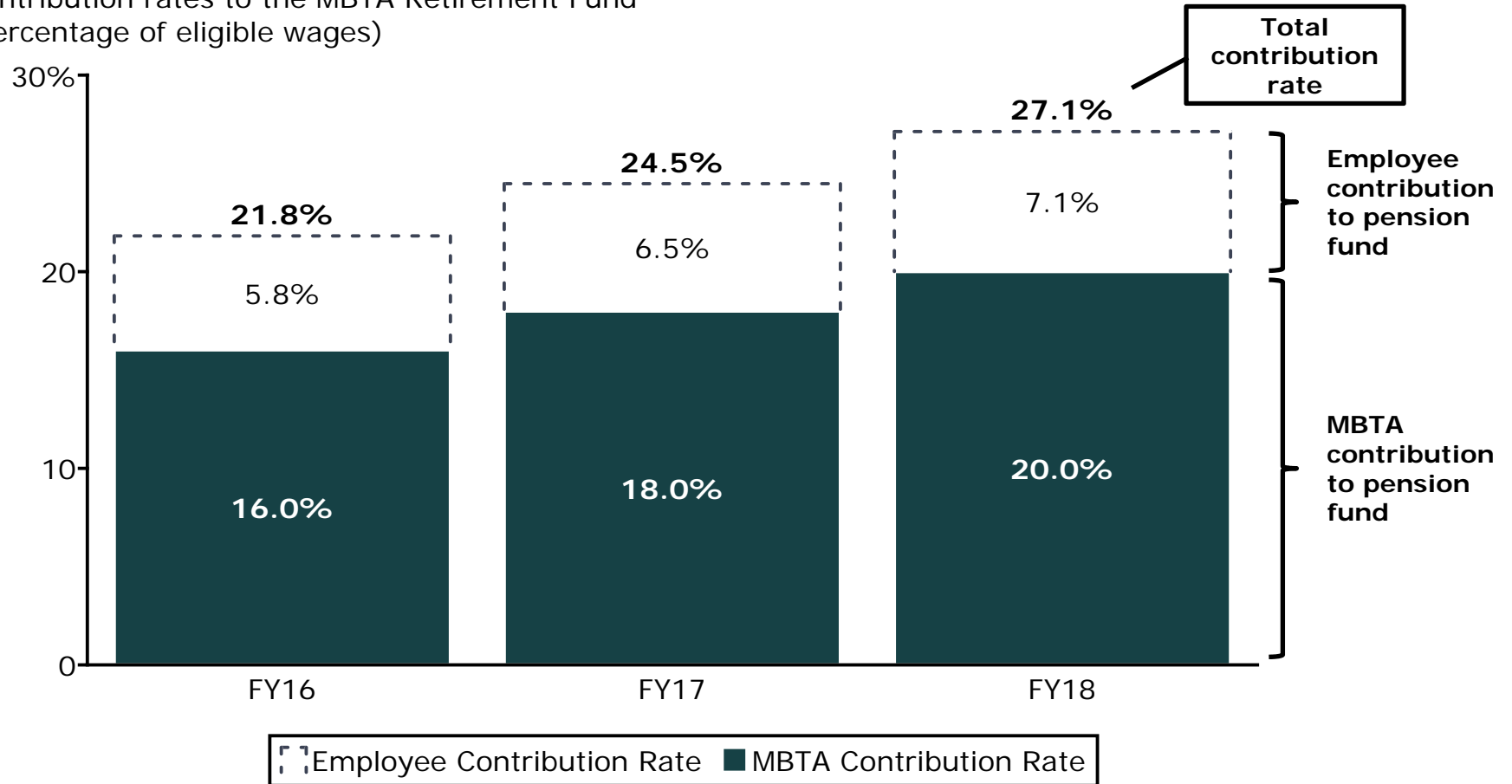
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Underperformance	(-3.2%)	(-7.1%)	(-1.6%)

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Contribution rate (%): FY16 – FY18

Contribution rates to the MBTA Retirement Fund
(Percentage of eligible wages)



Source: MBTARF Contribution Rates

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Contribution rate (\$): FY16 – FY18P

MBTA pension expense will grow 27% (\$20M) from FY16 through FY18

MBTA Main Fund Contribution (\$M)

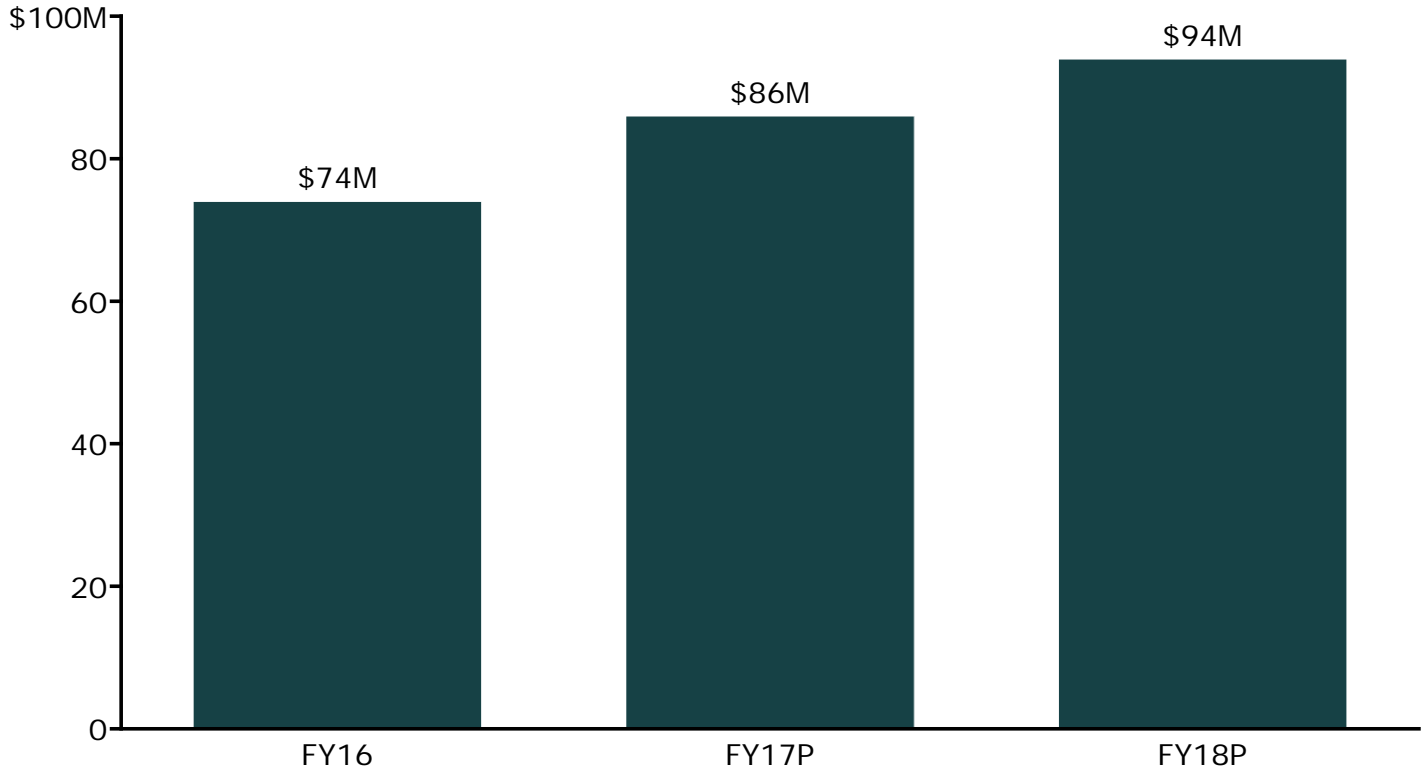




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6/26/2017



Topics for today's discussion

MBTA pension sustainability

Analyzing the impact of:

