AGENDA

DALLAS POLICE & FIRE PENSION SYSTEM

Date: March 8, 2019

The regular meeting of the Dallas Police and Fire Pension System Board of Trustees will be held at **8:30 a.m. on Thursday, March 14, 2019, in the Second Floor Board Room at 4100 Harry Hines Boulevard, Dallas, Texas.** Items of the following agenda will be presented to the Board:

A. MOMENT OF SILENCE

B. CONSENT AGENDA

1. Approval of Minutes

Regular meeting of February 14, 2019

2. Approval of Refunds of Contributions for the Month of February 2019

3. **Approval of Estate Settlements**

4. **Approval of Survivor Benefits**

5. **Approval of Service Retirements**

6. **Approval of Alternate Payee Benefits**

C. DISCUSSION AND POSSIBLE ACTION REGARDING ITEMS FOR INDIVIDUAL CONSIDERATION

1. **Chairman's Discussion Items**

   a. USERRA contributions from the City of Dallas
   b. Mayoral Trustee Vacancy

2. **Investment Advisory Committee**

   Portions of the discussion under this topic may be closed to the public under the terms of Section 551.074 of the Texas Government Code.

   a. Possible Investment Policy Statement Amendment
   b. Possible New Member Appointment

3. **Fourth Quarter 2018 Investment Performance Analysis and Third Quarter 2018 Private Markets & Real Assets Review**

4. **Securities Lending**

5. **AIRRO Update and Potential Funding**

6. **Lone Star Investment Advisor Funds**

   Portions of the discussion under this topic may be closed to the public under the terms of Section 551.071 of the Texas Government Code.

7. **Portfolio Update**

8. **Real Estate Overview - AEW Portfolio**

   Portions of the discussion under this topic may be closed to the public under the terms of Section 551.072 of the Texas Government Code.

9. **Real Estate Manager Discretion**

10. **Legislative Update**

11. **Legal issues - In accordance with Section 551.071 of the Texas Government Code, the Board will meet in executive session to seek and receive the advice of its attorneys about pending or contemplated litigation, including potential lawsuits involving collection of overpayments, USERRA contributions owed by the City of Dallas or any other legal matter in which the duty of the attorneys to DPFP and the Board under the Texas Disciplinary Rules of Professional Conduct clearly conflicts with Texas Open Meeting laws, including discussion about interpretation of Section 6.13 of Article 6243a-1 and Section 551.143 of the Texas Open Meetings Act.**

12. **Correction of Errors in Benefit Payments Policy**

13. **Pension Obligation Bond Research**

14. **Monthly Contribution Report**

15. **Board approval of Trustee education and travel**

    a. Future Education and Business-related Travel
    b. Future Investment-related Travel

D. BRIEFING ITEMS

1. Reports and concerns of active members and pensioners of the Dallas Police and Fire Pension System

2. Executive Director's report

a. Associations' newsletters
- NCPERS PERSist (Winter 2019)

b. Open Records

c. City Payroll Issues Update

The term "possible action" in the wording of any Agenda item contained herein serves as notice that the Board may, as permitted by the Texas Government Code, Section 551, in its discretion, dispose of any item by any action in the following non-exclusive list: approval, disapproval, deferral, table, take no action, and receive and file. At the discretion of the Board, items on this agenda may be considered at times other than in the order indicated in this agenda.

At any point during the consideration of the above items, the Board may go into Closed Executive Session as per Texas Government Code, Section 551.071 for consultation with attorneys, Section 551.072 for real estate matters, Section 551.074 for personnel matters, and Section 551.078 for review of medical records.

DALLAS POLICE & FIRE PENSION SYSTEM

MOMENT OF SILENCE

In memory of our Members and Pensioners who recently passed away

NAME	ACTIVE/ RETIRED	DEPARTMENT	DATE OF DEATH
M. D. Reinertson	Retired	Fire	Feb. 5, 2019
E. H. Dudley	Retired	Fire	Feb. 15, 2019
Kennith W. Epley	Retired	Fire	Feb. 15, 2019
L. M. Hester	Retired	Fire	Feb. 15, 2019
William L. Brown, Jr.	Retired	Police	Feb. 22, 2019

Dallas Police and Fire Pension System
Thursday, February 14, 2019
8:30 a.m.
4100 Harry Hines Blvd., Suite 100
Second Floor Board Room
Dallas, TX

Regular meeting, William F. Quinn, Chairman, presiding:

ROLL CALL

Board Members

Present at 8:30 a.m.	William F. Quinn, Nicholas A. Merrick, Samuel L. Friar, Blaine Dickens (by phone), Gilbert A. Garcia, Tina Hernandez Patterson, Robert C. Walters, Joseph P. Schutz, Kneeland Youngblood (by phone)
Present at 8:33 a.m.	Ray Nixon
Absent:	Frederick E. Rowe
Staff	Kelly Gottschalk, Josh Mond, Kent Custer, Brenda Barnes, John Holt, Damion Hervey, Cynthia Thomas, Ryan Wagner, Greg Irlbeck, Milissa Romero
Others	Leandro Festino, Aaron Lally, Bohdy Hedgcock, Travis Stevens, Ben Mesches, David Harper, David Elliston, James Parnell, Rick Salinas, Richard Kresse, Jerry M. Rhodes, Zaman Hemani

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The meeting was called to order at 8:30 a.m.

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A. MOMENT OF SILENCE

The Board observed a moment of silence in memory of retired police officers J. J. Hunter, James H. Colwell, Wayne B. Posey, and retired firefighters Jerry R. Boren, J. W. Goodgion, Steven K. Burgess, Winfred D. Parr, Charles C. Blaylock, Donald L. Lindsey.

No motion was made.

Regular Board Meeting
Thursday, February 14, 2019

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B. CONSENT AGENDA

1. **Approval of Minutes**

   Regular meeting of January 10, 2019

2. **Approval of Refunds of Contributions for the Month of January 2019**

3. **Approval of Activity in the Deferred Retirement Option Plan (DROP) for February 2019**

4. **Approval of Estate Settlements**

5. **Approval of Survivor Benefits**

6. **Approval of Service Retirements**

7. **Approval of Alternate Payee Benefits**

8. **Approval of Payment of DROP Revocation Contributions**

After discussion, Mr. Garcia made a motion to approve the minutes of the meeting of January 10, 2019. Mr. Schutz seconded the motion, which was unanimously approved by the Board. Mr. Nixon, Ms. Hernandez Patterson and Mr. Walters were not present when the vote was taken.

After discussion, Mr. Garcia made a motion to approve the remaining items on the Consent Agenda, subject to the final approval of the staff. Mr. Walters seconded the motion, which was unanimously approved by the Board. Mr. Nixon was not present when the vote was taken.

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Regular Board Meeting
Thursday, February 14, 2019

C. DISCUSSION AND POSSIBLE ACTION REGARDING ITEMS FOR INDIVIDUAL CONSIDERATION

1. Monthly Contribution Report

Staff presented the Monthly Contribution Report.

No motion was made.

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2. Trustee Election Procedures

Section 3.01(f) of Article 6243a-1 requires that the Board adopt rules for the election of Trustees. During the January 2019 Board meeting, staff presented a draft Trustee Election Procedure. The Board asked that the draft procedure be sent to the Nominations Committee members for comment.

Staff provided an update of comments received prior to the Board meeting.

After discussion, Mr. Garcia made a motion to adopt the Trustee Election Procedures as amended. Mr. Walters seconded the motion, which was unanimously approved by the Board.

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3. Quarterly Financial Reports

The Chief Financial Officer presented the fourth quarter 2018 financial statements.

No motion was made.

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4. Correction of Errors in Benefit Payments Policy

Section 6.20(c) of Article 6243a-1 states that the Board may adopt procedures to enable the pension system to offset future benefits or other payments of a recipient to recover an overpayment. The correction procedure must comply with the Internal Revenue Service's Employee Plans Compliance Resolution System and Revenue Procedure (EPCRS).

Regular Board Meeting
Thursday, February 14, 2019

4. Correction of Errors in Benefit Payments Policy (continued)

After discussion, Ms. Hernandez-Patterson made a motion to adopt the Correction of Errors in Benefit Payments Policy as amended. Mr. Garcia seconded the motion, which was unanimously approved by the Board.

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5. Funding Policy

On January 24, 2019, the Texas Pension Review Board (PRB) adopted the Interim Study on Funding Policies for Fixed Rate Plans (Study). The Study states the following:

"A pension funding policy should be designed to guide retirement systems to full funding and to help them achieve the three goals. A funding policy also should include clear and concrete funding objectives, the actuarial methods to be used, and a pathway to achieve the stated funding goals. Additionally, the funding policy should outline how the plan will address setbacks that occur when experience diverges from actuarial assumptions or assumption changes result in losses."

"As a result of the study, the PRB recommends that all Texas public retirement systems, including fixed rate plans, adopt and maintain a written funding policy that fully funds the plan over as brief a period as possible, as recommended in the PRB Pension Funding Guidelines. The funding period should be a finite, or closed, period, and the funding policy should be established in conjunction with the plan sponsor if possible."

Staff discussed the Pension Review Board's Interim Study on Funding Policies for Fixed Rate Plans with the Board.

No motion was made.

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6. Chairman's Discussion Item - Review of meeting with the City about USERRA, hiring plan and payroll issues

The Chairman reviewed the meeting he had with the City about USERRA, the City's hiring plan and the City's payroll issues.

No motion was made.

Regular Board Meeting
Thursday, February 14, 2019

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7. Board approval of Trustee education and travel

a. Future Education and Business-related Travel
b. Future Investment-related Travel

The Board and staff discussed approval of future education and business-related travel. There was no future investment-related travel.

After discussion, Mr. Garcia made a motion to approve Mr. Friar's request to attend the NCPERS Annual Conference. Ms. Hernandez-Patterson seconded the motion, which was unanimously approved by the Board.

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8. Public Equity Structure Study

Leandro Festino, Managing Principal and Aaron Lally, Executive Vice President both with Meketa Investment Group and Kent Custer, DPFP Chief Investment Officer, discussed the public equity structure study.

Public equity asset classes represented 24% of the DPFP portfolio as of 1/31/19 (preliminary). This weighting is expected to double over the next three to four years to reach a target allocation of 50% (40% Global Equity and 10% Emerging Markets Equity) as private market assets are gradually redeployed.

The Board reviewed the equity structure study presented by staff and Meketa and directed staff and Meketa to review it with the Investment Advisory Committee.

No motion was made.

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Mr. Youngblood left the Board meeting at 10:08 a.m. (by telephone)

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9. Portfolio Update

Investment Staff briefed the Board on recent events and current developments with respect to the investment portfolio.

No motion was made.

Regular Board Meeting
Thursday, February 14, 2019

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10. Lone Star Investment Advisors Update

Investment Staff updated the Board on recent performance and operational developments with respect to DPFP investments in funds managed by Lone Star Investment Advisors.

No motion was made.

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11. Real Estate Overview – Clarion Partners Portfolio

Bohdy Hedgcock, Senior Vice President, and Travis Stevens, Senior Analyst with Clarion Partners updated the Board on the status and plans for DPFP's investments in CCH Lamar and The Tribute. Clarion was engaged in October 2015 to take over the investment management of DPFP's interest in several Dallas area real estate assets, including the two remaining investments.

The Board went into a closed session executive session - Real Estate issues at 10:51 a.m.

The meeting was reopened at 11:30 a.m.

No motion was made.

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12. Legal issues - In accordance with Section 551.071 of the Texas Government Code, the Board will meet in executive session to seek and receive the advice of its attorneys about interpretation of Section 6.13 of Article 6243a-1, pending or contemplated litigation, or any other legal matter in which the duty of the attorneys to DPFP and the Board under the Texas Disciplinary Rules of Professional Conduct clearly conflicts with Texas Open Meeting laws.

Ben Mesches and David Harper from Haynes and Boone, LLP were present for the legal discussion.

The Board went into closed session executive session – Legal issues at 11:30 a.m.

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Regular Board Meeting
Thursday, February 14, 2019

12. Legal issues - In accordance with Section 551.071 of the Texas Government Code, the Board will meet in executive session to seek and receive the advice of its attorneys about interpretation of Section 6.13 of Article 6243a-1, pending or contemplated litigation, or any other legal matter in which the duty of the attorneys to DPFP and the Board under the Texas Disciplinary Rules of Professional Conduct clearly conflicts with Texas Open Meeting laws. (continued)

Mr. Garcia and Mr. Walters left the Board meeting at 12:07 p.m.

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The meeting was reopened at 12:23 p.m.

No motion was made.

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D. BRIEFING ITEMS

1. Reports and concerns of active members and pensioners of the Dallas Police and Fire Pension System

The Board received members' comments during the open forum. No motion was made.

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2. Executive Director's report

a. Associations' newsletters
- NCPERS Monitor (January 2019)
- NCPERS Monitor (February 2019)

b. Open Records Requests
c. Staffing Update

The Executive Director's report was presented. No motion was made.

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Regular Board Meeting
Thursday, February 14, 2019

Ms. Gottschalk stated that there was no further business to come before the Board. On a motion by Mr. Nixon and a second by Mr. Friar, the meeting was adjourned at 12:24 p.m.

_____
William F. Quinn
Chairman

ATTEST:

_____
Kelly Gottschalk
Secretary

DALLAS POLICE & FIRE PENSION SYSTEM

DISCUSSION SHEET

ITEM #C1

Topic: **Chairman's Discussion Items**

a. USERRA contributions from the City of Dallas
b. Mayoral Trustee Vacancy

Discussion: The Chairman will brief the Board on the status of these items.

DISCUSSION SHEET

ITEM #C2

Topic: **Investment Advisory Committee**

Portions of the discussion under this topic may be closed to the public under the terms of Section 551.074 of the Texas Government Code.

a. Possible Investment Policy Statement Amendment
b. Possible New Member Appointment

Discussion:

a. The requirements in the Investment Policy Statement regarding meetings of the Investment Advisory Committee (IAC) do not address the number of outside members who must attend meetings. Staff will discuss with the Board a possible amendment of the Investment Policy Statement to provide for the requirement that a majority of outside members be present at any meeting of the IAC and that the Board be advised of how each IAC member voted on any vote for any action reported to the Board by the IAC.

b. One of the appointed IAC members is no longer able to serve on the committee. The Board may discuss possible candidates to serve on the IAC.

Staff Recommendation: **Approve** the Investment Policy Statement as amended.

4. Appoints members to the Investment Advisory Committee (IAC);
5. Reviews investment related expenses;
6. Approves Board travel related to investments; and
7. Reviews the IPS annually and revises as needed.

B. Investment Advisory Committee (IAC)

1. IAC Composition, Selection and Criteria
   a. The requirement and general composition of the IAC is defined by statute.
   b. The IAC serves at the discretion of the Board of Trustees.
   c. IAC recommendations are not binding on the Board, provided however the Board may in the exercise of its fiduciary discretion grant decision-making authority to the IAC.
   d. The IAC is composed of up to six members including one or two current Board members and a majority of outside investment professionals.
   e. IAC members will serve two-year terms.
   f. The Board will appoint members of IAC members by vote.
   g. IAC meetings require a quorum of at least three IAC members, a majority of whom must not be current Trustees. Any vote by the IAC which is reported to the Board must also advise the Board as to how each member of the IAC voted who was present for such vote. IAC members shall be provided reasonable notice of upcoming meetings, but this shall not prevent the IAC from meeting on short notice for an urgent item requiring immediate attention.
   h. One IAC member who is also a member of the Board will function as Chair of the IAC. The Chair shall serve as liaison to the Board and preside over IAC meetings.
   i. The Board of Trustees may elect to dismiss a member of the IAC for any reason.
2. IAC Roles and Responsibilities:
   a. A key role of the IAC is to ensure that DPFP investments are prudently managed.
   b. The IAC will advise regarding the search and selection process for investment managers and other matters that the Board may request.
   c. All investment related agenda materials for the Board will be made available to the IAC.
   d. The IAC will meet as needed, but at least quarterly, to discuss the investment program and provide insight and recommendations to Staff and Consultant.
   e. The IAC Chair will report to the Board regarding IAC activity as well as investment-related concerns and recommendations.

DISCUSSION SHEET

ITEM #C3

Topic: **Fourth Quarter 2018 Investment Performance Analysis and Third Quarter 2018 Private Markets & Real Assets Review**

Attendees: Leandro Festino, Managing Principal – Meketa Investment Group

Discussion: Meketa and Investment Staff will review investment performance.

FUND EVALUATION REPORT

Dallas Police & Fire Pension System

Quarterly Review
As of December 31, 2018

Agenda

1. **Executive Summary**
2. **4Q18 Review**
3. **Disclaimer, Glossary, and Notes**

Executive Summary

DPFP 4Q18 Flash Summary

Category	Result	Notes
Total Fund Performance Return	**Negative**	-3.6%
Performance vs. Policy Index	**Outperformed**	-3.6% vs. -7.3% Policy Index
DPFP Public Markets vs. 60/40[1]	**Outperformed**	-6.5% vs. -7.6%
Asset Allocation vs. Targets	**Additive**	Underweight global equity and overweight real estate helped
Safety Reserve Exposure	**Sufficient**	$301 million (approximately 15%)
Performance vs. Peers	**Outperformed**	1st percentile in peer group in 4Q18[2]
Active Management	**Additive**	PE, Natural Resources and EM Equity
Compliance with Targets	**No**	Under Investment Grade Bond and EM Debt minimums[3]

[1] Performance of Total Fund excluding private market investments relative to a 60% MSCI ACWI IMI Net/40% Barclays Global Aggregate Index.
[2] InvestorForce Public DB $1-$5 billion net accounts.
[3] Investment Grade Bonds and Emerging Market Debt are below target minimums by design due to following the implementation plan approved by the Trustees.

