TRS Board of Trustees Meeting

December 14-15, 2017

TEACHER RETIREMENT SYSTEM OF TEXAS MEETING
BOARD OF TRUSTEES

AGENDA

December 14, 2017 – 9:00 a.m.
December 15, 2017 – 9:00 a.m.

TRS East Building, 5th Floor, Boardroom

All or part of the December 14-15, 2017, meeting of the TRS Board of Trustees may be held by telephone or video conference call as authorized under Sections 551.130 and 551.127 of the Texas Government Code. The Board intends to have the presiding officer and a quorum physically present at the following location, which will be open to the public during the open portions of the meeting: ***1000 Red River, Austin, Texas 78701 in the TRS East Building, 5th Floor, Boardroom.***

NOTE: The Board may take up any item posted on the agenda during its meeting on Thursday, December 14, 2017, or during the meeting on the following day, December 15, 2017, beginning at the time and place specified on this agenda.

The open portions of the December 14-15, 2017, Board meeting are being broadcast over the Internet. Access to the Internet broadcast of the Board meeting is provided at www.trs.texas.gov.

1. Call roll of Board members.

2. Consider the following administrative items – Chair:

   A. Approval of the proposed October 27, 2017, Board meeting minutes.

   B. Excusing Board member absences from the October 27, 2017, Board meeting.

   C. Consider the election of the Board Vice-Chair.

   D. Consider consenting to the Board Chair's appointment of committee members, and receive the Board Chair's public announcement of committee chairs.

   E. Setting, rescheduling, or canceling future Board meetings.

3. Provide opportunity for public comment – Chair.

4. Receive a presentation on *Making the Most When Markets are Giving You the Least* – Cliff Asness, Ph.D., AQR Capital Management.

5. Receive an update on the TEAM Program – Brian Guthrie and Chet Henry.

6. Receive a presentation from the TEAM Program Independent Program Assessment (IPA) Vendor – Michael Johnson, Bridgepoint Consulting..

7. Discuss the Executive Director's report on the following – Brian Guthrie:

   A. Administrative operational matters, including updates on financial, audit, legal, staff services, board administration activities, special projects, long-term space planning, security, and strategic planning.

   B. Board operational matters, including a review of draft agendas for upcoming meetings.

   C. Event notices or reminders; holiday and other schedules of interest; board member, employee or other individual recognitions; and expressions of thanks, congratulations, or condolences.

8. Consider the administrative appeal of Alice M. Jones-Smith – Carolina de Onís and Dan Junell.

9. Discuss the Third Quarter 2017 Performance Review – Steve Voss and Mike Comstock, Aon Hewitt.

NOTE: *The Board meeting likely will recess after the last item above to conduct committee meetings and will resume Friday morning to take up items listed below.*

10. Provide opportunity for public comments – Chair.

11. Recognize the service of R. David Kelly and T. Karen Charleston – Chair.

12. Receive the Deputy Director's report, including matters related to administrative, financial and staff services operations – Ken Welch.

13. Review the TRS Pension Trust Fund Actuarial Valuation as of August 31, 2017 – Joseph Newton, Gabriel, Roeder, Smith & Company.

14. Receive the Fiduciary Review of Actuarial Assumptions – Steve Huff, Reinhart Boerner Van Deuren.

15. Review the TRS-Care Actuarial Valuation and Other Post Employment Benefit (OPEB) reports as of August 31, 2017 and receive an overview and update on TRS-Care and TRS-ActiveCare, including recognizing William Hickman's retirement – Joseph Newton; Amy Cohen; and William Hickman, Gabriel, Roeder, Smith & Company.

16. Receive an update on TRS Care communications outreach – Katrina Daniel.

17. Review the Comprehensive Annual Financial Report for fiscal year 2017 – Richard Scheel and Cindy Haley.

18. Review the reports of the Chief Financial Officer regarding expenditures, current financial review, and other financial matters involving TRS programs – Don Green.

19. Receive the report of the Investment Management Committee on its December 14, 2017 meeting. – Committee Chair.

20. Receive the report of the Risk Management Committee on its December 14, 2017 meeting. – Committee Chair.

21. Receive the report of the Policy Committee on its December 14, 2017 meeting; consider proposed amendments to the General Authority Resolution, TRS Key Employee Determinations, or Mission Statement; and consider adopting the following new or amended TRS rules in Title 34, Part 3 of the Texas Administrative Code – Committee Chair:

    A. § 29.90, relating to Forfeiture of Certain Benefits Due to Criminal Offense
    B. § 29.91, relating to Restoring Forfeited Benefits After Conviction is Overturned.
    C. § 41.1, relating to Initial Enrollment Periods for the Health Benefit Program under the Texas Public School Retired Employees Group Benefits Act (TRS-Care)
    D. § 41.5, relating to Payment of Contributions
    E. § 41.7, relating to Effective Date of Coverage
    F. § 41.12, relating to Eligibility for the Alternative Plan for Medicare-Eligible Participants

22. Receive the report of the Audit Committee on its December 15, 2017 meeting – Committee Chair.

23. Review the report of the Chief Benefit Officer, and consider the following related matters – Barbie Pearson:

    A. Consider approving the list of members qualified for retirement for September through November 2017.

    B. Consider approving the minutes of the July and September 2017 Medical Board meetings.

24. Review the report of the General Counsel on pending and contemplated litigation, including updates on litigation involving benefit-program contributions, retirement benefits, health-benefit programs, and open records – Carolina de Onís.

25. Consider personnel matters, including the appointment, employment, evaluation, compensation, performance, duties, discipline, or dismissal of the Executive Director, Chief Investment Officer, Chief Audit Executive or IMD Directors – Chair.

26. Consult with the Board's attorney(s) in Executive Session on any item listed above on this meeting agenda as authorized by Section 551.071 of the Texas Open Meetings Act (Chapter 551 of the Texas Government Code) – Chair.

TAB 2

Minutes of the Board of Trustees

October 27, 2017

The Board of Trustees of the Teacher Retirement System of Texas met on October 27, 2017 in the boardroom located on the fifth floor of the TRS East Building offices at 1000 Red River, Austin, Texas. The following Board members were present:

David Kelly, Chair
Joe Colonnetta
David Corpus
John Elliott
Greg Gibson
Christopher Moss
Dolores Ramirez

Others present:

Brian Guthrie, TRS
Ken Welch, TRS
Don Green, TRS
Carolina de Onís, TRS
Jerry Albright, TRS
Jase Auby, TRS
Barbie Pearson, TRS
Chet Henry, TRS
Rebecca Merrill, TRS
Amy Barrett, TRS
Katherine Farrell, TRS
Steve Huff, Reinhart Boerner Van Deuren
Desiree Day, National Life Group
Fran Plemmons, TRTA
Shannon Meroney, National Life of AIG
Eileen O'Grady, Unite Here
Mitra Elie, Unite Here
Tom Rogers, TRTA, ARTA
Jay Thompson, TALHI
Tiffany Calderon, Humana
Nick Arnold, Humana
Alfred Ayensu Gharty, AXA Equilibrium
Eddie Solis, AXA
Brock Gregg, TRTA
Mike Meroney, TALHI
Deborah Polan, AIG
Ted Melina Raab, Texas AFT
Ted Kennedy, AIG
Mike Bentrott, AETNA

Mr. Kelly called the meeting to order at 11:05 a.m.

1. **Call roll of Board members.**

Ms. Farrell called the roll. A quorum was present.

2. **Consider the following administrative items – David Kelly:**

   A. **Approval of the proposed September 21-22, 2017 Board meeting minutes.**

On a motion by Mr. Colonnetta, seconded by Ms. Ramirez, the Board unanimously voted to approve the proposed minutes of the September 21-22, 2017 meeting.

B. Setting, rescheduling, or canceling future Board meetings.

On a motion by Dr. Gibson, seconded by Mr. Kelly, the Board unanimously voted to approve rescheduling the June 14-15, 2018, meeting to June 21-22, 2018.

3. Provide opportunity for public comment – David Kelly.

Ms. Mitra Ellie from the Pullman San Francisco Bay Hotel and Ms. Eileen O'Grady, from Unite Here, addressed the Board regarding hospitality union concerns with CBRE Global Investors.

Mr. Jay Thompson representing the Texas Association of Life and Health Insurers, addressed the Board regarding appreciation of staff and concerns for the 403(b) proposed rules.

4. Discuss the Executive Director's report on the following – Brian Guthrie:

A. Administrative operational matters, including updates on the following: Executive Director's goals, financial awareness project, audit, legal, staff services, investments, board administration, special projects, actuarial matters, and strategic planning.

B. Board operational matters, including a review of draft agendas for upcoming meetings.

C. Event notices or reminders; holiday and other schedules of interest; board member, employee, or other individual recognitions; and expressions of thanks, congratulations, or condolences.

Mr. Guthrie provided the board with updates on the national meetings in which TRS has participated over the past few months, including the National Institute for Retirement Security's Visionary Circle Meeting and the National Council on Teacher Retirement's Annual Meeting (NCTR). He noted that Ms. Ramirez and Ms. Charleston both attended the NCTR annual conference and Mr. Mohan Balachandran of TRS's Investment Management Division spoke as part of panel on fixed income that was very well received. Ms. Ramirez noted that it was a good meeting. Mr. Guthrie stated that NCTR's Resolutions Committee adopted a resolution memorializing Ms. Palmer and her contributions to NCTR over the years. Mr. Guthrie also discussed the Public Pension Financial Forum (P2F2) that Mr. Ken Welch attended and at which Ms. Barbie Pearson presented. Mr. Welch stated that Ms. Pearson gave a great presentation on data and the TEAM Program and that Mr. Rees Coombe, of TRS's Information Technology Division, presented on e-signature. Mr. Guthrie then provided general updates on upcoming meetings, including the Strategic Partnership Network Summit in Austin.

Mr. Guthrie thanked Dr. Gibson for presenting at a joint training day for some Benefits and Health Insurance Benefits staff on TEAM cut over day. Dr. Gibson stated that he enjoyed the opportunity very much and presented on managing energy and bringing your best self to work each day.

Mr. Guthrie discussed the House and Senate committee interim charges.

Mr. Guthrie then presented the summary of TRS's communications outreach on the TRS-Care and TRS-ActiveCare changes. Mr. Guthrie said the in-person meetings have been well attended and when all is complete, 42,000 total will have come to one of the TRS meetings. The Board then

watched a video that is being shown as part of the communication effort of Chief Healthcare Officer, Ms. Katrina Daniel discussing the legislative changes.

Mr. Guthrie then reviewed the proposed items for the next two upcoming Board meetings: December and February.

Mr. Guthrie informed the Board there was an issue relating to legislative implementation that would need to be addressed in executive session. Mr. Kelly announced, without objection, that this item would be taken up at the end of the agenda.

5. Receive an update on the TEAM Program – Brian Guthrie

Mr. Guthrie gave an update on the TEAM Program. He stated that Phase 1 Go Live was successful with some processing issues, including processing refunds. Mr. Guthrie stated that the refund processing would be addressed by mid-November and noted that because of these processing issues call volume has increased. Mr. Guthrie thanked Chairman Kelly for sponsoring breakfast for the TRS employees who contributed to TEAM. Mr. Guthrie then discussed Phase 2 and next steps in TEAM.

6. Consider the evaluation and performance of Bridgepoint Consulting as the TEAM Program Independent Program Assessment (IPA) Vendor and as appropriate, consider extending the related agreement – Amy Barrett.

Ms. Amy Barrett presented an evaluation of Bridgepoint as the Independent Program Assessment vendor. Ms. Barrett noted that Bridgepoint has been timely, responsive, and knowledgeable , and she recommended that the Board extend Bridgepoint's contract. On a motion by Mr. Corpus, seconded by Ms. Ramirez, the Board voted unanimously to extend Bridgepoint's contract for a period from January 1, 2018 to December 31, 2018.

7. Review the reports of the Chief Financial Officer regarding end of Fiscal Year 2017 Budget Report, expenditures, current financial review and other financial matters involving TRS programs – Don Green.

Mr. Don Green gave an update on the Fiscal Year 2017 year-end budget. Mr. Green reviewed the operating budget by functional areas and object of expense. He noted that TRS personnel, including wages and benefits, is about 50% of the budget. He stated that the remaining budget expenditures consist of 20% operating costs, 20% professional fees, 1% travel, and 4% capital. Mr. Green stated that there is $20.2 million of operating budget unspent, which translates into roughly 12% of the operating budget unspent. In response to a question from Mr. Moss, Mr. Green noted that $3 million of the savings were due to the hiring freeze. Mr. Green also stated that TRS lapsed 42% of the travel budget, which he mentioned could be contributed to TRS Tricot in London. Mr. Green discussed TRS's conscious efforts in energy conservation, which saved about $176,000 in utilities cost. Mr. Green stated that TRS lapsed about $1.3 million in TEAM funds of

which the majority was professional fees and services. Mr. Green discussed the $5.5 million lapsed in spending out of commission credits and that the funds from those credits are carried forward to the Fiscal Year 2018 budget. Mr. Green stated that TRS lapsed $1.7 million in spending in TRS-Care and TRS-Active Care, most of which were related to consulting services. In response to a question from Mr. Kelly, Mr. Green stated that it is too early to determine how the 2018 expenditures are trending relative to the budget, but that requested but unbudgeted items are trending lower thus far in the fiscal year. Based on questions from the Board, Mr. Green discussed the relationship between full time equivalent employees and the impact on the operating budget. Mr. Green and Dr. Gibson discussed communication between TRS staff and the Board on budget matters.

8. Consider adoption of proposed amendments to the Resolution Designating Persons Authorized to Sign TRS Vouchers – Don Green.

Mr. Green stated that the Resolution Designating Persons Authorized to Sign TRS Vouchers lists the individuals who are authorized to sign TRS vouchers on behalf of TRS. Mr. Green stated that the resolution needs to be updated because TRS has hired additional individuals who need to be included on the resolution. Mr. Green introduced Mr. Richard Scheel who will serve as TRS's new controller and director of operations. On a motion from Dr. Gibson, seconded by Mr. Corpus, the Board unanimously approved the updated resolution. Mr. Green also introduced Mr. Martin Cano, who is serving as TRS's new director of facilities security. Mr. Green discussed the reorganization of the Financial Division and brought u Janie Duarte, who has a new position as director of administration. Before concluding the presentation, Mr. Kelly and Mr. Guthrie discussed developing a discreet list of items over which the Board does not have control but impact TRS.

9. Receive an update on Records Management Project – Don Green.

Mr. Green introduced the electronic records management program and its goal to create centralized repositories for TRS electronic records and processes to improve efficiency of information management. Mr. Green reviewed the governance structure of the project and TRS's partnership with Access Sciences to accomplish the project. Mr. Robert O'Connor discussed the size of TRS's electronic file storage and the costs associated with those files. Ms. Kristin Homer discussed the work time lost when an employee has to sift through a large number of electronic files to identify documents and the goal of the e-records project to mitigate that lost time. Mr. Kelly, Mr. Green, and Mr. Jerry Albright discussed the efficiencies that needed to be derived during the hiring freeze and how TRS's e-records project will help improve employee efficiency.

10. Consider adoption of the proposed 403(b) rules, Title 34, Part 3, Chapter 53 of the Texas Administrative Code – Rebecca Merrill.

Ms. Rebecca Merrill presented to the Board the proposed new, amended and repealed rules for final adoption for the TRS 403(b) program. Ms. Merrill reviewed the major provisions of the rule, including proposed changes in the maximum allowable fees companies may charge for the sale of

registered products and investment options. On a motion by Mr. Corpus, seconded by Ms. Ramirez, the Board unanimously adopted the final proposed rule changes to TRS's 403(b) program.

11. Receive a report on Experience Study Overview – Rebecca Merrill.

Ms. Rebecca Merrill presented to the Board an overview of actuarial matters impacting TRS. Ms. Merrill noted that this presentation is to help the Board prepare for the actuarial valuation presentation in December and in preparation for the experience study and assumption set adoption that will be presented in February 2018. Ms. Merrill discussed the elements of the actuarial valuation, including the metrics used by the actuary to assess the actuarial profile of the pension trust fund. Ms. Merrill noted that the actuarial valuation is not an item adopted by the Board unlike the assumption set on which the Board does vote. Ms. Merrill discussed the difference between the economic and demographic assumptions that are included in the assumption set. She also addressed the "pension formula" of contributions plus investment earnings equals the amount of benefits that can be paid and how each of the assumptions fits into the formula. Ms. Merrill discussed that the actuaries use their own independent assessment of TRS's return by mapping TRS's strategic asset allocation to GRS's independently developed capital market expectations. Ms. Merrill reviewed the assumptions that were adopted as part of the 2015 experience study. She also provided the timeline for the 2017 experience study and discussed plans to bring an updated assumption set to the Board at the February meeting. Ms. Merrill, Dr. Gibson, and Jerry Albright then discussed that while historical experience is a factor in developing the investment return assumptions, historical performance is not a predictor of future performance. So, while the actuary examines how TRS has performed over the last 20 years, the most important element in setting the investment return assumption are the forward-looking capital expectations of independent investment firms mapped to the TRS strategic asset allocation.

4. Discuss the Executive Director's report on the following – Brian Guthrie:

A. Administrative operational matters, including updates on legislative implementation of investment matters, the Executive Director′s goals, audit, legal, staff services, investment, special projects, long-term space planning, and strategic planning.

Mr. Kelly announced that the board would go into executive session on agenda items 4A and 13 under Section 551.071 of the Government Code to consult with legal counsel as needed. At 2:40 p.m. the open session recessed.

After completing the executive session, Mr. Kelly at 3:03 p.m. reconvened the open session.

12. Consider personnel matters, including the appointment, employment, evaluation, compensation, performance, duties discipline or dismissal of the Executive Director, Chief Investment Officer, Chief Audit Executive or Investment Management Division Directors. – David Kelly.

This item was not taken up.

13. Consult with the Board's attorney(s) in Executive Session on any item listed above on this meeting agenda as authorized by Section 551.071 of the Texas Open Meetings Act (Chapter 551 of the Texas Government Code). – David Kelly.

This item was not taken up.

At 3:03 p.m., Mr. Moss moved, Ms. Ramirez seconded and the Board unanimously voted to adjourn.

APPROVED BY THE BOARD OF TRUSTEES OF THE TEACHER RETIREMENT SYSTEM OF TEXAS ON THE 14th DAY OF DECEMBER, 2017

ATTESTED BY:

_____ _____

Katherine H. Farrell Date
Secretary to the TRS Board of Trustees

Memorandum

DATE: December 14, 2017

TO: Board of Trustees

FROM: Brian Guthrie, Executive Director

RE: Consideration of Board Member Absences from October 27, 2017 Meeting

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Trustee absences may be excused by majority vote of the Board. Ms. Karen Charleston was unable to attend the October 27, 2017 meeting.

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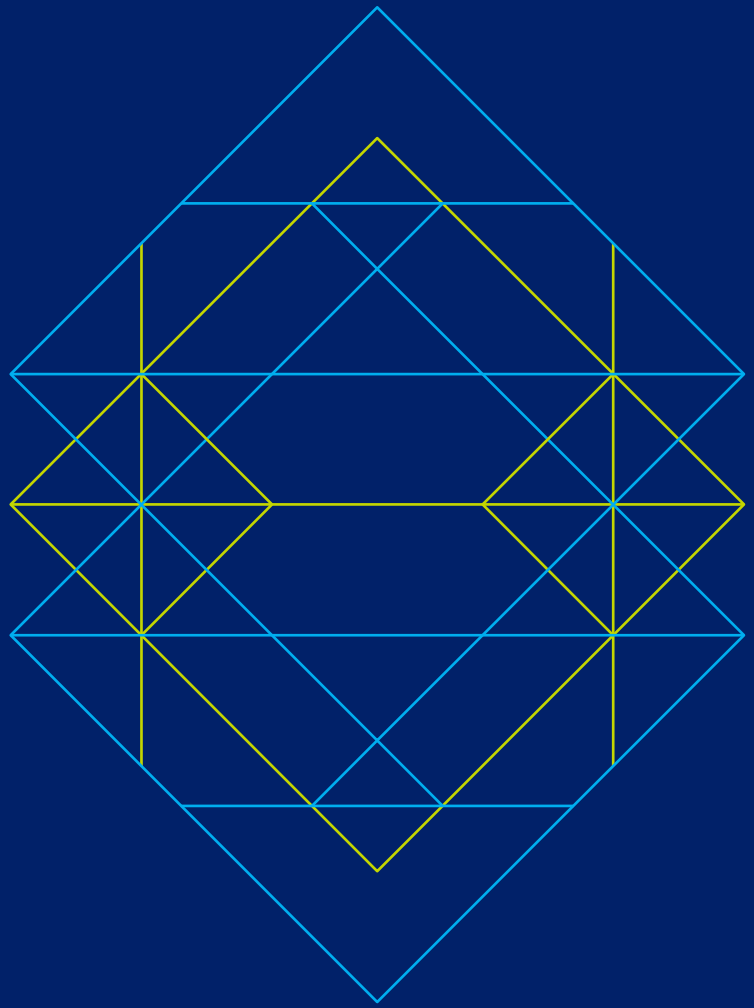
TAB 4

Making the Most When Markets Are Giving You the Least

Cliff Asness, Ph.D.
Managing and Founding Principal

December 14, 2017



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The information in this presentation may contain projections or other forward-looking statements regarding future events, targets, forecasts or expectations regarding the strategies described herein, and is only current as of the date indicated. There is no assurance that such events or targets will be achieved, and may be significantly different from that shown here. The information in this presentation, including statements concerning financial market trends, is based on current market conditions, which will fluctuate and may be superseded by subsequent market events or for other reasons. Performance of all cited indices is calculated on a total return basis with dividends reinvested.

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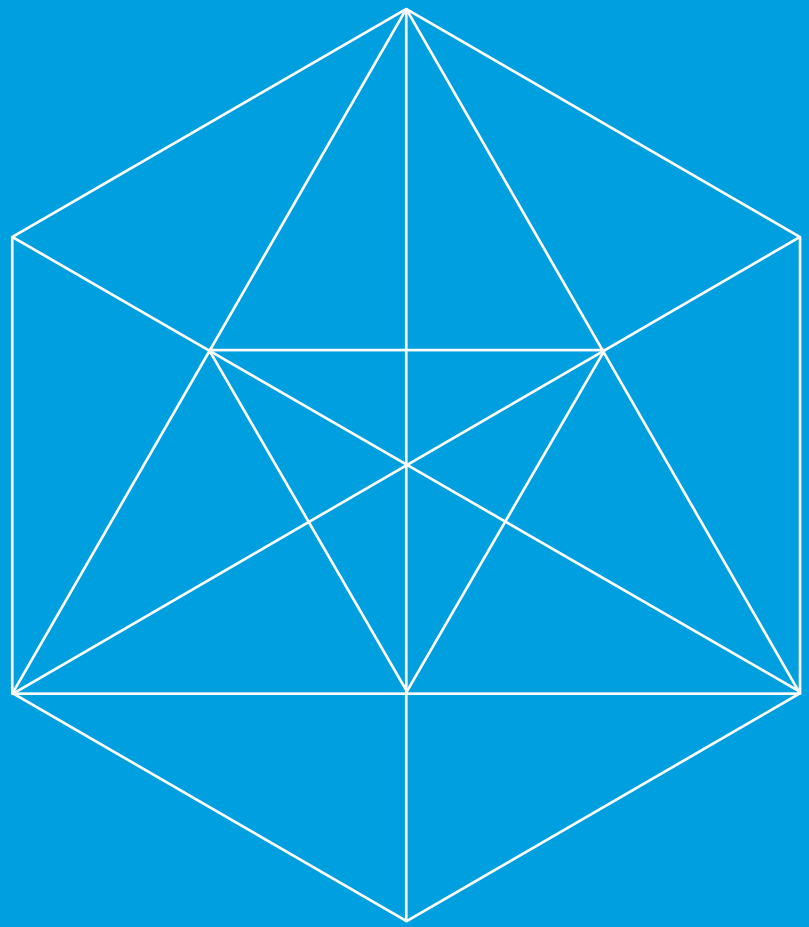
Introduction

- Current environment
  - Low expected returns on traditional assets
- Sources of return
  - Aggressive diversification across multiple sources of market (e.g., risk parity) and alternative risk premia can help
- Putting the pieces together
  - Different tools (e.g., leverage, shorting, derivative) are needed to capture these returns and risk should be managed accordingly

Source: AQR. Diversification does not eliminate the risk of experiencing investment losses.

Current Environment

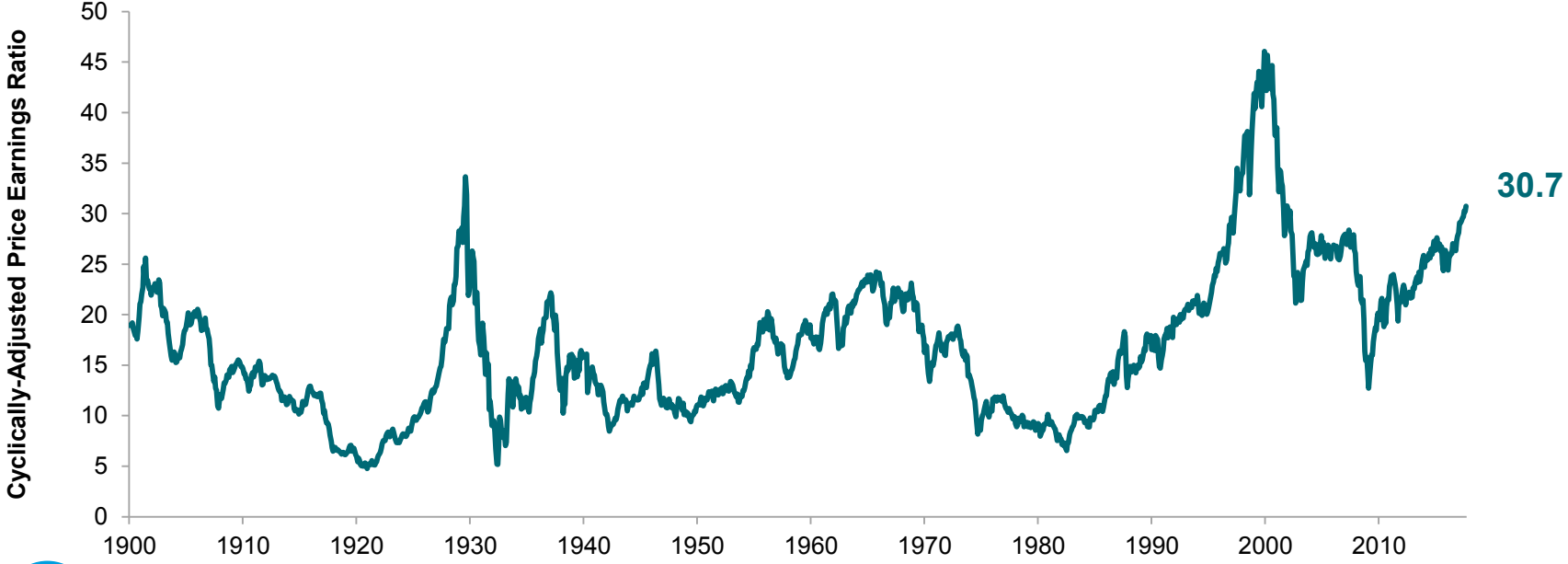


Current Environment

Equity valuation ratios are high compared to history

Shiller P/E for U.S. Equities*

January 1900 – September 2017



* Earnings data through 6/30/2017.
Source: AQR, Robert Shiller's Data Library ("U.S. Stock Markets 1987-Present and CAPE Ratio"), through September 30, 2017. The universe of stocks represented is the S&P 500. For illustrative purposes only.
Please read important disclosures in the Appendix.

Current Environment

How does today stack up to history?

Realized Real Returns by Starting Shiller P/E for U.S. Equities*

January 1926 – September 2017

Decile	Starting P/E Low	Starting P/E High	Average Realized 10 Yr Return	Worst Realized 10 Yr Return	Best Realized 10 Yr Return
1	5.2	9.7	9.9%	4.5%	19.1%
2	9.7	11.0	10.4%	2.8%	18.6%
3	11.0	12.1	10.4%	1.5%	16.3%
4	12.1	14.1	9.4%	-1.0%	15.0%
5	14.1	16.2	7.6%	-3.5%	15.7%
6	16.2	17.9	5.2%	-5.8%	15.1%
7	17.9	20.1	4.7%	-5.9%	14.4%
8	20.1	22.3	2.0%	-5.2%	8.7%
9	22.3	26.9	1.7%	-5.8%	6.8%
10	**26.9**	**46.1**	**0.4%**	**-6.7%**	**5.3%**

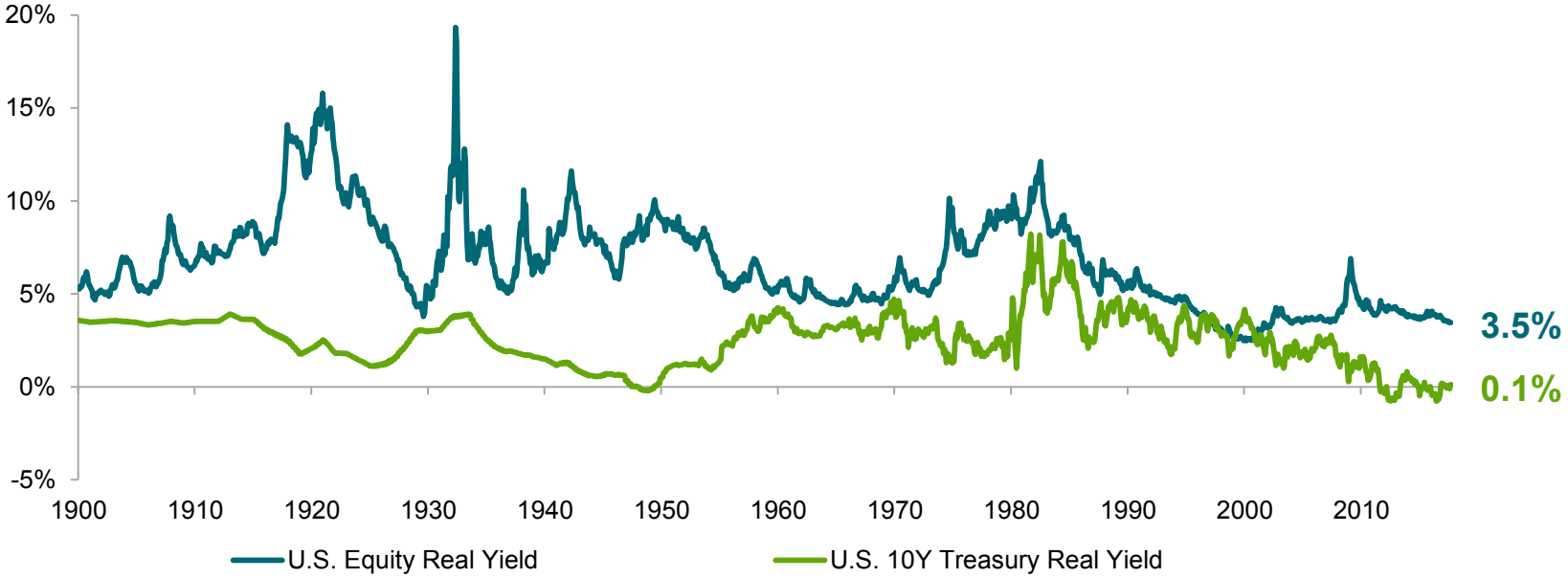
* Earnings data through 6/30/2017.
Source: AQR, Robert Shiller's Data Library, Ibbotson Associates, Bloomberg, Datastream, through June 30, 2017. The universe of stocks represented is the S&P 500. Realized 10-year returns are subsequent 10-year geometric averages. For illustrative purposes only. Please read important disclosures in the Appendix.

Current Environment

Comparing stocks to bonds

U.S. Equity and Bond Real Yields*

January 1900 – September 2017



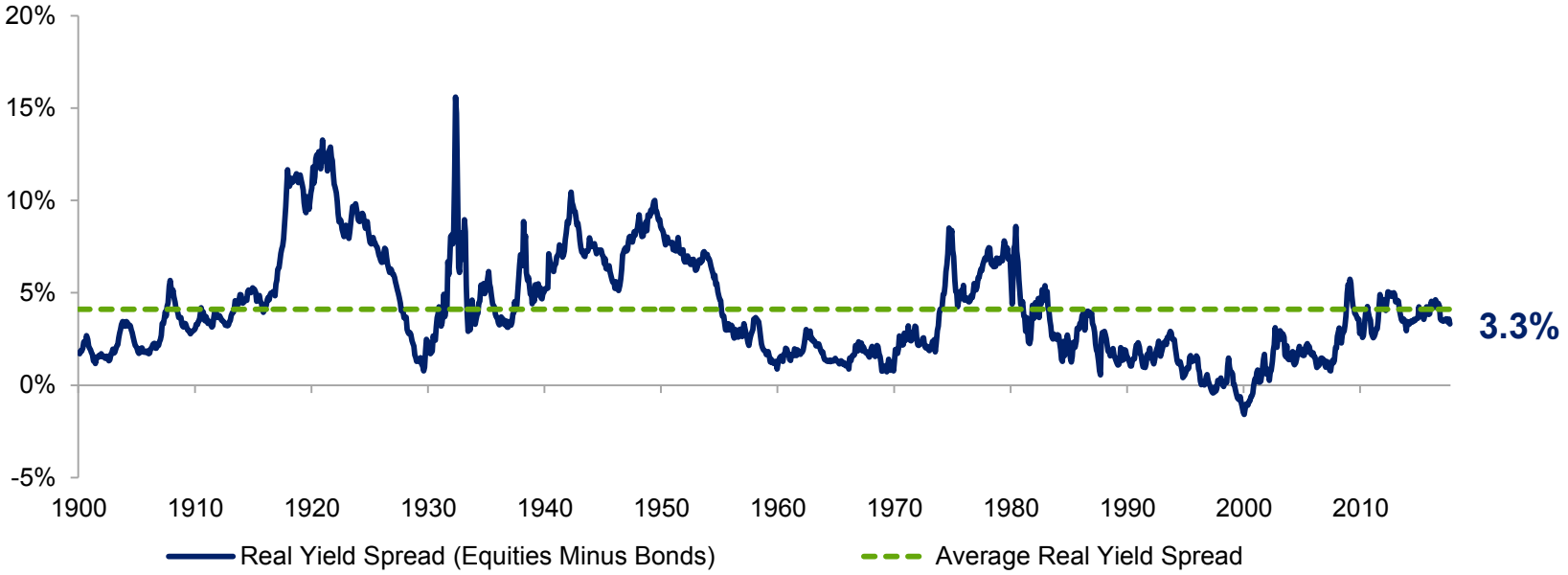
* Earnings data through 6/30/2017.
Source: AQR, Bloomberg, Robert Shiller's Data Library ("U.S. Stock Markets 1987-Present and CAPE Ratio"). Data description: The real equity yield is an average of the Shiller earnings yield (using 10-year earnings) scaled by 1.075 (embedding an annual EPS growth of 1.5%) and dividend yield plus 1.5% (roughly the long-run real growth of dividends-per-share and earnings-per-share). The universe of stocks represented is the S&P 500. The real bond yield is the yield on long-term U.S. Treasury bonds minus long-term expected inflation based on Blue Chip Economic Indicators, Consensus Economics and the Federal Reserve Bank of Philadelphia. Before survey data became available in 1978, expected long-term inflation is based on statistical estimates and on 1-year ahead Livingston inflation forecasts. This is one set of estimates of ex-ante real yields for equities and bonds, but other reasonable specifications should tell broadly the same story. Please read important disclosures in the Appendix.

Current Environment

Maybe surprisingly, neither asset class is a relative bargain

U.S. Real Yield Spread*

January 1900 – September 2017



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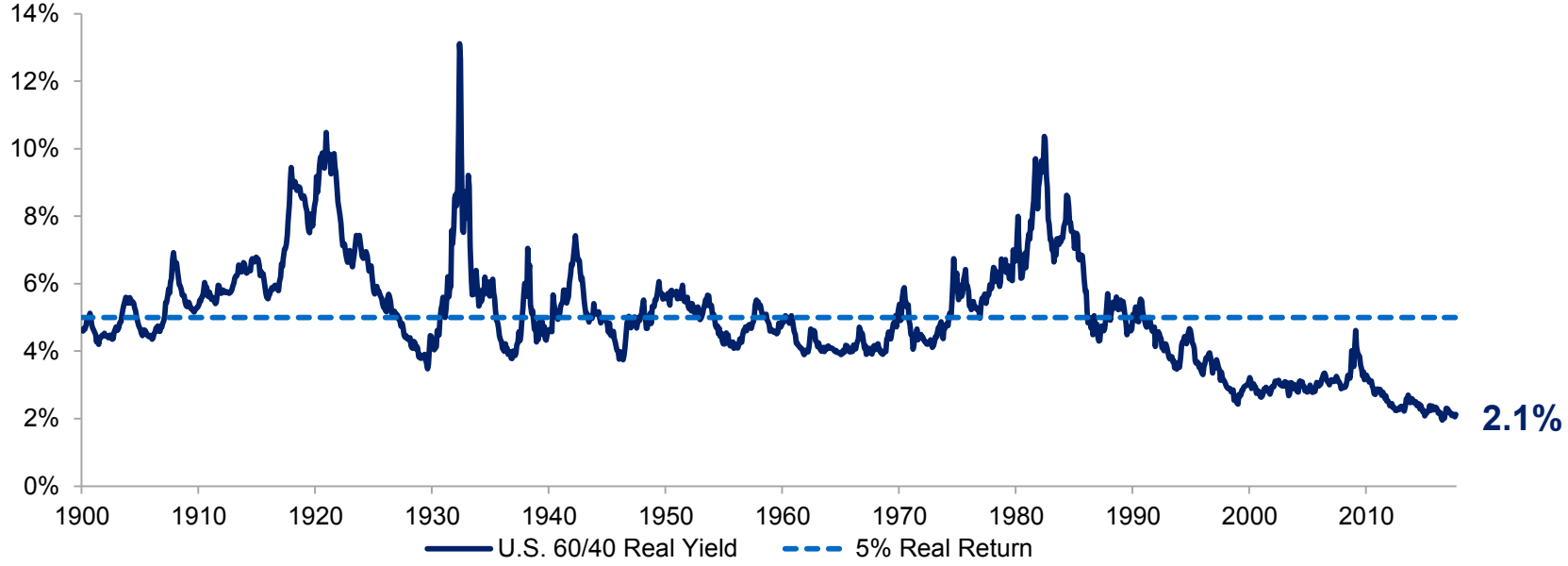
Current Environment

Low expected returns for 60/40

Real Yield of U.S. 60/40 Stock/Bond Portfolio*

January 1900 – September 2017



* Earnings data through 6/30/2017.
Source: AQR, Bloomberg, Robert Shiller's Data Library ("U.S. Stock Markets 1987-Present and CAPE Ratio"), Ibbotson Associates (Morningstar), Kozicki-Tinsley (2006), Federal Reserve Bank of Philadelphia, Blue Chip Economic Indicators, Consensus Economics. U.S. 60/40 is 60% U.S. stocks represented by the Standard & Poor's 500 Index and 40% long-dated Treasuries represented by 10-year Treasuries. The equity yield is a 50/50 mix of two measures: 50% Shiller E/P * 1.075 and 50% Dividend/Price + 1.5%. U.S. bond yield is 10-year real Treasury Yield over 10-year inflation forecast. Scalars are used to account for long term real Earnings Per Share (EPS) Growth. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

Current Environment

Choices for investors

Stay the course

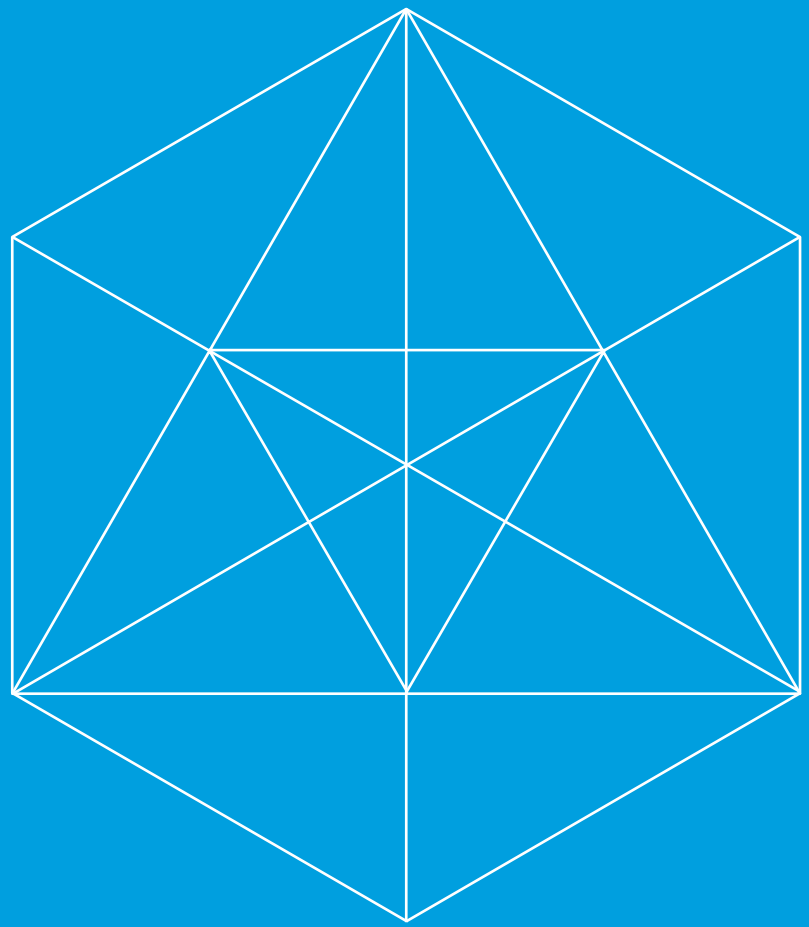
Add alpha

Take bigger portfolio risks

Diversify more across the “known”

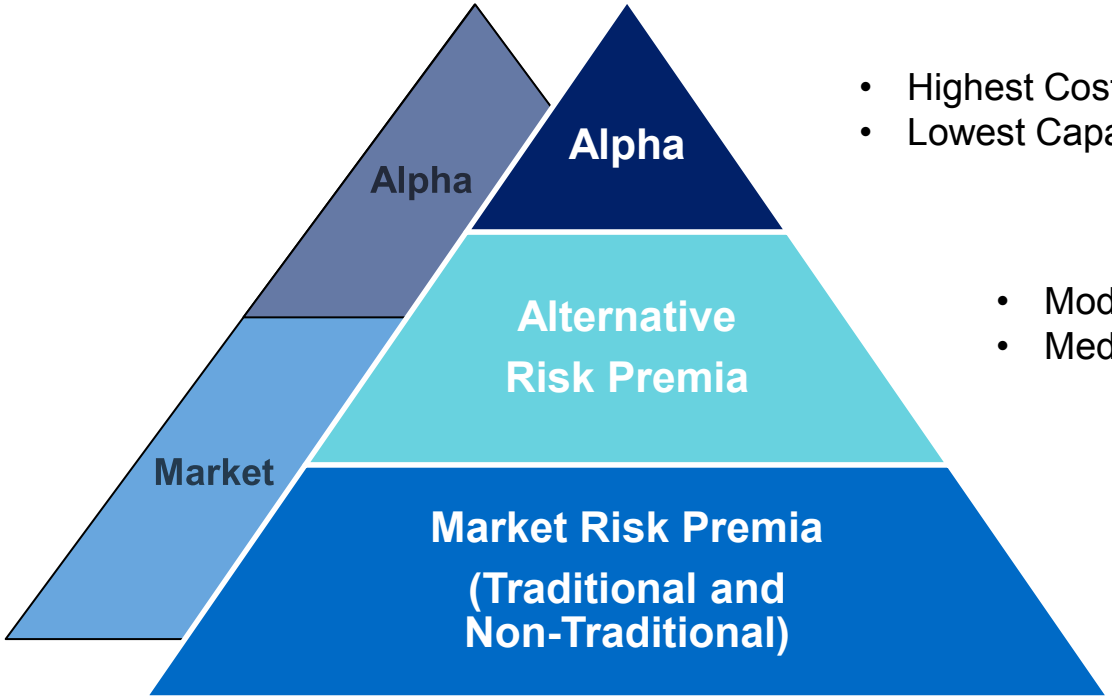
Sources of Return

- Market Risk Premia
- Alternative Risk Premia
- Alpha



Sources of Return

Understand what you are getting



- Highest Cost ("2 and 20")
- Lowest Capacity

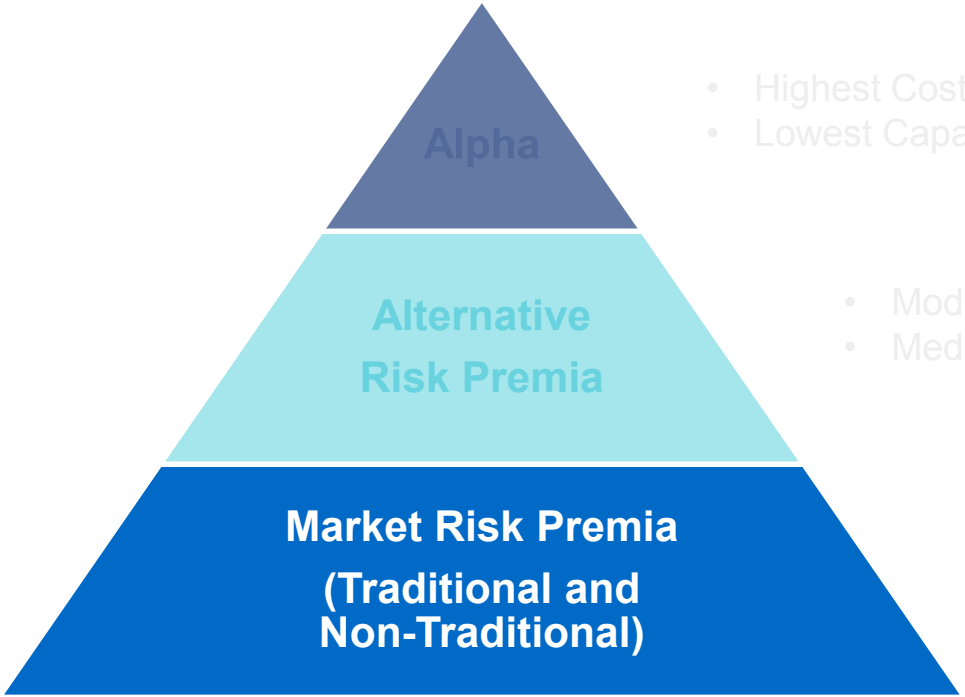
- Moderate Cost
- Medium Capacity

- Lowest Cost
- Highest Capacity

Source: AQR. For illustrative purposes only.