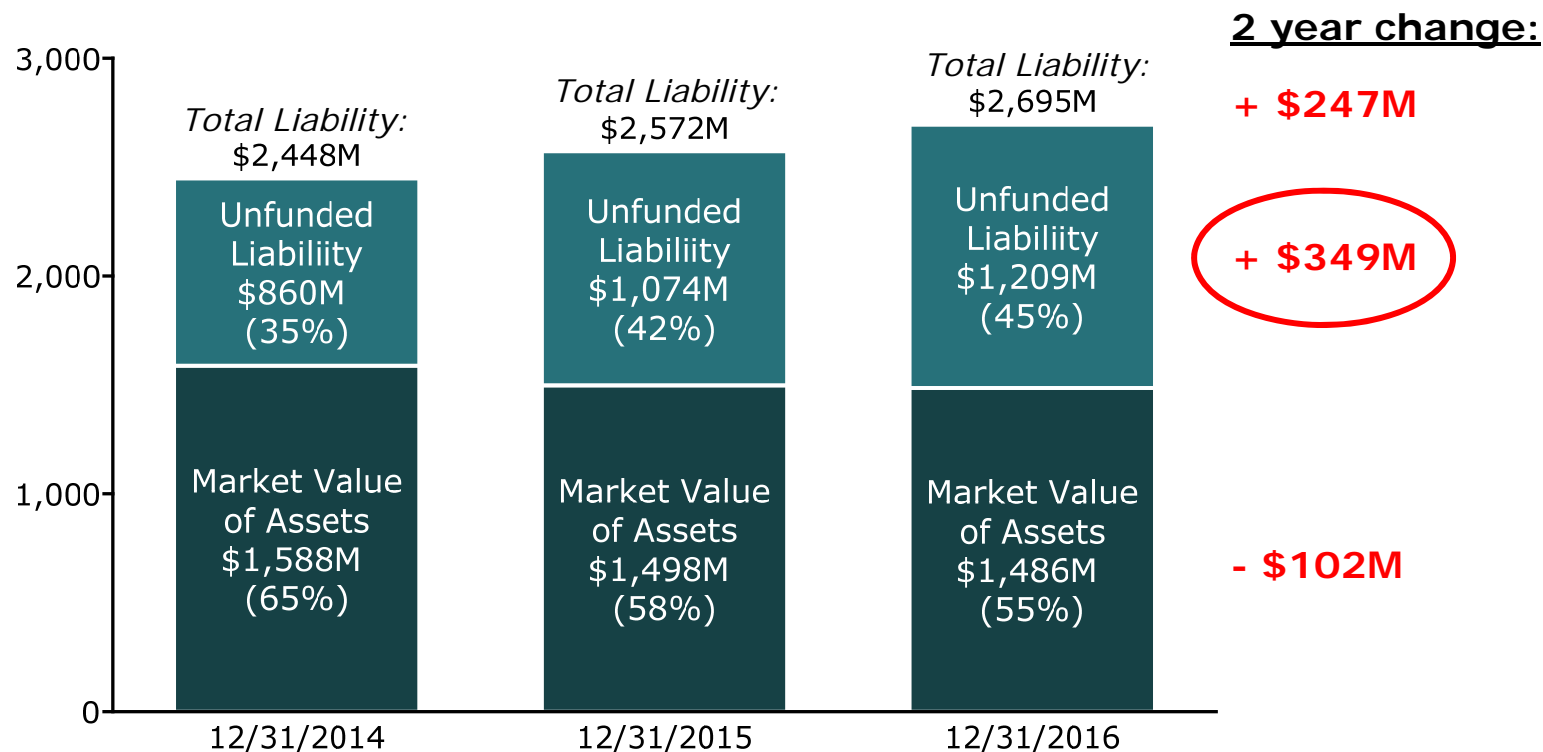
1. **Benefit equivalency with state (MBTA pension benefit schedule and age requirements changed to match state employee and teacher schedule, age and other eligibility requirements)**
2. **Integration of Social Security with MBTA pension benefits**
3. **Next steps**



Measured on a market-value basis, unfunded liability has increased by \$349M since 12/31/2014

FMCB Presentation 6/19/17

Assets and Liabilities of the MBTARF, 2014 - 2016



Target Market Return	8.00%	7.75%	7.75%
Actual Market Return	4.8%	0.7%	6.2%
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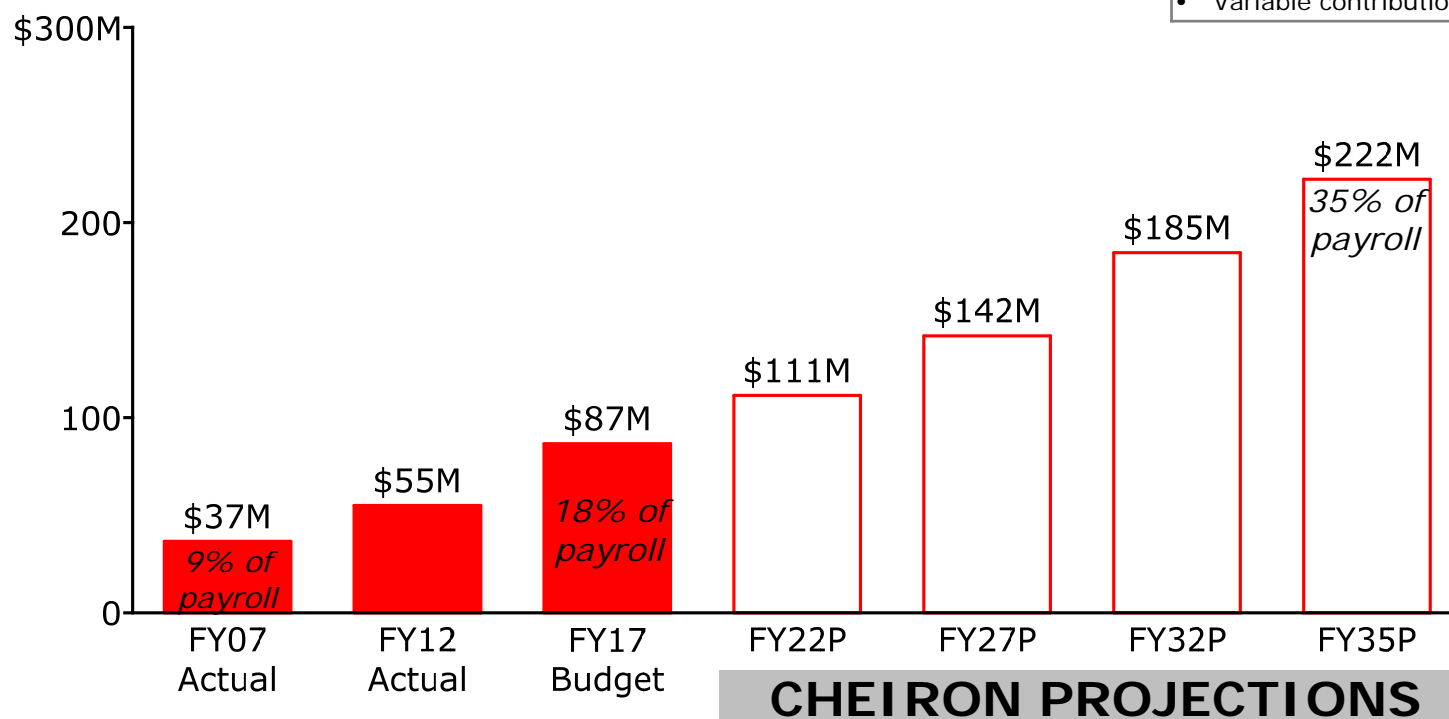
MBTA Required Contribution at 6% market returns 35% of payroll