DPFP Trailing One-Year Flash Summary

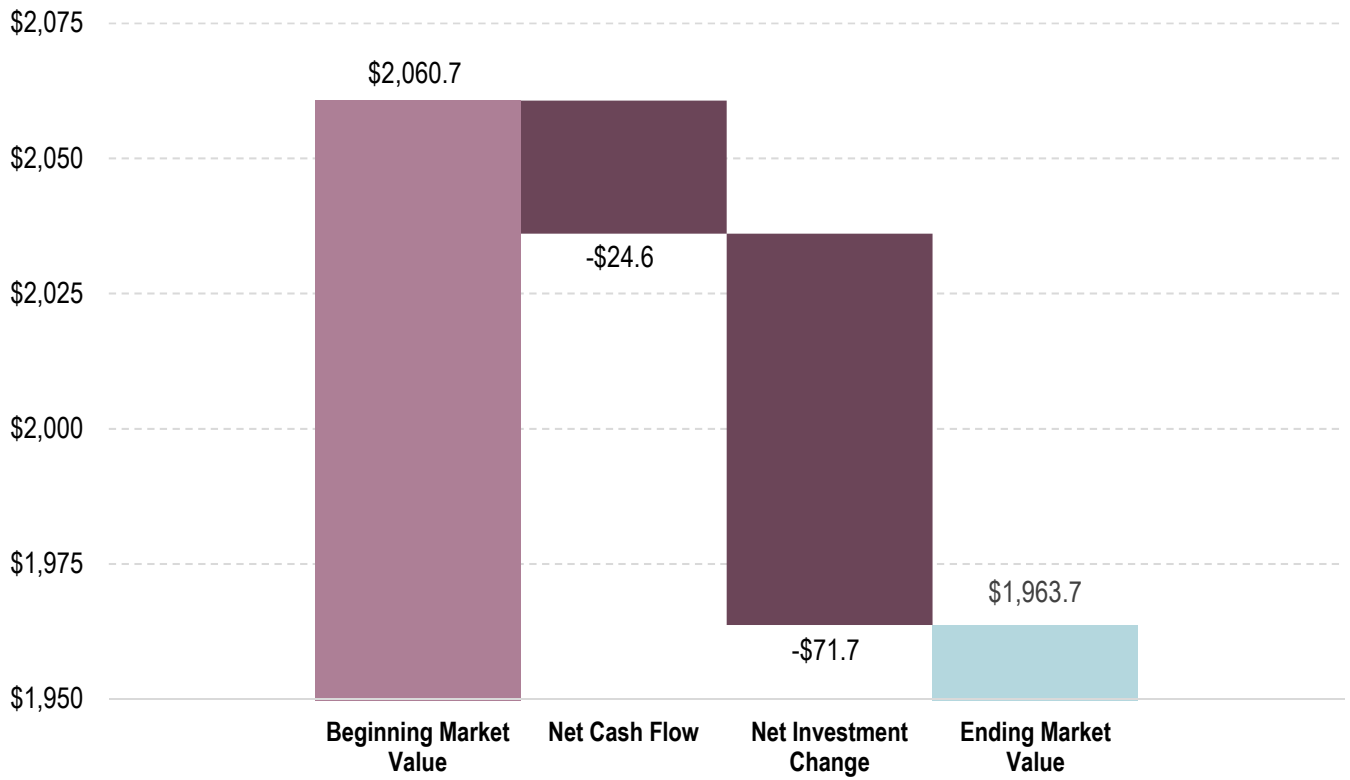
Category	Trailing 1 YR Result	1 YR Notes
Total Fund Performance Return	Negative	-1.5%
Asset Allocation vs. Targets	Additive	Underweight global equity and overweight RE helped
Performance vs. Policy Index	Outperformed	-1.5% vs. -5.3% Policy Index
Performance vs. Peers	Outperformed	2nd percentile in peer group[1]
Active Management	Additive	NR, RE, PE Positive Selection

DPFP Trailing Three-Year Flash Summary

Category	Trailing 3 YR Result	3 YR Notes
Total Fund Performance Return	Positive	+2.2%
Performance vs. Policy Index	Trailed	2.2% vs. 6.2% Policy Index
Performance vs. Peers	Trailed	99th percentile in peer group[1]
Active Management	Hurt	PE, NR, RE and PD Negative Selection

[1] InvestorForce Public DB $1-$5 billion net accounts.

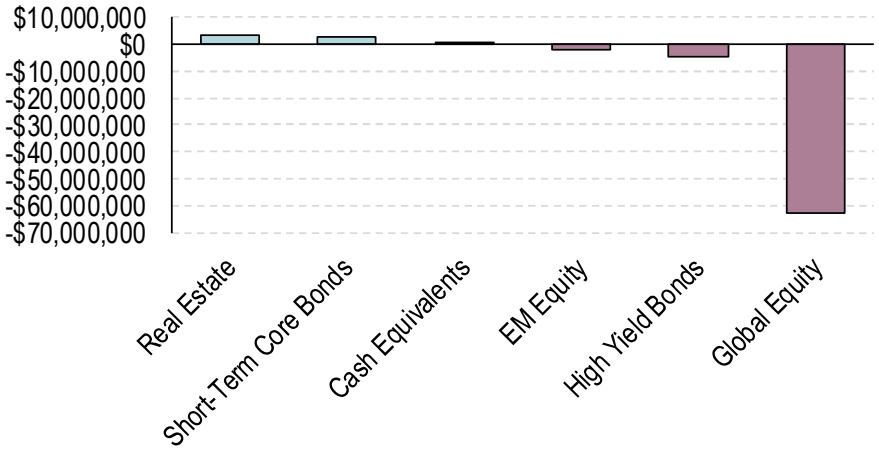
Quarterly Change in Market Value



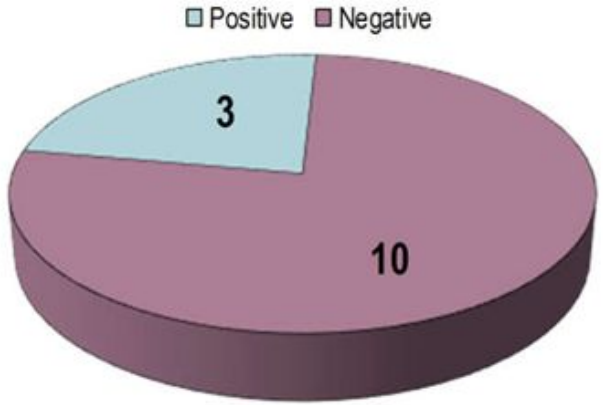
- Total market value decreased due to a combination of negative cash flows and negative investment performance.

Quarterly Absolute Performance

Asset Classes Dollar[1] Gain/Loss
Top Three and Bottom Three



Asset Class Absolute Performance

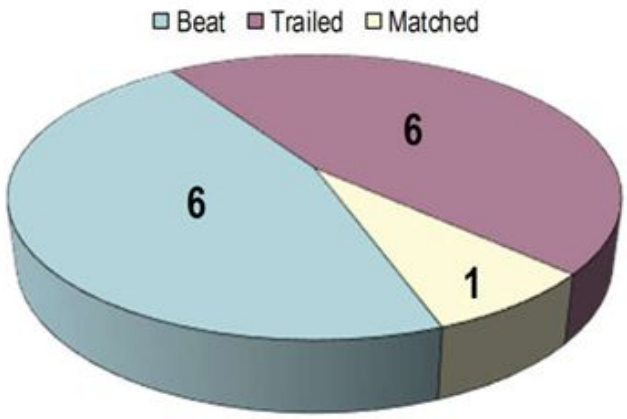


- In absolute terms, global equity depreciated the most during the quarter, losing $62.6 million in market value.
- Real estate, short-term bonds and cash had small increases in market value in the fourth quarter.
- In the quarter, ten out of thirteen asset classes generated negative absolute performance (approx. 77%).

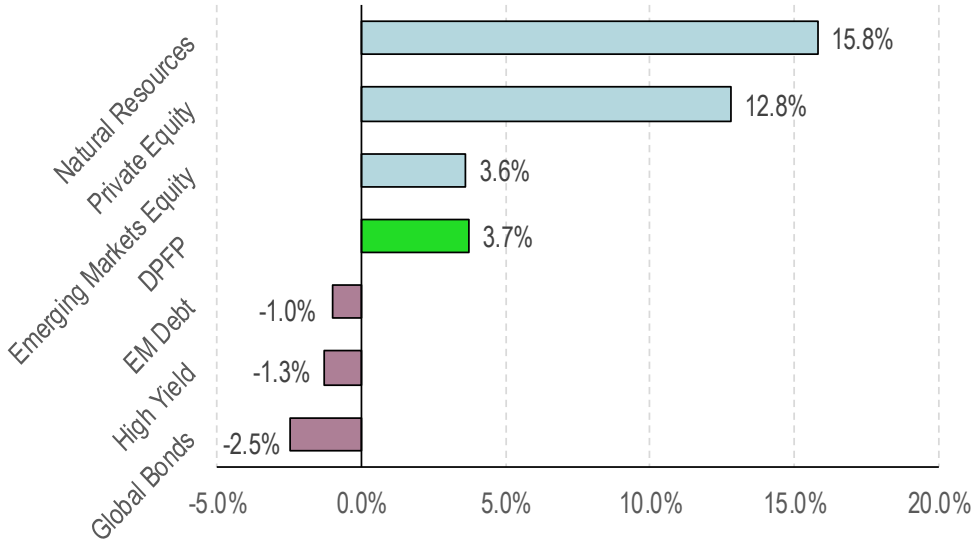
[1] Estimated gain/loss calculated by multiplying beginning market value by quarterly performance.

Quarterly Relative Performance

Asset Classes vs. Benchmarks



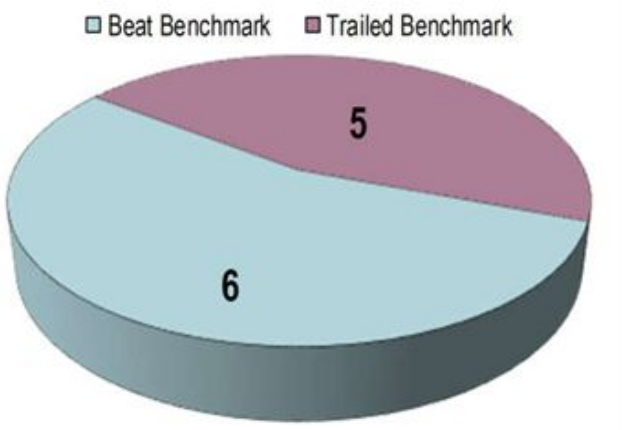
Top Three and Bottom Three Asset Classes vs. Benchmarks



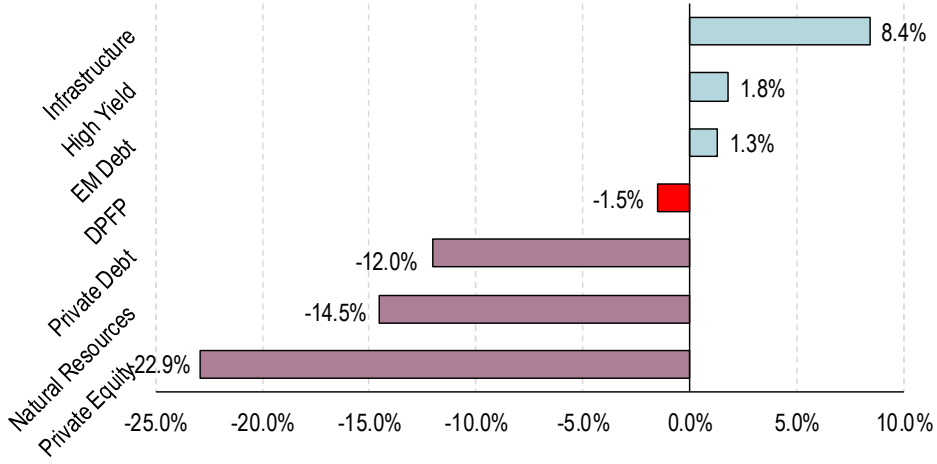
- In the quarter, the best relative performance came from natural resources, private equity and emerging market equities.
- Global bonds, high yield bonds and emerging market debt had the worst relative performance in the quarter.
- Six of the thirteen asset classes delivered positive relative performance versus respective benchmarks.

Trailing Three-Year Relative Performance

Asset Classes vs. Benchmarks



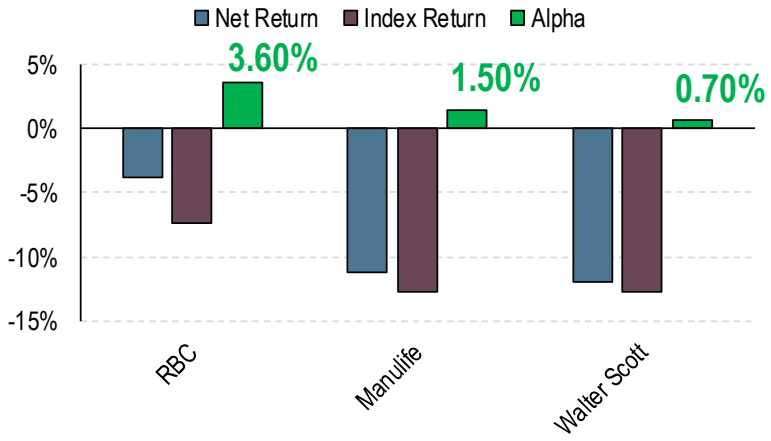
Top Three and Bottom Three Asset Classes vs. Benchmarks



- Six of the eleven asset classes with trailing three-year return history have delivered positive relative performance versus respective benchmarks.
- Over the trailing three-year period, the best relative performance came from infrastructure, high yield bonds and emerging market debt asset classes.
- Private equity, natural resources and private debt had the worst relative performance over the three-year trailing period.

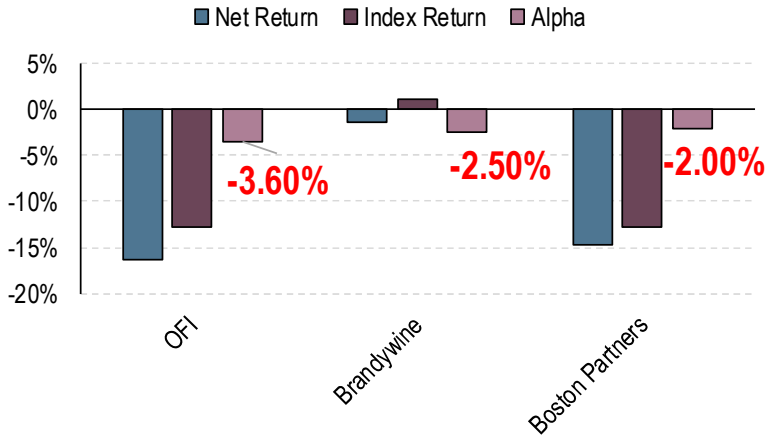
Public Manager Alpha

Top Three Outperformers in Quarter



$256 million combined exposure

Bottom Three Underperformers in Quarter

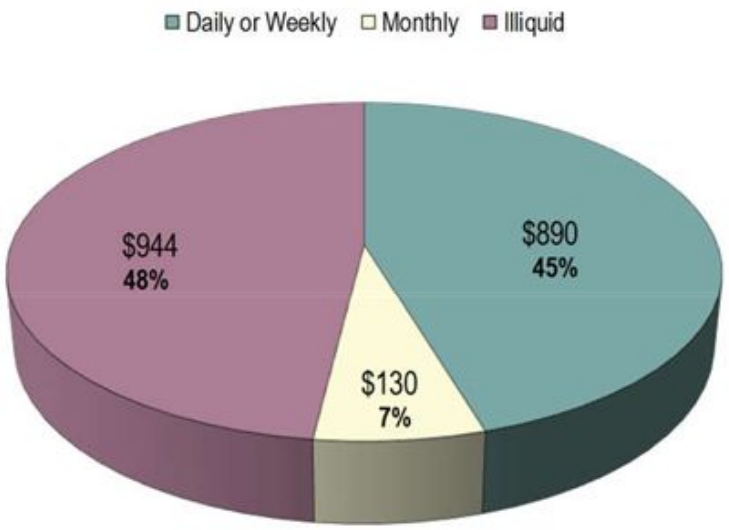


$253 million combined exposure

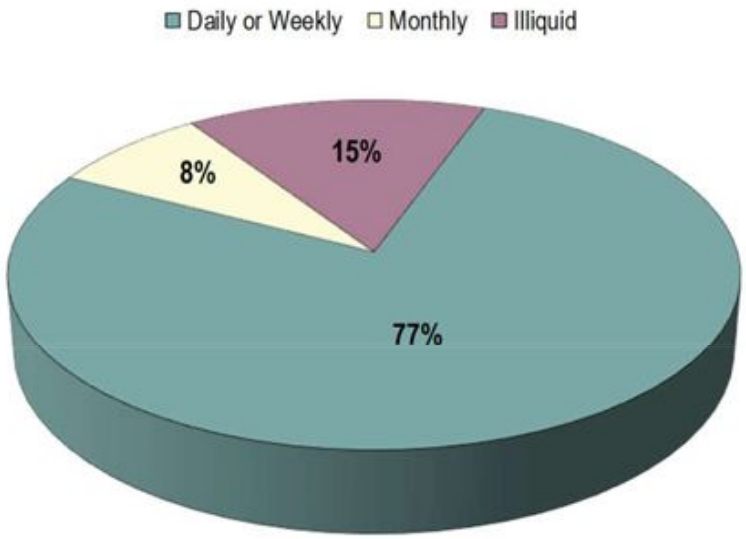
- 7 out of the 11 public markets managers underperformed their respective benchmarks in the quarter.

Liquidity Exposure
as of December 31, 2018

Exposure ($mm)



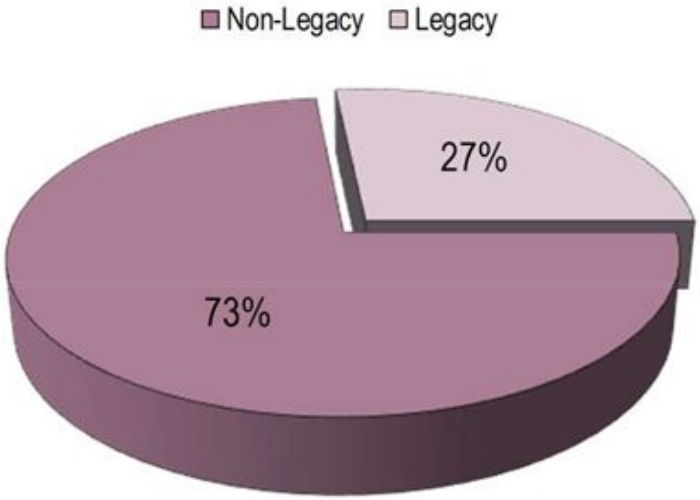
Targets

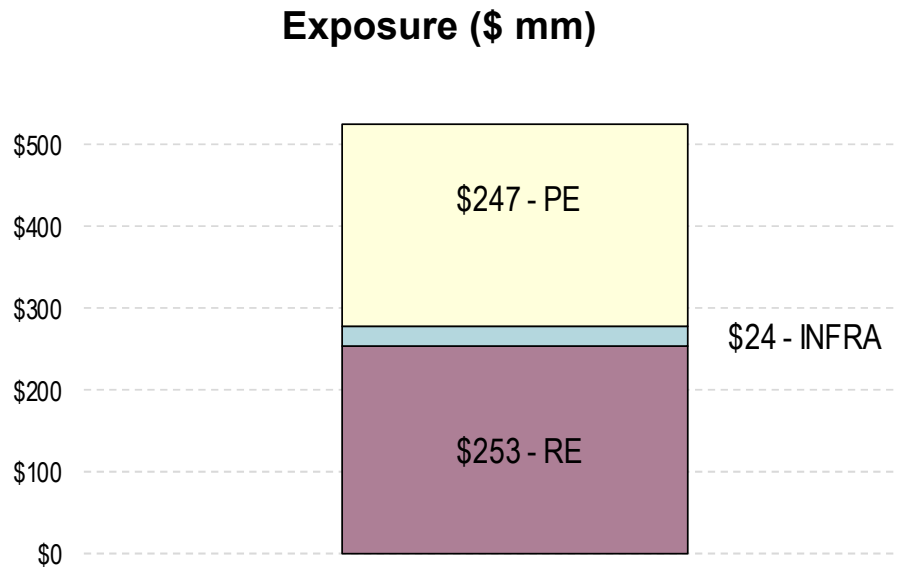


- Approximately 48% of the System's assets are illiquid versus 15% of the target allocation.

* Assets can be redeemed between monthly and annual basis often with gating, lock-ups or notice of more than 30 days required.