Market Risk Premia

Traditional and non-traditional



- Highest Cost ("2 and 20")
- Lowest Capacity

- Moderate Cost
- Medium Capacity

- **Lowest Cost**
- **Highest Capacity**

Source: AQR. For illustrative purposes only. Diversification does not eliminate the risk of experiencing investment losses.

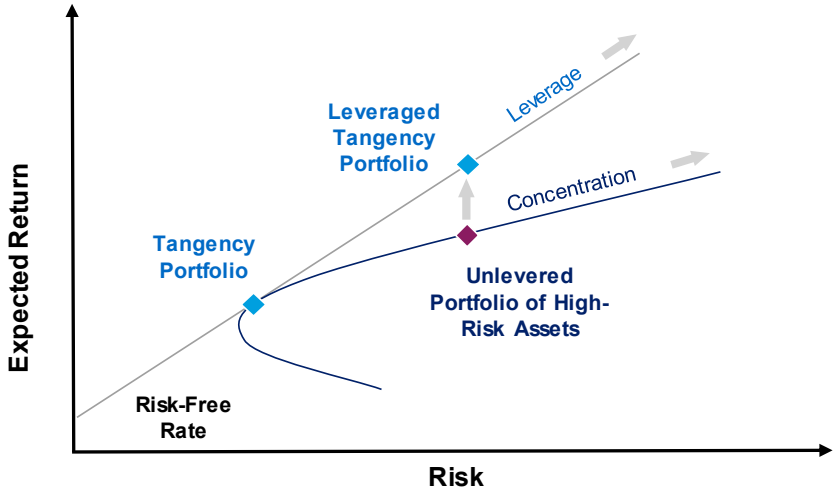
Market Risk Premia

Leverage aversion may present some useful choices for investors

According to academic theory, you are supposed to build the best portfolio of risky assets, and then lever it if you desire more expected return / risk

What if a significant subset of investors won't lever?

Leverage aversion predicts that higher-risk portfolios have lower risk-adjusted returns, creating opportunities within and across asset classes



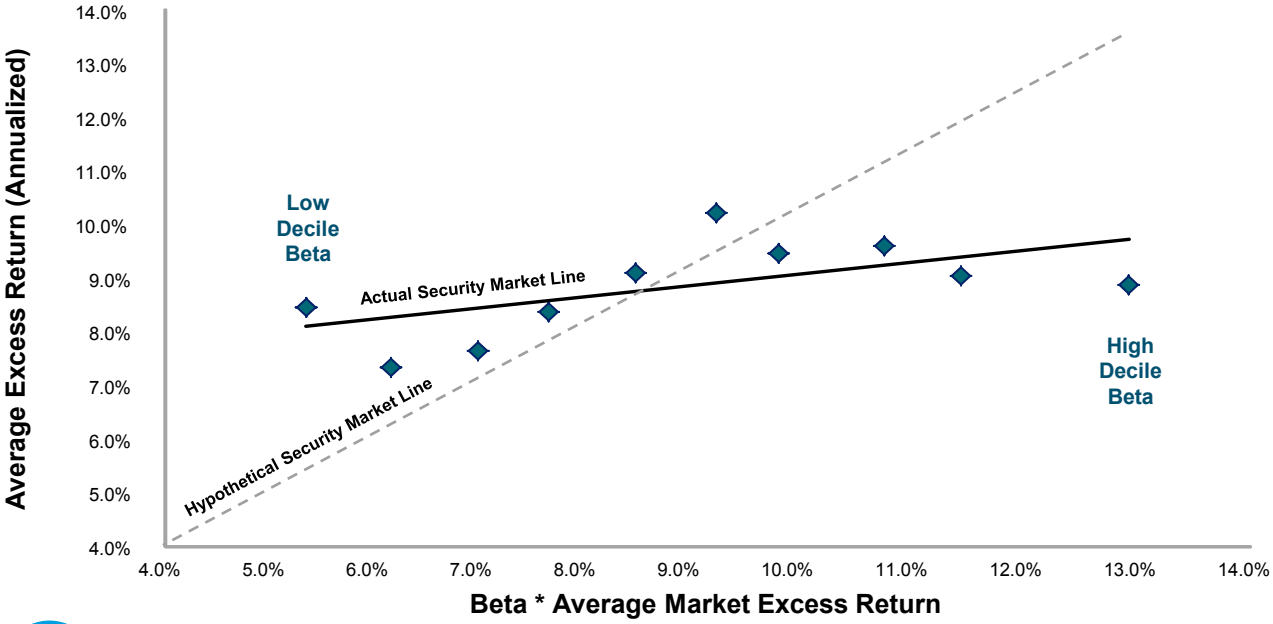
Source: AQR. For illustrative purposes only.

Market Risk Premia

Evidence of leverage aversion is not new and exists broadly

Beta-Sorted U.S. Equity Portfolios

1926 –2012



Source: Frazzini and Pedersen (JFE 2014). U.S. equites include all available common stocks on CRSP between January 1926 and March 2012. Returns are excess of the risk-free rate, which is based on one-month Treasury bills. Please read important disclosures in the Appendix.

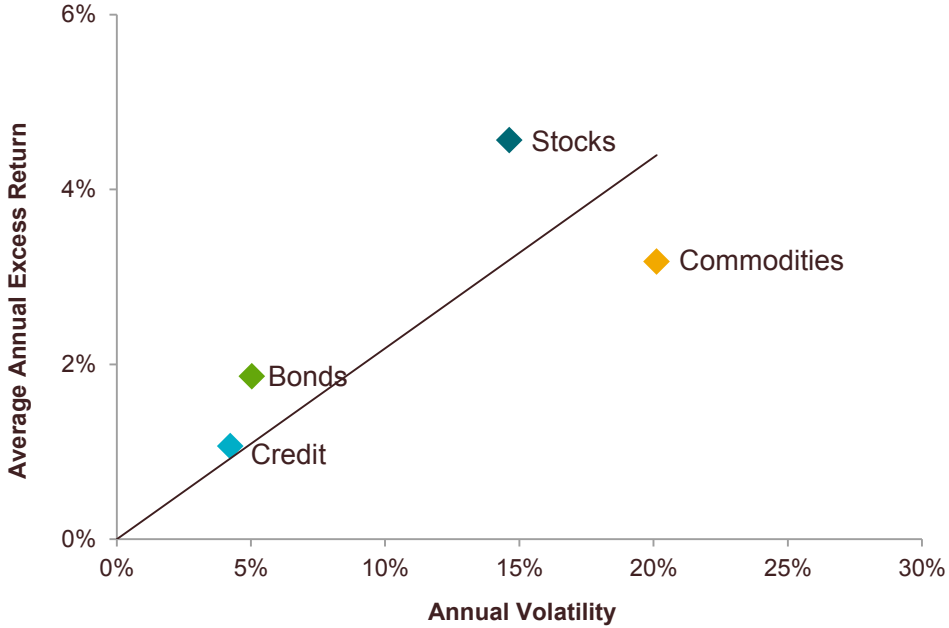
Market Risk Premia

Risk-adjusted returns are similar, so risk allocations should be too

Expected Contribution to Return

Historical Asset Class Risk and Return Scatter Plot

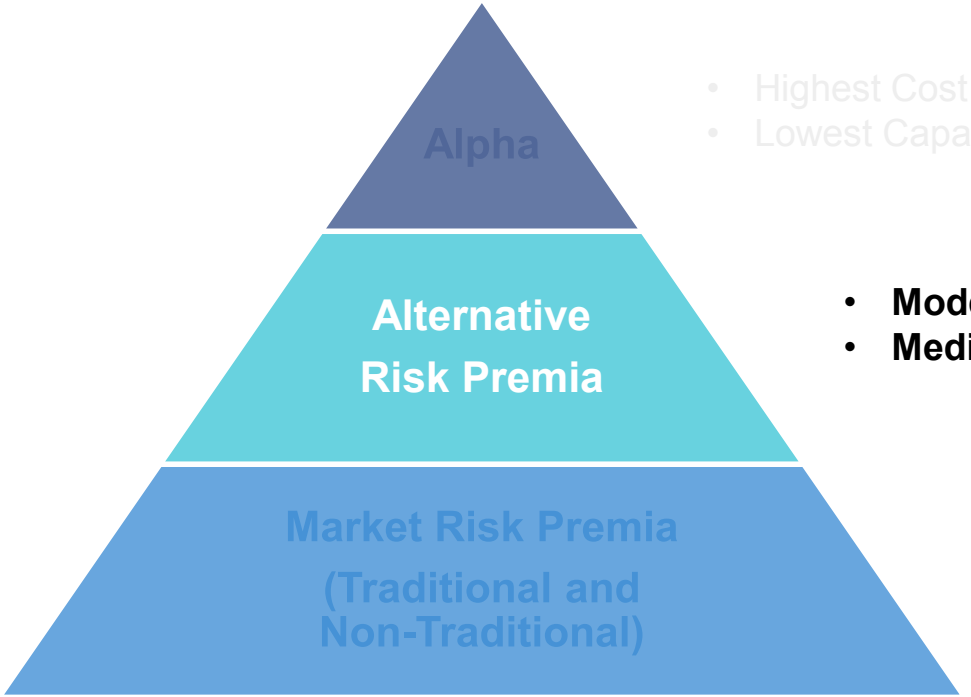
January 1971 – June 2017



Source: AQR, Barclays Live, Bloomberg, Ibbotson Associates (Morningstar). Excess returns are in excess of cash proxied by the Merrill Lynch 3-Month T-Bill Index. Stocks are defined as the MSCI World Index. Bonds are defined as the Barclays Capital U.S. Government Index and, prior to 1976, the Ibbotson U.S. Intermediate Government Bond Index. Commodities are defined as the S&P GSCI Total Return Index. Credit is defined as the Barclays U.S. Corporate Index minus key-rate duration matched treasury returns and, prior to 1988, the Ibbotson's Long-term Corp Bond Index minus duration matched long-term government bonds total returns. Please read important disclosures in the Appendix.

Alternative Risk Premia

Long/short strategies seek to harvest "good" return sources



- Highest Cost ("2 and 20")
- Lowest Capacity

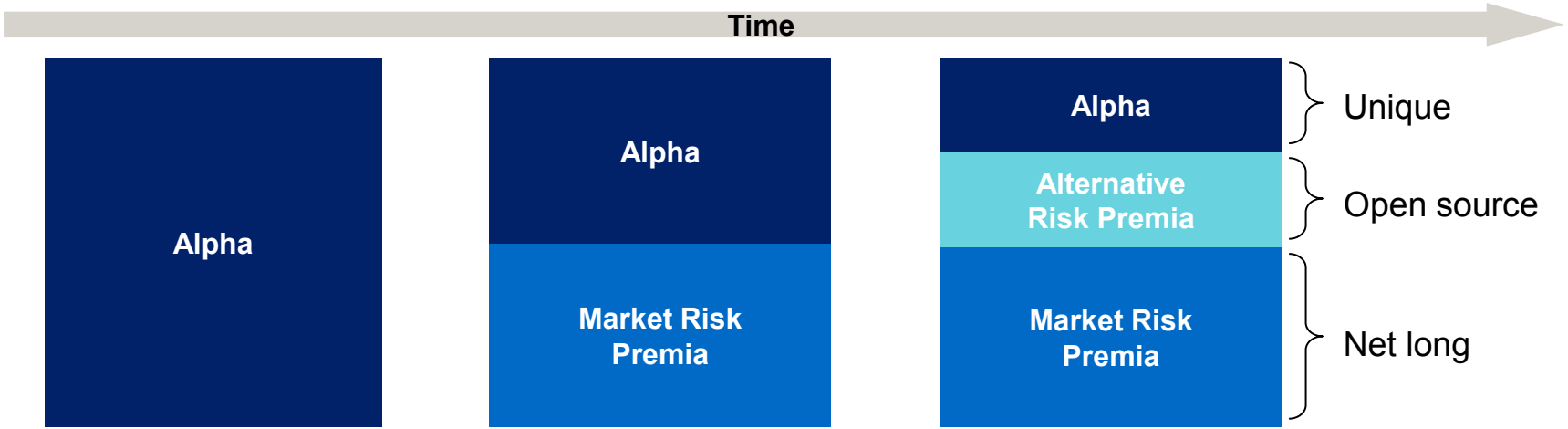
- **Moderate Cost**
- **Medium Capacity**

- Lowest Cost
- Highest Capacity

Alternative risk premia are also sometimes referred to as exotic beta premia.

Alternative Risk Premia

Evolution of risk premia: is alpha just beta waiting to be discovered?



"Passive Factors," e.g.,

- Equity Risk Premium
- Term Premium
- Credit Premium

"Active Factors," e.g.,

- Merger Arbitrage Premium
- Trend-Following
- Value Premium
- Momentum Premium

Source: AQR. For illustrative purposes only.

Alternative Risk Premia

Finding implementable, good sources of alternative returns

There is no roadmap to alternative risk premia like there is for asset classes

Instead, we have to find them

Our two most fertile areas have been:

- Academic and industry research for much of the theory
- Hedge funds and active managers for much of the practice

Some keys to be included

- Evidence both in- and, more importantly, out-of-sample
- Economic motivation

Source: AQR.

Alternative Risk Premia

Focusing on six intuitive premia

Value	Relatively cheap assets tend to outperform relatively expensive ones
Momentum	An asset's recent *relative* performance tends to continue in the near future
Carry	Higher-yielding assets tend to provide higher returns than lower-yielding assets
Defensive	Lower-risk and higher-quality assets tend to generate higher risk-adjusted returns
Trend	An asset's recent performance tends to continue in the near future
Volatility	Options tend to be richly priced due to financial insurance premium

Characteristics of Alternative Premia:

Persistent
Long-term evidence supported by economic intuition

Pervasive
Exist broadly across regions and asset groups

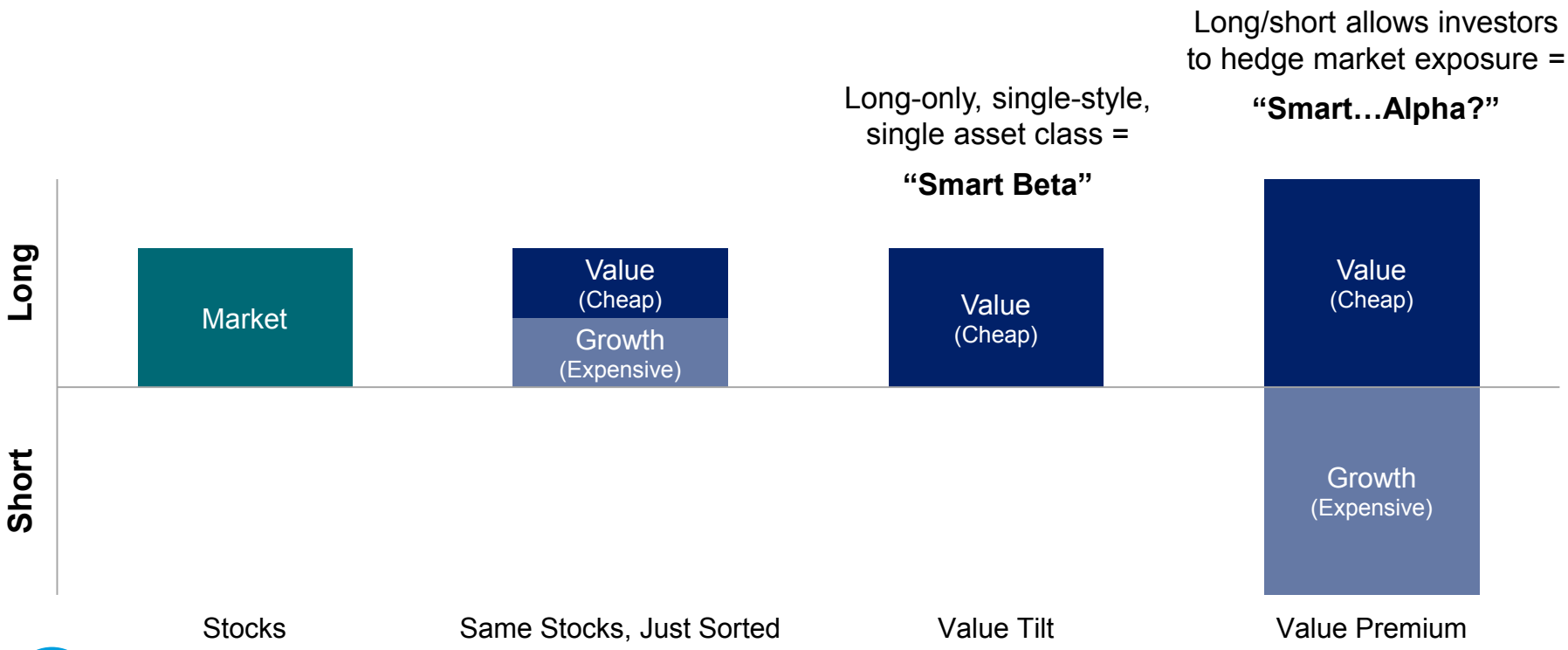
Liquid
Can be captured by trading liquid instruments

Dynamic
Limited static exposure to any asset or market

Source: AQR. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

Alternative Risk Premia

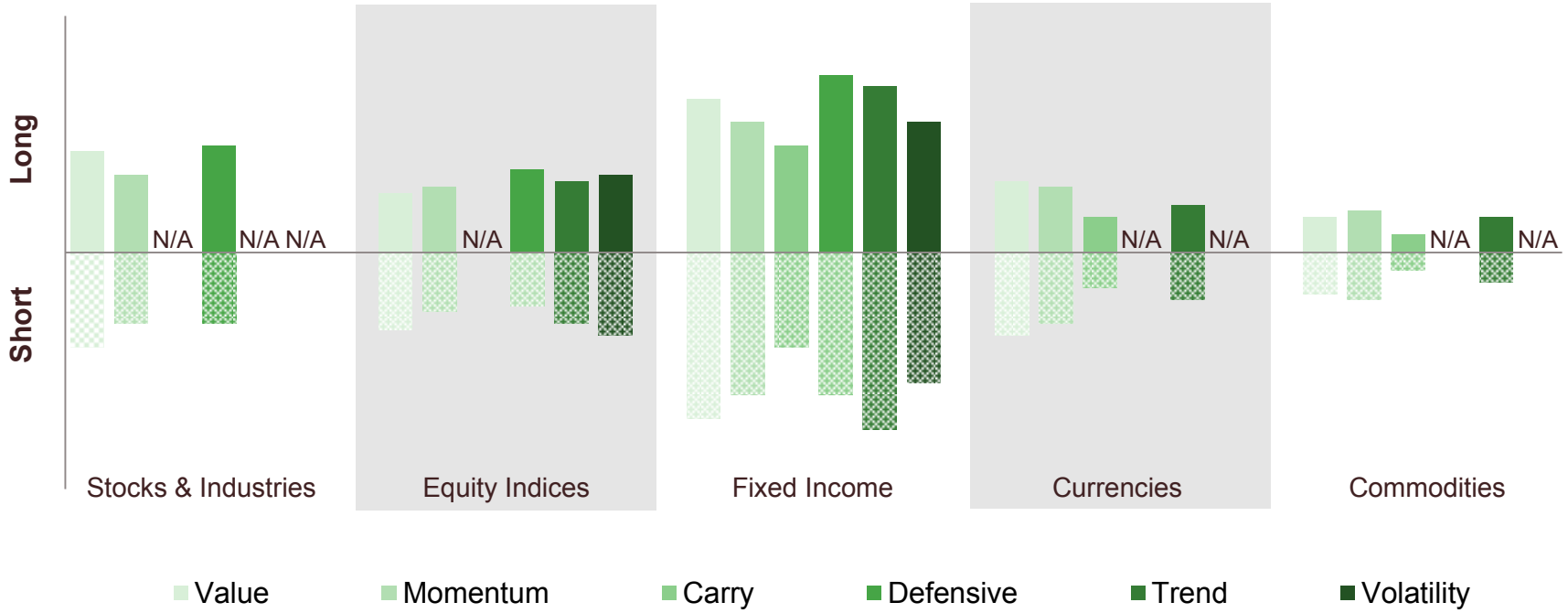
Long-only tilts versus long/short strategies



Source: AQR. For illustrative purposes only.

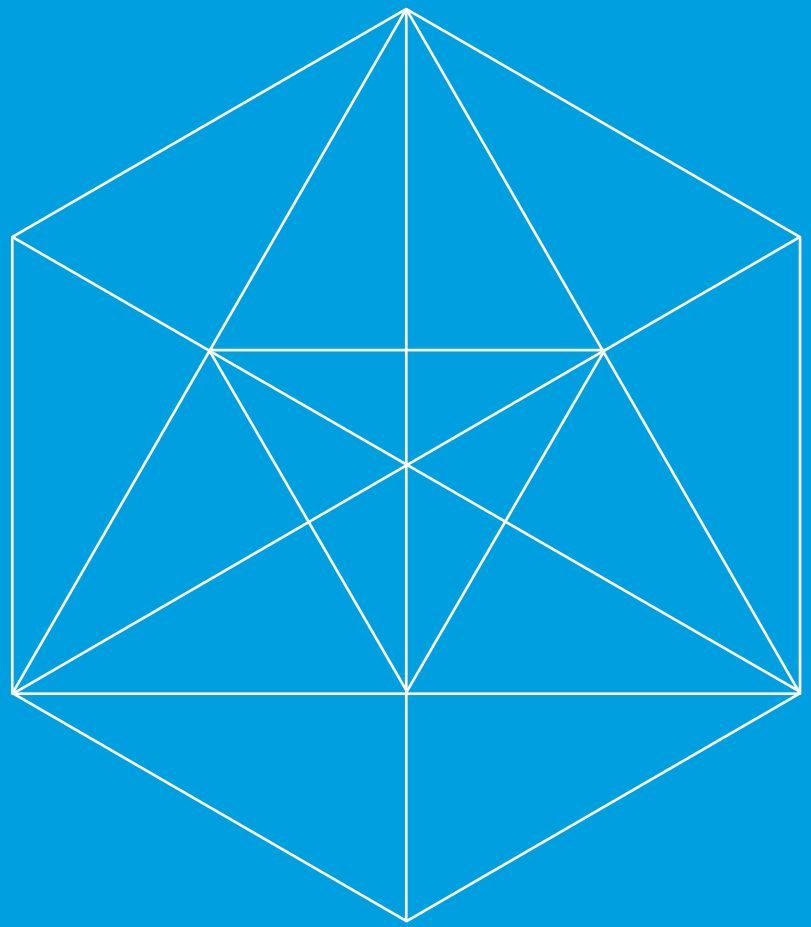
Alternative Risk Premia

...It's not just value... and not just stocks



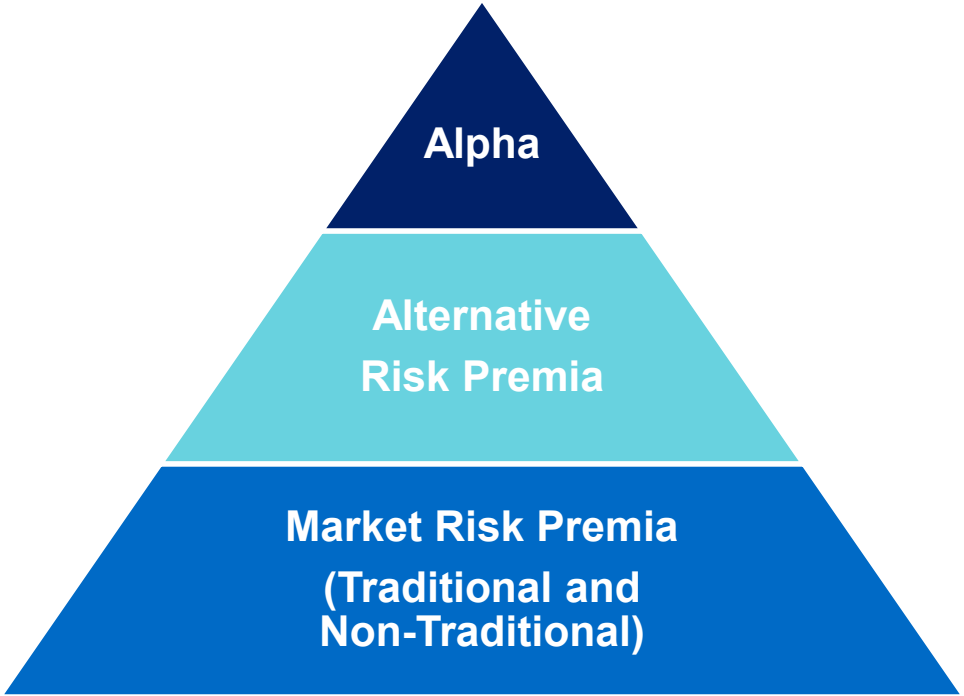
Source: AQR. Graphic above is stylized and for illustrative purposes only.

Putting the Pieces Together



Putting the Pieces Together

Allocate by risk, not by dollars



Source: AQR. For illustrative purposes only.

Putting the Pieces Together

Allocating by risk generally requires the "dirty words of finance"

Leverage

Shorting

Derivatives

What can these tools allow investors to do?

- Open the opportunity set to diversifying sources of return
- Reduce reliance on concentrated risks
- Potentially improve risk-adjusted returns

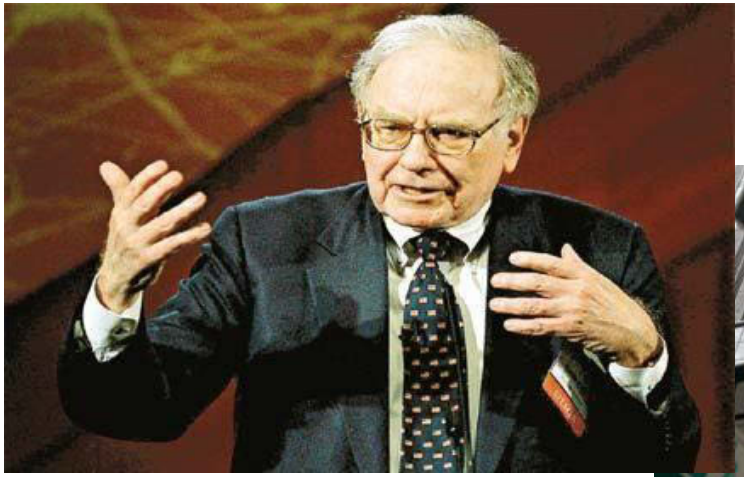
…so what's the problem?

Source: AQR. For illustrative purposes only. Diversification does not eliminate the risk of experiencing investment losses.

Putting the Pieces Together

Sometimes they get a little hairy …

Derivatives are "Financial Weapons of Mass Destruction"



Leveraged Institutions Can Fail

Putting the Pieces Together

Risk management

Manage and diversify portfolio risk through time

Maintain adequate levels of cash

Hold liquid assets

Don't over-react to near-term performance (of course that sounds easy …)

Plan for bad events with painful stress tests

Have a plan for reducing risk when things are really bad

To survive in the long term, brace yourself for the short term

AQR

Source: AQR. Please read important disclosures in the Appendix.

Putting the Pieces Together

Overview

Investors face a challenging environment to meet their performance hurdles

Fees and t-costs make active management a negative sum game in aggregate

But, passive investing still makes bets — it overweights the most overvalued assets and does so at the volatility the market (not you!) decides upon

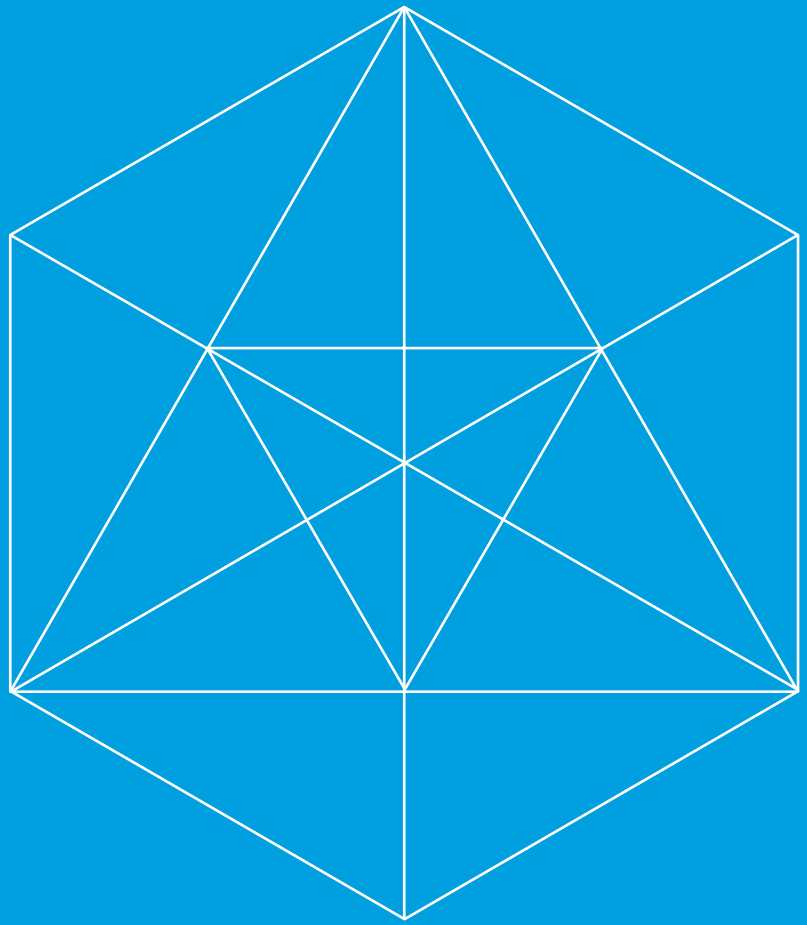
It's not about "active vs. passive" but about fair fees for each (and in between)

As a partial solution to long-term portfolio needs, consider:

- Allocations to alternative risk premia, and alternative methods of obtaining market risk premia
- Looking for fairly priced and actually diversifying alpha (if you aren't doing the above, then doing them can be alpha to you)
- Allocating by risk, not dollars
- Leverage, derivatives and short selling, in moderation, are tools that may help
- Taking steps to protect the process from the bad times

Source: AQR.

Appendix

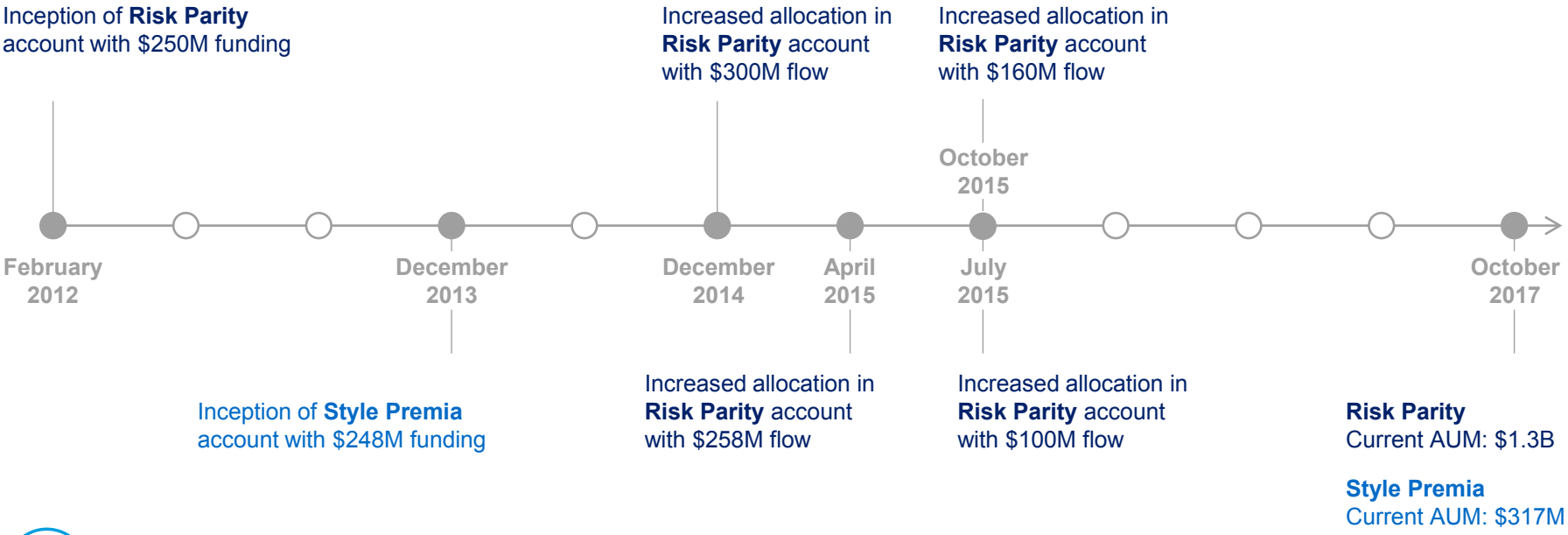


Current Texas TRS and AQR Partnership

$1.6 billion invested across AQR strategies

Texas TRS Accounts

January 2012 – October 2017



Source: AQR.

Texas TRS and AQR Partnership

Selected engagements

Risk Parity Education and Discussion

- Risk parity teach-in
- Cash management discussion
- Rebalancing rule research update
- Equity, emerging currency, and commodity risk premia discussion

Style Premia Education and Discussion

- Style premia teach-in
- Webex demo of AQR portfolio management and trading systems
- Hedge fund and style beta analysis of Texas TRS's portfolio
- Sample Style Premia Fund performance attribution calculation

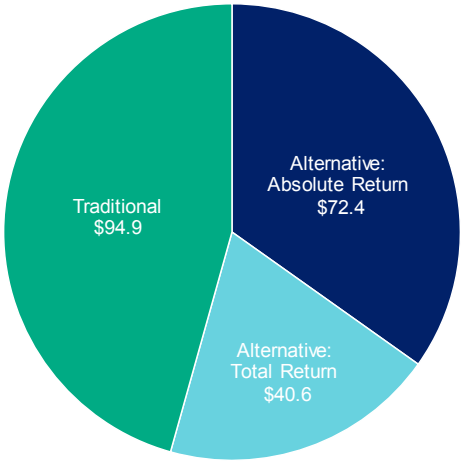
Other Custom Analyses and Knowledge Transfer

- Annual "best ideas" survey
- Discussion on uses and types of leverage in hedge funds
- List of opportunistic investments traded in AQR Churchill fund
- Presentation on Appraisal Ratio and its potential application in Texas TRS's equity portfolio
- Analysis of equity market value spreads
- Feedback on Texas TRS's intern project

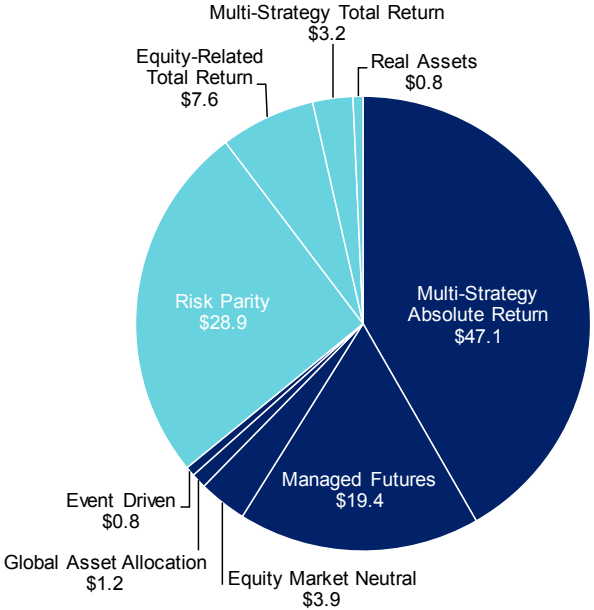
Source: AQR.

Assets Under Management

Total Assets
$208 Billion*



Alternative Investment Assets
$113 Billion*



*Approximate as of 9/30/2017, includes assets managed by AQR and its advisory affiliates.

Performance Disclosures

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Hypothetical performance results (e.g., quantitative backtests) have many inherent limitations, some of which, but not all, are described herein. No representation is being made that any fund or account will or is likely to achieve profits or losses similar to those shown herein. In fact, there are frequently sharp differences between hypothetical performance results and the actual results subsequently realized by any particular trading program. One of the limitations of hypothetical performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or adhere to a particular trading program in spite of trading losses are material points which can adversely affect actual trading results. The hypothetical performance results contained herein represent the application of the quantitative models as currently in effect on the date first written above and there can be no assurance that the models will remain the same in the future or that an application of the current models in the future will produce similar results because the relevant market and economic conditions that prevailed during the hypothetical performance period will not necessarily recur. There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical performance results, all of which can adversely affect actual trading results. Discounting factors may be applied to reduce suspected anomalies. This backtest's return, for this period, may vary depending on the date it is run. Hypothetical performance results are presented for illustrative purposes only. In addition, our transaction cost assumptions utilized in backtests , where noted, are based on AQR's historical realized transaction costs and market data. Certain of the assumptions have been made for modeling purposes and are unlikely to be realized. No representation or warranty is made as to the reasonableness of the assumptions made or that all assumptions used in achieving the returns have been stated or fully considered. Changes in the assumptions may have a material impact on the hypothetical returns presented. Hypothetical performance is gross of advisory fees, net of transaction costs, and includes the reinvestment of dividends. If the expenses were reflected, the performance shown would be lower. Where noted, the hypothetical net performance data presented reflects the deduction of a model advisory fee and does not account for administrative expenses a fund or managed account may incur. Actual advisory fees for products offering this strategy may vary.

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There is a risk of substantial loss associated with trading commodities, futures, options, derivatives and other financial instruments. Before trading, investors should carefully consider their financial position and risk tolerance to determine if the proposed trading style is appropriate. Investors should realize that when trading futures, commodities, options, derivatives and other financial instruments one could lose the full balance of their account. It is also possible to lose more than the initial deposit when trading derivatives or using leverage. All funds committed to such a trading strategy should be purely risk capital.

Broad-based securities indices are unmanaged and are not subject to fees and expenses typically associated with managed accounts or investment funds. Investments cannot be made directly in an index.

The Morgan Stanley Capital International World Index is a market-capitalization-weighted index composed of company's representative of the market structure of 23 developed market countries in North America, Europe and the Asia/Pacific Region. There are material differences between an index and the strategy.

The Barclays Global Aggregate Index is a flagship measure of global investment grade debt from 23 different local currency markets. This multicurrency benchmark includes fixed-rate Treasury, government-related, corporate and securitized bonds from both developed and emerging markets issuers. There are material differences between an index and the strategy. One significant difference between the indices and the performance presented is that the index performance is weighted on the basis of capitalization whereas the strategy performance reflects a risk-weighted calculation. This difference may have a material affect on the comparison of the indices with the performance of the strategy.

AQR

TAB 5

TEAM PROGRAM UPDATE

TRS
TEACHER RETIREMENT SYSTEM OF TEXAS

TEAM-TRS Enterprise Application Modernization

- TRS legacy computer systems are very stable, but represented a growing risk of technological obsolescence
- TRS Enterprise Application Modernization (TEAM) Program, launched in 2010, is a multi-year effort to update our legacy computer systems and business processes
- TRS has contracted with vendors to help with the TEAM Program
  - Provaliant, Program and Project Management
  - Bridgepoint Consulting, Independent Program Assessment
  - DXC, Implementation Services

TEAM PROGRAM - Introduction

WHY TEAM?

- Improved technology
- Improved business processes
- More member self service
- Integrated solution with single source of truth

TEAM PROGRAM - Introduction

TEAM Projects

TRS Enterprise Application Modernization

Line of Business Pension System
Customer Relationship Management
Website Redesign

Reporting Entity Outreach
Organizational Change Management
Data Management

Business Rules
Business Procedures and Training
Health Insurance Line of Business

Decommissioning
Maintenance & Enhancements
Quality Assurance Testing

TEAM PROGRAM - Progress

- Progress To Date
  - New TRS Website launched in September 2016
  - Much cleaner data, TRS spent 3 years preparing and conditioning our data
  - Improved technical infrastructure
  - Phase 1 of the new Pension Line of Business system, called TRUST, went live in October 2017 and certain legacy systems were decommissioned
  - Phase 2 of TRUST and Health Insurance Line of Business solution scheduled to Go Live by August 2019

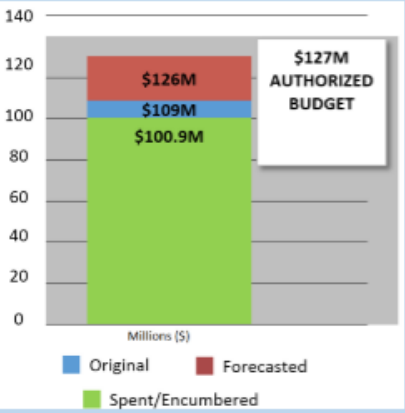
TRS

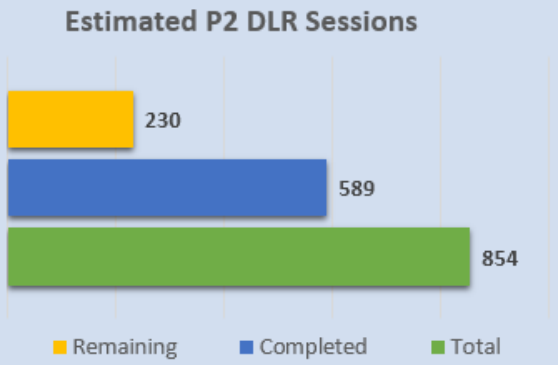
TEAM PROGRAM - Summary

TEAM TRANSPARENCY	October 1 – October 31, 2017	Days to P2 Go Live 699	October 2017

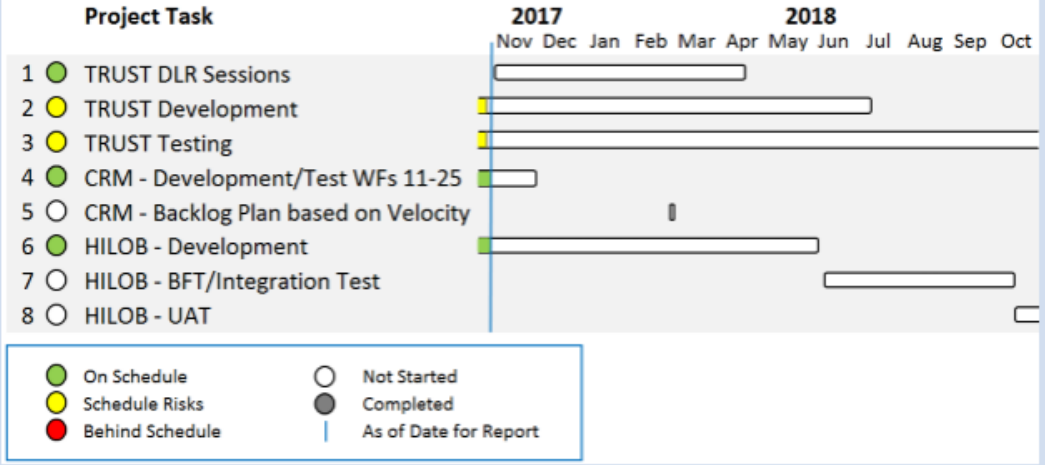
Project Health

B





Milestones



Other Key Updates/Notes

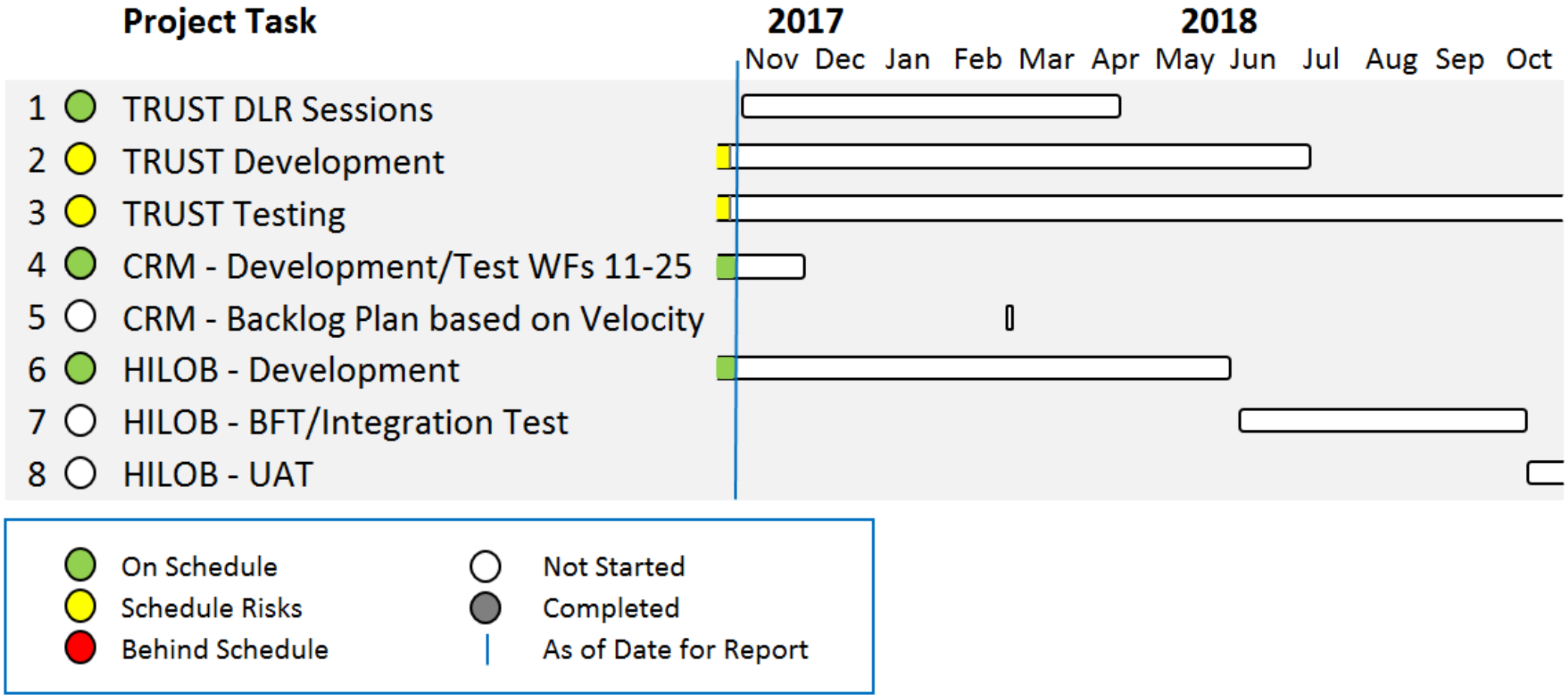
Achievements
- P1 – Went live on 10/02
- SWAT team formed and engaged to handle questions/issues
- "Operationalization" of TRUST