FMCB Presentation 6/19/17

KEY ASSUMPTIONS:

- Target rate of return (discount rate) = 7.75%
- Current Plan Provisions
- Projected Average Annual Rate of Return = 6%
- Variable contribution rate

MBTARF contribution (\$M)



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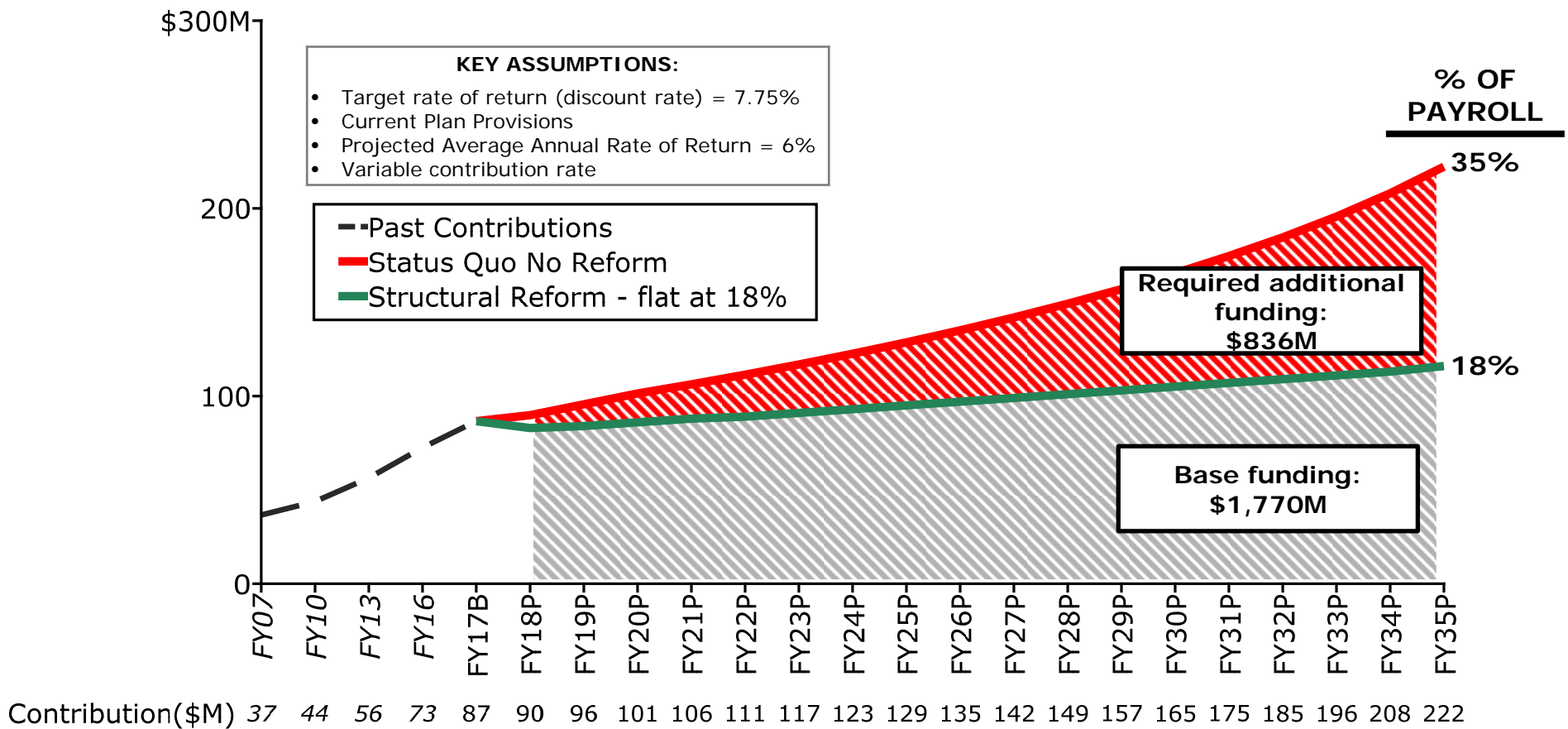
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Required taxpayer funding at 6% market returns \$2.6B

FMCB Presentation 6/19/17

MBTARF Contribution Scenarios



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State and Teachers' annual benefit accrual increases with employee retirement age

STATE EMPLOYEE RETIREMENT AGE	MIN YEARS OF SERVICE REQUIREMENT	AGE FACTOR
67 or older	10	2.50%
66	10	2.35%
65	10	2.20%
64	10	2.05%
63	10	1.90%
62	10	1.75%
61	10	1.60%
60	10	1.45%
59	<i>State minimum retirement age is 60</i>	
58		
57		
56		
55		

*Group 1 members entering service on or after April 2, 2012

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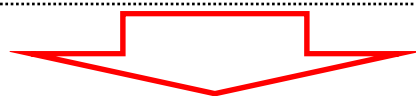
Other State and Teachers' pension benefit provisions

- 5 highest average years for final average earnings (FAE) calculation
- Pension based state salary FAE, subject to anti-spiking provisions
- Sick time paid out (20%) at retirement, not creditable to retirement
- 10 years service required for pension and minimum retirement age 60
- Beneficiary rules for spouses and other designees incorporate actuarial reductions



MBTA Retirement Fund multiplier does not adjust for changes in employee's retirement age

MBTA EMPLOYEE RETIREMENT AGE*	MIN YEARS OF SERVICE REQUIREMENT	AGE FACTOR
67 or older	ANY	2.46%
66	ANY	2.46%
65	ANY	2.46%
64	25	2.46%
63	25	2.46%
62	25	2.46%
61	25	2.46%
60	25	2.46%
59	25	2.46%
58	25	2.46%
57	25	2.46%
56	25	2.46%
55	25	2.46%



Impact of adopting State multipliers for MBTA is to be determined

*Members entering service on or after December 6, 2012

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MBTARF plan design provides added incentive to retire young

Years of service x Annual Multiplier = Pension % of Highest Wages

<u>Years of service</u>	<u>Age at retirement</u>	<u>Employer</u>	<u>Annual multiplier*</u>	<u>Pension % of highest wages</u>
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25	65	MBTA	2.46%	61.5%
		State	2.20%	55.0%
32	67	MBTA	2.46%	75% ^
		State	2.50%	80%



Because MBTA pension multiplier does not grow with age, benefits for early retirees are significantly higher than those for state employees

*Uses age rates for state employees hired after 4/2/2012

^Calculation produces result >75%, which is adjusted down to maximum benefit

Note: MBTARF benefits do not get automatic COLAs; retirees in State systems do (those covered by Chapter 32)