Legacy Assets



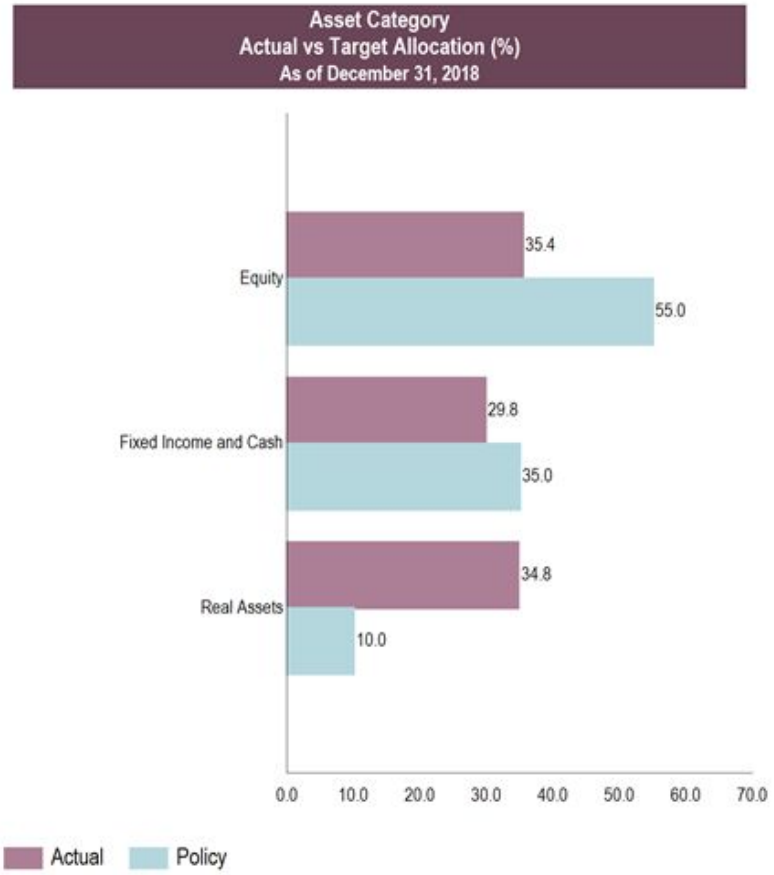


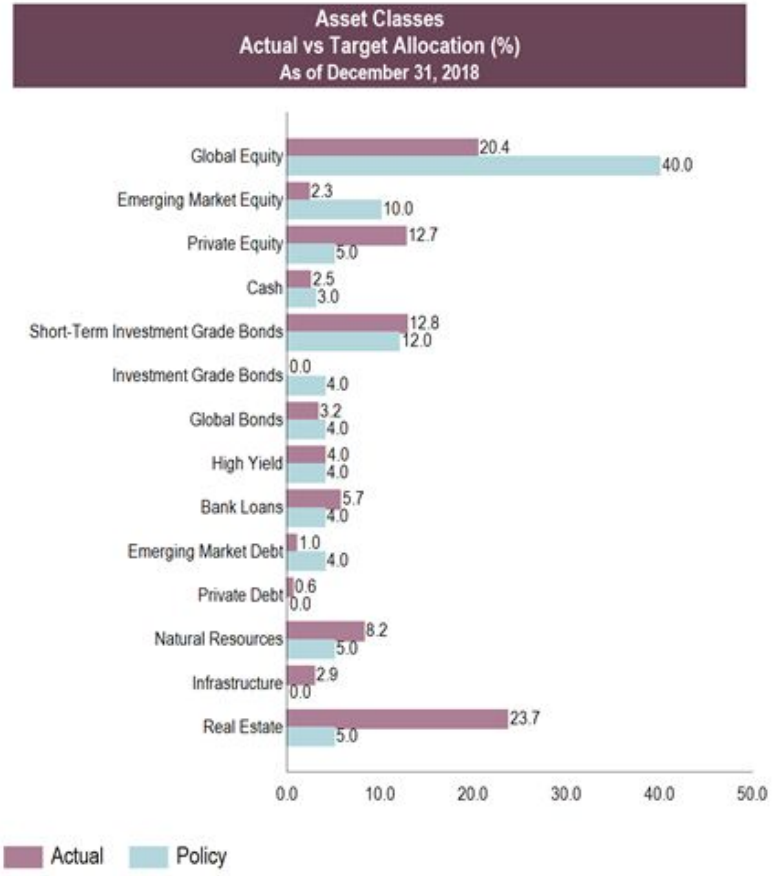
$524 million

Net Asset Value of Legacy Assets

4Q18 Review

As of December 31, 2018





Dallas Police & Fire Pension System

DPFP

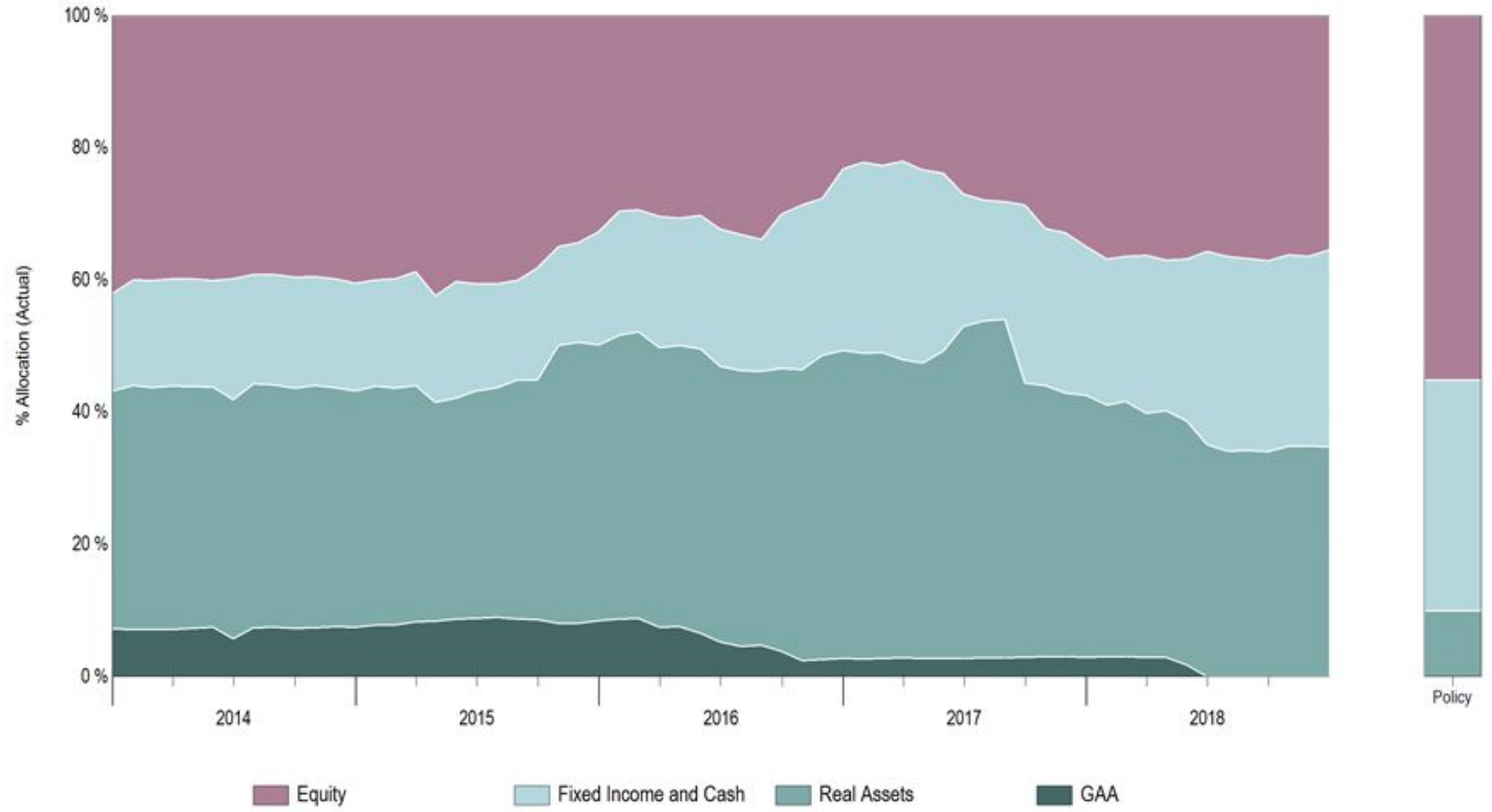
As of December 31, 2018

Allocation vs. Targets and Policy

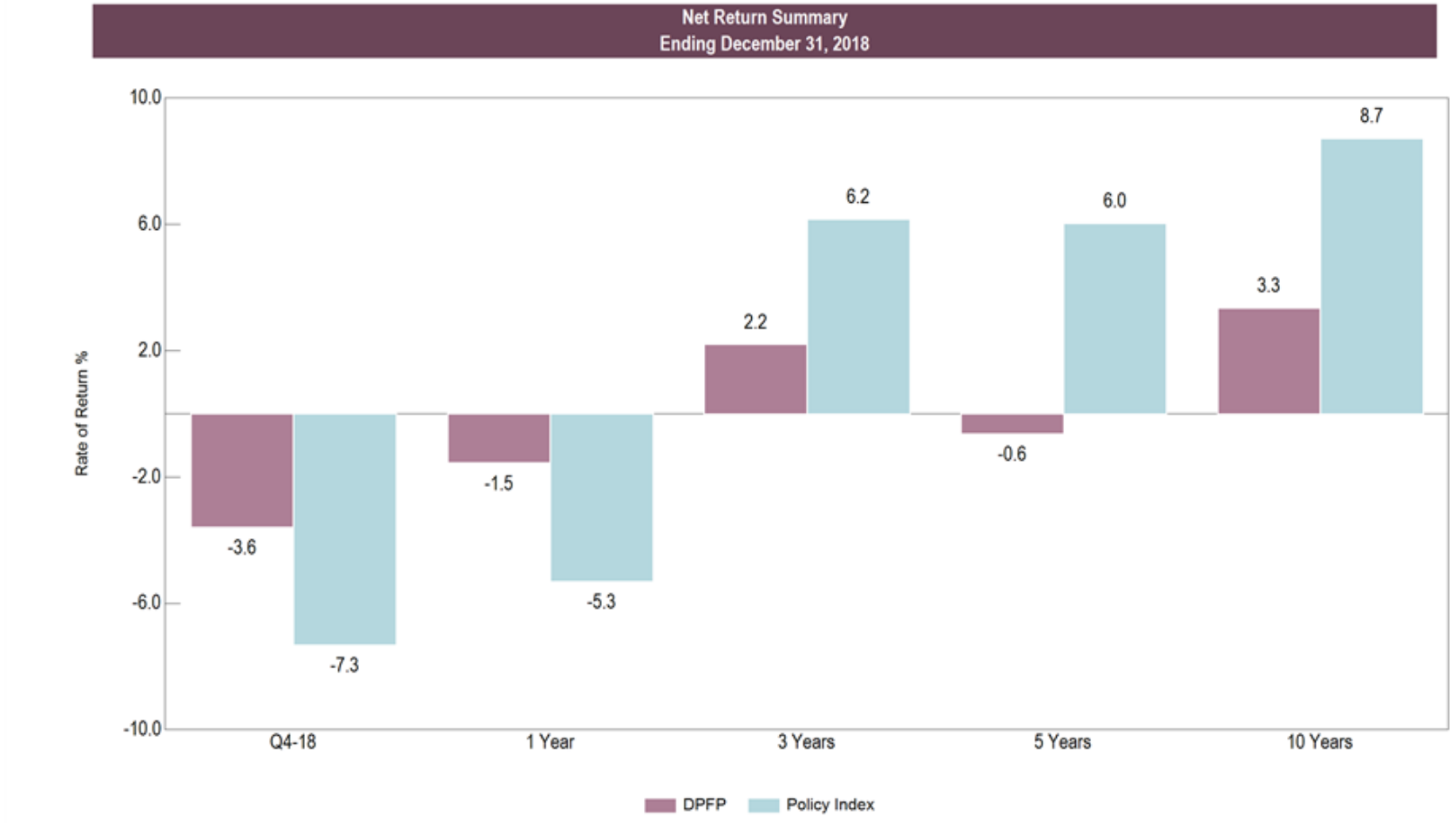
	Current Balance	Current Allocation	Policy	Policy Range	Within IPS Range?
Equity	**$695,717,169**	**35%**	**55%**		
Global Equity	$401,068,748	20%	40%	18% - 48%	Yes
Emerging Market Equity	$45,076,546	2%	10%	0% - 12%	Yes
Private Equity	$249,571,875	13%	5%		
Fixed Income and Cash	**$585,144,812**	**30%**	**35%**		
Cash	$48,527,296	2%	3%	0% - 5%	Yes
Short-Term Investment Grade Bonds	$252,325,469	13%	12%	5% - 15%	Yes
Investment Grade Bonds	$0	0%	4%	2% - 6%	No
Global Bonds	$63,652,773	3%	4%	2% - 6%	Yes
High Yield	$79,244,095	4%	4%	2% - 6%	Yes
Bank Loans	$111,099,111	6%	4%	2% - 6%	Yes
Emerging Market Debt	$19,162,370	1%	4%	2% - 6%	No
Private Debt	$11,133,698	1%	0%		
Real Assets	**$682,818,059**	**35%**	**10%**		
Natural Resources	$161,460,970	8%	5%		
Infrastructure	$56,908,601	3%	0%		
Real Estate	$464,448,488	24%	5%		
Total	**$1,963,680,040**	**100%**	**100%**		

As of 12/31/2018, the Safety Reserve exposure was approximately $300.9 million (15.3%).
Rebalancing ranges are not established for illiquid assets (Private Equity, Private Debt, Natural Resources, Infrastructure and Real Estate)

Asset Allocation History vs. Policy
5 Years Ending December 31, 2018

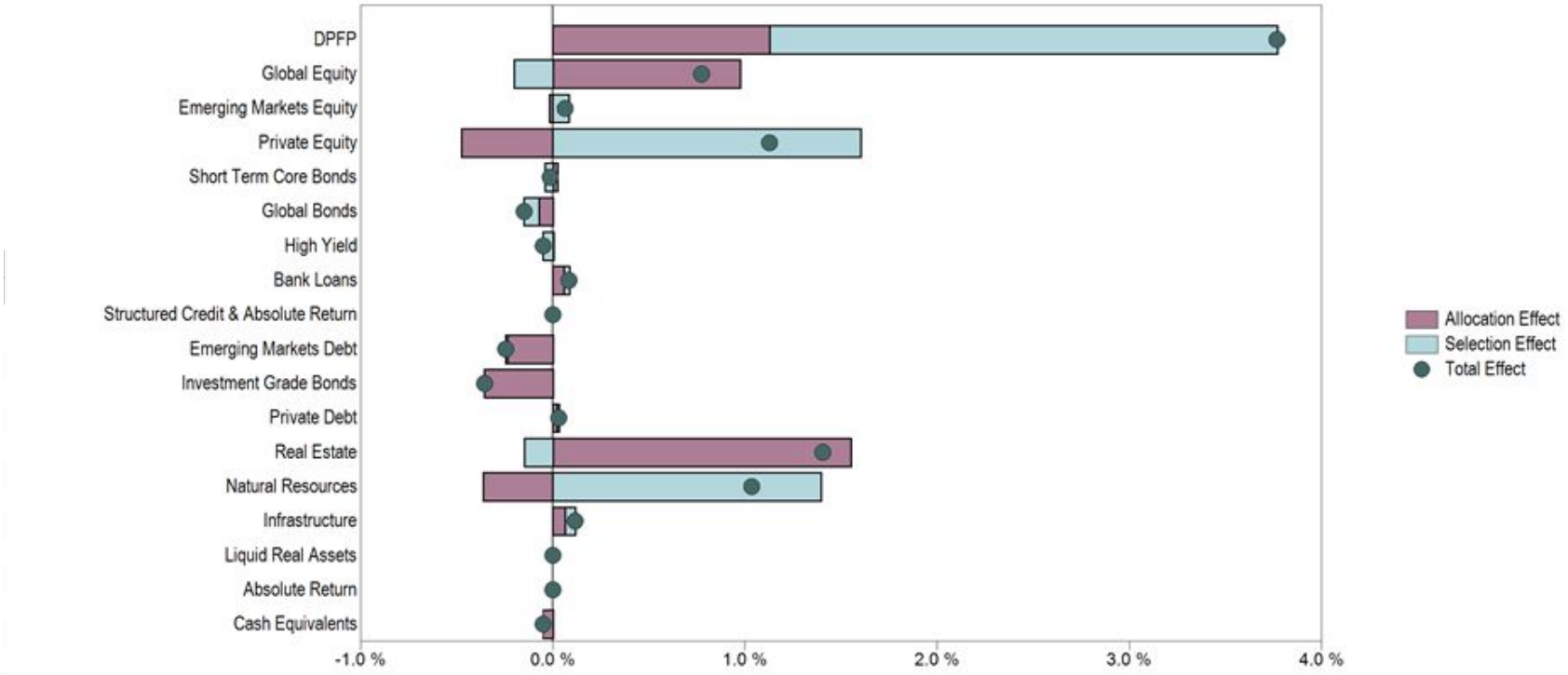


As of December 31, 2018



As of December 31, 2018

Attribution Effects vs. Policy Benchmark
3 Months Ending December 31, 2018



Attribution Summary
3 Months Ending December 31, 2018

	Wtd. Actual Return	Wtd. Index Return	Excess Return	Selection Effect	Allocation Effect	Total Effects
Total	**-3.6%**	**-7.3%**	**3.8%**	**2.6%**	**1.1%**	**3.8%**

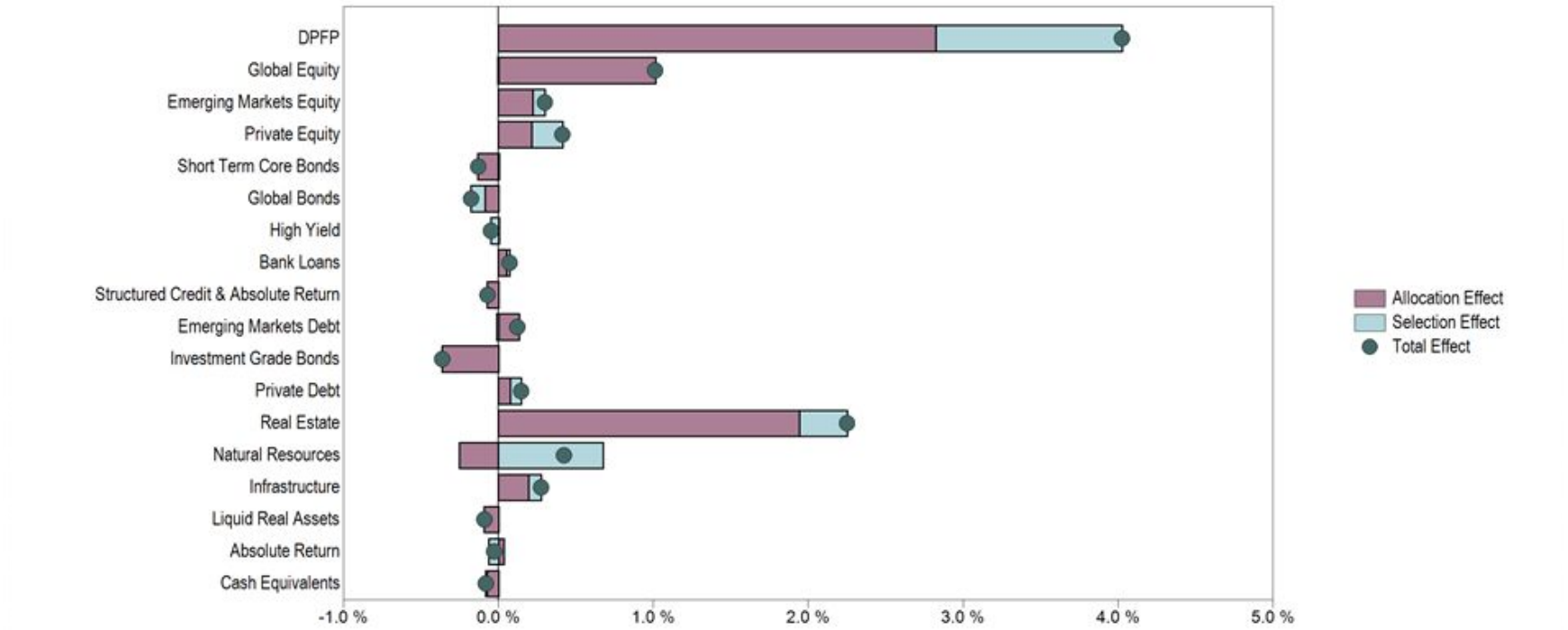
The performance claculation methodology in attribution tables is different from the standard time weighted returns (geometric linkage of monthly returns) found throughout the rest of the report. In attribution tables, the average weight of each asset class (over the specified time period) is multiplied by the time period performance of that asset class and summed.