Key Goals Upcoming
- 11/06/2017: Start TRUST DLR sessions back up

Issues/Risks
- Risk – P1 and P2 – Focus on P1 impacting P2 schedule
- Legislative changes – Impact on P2 schedule and budget
- CAPPS Chart of Account changes – Possible impact on P2 schedule and budget

TEAM PROGRAM – Near Term Goals

Near Term Goals and Progress



TEAM PROGRAM – Post Go Live Issues

Post Go Live Issues

- Employer Reporting – Delays and difficulties completing employer reports
- Refunds – Some refunds delayed due to defects and delayed employer reports
- Increased Call Volume – Increased call volume and learning newer system resulted in longer hold times

TEAM PROGRAM – Employer Reporting

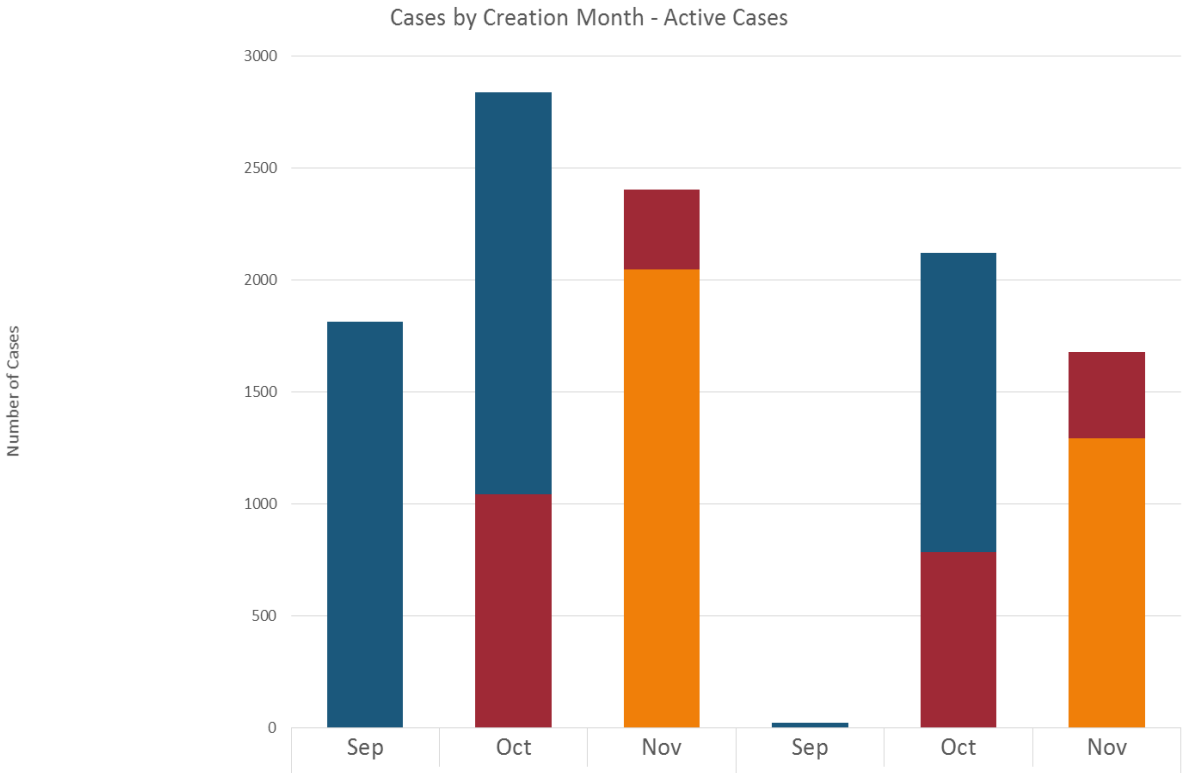
September Report Status	Reporting Entity Count	Regular Payroll Records
Completed	1,025	547,247
Incomplete	259	423,478
Not Started	38	

October Report Status	Reporting Entity Count	Regular Payroll Records
Completed	691	210,576
Incomplete	334	343,837
Not Started	297	

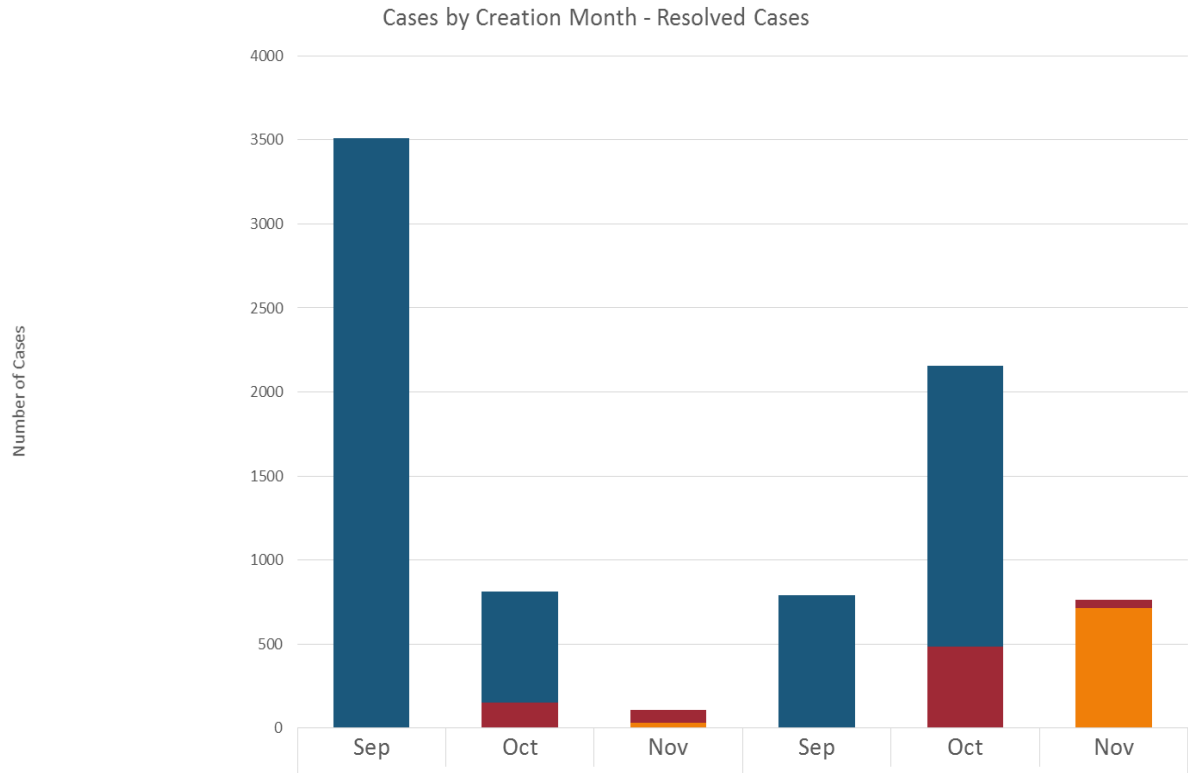
As of November 20, 2017

TRS

TEAM PROGRAM – Processing Volume



	REF - Process Refund			BE - Retirement Estimate		
	Sep	Oct	Nov	Sep	Oct	Nov
More than 30 days	1812	1796		22	1336	
Between 16 and 30 days		1042	357		786	385
less than 16 days			2045			1294

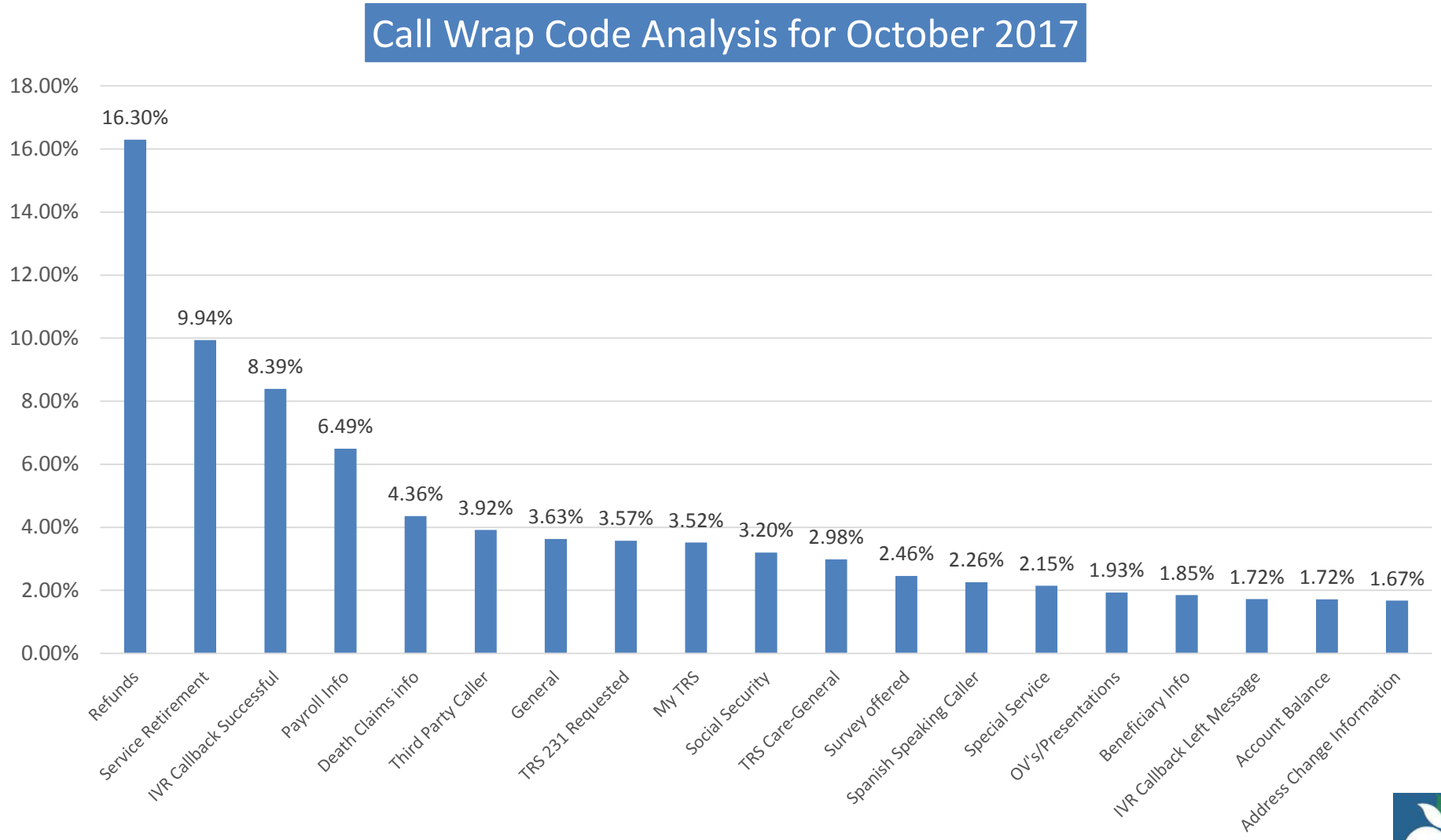


	REF - Process Refund			BE - Retirement Estimate		
	Sep	Oct	Nov	Sep	Oct	Nov
More than 30 days	3510	665		789	1675	
Between 16 and 30 days		150	76		483	50
less than 16 days			34			714

As of November 20, 2017

TEAM PROGRAM – Call Volume

Month	Call Totals
Sep-17	46,309
Oct-17	58,437
Sep-16	52,124
Oct-16	48,653



TEAM PROGRAM – Issues and Risks

- Continue to face challenges with Reporting Entity Reporting Posting
- Phase 1 Cutover, issue resolution, and resource contention impacting Phase 2 schedule
- Legislative changes from last session don’t fit within existing schedule contingency, looking at alternative solutions
- CAPPS Chart of Accounts Changes may impact schedule
- 22% of Phase 2 schedule contingency has been used

TRS

TEAM PROGRAM – Questions

QUESTIONS?

TAB 6

Bridgepoint Consulting

TEAM Program
Independent Program Assessment
Board Presentation

December 2017

TRS
TEACHER RETIREMENT SYSTEM OF TEXAS

Objectives

Independent Program Assessment (IPA)

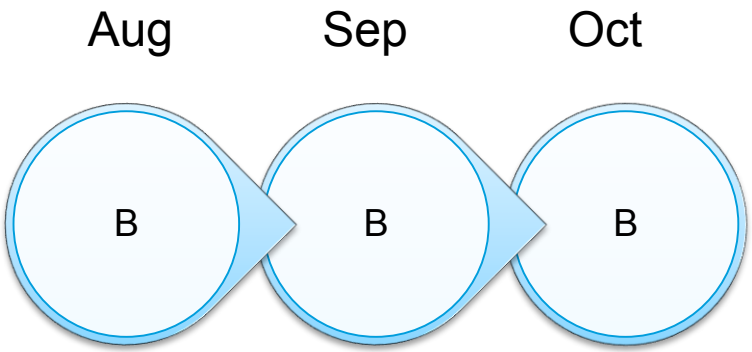
Provide independent reporting and oversight to the TRS Board and Executive Director, or designee, regarding critical risks related to the TRS Enterprise Application Modernization (TEAM) Program to enable informed decision making

Critical Risks Focus:

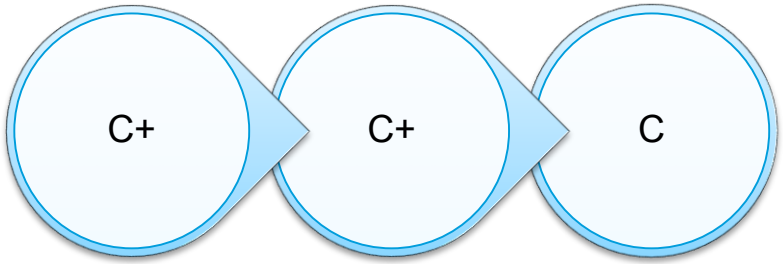
- Schedule: program substantially delayed
- Quality: scope requirements not adequately defined; significant defects in code development
- Cost: program substantially over budget

Execution Scores

TEAM Overall Scores: based on Transparency Report



IPA Overall Scores: based on Transparency Report considerations and further risk outlook



Project Strengths

- Continued collaborative and timely resolutions of Phase 1 post go-live issues

- Reporting Entity Outreach project – excellent progress with Payroll reports completed as of November 15th
  - 986 Regular Payroll (RP) reports
  - 1,143 Employee Data (ER) reports

TRS
TEACHER RETIREMENT SYSTEM OF TEXAS

Bridgepoint Consulting

Key Discussion Matters

1. **Schedule** (IPA score = C-)
   - Increasing risk of Phase 2 schedule slippage
     - Detailed schedules have not yet been fully baselined and resource loaded
     - Continued resource constraints and capacity from ongoing prioritization of Phase 1 post go-live defect resolutions; fixes and overrides for employer reporting in particular continues requiring significant resource time
     - Impact on Phase 2 schedule and requirements scope from healthcare and other legislative changes – vision documents prepared with analysis and discussions in process
   - Increasing risk of subject matter expert resource constraints
     - CAPPS (Central Accounting and Payroll Personnel System) and other initiatives activity overlap elevates risk outlook

Key Discussion Matters

2. Quality (IPA Score = C)

- High number of Phase 1 defects discovered in production, trending down now as defects are triaged daily and resolved quickly
  - 326 production defects were discovered during the month of October
    - 144 Severity 2 defects
  - 255 total defects were closed during the month of October

- Phase 2 increased risk outlook given resource constraints and schedule pressures
  - Quality of requirements packages delivery and approval
  - Quality of development and testing
  - Maintenance & Enhancements carryover

Key Discussion Matters

3. **Cost** (IPA Score = B)
   - Phase 1 post go-live defect resolutions could add to costs and usage of budget contingency
   - Possible added costs related to Phase 2 resource needs and potential further extension of the schedule or schedule contingency usage
     - Includes consideration of TRS taking on TRUST-HILOB (Healthcare) and TRUST-CRM workflow scope

Activities Completed – Current Period

1. Attended Enterprise Project Oversight Committee (EPOC), Line of Business (LOB), TEAM MS Project Schedule update, LOB defect triage and various other project team meetings.

2. Continued to provide feedback on project schedule variance, defect tracking, common metrics measurements, and transparency reporting.

3. Reviewed and evaluated current DXC and TRS MS Project plan and progress against schedule. Provided feedback to TEAM Project Scheduler.

4. Continued to review and analyze defect data extracted from ALM (Application Lifecycle Management) system and continued tracking LOB defects trends.

5. Attended and observed CAPPS (Central Accounting and Payroll Personnel System) discovery requirements and HILOB Sprint review session.

Activities for Next Period

1. Attend and observe key TEAM project meetings.
2. Continue to review and analyze vendor deliverables for completeness, acceptance approvals.
3. Review and analyze Phase 1 change management process including M&E (Maintenance and Enhancements) schedules and releases.
4. Review and analyze Phase 2 DXC and TRS MS Project schedules.
5. Continue to review and monitor Phase 1 post go-live activities, defect tracking, defect resolution process, including defect emergency and maintenance releases.
6. Continue to monitor CAPPS project progress and review impact on TEAM Project schedules.
7. Continue to review and provide feedback on transparency reporting, and common metrics measurements.

IPA Financial Summary Status

Through October 31, 2017	
Total Hours Incurred	7,076
Total Calculated Cost Incurred	$1,256,100
Total Billings	$1,174,480
Variance	$81,620

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TAB 7

Executive Director's Report, Brian Guthrie
December 14, 2017

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Topics for Discussion

- General Updates.
- Federal Legislative Update.
- Board Reporting Process.
- Review of Executive Director’s Goals.
- Upcoming Board Agendas.
- Security Updates. (Executive Session)

General Updates

General Updates

Past Conferences and Meetings:

- November 8th: GCM Grosvenor Small & Emerging Managers Conference; Chicago, IL.
- November 16th: 5th Annual Texas Institutional Investor Forum; Austin, TX.
- November 16th: Legislative and Association Briefing on Actuarial Valuations; Austin, TX.
- November 27: Joe Colonnetta's meeting with TRICOT.
- November 29-30th: TRS SPN Summit; Austin, TX.

Upcoming Conferences and Meetings:

- February 2, 108: 2018 Emerging Manager Conference; Austin, TX.
- February 24 – 26, 2018: NASRA/NCTR Winter Meeting and Joint Legislative Conference, Washington, D.C.
- April 10-11, 2018: Pension Bridge Conference; San Francisco, CA.

General Updates

National Council on Teacher Retirement (NCTR)

2018 Dates:

February 24-26: Joint NASRA/NCTR Legislative Conference, Washington, D.C.
June 10-15: Administrator Workshops, Atlanta, GA.
July 22-25: 18th Annual Trustee Workshop, Berkeley, CA.
October 6-10: Annual Conference, Washington, DC.

Future Annual Conference Dates:

October 12-16, 2019: Nashville, TN.
October 10-14, 2020: La Jolla, CA.
October 2021: TBD.
October 2022: Likely return to Tucson, AZ

2018 Committee Assignments:

Dolores Ramirez, Chair of Resolutions Committee.
Greg Gibson, Member of Trustee Education Committee.
Nanette Sissney, Member of Resolutions Committee.
Brian Guthrie, Secretary/Treasurer, Member of Executive Committee, Liaison to the Legislative Committee

NCTR Strategic Planning

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General Updates

General Updates

- News clippings dissemination to Trustees.
- EC 360 Review Process
- Board Tour late January
- Council of Institutional Investors
  - TRS has rejoined this organization after a lengthy absence.
  - Spring 2018 Conference set for Monday, March 12 – Wednesday, March 14, 2018 in Washington, D.C.
  - Opportunity for Trustee Training.

Federal Legislative Update

Federal Legislative Update

H.R. 1/ S. 1: "Tax Cuts and Jobs Act"

- Federal legislation amends the Internal Revenue Code to modify tax rates and policies, credits, and deductions for individuals and businesses.
- Section 5001 of H.R. 1 applies the Unrelated Business Income Tax ("UBIT") to public pension plans and other tax-exempt entities under the Internal Revenue Code, such as 501(c)(3) charities. The application would take effect for taxable years beginning after 2017 without grandfathering. S.1 does not include this provision.
- TRS and three major statewide Texas public pension systems sent a joint letter to the Texas delegation on the House Ways and Means committee.
- The legislation would likely result in significant revenue loss for billions of dollars of existing investments not currently structured to minimize UBIT, as well as future investments.

November 15, 2017

The Honorable Kevin Brady
Chairman, Ways and Means Committee
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Brady:

We represent the four major statewide Texas public pension fund systems that serve over 2 million Texans. The Teacher Retirement System of Texas (TRS) administers a fund that is currently valued at $146 billion dollars and paid out $9.4 billion to its annuitants this fiscal year. The Texas County and District Retirement System (TCDRS) is valued at $29 billion and paid $1.2 billion. The Employees Retirement System of Texas (ERS) is valued at $28.1 billion and paid $2.2 billion. The Texas Municipal Retirement System (TMRS) is valued at $25.8 billion and paid $1.2 billion.

As administrators of some of the largest trust funds in the nation, we share serious concerns related to Section 5001 of H.R. 1, the *Tax Cuts and Jobs Act*, and the application of the Unrelated Business Income Tax ("UBIT"). This provision makes an entity that is currently exempt from U.S. federal income taxation under Section 501(a) of the U.S. Internal Revenue Code of 1986, as amended, (which would include government pension plans such as our systems) subject to UBIT. Investment earnings pay for approximately two-thirds of pension benefits, which are taxed when paid to its annuitants.

If enacted, we believe the proposed legislation would significantly impact our investments in several detrimental ways. The legislation may result in significant revenue loss for billions of dollars of existing investments not currently structured to minimize UBIT. As fiduciaries of the trusts, we would have to analyze how to most efficiently structure current and future investments to minimize UBIT, including the consideration of investing through a corporate entity (a "blocker" entity) instead of a pass-through entity. This would potentially cause investments to incur greater costs as a result of corporate taxation of the blocker entity along with other expenses. Another investment consideration that may require careful investment structuring includes use of leverage. Even if the proposed legislation "grandfathers" investments made prior to enactment, it will negatively impact future investment behavior. Future investments would also have to be structured contrary to how investments may be optimally structured in order to minimize the impact of UBIT. This, again, could result in lower investment returns to the trusts and increased costs to state and local entities.

We appreciate your attention to this matter and the significant harmful impact it will have on public pension funds. If we can provide any further information or assistance please do not hesitate to contact us.

Regards,

Brian K. Guthrie
Executive Director
Teacher Retirement System of Texas

Amy Bishop
Executive Director
Texas County & District Retirement System

Porter Wilson
Executive Director
Employees Retirement System of Texas

David Gavia
Executive Director
Texas Municipal Retirement System

CC: The Honorable Sam Johnson
The Honorable Kenny Marchant
The Honorable Lloyd Doggett
The Honorable Greg Abbott

Board Reporting Process

Board Reporting Process Internal Audit Review

Project Overview

- One of the Executive Director's goal is to identify continuous improvement opportunities (aligned to TRS Strategic Plan Goal 4)
- The Executive Director requested that Internal Audit conduct a consulting project to identify improvement opportunities around the timeliness and content of board materials and the number of meetings
- Improvements in related business processes since a 2008 audit include:
  - Use of board materials preparation software (Diligent and SharePoint)
  - Implementation of board planning meetings
  - Creation of the board secretary position
- Recommended actions are in four areas:
  - Timeliness of board materials
  - Number of board meetings
  - Board committee structure
  - Other (strategic planning, staff recognition, presentation skills training, evaluations, public comments)

Strategic Goal 4: Attract, retain, and develop a highly competent staff.

TRS

Board Reporting Process Internal Audit Review

Observations

1. Timeliness of board materials
   A. Formal board reporting timelines are the same for all materials; informal exceptions are granted frequently
   B. Most materials are uploaded later than communicated timelines
   C. Healthcare, TEAM, and legislative presentations are most dependent on time-sensitive data

Recommendations

1. Provide committee and standard materials two weeks in advance; others can be closer to meeting date (based on agreed-upon upload dates)
2. Highlight significant changes made to uploaded materials
3. Formalize upload extension request process
4. Establish “as of” dates for time-sensitive materials and provide verbal updates (e.g., TEAM, healthcare, investments)
5. Use SharePoint List Library and other proposed tools to enhance efficiency

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Board Reporting Process Internal Audit Review

Observations

2. Number of board meetings
   A. Number of board meetings held (8 per year) is consistent with trustee expectations and peer practices
   B. The length of the February retreat (3 days) is good; other meetings could be shortened
   C. Costs for holding meetings are not substantial ($50k for quarterly and $22k for one-day)

Recommendations

1. Map meetings to the strategic plan and required action items to establish number of meetings
2. Implement proposed tools regarding scheduling, action items, and contacts to plan meetings at optimum dates
3. Provide phone-in options for shorter meetings
4. Condense shorter two-day meetings into one day; schedule shorter one-day meetings (9 am to 4 pm), when feasible

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Board Reporting Process Internal Audit Review

Observations

3. Board committee structure
   A. Trustees requested more discussion regarding the strategic plan, major projects, benefit rule changes, healthcare operations, and emerging managers
   B. Staff inquired about the design of the ethics committee of the full board

Recommendations

1. Repurpose the Risk Committee into a strategic planning, enterprise risk, and major projects committee; move investment risk presentation to the Investment Committee
2. Schedule routine Benefit Committee meetings to provide discussion on pension laws and rules as well as timely healthcare topics
3. Combine the Ethics Committee with the TRS Audit Committee
4. Provide committee chairs with standard questions for routine meetings with staff
5. Provide more information on Emerging Managers program results

TRS

Board Reporting Process Internal Audit Review

Observations

4. Other feedback
   A. Trustees and staff commented on other topics related to board and committee meetings
   B. Topics included the strategic plan linkage to agenda items, staff recognition, presentation training, executive evaluations, and public comments

Recommendations

1. Connect board items to TRS strategic goals before agenda items are presented and include results of key measures
2. Include staff recognition at every meeting
3. Require presentation training for those presenting to the board and committees
4. Push detailed discussions to committees and cover summarized information at board meetings
5. Begin executive evaluation process earlier to ensure information is provided to trustees timely
6. Use a timer viewable by the speaker during public comments to ensure equal time for all

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Board Reporting Process Internal Audit Review

Next Actions

- Prepare a project implementation plan
  - Identify recommendations to implement
  - Identify an owner for each
  - Establish an implementation timeline
  - Monitor progress
- Implement recommended tools to improve efficiency and timeliness
- Map meetings and decision items to the strategic plan and revisit the number of meetings planned
- Discuss committee structure recommendations at February retreat

TRS

Review of
Executive Director’s Goals

Executive Director Goals for FY 2018

Goal 1

Sustain a Financially Sound Pension System.

- Examine the Assumption Set, Including the Assumed Rate of Return.
- Update the Pension Benefit Design Study.
- Successfully execute on IMD top 5 priorities.

Goal 2

Continuously Improve our Benefit Delivery.

- Successfully complete TEAM Phase 1 "Go Live".
- Meet All Developmental Milestones for TEAM Phase 2.
- Implement 403(b) rules and Identify Potential Legislative Changes.
- Complete call center modernization.

Goal 3

Facilitate Access to Competitive, Reliable, Health Care Benefits.

- Effectively Execute on the Health Care Communication Prior to January 1, 2018.
- Successfully Implement New Health Care Provisions on January 1, 2018.

Goal 4

Align People, Processes, and Technology to Achieve the TRS Mission.

- Implement the Management Continuity Program.
- Execute on the CAPPS Project.
- Complete the Records Management Project.
- Advance the 1st -3rd Floor Redesign.
- Identify Continuous Improvement Opportunities.
- Enhance Strategic Communications.

Strategic Goal 4: Attract, retain, and develop a highly competent staff

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Next Updates on Executive Director Goals for FY 2018

- Key Performance Indicators associated with each goal will be reported at future meetings.
- The current schedule for providing Board updates on the goals is as follows:

✓ October 2017

- Records Management Project.
- 403(b) Rules. Final Adoption.
- Call Center Modernization.

✓ December 2017

- TEAM.
- Health Care.
- Board Operations and Materials Submission.

February 2018

- Assumption Set. Final Adoption.
- Management Continuity.
- 1st – 3rd Floor Redesign.
- Rule Review.
- Strategic Communications.

April 2018

- CAPPS.
- Continuous Improvement.

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Upcoming Agendas

Upcoming Agendas

February 14-16, 2018

Wednesday, February 14, 2018
*Return Assumption Set – final adoption
*Review of DB/DC Report and Proposed Update
*TEAM – Reset for Phase 2
*Allocation of Resources - Post TEAM
*Update on Call Center modernization
*Update on Management Continuity
*Business Process and Rule Review

Thursday, February 15, 2018
Investments Focused Day
*IMD Strategic Goals
*Market Update
*Emerging Manager Annual Update

Friday, February 16, 2018
*Top 10 Innovations
*Value Add of Audit
*Fiduciary Training
*Board Elections
*TRS Strategic Communications
*State Street

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Upcoming Agendas

April 19-20, 2017

- CAPPS
- Continuous Improvement
- Rule Review
- Litigation Policy

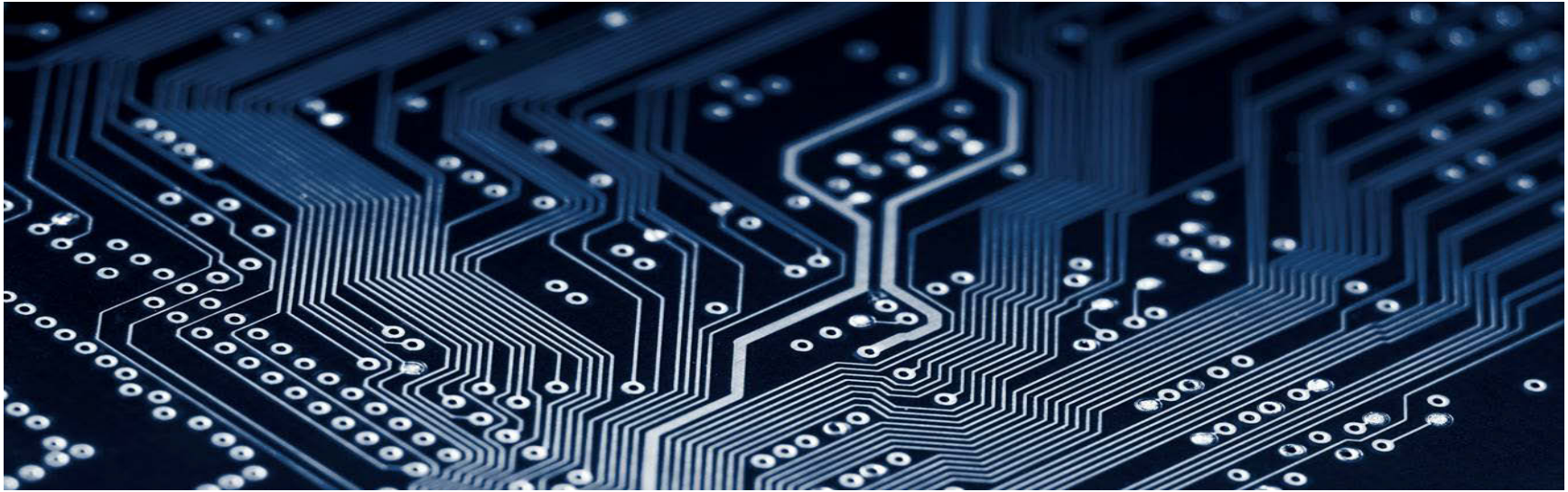
Committees:

- Audit
- IMC
- Policy
- Risk

Security Updates

Strategic Goal 1: Sustain a financially sound pension trust fund.
Strategic Goal 2: Continuously improve our benefit delivery.

TAB 9



Teacher Retirement System of Texas

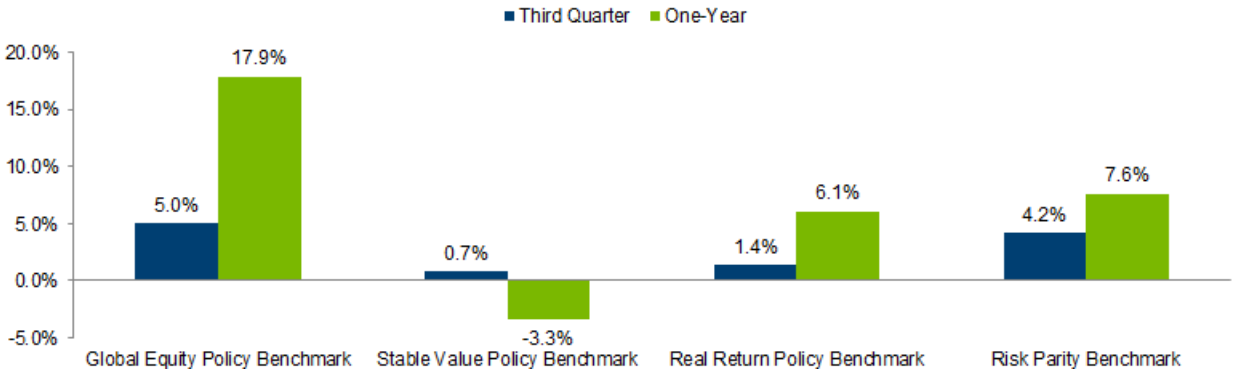
Performance Review: Third Quarter 2017

Aon Hewitt
Retirement and Investment

Investment advice and consulting services provided by Aon Hewitt Investment Consulting, Inc., an Aon Company.

Empower Results®

Summary

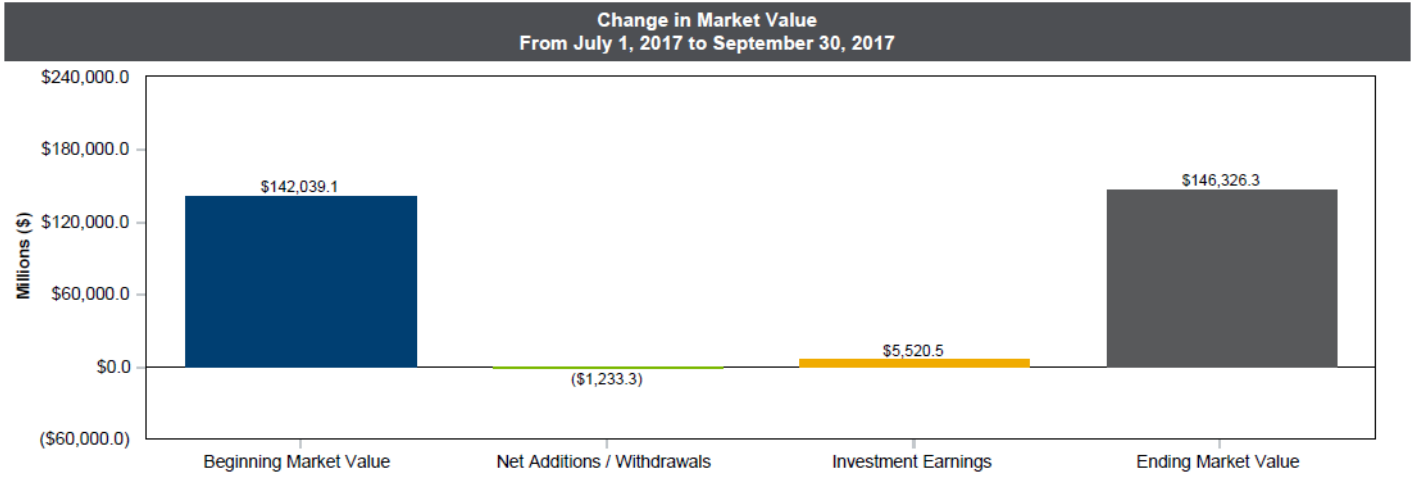


- Led by emerging markets stocks, global equities delivered strong returns for the third quarter; fixed income assets delivered modest gains as the yield curve flattened and inflation ticked up; real assets also posted gains as oil prices recovered
- The TRS investment portfolio returned 3.9% for the quarter which outperformed its benchmark by 0.3 percentage points
  - Security selection in real assets and an underweight allocation to Treasuries were the largest contributors to the outperformance
- For the trailing twelve months, TRS returned 12.9%, outperforming its performance benchmark by 1.7 percentage points
  - Security selection in real assets and energy & natural resources paired with an underweight allocation to Treasuries contributed most to the outperformance

1. Market Summary – Third Quarter 2017

	Third Quarter	Year to Date	One Year	Three Years	Five Years	Ten Years
Global Equity:						
MSCI U.S.A. IMI Index	4.6%	14.1%	18.6%	10.8%	14.2%	7.7%
MSCI EAFE + Canada Index	5.6	19.2	18.7	4.6	7.8	1.3
MSCI Emerging Markets Index	7.9	27.8	22.5	4.9	4.0	1.3
HFRI Fund of Funds Composite Index	2.3	5.6	6.5	2.2	3.9	1.1
State Street Private Equity Index (qtr lagged)	4.0	10.9	15.1	8.4	11.6	7.2
Global Equity Policy Benchmark	5.0	16.5	17.9	7.5	9.8	4.5
Stable Value:						
Bloomberg Barclays Long Treasury Index	0.6%	6.0%	-6.4%	4.9%	2.8%	6.9%
HFRI Fund of Funds Conservative Index	1.3	2.9	4.6	1.8	3.5	1.0
3 Month LIBOR + 2%	0.8	2.4	3.2	2.7	2.5	2.8
90 Day U.S. Treasury Bill	0.3	0.6	0.7	0.3	0.2	0.5
Stable Value Policy Benchmark	0.7	5.0	-3.3	4.1	3.0	5.8
Real Return:						
Bloomberg Barclays U.S. TIPS Index	0.9%	1.7%	-0.7%	1.6%	0.0%	3.9%
NCREIF ODCE (qtr lagged)	1.5	5.0	6.9	10.3	10.8	4.3
Energy, Natural Resources & Infrastructure Benchmark	1.5	7.9	10.4	--	--	--
Goldman Sachs Commodities Index	7.2	-3.8	1.8	-19.6	-14.4	-10.0
Real Return Policy Benchmark	1.4	4.9	6.1	6.8	7.3	5.5
Risk Parity:						
Risk Parity Benchmark	4.2	9.4	7.6	3.9	4.9	--
TRS Policy Benchmark	3.5%	11.8%	11.2%	6.8%	8.1%	5.3%

2. Market Value Change



Summary of Cash Flow

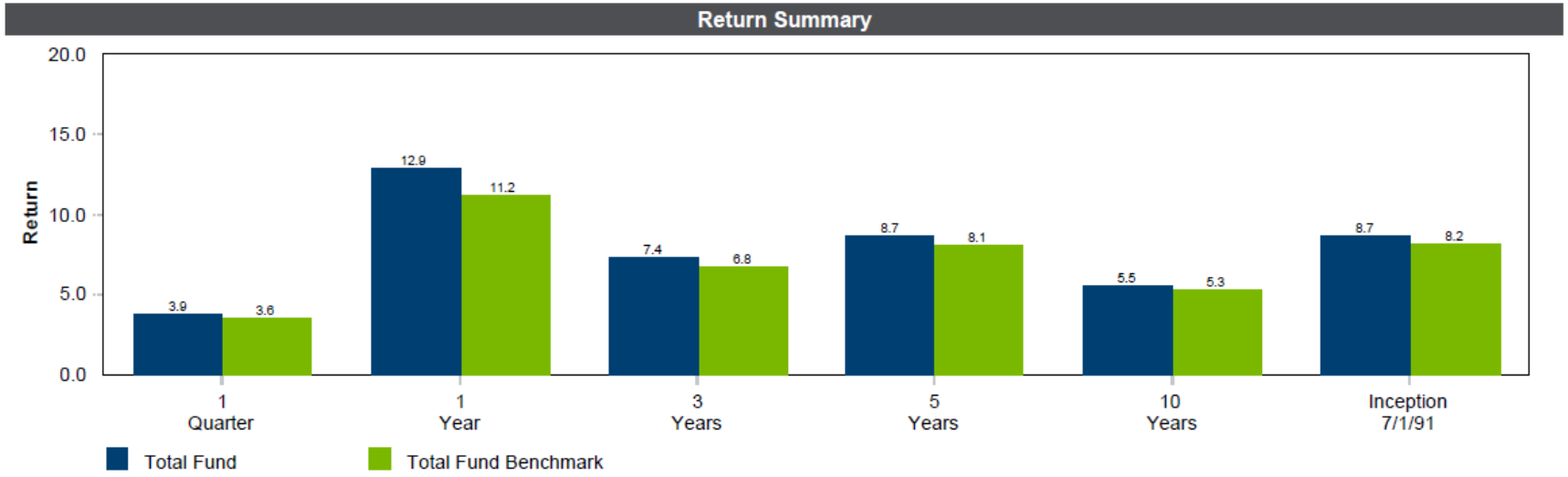
	1 Quarter	1 Year	3 Years	5 Years
Total Fund				
Beginning Market Value	142,039,096,944	133,220,843,678	129,669,237,891	111,719,637,897
+ Additions / Withdrawals	-1,233,264,831	-3,035,811,942	-11,073,161,289	-19,631,298,207
+ Investment Earnings	5,520,504,198	16,141,304,576	27,730,259,710	54,237,996,621
= Ending Market Value	**146,326,336,312**	**146,326,336,312**	**146,326,336,312**	**146,326,336,312**

3. Asset Allocation Detail

	Market Value ($ in millions) as of 9/30/2017		Interim Policy Target	Relative Allocation to Interim Policy Target	Long Term Policy Target	Long Term Policy Ranges
	($)	(%)				
Total Fund	$146,326	100%		---	--	--
Total U.S.A.	$25,645	17.5%	18.7%	-1.2%	18.0%	13-23%
Non-U.S. Developed	$21,988	15.0%	13.7%	+1.3%	13.0%	8-18%
Emerging Markets	$13,466	9.2%	9.7%	-0.5%	9.0%	4-14%
Directional Hedge Funds	$5,907	4.0%	4.0%	+0.0%	4.0%	0-10%
Private Equity	$18,569	12.7%	12.6%	+0.1%	13.0%	8-18%
Global Equity	$85,575	58.5%	58.6%	-0.1%	57.0%	50-64%
Long Treasuries	$15,065	10.3%	11.7%	-1.4%	11.0%	0-20%
Stable Value Hedge Funds	$5,917	4.0%	4.0%	+0.0%	4.0%	0-10%
Absolute Return (including OAR)	$2,463	1.7%	0.0%	+1.7%	0.0%	0-20%
Cash	$1,235	0.8%	1.0%	-0.2%	1.0%	0-5%
Stable Value	$24,680	16.9%	16.7%	+0.2%	16.0%	11-21%
TIPS	$5,461	3.7%	3.7%	+0.0%	3.0%	0-10%
Real Assets	$17,573	12.0%	12.1%	-0.1%	16.0%	7-17%
Energy, Natural Resource and Infrastructure	$5,667	3.9%	3.9%	-0.0%	3.0%	0-7%
Commodities	$82	0.1%	0.0%	+0.1%	0.0%	0-5%
Real Return	$28,783	19.7%	19.7%	-0.0%	22.0%	17-27%
Risk Parity	$7,288	5.0%	5.0%	-0.0%	5.0%	0-10%
Risk Parity	$7,288	5.0%	5.0%	-0.0%	5.0%	0-5%

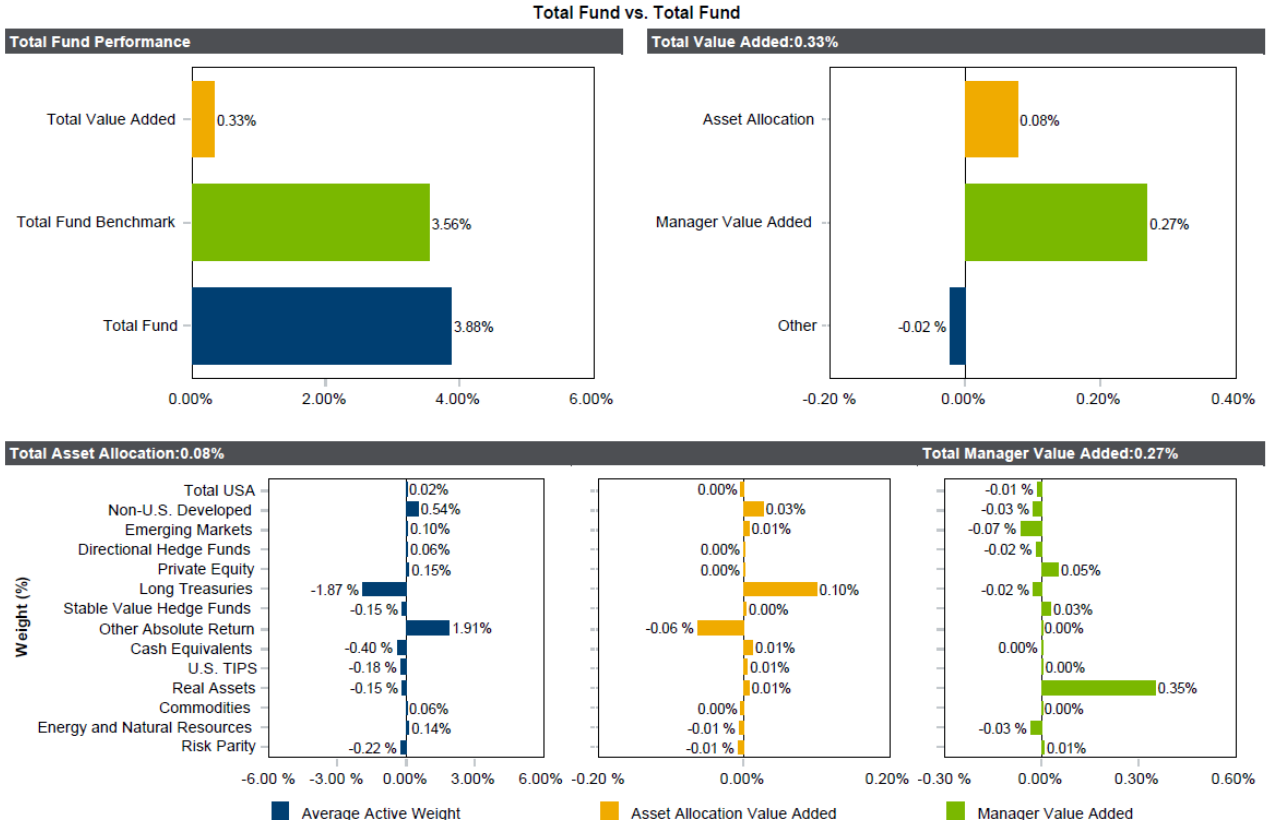
Note: Asset allocation information shown above is based upon PureView reporting.