Social Security: MA state employees and teachers do not receive

- **Massachusetts is one of a handful of non-Social Security states where members contribute to a state retirement system, but do not pay into Social Security**
 - › MA State employees and teachers do not earn any Social Security “credits” or “quarters” for contributions or service
 - › MA chose to be exempted from Social Security contributions after the Social Security Act of 1950
 - » Employees of the Commonwealth are not subject to Social Security tax in accordance with a Section 218 agreement entered into by the Commonwealth and the U.S. Secretary of Health and Human Services in 1952
 - » State employees are not covered by Social Security in AK, CA, CO, IL, LA, ME, NV, OH, and TX
- **Massachusetts State Pension recipients eligible for Social Security benefits from other employment may be subject to Social Security “double-dipping” laws:**
 1. **Windfall Elimination Provision** primarily affects employees that (1) earned a pension in any job where they did not pay Social Security taxes and (2) worked in other jobs long enough to qualify for a Social Security retirement or disability benefit
 - » A modified formula is used to calculate the benefit amount, resulting in a lower Social Security benefit: benefits would be reduced by up to about ~50% for those people
 2. **Government Pension Offset** affects those who receive a retirement or disability pension from a federal, state, or local government based on work for which they did not pay Social Security taxes
 - » As a result, Social Security spouse, widow, or widowers benefits can be reduced by two-thirds of a government pension



Social Security: MBTA employees receive social security

SECTION 210K OF THE 1950 SOCIAL SECURITY ACT INCLUDES SPECIAL COVERAGE RULES FOR PUBLIC TRANSIT EMPLOYEES:

- **Transportation systems made public between 1936 and 1951 are required to participate**

- › MTA—MBTA's predecessor—was created in 1947

"If the transportation service was acquired from private ownership in whole or in part after 1936 and before 1951, or was operated at least in part by the State (or political subdivision) on December 31, 1950, with no general retirement system, all employees are compulsorily covered after 1950." –SOCIAL SECURITY PROGRAM OPERATIONS MANUAL, SL 30001.365

- The **MBTA Retirement Fund does not exempt MBTA from social security** because (1) it is only for transit employees and (2) it is not backstopped by the state

"The term [general retirement system] does not include a fund or system which covers only services performed in connection with the operation of the transportation system. For this purpose, a general retirement system is guaranteed by the State if the State constitution contains a provision which states specifically that State and local retirement systems cannot diminish or impair their benefits." –SOCIAL SECURITY PROGRAM OPERATIONS MANUAL, SL 30001.365



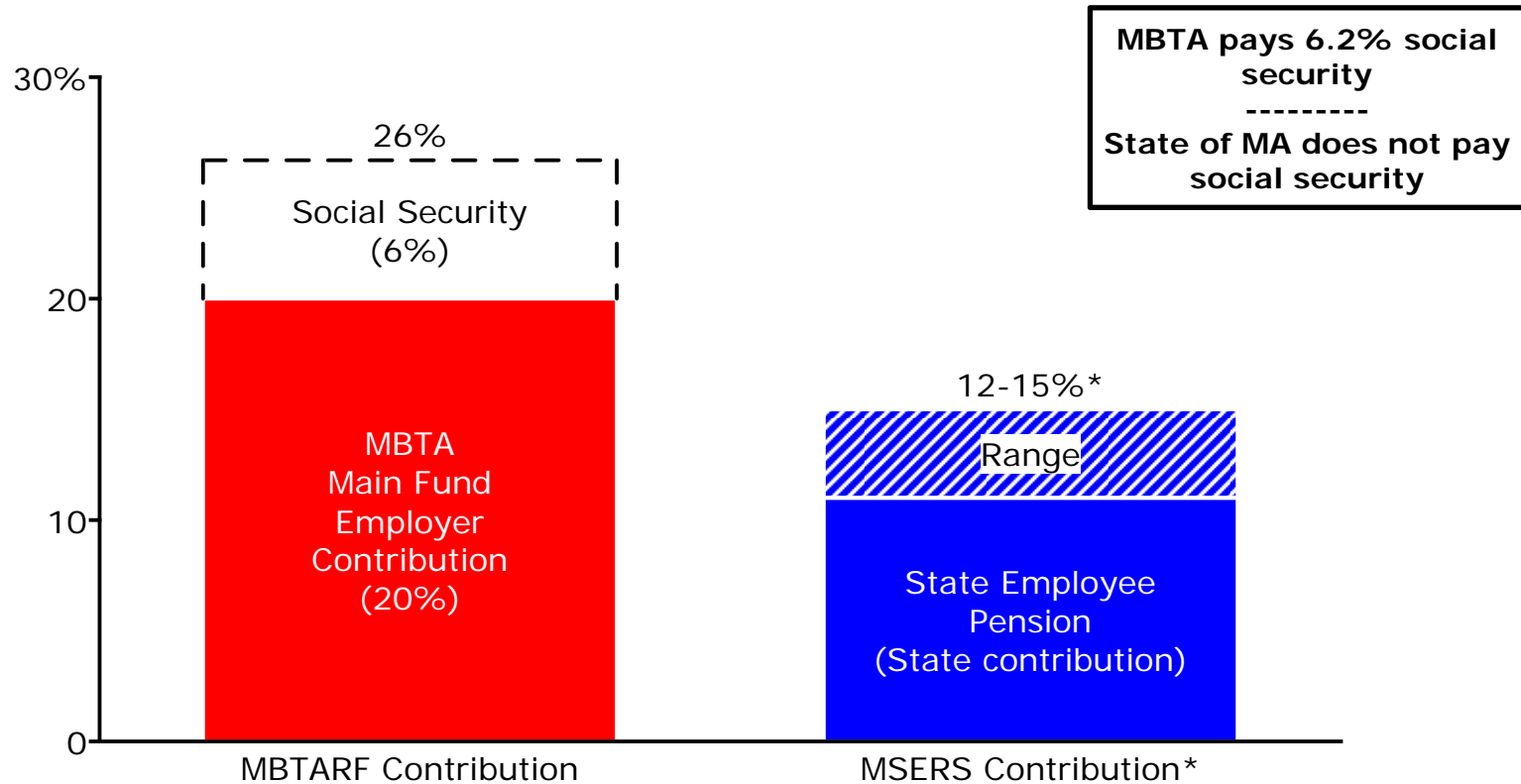
Exempting MBTA from Social Security would require an act of Congress and approval from the Social Security Administration

UPDATED WITH FY18 CONTRIBUTION RATE



MBTA full contribution rate to employee retirement benefits is 2X that of state employees and teachers