Dallas Police & Fire Pension System

DPFP

As of December 31, 2018

Attribution Effects vs. Policy Benchmark
1 Year Ending December 31, 2018



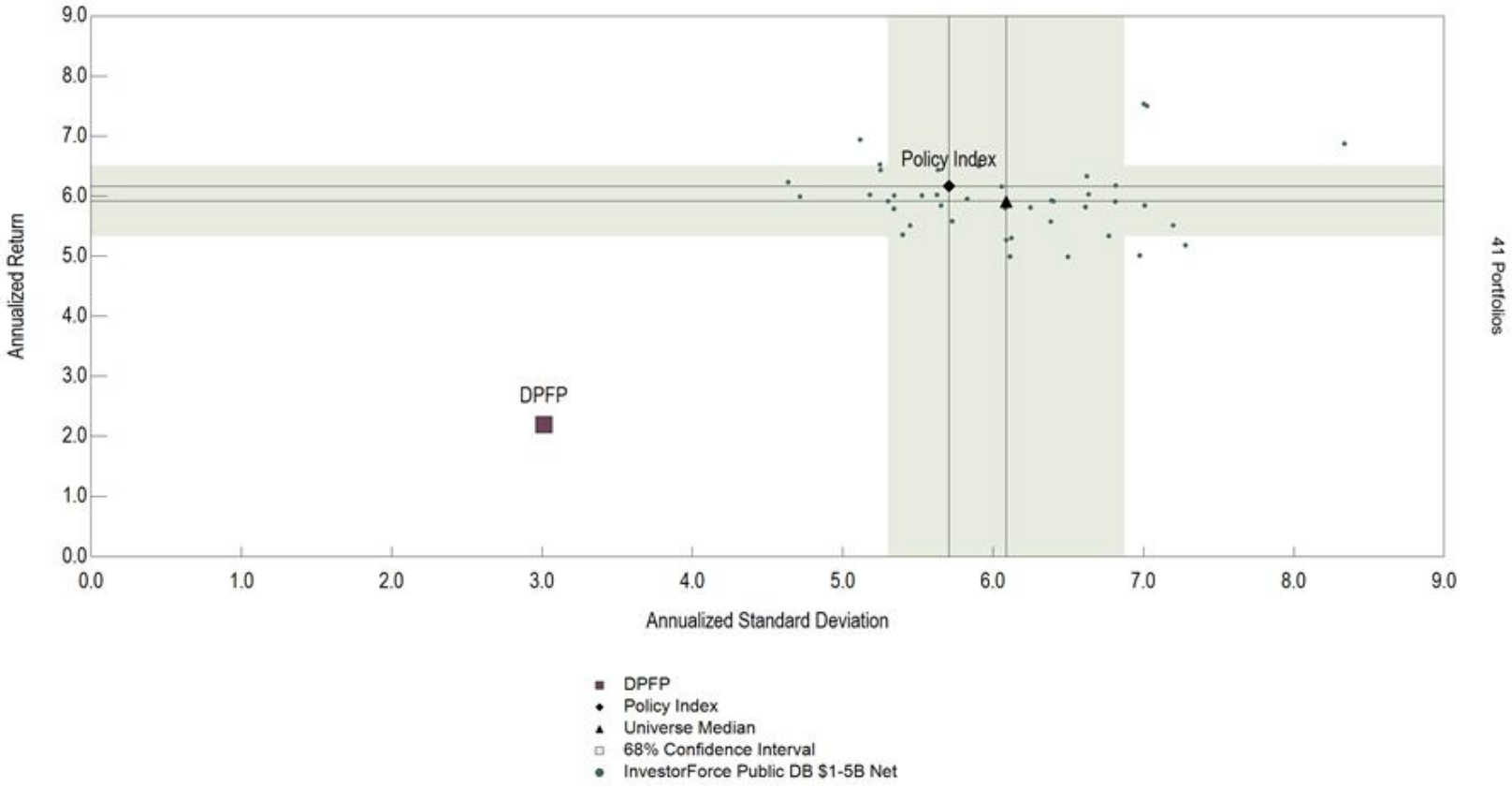
Attribution Summary
1 Year Ending December 31, 2018

	Wtd. Actual Return	Wtd. Index Return	Excess Return	Selection Effect	Allocation Effect	Total Effects
Total	**-1.1%**	**-5.3%**	**4.2%**	**1.2%**	**2.8%**	**4.0%**

The performance claculation methodology in attribution tables is different from the standard time weighted returns (geometric linkage of monthly returns) found throughout the rest of the report. In attribution tables, the average weight of each asset class (over the specified time period) is multiplied by the time period performance of that asset class and summed.

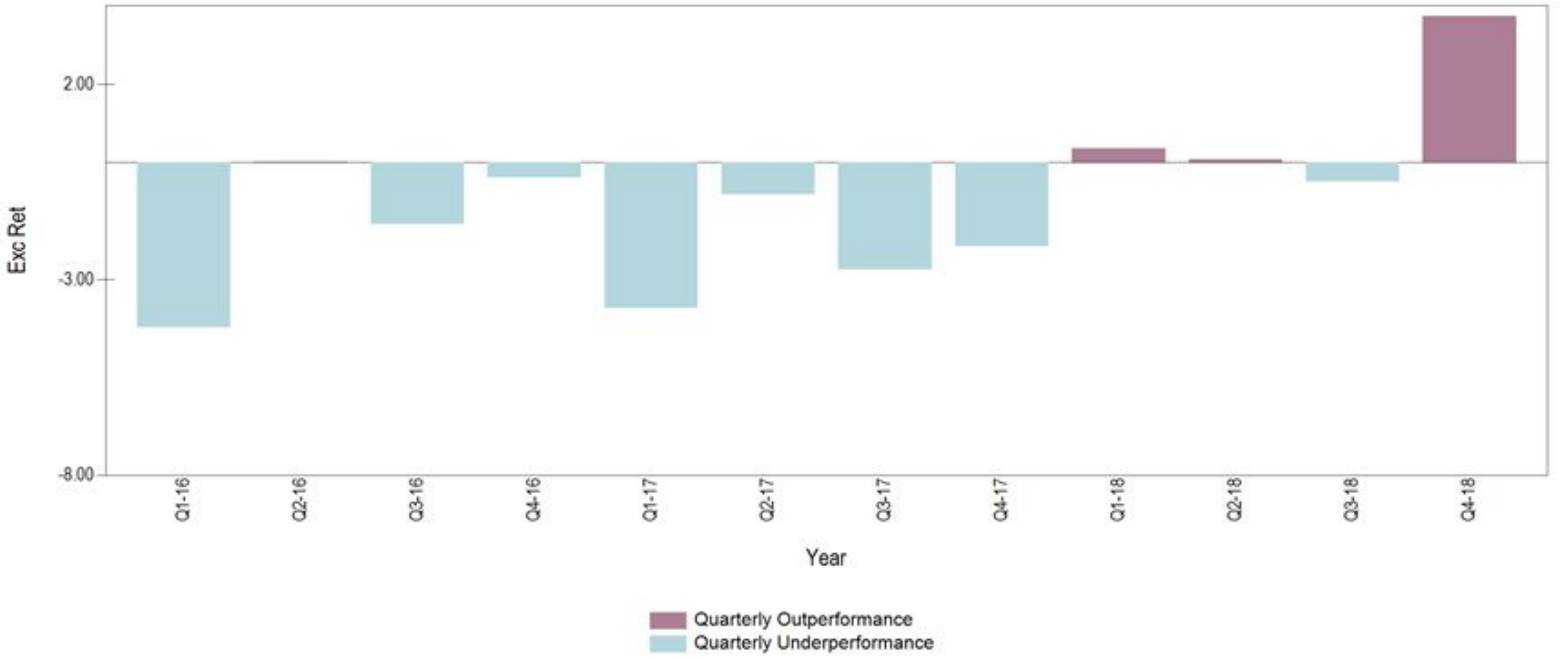
As of December 31, 2018

Net Annualized Return vs. Annualized Standard Deviation
3 Years Ending December 31, 2018



As of December 31, 2018

Quarterly Excess Performance vs. Policy Benchmark



As of December 31, 2018

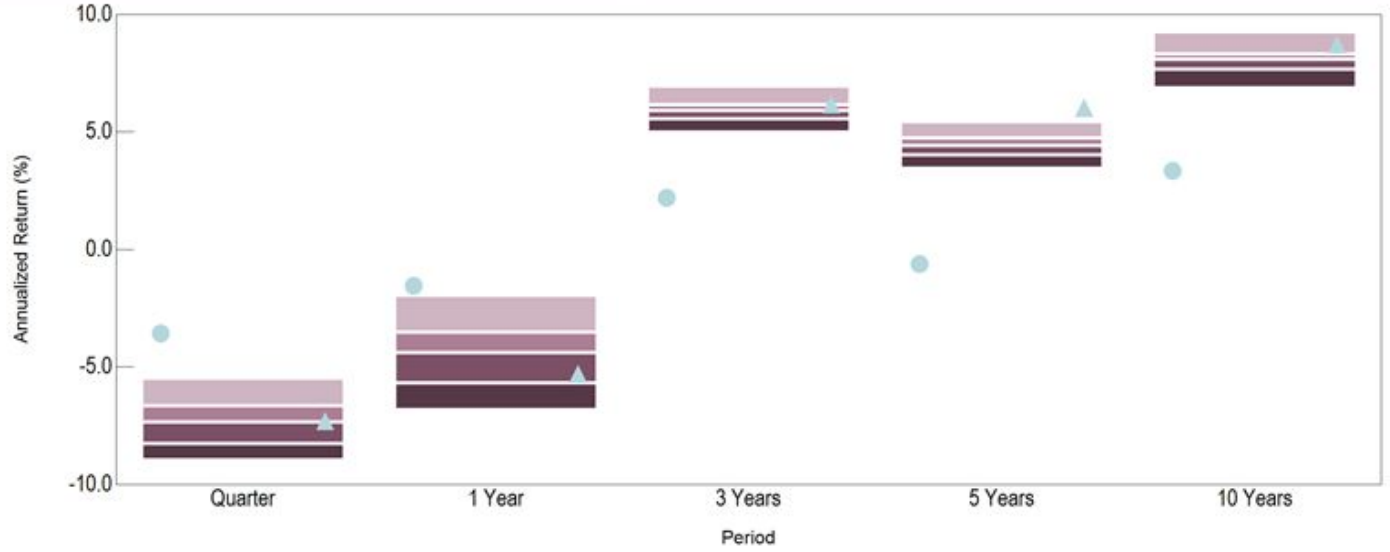
Total Fund Correlation Matrix
1 Year Ending December 31, 2018

	DPFP	Policy Index	60% MSCI ACWI/40% Barclays Global Agg
DPFP	1.00	--	--
Policy Index	0.98	1.00	--
60% MSCI ACWI/40% Barclays Global Agg	0.98	0.98	1.00

Total Fund Correlation Matrix
3 Years Ending December 31, 2018

	DPFP	Policy Index	60% MSCI ACWI/40% Barclays Global Agg
DPFP	1.00	--	--
Policy Index	0.72	1.00	--
60% MSCI ACWI/40% Barclays Global Agg	0.65	0.96	1.00

Total Plan Allocation vs. InvestorForce Public DB $1-5B Net Accounts
As of December 31, 2018



	Return (Rank)									
5th Percentile	-5.5		-2.0		6.9		5.4		9.2	
25th Percentile	-6.6		-3.5		6.2		4.8		8.3	
Median	-7.3		-4.4		5.9		4.4		8.1	
75th Percentile	-8.2		-5.7		5.6		4.0		7.7	
95th Percentile	-8.9		-6.8		5.0		3.5		6.9	
# of Portfolios	42		41		41		40		38	
DPFP	-3.6	(1)	-1.5	(2)	2.2	(99)	-0.6	(99)	3.3	(99)
Policy Index	-7.3	(50)	-5.3	(73)	6.2	(27)	6.0	(4)	8.7	(18)

Dallas Police & Fire Pension System

As of December 31, 2018

Fund Watch List / Compliance
As of December 31, 2018

Name	Status	1 YR Return Above Benchmark	3 YR Return Above Benchmark	3 YR Sharpe Ratio Above Peers	3 YR Return Above Peers
Global Equity					
Boston Partners Global Equity Fund	Hold	No	--	--	--
Manulife Global Equity Strategy	Hold	No	--	--	--
OFI Global Equity Strategy	Hold	No	No	No	No
Walter Scott Global Equity Fund	Hold	Yes	Yes	Yes	Yes
Emerging Markets Equity					
RBC Emerging Markets Equity	Hold	Yes	--	--	--
Short Term Core Bonds					
IR&M 1-3 Year Strategy	Hold	Yes	--	--	--
Global Bonds					
Brandywine Global Fixed Income	Hold	No	Yes	Yes	Yes
High Yield					
Loomis Sayles High Yield Fund	Hold	No	Yes	Yes	Yes
Bank Loans					
Loomis Sayles Senior Rate and Fixed Income	Hold	Yes	Yes	Yes	Yes
Pacific Asset Management Corporate (Bank) Loan Strategy	Hold	No	--	--	--
Emerging Markets Debt					
Ashmore EM Blended Debt	Hold	No	--	--	--

1 YR Return Above Benchmark - 1 YR Return Above Benchmark
3 YR Return Above Benchmark - 3 YR Return Above Benchmark
3 YR Sharpe Ratio Above Peers - 3 YR Sharpe Ratio Above Peer Group Median
3 YR Return Above Peers - 3 YR Return Above Peer Group Median

Returns are net of fees.

Dallas Police & Fire Pension System

Asset Class Performance Summary (Net)

	Market Value ($)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
DPFP	**1,963,680,040**	**100.0**	**-3.6**	**-1.5**	**2.2**	**-0.6**	**3.3**	**5.7**	**Jun-96**
Policy Index			*-7.3*	*-5.3*	*6.2*	*6.0*	*8.7*	*--*	*Jun-96*
Allocation Index			*-4.6*	*-0.6*	*7.2*	*6.6*	*8.1*	*7.1*	*Jun-96*
Total Fund Ex Private Markets			*-6.5*	*-4.3*	*7.0*	*4.1*	*9.3*	*--*	*Jun-96*
60% MSCI ACWI IMI Net/40% Barclays Global Aggregate Index			*-7.6*	*-6.4*	*5.1*	*3.1*	*7.0*	*--*	*Jun-96*
Global Equity	**401,068,748**	**20.4**	**-13.5**	**-9.0**	**7.4**	**5.3**	**10.2**	**5.4**	**Jul-06**
Global Equity Weighted Index			*-12.7*	*-8.9*	*7.8*	*4.7*	*10.0*	*5.4*	*Jul-06*
Emerging Markets Equity	**45,076,546**	**2.3**	**-3.8**	**-10.8**	**--**	**--**	**--**	**-10.8**	**Jan-18**
MSCI Emerging Markets Gross			*-7.4*	*-14.2*	*9.7*	*2.0*	*8.4*	*-14.2*	*Jan-18*
Private Equity	**249,571,875**	**12.7**	**-0.8**	**-0.7**	**-10.7**	**-9.6**	**-3.9**	**-0.7**	**Oct-05**
Private Equity Custom Benchmark			*-13.6*	*-2.4*	*12.2*	*11.1*	*16.5*	*11.0*	*Oct-05*
Cash Equivalents	**48,527,296**	**2.5**	**0.6**	**1.9**	**1.3**	**--**	**--**	**1.3**	**Apr-15**
91 Day T-Bills			*0.6*	*1.9*	*1.1*	*0.6*	*0.4*	*0.8*	*Apr-15*
Short Term Core Bonds	**252,325,469**	**12.8**	**1.0**	**1.8**	**--**	**--**	**--**	**1.3**	**Jun-17**
BBgBarc US Treasury 1-3 Yr TR			*1.3*	*1.6*	*0.9*	*0.8*	*1.0*	*1.0*	*Jun-17*
Global Bonds	**63,652,773**	**3.2**	**-1.3**	**-4.0**	**3.3**	**1.5**	**--**	**2.3**	**Dec-10**
BBgBarc Global Aggregate TR			*1.2*	*-1.2*	*2.7*	*1.1*	*2.5*	*1.6*	*Dec-10*
High Yield	**79,244,095**	**4.0**	**-5.8**	**-3.2**	**9.0**	**2.9**	**--**	**5.8**	**Dec-10**
BBgBarc US High Yield TR			*-4.5*	*-2.1*	*7.2*	*3.8*	*11.1*	*5.9*	*Dec-10*
Bank Loans	**111,099,111**	**5.7**	**-3.0**	**0.8**	**5.9**	**3.5**	**--**	**3.5**	**Jan-14**
S&P/LSTA Leveraged Loan			*-3.5*	*0.4*	*4.8*	*3.1*	*--*	*3.1*	*Jan-14*
Emerging Markets Debt	**19,162,370**	**1.0**	**-0.6**	**-6.2**	**6.9**	**2.3**	**--**	**2.9**	**Dec-10**
50% JPM EMBI/50% JPM GBI-EM			*0.4*	*-5.2*	*5.6*	*1.8*	*--*	*2.6*	*Dec-10*
Private Debt	**11,133,698**	**0.6**	**-1.3**	**11.6**	**-3.3**	**--**	**--**	**-3.3**	**Jan-16**
Barclays Global High Yield +2%			*-3.0*	*-2.1*	*8.7*	*--*	*--*	*8.7*	*Jan-16*
Real Estate	**464,448,488**	**23.7**	**0.7**	**7.9**	**2.4**	**-5.4**	**-4.4**	**3.8**	**Mar-85**
NCREIF Property Index			*1.4*	*6.7*	*7.2*	*9.3*	*7.5*	*8.0*	*Mar-85*
Natural Resources	**161,460,970**	**8.2**	**-1.1**	**-4.9**	**-2.8**	**1.6**	**--**	**3.7**	**Dec-10**
Natural Resources Benchmark (Linked)			*-16.9*	*-13.1*	*11.7*	*11.0*	*--*	*10.3*	*Dec-10*
Infrastructure	**56,908,601**	**2.9**	**-3.3**	**-6.7**	**15.3**	**8.3**	**--**	**8.0**	**Jul-12**
S&P Global Infrastructure TR USD			*-5.1*	*-9.5*	*6.9*	*4.1*	*7.6*	*6.5*	*Jul-12*

[1] Please see the Appendix for composition of the Custom Benchmarks [2] As of 12/31/2018 the Safety Reserve exposure was approximately $300.9 million (15.3%).[3] All private market data is preliminary until valuations are finalized