4. Total TRS Performance Ending 9/30/2017

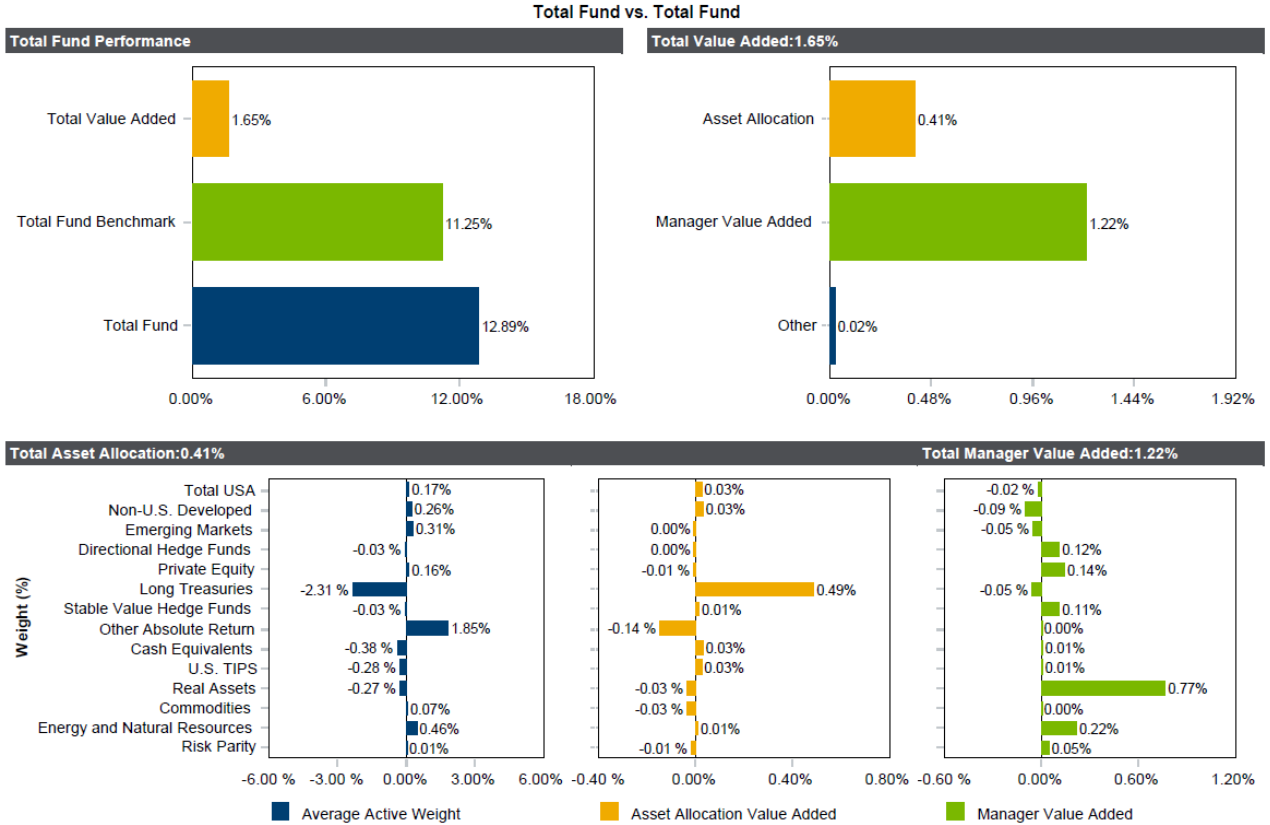


Note: The excess returns shown above may not be a perfect difference between the actual and benchmark returns due entirely to rounding.

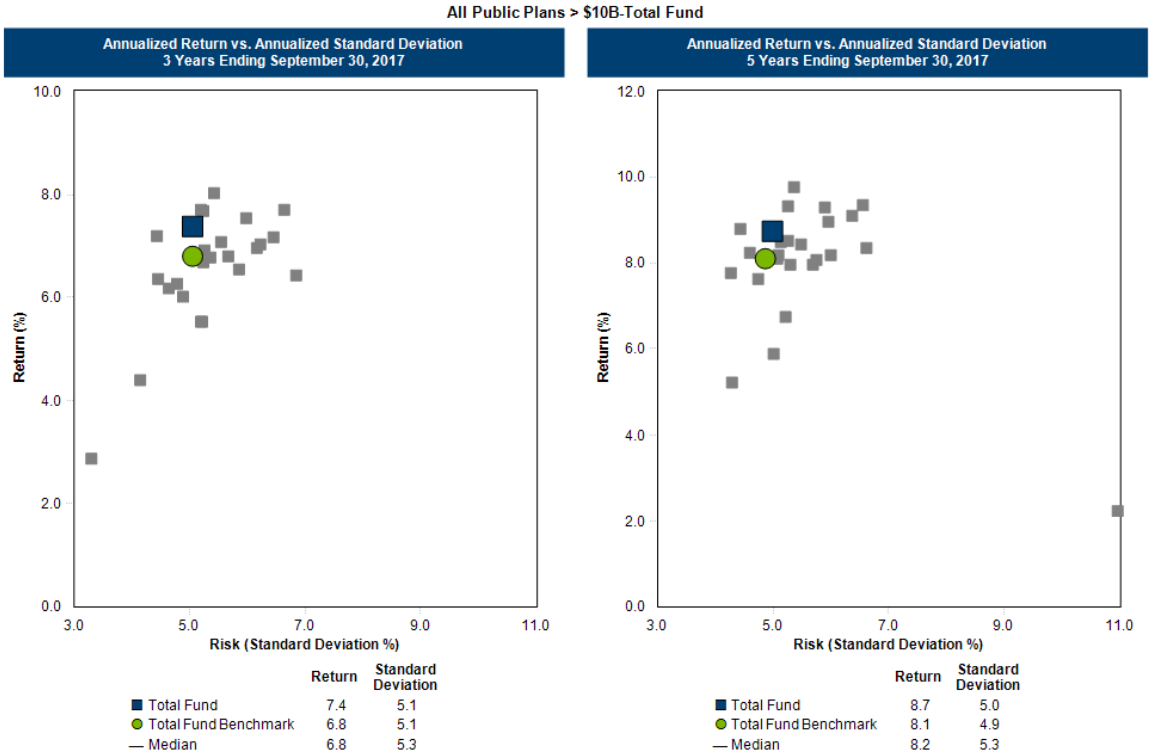
5. Total Fund Attribution - Quarter Ending 9/30/2017



5. Total Fund Attribution – Trailing One Year Ending 9/30/2017

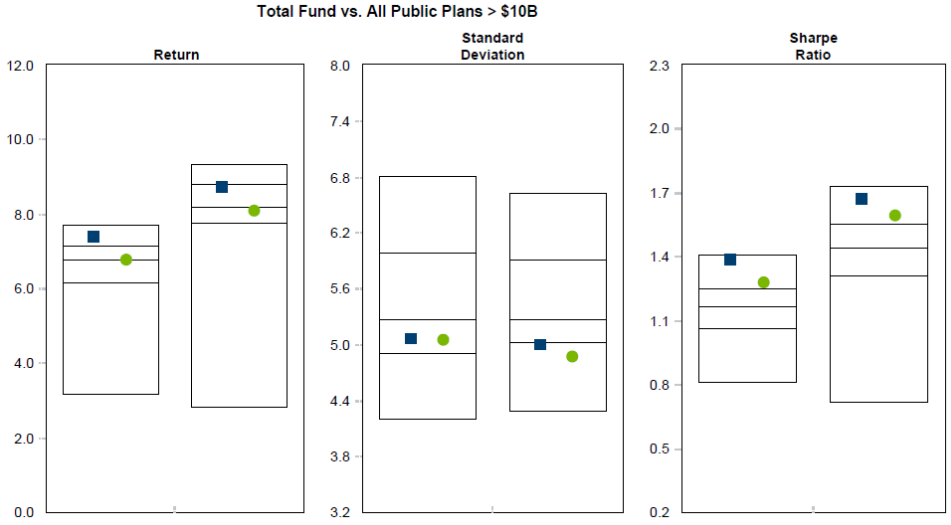


6. Risk Profile: Total Fund Risk-Return vs. Peers



Plan Sponsor Peer Group composed of 25 public funds with total assets in excess of $10B as of 9/30/2017. An analytic outlining the asset allocation of the peer portfolios has been included in the appendix of this report.

6. Risk Profile: Trailing 3-Year and 5-Year Risk Metrics Peer Comparison



	Return 3 Years	Return 5 Years	Standard Deviation 3 Years	Standard Deviation 5 Years	Sharpe Ratio 3 Years	Sharpe Ratio 5 Years
■ Total Fund	7.4 (19)	8.7 (26)	5.1 (73)	5.0 (76)	1.4 (13)	1.7 (18)
● Total Fund Benchmark	6.8 (49)	8.1 (60)	5.0 (74)	4.9 (78)	1.3 (20)	1.6 (21)
5th Percentile	7.7	9.3	6.8	6.6	1.4	1.7
1st Quartile	7.2	8.8	6.0	5.9	1.3	1.6
Median	6.8	8.2	5.3	5.3	1.2	1.4
3rd Quartile	6.2	7.8	4.9	5.0	1.1	1.3
95th Percentile	3.2	2.8	4.2	4.3	0.8	0.7

Plan Sponsor Peer Group composed of 25 public funds with total assets in excess of $10B as of 9/30/2017. An analytic outlining the asset allocation of the peer portfolios has been included in the appendix of this report.

7. Global Equity: Performance Summary Ending 9/30/2017

	Third Quarter	Year to Date	One Year	Three Years	Five Years
Total Global Equity	**4.9%**	**16.1%**	**18.1%**	**7.6%**	**10.3%**
Global Equity Benchmark	5.0	16.5	17.9	7.5	9.8
Difference	*-0.1*	*-0.4*	*+0.2*	*+0.1*	*+0.5*
Total U.S. Equity	**4.5**	**13.8**	**18.5**	**9.1**	**12.9**
Total U.S. Equity Benchmark	4.6	14.1	18.6	10.8	14.2
Difference	*-0.1*	*-0.3*	*-0.1*	*-1.7*	*-1.3*
Non-U.S. Equity	**6.2**	**21.3**	**19.7**	**5.7**	**7.2**
Non-U.S. Benchmark	6.6	22.7	20.3	4.8	6.4
Difference	*-0.4*	*-1.4*	*-0.6*	*+0.9*	*+0.8*
Non-U.S. Developed	**5.4**	**17.8**	**18.0**	**5.7**	**8.8**
MSCI EAFE + Canada	5.6	19.2	18.7	4.6	7.8
Difference	*-0.2*	*-1.4*	*-0.7*	*+1.1*	*+1.0*
Emerging Markets	**7.2**	**26.4**	**21.9**	**5.7**	**5.0**
MSCI Emerging Markets	7.9	27.8	22.5	4.9	4.0
Difference	*-0.7*	*-1.4*	*-0.6*	*+0.8*	*+1.0*

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

7. Global Equity: Performance Summary Ending 9/30/2017 (cont'd)

	Third Quarter	Year to Date	One Year	Three Years	Five Years
Directional Hedge Funds	**1.9%**	**5.7%**	**9.2%**	**1.8%**	**4.8%**
HFRI Fund of Funds Composite Index	2.3	5.6	6.5	2.2	3.9
Difference	*-0.4*	*+0.1*	*+2.7*	*-0.4*	*+0.9*
Total Public Equity	**5.1**	**16.9**	**18.4**	**6.9**	**9.4**
Public Equity Benchmark	5.4	17.6	18.5	7.1	9.3
Difference	*-0.3*	*-0.7*	*-0.1*	*-0.2*	*+0.1*
Total Private Equity	**4.1**	**13.4**	**17.0**	**10.7**	**14.7**
Private Equity Benchmark	3.6	12.3	15.5	9.2	11.6
Difference	*+0.5*	*+1.1*	*+1.5*	*+1.5*	*+3.1*

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

8. Stable Value: Performance Summary Ending 9/30/2017

	Third Quarter	Year to Date	One Year	Three Years	Five Years
Total Stable Value	**0.9%**	**5.9%**	**-1.6%**	**5.9%**	**4.5%**
Total Stable Value Benchmark	0.7	5.0	-3.3	4.1	3.0
Difference	*+0.2*	*+0.9*	*+1.7*	*+1.8*	*+1.5*
Long Treasuries	**0.3**	**6.8**	**-6.9**	**5.4**	**3.4**
Treasury Benchmark	**0.6**	**6.0**	**-6.4**	**4.9**	**2.8**
Difference	*-0.3*	*+0.8*	*-0.5*	*+0.5*	*+0.6*
Stable Value Hedge Funds	**2.0**	**4.9**	**7.4**	**4.9**	**5.1**
Hedge Funds Benchmark	**1.3**	**2.9**	**4.6**	**1.8**	**3.5**
Difference	*+0.7*	*+2.0*	*+2.8*	*+3.1*	*+1.6*
Other Absolute Return	**0.6**	**3.9**	**4.5**	**5.0**	**9.0**
Other Absolute Return Benchmark	**0.8**	**2.4**	**3.2**	**2.7**	**2.5**
Difference	*-0.2*	*+1.5*	*+1.3*	*+2.3*	*+6.5*
Cash Equivalents	**0.2**	**1.8**	**2.0**	**2.4**	**2.3**
Cash Benchmark	**0.3**	**0.6**	**0.7**	**0.3**	**0.2**
Difference	*-0.1*	*+1.2*	*+1.3*	*+2.1*	*+2.1*

Note: Performance of Cash Equivalents is shown net of fees paid to TRS Strategic Partners

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

9. Real Return: Performance Summary Ending 9/30/2017

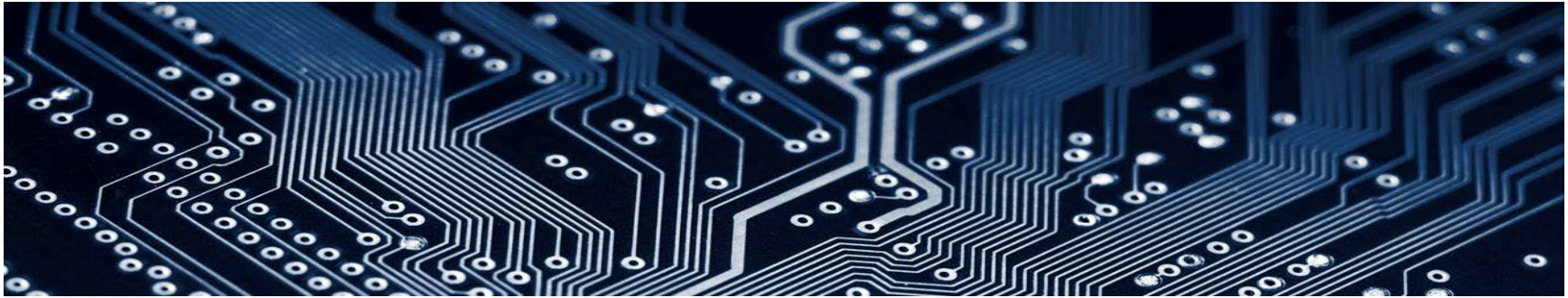
	Third Quarter	Year to Date	One Year	Three Years	Five Years
Total Real Return	**3.0%**	**9.2%**	**10.9%**	**8.4%**	**7.8%**
Real Return Benchmark	**1.4%**	**4.9%**	**6.1%**	**6.8%**	**7.3%**
Difference	*+1.6*	*+4.3*	*+4.8*	*+1.6*	*+0.5*
TIPS	**0.9**	**2.0**	**-0.5**	**1.8**	**0.2**
U.S. TIPS Benchmark	**0.9**	**1.7**	**-0.7**	**1.6**	**0.0**
Difference	*+0.0*	*+0.3*	*+0.2*	*+0.2*	*+0.2*
Real Assets	**4.4**	**10.7**	**13.1**	**12.5**	**12.4**
Real Asset Benchmark	**1.5**	**5.0**	**6.9**	**10.3**	**10.8**
Difference	*+2.9*	*+5.7*	*+6.2*	*+2.2*	*+1.6*
Energy, Natural Resource and Infrastructure	**0.6**	**11.3**	**15.8**	**--**	**--**
Energy and Natural Resources Benchmark	**1.5**	**7.9**	**10.4**	--	--
Difference	*-0.9*	*+3.4*	*+5.4*	--	--
Commodities	**-5.2**	**14.6**	**-11.1**	**-15.6**	**-18.5**
Commodities Benchmark	**7.2**	**-3.8**	**1.8**	**-19.6**	**-14.4**
Difference	*-12.4*	*+18.4*	*-12.9*	*+4.0*	*-4.1*

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

10. Risk Parity: Performance Summary Ending 9/30/2017

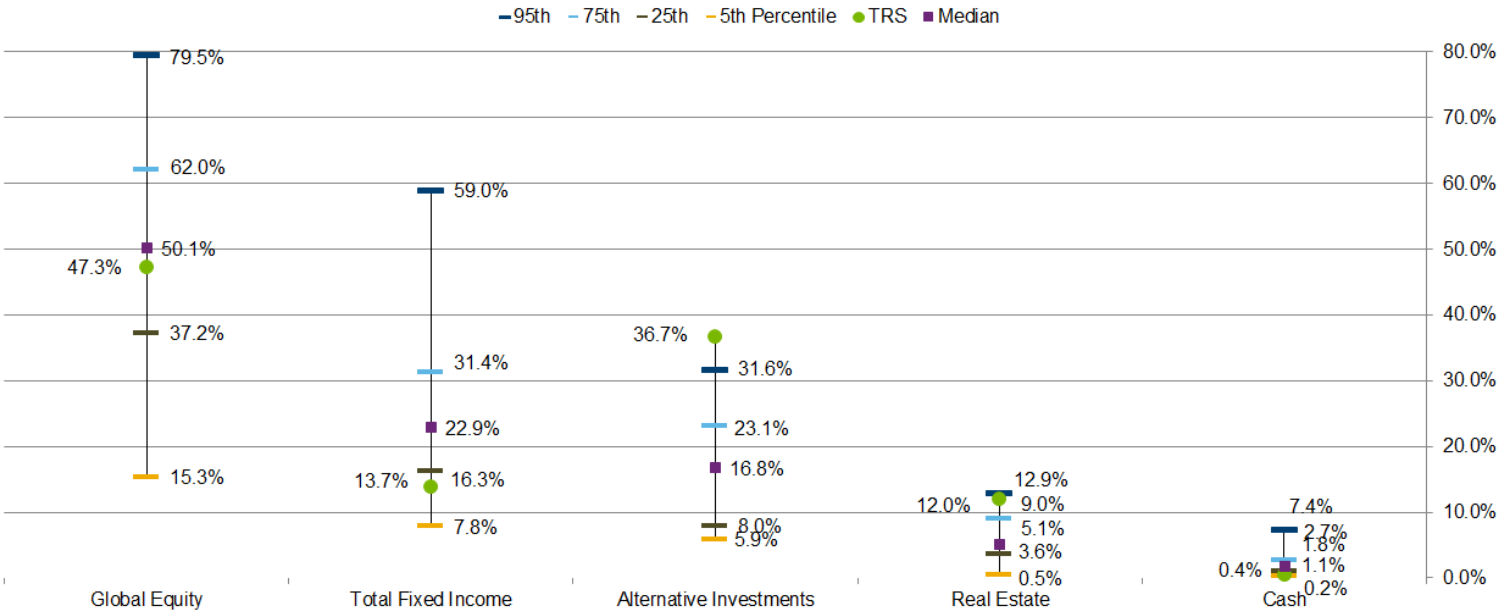
	Second Quarter	Year to Date	One Year	Three Years	Five Years
Total Risk Parity	**4.3%**	**9.8%**	**8.5%**	**4.9%**	**4.5%**
Risk Parity Benchmark	**4.2**	**9.4**	**7.6**	**3.9**	**4.9**
Difference	*+0.1*	*+0.4*	*+0.9*	*+1.0*	*-0.4*

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.



Appendix – Supplemental Reporting

TRS Commitment Levels vs. Peers (>$10 Billion)



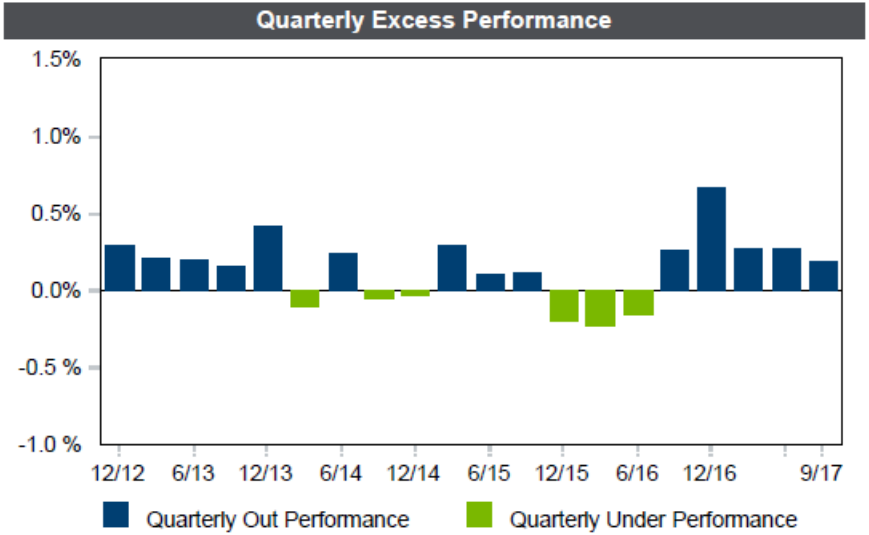
- The chart above depicts the asset allocation of peer public funds with assets greater than $10 billion.
  - The ends of each line represent the 95th and 5th percentile of exposures, the middle light blue and grey lines represent the 25th and 75th percentile of exposures, the purple square represents the median, and the green dot represents TRS exposure.

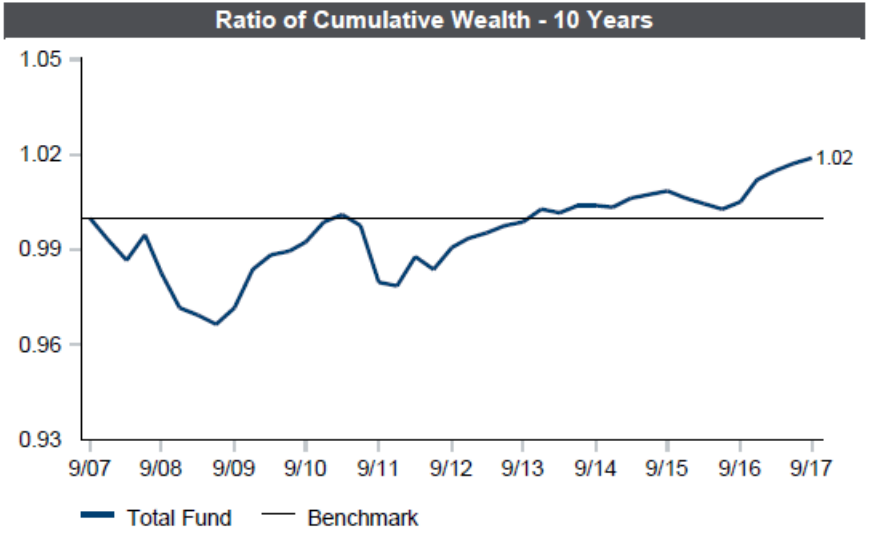
Note: The peer universe had 28 observations.

Historical Excess Performance Ending 9/30/2017

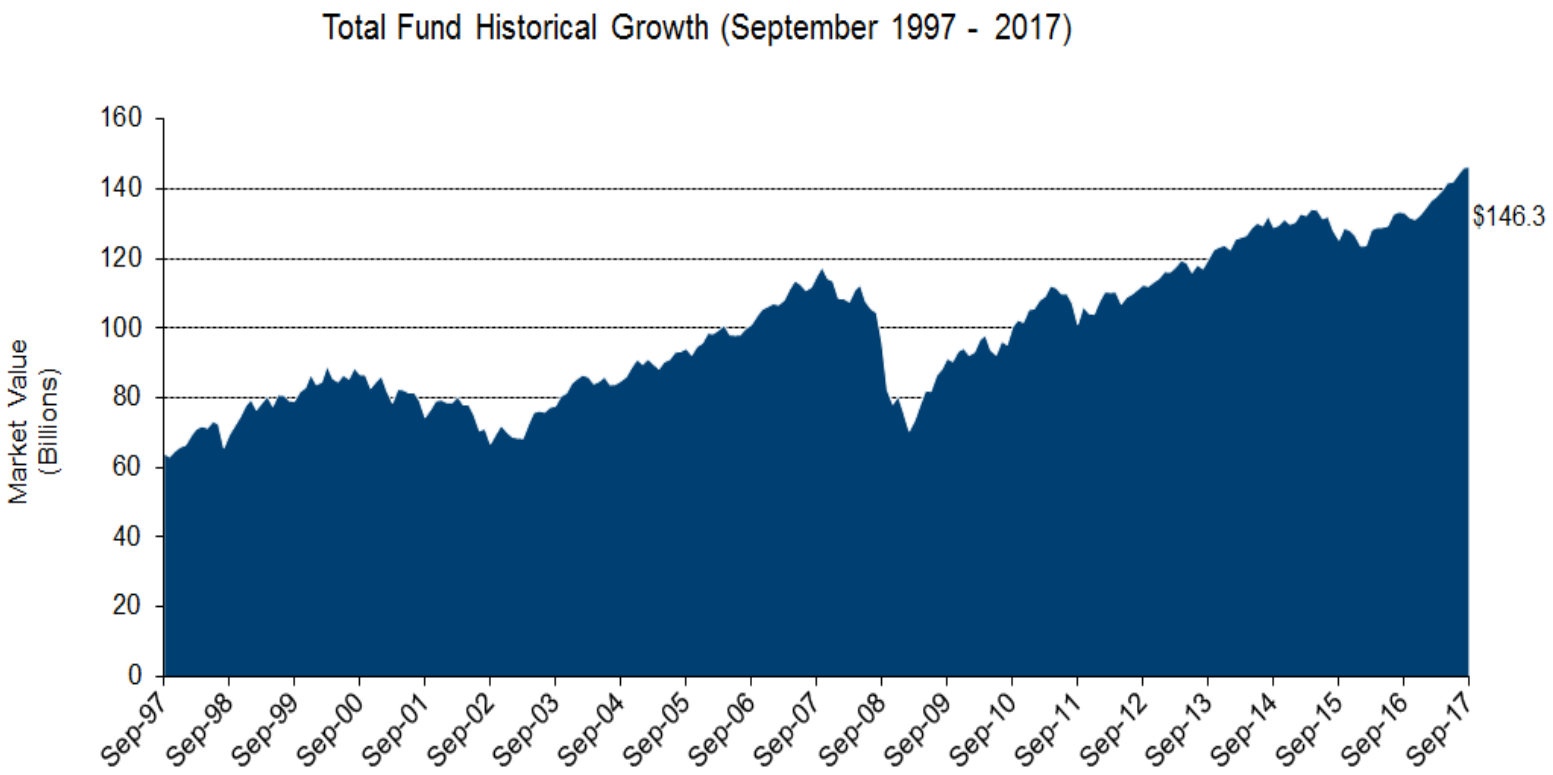
Quarterly and Cumulative Excess Performance

Total Fund vs. Total Fund Benchmark





TRS Asset Growth



External Manager Program:
Public Equity Performance as of 9/30/2017

	Allocation ($ in billions)	Third Quarter	Year to Date	One Year	Three Years
EP Total Global Equity	**$29.5**	**5.0%**	**17.4%**	**18.3%**	**6.7%**
EP Global Equity Benchmark	--	5.3	17.4	17.5	6.7
Difference	--	*-0.3*	*+0.0*	*+0.8*	*+0.0*
EP U.S.A.	**$5.6**	**3.6**	**11.5**	**16.6**	**8.6**
EP U.S.A. Benchmark	--	4.6	14.1	18.6	**10.8**
Difference	--	*-1.0*	*-2.6*	*-2.0*	*-2.2*
EP Non-U.S. Developed	**$5.4**	**6.0**	**20.8**	**21.0**	**7.9**
MSCI EAFE + Canada Index	--	5.6	19.2	18.7	4.6
Difference	--	*+0.4*	*+1.6*	*+2.3*	*+3.3*
EP Emerging Markets	**$7.3**	**7.3**	**27.6**	**22.3**	**5.4**
MSCI Emerging Markets Index	--	7.9	27.8	22.5	4.9
Difference	--	*-0.6*	*-0.2*	*-0.2*	*+0.5*
EP World Equity	**$5.3**	**5.8**	**18.8**	**20.8**	**8.2**
EP World Equity Benchmark	--	5.3	17.5	19.0	7.8
Difference	--	*+0.5*	*+1.3*	*+1.8*	*+0.4*
EP Directional Hedge Funds	**$5.9**	**1.9**	**5.7**	**9.2**	**1.8**
HFRI Fund of Funds Composite Index	--	2.3	5.6	6.5	2.2
Difference	--	*-0.4*	*+0.1*	*+2.7*	*-0.4*

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

External Manager Program:
Stable Value/Total Program Performance as of 9/30/2017

	Allocation ($ in billions)	Third Quarter	Year to Date	One Year	Three Years
EP Total Stable Value	**$6.5**	**1.7%**	**5.0%**	**7.4%**	**5.1%**
EP Stable Value Benchmark	--	1.2	2.8	4.5	1.8
Difference	--	*+0.5*	*+2.2*	*+2.9*	*+3.3*
EP Stable Value Hedge Funds	**$5.9**	**2.0**	**4.9**	**7.4**	**4.9**
EP Stable Value Hedge Funds Benchmark	--	1.3	2.9	4.6	1.8
Difference	--	*+0.7*	*+2.0*	*+2.8*	*+3.1*
EP Absolute Return	**$0.6**	**-2.0**	**9.3**	**10.8**	**13.7**
EP Absolute Return Benchmark	--	0.8	2.4	3.2	2.7
Difference	--	*-2.8*	*+6.9*	*+7.6*	*+11.0*
Total External Public Program	**$36.0**	**4.5**	**15.4**	**16.6**	**6.4**
EP External Public Benchmark	--	4.7	15.1	15.5	5.9
Difference	--	*-0.2*	*+0.3*	*+1.1*	*+0.5*

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

Public Strategic Partnership Program (SPN): Performance Summary as of 9/30/2017

	Allocation ($ in billions)	Third Quarter	Year to Date	One Year	Three Years
Public Strategic Partnership	**$7.8**	**4.4%**	**15.6%**	**13.9%**	**6.5%**
Public SPN Benchmark	--	4.0	13.7	11.5	6.4
Difference	--	*+0.4*	*+1.9*	*+2.4*	*+0.1*
Blackrock	**$2.0**	**4.0%**	**14.7%**	**13.9%**	**7.6%**
J.P. Morgan	**$2.1**	**5.3%**	**16.5%**	**14.8%**	**7.7%**
Neuberger Berman	**$1.9**	**5.1%**	**16.7%**	**13.8%**	**6.2%**
Morgan Stanley	**$1.9**	**3.3%**	**14.7%**	**12.9%**	**4.6%**

- The Public SPNs in aggregate outperformed the benchmark during the third quarter and also over the trailing one and three-year periods

Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material. Returns are shown on a before-fees basis.

Benchmarks

- Total Fund Performance Benchmark – 18.7% MSCI U.S.A. IMI, 9.7% MSCI Emerging Markets, 13.7% MSCI EAFE plus Canada, 4.0% HFRI FoF Composite Index, 12.3% State Street Private Equity (1 qtr lagged), 11.7% BC Long Term Treasury, 4.0% HFRI FoF Conservative Index, 1.0% Citigroup 3 Mo T-Bill, 3.7% BC U.S. TIPS, 12.3% NCREIF ODCE (1 qtr lagged), 3.9% Energy and Natural Resources Benchmark, and 5.0% Risk Parity Benchmark.

- Global Equity Benchmark– 23.4% MSCI EAFE plus Canada, 31.9% MSCI U.S.A. IMI,16.5% MSCI Emerging markets index, 6.8% HFRI FoF Composite Index, and 21.4% State Street Private Equity (1 qtr lagged)
  - U.S, Equity Benchmark - MSCI U.S.A. IMI Index
  - Emerging Markets Equity Benchmark – MSCI Emerging Markets
  - Non-US Developed Equity Benchmark– MSCI EAFE plus Canada
  - Directional Hedge Funds – HFRI Fund of Funds (FoF) Composite Index
  - Private Equity Benchmark - State Street Private Equity (1 qtr lagged)

Note: Returns and market values (based on account level) reported are provided by State Street. Net additions/withdrawals are reported on a gross (adjusted for expenses) total fund level as provided by State Street. All rates of return for time periods greater than one year are annualized. The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

Benchmarks (cont'd)

- Stable Value Benchmark – 24.0% HFRI FoF Conservative Index, 70.0% Barclays Long Term Treasury, and 6.0% Citigroup 3 mo T-Bill.
  - US Treasuries Benchmark – Barclays Long Term Treasury
  - Stable Value Hedge Funds – HFRI Fund of Funds (FoF) Conservative Index
  - Other Absolute Return Benchmark - 3 Mo LIBOR + 2%
  - Cash Benchmark - Citigroup 3 Mo T-Bill
- Real Return Benchmark – 18.7% Barclays U.S. TIPS, 61.3% NCREIF ODCE, and 19.9% Energy & Natural Resources Benchmark
  - US TIPS Benchmark – Barclays U.S. TIPS Index
  - Real Assets Benchmark – NCREIF ODCE (1qtr lagged)
  - Energy and Natural Resources – 75% Cambridge Associates Natural Resources (reweighted) / 25% quarterly Seasonally-Adjusted Consumer Price Index (1qtr lagged)
  - Commodities Benchmark – Goldman Sachs Commodity Index

Note: Returns and market values (based on account level) reported are provided by State Street. Net additions/withdrawals are reported on a gross (adjusted for expenses) total fund level as provided by State Street. All rates of return for time periods greater than one year are annualized. The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.

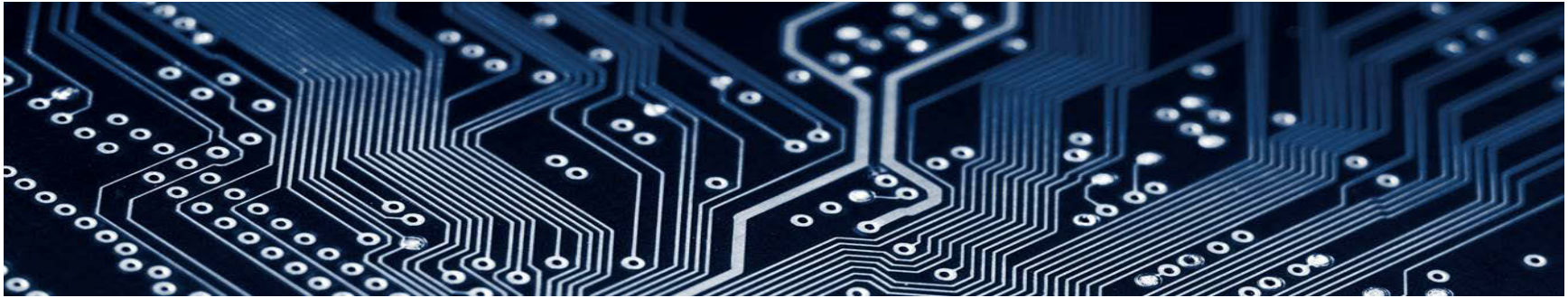
Description of Performance Attribution

- A measure of the source of the deviation of a fund's performance from that of its policy benchmark. Each bar on the attribution graph represents the contribution made by the asset class to the total difference in performance. A positive value for a component indicates a positive contribution to the aggregate relative performance. A negative value indicates a detrimental impact. The magnitude of each component's contribution is a function of (1) the performance of the component relative to its benchmark, and (2) the weight (beginning of period) of the component in the aggregate.
- The individual Asset Class effect, also called Selection Effect, is calculated as

  Actual Weight of Asset Class x (Actual Asset Class Return – Asset Class Benchmark Return)
- The bar labeled Allocation Effect illustrates the effect that a Total Fund's asset allocation has on its relative performance. Allocation Effect calculation = (Asset Class Benchmark Return –Total Benchmark Return) x (Actual Weight of Asset Class – Target Policy Weight of Asset Class).
- The bar labeled Other is a combination of Cash Flow Effect and Benchmark Effect:
  - Cash Flow Effect describes the impact of asset movements on the Total Fund results. Cash Flow Effect calculation = (Total Fund Actual Return – Total Fund Policy Return) – Current Selection Effect – Current Allocation Effect
  - Benchmark Effect results from the weighted average return of the asset classes' benchmarks being different from the Total Funds' policy benchmark return. Benchmark Effect calculation = Total Fund Policy Return – (Asset Class Benchmark Return x Target Policy Weight of Asset Class)
- Cumulative Effect

  Cumulative Effect calculation = Current Effect t *(1+Cumulative Total Fund Actual Return t-1) +

  Cumulative Effect t-1*(1+Total Fund Benchmark Return t)



Disclaimers and Notes

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Disclaimers:

- Please review this report and notify Aon Hewitt Investment Consulting (AHIC) with any issues or questions you may have with respect to investment performance or any other matter set forth herein.
- The client portfolio data presented in this report have been obtained from the custodian. AHIC has compared this information to the investment managers' reported returns and believes the information to be accurate. AHIC has not conducted additional audits and cannot warrant its accuracy or completeness. This document is not intended to provide, and shall not be relied upon for, accounting and legal or tax advice.
- Refer to Hedge Fund Research, Inc www.hedgefundresearch.com for more information on HFR indices

Notes:

- The rates of return contained in this report are shown on an after-fees basis unless otherwise noted. They are geometric and time weighted. Returns for periods longer than one year are annualized.
- Universe percentiles are based upon an ordering system in which 1 is the best ranking and 100 is the worst ranking.
- Due to rounding throughout the report, percentage totals displayed may not sum up to 100.0%. Additionally, individual fund totals in dollar terms may not sum up to the plan totals.

General Disclosures

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  Aon Hewitt Investment Consulting, Inc.

  200 E. Randolph Street

  Suite 1500

  Chicago, IL 60601

  ATTN: AHIC Compliance Officer

TAB 12

TRS
TEACHER RETIREMENT SYSTEM OF TEXAS

Deputy Director's Report, Ken Welch, Dec. 14, 2017

Operational Updates

- Operational Issues
- Employee Recognition
- TRS Events

Operational Issues

- Pension
  - Employer Reporting
  - Refunds
  - Hold Time
- Health Care
  - Hold Time

Operational Issues

Fast Facts:

FAST FACTS - NOVEMBER 2017

Scheduled Events for December 2017	Date	Time	Hot Topics
TRS Board of Trustees Quarterly Meeting – 1000 Red River, Austin, TX (B. Guthrie)	14-Dec-15-Dec	9:00 AM / 9:00 AM	FY 2017 Actuarial Valuation

Scheduled Events for November 2017	Date	
TRS Update to Texas Association of School Business Officials – Austin, TX (M. Zoga)	7-Nov	10:10 AM
TRS Update to CTASPA – Austin, TX (M. Zoga)	7-Nov	1:00 PM
GCM Grosvenor Small & Emerging Managers Conference – Chicago, IL (E. Lang)	8-Nov	10:10 AM
CEM Global Leaders Conference – Omni Chicago Hotel, Chicago, IL (S. Bell)	9-Nov	1:30 PM
Interview with PolitiFact Texas re: health care legislation (B. Guthrie)	9-Nov	1:00 PM
Interview with Top 1000 Funds re: global public equities portfolio (J. Auby)	13-Nov	2:00 PM
Markets Group 5th Annual Texas Institutional Investor Forum, Austin, TX (B. Guthrie)	16-Nov	8:40 AM
Legislative Briefing on Actuarial Valuation – 1000 Red River, Austin, TX (B. Guthrie)	16-Nov	10:30 AM
Associations Briefing on Actuarial Valuation - 1000 Red River, Austin, TX (B. Guthrie)	16-Nov	2:00 PM
Private SPN Summit – 816 Congress, Austin, TX (M. Pia)	29-Nov	11:30 AM
Public SPN Summit – 816 Congress, Austin, TX (M. Pia)	30-Nov	8:30 AM

Month Ended October 2017

Total Pension Investments Market Value (in billions)				
	Oct 2017	$147	2016	$132
	Sep 2017	$146	2016	$133
	Aug 2017	$146	2016	$133
	Jul 2017	$144	2016	$132
	Jun 2017	$142	2016	$129
	May 2017	$141	2016	$129

Return Peer Ranking for Period Ending 6/30/17: 1 Year: 42nd Percentile 3 Years: 32nd Percentile 5 Years: 70th Percentile
(Ranking of total returns for public funds > $10 billion. Individual sector comparisons are also available.)

	Oct 2017	Oct 2016	Change
Average Speed of Answer	18 min. 19 sec.	2 min. 3 sec.	16 min. 16 sec.
Service Level--Calls Answered Within 3 Minutes	10.1%	76.5%	-66.4%
YTD Retirements	1,083	3,537	-2,454
TRS-Care Enrollment	273,170	268,288	4,882
TRS-ActiveCare Enrollment	496,337	504,030	(7,693)
Monthly Annuity Payments (millions)	$809	$770	$39
Number of Annuity Payments	411,418	395,798	15,620

MONTHLY FINANCIAL STATUS - 10/31/2017 (17%)

Expenditures by *Division*	Budgeted	Expended	% Spent	Budget FTEs	Actual FTEs
Executive	22,208,171	2,283,837	10.3%	74.50	67.00
Investment Management	43,855,085	4,708,367	10.7%	143.00	141.00
London Office	2,350,672	256,400	10.9%	3.00	3.00
Commission Credits*	23,932,365	3,067,204	12.8%	-	-
Benefit Services	12,161,665	1,639,259	13.5%	161.50	143.50
Financial	15,239,740	1,607,526	10.5%	64.30	62.90
Information Technology	23,832,623	3,260,949	13.7%	78.00	74.00
TEAM Program	21,679,860	1,607,049	7.4%	78.00	74.00
Interns	409,000	24,319.00	5.9%	-	-
TRS Care	7,164,477	690,193	9.6%	48.00	45.00
TRS ActiveCare	4,097,690	339,467	8.3%	26.00	26.00
403(b) Certification	392,200	10,504	2.7%	1.00	1.00
Adjustments & Reimbursements	-	-			
Total	**177,323,548**	**19,495,075**	**11.0%**	**677.30**	**637.40**

Expenditures by *Fund*	Budgeted	Expended	% Spent	% of Total
Pension Fund	121,791,256	13,902,514	11.4%	71.3%
TEAM	18,111,930	1,378,735	7.6%	7.1%
Commission Credits*	24,672,365	3,088,020	12.5%	15.8%
TRS Care	8,258,107	775,835	9.4%	4.0%
ActiveCare	4,097,690	339,467	8.3%	1.7%
403(b)	392,200	10,504	2.7%	0.1%
Total Expenses	**$177,323,548**	**$19,495,075**	**11.0%**	**100.0%**

Expenditures by *Category*	Budgeted	Expended	% Spent	% of Total
Wages and Benefits	97,086,754	12,263,087	12.6%	62.9%
Professional Fees & Svs	29,600,879	823,459	2.8%	4.2%
Operating Costs	6,844,824	852,630	12.5%	4.4%
Travel	1,685,760	258,279	15.3%	1.3%
Capital Projects	36,995,331	5,297,619	14.3%	27.2%
Other Operating Expenses	5,110,000	-	0.0%	0.0%
Total Expenses	**$177,323,548**	**$19,495,075**	**11.0%**	**100.0%**

* Includes both commission sharing arrangements (CSAs) and commission recapture arrangements (CRAs).

ANNUAL SPOTLIGHT

TRS Administrative Budget (FY 2016 & FY 2017)

	FY 2016 Amended	FY 2017 Adopted
Operating Budget	$103,597,313	$107,995,593
TEAM	24,636,163	21,445,217
Commission Credits *	22,137,462	25,175,436
Health Funds	8,713,398	9,750,742
403(b)	85,397	129,973
Total	$159,169,733	$164,536,961
FTE Total**	640.75	646.80

* Includes both commission sharing arrangements (CSAs) and commission recapture arrangements (CRAs).
**There were 627.70 Actual FTEs at the end of FY 2016. Includes 67 Actual FTEs in FY 2016 and 69 Budgeted FTEs in FY 2017 for TEAM. Excludes Interns.