FY18 contribution to retirement fund and social security



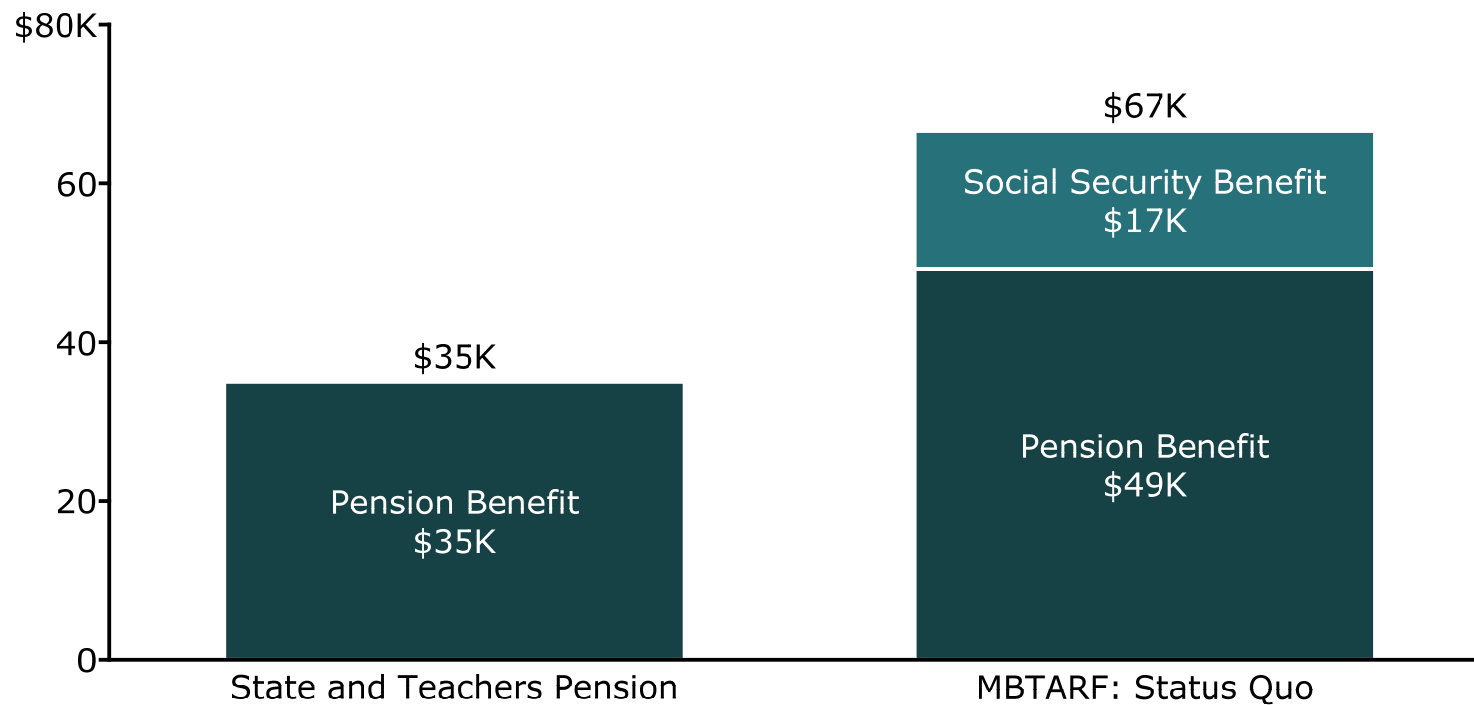
*High range of state employer contribution calculated for MBTA by ANF, Low side of range from 12/15/16 Boston Globe article 'Report proposes major overhaul of retirement benefits for new MBTA Employees'; Estimated amount based on allocation of total lump sum pension payment by Commonwealth to PRIM for state employees varies based on calculation method



Full MBTA retirement benefit is almost double the state benefit for a retiree at age 62 with 25 years of service

EXAMPLE: FINAL AVERAGE EARNINGS \$80,000 | 25 YEARS OF SERVICE | 62 YEARS OLD AT RETIREMENT

Post-Retirement Benefits



PRESENTED TO FMCB ON 5/22



MBTA employees earn significantly more in post-retirement pension benefits than state employees and teachers at all ages

EXAMPLE: FINAL AVERAGE EARNINGS \$80,000 | 25 YEARS OF SERVICE

COMPARISON OF MBTA PENSION BENEFIT WITH STATE AND TEACHERS BENEFIT

AGE AT RETIREMENT	TEACHERS AND STATE EMPLOYEES (HIRED SINCE 4/2012)	MBTARF MULTIPLIER (2.46%)	SOCIAL SECURITY	TOTAL RETIREMENT BENEFIT (SS+MBTARF)
60	\$29,000	\$49,200		\$49,200 (\$66,600 at Age 62)
61	\$32,000	\$49,200		\$49,200 (\$66,600 at Age 62)
62	\$35,000	\$49,200	+\$17,400	\$66,600
63	\$38,000	\$49,200	+\$18,600	\$67,800
64	\$41,000	\$49,200	+\$19,800	\$69,000
65	\$44,000	\$49,200	+\$20,700	\$69,900
66	\$47,000	\$49,200	+\$22,300	\$71,500
67	\$50,000	\$49,200	+\$23,800	\$73,000



Social security “integration” is common in plans where public employees receive both a public pension and social security

- **“Integrated” plans take a comprehensive view of all benefits earned by employees**
 - › Integration creates an overall retirement package by combining an employer’s pension with Social Security
- **A pension plan that is “integrated” takes into account Social Security benefits when determining the pension benefits**
 - › Integration offsets pension benefits to account for the Social Security benefit received from time served in public agency
 - › Integration can be structured to account for changes in Social Security, including rising retirement age



Integration is one approach that MBATRF could use to put pension on a more sustainable path



How does social security integration work:

- › The most common offset is 50% of Social Security benefits, which equals the employer-funded proportion of Social Security
- › This means that 50% of the social security benefit earned by the employee during their service at the public agency is used to offset against the pension benefit
 - » A large percentage of employers adopting this approach concluded that it would be too difficult to take credit for more than one-half of the Social Security retirement benefit actually received by the employee*
- › Employers (subject to ERISA) are allowed to go as high as 83.3% of Social Security Benefits, if they do not violate other aspects of pension law (like the multiplier analysis above)
- › For ERISA plans using integration to reduce pensions, benefits can be offset to equal final pay minus half of the Social Security benefit when the benefit formula calculation exceeds that amount (401(a)(5))

*Source: EBRI's Fundamentals of Employee Benefit Programs – 6th Edition (2009)



Current pension design and obligations are set by the Pension Agreement

Approaches to modifying the Pension Agreement:

- A. Negotiations with the Boston Carmen's Union, Local 589 ahead of the July 2018 expiration of current Pension Agreement (parties met in June 2017)**

- B. Binding arbitration, if negotiations fail to produce a sustainable pension design**

- C. Legislative actions to adjust pension design and future obligations**



Next Steps

- Independent actuaries are engaged to calculate effect on MBTA RF of changes to plan of (1) Matching the State and Teachers' multiplier / age requirements and (2) Social Security integration
 - › Quantify the effects of these reforms on MBTA contributions, employee contributions, funded status, and total liability
 - › Quantify impact of applying the reforms to employees of different ages and tenure
 - › Test impact over a variety of actual market investment returns (keeping the MBTA RF target return at current 7.75%)
 - › Measure total impact over a 20 year time horizon
 - › Ensure that full benefit will be equivalent to or more generous than state employees
 - › Model and analyze a variable defined (adjusted) benefit plan structure similar to UNITE HERE! Local 26)

- Provide a quantitative framework for all stakeholders (MBTA, Carmen's Union, employees, retirees, legislature, taxpayers) to provide feedback on concepts to putting the MBTA RF on a sustainable path