Dallas Police & Fire Pension System

DPFP

As of December 31, 2018

Trailing Net Performance

	Market Value ($)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
DPFP	**1,963,680,040**	**100.0**	**--**	**-3.6**	**-1.5**	**2.2**	**-0.6**	**3.3**	**5.7**	**Jun-96**
Policy Index				*-7.3*	*-5.3*	*6.2*	*6.0*	*8.7*	*--*	*Jun-96*
Allocation Index				*-4.6*	*-0.6*	*7.2*	*6.6*	*8.1*	*7.1*	*Jun-96*
Total Fund Ex Private Markets				*-6.5*	*-4.3*	*7.0*	*4.1*	*9.3*	*--*	*Jun-96*
60% MSCI ACWI IMI Net/40% Barclays Global Aggregate Index				*-7.6*	*-6.4*	*5.1*	*3.1*	*7.0*	*--*	*Jun-96*
InvestorForce Public DB $1-5B Net Rank				*1*	*2*	*99*	*99*	*99*	*76*	*Jun-96*
Total Equity	**695,717,169**	**35.4**	**35.4**	**-8.7**	**-6.1**	**-3.1**	**-1.0**	**--**	**3.2**	**Dec-10**
Total Equity Policy Index				*-11.8*	*-8.6*	*8.6*	*--*	*--*	*--*	*Dec-10*
Public Equity	**446,145,294**	**22.7**	**64.1**	**-12.6**	**-9.2**	**7.4**	**5.3**	**10.2**	**5.3**	**Jul-06**
Public Equity Weighted Index				*-12.2*	*-9.5*	*7.6*	*4.5*	*9.9*	*5.3*	*Jul-06*
eV All Global Equity Net Rank				*42*	*49*	*25*	*34*	*41*	*43*	*Jul-06*
Global Equity	**401,068,748**	**20.4**	**89.9**	**-13.5**	**-9.0**	**7.4**	**5.3**	**10.2**	**5.4**	**Jul-06**
Global Equity Weighted Index				*-12.7*	*-8.9*	*7.8*	*4.7*	*10.0*	*5.4*	*Jul-06*
eV All Global Equity Net Rank				*51*	*48*	*25*	*33*	*41*	*42*	*Jul-06*
Boston Partners Global Equity Fund	94,917,987	4.8	23.7	-14.7	-12.9	--	--	--	-2.8	Jul-17
MSCI ACWI Gross				*-12.7*	*-8.9*	*7.2*	*4.8*	*10.0*	*1.0*	*Jul-17*
eV Global Large Cap Value Eq Net Rank				*81*	*64*	*--*	*--*	*--*	*64*	*Jul-17*
Manulife Global Equity Strategy	103,449,463	5.3	25.8	-11.2	-9.8	--	--	--	-2.9	Jul-17
MSCI ACWI Gross				*-12.7*	*-8.9*	*7.2*	*4.8*	*10.0*	*1.0*	*Jul-17*
eV Global Large Cap Value Eq Net Rank				*30*	*37*	*--*	*--*	*--*	*66*	*Jul-17*
OFI Global Equity Strategy	94,764,747	4.8	23.6	-16.3	-12.3	6.3	5.1	11.4	4.8	Oct-07
MSCI ACWI Gross				*-12.7*	*-8.9*	*7.2*	*4.8*	*10.0*	*3.6*	*Oct-07*
eV Global Large Cap Growth Eq Net Rank				*81*	*75*	*68*	*74*	*55*	*51*	*Oct-07*
Walter Scott Global Equity Fund	107,936,551	5.5	26.9	-12.0	-1.1	9.4	6.4	--	8.4	Dec-09
MSCI ACWI Gross				*-12.7*	*-8.9*	*7.2*	*4.8*	*10.0*	*7.7*	*Dec-09*
eV Global Large Cap Growth Eq Net Rank				*33*	*10*	*28*	*37*	*--*	*74*	*Dec-09*

Dallas Police & Fire Pension System

DPFP

As of December 31, 2018

	Market Value ($)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Emerging Markets Equity	**45,076,546**	**2.3**	**10.1**	**-3.8**	**-10.8**	**--**	**--**	**--**	**-10.8**	**Jan-18**
MSCI Emerging Markets Gross				*-7.4*	*-14.2*	*9.7*	*2.0*	*8.4*	*-14.2*	*Jan-18*
eV Emg Mkts Equity Net Rank				*10*	*11*	*--*	*--*	*--*	*11*	*Jan-18*
RBC Emerging Markets Equity	45,076,546	2.3	100.0	-3.8	-10.8	--	--	--	-10.8	Jan-18
MSCI Emerging Markets Gross				*-7.4*	*-14.2*	*9.7*	*2.0*	*8.4*	*-14.2*	*Jan-18*
eV Emg Mkts Equity Net Rank				*10*	*11*	*--*	*--*	*--*	*11*	*Jan-18*
Private Equity	**249,571,875**	**12.7**	**35.9**	**-0.8**	**-0.7**	**-10.7**	**-9.6**	**-3.9**	**-0.7**	**Oct-05**
Private Equity Custom Benchmark				*-13.6*	*-2.4*	*12.2*	*11.1*	*16.5*	*11.0*	*Oct-05*
Total Fixed Income	**536,617,516**	**27.3**	**27.3**	**-1.3**	**0.1**	**5.1**	**2.0**	**8.6**	**5.2**	**Jul-06**
Total Fixed Income Policy Index				*-1.7*	*-1.6*	*5.6*	*--*	*--*	*--*	*Jul-06*
eV All Global Fixed Inc Net Rank				*62*	*22*	*20*	*52*	*14*	*32*	*Jul-06*
Public Fixed Income	**525,483,818**	**26.8**	**97.9**	**-1.3**	**-0.1**	**7.5**	**3.1**	**--**	**5.1**	**Dec-10**
Public Fixed Income Weighted Index				*-0.5*	*-0.2*	*5.8*	*3.3*	*--*	*4.7*	*Dec-10*
Short Term Core Bonds	**252,325,469**	**12.8**	**48.0**	**1.0**	**1.8**	**--**	**--**	**--**	**1.3**	**Jun-17**
BBgBarc US Treasury 1-3 Yr TR				*1.3*	*1.6*	*0.9*	*0.8*	*1.0*	*1.0*	*Jun-17*
IR&M 1-3 Year Strategy	252,325,469	12.8	100.0	1.0	1.8	--	--	--	1.3	Jul-17
BBgBarc US Treasury 1-3 Yr TR				*1.3*	*1.6*	*0.9*	*0.8*	*1.0*	*1.0*	*Jul-17*
eV US Short Duration Fixed Inc Net Rank				*36*	*5*	*--*	*--*	*--*	*32*	*Jul-17*
Global Bonds	**63,652,773**	**3.2**	**12.1**	**-1.3**	**-4.0**	**3.3**	**1.5**	**--**	**2.3**	**Dec-10**
BBgBarc Global Aggregate TR				*1.2*	*-1.2*	*2.7*	*1.1*	*2.5*	*1.6*	*Dec-10*
eV All Global Fixed Inc Net Rank				*62*	*76*	*52*	*66*	*--*	*66*	*Dec-10*
Brandywine Global Fixed Income	63,652,773	3.2	100.0	-1.3	-4.0	3.6	1.6	5.6	4.4	Oct-04
BBgBarc Global Aggregate TR				*1.2*	*-1.2*	*2.7*	*1.1*	*2.5*	*3.3*	*Oct-04*
eV All Global Fixed Inc Net Rank				*62*	*76*	*46*	*63*	*43*	*49*	*Oct-04*

[1] Please note, private market data is preliminary until valuations are finalized.

Dallas Police & Fire Pension System

DPFP

As of December 31, 2018

	Market Value ($)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
High Yield	**79,244,095**	**4.0**	**15.1**	**-5.8**	**-3.2**	**9.0**	**2.9**	**--**	**5.8**	**Dec-10**
BBgBarc US High Yield TR				*-4.5*	*-2.1*	*7.2*	*3.8*	*11.1*	*5.9*	*Dec-10*
eV US High Yield Fixed Inc Net Rank				*91*	*76*	*4*	*71*	*--*	*24*	*Dec-10*
Loomis Sayles High Yield Fund	79,244,095	4.0	100.0	-5.8	-3.2	9.4	3.7	12.5	9.0	Oct-98
BBgBarc US High Yield TR				*-4.5*	*-2.1*	*7.2*	*3.8*	*11.1*	*6.6*	*Oct-98*
eV US High Yield Fixed Inc Net Rank				*91*	*76*	*3*	*31*	*3*	*1*	*Oct-98*
Bank Loans	**111,099,111**	**5.7**	**21.1**	**-3.0**	**0.8**	**5.9**	**3.5**	**--**	**3.5**	**Jan-14**
S&P/LSTA Leveraged Loan				*-3.5*	*0.4*	*4.8*	*3.1*	*--*	*3.1*	*Jan-14*
eV US Float-Rate Bank Loan Fixed Inc Net Rank				*30*	*11*	*5*	*11*	*--*	*11*	*Jan-14*
Loomis Sayles Senior Rate and Fixed Income	59,839,413	3.0	53.9	-2.8	0.9	6.0	3.6	--	3.6	Jan-14
S&P/LSTA Leveraged Loan				*-3.5*	*0.4*	*4.8*	*3.1*	*--*	*3.1*	*Jan-14*
eV US Float-Rate Bank Loan Fixed Inc Net Rank				*15*	*8*	*4*	*5*	*--*	*5*	*Jan-14*
Pacific Asset Management Corporate (Bank) Loan Strategy	51,259,699	2.6	46.1	-3.3	0.7	--	--	--	1.8	Aug-17
Credit Suisse Leveraged Loan				*-3.1*	*1.1*	*5.0*	*3.3*	*--*	*1.8*	*Aug-17*
eV US Float-Rate Bank Loan Fixed Inc Net Rank				*45*	*17*	*--*	*--*	*--*	*14*	*Aug-17*
Emerging Markets Debt	**19,162,370**	**1.0**	**3.6**	**-0.6**	**-6.2**	**6.9**	**2.3**	**--**	**2.9**	**Dec-10**
50% JPM EMBI/50% JPM GBI-EM				*0.4*	*-5.2*	*5.6*	*1.8*	*--*	*2.6*	*Dec-10*
eV All Emg Mkts Fixed Inc Net Rank				*51*	*56*	*11*	*53*	*--*	*58*	*Dec-10*
Ashmore EM Blended Debt	19,162,370	1.0	100.0	-0.6	-6.2	--	--	--	-4.3	Dec-17
Ashmore Blended Debt Benchmark				*0.2*	*-4.5*	*5.0*	*2.0*	*5.3*	*-3.1*	*Dec-17*
eV All Emg Mkts Fixed Inc Net Rank				*51*	*56*	*--*	*--*	*--*	*44*	*Dec-17*
Private Debt	**11,133,698**	**0.6**	**2.1**	**-1.3**	**11.6**	**-3.3**	**--**	**--**	**-3.3**	**Jan-16**
Barclays Global High Yield +2%				*-3.0*	*-2.1*	*8.7*	*--*	*--*	*8.7*	*Jan-16*

[1] Please note, private market data is preliminary until valuations are finalized.

Dallas Police & Fire Pension System

DPFP

As of December 31, 2018

	Market Value ($)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Total Real Assets	**682,818,059**	**34.8**	**34.8**	**-0.1**	**1.5**	**4.0**	**-2.2**	**--**	**-2.1**	**Dec-10**
Total Real Assets Policy Index				*-3.7*	*-0.6*	*8.3*	*--*	*--*	*--*	*Dec-10*
Real Estate	**464,448,488**	**23.7**	**68.0**	**0.7**	**7.9**	**2.4**	**-5.4**	**-4.4**	**3.8**	**Mar-85**
NCREIF Property Index				*1.4*	*6.7*	*7.2*	*9.3*	*7.5*	*8.0*	*Mar-85*
Natural Resources	**161,460,970**	**8.2**	**23.6**	**-1.1**	**-4.9**	**-2.8**	**1.6**	**--**	**3.7**	**Dec-10**
Natural Resources Benchmark (Linked)				*-16.9*	*-13.1*	*11.7*	*11.0*	*--*	*10.3*	*Dec-10*
Infrastructure	**56,908,601**	**2.9**	**8.3**	**-3.3**	**-6.7**	**15.3**	**8.3**	**--**	**8.0**	**Jul-12**
S&P Global Infrastructure TR USD				*-5.1*	*-9.5*	*6.9*	*4.1*	*7.6*	*6.5*	*Jul-12*
Cash Equivalents	**48,527,296**	**2.5**	**2.5**	**0.6**	**1.9**	**1.3**	**--**	**--**	**1.3**	**Apr-15**
91 Day T-Bills				*0.6*	*1.9*	*1.1*	*0.6*	*0.4*	*0.8*	*Apr-15*

[1] Please note, private market data is preliminary until valuations are finalized.

Dallas Police & Fire Pension System

DPFP

As of December 31, 2018

Statistics Summary

5 Years Ending December 31, 2018

	Anlzd Return	Anlzd Standard Deviation	Information Ratio	Beta	Sharpe Ratio	Tracking Error
DPFP	-0.5%	5.6%	-1.3	0.5	-0.2	5.5%
Policy Index	6.4%	4.5%	--	1.0	1.3	0.0%
Public Equity	5.3%	11.0%	0.4	1.0	0.4	1.8%
Public Equity Weighted Index	4.5%	11.0%	--	1.0	0.4	0.0%
Global Equity	5.3%	11.0%	0.4	1.0	0.4	1.8%
Global Equity Weighted Index	4.7%	11.0%	--	1.0	0.4	0.0%
Private Equity	-9.5%	16.8%	-1.0	0.0	-0.6	20.3%
Private Equity Custom Benchmark	11.1%	11.2%	--	1.0	0.9	0.0%
Public Fixed Income	3.1%	4.7%	-0.1	1.1	0.5	1.5%
Public Fixed Income Weighted Index	3.3%	4.1%	--	1.0	0.6	0.0%
Global Bonds	1.5%	6.3%	0.1	1.1	0.1	3.8%
BBgBarc Global Aggregate TR	1.1%	4.5%	--	1.0	0.1	0.0%
High Yield	2.9%	6.4%	-0.4	1.2	0.3	2.3%
BBgBarc US High Yield TR	3.8%	5.1%	--	1.0	0.6	0.0%
Emerging Markets Debt	2.3%	8.2%	0.3	1.0	0.2	2.1%
50% JPM EMBI/50% JPM GBI-EM	1.8%	7.9%	--	1.0	0.1	0.0%
Real Estate	-5.4%	13.7%	-0.9	-1.3	-0.4	15.6%
NCREIF Property Index	9.3%	3.9%	--	1.0	2.2	0.0%
Natural Resources	1.9%	5.0%	-0.7	0.0	0.3	13.4%
Natural Resources Benchmark (Linked)	11.0%	12.9%	-	1.0	0.8	0.0%
Infrastructure	9.6%	29.1%	0.2	0.0	0.3	30.9%
S&P Global Infrastructure TR USD	4.1%	10.1%	-	1.0	0.3	0.0%

As of December 31, 2018

Benchmark History
As of December 31, 2018

DPFP		
10/1/2018	Present	40% MSCI ACWI Gross / 10% MSCI Emerging Markets Gross / 5% Private Equity Custom Benchmark / 12% BBgBarc US Treasury 1-3 Yr TR / 4% BBgBarc Global Aggregate TR / 4% BBgBarc Global High Yield TR / 4% S&P/LSTA Leveraged Loan / 4% 50% JPM EMBI/50% JPM GBI-EM / 5% Natural Resources Benchmark (Linked) / 5% NCREIF Property Index / 3% 91 Day T-Bills / 4% BBgBarc US Aggregate TR
4/1/2016	9/30/2018	20% MSCI ACWI Gross / 5% MSCI Emerging Markets Gross / 5% Private Equity Custom Benchmark / 2% BBgBarc US Treasury 1-3 Yr TR / 3% BBgBarc Global Aggregate TR / 5% BBgBarc Global High Yield TR / 6% S&P/LSTA Leveraged Loan / 6% HFRI RV: FI (50/50-ABS/Corp) / 6% 50% JPM EMBI/50% JPM GBI-EM / 5% Barclays Global High Yield +2% / 5% 60% MSCI ACWI/40% Barclays Global Agg / 3% 60% MSCI ACWI/40% Barclays Global Agg / 2% HFRX Absolute Return Index / 5% Natural Resources Benchmark (Linked) / 5% S&P Global Infrastructure TR USD / 12% NCREIF Property Index / 3% CPI + 5% (Seasonally Adjusted) / 2% 91 Day T-Bills
4/1/2014	3/31/2016	15% MSCI ACWI / 15% S&P 500 + 2% / 10% Total Global Natural Resources Custom Benchmark / 15% BBgBarc Global Aggregate TR / 20% CPI + 5% (Seasonally Adjusted) / 10% CPI + 5% (Seasonally Adjusted) / 15% NCREIF Property Index
Total Equity		
10/1/2018	Present	72.73% MSCI ACWI Gross / 18.18% MSCI Emerging Markets Gross / 9.09% Private Equity Custom Benchmark
1/1/2016	9/30/2018	66.67% MSCI ACWI Gross / 16.67% MSCI Emerging Markets Gross / 16.66% Private Equity Custom Benchmark
Public Equity		
2/1/2018	Present	Weighted Average of MSCI ACWI Gross / MSCI Emerging Markets
1/1/2018	1/31/2018	Weighted Average of MSCI ACWI Gross / MSCI Emerging Markets / FTSE EPRA/NAREIT Linked 91 Day Tbill
12/1/2017	12/31/2017	Weighted Average of MSCI ACWI Gross / FTSE EPRA/NAREIT Linked 91 Day Tbill
7/1/2006	11/30/2017	100% Global Equity Weighted Index
Global Equity		
2/1/2018	Present	MSCI ACWI Gross
1/1/2018	1/31/2018	Weighted Average of MSCI ACWI Gross / FTSE EPRA/NAREIT Global
12/1/2017	12/31/2017	Weighted Average of MSCI ACWI Gross / FTSE EPRA/NAREIT Linked 91 Day Tbill
8/1/2017	11/30/2017	Weighted Average of MSCI ACWI Gross / FTSE EPRA/NAREIT Linked 91 Day Tbill / MSCI ACWI Gross Linked 91 Day TBill
7/1/2017	7/31/2017	Weighted Average of MSCI ACWI Gross / FTSE EPRA/NAREIT Linked 91 Day Tbill / MSCI ACWI Gross Linked 91 Day TBill
5/1/2017	6/30/2017	Weighted Average of MSCI ACWI Gross / FTSE EPRA/NAREIT Linked 91 Day Tbill / MSCI ACWI Gross Linked 91 Day TBill / MSCI ACWI Gross
4/1/2017	4/30/2017	Weighted Average of MSCI ACWI Gross / FTSE EPRA/NAREIT Linked 91 Day Tbill / MSCI ACWI Gross Linked 91 Day TBill / MSCI ACWI Gross / Russell 2000
12/1/2016	3/31/2017	Weighted Average of MSCI ACWI Gross / FTSE EPRA/NAREIT Linked 91 Day Tbill / MSCI ACWI Gross Linked 91 Day TBill / MSCI ACWI Gross / Russell 2000 / Dow Jones Equal Wtd. Oil & Gas
11/1/2016	11/30/2016	Weighted Average of Russell 2000 / MSCI ACWI Gross Linked 91 Day TBill / MSCI ACWI Gross / FTSE EPRA/NAREIT Linked 91 Day Tbill / Dow Jones Equal Wtd. Oil & Gas / MSCI ACWI Gross

9/1/2016	10/31/2016	Weighted Average of Russell 2000 / MSCI ACWI Gross Linked 91 Day TBill / MSCI ACWI Gross / FTSE EPRA/NAREIT Global / Dow Jones Equal Wtd. Oil & Gas / MSCI ACWI Gross
Private Equity		
10/1/2005	Present	Russell 3000+3%
Total Fixed Income		
1/1/2015	Present	6.07% BBgBarc US Treasury 1-3 Yr TR / 9.09% BBgBarc Global Aggregate TR / 15.15% BBgBarc Global High Yield TR / 18.18% S&P/LSTA Leveraged Loan / 18.18% HFRI RV: FI (50/50-ABS/Corp) / 18.18% 50% JPM EMBI/50% JPM GBI-EM / 15.15% Barclays Global High Yield +2%
Public Fixed Income		
5/1/2018	Present	Weighted Average of BBgBarc US Treasury 1-3 Yr TR / BBgBarc Global Aggregate TR / BBgBarc Global High Yield TR / S&P/LSTA Leveraged Loan / Credit Suisse Leveraged Loan / Ashmore Blended Debt Benchmark
12/1/2017	4/30/2018	Weighted Average of BBgBarc US Treasury 1-3 Yr TR / BBgBarc Global Aggregate TR / BBgBarc Global High Yield TR / S&P/LSTA Leveraged Loan / Credit Suisse Leveraged Loan / Ashmore Blended Debt Benchmark / JP Morgan GBI EM Global Diversified TR USD
10/1/2017	11/30/2017	Weighted Average of BBgBarc US Treasury 1-3 Yr TR / BBgBarc Global Aggregate TR / BBgBarc Global High Yield TR / S&P/LSTA Leveraged Loan / Credit Suisse Leveraged Loan / JP Morgan GBI EM Global Diversified TR USD
9/1/2017	9/30/2017	Weighted Average of BBgBarc US Treasury 1-3 Yr TR / BBgBarc Global Aggregate TR / BBgBarc Global High Yield TR / S&P/LSTA Leveraged Loan / JP Morgan GBI EM Global Diversified TR USD / Credit Suisse Leveraged Loan
7/1/2017	8/31/2017	Weighted Average of BBgBarc US Treasury 1-3 Yr TR / BBgBarc Global Aggregate TR / BBgBarc Global High Yield TR / S&P/LSTA Leveraged Loan / JP Morgan GBI EM Global Diversified TR USD
4/1/2017	6/30/2017	Weighted Average of BBgBarc Global Aggregate TR / BBgBarc Global High Yield TR / S&P/LSTA Leveraged Loan / JP Morgan GBI EM Global Diversified TR USD / JP Morgan EMBI Global Diversified
Ashmore EM Blended Debt		
12/1/2017	Present	50% JP Morgan EMBI Global Diversified / 25% JPM ELMI+ TR USD / 25% JP Morgan GBI EM Global Diversified TR USD
Total Real Assets		
1/1/2016	Present	20% Natural Resources Benchmark (Linked) / 20% S&P Global Infrastructure TR USD / 48% NCREIF Property Index / 12% CPI + 5% (Seasonally Adjusted)
Natural Resources		
1/1/2016	Present	S&P Global Natural Resources Net USD
12/31/2010	12/31/2015	Total Global Natural Resources Custom Benchmark

Disclaimer, Glossary, and Notes

Disclaimer

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SIGNIFICANT EVENTS MAY OCCUR (OR HAVE OCCURRED) AFTER THE DATE OF THIS REPORT AND THAT IT IS NOT OUR FUNCTION OR RESPONSIBILITY TO UPDATE THIS REPORT. ANY OPINIONS OR RECOMMENDATIONS PRESENTED HEREIN REPRESENT OUR GOOD FAITH VIEWS AS OF THE DATE OF THIS REPORT AND ARE SUBJECT TO CHANGE AT ANY TIME. ALL INVESTMENTS INVOLVE RISK. THERE CAN BE NO GUARANTEE THAT THE STRATEGIES, TACTICS, AND METHODS DISCUSSED HERE WILL BE SUCCESSFUL.