Pension Fund, Year Ended 08/31/16 (FY 2016)

Inception	FY 1937
Actuarial Valuation	
Unfunded Liability (UAAL)	$35.4 billion
Funded Ratio	79.7%
Funding Period	33.6 years

Contribution Rates	*FY 2016*	*FY 2017*
State	6.80%	6.80%
Employee	7.20%	7.70%
Employer (non-Social Security)	1.50%	1.50%
Total	15.50%	16.00%

Active Member Profile

Average Annual Salary	$46,343
Average Age	44.5
Average Years of Service	10.2

Annuitant (and Beneficiary) Profile

Average Life Annuity	$2,035
Average Age of Current Retirees	70.9

Asset Allocation

Global Equities	59.8%:	Real Return	19.4%:
Public Equities	47.8%	Global Inflation Linked Bonds	3.4%
Private Equities	12.0%	Real Assets	13.9%
Stable Value	16.3%:	Energy & Natural Resources	1.9%
U.S. Treasuries	10.1%	Commodities	0.2%
Absolute Return	1.9%		
Hedge Funds	4.1%	Risk Parity	4.5%
Cash	0.2%		

Membership	
Members	1,110,026
Retirees	393,914
Total	1,503,940
Current Year Retirees	
Average Salary at Retirement	$51,962
Average Age	61.8
Average Years of Service	23.4
Administrative Cost per Member	
Investments	$157.92
Benefits	$29.52
Overall Member Satisfaction (2016)	
Active Members	88.8%
Retirees	96.5%

TRS-Care, Year Ended 08/31/16 (FY 2016)

Inception	FY 1987
Actuarial Valuation	
Unfunded Liability (UAAL)	$49.6 billion
Funded Ratio	1.29%
Normal Cost as a % of Payroll	6.62%
Contribution Rates (FY 2015)	
State	1.00%
Employee	0.65%
District	0.55%
Total	2.20%

Monthly Premium Rates - Retiree or Surviving Spouse Only (FY 2017)

	Care 1	Care 2		Care 3	
		20-29 Years	30+ Years	20-29 Years	30+ Years
With Medicare Advantage	N/A	$ 55	$ 45	$ 85	$ 75
With Medicare A&B	$ 0	$ 70	$ 60	$ 100	$ 90
With Medicare B Only	$ 0	$ 155	$ 145	$ 230	$ 215
Not Eligible for Medicare	$ 0	$ 200	$ 190	$ 295	$ 280

Enrollment	
Retirees	206,582
Dependents	54,946
Total	261,528
Traditional Medical Plan	
Care 1	10.9%
Care 2	20.4%
Care 3	28.2%
Medicare Advantage Plan	
Care 2	6.1%
Care 3	34.4%
Incurred Claims (millions)	
Medical & Ins Premiums	$ 859.0
Prescription Drugs	$ 716.5
Total	$ 1,575.5
Member Satisfaction (2016)	92.8%

TRS-ActiveCare, Year Ended 08/31/16 (FY 2016)

Inception	FY 2003
Contributions (per month)	
District (minimum)	$ 150
State (school finance formulas)	75
Total	$ 225
District Participation	
Number Participating	1,095
Percent Participating	90.0%

PPO Monthly Premium Rates - Employee Only (FY 2017)

	AC 1 & AC 3	AC 1-HD	AC Select	AC 2
Employee Only	N/A	$ 341	$ 484	$ 645

Enrollment	
Active Employees	296,523
Dependents	187,793
Total	484,316
AC - 1HD	41.8%
AC 2	25.9%
AC Select (ACO & Non-ACO)	20.7%
HMOs (3)	11.6%
Incurred Claims (millions)	
Medical & Ins Premiums	$ 1,644.8
Prescription Drugs	325.5
Total	$ 1,970.3
Member Satisfaction (2016)	78.6%

Deputy Director's Report, Ken Welch, December 15, 2017

TRS
TEACHER RETIREMENT SYSTEM OF TEXAS

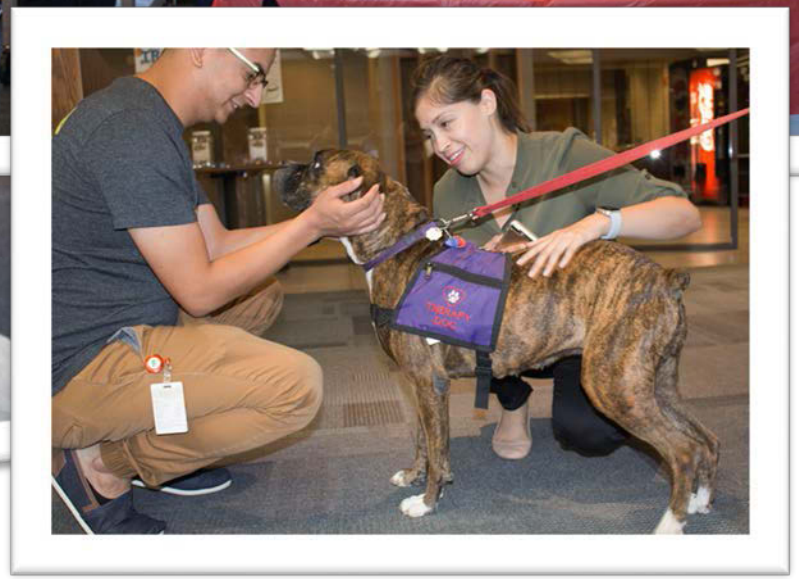
Employee Recognition

- Golden Apple Recipients

TRS Events

- Blood Drive
- SECC Campaign
- GO Live Celebrations
- TRS Tail Gate & Employee Appreciation Day

SECC: Giving and Sharing



SECC: Giving and Sharing

Tailgate Fun

Tailgate Fun

TAB 13

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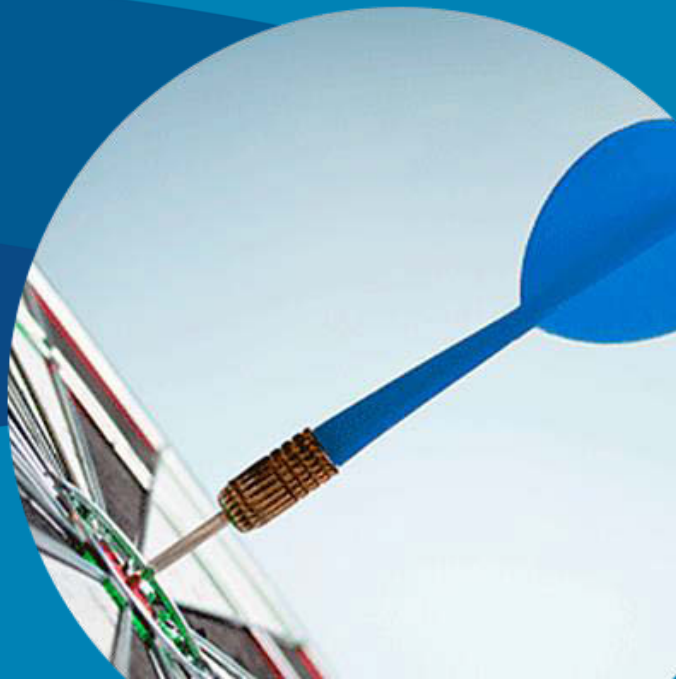
Teacher Retirement System of Texas

Actuarial Valuation as of August 31, 2017



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Agenda

- 2017 Valuation Results
- Historical Metrics
- Historical Change in Unfunded Liability
- Impact on the “Plan”
- Upcoming Experience Study
- Summary

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Actuarial Valuation

- Prepared as of August 31, 2017 using member data, financial data, benefit and contribution provisions, actuarial assumptions and methods as of that date
- Purposes:
  - Measure the actuarial liabilities
  - Determine adequacy of current statutory contributions
  - Provide other information for reporting
    - CAFR
    - Accounting results provided under separate report
  - Explain changes in actuarial condition of TRS
  - Track changes over time
  - Warn about possible future problems and issues

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Actuarial Valuation – Key Changes and Issues

- Forecast improved from previous valuation:
  - Market assets returns 12.9%, net of investment expenses
  - Completely offset previously deferred investment losses
  - Liability gain primarily due to salary increases smaller than expected
  - Small liability loss from reversing an adjustment from the 2013 TRS-Care changes
  - Continue to get population growth (+2.0%)
- Funding period of 32 years based on smoothed assets
  - Assumes all current statutory contribution levels continue and no changes to benefits
- Projections have an expectation of an increasing funded status
- Experience study scheduled before next valuation

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2017 Valuation Results

	2017 Valuation	2016 Valuation	2015 Valuation
Based on Smoothed Asset Value			
UAAL ($ Billions)	$35.47	$35.45	$32.97
Actuarial Funded Ratio	80.5%	79.7%	80.2%
UAAL/Payroll	82.2%	83.7%	
Funding Period in years*	32.2	33.6	33.3
Increase in Contribution Rate needed to have 30 year funding period	0.15%	0.26%	0.23%
Based on Market Value			
Actuarial Funded Ratio	81.1%	76.9%	77.2%
Funding Period in years*	29.6	54.5	56.4
Increase in Contribution Rate needed to have 30 year funding period	NA	1.02%	1.06%

*Assumes current statutory contribution rates continue indefinitely

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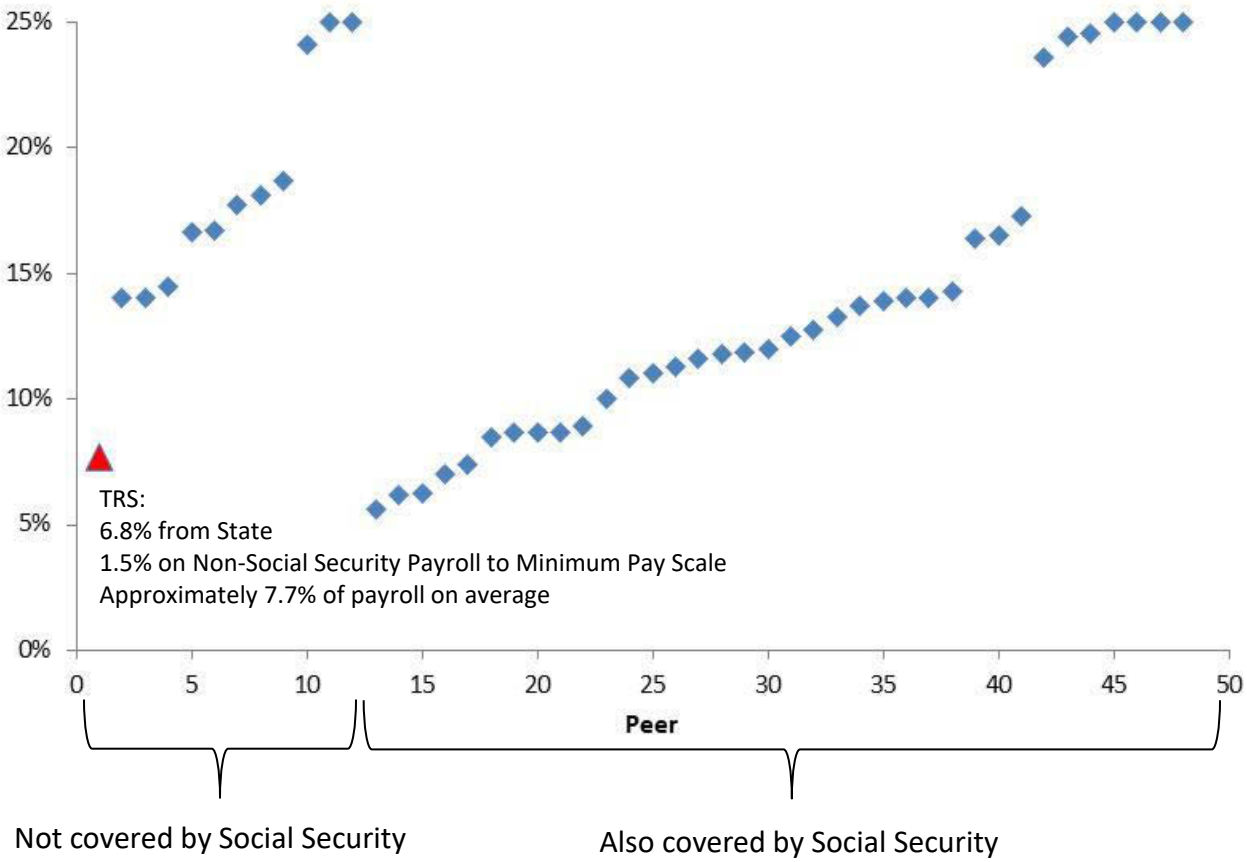
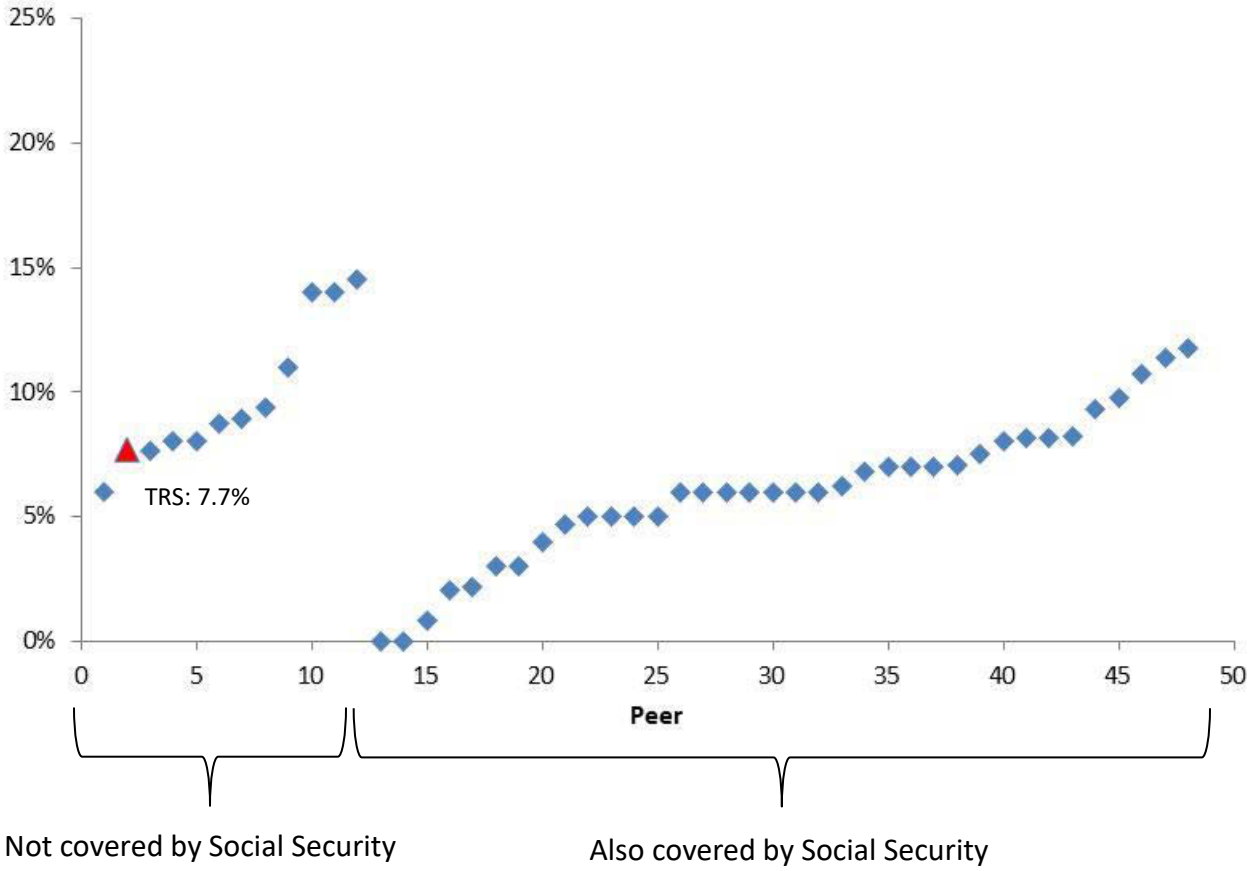
Peer Employer Contribution Rates by State: Teachers Plans



NASRA Public Funds Survey

GRS Retirement Consulting

Peer Member Contribution Rates by State: Teachers Plans



NASRA Public Funds Survey

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Next Year Projections (from 2016 ppt)

	Market Return for 12 month period ending August 31, 2017				
	12%	8%	4%		Actual (12.9%)
UAAL	$36.1	$37.6	$38.7		$35.5
Funded Ratio	80.0%	79.1%	78.5%		80.5%
Funding Period based on new contribution policy					
Smoothed Assets	32.5	36.7	40.1		32.2
Market Assets	32.5	53.5	Never		29.6

All metrics ended up better due to investment performance and liability growth slower than expected

Funding Period even better due to 2% growth in active membership

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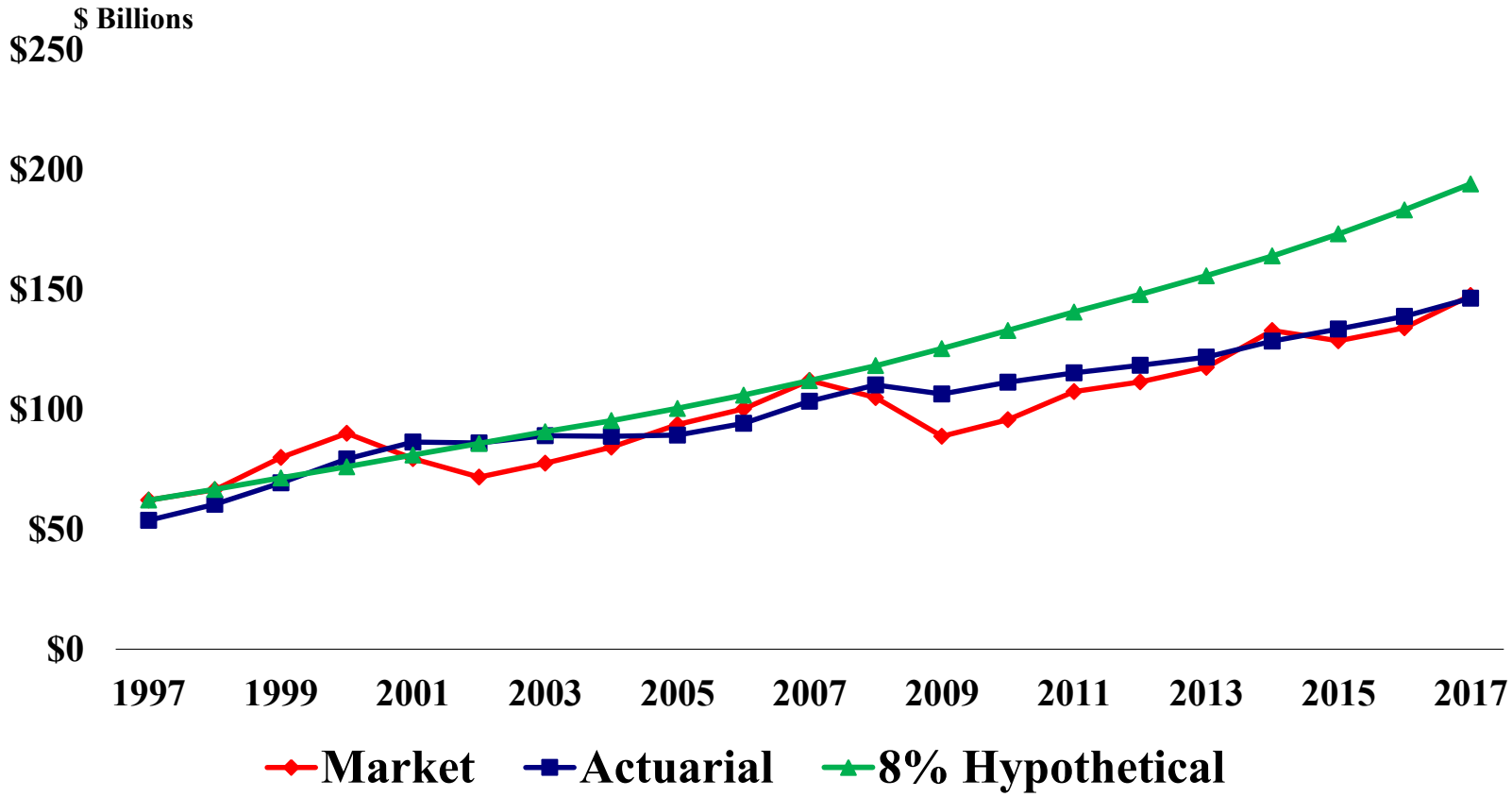
Market and Actuarial Values of Assets



8% Hypothetical assumes 8% had been earned on market every year since 1997, all cash flows unchanged

6.94% average compound return (on market value) over last 20 years.

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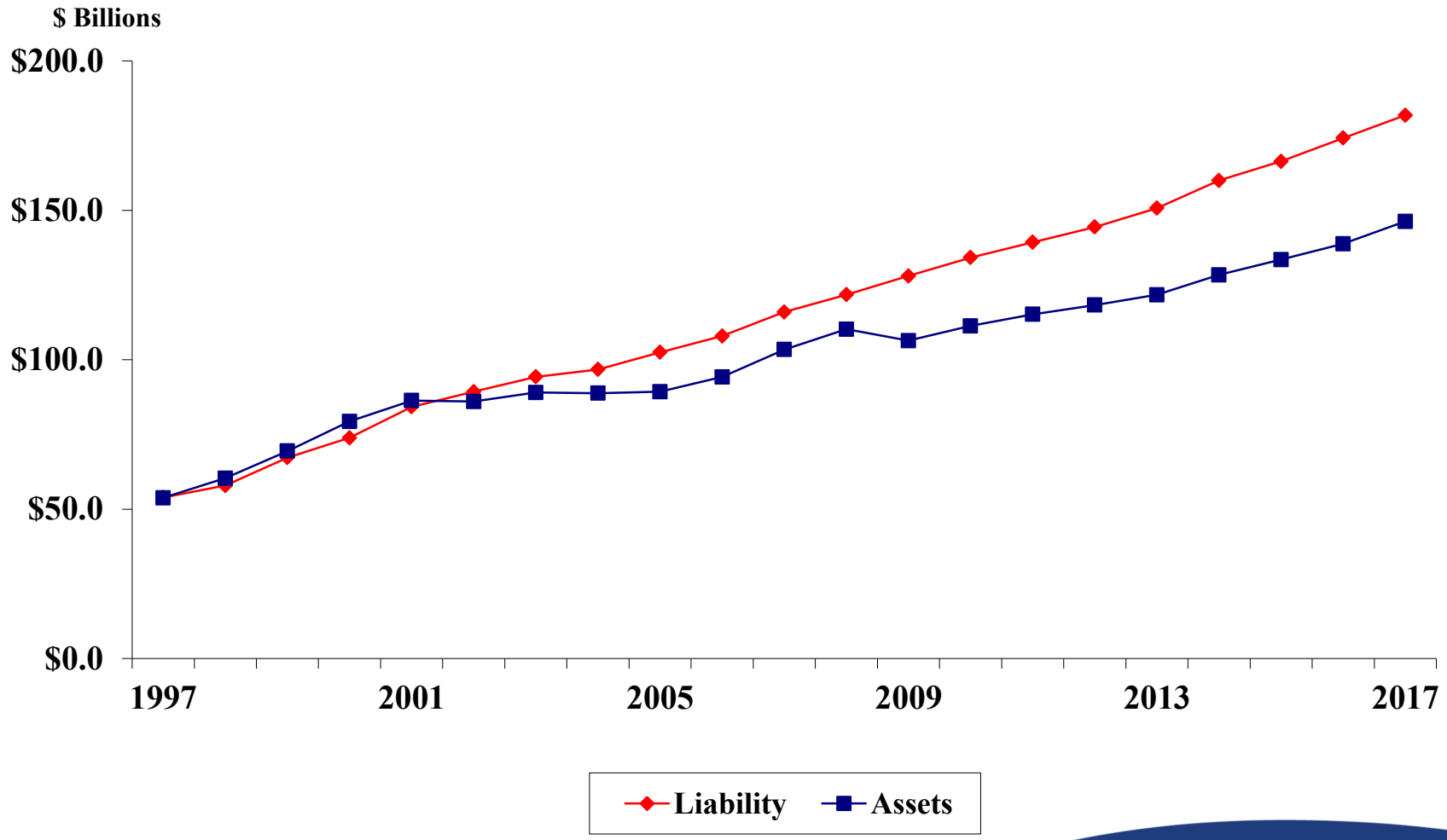
Actuarial Values of Assets vs. Actuarial Accrued Liability



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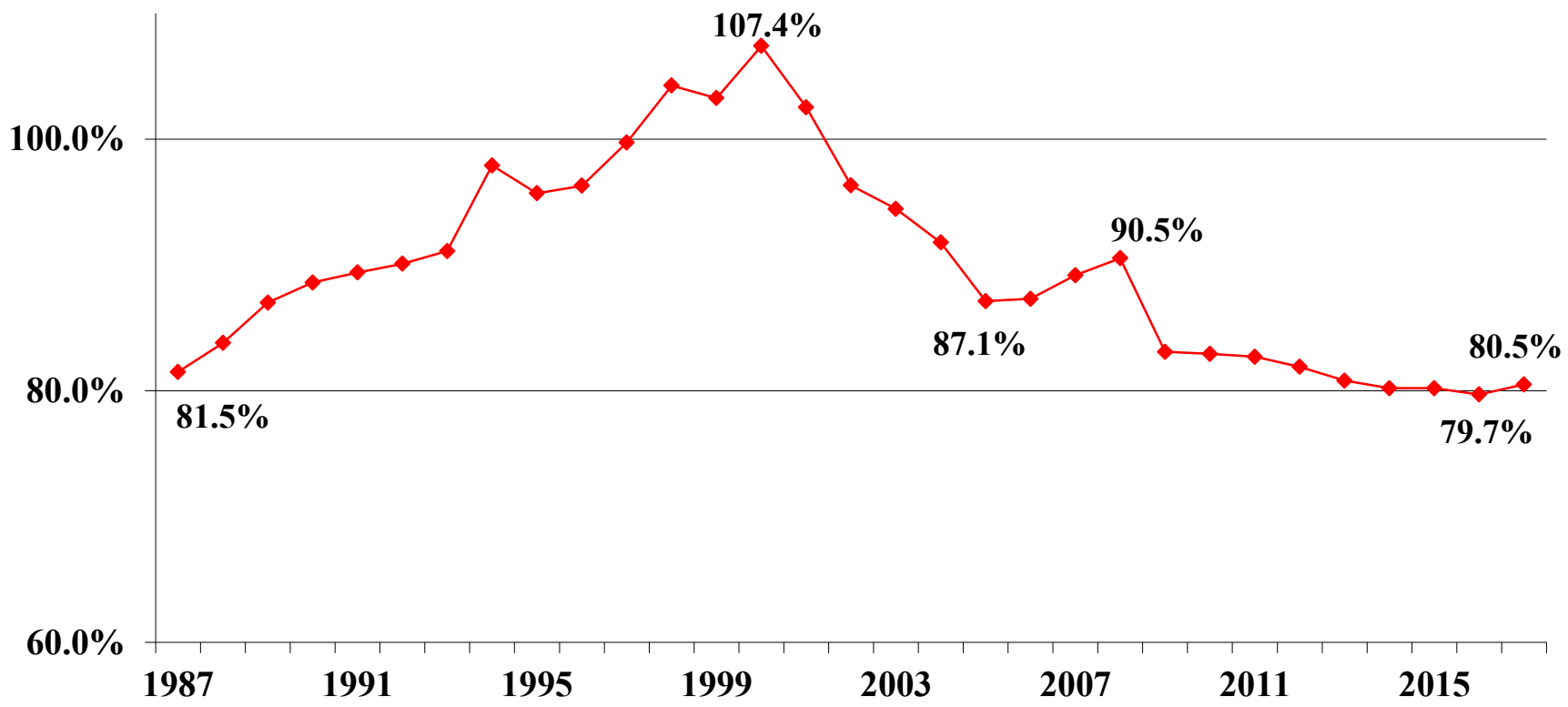
Funded Ratio



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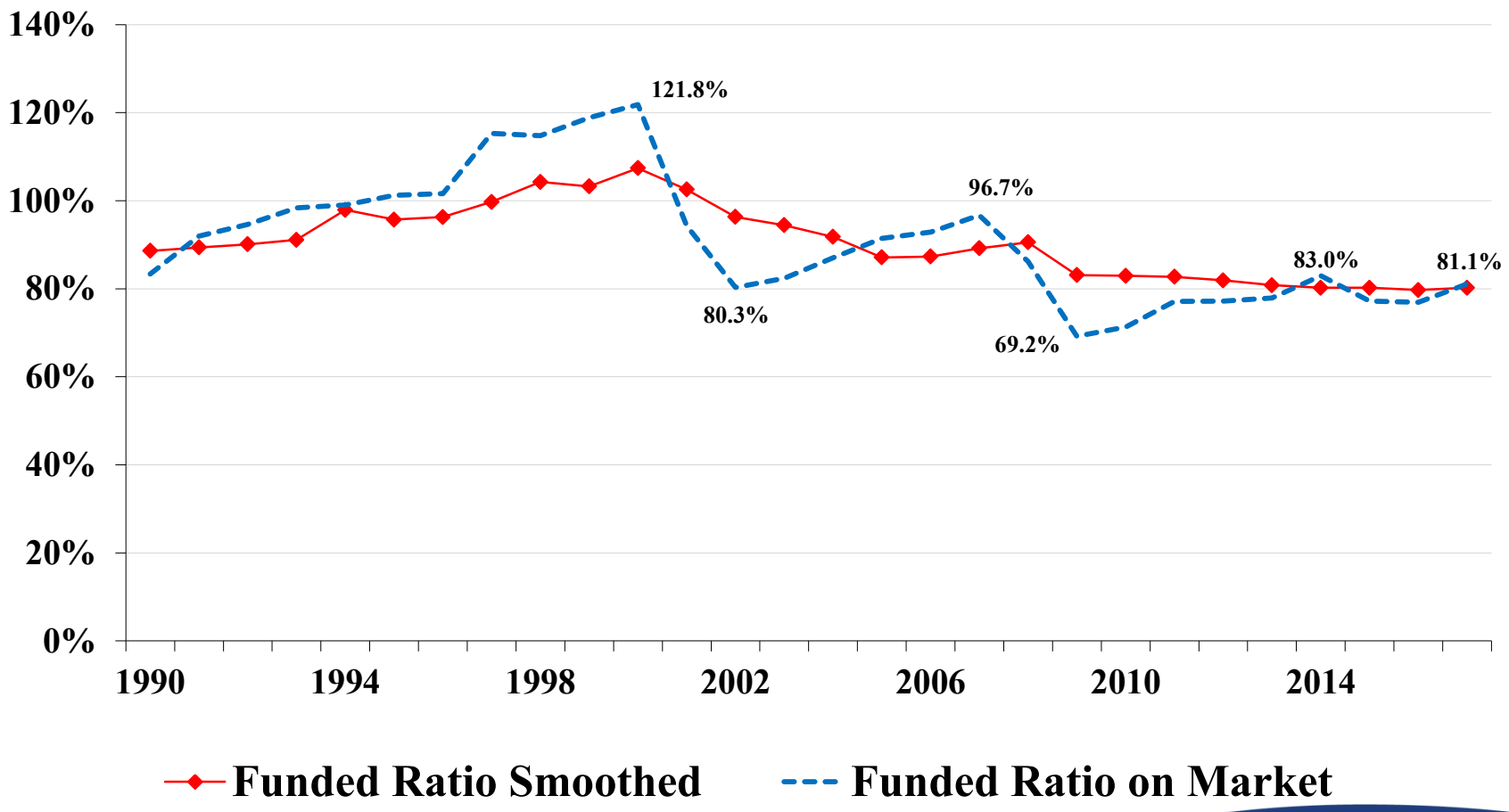
Funded Ratio: Smoothed vs Market



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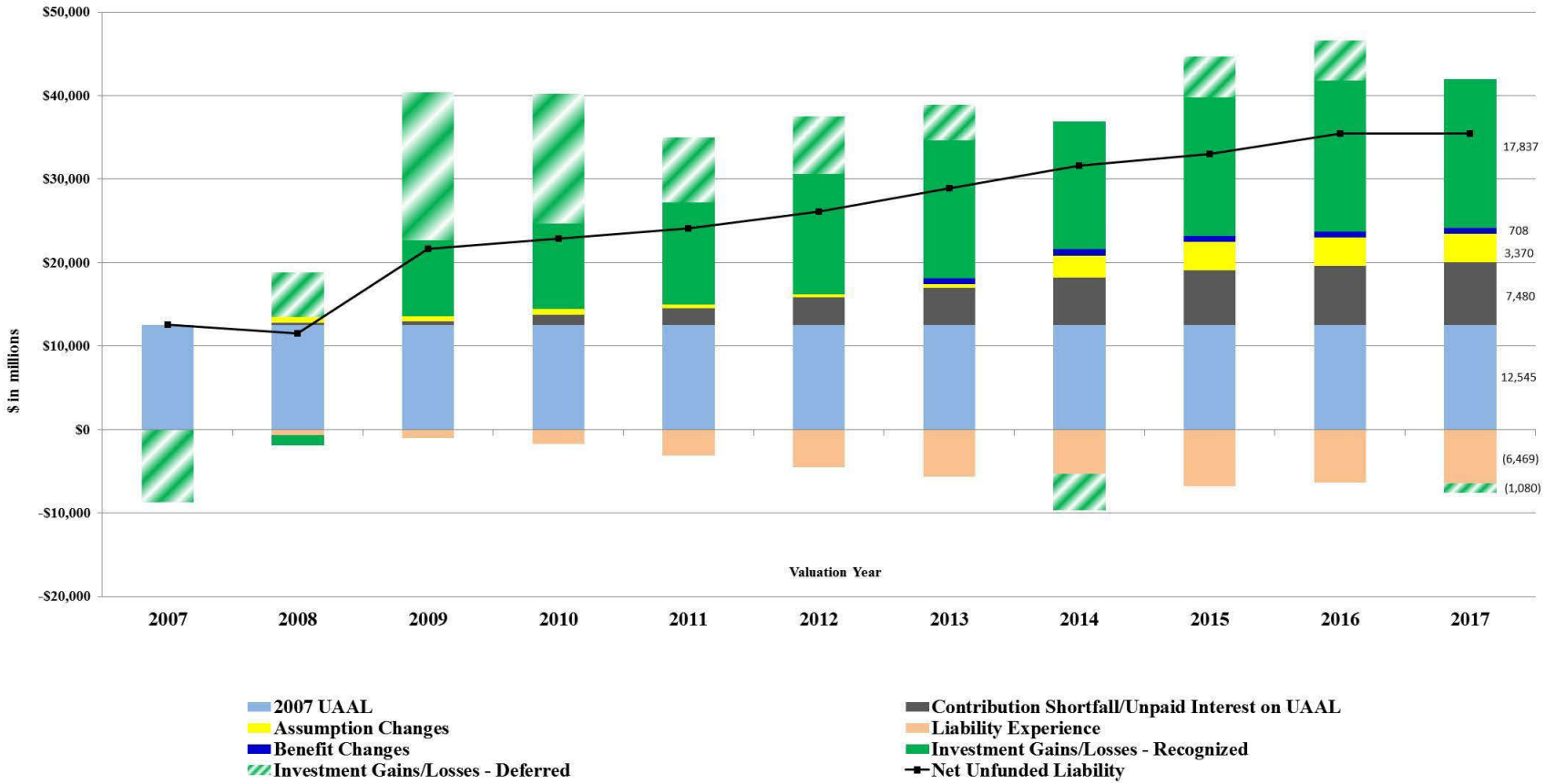
10 Year Source of Change in UAAL



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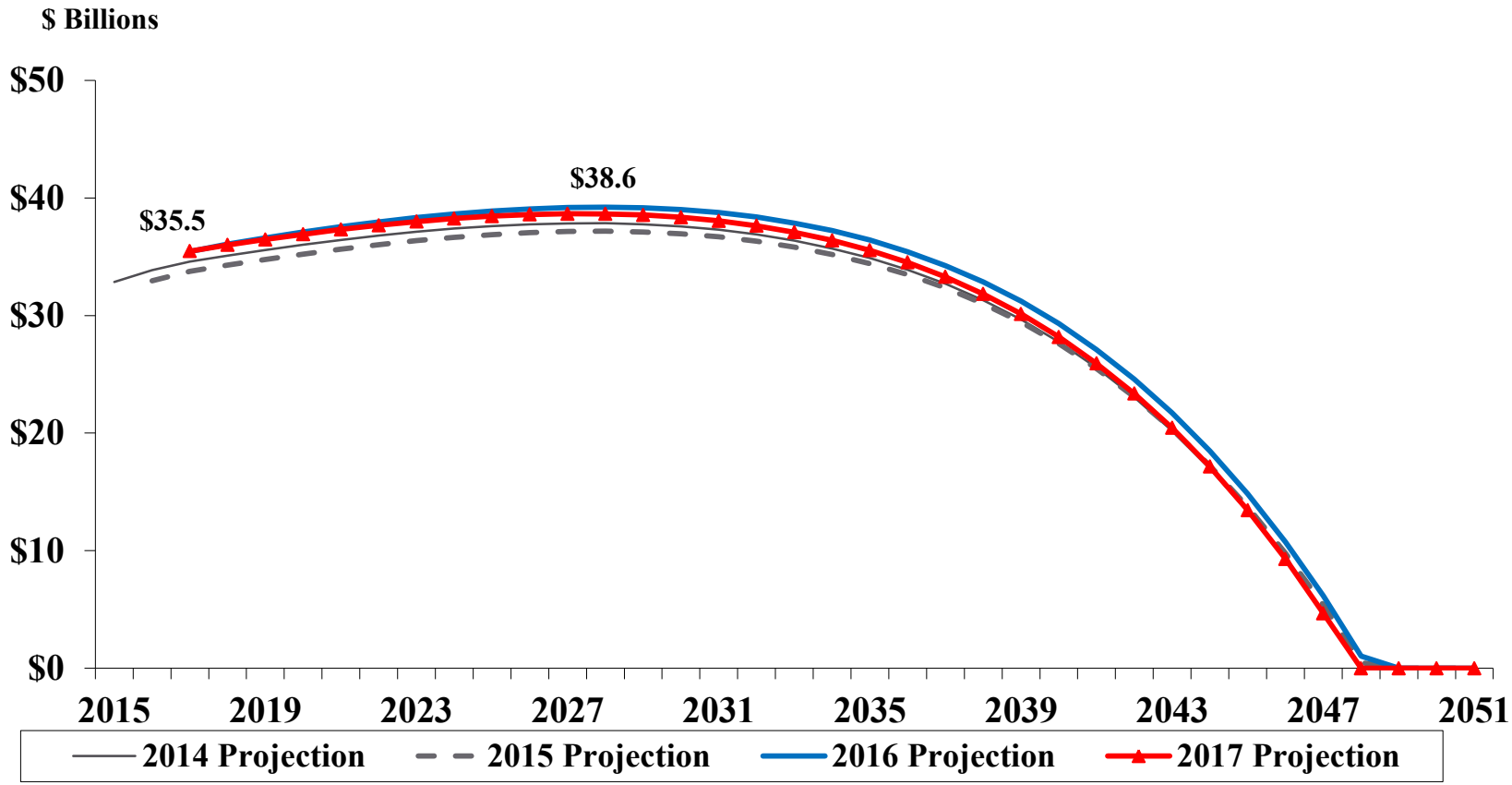
Projection of UAAL (Based on Smoothed Assets)



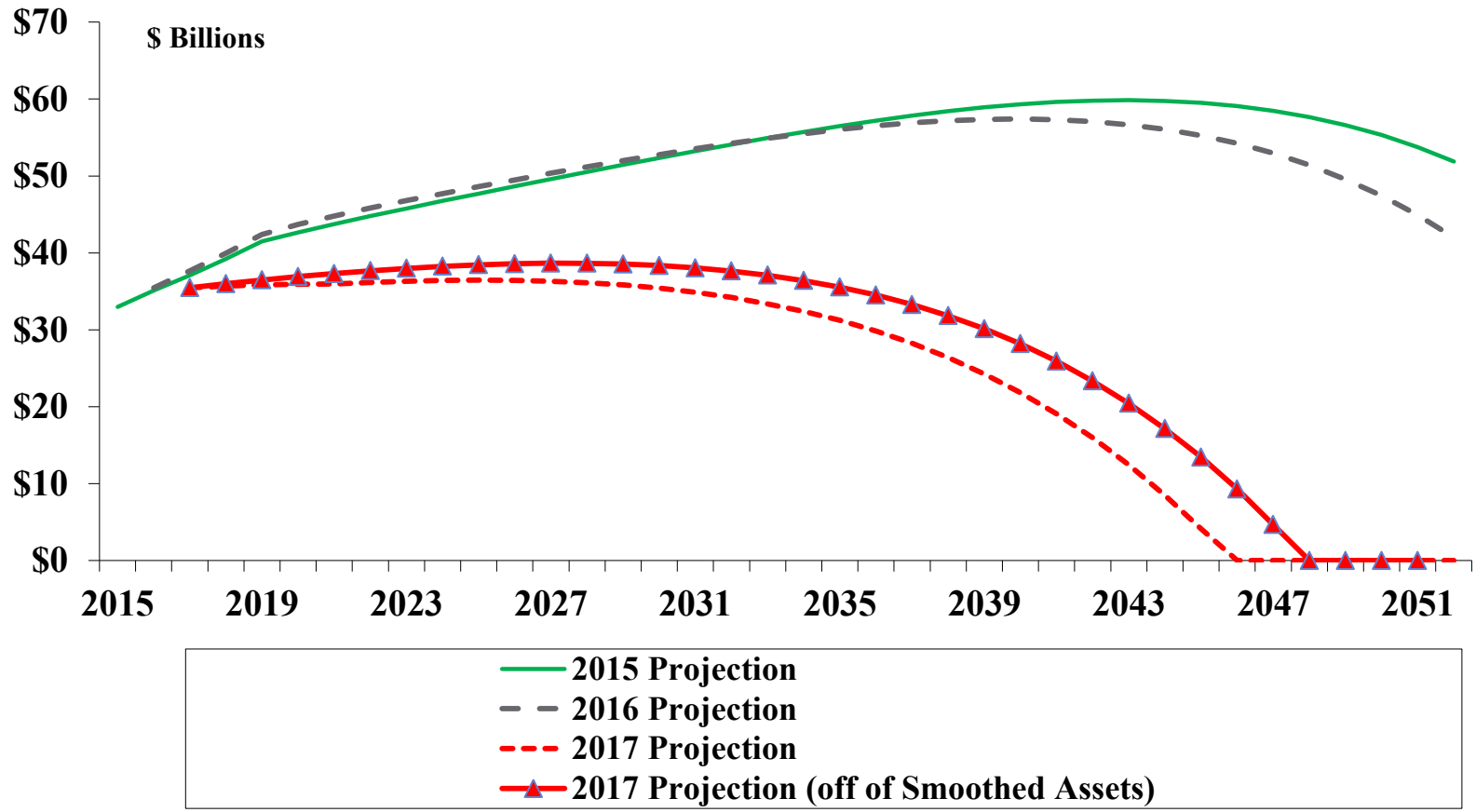
The above assumes all assumptions exactly met, including 8% annual investment returns

Assumes no changes to benefit policy

Assumes current statutory contribution policy remains throughout period

GRS Retirement Consulting

Projection of UAAL based on Market Asset Values on each Valuation Date (2015, 2016, 2017)



The above assumes all assumptions exactly met, including 8% annual investment returns on current market assets

Assumes no changes to benefit policy

Assumes current statutory contribution policy remains throughout period

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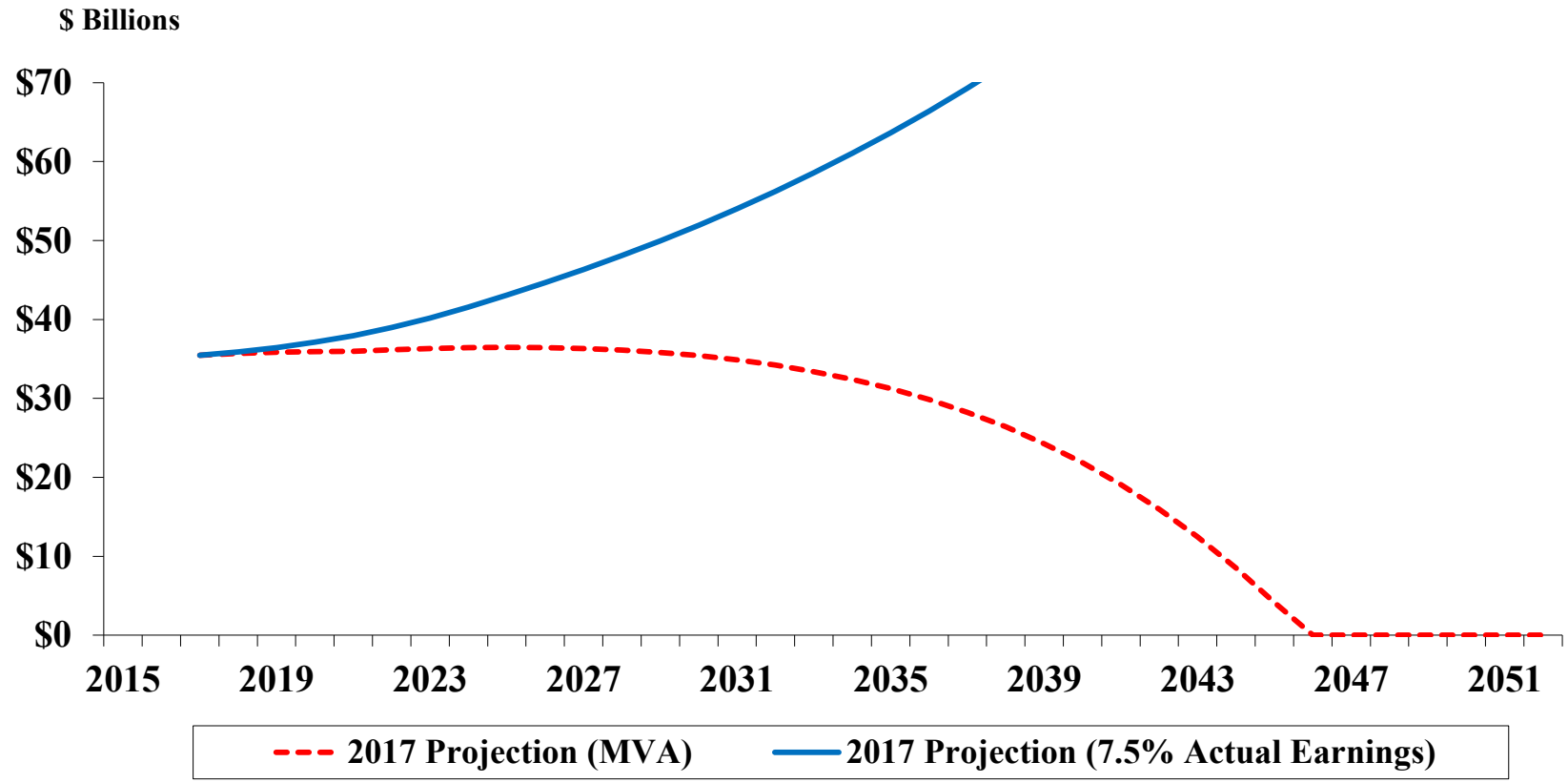
Sensitivity of UAAL Projection to Actual Investment Performance



The above assumes all assumptions exactly met, except state investment returns on current market assets