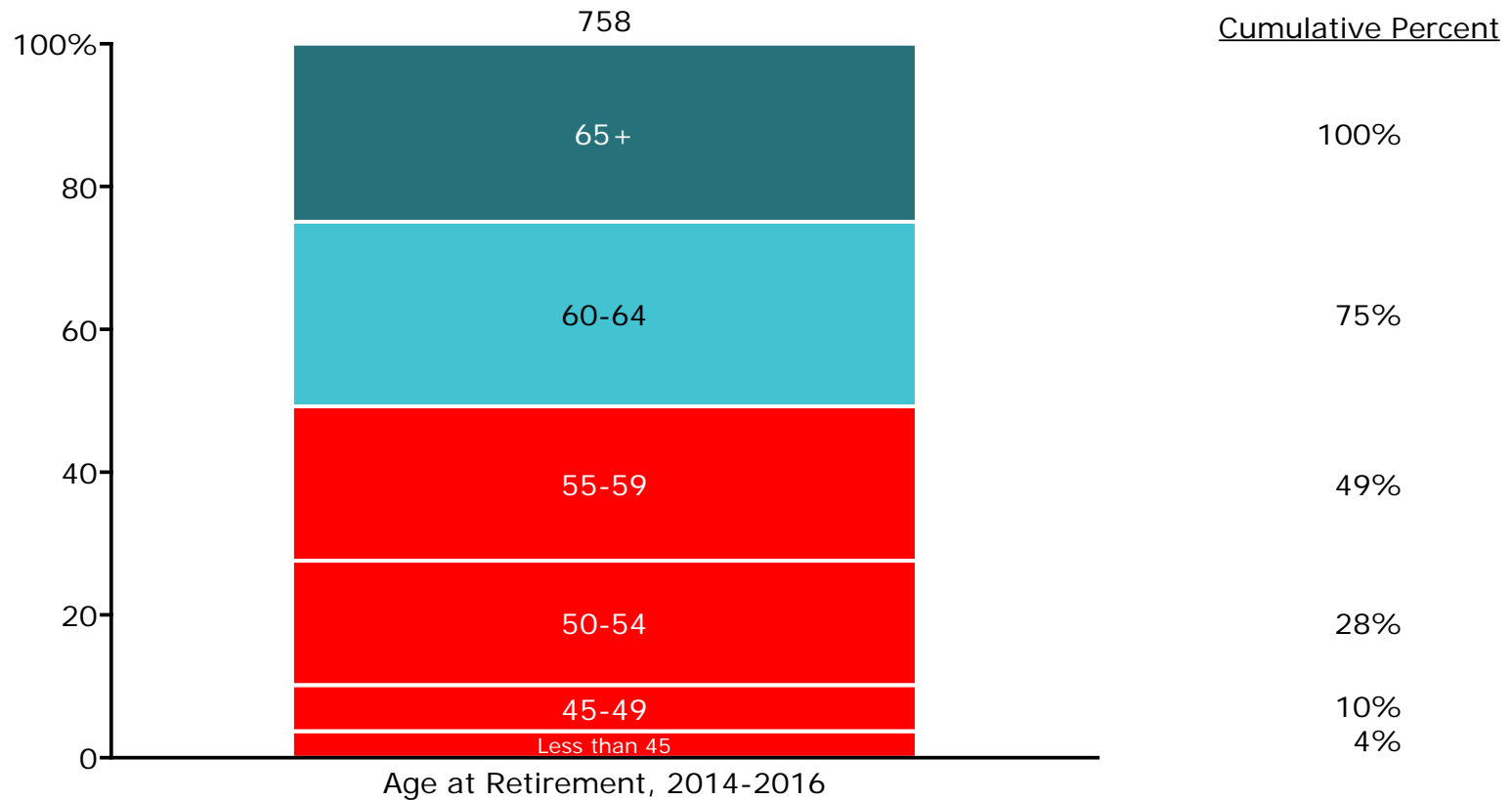


BACKUP



Unsustainable Plan Design: Half of MBTA employees retire and begin drawing pension benefits in their 50s

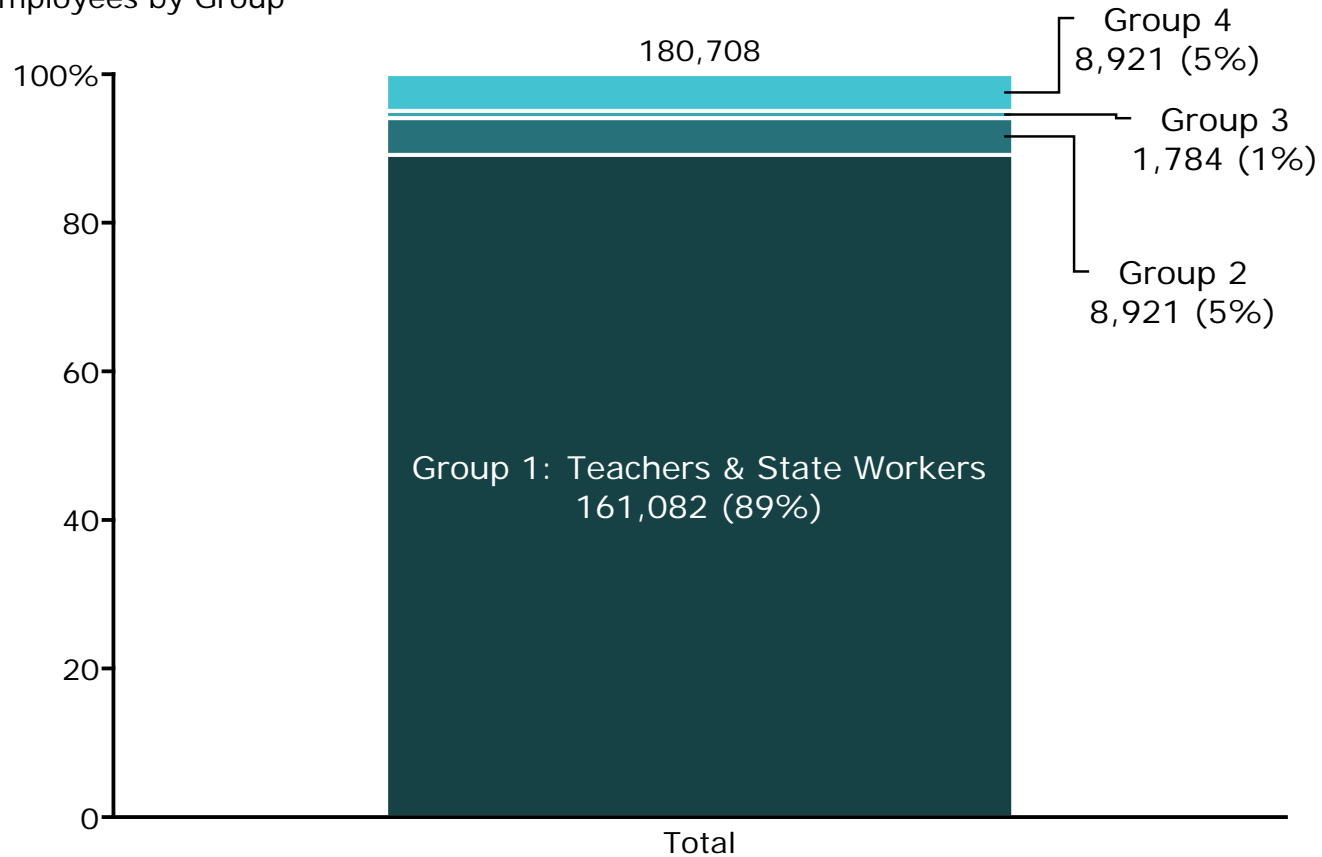
Retired MBTA employee count, 2014-2016





Almost 90% of state and teachers pension participants (including MassDOT) receive Group 1 benefits table

Active Employees by Group





State Group 2 annual benefit accrual increases with employee retirement age

GROUP 2: Employees with specified "hazardous duty" positions, such as those who provide direct care, custody, or supervision of parolees

GROUP 2 STATE EMPLOYEE RETIREMENT AGE	MIN YEARS OF SERVICE REQUIREMENT	AGE FACTOR
62 or older	10	2.50%
61	10	2.35%
60	10	2.20%
59	10	2.05%
58	10	1.90%
57	10	1.75%
56	10	1.60%
55	10	1.45%
54	<i>Minimum retirement age is 54</i>	

*Members entering service on or after April 2, 2012

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State Group 3 annual benefit calculated differently from other state employments groups