INFORMATION USED TO PREPARE THIS REPORT WAS OBTAINED FROM INVESTMENT MANAGERS, CUSTODIANS, AND OTHER EXTERNAL SOURCES. WHILE WE HAVE EXERCISED REASONABLE CARE IN PREPARING THIS REPORT, WE CANNOT GUARANTEE THE ACCURACY OF ALL SOURCE INFORMATION CONTAINED HEREIN.

CERTAIN INFORMATION CONTAINED IN THIS REPORT MAY CONSTITUTE "FORWARD - LOOKING STATEMENTS," WHICH CAN BE IDENTIFIED BY THE USE OF TERMINOLOGY SUCH AS "MAY," "WILL," "SHOULD," "EXPECT," "AIM", "ANTICIPATE," "TARGET," "PROJECT," "ESTIMATE," "INTEND," "CONTINUE" OR "BELIEVE," OR THE NEGATIVES THEREOF OR OTHER VARIATIONS THEREON OR COMPARABLE TERMINOLOGY. ANY FORWARD - LOOKING STATEMENTS, FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS IN THIS PRESENTATION ARE BASED UPON CURRENT ASSUMPTIONS. CHANGES TO ANY ASSUMPTIONS MAY HAVE A MATERIAL IMPACT ON FORWARD - LOOKING STATEMENTS, FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS. ACTUAL RESULTS MAY THEREFORE BE MATERIALLY DIFFERENT FROM ANY FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS IN THIS PRESENTATION.

PERFORMANCE DATA CONTAINED HEREIN REPRESENT PAST PERFORMANCE. PAST PERFORMANCE IS NO GUARANTEE OF FUTURE RESULTS.

Credit Risk: Refers to the risk that the issuer of a fixed income security may default (i.e., the issuer will be unable to make timely principal and/or interest payments on the security.)

Duration: Measure of the sensitivity of the price of a bond to a change in its yield to maturity. Duration summarizes, in a single number, the characteristics that cause bond prices to change in response to a change in interest rates. For example, the price of a bond with a duration of three years will rise by approximately 3% for each 1% decrease in its yield to maturity. Conversely, the price will decrease 3% for each 1% increase in the bond's yield. Price changes for two different bonds can be compared using duration. A bond with a duration of six years will exhibit twice the percentage price change of a bond with a three-year duration. The actual calculation of a bond's duration is somewhat complicated, but the idea behind the calculation is straightforward. The first step is to measure the time interval until receipt for each cash flow (coupon and principal payments) from a bond. The second step is to compute a weighted average of these time intervals. Each time interval is measured by the present value of that cash flow. This weighted average is the duration of the bond measured in years.

Information Ratio: This statistic is a measure of the consistency of a portfolio's performance relative to a benchmark. It is calculated by subtracting the benchmark return from the portfolio return (excess return), and dividing the resulting excess return by the standard deviation (volatility) of this excess return. A positive information ratio indicates outperformance versus the benchmark, and the higher the information ratio, the more consistent the outperformance.

Jensen's Alpha: A measure of the average return of a portfolio or investment in excess of what is predicted by its beta or "market" risk. Portfolio Return- [Risk Free Rate+Beta*(market return-Risk Free Rate)].

Market Capitalization: For a firm, market capitalization is the total market value of outstanding common stock. For a portfolio, market capitalization is the sum of the capitalization of each company weighted by the ratio of holdings in that company to total portfolio holdings; thus it is a weighted-average capitalization. Meketa Investment Group considers the largest 65% of the broad domestic equity market as large capitalization, the next 25% of the market as medium capitalization, and the smallest 10% of stocks as small capitalization.

Market Weighted: Stocks in many indices are weighted based on the total market capitalization of the issue. Thus, the individual returns of higher market-capitalization issues will more heavily influence an index's return than the returns of the smaller market-capitalization issues in the index.

Maturity: The date on which a loan, bond, mortgage, or other debt/security becomes due and is to be paid off.

Prepayment Risk: The risk that prepayments will increase (homeowners will prepay all or part of their mortgage) when mortgage interest rates decline; hence, investors' monies will be returned to them in a lower interest rate environment. Also, the risk that prepayments will slow down when mortgage interest rates rise; hence, investors will not have as much money as previously anticipated in a higher interest rate environment. A prepayment is any payment in excess of the scheduled mortgage payment.

Price-Book Value (P/B) Ratio: The current market price of a stock divided by its book value per share. Meketa Investment Group calculates P/B as the current price divided by Compustat's quarterly common equity. Common equity includes common stock, capital surplus, retained earnings, and treasury stock adjusted for both common and nonredeemable preferred stock. Similar to high P/E stocks, stocks with high P/B's tend to be riskier investments.

Price-Earnings (P/E) Ratio: A stock's market price divided by its current or estimated future earnings. Lower P/E ratios often characterize stocks in low growth or mature industries, stocks in groups that have fallen out of favor, or stocks of established blue chip companies with long records of stable earnings and regular dividends. Sometimes a company that has good fundamentals may be viewed unfavorably by the market if it is an industry that

is temporarily out of favor. Or a business may have experienced financial problems causing investors to be skeptical about is future. Either of these situations would result in lower relative P/E ratios. Some stocks exhibit above-average sales and earnings growth or expectations for above average growth. Consequently, investors are willing to pay more for these companies' earnings, which results in elevated P/E ratios. In other words, investors will pay more for shares of companies whose profits, in their opinion, are expected to increase faster than average. Because future events are in no way assured, high P/E stocks tend to be riskier and more volatile investments. Meketa Investment Group calculates P/E as the current price divided by the I/B/E/S consensus of twelve-month forecast earnings per share.

Quality Rating: The rank assigned a security by such rating services as Fitch, Moody's, and Standard & Poor's. The rating may be determined by such factors as (1) the likelihood of fulfillment of dividend, income, and principal payment of obligations; (2) the nature and provisions of the issue; and (3) the security's relative position in the event of liquidation of the company. Bonds assigned the top four grades (AAA, AA, A, BBB) are considered investment grade because they are eligible bank investments as determined by the controller of the currency.

Sharpe Ratio: A commonly used measure of risk-adjusted return. It is calculated by subtracting the risk free return (usually three-month Treasury bill) from the portfolio return and dividing the resulting excess return by the portfolio's total risk level (standard deviation). The result is a measure of return per unit of total risk taken. The higher the Sharpe ratio, the better the fund's historical risk adjusted performance.

Standard Deviation: A measure of the total risk of an asset or a portfolio. Standard deviation measures the dispersion of a set of numbers around a central point (e.g., the average return). If the standard deviation is small, the distribution is concentrated within a narrow range of values. For a normal distribution, about two thirds of the observations will fall within one standard deviation of the mean, and 95% of the observations will fall within two standard deviations of the mean.

STIF Account: Short-term investment fund at a custodian bank that invests in cash-equivalent instruments. It is generally used to safely invest the excess cash held by portfolio managers.

Style: The description of the type of approach and strategy utilized by an investment manager to manage funds. For example, the style for equities is determined by portfolio characteristics such as price-to-book value, price-to-earnings ratio, and dividend yield. Equity styles include growth, value, and core.

Yield to Maturity: The yield, or return, provided by a bond to its maturity date; determined by a mathematical process, usually requiring the use of a "basis book." For example, a 5% bond pays $5 a year interest on each $100 par value. To figure its current yield, divide $5 by $95—the market price of the bond—and you get 5.26%. Assume that the same bond is due to mature in five years. On the maturity date, the issuer is pledged to pay $100 for the bond that can be bought now for $95. In other words, the bond is selling at a discount of 5% below par value. To figure yield to maturity, a simple and approximate method is to divide 5% by the five years to maturity, which equals 1% pro rata yearly. Add that 1% to the 5.26% current yield, and the yield to maturity is roughly 6.26%.

$$\frac{\text{5\% (discount)}}{\text{5 (yrs. to maturity)}} = \text{1\% pro rata, plus 5.26\% (current yield)} = \text{6.26\% (yield to maturity)}$$

Sources: Investment Terminology, International Foundation of Employee Benefit Plans, 1999.
The Handbook of Fixed Income Securities, Fabozzi, Frank J., 1991.

Notes

The Russell Indices®, TM, SM are trademarks/service marks of the Frank Russell Company.

Throughout this report, numbers may not sum due to rounding.

Returns for periods greater than one year are annualized throughout this report.

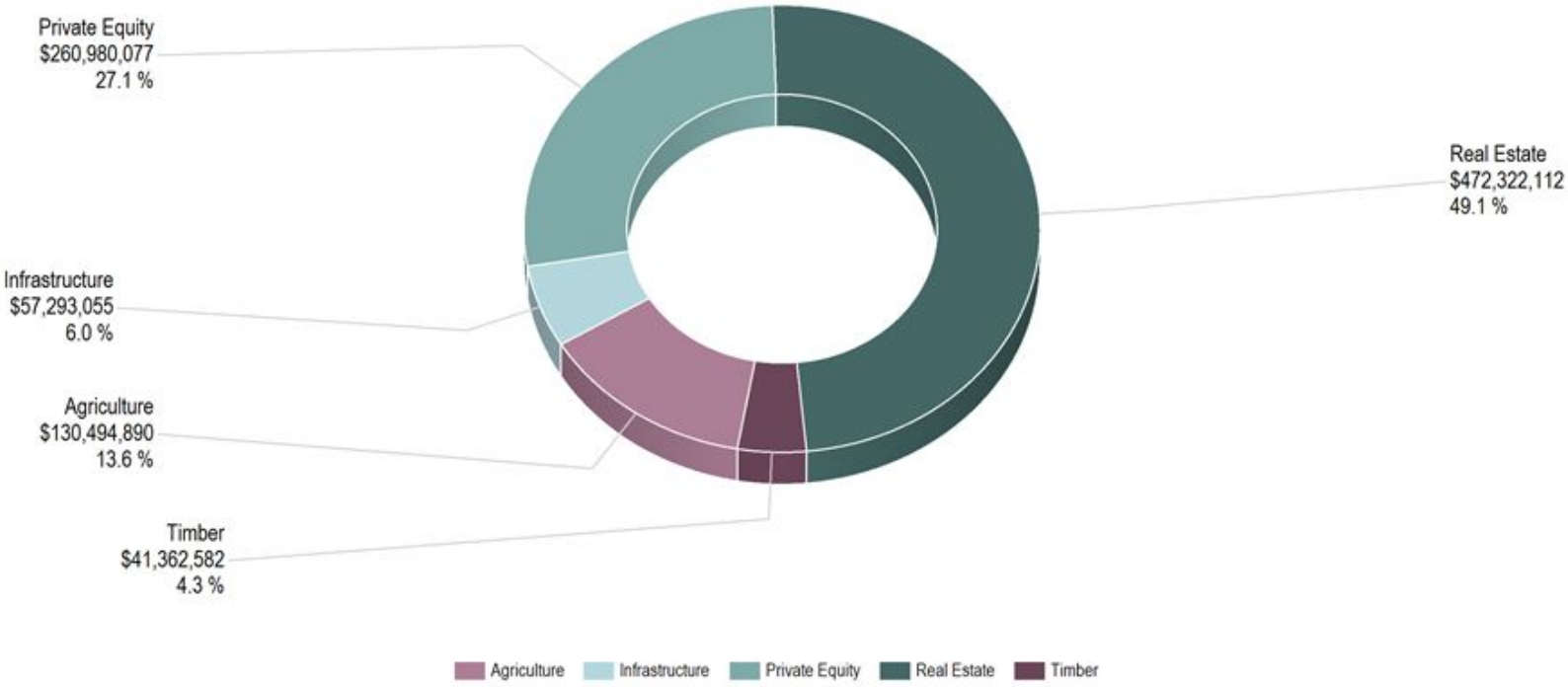
Values shown are in millions of dollars, unless noted otherwise.

FUND EVALUATION REPORT

Dallas Police & Fire Pension System

Private Markets Review
As of September 30, 2018

Private Market Investments as of September 30, 2018
Market Value Allocation by Asset Class



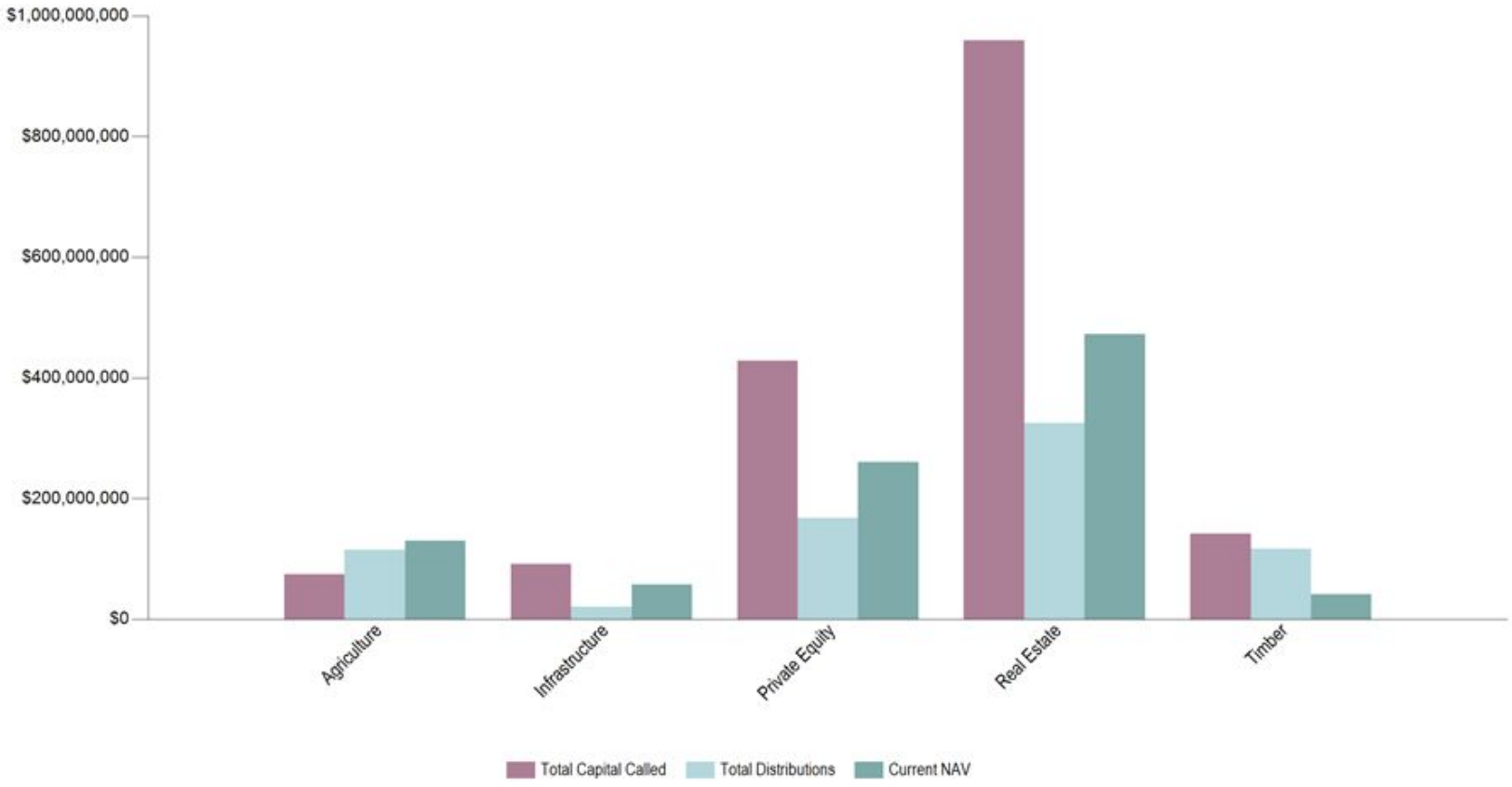
1. Private Equity is composed of Private Equity and Private Debt

Dallas Police & Fire Pension System

Private Markets Review

As of September 30, 2018

Private Market Investments as of September 30, 2018
Total Capital Called, Distributions, and Current NAV by Asset Class