Assumes no changes to benefit policy

Assumes current statutory contribution policy remains throughout period

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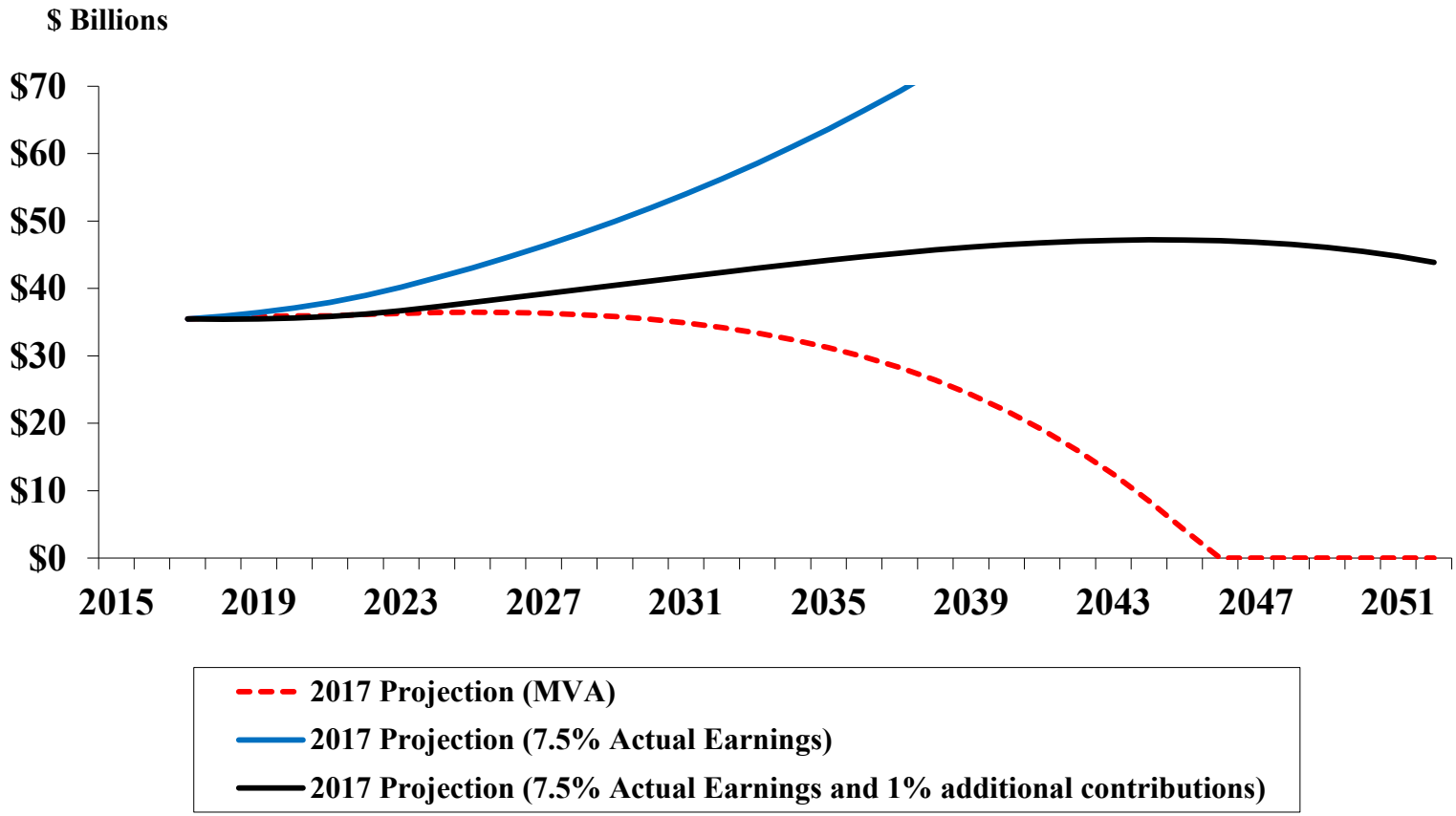
Sensitivity of UAAL Projection to Actual Investment Performance and Contributions



The above assumes all assumptions exactly met, except state investment returns on current market assets

Assumes no changes to benefit policy

Assumes current statutory contribution policy remains throughout period

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Upcoming Experience Study: Purpose of Valuation

- The ***primary*** purpose of the annual actuarial valuation is to either (1) set or (2) assess the adequacy of the contribution policy
  - "Funding" or "contribution allocation procedure"
- The funding policy is the pattern of contributions, not necessarily the contribution in a given year
- For TRS, the funding policy has mostly a fixed contribution rate from members, employers, and the State

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Purpose of Experience Study

- Actuarial assumptions and methods are utilized to develop each of the inputs of the actuarial valuation process
- Experience Study is a regularly scheduled review of the assumptions and methods
  - GFOA recommends at least once every five years
  - TRS' last experience study was in 2015, based on data through 2014
- Winter of 2018 begins an optimal schedule for experience studies to be performed every 4 years and always be during an off legislative year
- Also, there has been significant changes to Actuarial Standards, Accounting Standards, and assumptions used by peer systems since 2015
- General process for setting assumptions and methods
  - Actuary gathers data and performs analysis
  - Actuary makes recommendations
  - Board considers actuary's recommendation and makes the final decision for the system

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Procedure of 2018 Experience Study

- Compare economic assumptions to:
  - General US price inflation and wage inflation statistics
  - TRS specific salary increases
  - Expected return using alternative capital market assumption sets
  - Economic assumptions should be consistent
- Analyze demographic assumptions
  - Retirement, mortality, disability, other terminations
  - Compared to TRS' actual experience
  - Used Actual-to-Expected (A/E) Ratio as analysis tool
  - Looked at patterns by age and service
- Currently, we anticipate most current assumptions to be found reasonable or to only need small modifications
- Largest decision will be the investment return assumption

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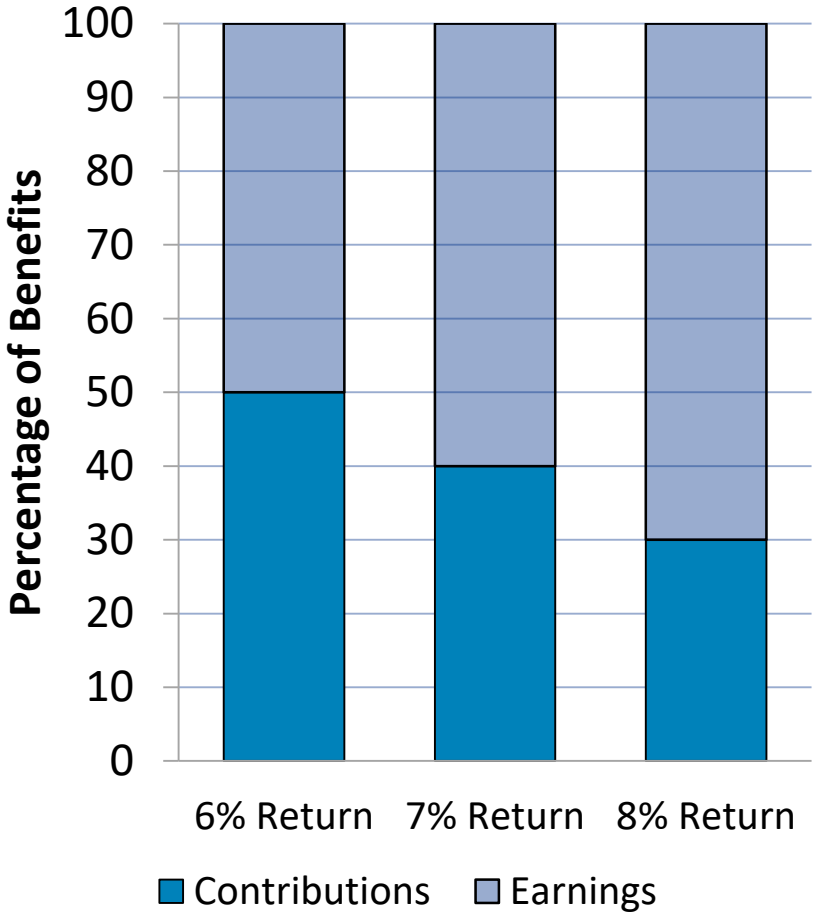
Investment Return Assumption

- This assumption is used to predict what percentage of a future benefit payments will be covered by investment return and what percentage by contributions.
- Lower Returns/Higher Contributions



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Investment Return Assumption

- The assumption selected should be reasonable
  - Not necessarily a single “correct” answer
- Assumption is selected using a process that considers:
  - TRS target asset allocation
  - Capital market expectations
    - Will use AON, in addition to several other independent sources
  - Utilize a building block approach that reflects expected inflation, real rates of return, and plan related expenses
    - Take into account the volatility of the expected returns produced by the investment portfolio
- Other factors to consider
  - Historical investment performance
  - Comparison with peers

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Per ASOP 27: Reasonable Assumptions

- An economic assumption is reasonable if
  - It is appropriate for the purpose of the measurement
  - It reflects the actuary's professional judgement
  - It takes into account historical and current economic data that is relevant as of the measurement date
  - It reflects the actuary's estimate of future experience
  - It has no significant bias (i.e., it is not significantly optimistic or pessimistic)
    - Although some allowance for adverse experience may be appropriate
- The standard explicitly advises an actuary not to give undue weight to recent experience
- The assumption set as a whole must be consistant and satisfy the ASOP

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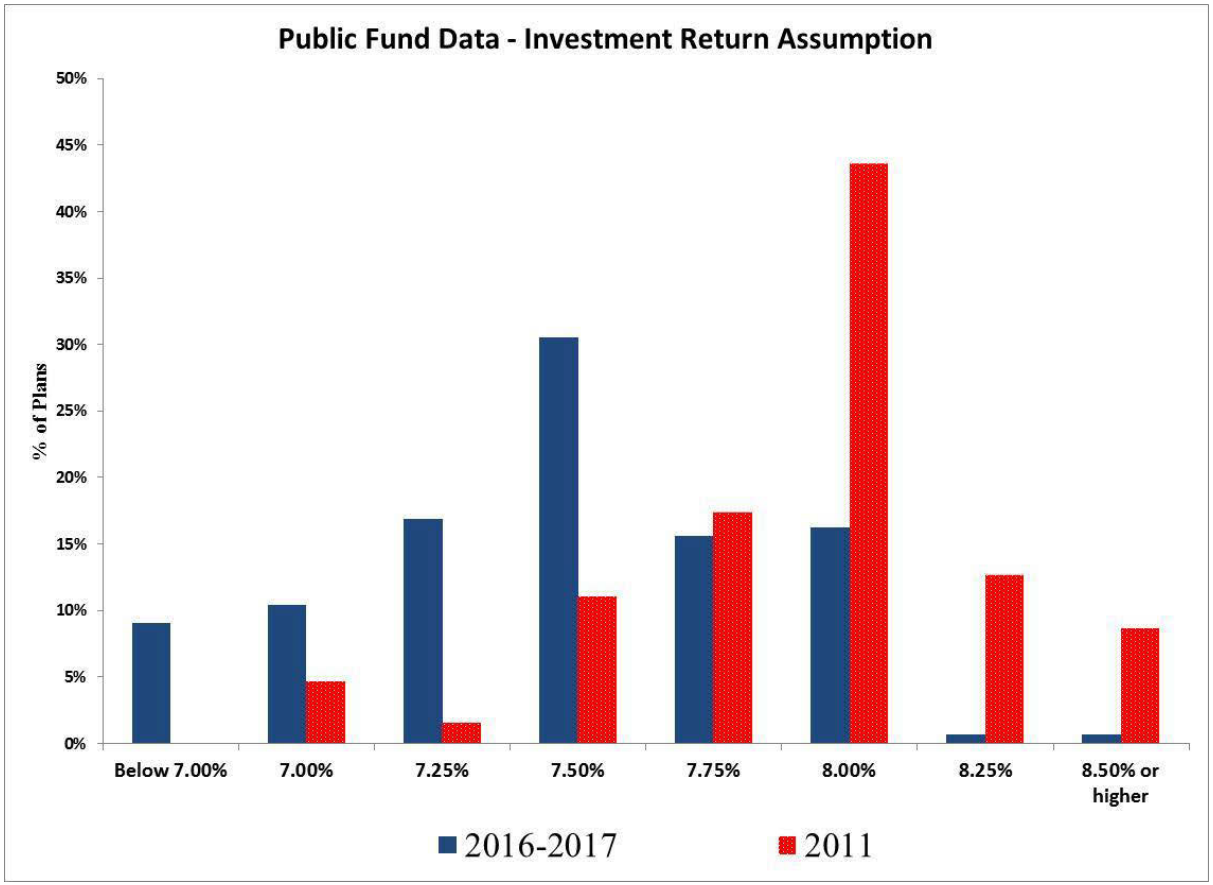
Investment Return Assumption

Comparison to Peers



Source: 2017 Public Plans Database

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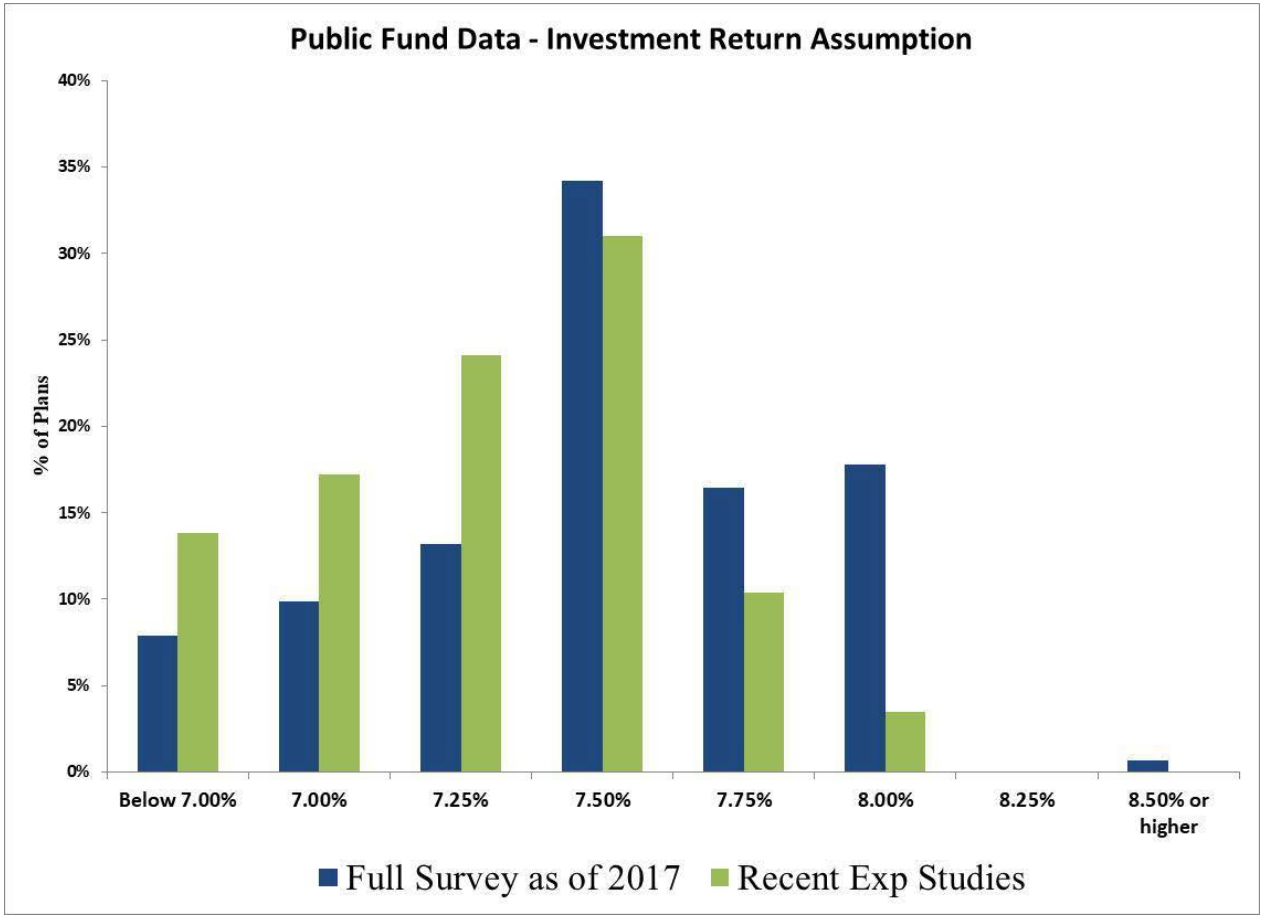
Investment Return Assumption

Comparison to Peers



"Recent Exp Studies" is the compilation from Systems that have performed experience studies in 2016 or 2017

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2018 Experience Study

- Experience study will be for five-year period ending August 31, 2017
- Timeline for next assumption review
  - Draft report provided to Board in advance of February Board meeting
  - Summary of results and discussion at February Board meeting
  - The Board adopts, modifies, or rejects proposed assumptions
  - The Board adopted assumptions are used for performing the August 31, 2018 actuarial valuation and preparation for 2019 legislative session

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Summary

- Results from this valuation are very favorable
- As shown, the margin is very low
- Experience study scheduled for this winter, investment return assumption will be most meaningful decision
- Projections expect the UAAL to increase in nominal dollars over the next 10 years before beginning to decrease
  - The ride is likely to be volatile
- Any future benefit enhancements need to be supported by a representative increase in revenue

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TAB 14

FIDUCIARY REVIEW OF ACTUARIAL ASSUMPTIONS

December 14, 2017

Steven D. Huff
Reinhart Boerner Van Deuren s.c.

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Investment of Assets

- Board adopts IPS and oversees investment of assets with goal to have trust assets sufficient to pay benefits.
- To achieve and sustain a financially sound trust, long-term assets derived from investments and contributions equal long-term liabilities.
  - Texas law establishes funding guidelines. *Govt Code Sec. 821.006*.

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Adoption of Assumptions

- Funding a pension benefit requires the use of actuarial assumptions about future events.
  - Economic Assumptions
  - Demographic Assumptions
- Board sets actuarial assumptions after analysis and recommendations presented by actuary. *Govt Code Sec. 825.105; Govt Code Sec. 825.301(e).*

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Fiduciary Process in Setting Assumptions

- In setting assumptions, Board follows a prudent process in order to fulfill its fiduciary duties.
- Board will be following a prudent process if it takes the following steps:
  1. Actuary reviews the experience study and provides recommendations on assumptions;
  2. TRS staff provides information and comments on assumptions;
  3. Board asks questions of the actuary, TRS staff or other TRS service providers; and
  4. After consideration of recommendations and comments, Board selects most reasonable assumptions and level of risk, mindful of its duty to the trust and members.

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Considerations in Setting Assumptions – Actuary

- Board should consider the actuary's presentation of information and recommendations.
- Actuary's role: Provide information related to the experience study and make recommendations to Board regarding most appropriate assumptions for the plan.
  - Board can adopt all, none or some of actuary's recommendations.
  - Board most recently set assumptions in 2015. Assumptions are not static and should be periodically reviewed to reflect actual experience as well as changing patterns.

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Considerations in Setting Assumptions – Actuary

- Actuary will present to the Board its experience study, which reviews data over a period of several years. Actuary will review:
  - plan's actual experience for each assumption;
  - analysis of how actual experience compares to each current assumption;
  - actuary's best estimate for each assumption.
- Actuary must estimate possible future economic outcomes based on reasonable economic assumptions and relevant historical and current economic data.

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Considerations in Setting Assumptions - Best Practices

- Board should also consider practices used by similarly-situated peers as a reference point.
- However, actions of peers should not preclude the Board from coming to a different conclusion after carefully considering the facts that affect TRS.

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Best Practices - Assumed Rate of Return

- Investment earnings are a large portion of retirement plan revenue. Therefore, the accuracy of the assumed rate of return is critical to a retirement plan's actuarial soundness.
- While all assumptions need to be carefully considered, the assumption receiving the greatest scrutiny currently is the assumed rate of return.

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Best Practices – Assumed Rate of Return

The sustained period of low interest rates since 2009 has caused many public plans to reevaluate and reduce assumptions, especially the assumed rate of return.

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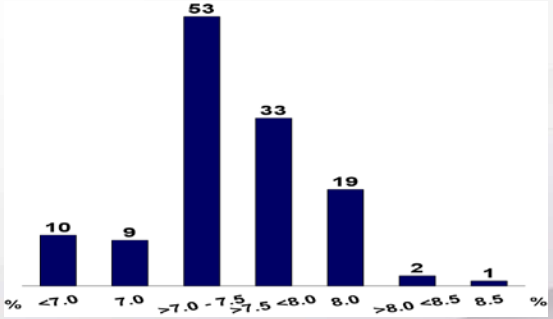
Best Practices – Assumed Rate of Return

- In fiscal year 2017, of 127 public pension funds studied by the National Association of State Retirement Administrators:
  - 114 had an assumed rate of return set at between 7 percent and 8 percent;
  - 3 had an assumed rate of return greater than 8 percent; and
  - 10 had an assumed rate lower than 7 percent.
- Average assumed rate was 7.525.



Source: NASRA ISSUE BRIEF: Public Pension Plan Investment Return Assumptions February 2017

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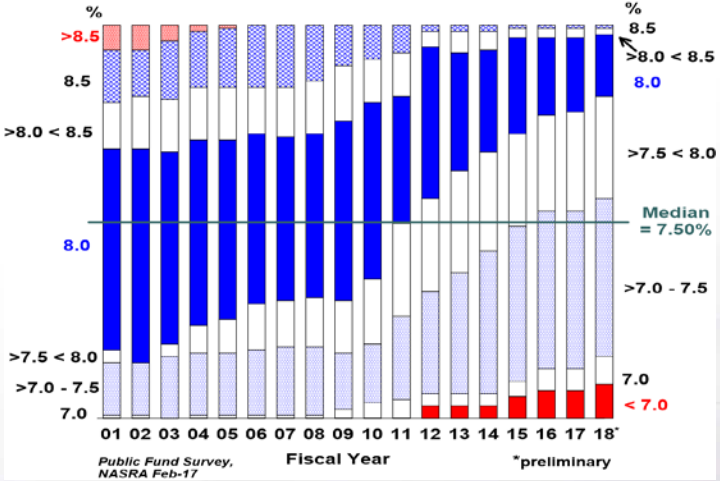
Best Practices – Assumed Rate of Return

Long-Term Trend of Public Pension Investment Return Assumptions



Source: NASRA ISSUE BRIEF: Public Pension Plan Investment Return Assumptions February 2017

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Considerations in Setting Assumptions – Members and Trust

- Board should understand how a change to an assumption would affect the trust and the members. *See Article 16, section 67(a) of the Texas Constitution; TRS bylaws.*
- Board should also consider how a change to an assumption would affect all members - current and future.
  - If the assumptions are set too high, future contributors will bear the burden.
  - If the assumptions are set too low, current contributors will bear the burden.

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Understanding Potential Consequences

- While the Board does not set contribution rates (the legislature does), the Board should be aware of how the assumptions may affect contributions.
- Both investment income and contributions determine plan funding.

Contributions + Investments = Benefits + Expenses

- If investment income or assumptions decline, contributions generally rise. Accordingly, a reduction to the assumed rate of return will likely result in an increase in contributions to account for the reduced investment income.

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Understanding Potential Consequences

- The Board could also examine the impact an adjustment to the assumptions would have on TRS' investment risk.
- If the assumed rate of return is reasonable in light of the particular fund's circumstances, it is more likely that the actual investment returns will meet or exceed the target rate while not requiring unnecessary risk to meet unreasonable target rates.

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Board Should Document Its Decisions Are Not Based on Plan Sponsor or Third-Party Interests

- Independence of Board is important in demonstrating Board's fiduciary duty of loyalty.
  - This means independence from the plan sponsor, contributing employers or other outside influences.
- Board acts as a whole. Each Trustee acts for the benefit of the trust as a whole, not for or on behalf of an individual member, a group of members, or any other third party.

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Questions?

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TAB 15

GRS Health & Welfare

Health Benefits Briefing

Teacher Retirement System of Texas

December 15, 2017

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TRS-Care

Health Care Program

For Retired Public School Employees and Their Dependents

GRS Health & Welfare

History

- Created in 1985 with coverage beginning September 1, 1986
- Historically operates through a separate trust fund
- Provides health coverage for retired Texas public school employees
- Higher education retirees are generally covered by ERS, UT or A&M
- Benefits are provided through medical and pharmacy networks
  - Self-funded medical benefits administered by Aetna
  - Fully insured Medicare Advantage plan options insured by Humana
  - Pharmacy benefits administered by Express Scripts
    - Self-funded prescription drug benefits for non-Medicare participants
    - Self-funded Medicare Part D drug benefits for Medicare participants

GRS Health & Welfare

FY2017 Medical Plan Design

	TRS-Care 1	TRS-Care 2	TRS-Care 3	Medicare Advantage for TRS-Care 2	Medicare Advantage for TRS-Care 3
Eligibility	All members			Members with both Medicare Part A & B	
Deductible	$2,350/$4,700 Parts A&B $3,900/$7,800 Part B Only $5,250/$10,500 Non-Medicare	$1,300/$2,600	$400/$800	$500	$150
Maximum Out-of-Pocket (MOOP)[1,2]	$6,250/$12,500 Parts A&B $7,800/$15,600 Part B Only $8,250/$16,500 Non-Medicare	$5,800/$11,600	$4,900/$9,800	$3,500	$3,150
Coinsurance	80%/20% (after Medicare payment)	80%/20% (after Medicare payment)	80%/20% (after Medicare payment)	95%/5%	95%/5%
Inpatient Hospital Facility				$500 copay per stay	$250 copay per stay
Outpatient Hospital Facility				$250 copay	$75 copay
Emergency Room				$65 copay	$50 copay
Urgent Care				$35 copay	$35 copay
Office Visits				$5 PCP $10 Specialist	$5 PCP $10 Specialist

[1] MOOP includes medical and pharmacy deductible, coinsurance and copayments for TRS-Care 1.
[2] MOOP includes medical deductible, coinsurance and copayments for TRS-Care 2 and TRS-Care-3.

GRS Health & Welfare

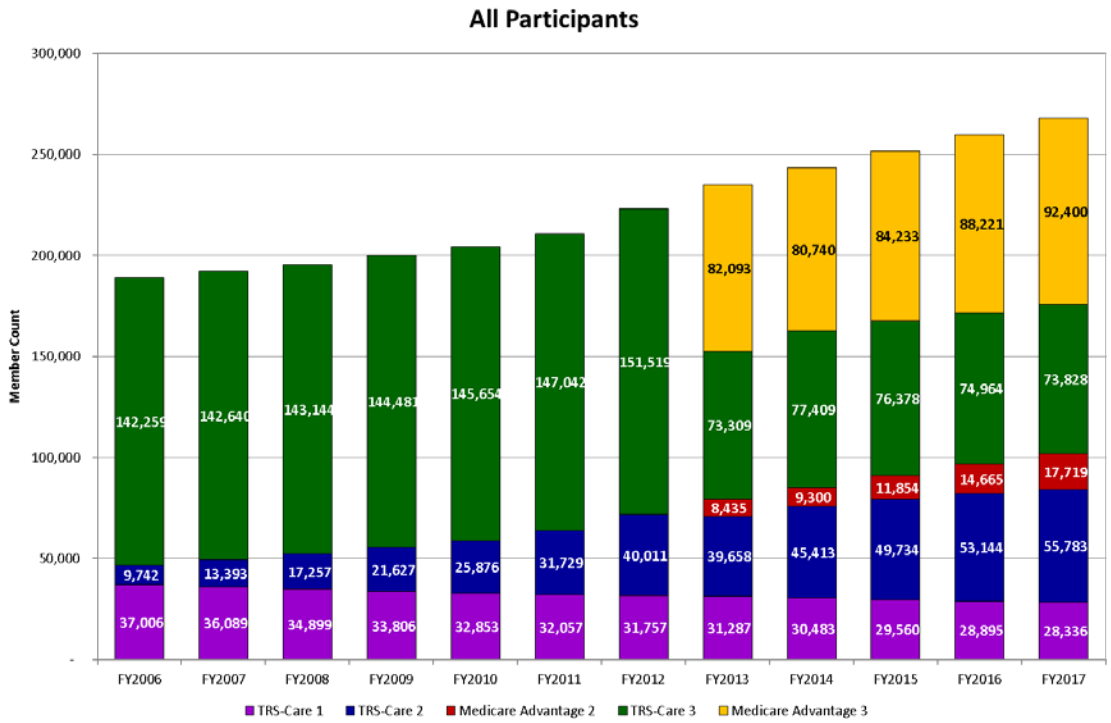
FY2017 Prescription Drug Plan Design

	TRS-Care 1	TRS-Care 2	TRS-Care 3	Medicare Part D for TRS-Care 2	Medicare Part D for TRS-Care 3
Eligibility	All members	All members		Members with Medicare Part A and/or B	
Retail Copays[2]	80%/20% coinsurance[1]				
Generic		$13	$13	$5	$5
Preferred Brand		$40	$30	$25	$20
Non-Preferred Brand		$65	$50	$50	$40
Specialty Tier Drugs		$65	$50	$50	$40
Mail Order Copays					
Generic		$25	$25	$15	$15
Preferred Brand		$100	$65	$70	$45
Non-Preferred Brand		$165	$105	$125	$80
Specialty Tier Drugs		$165	$105	$125	$80

[1] Prescription drug benefits under TRS-Care 1 are subject to the medical deductible, coinsurance and out-of-pocket maximum limits.
[2] Under the traditional TRS-Care 2 and TRS-Care 3 plans, maintenance medications filled at a retail pharmacy are subject to an additional $10 convenience fee after the first fill.

GRS Health & Welfare

Participation by Plan



Fiscal Year	Average Membership	Percent Change
2010	204,382	2.2%
2011	210,828	3.2%
2012	223,287	5.9%
2013	234,783	5.1%
2014	243,344	3.6%
2015	251,758	3.5%
2016	259,889	3.2%
2017	268,066	3.1%

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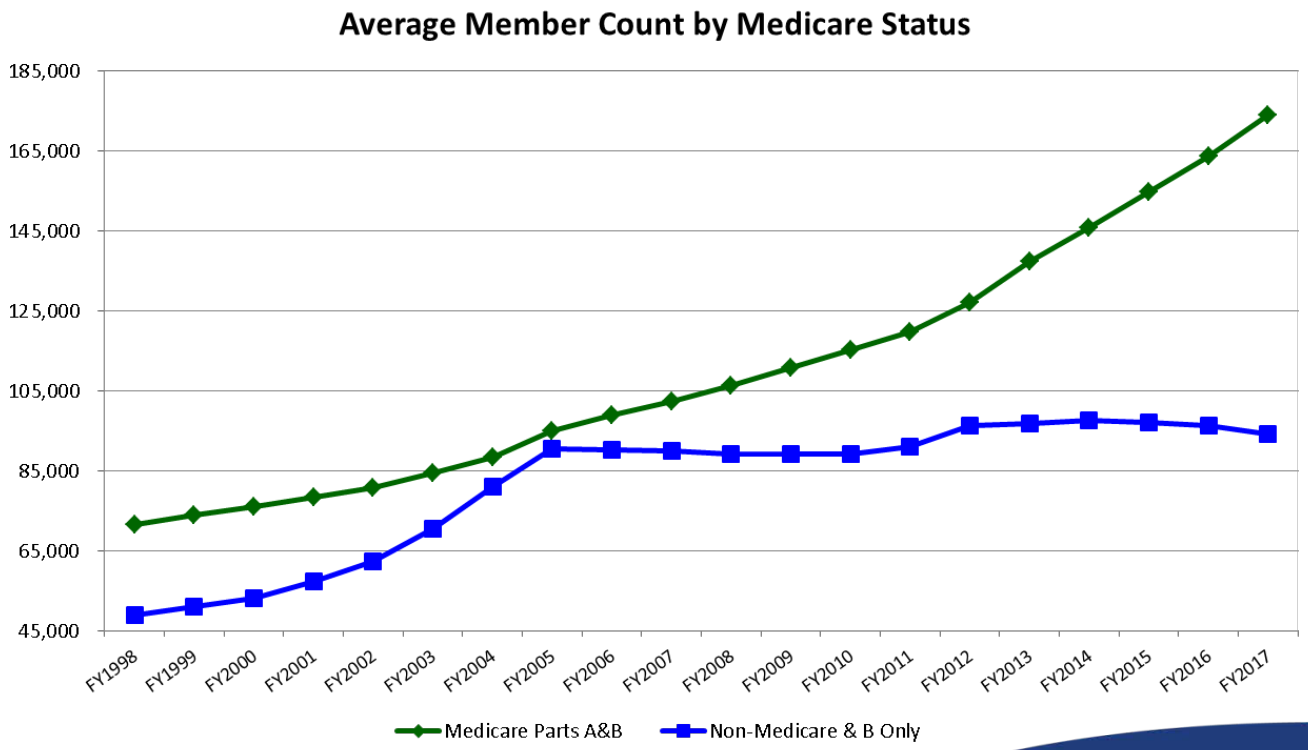
Participation by Medicare Status



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FY2017 TRS-Care Funding Sources

- State Contributions
  - 1.0% of public education payroll
  - Supplemental funding
- Active Employee Contributions – 0.65% of employee's salary
- School District Contributions – 0.55% of employee's salary
- Retiree Contributions – tiered by years of service and Medicare status for TRS-Care 2, TRS-Care 3 and dependent coverage
- Employer Surcharge to account for the "Return to Work" retirees
- Prescription Drug Subsidies
  - Retiree Drug Subsidy (RDS)
  - PDP Subsidy
  - Coverage Gap Discounts
  - Catastrophic Reinsurance
- Investment Income
- Retirees also pay substantial amounts for deductibles, copays, medical coinsurance and Medicare Part B Premiums

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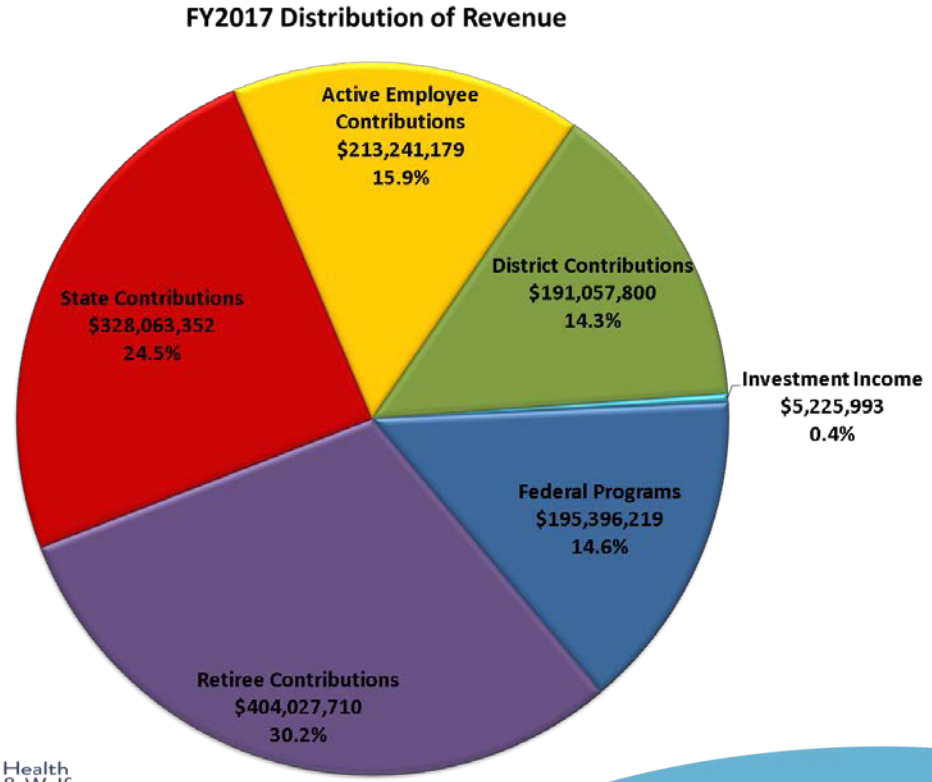
FY2017 TRS-Care Funding Sources



- $1.35 billion was provided by multiple funding sources for TRS-Care.
- State, District and Active Employee Contributions are based on a percentage of active employee payroll rather than by medical trend.
- In addition to retiree contributions, plan participants also paid $287 million in deductibles, copayments and coinsurance during the year.

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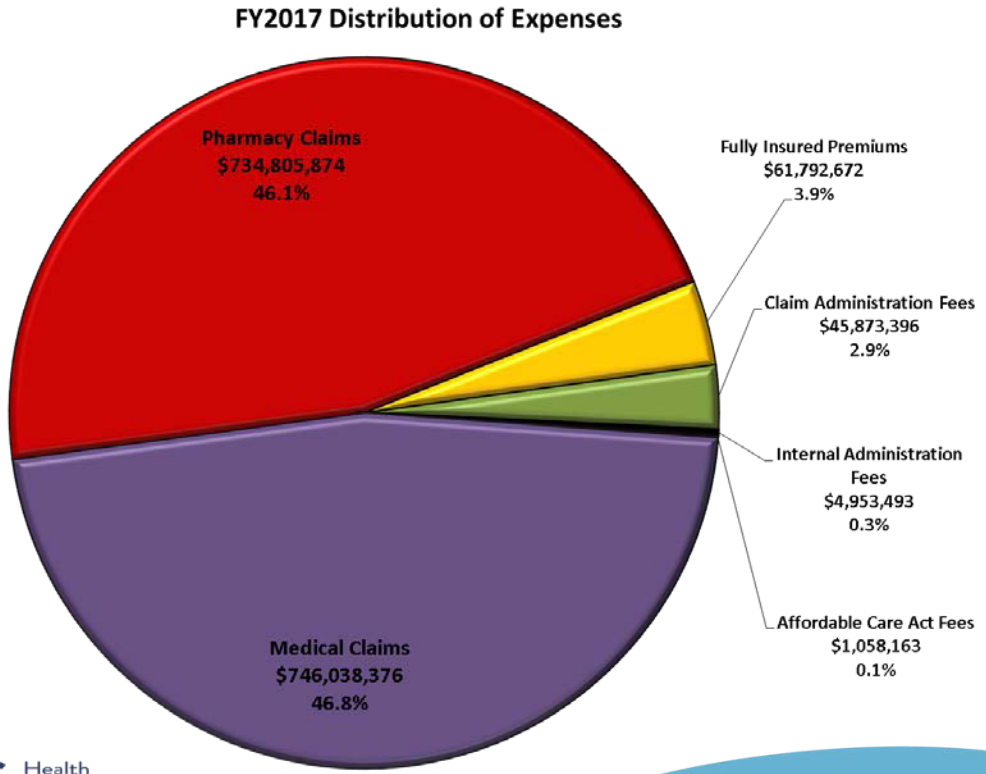
FY2017 TRS-Care Expenses



- A total of $1.6 billion in expenses were paid by the plan during FY2017.
- Medical and pharmacy claims accounted for 92.9% of expenses during FY2017.
- Administration fees paid to both the health plan administrator and the PBM accounted for less than 3% of expenses.

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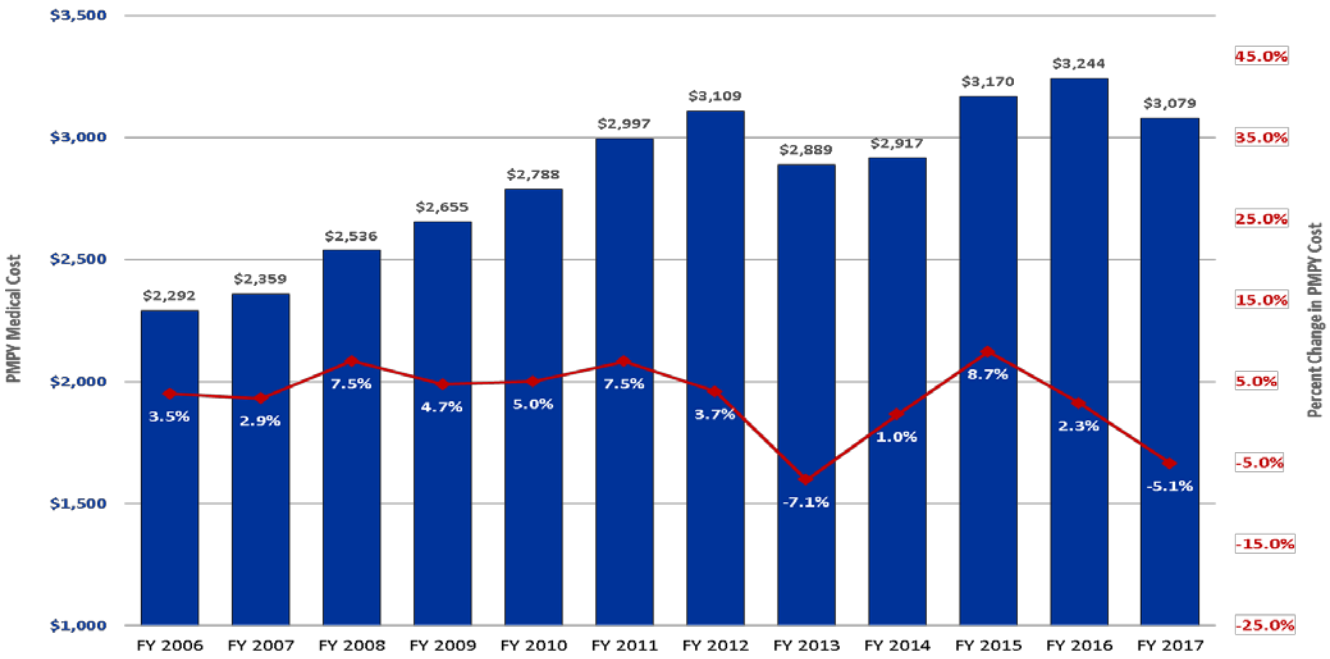
Average Medical Cost per Member



Medical costs reflect the average cost of both the self-funded medical claims and Medicare Advantage premiums. Self-funded costs are shown based on claims incurred during the fiscal year and paid through August 31, 2017. FY2017 figures include an estimate of IBNR.

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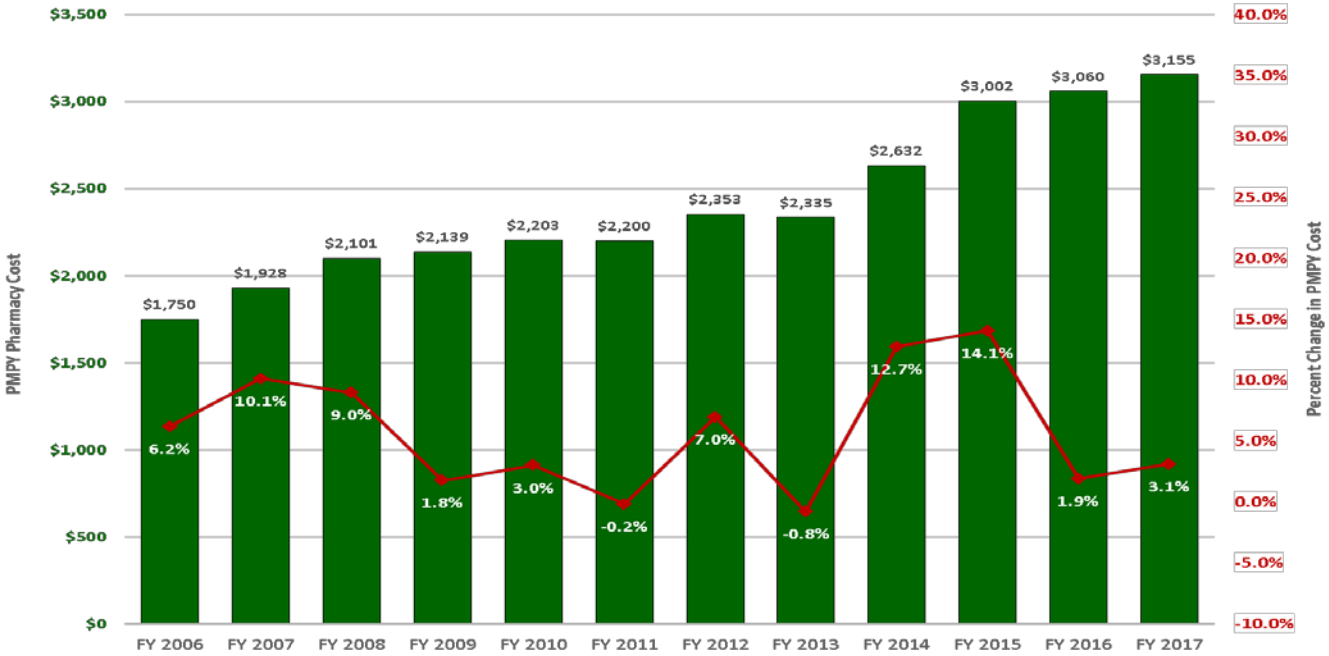
Pharmacy Claims per Member



Pharmacy costs are shown on an incurred basis net of pharmaceutical rebates for TRS-Care 2 and TRS-Care 3.

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FY2018 Funding Changes

- State Contributions
  - 1.25% of public education payroll
  - Supplemental funding of $394 million for the FY2018-FY2019 biennium
- Active Employee Contributions – 0.65% of employee's salary
- School District Contributions – 0.75% of employee's salary
- Retiree Contributions – tiered by Medicare status of the retiree and family size

GRS Health & Welfare

Retiree Premium Contribution Changes

for January 1, 2018

	FY2017			Calendar Year 2018	
Coverage Tier	**TRS-Care 1**	**TRS-Care 2**	**TRS-Care 3**	**Non-Medicare Retirees[1,2]**	**Medicare Retirees[2]**
Retiree Only	$0	$60 – 210	$90 - $310	$200	$135
Retiree & Spouse	$20 - $140	$160 - $450	$235 - $665	$689	$529
Retiree & Child(ren)	$28 - $41	$122 - $272	$172 - $392	$408	$468
Retiree & Family	$58 - $168	$222 - $512	$317 - $747	$999	$1,020

[1] Non-Medicare, disabled retirees will receive a $200 per month reduction in premium if retired as of 1/1/2017.
[2] Retirees who cover an adult, disabled child will received a $200 per month reduction in premium.

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Medical Plan Design Changes

for January 1, 2018

	FY2017					Calendar Year 2018	
	TRS-Care 1	TRS-Care 2	TRS-Care 3	Medicare Advantage Plan For TRS-Care 2	Medicare Advantage Plan For TRS-Care 3	TRS-Care Standard Plan	TRS-Care Medicare Advantage Plan
Deductible[1]	$2,350/$4,700 Part A&B $3,900/$7,800 Part B $5,250/$10,500 Non-Medicare	$1,300/$2,600	$400/$800	$500	$150	$1,500/$3,000 In-Network $3,000/$6,000 Out-of-Network	$500
Maximum Out-of-Pocket[1]	$6,250/$12,500 Part A&B $7,800/$15,600 Part B $8,250/$16,500 Non-Medicare	$5,800/$11,600	$4,900/$9,800	$3,500	$3,150	$5,650/$11,300 In-Network $11,300/$22,600 Out-of-Network	$3,500
Coinsurance	80%/20%[2]	80%/20%[2]	80%/20%[2]	95%/5%	95%/5%	80%/20% In-Network 60%/40% Out-of-Network	95%/5%
Inpatient Hospital Copay	80%/20%[2]	80%/20%[2]	80%/20%[2]	$500 per stay	$250 per stay	80%/20% In-Network 60%/40% Out-of-Network	$500 per Stay
Outpatient Hospital copay	80%/20%[2]	80%/20%[2]	80%/20%[2]	$250 per visit	$75 per visit	80%/20% In-Network 60%/40% Out-of-Network	$250 per visit
ER Copay	80%/20%[2]	80%/20%[2]	80%/20%[2]	$65 per visit	$50 per visit	80%/20% In-Network 60%/40% Out-of-Network	$65 per visit
Urgent Care Copay	80%/20%[2]	80%/20%[2]	80%/20%[2]	$35 per visit	$35 per visit	80%/20% In-Network 60%/40% Out-of-Network	$35 per visit
PCP/Specialist Office Visit	80%/20%[2]	$35 per visit[3]	$25 per visit[3]	$5/$10 per visit	$5/$10 per visit	80%/20% In-Network 60%/40% Out-of-Network	$5/$10 per visit

[1] Individual/Family
[2] Coinsurance is applied after the deductible is met and after Medicare payment.
[3] Copay is applicable for non-Medicare participants.