GROUP 3: State police officers and inspectors

- State police have a separate system, with a different payout formula
- Age factor for state police equal to 3%
- Retiring with 20 years of service receive 60% of annual salary average for previous 12 months
 - Additional 3% per year for each year over 20, for a maximum of 75 percent of final pay after 25 years of service



State Group 4 annual benefit accrual increases with employee retirement age

GROUP 4: Public safety officers and officials, such as corrections officers

GROUP 4 STATE EMPLOYEE RETIREMENT AGE	MIN YEARS OF SERVICE REQUIREMENT	AGE FACTOR
57 or older	10	2.50%
56	10	2.35%
55	10	2.20%
54	10	2.05%
53	10	1.90%
52	10	1.75%
51	10	1.60%
50	10	1.45%
49	<i>Minimum retirement age is 50</i>	

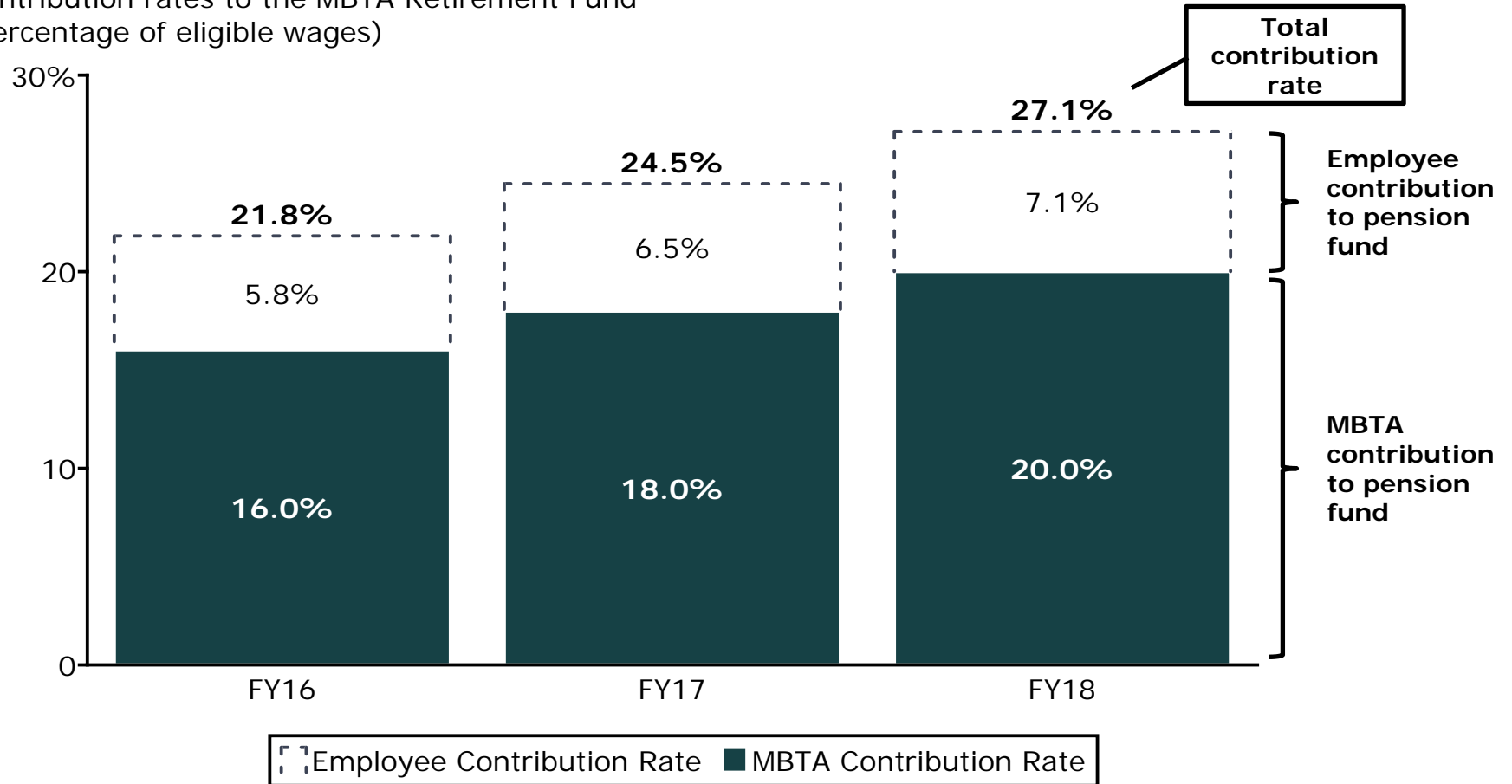
*Members entering service on or after April 2, 2012

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Contribution rate (%): FY16 – FY18

Contribution rates to the MBTA Retirement Fund
(Percentage of eligible wages)