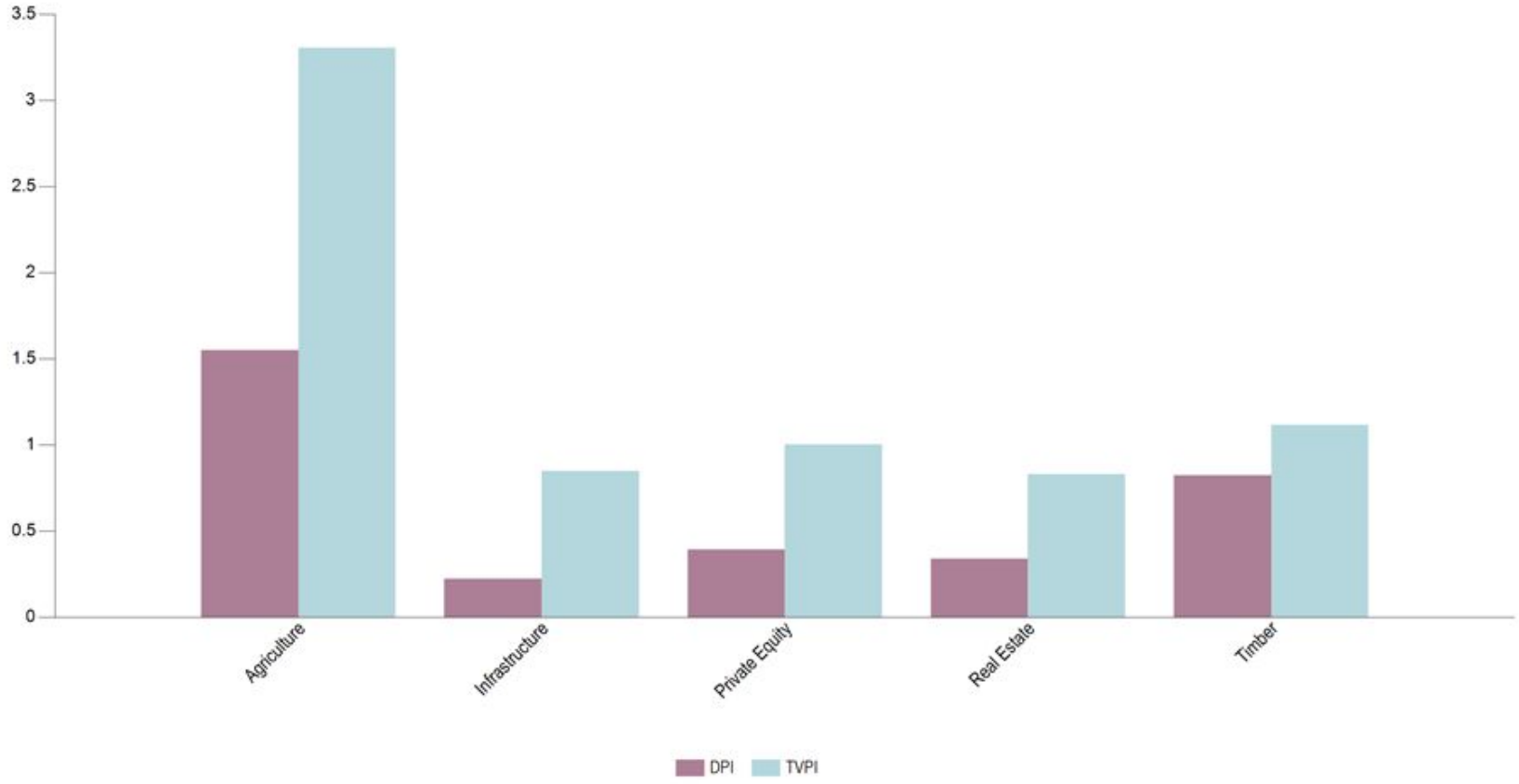


1. Private Equity is composed of Private Equity and Private Debt
2. Private markets performance reflected is composed of active investments only

Private Markets Review

As of September 30, 2018

Private Market Investments as of September 30, 2018
DPI and TVPI by Asset Class



1. Private Equity is composed of Private Equity and Private Debt
2. Private markets performance reflected is composed of active investments only

Dallas Police & Fire Pension System

Private Markets Review

As of September 30, 2018

Private Market Investments Overview

Active Funds	Commitments		Distributions & Valuations				Performance			
Asset Class	Commitment ($)	Paid In Capital ($)	Distributions ($)	Valuation ($)	Total Value ($)	Unrealized Gain/Loss ($)	Call Ratio	DPI	TVPI	IRR (%)
Total Agriculture	74,420,001	74,420,001	115,359,132	130,494,890	245,854,022	171,434,021	1.00	1.55	3.30	15.18
Total Infrastructure	97,000,000	92,070,029	20,964,199	57,293,055	78,257,254	-13,812,775	0.95	0.23	0.85	-3.51
Total Private Equity	414,034,369	440,605,982	168,279,129	260,980,077	429,259,205	-11,346,776	1.06	0.38	0.97	1.25
Total Real Estate	970,210,362	959,560,842	325,621,496	472,322,112	797,943,608	-161,617,233	0.99	0.34	0.83	-2.89
Total Timber	141,567,547	141,567,547	116,830,209	41,362,582	158,192,791	16,625,244	1.00	0.83	1.12	2.10
Total	1,697,232,279	1,708,224,401	747,054,165	962,452,716	1,709,506,881	1,282,480	1.01	0.44	1.00	0.41

1. Private Equity is composed of Private Equity and Private Debt
2. Private markets performance reflected is composed of active investments only
3. Commitment value is equal to paid in capital for direct investments made outside of a traditional limited partnership fund structure.

Dallas Police & Fire Pension System

Active Funds with Unfunded Commitments Overview

As of September 30, 2018

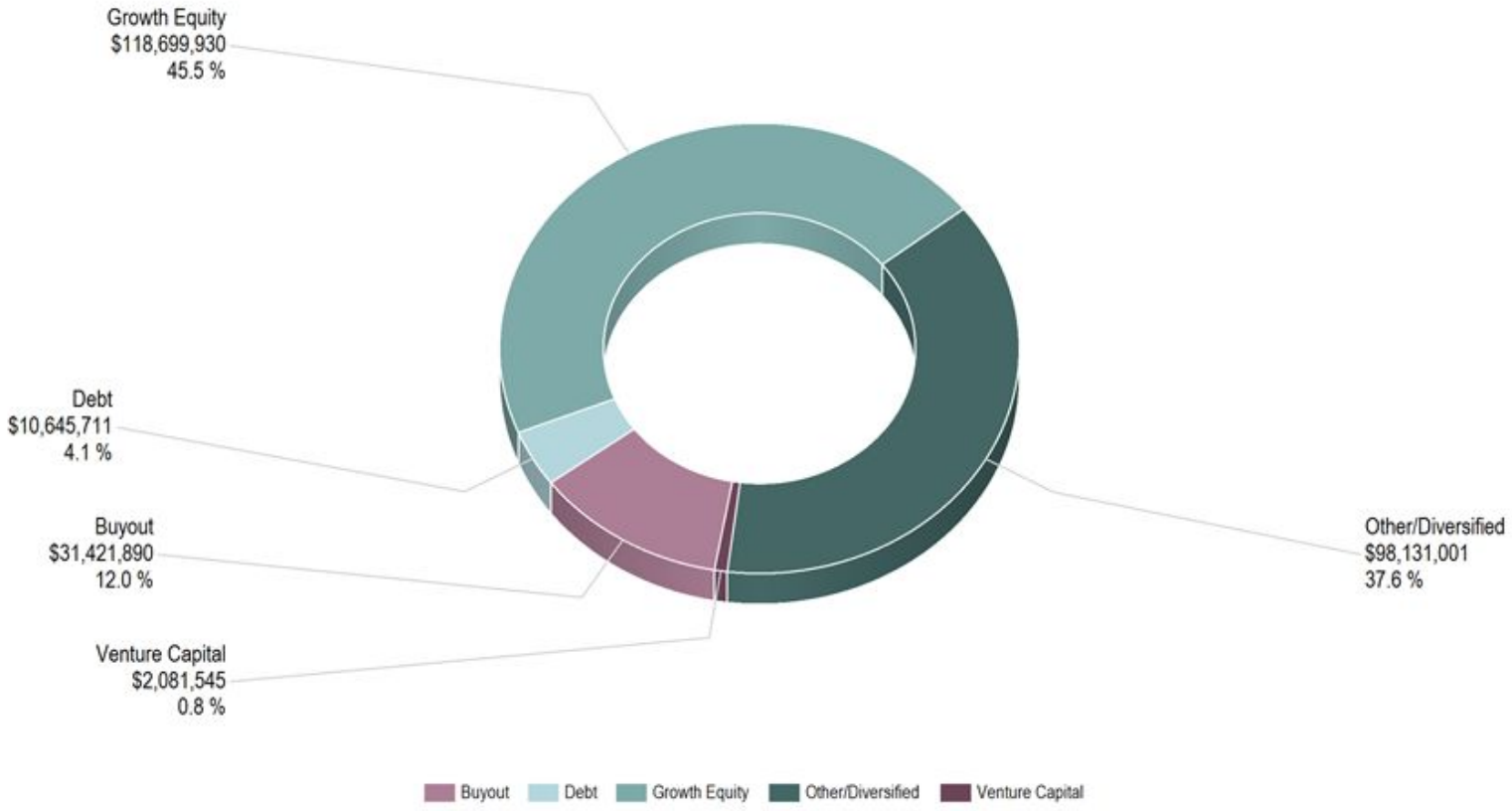
Active Funds with Unfunded Commitments

Active Funds		Commitments		
Investment Name	**Vintage Year**	**Commitment ($)**	**Paid In Capital ($)**	**Unfunded Commitment ($)**
Infrastructure				
JP Morgan Asian Infrastructure	2008	37,000,000	36,408,196	221,900
JP Morgan Asian Infrastructure & Related Resources II	2013	10,000,000	7,048,417	2,539,271
JP Morgan Maritime Fund, LP	2009	50,000,000	48,613,416	1,365,941
Total Infrastructure		**97,000,000**	**92,070,029**	**4,127,112**
Private Equity				
Huff Energy Fund LP	2006	100,000,000	98,932,684	119,985
Industry Ventures Partnership IV	2016	5,000,000	1,725,000	3,275,000
Lone Star Growth Capital	2006	16,000,000	26,560,000	2,240,000
Riverstone Credit Partners LP	2016	10,000,000	10,613,522	2,690,092
Yellowstone Capital	2008	5,283,254	5,112,307	170,947
Total Private Equity		**136,283,254**	**142,943,513**	**8,496,024**
Real Estate				
Hearthstone MS II Homebuilding Investors	1999	10,000,000	7,973,058	1,008,131
Hearthstone MS III Homebuilding Investors	2003	10,000,000	1,221,446	1,278,554
Total Real Estate		**20,000,000**	**9,194,504**	**2,286,685**
Total		**253,283,254**	**244,208,046**	**14,909,821**

1. Private markets performance reflected is composed of active investments only
2. The funds and figures above represent investments with unfunded capital commitments
3. Lone Star valuations as directed by Dallas Police and Fire investment staff
4. Commitment value is equal to paid in capital for direct investments made outside of a traditional limited partnership fund structure.

As of September 30, 2018

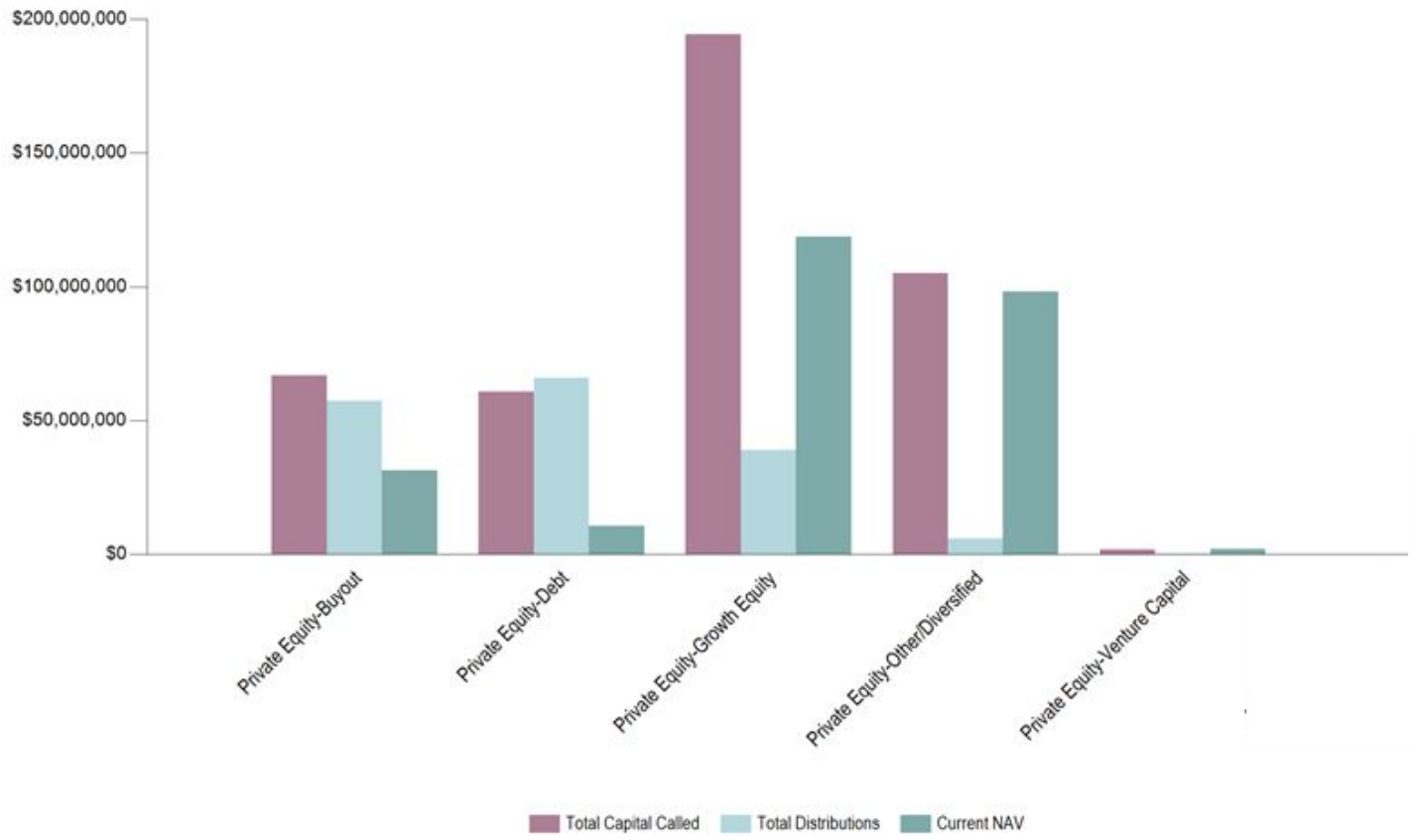
Private Equity and Debt Investments as of September 30, 2018
Market Value Allocation by Strategy



Private Equity and Debt

As of September 30, 2018

Private Equity and Debt Investments as of September 30, 2018
Total Capital Called, Distributions, and Current NAV by Strategy



1. Private markets performance reflected is composed of active investments only

Private Equity and Debt

As of September 30, 2018

Private Equity and Debt Investments as of September 30, 2018
DPI and TVPI by Strategy

1. Private markets performance reflected is composed of active investments only

Dallas Police & Fire Pension System

Private Equity and Debt

As of September 30, 2018

Private Equity and Debt Investments Overview

Active Funds		Commitments		Distributions & Valuations				Performance			
Investment Name	Vintage Year	Commitment ($)	Paid In Capital ($)	Distributions ($)	Valuation ($)	Total Value ($)	Unrealized Gain/Loss ($)	Call Ratio	DPI	TVPI	IRR (%)
Buyout											
Huff Alternative Fund	2000	66,795,718	78,818,394	57,386,716	31,421,890	88,808,606	9,990,212	1.18	0.73	1.13	1.66
Total Buyout		**66,795,718**	**78,818,394**	**57,386,716**	**31,421,890**	**88,808,606**	**9,990,212**	**1.18**	**0.73**	**1.13**	**1.66**
Debt											
Highland Crusader Fund	2003	50,955,397	50,955,397	62,263,032	2,679,741	64,942,773	13,987,376	1.00	1.22	1.27	4.25
Riverstone Credit Partners LP	2016	10,000,000	10,613,522	3,716,969	7,965,970	11,682,939	1,069,417	1.06	0.35	1.10	11.59
Total Debt		**60,955,397**	**61,568,919**	**65,980,001**	**10,645,711**	**76,625,712**	**15,056,793**	**1.01**	**1.07**	**1.24**	**4.48**
Growth Equity											
Hudson Clean Energy	2009	25,000,000	24,994,470	3,671,932	5,223,115	8,895,047	-16,099,423	1.00	0.15	0.36	-15.61
Lone Star CRA	2008	50,000,000	57,696,646	12,928,698	70,073,832	83,002,530	25,305,884	1.15	0.22	1.44	15.21
Lone Star Growth Capital	2006	16,000,000	26,560,000	12,800,000	15,359,684	28,159,684	1,599,684	1.66	0.48	1.06	1.88
Lone Star Opportunities V	2012	75,000,000	75,000,000	531,444	26,457,213	26,988,657	-48,011,343	1.00	0.01	0.36	-61.43
North Texas Opportunity Fund	2000	10,000,000	10,000,000	9,023,910	1,586,086	10,609,996	609,996	1.00	0.90	1.06	0.68
Total Growth Equity		**176,000,000**	**194,251,116**	**38,955,984**	**118,699,930**	**157,655,914**	**-36,595,202**	**1.10**	**0.20**	**0.81**	**-5.26**
Other/Diversified											
Huff Energy Fund LP	2006	100,000,000	98,932,684	4,477,394	98,024,233	102,501,627	3,568,943	0.99	0.05	1.04	0.43
Yellowstone Capital	2008	5,283,254	5,112,307	1,458,572	106,768	1,565,340	-3,546,967	0.97	0.29	0.31	-26.79
Total Other/Diversified		**105,283,254**	**104,044,991**	**5,935,966**	**98,131,001**	**104,066,967**	**21,976**	**0.99**	**0.06**	**1.00**	**0.00**
Venture Capital											
Industry Ventures Partnership IV	2016	5,000,000	1,725,000	20,462	2,081,545	2,102,007	377,007	0.35	0.01	1.22	14.01
Total Venture Capital		**5,000,000**	**1,725,000**	**20,462**	**2,081,545**	**2,102,007**	**377,007**	**0.35**	**0.01**	**1.22**	**14.01**
Unclassified											
Miscellaneous Private Equity Expenses	2016		197,562								
Total Unclassified			**197,562**								
Total		**414,034,369**	**440,605,982**	**168,279,129**	**260,980,077**	**429,259,205**	**-11,346,776**	**1.06**	**0.38**	**0.97**	**1.25**

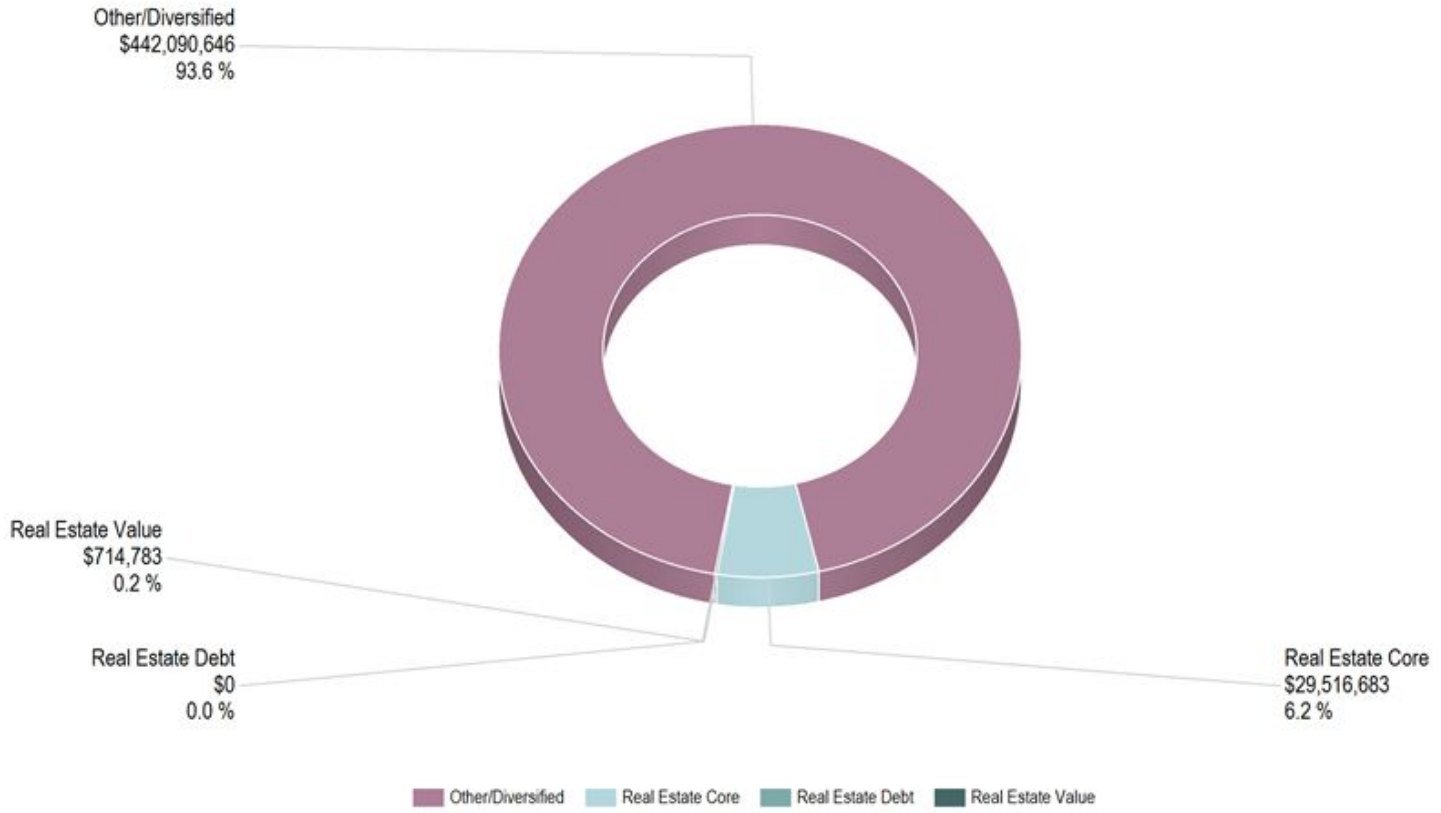
1. Private markets performance reflected is composed of active investments only

2. Lone Star valuations as directed by Dallas Police and Fire Investment staff 3. Commitment value is equal to paid in capital for direct investments made outside of a traditional limited partnership fund structure.