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Prescription Drug Plan Design Changes

for January 1, 2018

- CVS/Caremark began administering the traditional prescription drug plans on 9/1/2017.
- SilverScripts, a subsidiary of CVS/Caremark, will begin administering the Medicare Part D plan benefits on 1/1/2018.

	FY2017					Calendar Year 2018	
	TRS-Care 1	TRS-Care 2	Medicare Part D for TRS-Care 2	TRS-Care 3	Medicare Part D for TRS-Care 3	TRS-Care Standard	Medicare Part D
Retail Pharmacy Generic Preferred Brand Non-Preferred Brand Specialty	80%/20% coinsurance[1]	$13 $40 $65 N/A	$5 $25 $50 $50	$13 $30 $50 N/A	$5 $20 $40 $40	80%/20% coinsurance[1]	$5 $25 $50 $50
Retail Maintenance Generic Preferred Brand Non-Preferred Brand	80%/20% coinsurance[1]	$23 $50 $75	N/A N/A N/A	$23 $40 $60	N/A N/A N/A	80%/20% coinsurance[1] ($0 copay for certain generic preventive maintenance medications)	N/A N/A N/A
Mail Order Generic Preferred Brand Non-Preferred Brand Specialty	80%/20% coinsurance[1]	$25 $100 $165 N/A	$15 $70 $125 $125	$25 $65 $105 N/A	$15 $45 $80 $80	80%/20% coinsurance[1] ($0 copay for certain generic preventive maintenance medications)	$15 $70 $125 $125

[1] Prescription drug benefits under TRS-Care 1 and the TRS-Care Standard plan are subject to the medical deductible, coinsurance and out-of-pocket maximum limits.

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TRS-Care Funding

Financial History & Projection Through FY2023 with Data Through August 2017

	Contributions							Expenditures				
Fiscal Year	Retiree Contributions	State Contributions	Supplemental Appropriations	Active Employee Contributions	District Contributions	Investment Income	CMS, Part D and ERRP Subsidies	Medical Incurred	Drug Incurred	Medicare Advantage Premiums	Administrative Costs	Ending Balance (Incurred Basis)
FY 1986	$0	$0	$250,000	$17,625,194	$0	$572,153	$0	$0	$0	$0	$362,371	$18,084,976
FY 1987	$22,617,624	$25,931,680	$0	$18,522,629	$0	$2,568,998	$0	$50,988,845	$7,044,825	$0	$3,941,936	$25,750,301
FY 1988	$23,948,600	$31,357,632	$0	$19,598,520	$0	$5,703,832	$0	$16,157,649	$12,441,672	$0	$4,614,755	$73,144,809
FY 1989	$25,428,632	$37,420,711	$0	$20,789,215	$0	$8,802,914	$0	$32,926,324	$15,458,710	$0	$5,212,073	$111,989,174
FY 1990	$37,556,561	$44,369,915	$0	$22,184,958	$0	$13,098,835	$0	$50,171,919	$19,835,965	$0	$7,186,851	$152,004,708
FY 1991	$46,563,787	$47,277,743	$0	$23,638,871	$0	$15,801,047	$0	$82,697,189	$28,683,081	$0	$8,258,029	$165,647,857
FY 1992	$56,395,797	$50,392,512	$0	$25,196,592	$0	$17,314,372	$0	$74,307,953	$33,829,694	$0	$8,862,560	$197,946,923
FY 1993	$65,154,653	$54,029,406	$0	$27,014,703	$0	$17,181,190	$0	$101,627,864	$40,700,513	$0	$10,067,359	$208,931,140
FY 1994	$80,128,944	$56,912,083	$0	$28,456,041	$0	$16,467,438	$0	$108,284,693	$45,712,060	$0	$11,668,828	$225,230,065
FY 1995	$89,006,331	$59,849,850	$0	$29,924,925	$0	$16,841,673	$0	$122,054,551	$50,782,093	$0	$12,219,847	$235,796,353
FY 1996	$82,622,236	$63,634,087	$0	$31,817,043	$0	$16,818,747	$0	$135,982,304	$57,074,921	$0	$13,593,578	$224,037,663
FY 1997	$87,657,784	$67,616,395	$0	$33,808,197	$0	$16,202,440	$0	$148,823,489	$62,530,982	$0	$14,097,454	$203,870,554
FY 1998	$91,390,173	$72,210,190	$0	$36,105,095	$0	$15,260,517	$0	$156,537,913	$76,256,158	$0	$14,616,678	$171,425,780
FY 1999	$96,474,107	$76,488,424	$0	$38,244,213	$0	$9,762,741	$0	$184,398,533	$93,459,890	$0	$14,905,196	$99,631,646
FY 2000	$120,227,960	$85,505,637	$0	$42,738,069	$0	$6,923,485	$0	$203,029,971	$110,903,247	$0	$16,837,127	$24,256,451
FY 2001	$131,213,445	$90,118,787	$76,281,781	$45,059,394	$0	$5,824,134	$0	$250,691,898	$139,774,848	$0	$18,237,767	($35,950,521)
FY 2002	$143,797,748	$94,792,026	$285,515,036	$47,378,092	$0	$7,140,560	$0	$287,729,918	$163,979,754	$0	$19,017,292	$71,945,978
FY 2003	$162,954,010	$98,340,798	$124,661,063	$49,170,399	$0	$3,394,956	$0	$368,462,963	$203,281,400	$0	$21,690,329	($82,967,487)
FY 2004	$248,552,679	$198,594,194	$298,197,463	$99,297,097	$79,457,387	$4,840,982	$0	$366,840,457	$214,514,500	$0	$26,332,200	$238,285,158
FY 2005	$322,780,191	$202,397,566	$64,172,167	$101,198,783	$80,914,228	$11,300,868	$0	$431,036,095	$229,522,988	$0	$33,333,010	$327,156,868
FY 2006	$326,844,982	$215,666,940	$0	$140,183,511	$118,607,527	$21,435,792	$34,611,607	$427,553,404	$259,532,887	$0	$34,434,969	$462,985,967
FY 2007	$323,957,945	$238,190,720	$0	$154,823,968	$136,008,512	$32,671,539	$52,329,617	$437,519,747	$304,773,401	$0	$35,878,194	$622,796,927
FY 2008	$328,505,433	$254,722,174	$0	$165,569,413	$141,672,630	$29,252,347	$59,486,239	$498,767,038	$334,742,500	$0	$39,656,301	$728,839,324
FY 2009	$329,723,191	$267,471,299	$0	$173,856,344	$149,562,613	$17,482,143	$61,530,735	$531,239,020	$353,893,845	$0	$43,184,393	$800,148,391
FY 2010	$332,481,933	$279,250,547	$0	$181,512,856	$155,918,241	$11,679,229	$70,795,686	$575,539,788	$395,817,017	$0	$45,465,776	$814,964,302
FY 2011	$345,164,271	$282,782,431	$0	$183,808,580	$158,724,010	$8,168,640	$136,887,805	$608,461,321	$384,017,059	$0	$47,151,354	$890,870,304
FY 2012	$363,348,030	$271,925,242	$0	$176,751,407	$154,607,926	$5,189,934	$68,633,946	$687,987,585	$454,143,825	$0	$48,181,723	$741,013,656
FY 2013	$355,685,504	$139,213,557	$102,363,704	$180,824,522	$160,952,396	$3,041,001	$98,628,841	$686,321,003	$496,229,923	$1,075,388	$47,048,587	$551,048,281
FY 2014	$363,631,292	$290,775,235	$36,058,148	$189,003,903	$169,847,447	$2,061,745	$135,536,021	$663,776,623	$539,842,962	$27,507,107	$48,894,894	$457,940,487
FY 2015	$369,066,459	$304,917,343	$768,100,754	$198,196,273	$179,157,485	$1,495,680	$200,321,166	$746,668,738	$649,457,501	$59,000,080	$51,150,088	$972,919,240
FY 2016	$374,736,269	$320,895,370	$0	$208,581,991	$189,111,901	$5,421,446	$198,315,301	$789,756,266	$716,536,786	$69,228,872	$52,973,441	$641,486,153
FY 2017	$404,027,710	$328,063,352	$15,559,552	$213,241,179	$191,057,800	$5,225,993	$195,396,219	$746,038,376	$734,805,874	$61,792,672	$51,885,051	$399,535,986
FY 2018	$538,283,435	$422,381,566	$394,600,000	$219,638,414	$264,070,900	$2,468,748	$226,932,368	$722,565,693	$899,855,619	$157,667,745	$52,281,584	$635,540,776
FY 2019	$621,384,358	$435,053,013	$0	$226,227,567	$271,673,768	$2,552,944	$266,790,678	$695,248,615	$1,054,002,245	$250,414,560	$50,072,028	$409,485,655
FY 2020	$674,905,109	$443,754,073	$0	$230,752,118	$276,894,404	$1,383,776	$302,613,340	$728,612,919	$1,220,389,795	$284,535,417	$50,230,446	$56,019,897
FY 2021	$729,124,477	$452,629,154	$0	$235,367,160	$282,219,453	$138,336	$341,145,539	$755,869,072	$1,402,070,829	$321,525,051	$50,811,588	($433,632,524)
FY 2022	$753,075,518	$461,681,737	$0	$240,074,503	$287,651,003	$0	$382,440,780	$780,682,946	$1,597,381,534	$361,687,355	$51,353,406	($1,099,814,223)
FY 2023	$762,713,112	$470,915,372	$0	$244,875,993	$293,191,184	$0	$426,285,569	$805,027,048	$1,805,231,551	$404,846,654	$51,903,628	($1,968,841,873)

NOTES

- *Invoice data through August 31, 2017*
- *The purpose of this report is to project revenue and expenses on an incurred basis and should not be used as a projection of cash flow. Cash flow projections are usually less than incurred primarily due to a delay in receipt of federal subsidies.*
- *99.95% participation in Medicare Advantage and 100% participation in Part D plan*
- *State Contribution rate of 1.25%; District Contribution rate of 0.75%; and Active Contribution rate of 0.65% beginning 9/1/2017.*
- *3.0% payroll growth in FY2018 and FY2019; 2% increase in payroll growth thereafter.*
- *Enrollment assumptions based on headcounts assumed in annual Other Post Employment Benefits (OPEB) valuation report.*
- *Medical trends: 6.75% in FY2018; reduced by 0.25 each year thereafter.*
- *Pharmacy trends: 11.5% in FY2018; reduced by 0.50 each year thereafter.*

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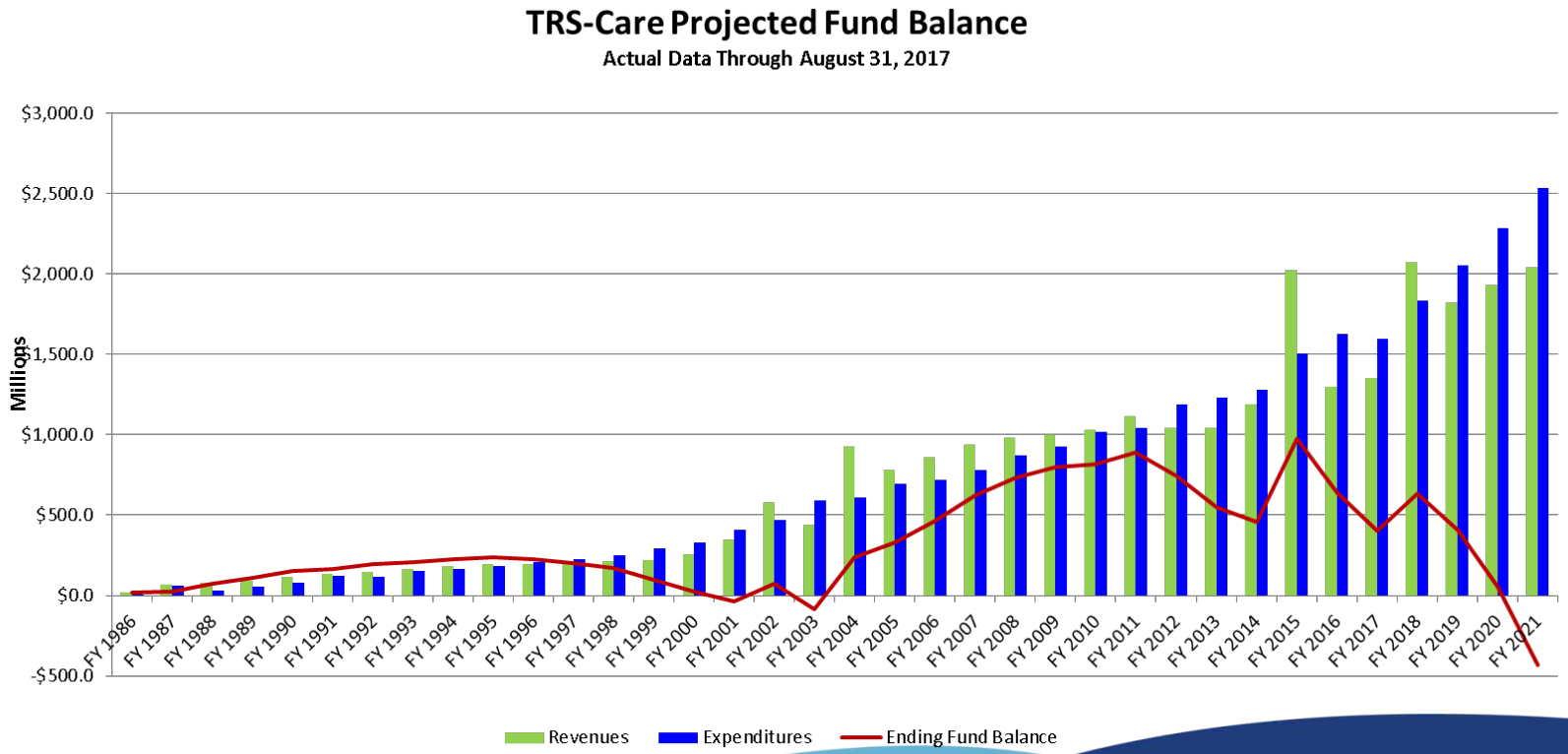
TRS-Care Revenue vs. Expenses



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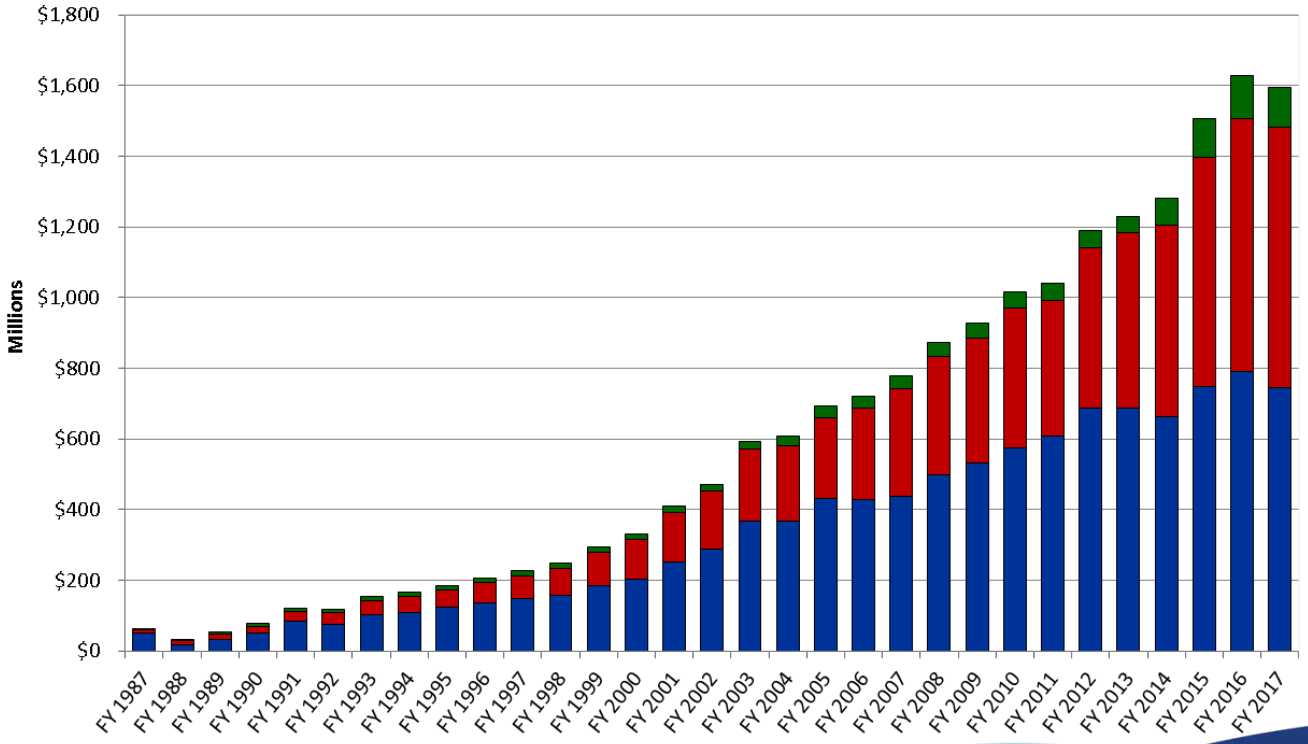
TRS-Care Historical Expenditures



- Administrative Fees
- Prescription Drug Costs
- Medical Costs

Medical and pharmacy costs include invoiced self-funded claims; administrative fees include ASO fees, PPACA fees and MA premiums.

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Cost Drivers

- Increases in medical cost of services
- Increases in prescription drug costs
- Maintaining access and choice in managing providers
- Increased utilization due to an aging population
- Changes in the number of retirees in the group, particularly Non-Medicare
- Changes in the Medicare programs
  - Medicare primary benefits for members enrolled in the self-funded plans
  - CMS reimbursements for Fully insured Medicare Advantage and Medicare Part D plans
- Advances in technology for medical testing/equipment
- Development of new specialty and biogenetic drugs
- Federal and state legislation

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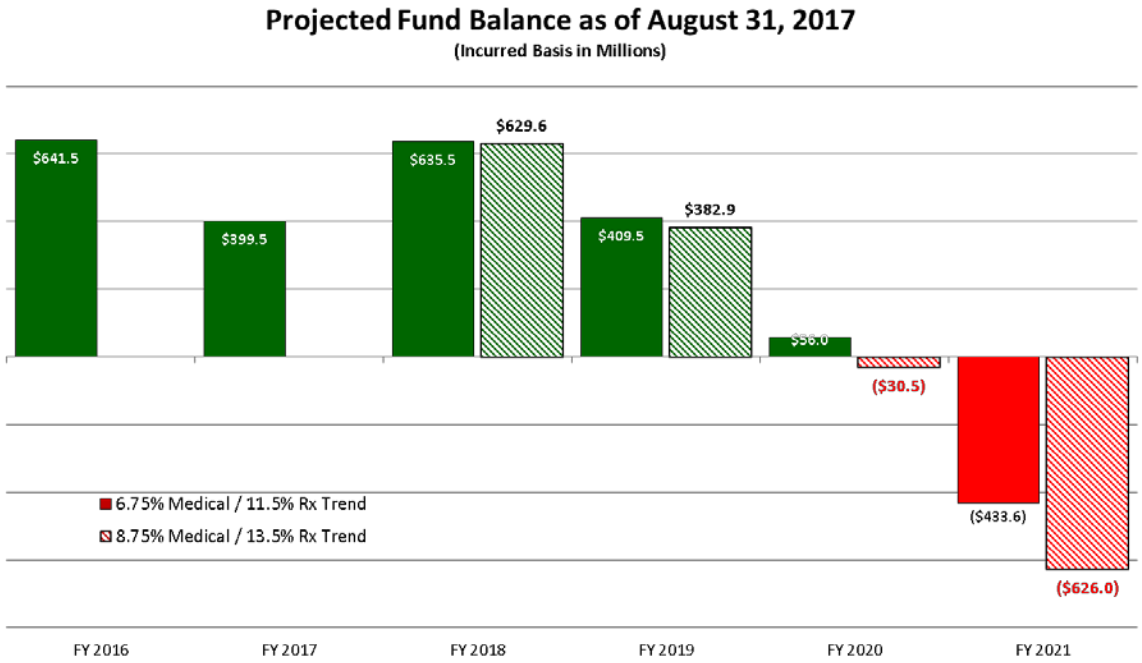
TRS-Care Funding

Financial History & Projection Through FY2021 with Data Through August 2017



*Due to the volatility of future health care costs, projected fiscal years are also shown assuming actual medical and pharmacy trends exceed current trend levels by 2 percentage points.

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TRS-ActiveCare

Health Care Program

for Employees and Dependents of Public Education Entities

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History

- Created in 2001 with coverage beginning on September 1, 2002
  - Medical benefits administered by Blue Cross Blue Shield on a self-funded basis
  - Prescription drug benefits administered by Medco (Express Scripts, Inc.) on a self-funded basis
- Effective September 1, 2014, plan design changes were implemented
  - Medical benefits administered by Aetna on a self-funded basis
  - Prescription drug benefits administered by CVS/Caremark on a self-funded basis
- Approximately 11.1% of the covered population has elected coverage in the fully insured HMO plans

TRS-ActiveCare Medical Plan Design

	FY2017			FY2018		
	TRS-ActiveCare 1-HD	TRS-ActiveCare Select	TRS-ActiveCare-2	TRS-ActiveCare 1-HD	TRS-ActiveCare Select	TRS-ActiveCare-2
Deductible In-network Out-of-network	$2,500/$5,000	$1,200/$3,600 No coverage	$1,000/$3,000	$2,500/$5,000 **$5,000/$10,000**	$1,200/$3,600 No coverage	$1,000/$3,000 **$2,000/$6,000**
Maximum Out-of-Pocket[1] In-network Out-of-network	$6,550/$13,100	$6,850/$13,700 No coverage	$6,850/$13,700	$6,550/$13,100 **$13,100/$26,200**	**$7,150/$14,300** No coverage	**$7,150/$14,300** **$14,300/$28,600**
Coinsurance In-network Out-of-network	80%/20% 60%/40%	80%/20% No coverage	80%/20% 60%/40%	80%/20% 60%/40%	80%/20% No coverage	80%/20% 60%/40%
Hospital Facility	80%/20%	$150 copay per day, plus 20%	$150 copay per day, plus 20%	80%/20%	$150 copay per day, plus 20%	$150 copay per day, plus 20%
Emergency Room Visit	80%/20%	$150 copay plus 20% after deductible	$150 copay plus 20% after deductible	80%/20%	**$200 copay** plus 20% after deductible	**$200 copay** plus 20% after deductible
Preventive Services	Plan pays 100%	Plan pays 100%	Plan pays 100%	Plan pays 100%	Plan pays 100%	Plan pays 100%
Physician Office Visits	80%/20%	$30 PCP copay $60 Specialist copay	$30 PCP copay $50 Specialist copay	80%/20%	$30 PCP copay $60 Specialist copay	$30 PCP copay $50 Specialist copay
Urgent Care Center	80%/20%	$50 copay	$50 copay	80%/20%	$50 copay	$50 copay
Teledoc	$40 consult fee	Plan pays 100%	Plan pays 100%	$40 consult fee	Plan pays 100%	Plan pays 100%
Bariatric Surgery	$5,000 copay plus 20% after deductible	Not covered	$5,000 copay plus 20% after deductible	$5,000 copay plus 20% after deductible	Not covered	$5,000 copay plus 20% after deductible

[1] MOOP includes deductible, coinsurance and copayments for medical and pharmacy benefits.

TRS-ActiveCare Rx Plan Design

	TRS-ActiveCare 1-HD[1]	TRS-ActiveCare Select[2]	TRS-ActiveCare 2[2]
Retail Short Term (1-31 days supply)			
Generic	20% coinsurance	$20 copay	$20 copay
Preferred Brand	20% coinsurance	$40 copay	$40 copay
Non-Preferred Brand	20% coinsurance	50% coinsurance	$65 copay
Retail-*Plus* (60-90 days supply)			
Generic	20% coinsurance	$45 copay	$45 copay
Preferred Brand	20% coinsurance	$105 copay	$105 copay
Non-Preferred Brand	20% coinsurance	50% coinsurance	$180 copay
Mail Order			
Generic	20% coinsurance	$45 copay	$45 copay
Preferred Brand	20% coinsurance	$105 copay	$105 copay
Non-Preferred Brand	20% coinsurance	$50% coinsurance	$180 copay
Specialty Drugs	20% coinsurance	20% coinsurance per fill	$200 per fill (1-31 days supply) $450 per fill (32-90 days supply)

[1] Prescription drug benefits under TRS-ActiveCare 1-HD are subject to the medical deductible, coinsurance and out-of-pocket maximum limits.
[2] Retail Maintenance drugs copays for TRS-ActiveCare Select and TRS-ActiveCare 2 are an additional $5, $10 or $15 if the member continues to have the script filled at a retail pharmacy.

GRS Health & Welfare

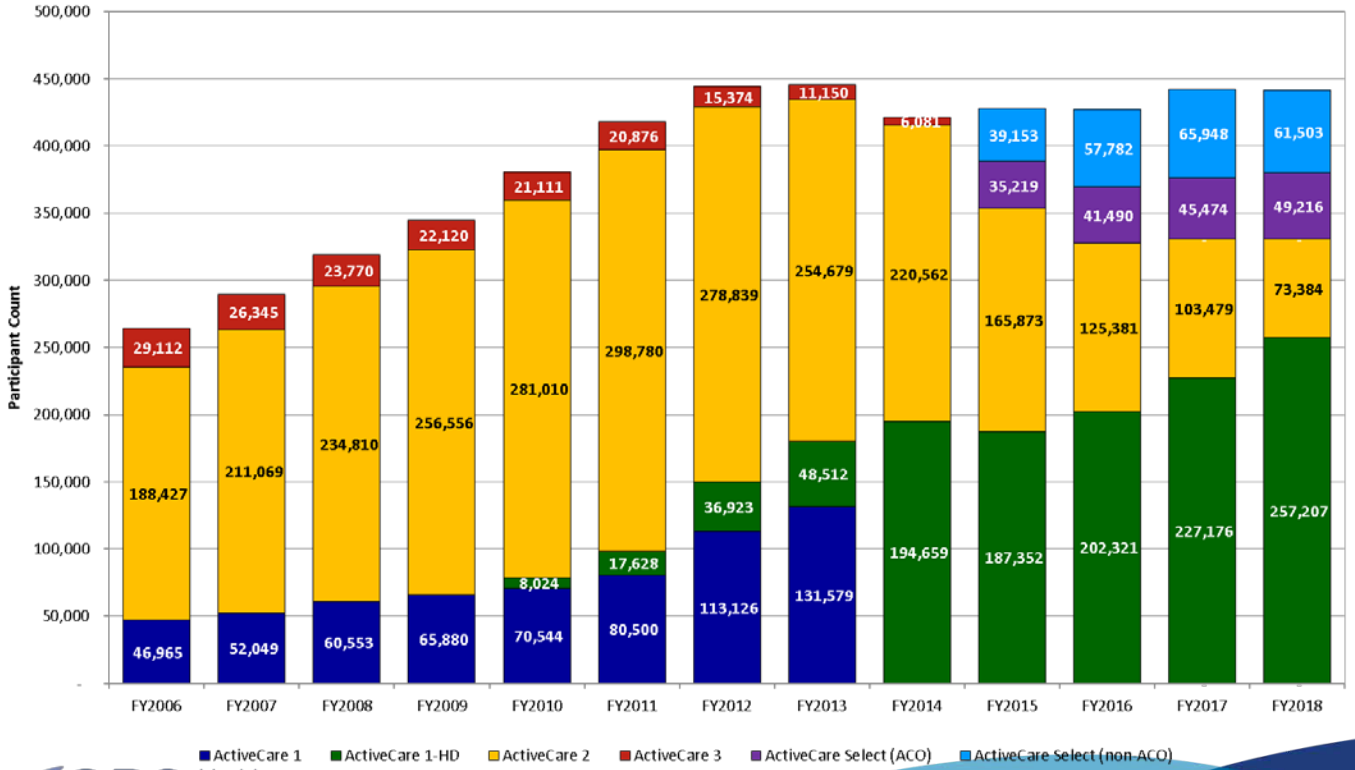
TRS-ActiveCare Participation

Entity Type	# Eligible	#Participating	% Participation
Less than 500	818	803	98.2%
500-1,000	102	90	88.2%
More than 1,000	106	56	53.8%
Charter	164	117	71.3%
RSC	20	20	100%
Other Ed	4	4	100%
Total	1,215	1,091	89.8%

As of November 1, 2017

GRS Health & Welfare

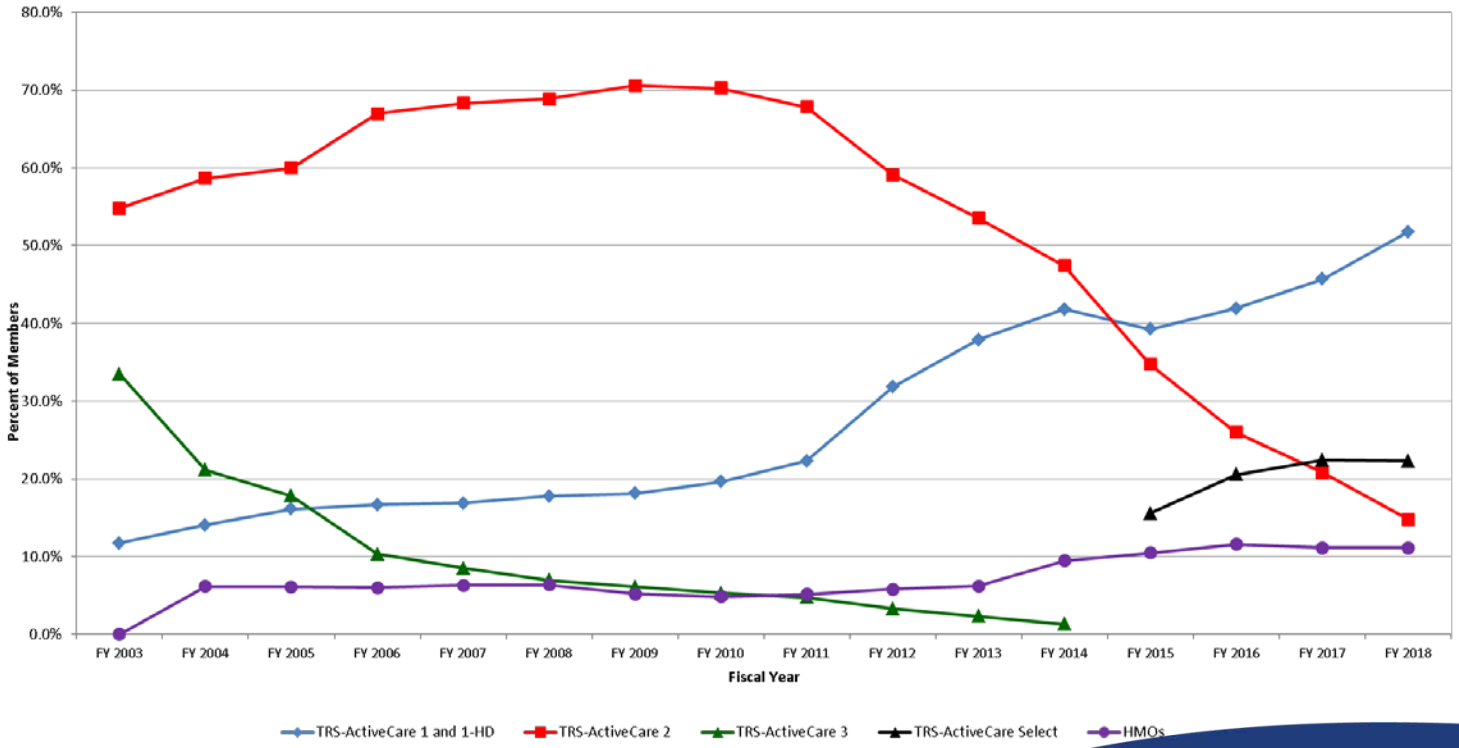
TRS-ActiveCare Participation



Fiscal Year	Average Membership	Percent Change
2010	380,688	10.5%
2011	417,784	9.7%
2012	444,263	6.3%
2013	445,920	0.4%
2014	421,303	-5.5%
2015	427,598	1.5%
2016	426,974	-0.1%
2017	442,077	3.5%
2018	441,309	-0.2%

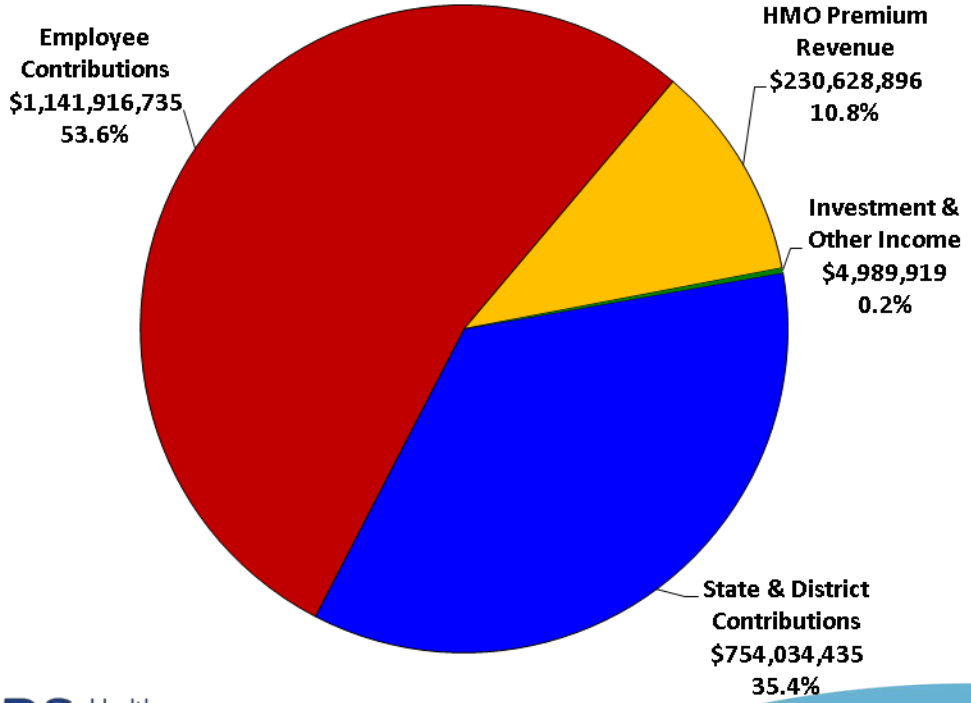
GRS Health & Welfare

TRS-ActiveCare Participation



GRS Health & Welfare

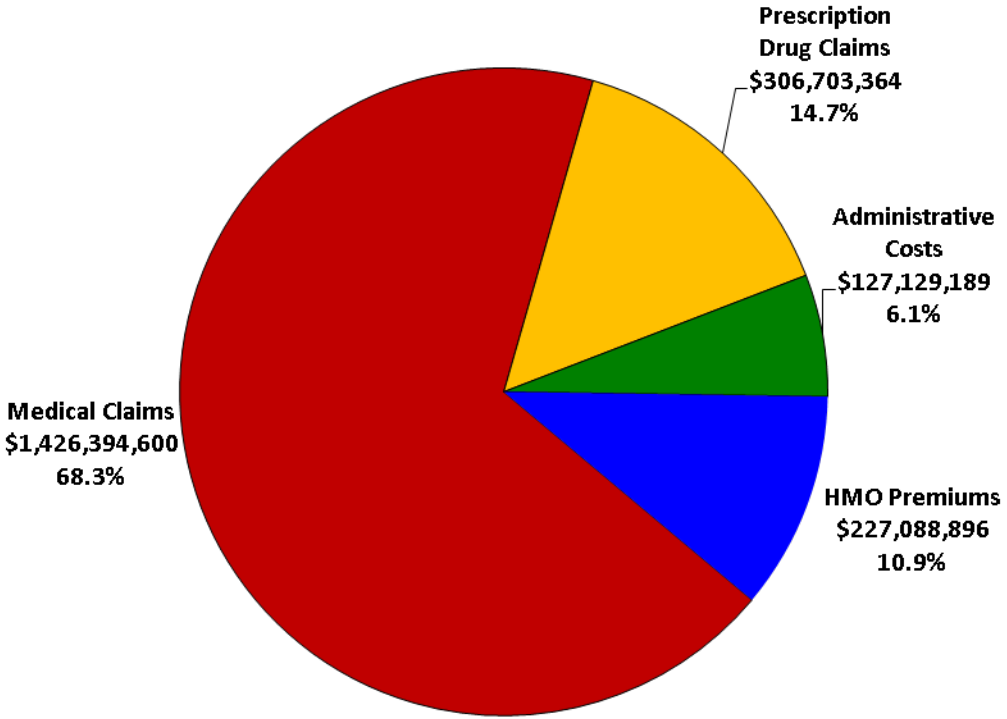
FY2017 TRS-ActiveCare Revenue



- $1.9 billion was provided by multiple funding sources for the TRS-ActiveCare plans.
- State and District Contributions are based on a fixed dollar amount per employee per month.

GRS Health & Welfare

FY2017 TRS-ActiveCare Expenditures



- $1.73 billion in claims were paid on behalf of TRS-ActiveCare plan participants.
- Medical and pharmacy claims accounted for 93.2% of TRS-ActiveCare plan expenses during FY2017.
- Administration fees paid to both the health plan administrator and the PBM accounted for 6.8% of expenses for the self-funded plans.

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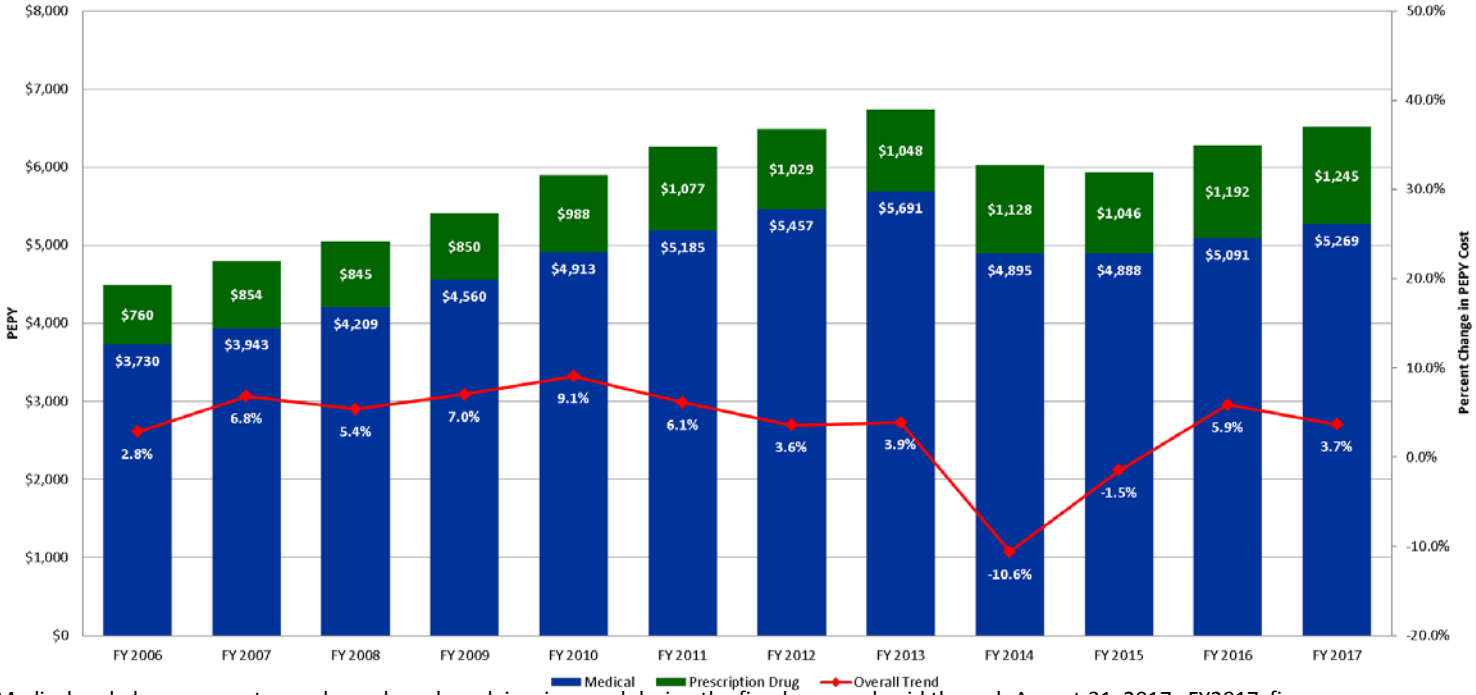
TRS-ActiveCare Claims Cost



Medical and pharmacy costs are shown based on claims incurred during the fiscal year and paid through August 31, 2017. FY2017 figures include an estimate of IBNR. Prescription drug claims are net of pharmaceutical rebates.

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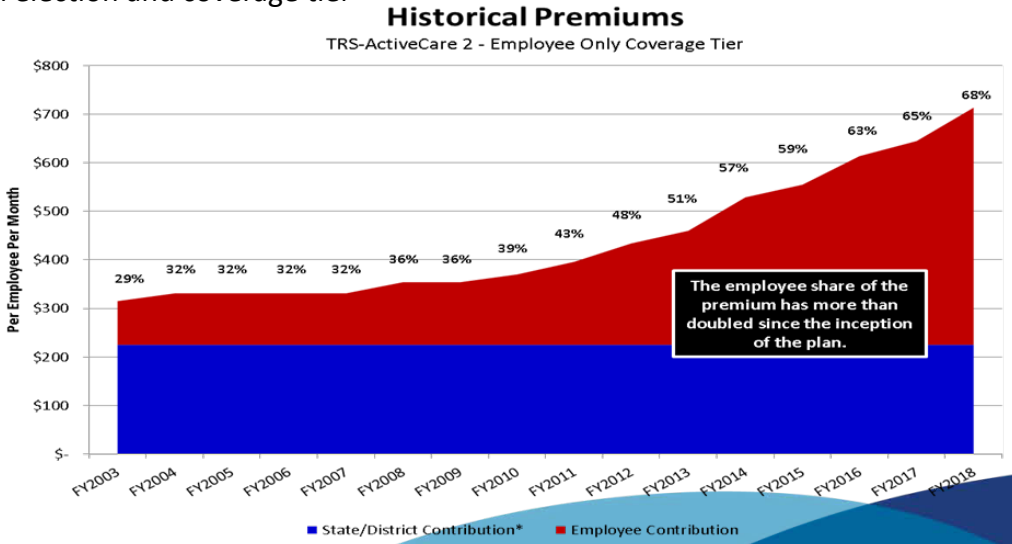
TRS-ActiveCare Funding

- State & District Contributions
  - The State contributes $75 per employee per month through school finance formulas
  - Districts are required to contribute at least $150 per employee per month but may contribute more
  - Funding requirements have not changed since program inception in 2002
- Employee Contributions
  - Vary by plan election and coverage tier



*Assumes a $75 state and $150 minimum district contribution per month toward the cost of coverage.

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Cost Drivers

- Increase in the number of participating entities
- Increases in medical cost of services
- Increases in prescription drug costs
- Maintaining access and choice in managing providers
- Advances in technology for medical testing/equipment
- Development of new specialty and biogenetic drugs
- State and District contributions are not linked to industry trend
- Potential adverse selection due to the availability of public exchanges
- Federal and state legislation

GRS Health & Welfare

TAB 16

ENGAGING AND PREPARING TRS-CARE PARTICIPANTS FOR THE 2018 HEALTH PLAN CHANGES

Katrina Daniel, Chief Health Care Officer
December 15, 2017

PREPARING FOR 2018

Significant changes to the 2018 TRS-Care health plans required a major education initiative to inform participants of the changes and the impact.

A multi-channel campaign was conducted incorporating:

- Direct mail
- Social/digital media
- In-person information sessions

CHANNEL BREAKOUT

3.93 MILLION TOUCHPOINTS

15 TOUCHPOINTS PER PARTICIPANT

DIRECT MAIL

OVER 1.2M MEDICARE

- TRS Announcement Letter
- TRS-Care Medicare Advantage Information Kits
- Medicare Advantage Provider Directory Postcards
- Plan Change Letter
- Express Scripts Medicare Termination Letter
- Medicare Rx Welcome Kit and ID Cards
  Medicare Advantage Welcome Kit and ID Cards

400K NON-MEDICARE

- TRS Announcement Letter
- CVS Welcome Letter and ID Cards
- TRS-Care Standard Plan Guide
- TRS-Care Standard Medical & Rx ID Cards

OVER 1.6M ENTIRE POP.