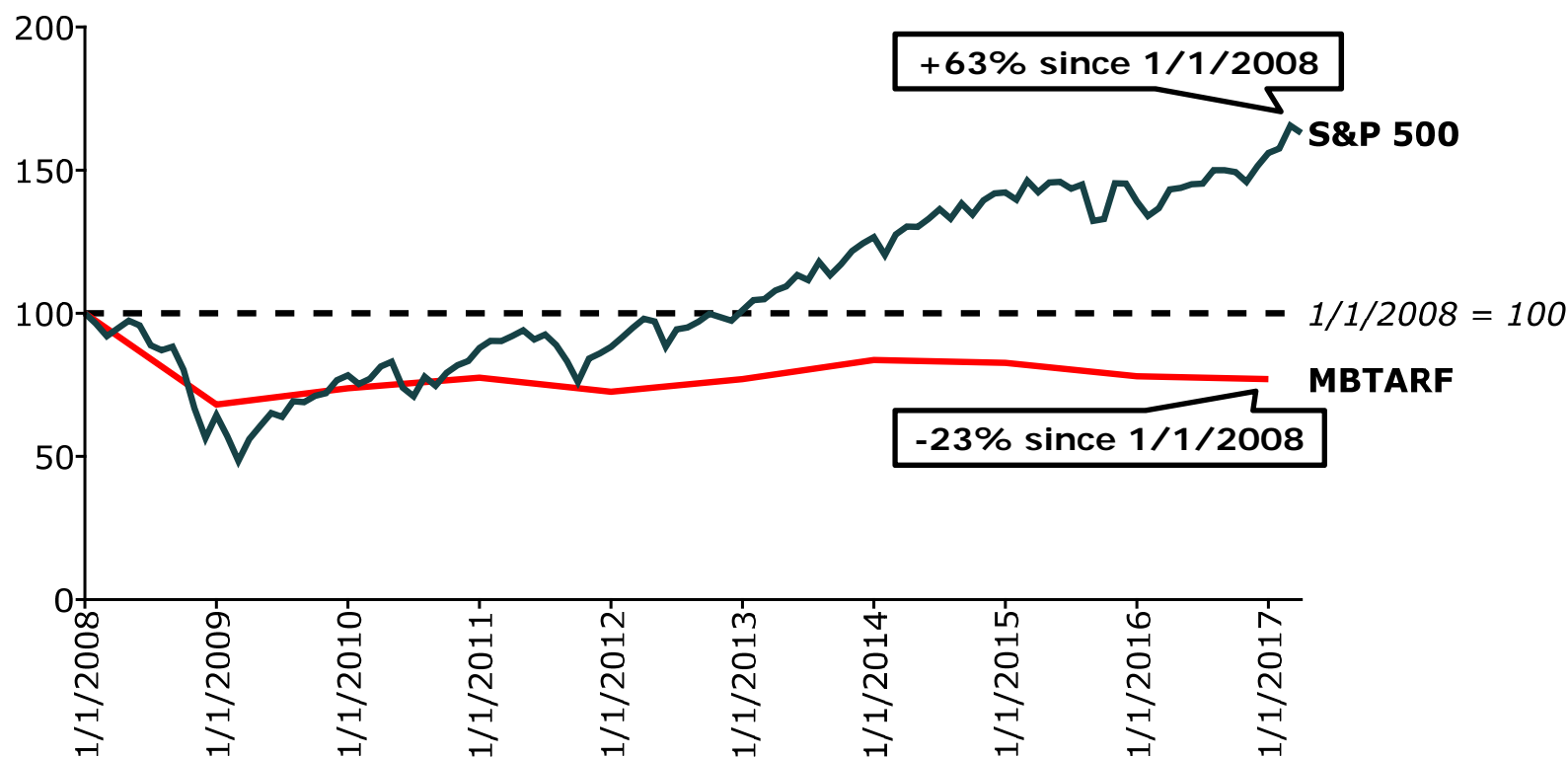
Source: MBTARF Contribution Rates

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While the broader market has recovered from the 2009 downturn, the MBTARF portfolio has failed to keep pace

S&P 500 and MBTARF valuations



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MBTARF return expectations: Fund should ensure sustainability with returns of 4% over the next 10 years

CONSERVATIVE EVALUATION OF MBTARF PORTFOLIO ESTIMATES 4% RETURN OVER 10 YEARS

EQUITY	Source	% Alloc	Geometric Return	Volatility	Arithmetic Return
Domestic - Large	RA	18%	2.60%	14.3%	3.62%
Domestic - Small	RA	7%	2.40%	19.0%	4.21%
International	RA	11%	7.30%	16.9%	8.73%
Emerging	RA	2%	8.90%	23.2%	11.59%
Global	BNY	5%	6.40%	16.5%	7.76%
FIXED INCOME					
Core	RA	8%	2.70%	3.8%	2.77%
TIPS	RA	3%	3.00%	6.2%	3.19%
Mortgage	BNY	3%	2.70%	2.5%	2.73%
Multi-sector	BNY	8%	2.57%	10.4%	3.10%
Bank Loans	RA	2%	3.90%	8.1%	4.23%
Real Estate Debt	BR	1%	3.15%	8.8%	3.54%
Cash	BNY	2%	1.50%	0.0%	1.50%
ALTERNATIVES					
Hedge Funds	BNY	10%	4.30%	6.3%	4.50%
Real Estate	BNY	9%	4.00%	5.0%	4.13%
Private Equity	BNY	8%	7.90%	17.8%	9.48%
Risk Parity	Est	3%	5.00%	10.0%	5.50%
Estimated Portfolio		100%	4.46%	11%	5.07%
Uncertainty for Alternatives			-0.30%		
Net Expected Geometric Return			4.16%		

Notes: 100 bps reduction for alternative risk;
BNY net of fees, RA gross of fees

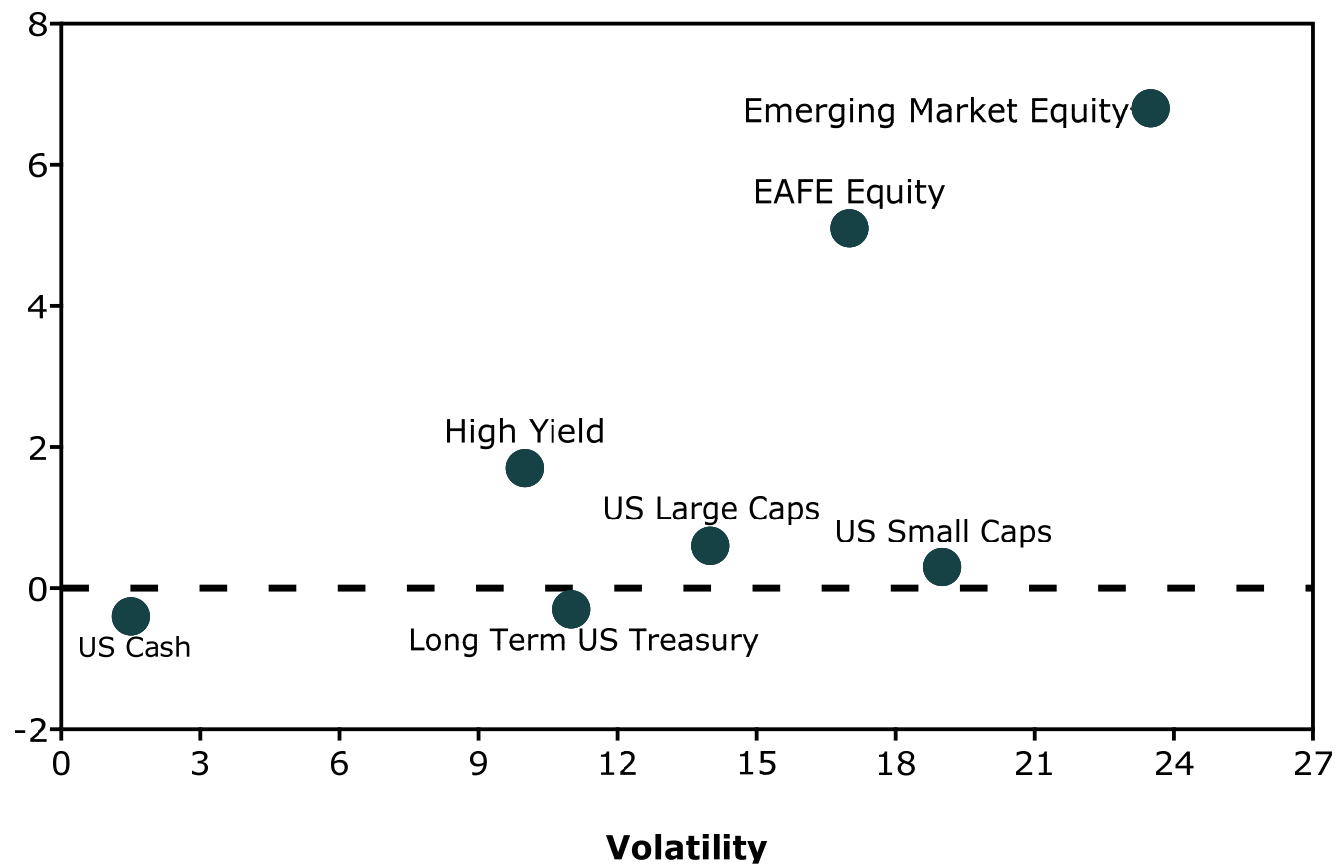
EXPERT RECOMMENDS ASSUMING 4% RETURN FOR NEXT TEN YEARS, BUT ENSURING SUSTAINABILITY AT EVEN LOWER RETURNS

- Due to high benefit liability (50% of total) due over the next ten years, returns over that period are critical for determining future funding levels
- A reasonable annual return expectation for MBTARF over the next 10 years is 4-5%
- Optimistic forecasts results in an expectation of 5.2% over 10 years
- Lower returns are possible and full sustainability would require that the plan survive returns lower than 4% in the next 10 years.
- **Recommended that the baseline evaluation of MBTARF use 4% returns for the next 10 years to stress test the fund under various scenarios and develop a rescue strategy**



Global Investing: 10-year outlook poor for most asset classes

10-Year Real Expected Returns



Source: Barron's—May 15, 2017, "Global Investing: Taking a Long View", projections from Research Affiliates

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