- *TRS News* with Announcement of Health Plan Changes
- 2018 TRS-Care Health Plan Changes Flyer
- Invitations for Retiree Information Sessions
- Invitations for Rescheduled Houston Retiree Information Sessions
- Annual Net Change Pay Letter
- *TRS News* with Reminders about Health Plan Changes

EMAIL

350K EMAILS

- Monthly issues of *The Pulse* enewsletter
- *TRS News* in August and December

IN-PERSON

45.3k RSVPS

35.6k ATTENDEES

Information Sessions:

- 40 cities
- 90 meetings
- Plus 20 TRTA district meetings

WEBINARS

10.5K RSVPS

7k ATTENDEES

20 webinars

- 10 Medicare
- 10 non-Medicare

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WEBSITE VISITS

MEDICARE AND NON-MEDICARE ANNOUNCEMENT WEB PAGES

310k

VISITS JUNE THROUGH MID-NOVEMBER

ANNOUNCEMENT WEB PAGES

130k

VISITS DURING JUNE LAUNCH ALONE

80%

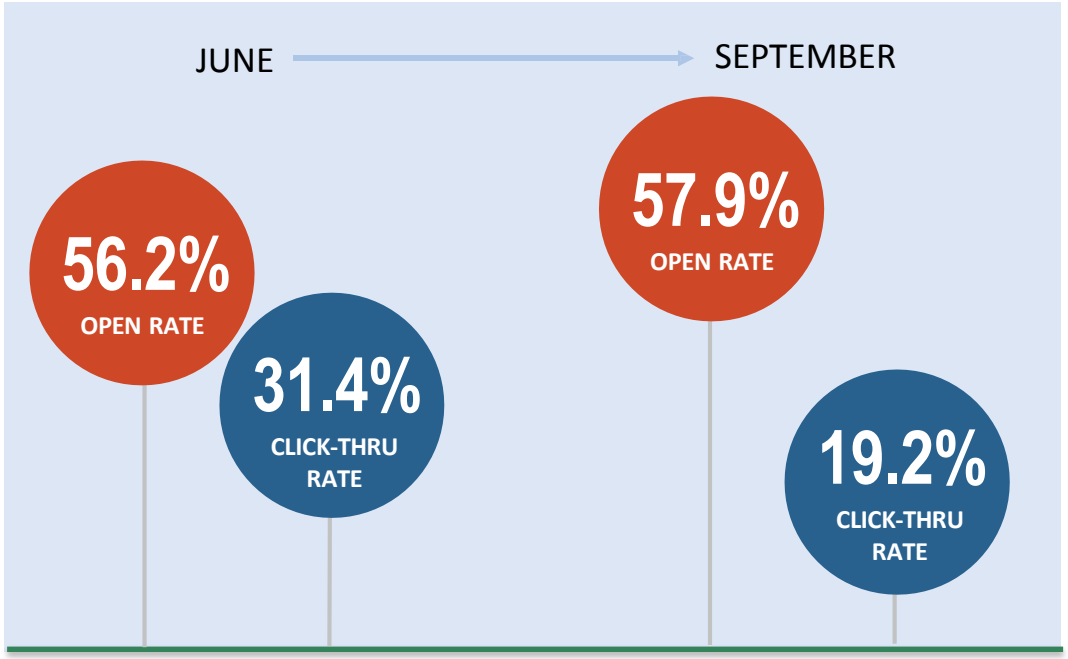
OF ALL HOMEPAGE VISITS THAT MONTH

Our participant outreach via social media and e-newsletters significantly increased traffic to the Health Care Benefits section of the TRS website.

TRS

SUCCESS OF *THE PULSE*

STEADY INCREASE IN NUMBER OF PULSE RECIPIENTS

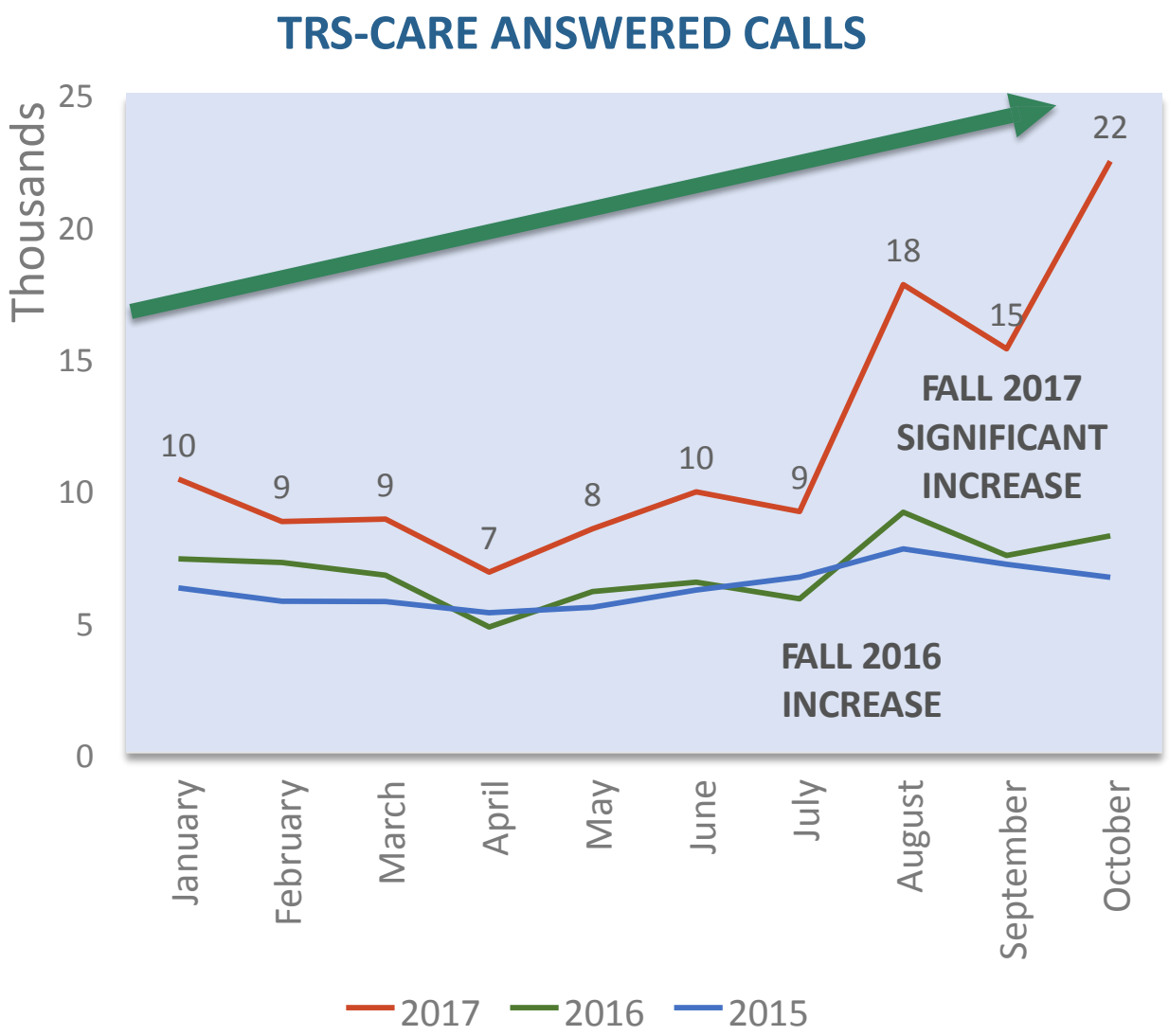


Above Average Results
(25% more than industry standard)

STABLE OPEN RATE & HIGH CLICK-THRU RATE WHEN PLAN CHANGES WERE ANNOUNCED

Each edition of *The Pulse,* TRS-Care's new "opt-in" email newsletter, was sent to **over 43,000 subscribers each month and read by more than half** — a high rate of engagement from a population typically hesitant to embrace digital outreach.

ANSWERING THE CALL



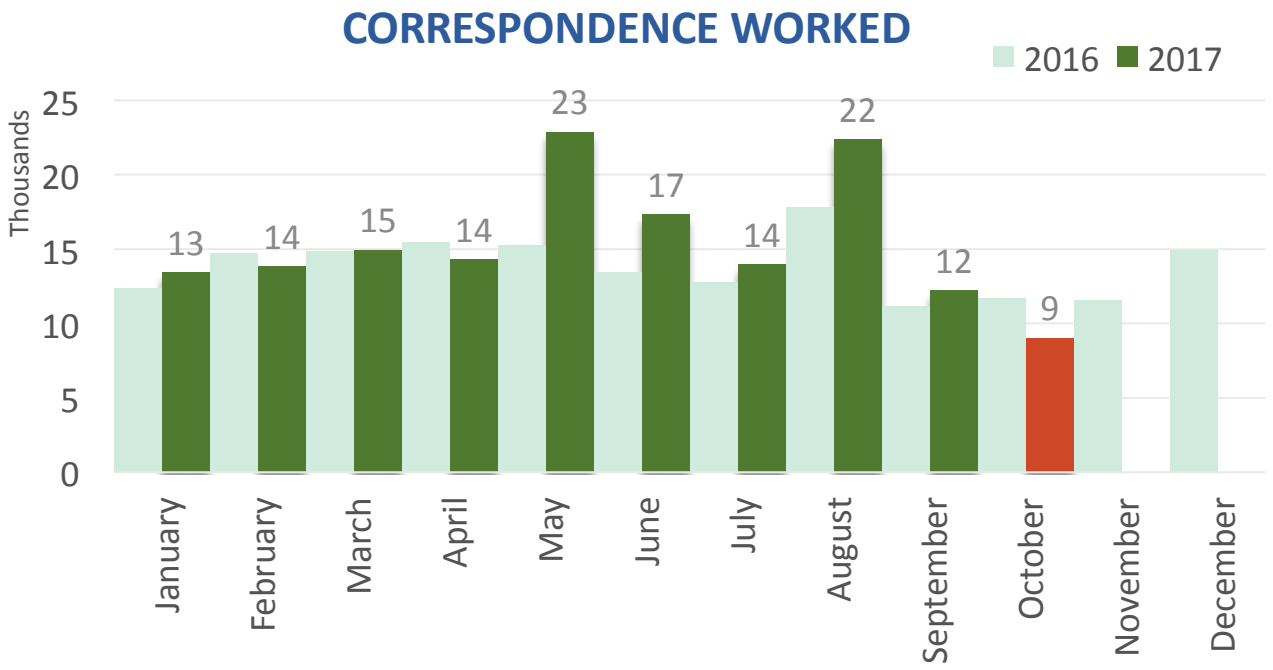
We educated participants about changes to their health plan, and they contacted TRS in record numbers.

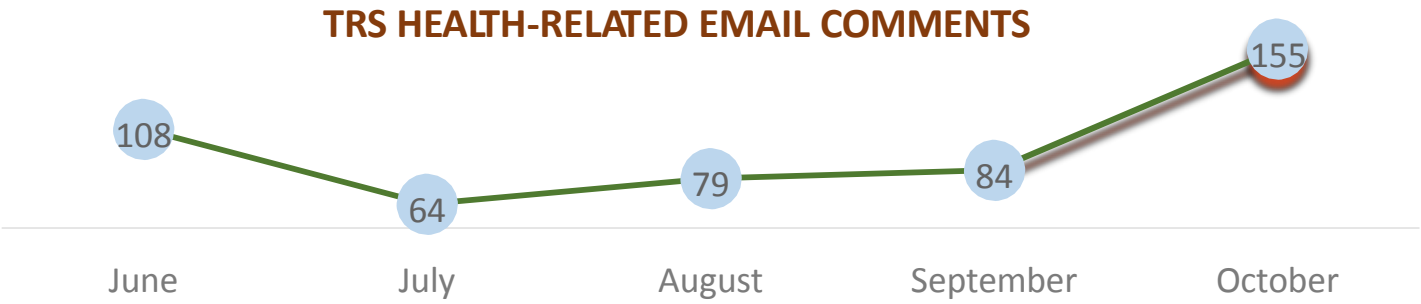
We saw unprecedented engagement among TRS-Care participants.

RESPONDING ALL WAYS

The call peak in October was accompanied by a decrease in the amount of correspondence HIB could work.

Participants reached out more via email during this time as well.



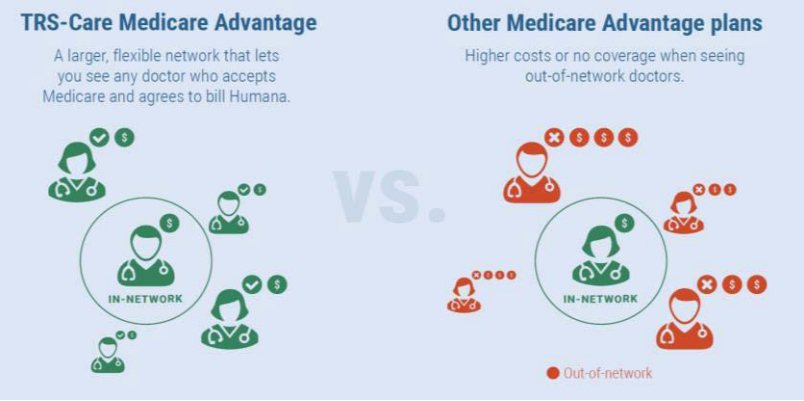


SUPPORTING INFORMED DECISIONS

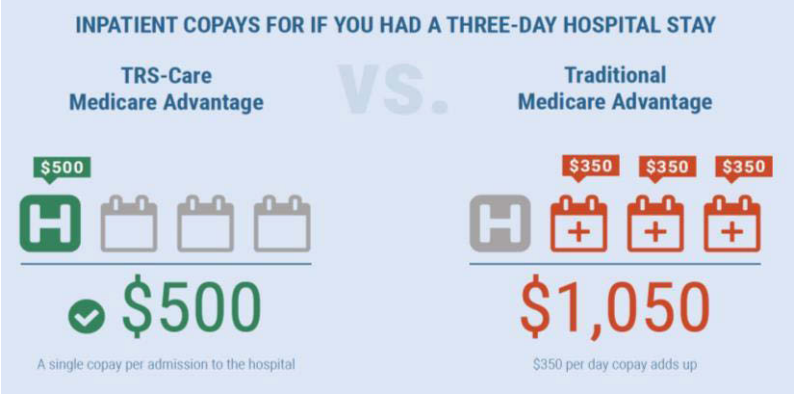
I'm thinking of leaving TRS-Care Medicare Advantage for an individual plan that costs less each month. What do I need to know?

TRS developed information including a checklist that was distributed at sessions and online along with social media and email campaigns to educate participants about the richness of their benefits and the rules about re-entering the program.

Flexibility to go out of network.



Low, predictable copays.



Rich drug coverage with no gaps.

CONTINUING TO ENGAGE AFTER JANUARY

THREE ENGAGEMENT GOALS SHAPING OUR LONG-TERM STRATEGY

1

ensuring participants understand how their benefits work

how to get maximum value

2

ensuring they understand the actual cost of the health service they receive

therefore the value their health plan brings

3

engaging targeted participants in health management programs

to achieve better health outcomes and reduce costs

TRS

TAB 17

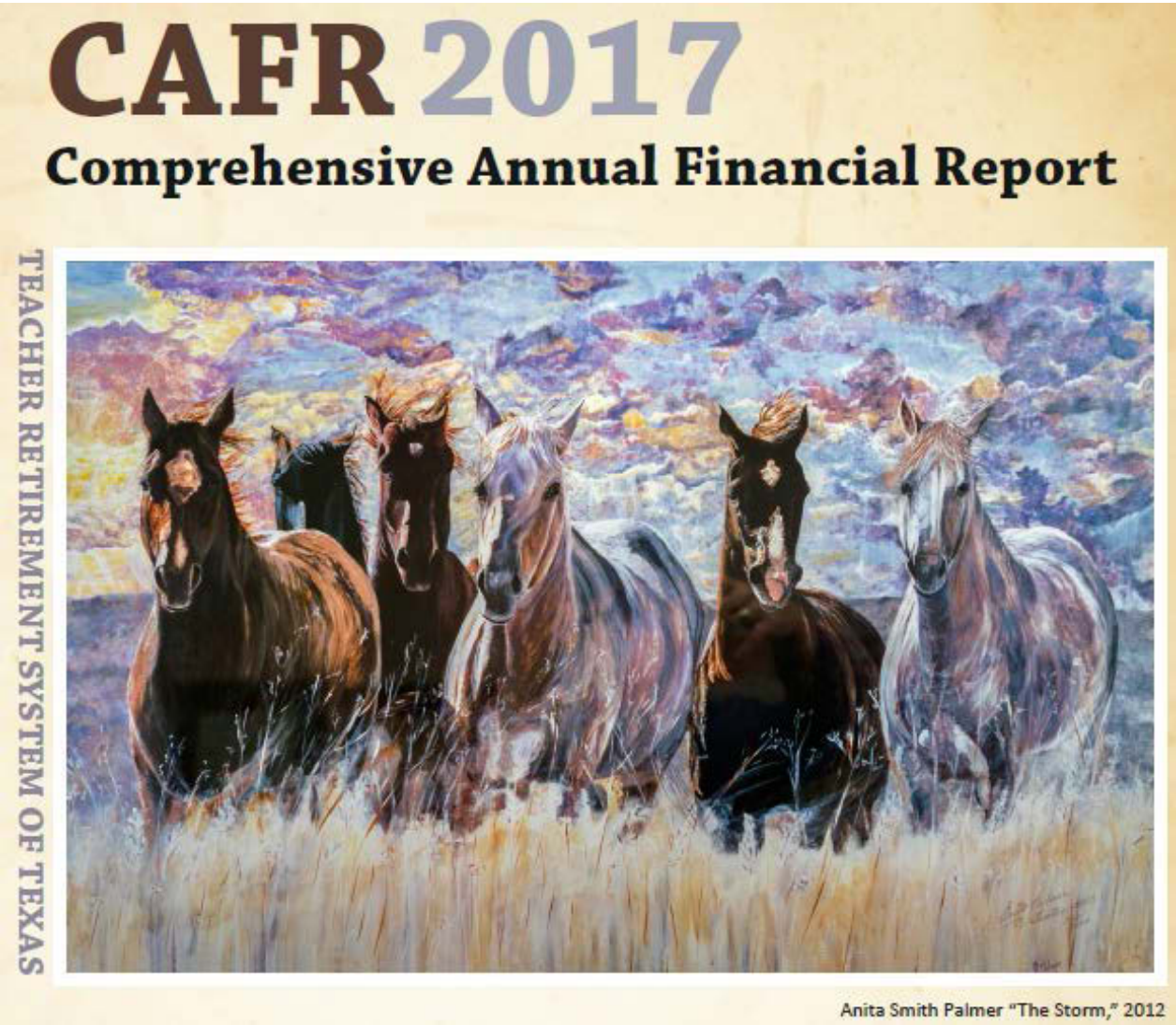
Comprehensive Annual Financial Report

Richard L Scheel, CPA and Cindy Haley, CPA

December 15, 2017

TRS
TEACHER RETIREMENT SYSTEM OF TEXAS

2017 Comprehensive Annual Financial Report



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2017 Comprehensive Annual Financial Report

From TRS, with fondness and gratitude, we dedicate the FY 2017 TRS Comprehensive Annual Financial Report to former TRS Trustee, Anita Smith Palmer, featuring her beautiful artwork.

Anita Smith Palmer of Jacksboro represented retired Texas teachers as a TRS trustee from September 2011 until her death in January of 2017. She was a community volunteer and retired educator with 30 years teaching and administrative experience, including 12 years of service in the Wichita Falls ISD. Anita was also a published author and a truly gifted artist. She was a Special Selected Member of Women Artists of the West, the National Association of Oil and Acrylic Painters, and the American Association of Equine Artists. Anita served as director of the Faith Community Hospital Foundation of Jacksboro and was an active member of The Parish of Jacksboro. Anita was an honorary life member of the National Parent Teacher Association, past district president of the Texas Retired Teachers Association (TRTA), and a former member of TRTA's State Retirement Education Committee. Anita held eight state teaching certifications and served as an adjunct professor at Midwestern State University. She earned bachelor's and master's degrees in education from Southwestern Oklahoma State University.

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2017 Comprehensive Annual Financial Report

Anita Smith Palmer "Me Too," 2006

TRS

2017 Comprehensive Annual Financial Report

Financial Highlights

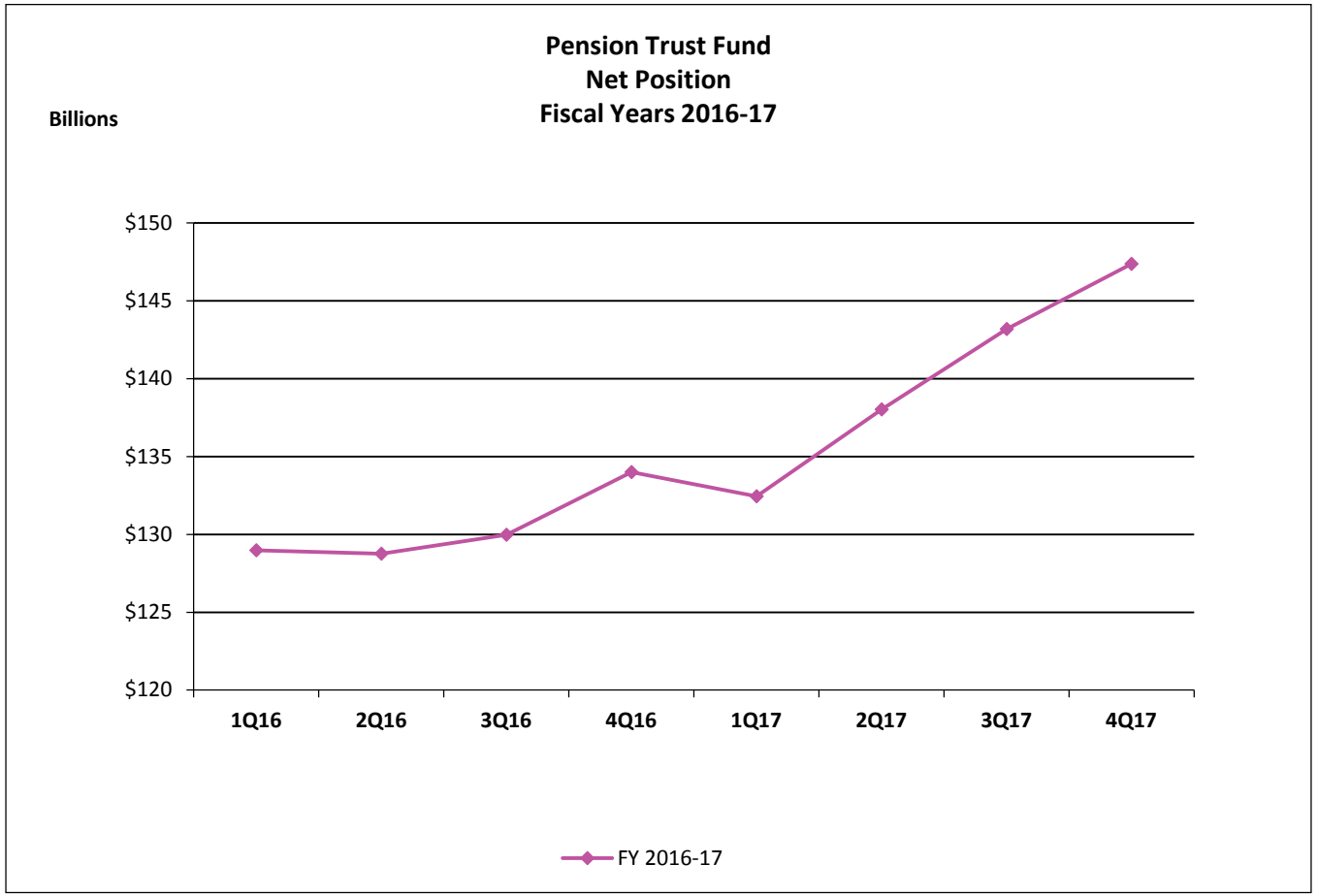
PENSION TRUST FUND

(billions)

Net Position - September 1, 2016	**$**	**134.0**
Additions:		
Member Contributions		3.2
State Contributions		3.3
(As Non-employer Contributor $1.7B; as Employer $1.6B)		
Investment Income		17.1
Other		0.1
Deductions:		
Retirement Benefits and Other		(9.9)
Refunds of Contributions and Admin. Exps.		(0.4)
Net Position - August 31, 2017	**$**	**147.4**
Administrative Cost per Member		$28.60
Investment Cost per Member (in basis points 16.0)		$141.17
Membership		
Current Members (Average Age 44.5)		1,137,289
Retirees and Beneficiaries		407,768
Total Membership		1,545,057
Participating Employers		1,325

TRS

2017 Comprehensive Annual Financial Report



TRS

2017 Comprehensive Annual Financial Report

Financial Highlights

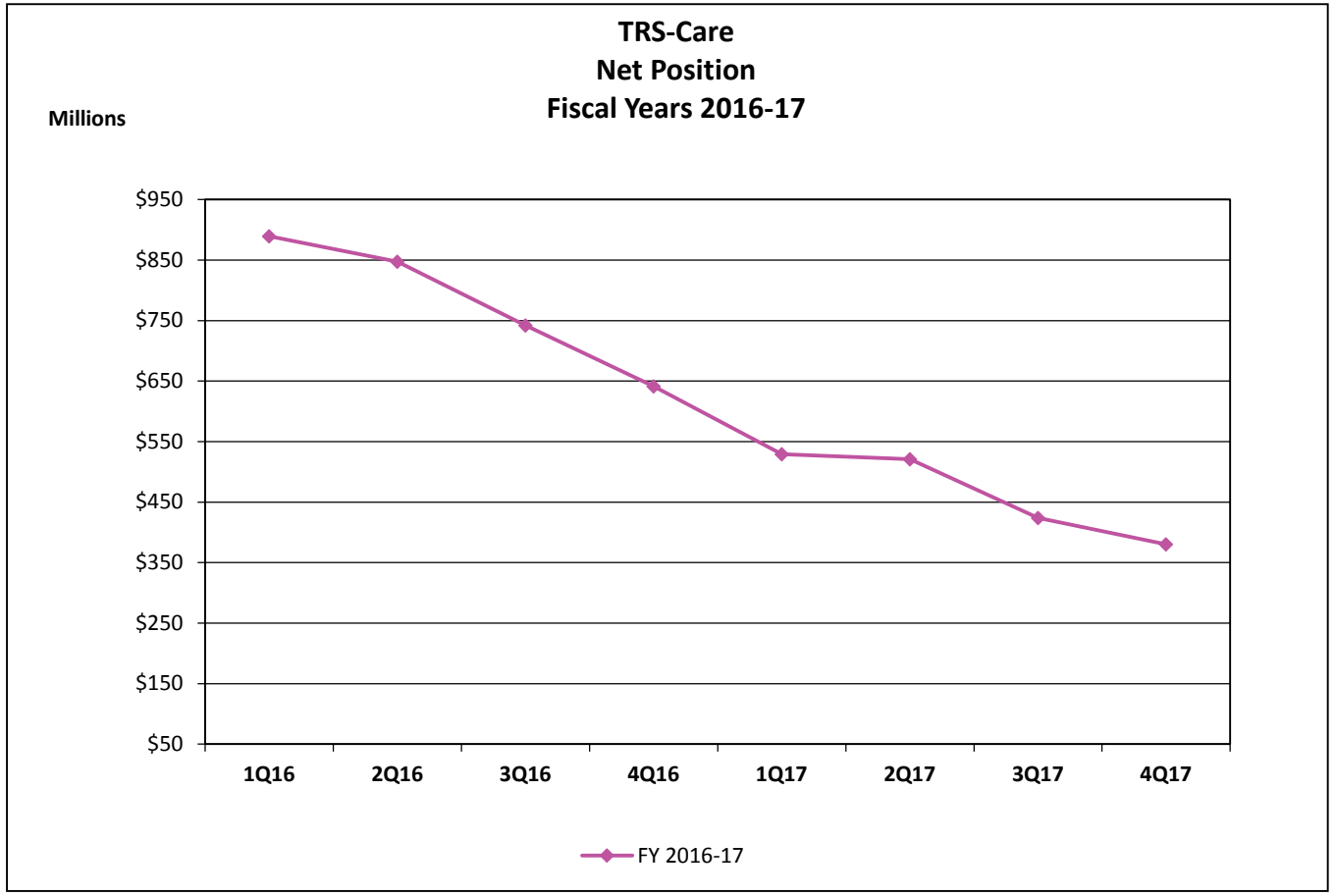
HEALTH BENEFIT PROGRAMS

(millions)

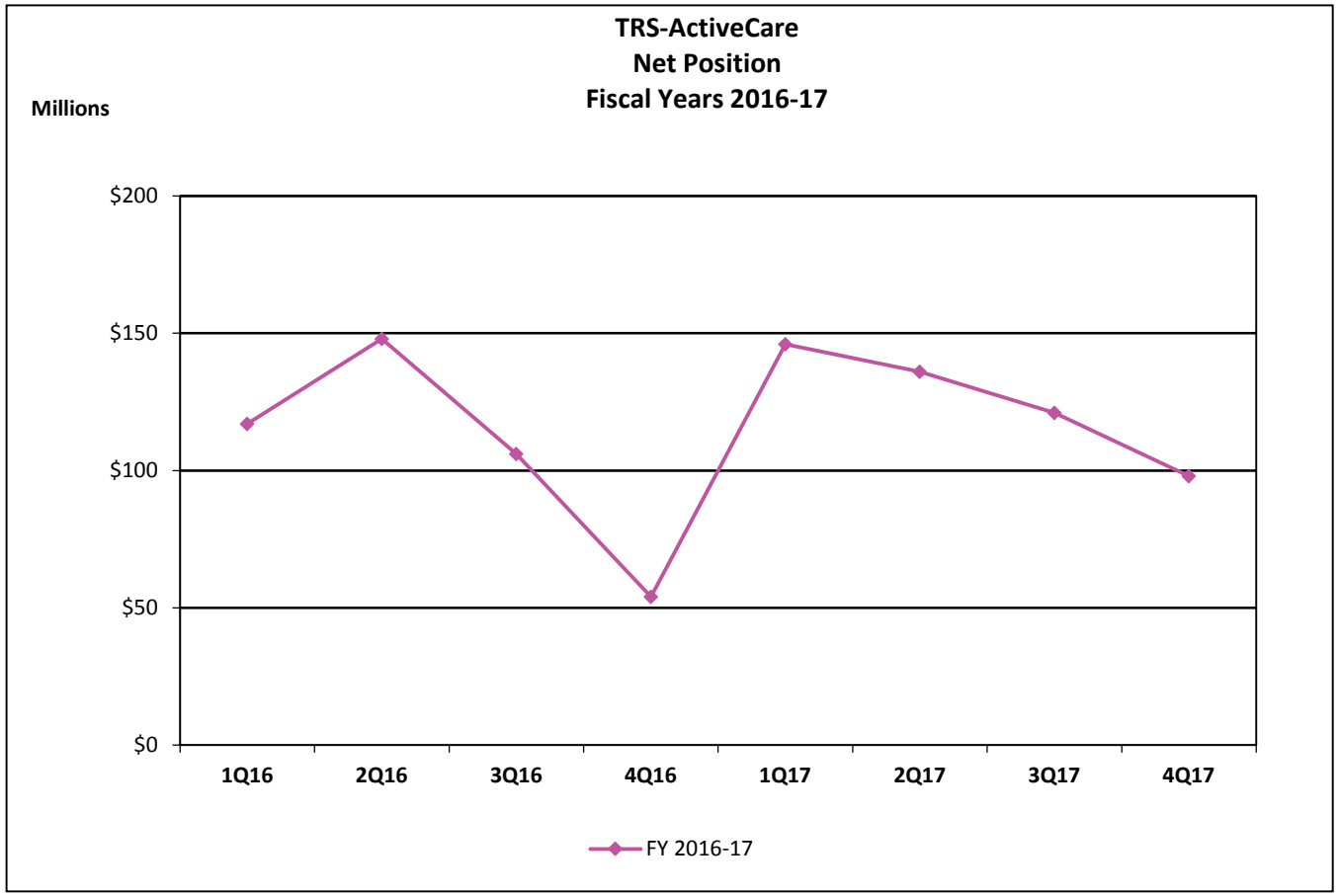
	TRS-Care	ActiveCare
Net Position - September 1, 2016	**$ 641.5**	**$ 53.6**
Additions:		
Member Contributions	213.2	
Non-Employer Contributing Entity Contributions	303.8	
Participating Entity Contributions	215.4	
Health Care Premiums		2,240.0
Rebates and Discount Income	291.7	
Federal Revenue	101.7	
Supplemental Appropriation	15.6	
Investment Income/Other	5.2	4.9
Deductions:		
Medical and Rx Claims	(1,274.9)	(1,846.5)
Claims Processing, Premiums, Fees and Admin. Expenses	(113.7)	(354.2)
Net Position - August 31, 2017	**$ 399.5**	**$ 97.8**
Membership (and dependents)	268,427	492,317

TRS

2017 Comprehensive Annual Financial Report



2017 Comprehensive Annual Financial Report



GASB 74

- GASB 74 is a major change in how state and local governments report on Other Post Employment Benefits (OPEB) and replaces GASB 43
  - Traditionally OPEB reporting focused on the funding or financing of OPEB.
  - GASB 74 focuses on point in time liability for the OPEB unfunded liability
- GASB 74 mirrors the pension standards and financial statement users familiar with the Pension changes will see similar terminology and reporting requirements applied to OPEB.

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TAB 18

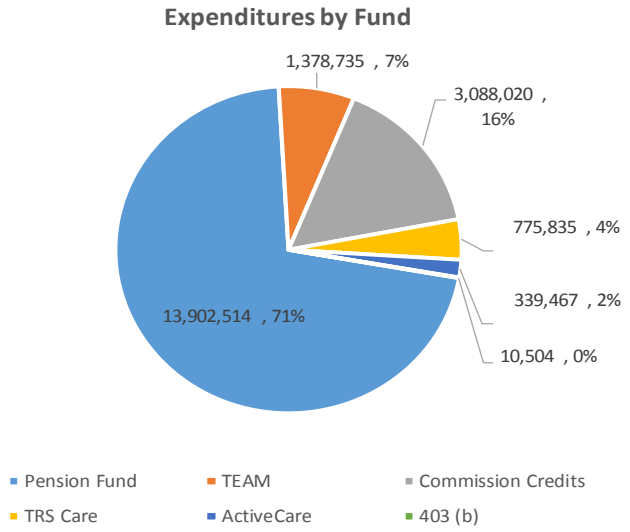
Current Financial Review

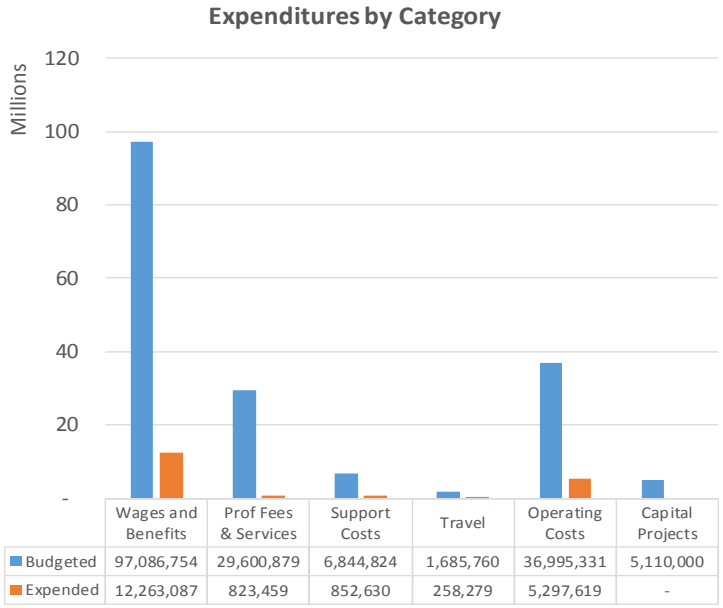
Don Green, Chief Financial Officer

December 15, 2017

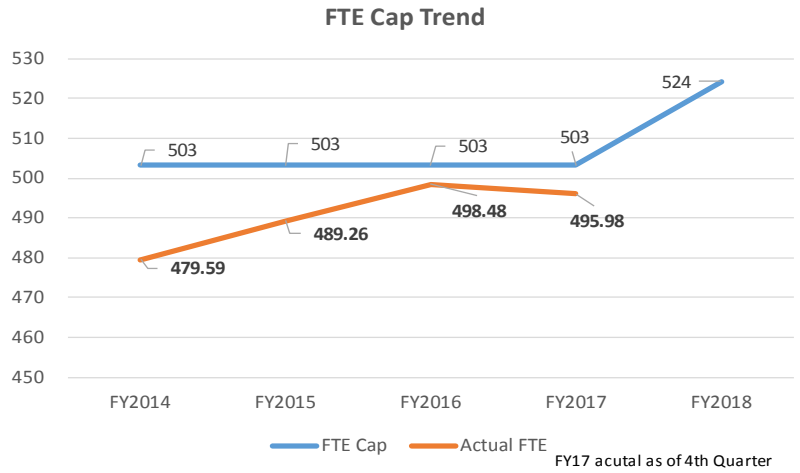
TRS
TEACHER RETIREMENT SYSTEM OF TEXAS

TRS Financial Status as of 10/31/17 (17%)

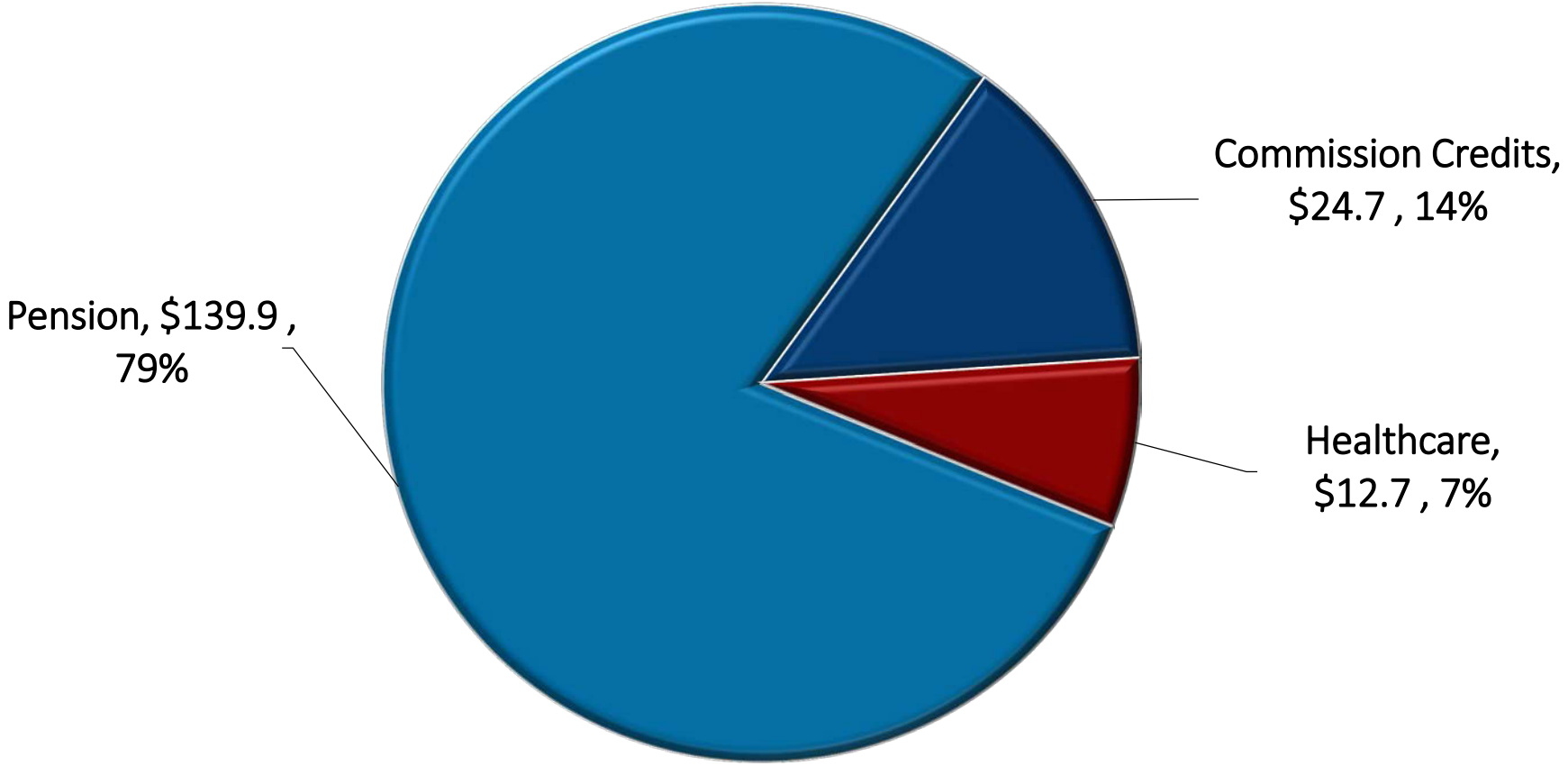




Expenditures by Division	Budgeted	Expended	% Spent	FTE Status Budgeted	FTE Status Actual
Support Division	22,208,171	2,283,837	10.3%	74.5	67.0
IMD	43,855,085	4,708,367	10.7%	143.0	141.0
London Office	2,350,672	256,400	10.9%	3.0	3.0
Comission Credits	23,932,365	3,067,204	12.8%	0.0	0.0
Benefits Services Division	12,161,665	1,639,259	13.5%	161.5	143.5
Financial Division	15,239,740	1,607,526	10.5%	64.3	62.9
IT Division	23,832,623	3,260,949	13.7%	78.0	74.0
TEAM	21,679,860	1,607,049	7.4%	78.0	74.0
Interns	409,000	24,319	5.9%	0.0	0.0
TRS Care	7,164,477	690,193	9.6%	48.0	45.0
ActiveCare	4,097,690	339,467	8.3%	26.0	26.0
403(b)	392,200	10,504	2.7%	1.0	1.0
Total Expenses	**177,323,548**	**19,495,074**	**11.0%**	**677.3**	**637.4**



FY 2018 Budget by Fund



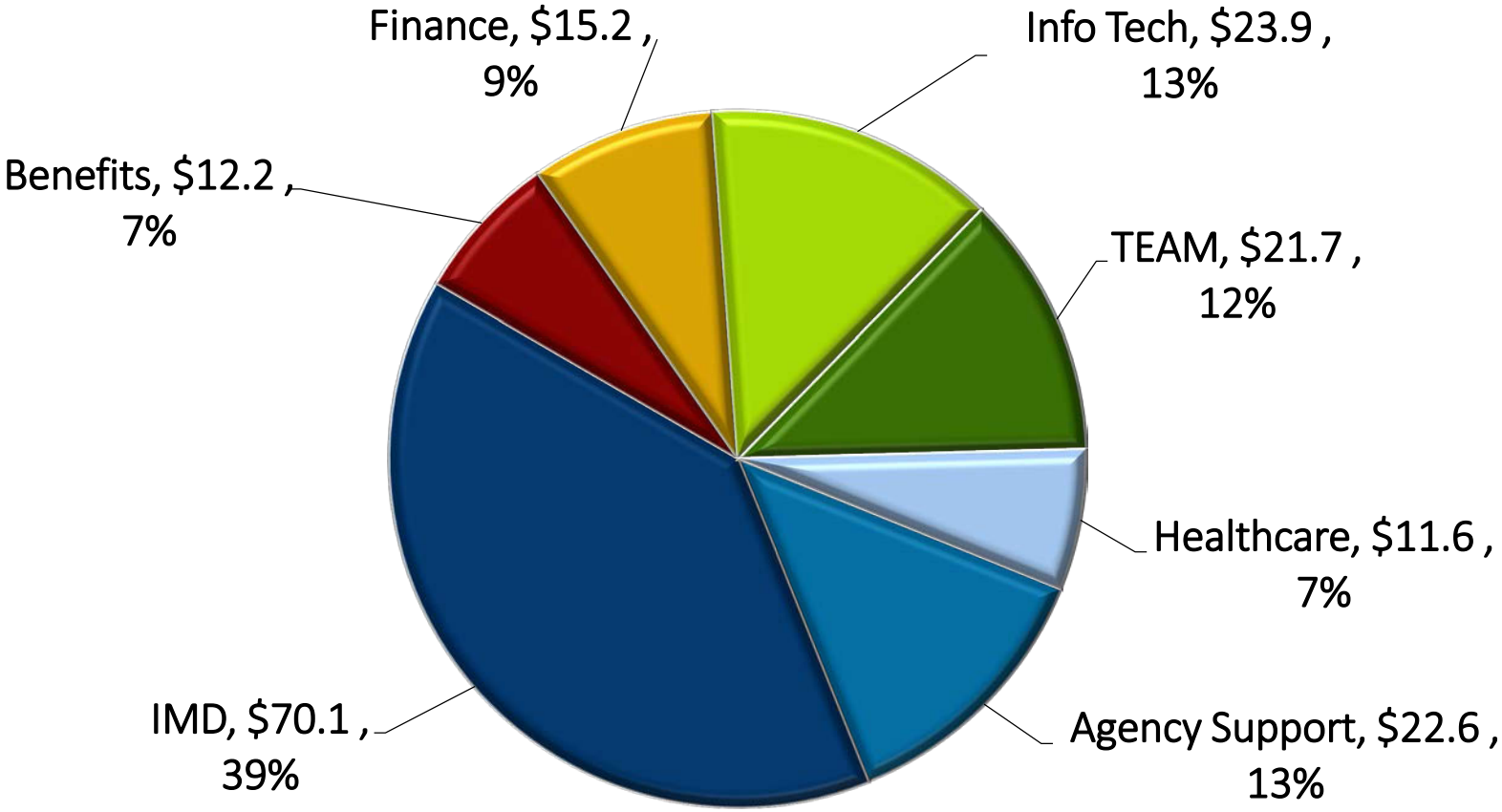
The total operating budget is $177,323,548 across all funds. Label amounts in millions.

Summary By Fund

Fund	Budget	Expended	% Spent
Pension	121,791,256	13,902,514	11%
TEAM	18,111,930	1,378,735	8%
Commission Credits	24,672,365	3,088,020	13%
Care	8,258,107	775,835	9%
ActiveCare	4,097,690	339,467	8%
403(b)	392,200	10,504	3%
Total	**177,323,548**	**19,495,074**	**11%**

TRS

FY 2018 Budget by Division



The Agency Support Division includes Executive, Organizational Excellence, Communications, Internal Audit, Strategy Office, Risk Management and Legal. Label amounts in millions.

Summary By Category

Category	Budget	Expended	% Spent
Wages/Benefits	97,086,754	12,263,087	13%
Pro Fees and Services	29,600,879	823,459	3%
Support Costs	6,844,824	852,630	13%
Travel	1,685,760	258,279	25%
Capital Projects	5,110,000	0	0%
Operating Costs	36,995,331	5,297,619	14%
Totals	**177,323,548**	**19,495,074**	**11%**

TRS

Capital Budget (non TEAM)

Item	Budget	Expended	% Spent
Building Renovations	2,000,000	-	0%
Data Center Upgrade	420,000	-	0%
Investment Systems Modernization	370,000	-	0%
Network Infrastructure	450,000	-	0%
PC Workstation Refresh	370,000	-	0%
Telephone Counseling Ctr System Upgrade	1,500,000	-	0%
Totals	**5,110,000**	**0**	**0%**

TRS

Significant Budget Issues

Two months into FY 2018, the lapse rate is approximately 6% of the budget.

Statutory rule changes made during the 85th Legislative Session will create additional cost to the Line of Business (LOB) within TEAM.

The East Building Remodel Project budget will be revised as the scope of the project changes due to:

- incorporating security changes in the lobby
- adding additional fire suppression
- embracing the open design concept

We expect to operate within existing budget authority as provided by the Board.

TRS