Real Estate

As of September 30, 2018

Real Estate Investments as of September 30, 2018
Market Value Allocation by Strategy

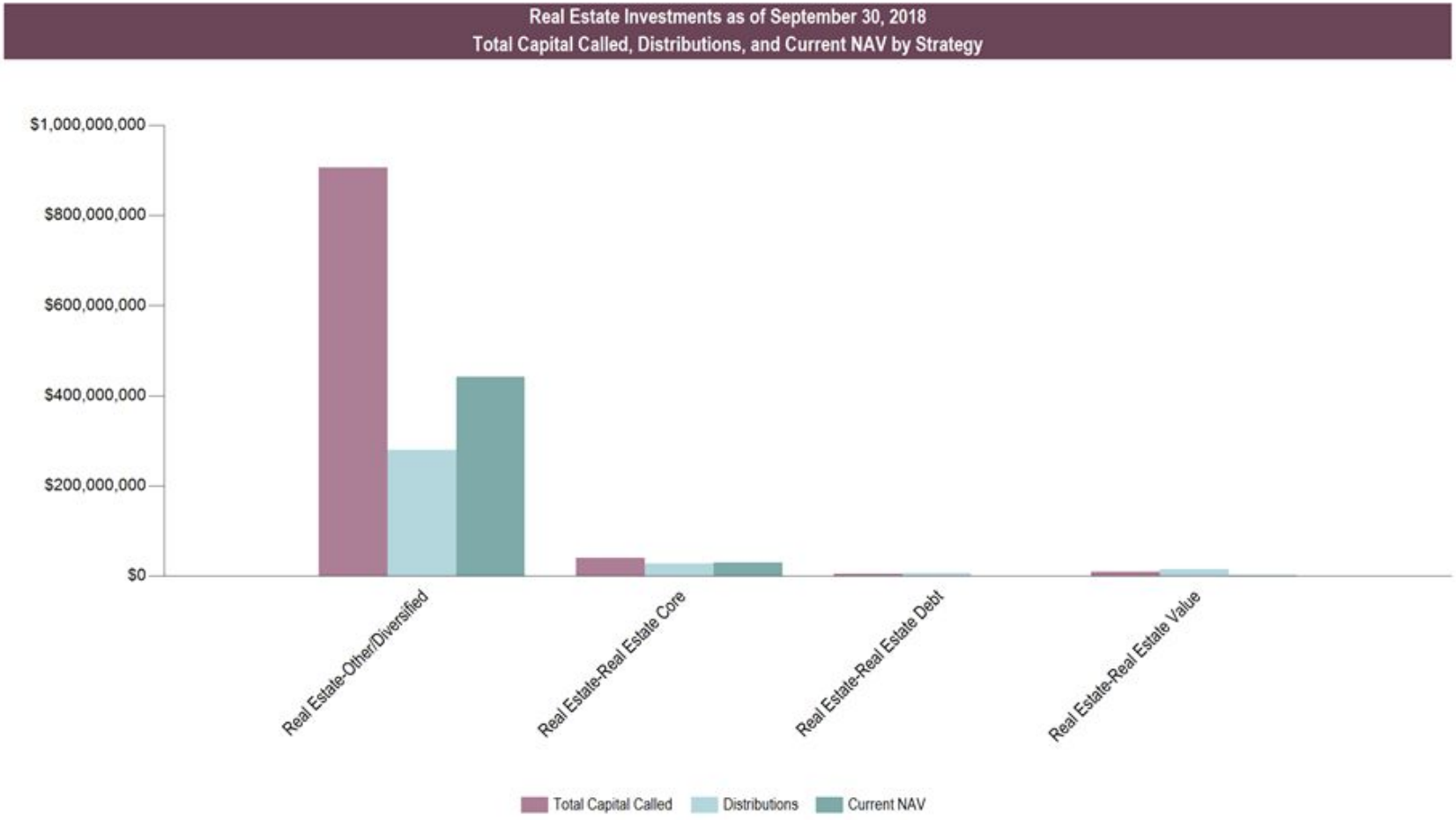


1. Other/Diversified is composed of direct real estate investments made by the fund

Dallas Police & Fire Pension System

Real Estate

As of September 30, 2018



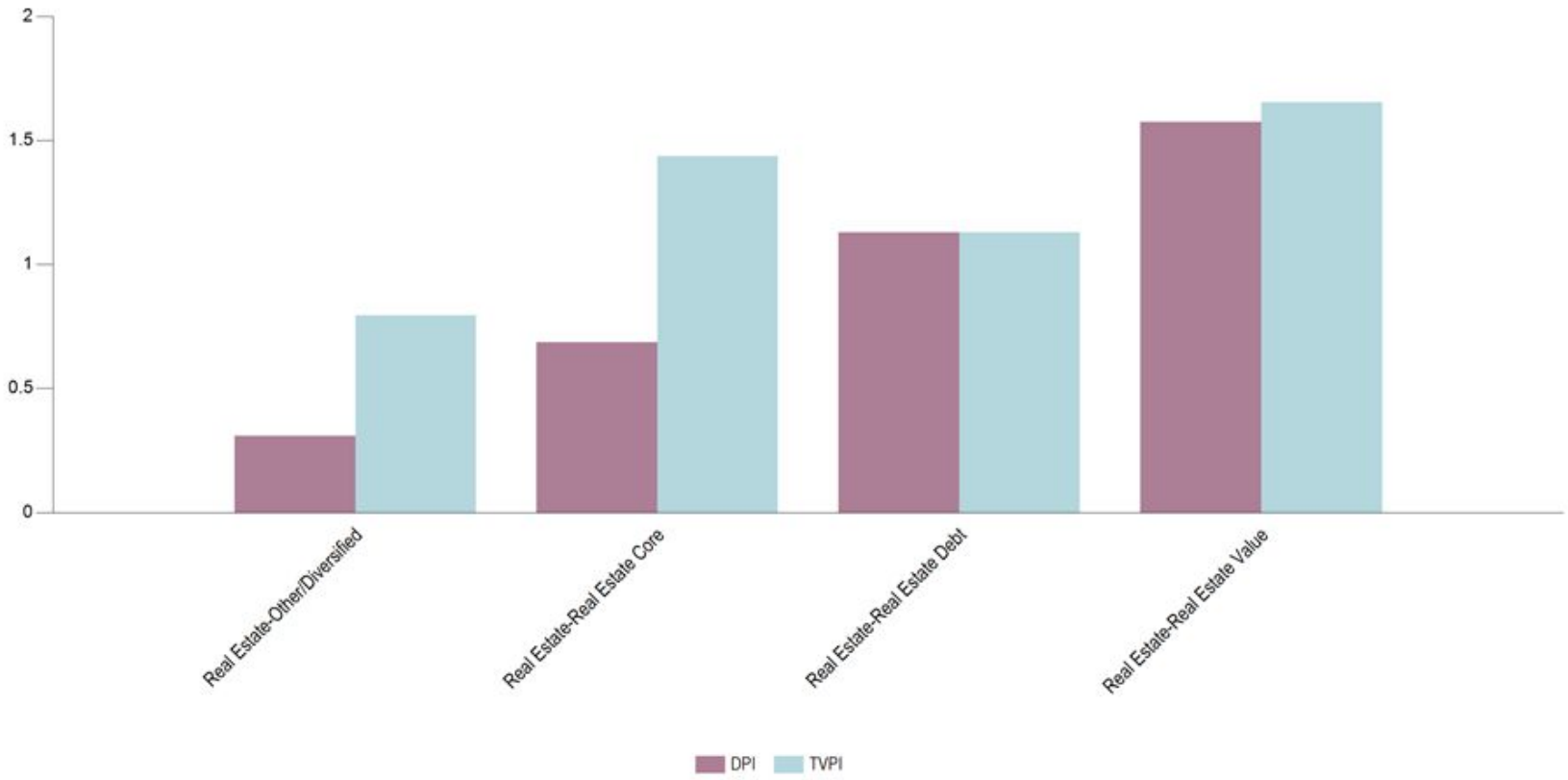
1. Other/Diversified is composed of direct real estate investments made by the fund
2. Private markets performance reflected is composed of active investments only

Dallas Police & Fire Pension System

Real Estate

As of September 30, 2018

Real Estate Investments as of September 30, 2018
DPI and TVPI Call Ratio by Strategy



1. Other/Diversified is composed of direct real estate investments made by the fund
2. Private markets performance reflected is composed of active investments only

As of September 30, 2018

Real Estate Investments Overview

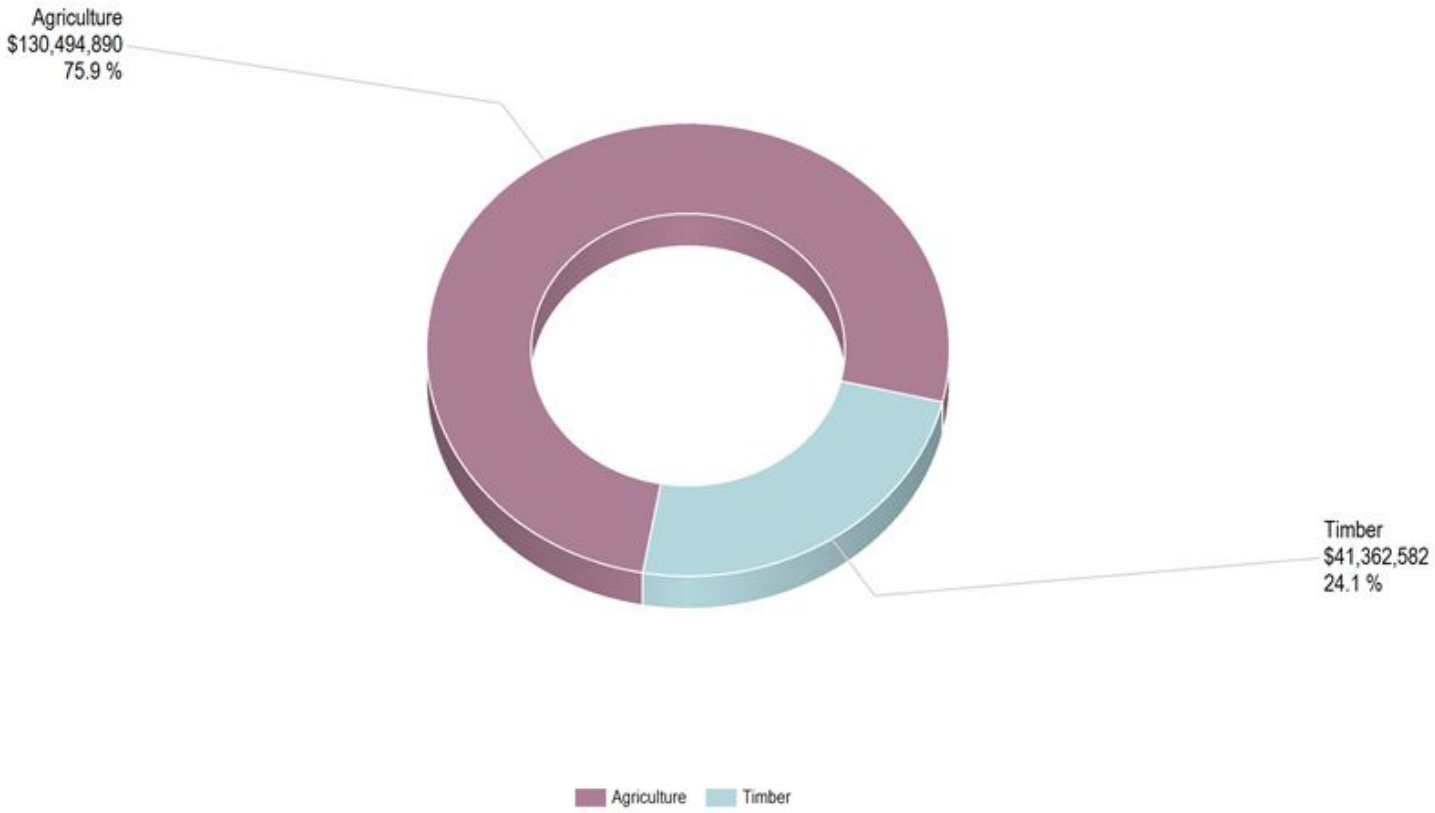
Active Funds	Commitments		Valuations				Performance			
Investment Name	Commitment ($)	Paid In Capital ($)	Distributions ($)	Valuation ($)	Total Value ($)	Unrealized Gain/Loss ($)	Call Ratio	DPI	TVPI	IRR (%)
Total Other/Diversified	906,421,230	906,421,230	278,549,512	442,090,646	720,640,158	-185,781,072	1.00	0.31	0.80	-3.48
Real Estate Core										
Total Real Estate Core	39,289,132	39,289,132	26,942,265	29,516,683	56,458,948	17,169,816	1.00	0.69	1.44	5.75
Real Estate Debt										
Total Real Estate Debt	4,500,000	4,500,000	5,082,785	0	5,082,785	582,785	1.00	1.13	1.13	5.75
Real Estate Value										
Total Real Estate Value	20,000,000	9,194,504	14,487,455	714,783	15,202,238	6,007,734	0.46	1.58	1.65	25.94
Total	970,210,362	959,560,842	325,621,496	472,322,112	797,943,608	-161,617,233	0.99	0.34	0.83	-2.89

1. Private markets performance reflected is composed of active investments only
2. Tucson Loan and Museum Tower valuations as directed by Dallas Police and Fire investment staff
3. Commitment value is equal to paid in capital for direct investments made outside of a traditional Limited Partnership fund structure

Natural Resources

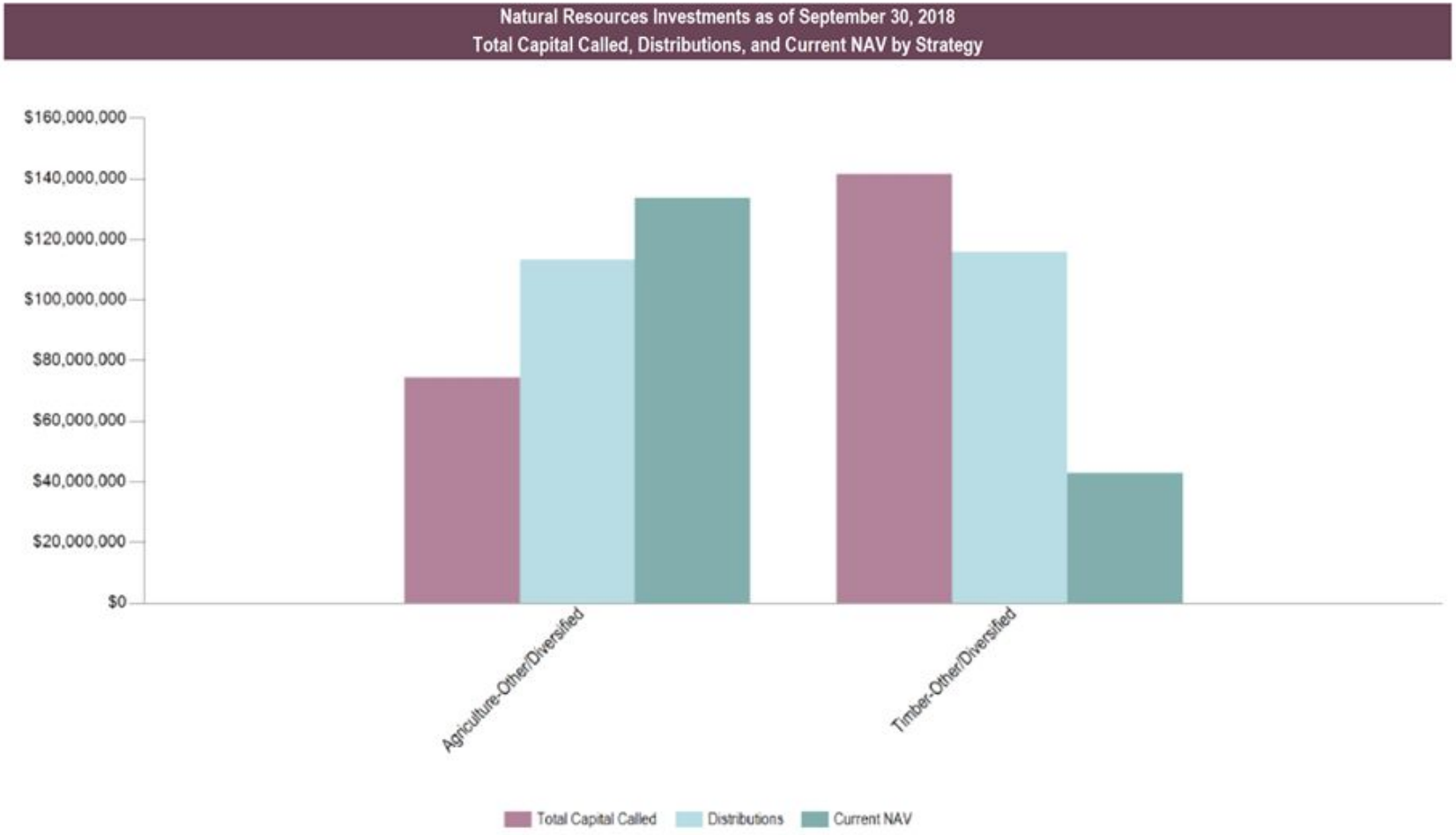
As of September 30, 2018

Natural Resources Investments as of September 30, 2018
Market Value Allocation by Asset Class



Natural Resources

As of September 30, 2018

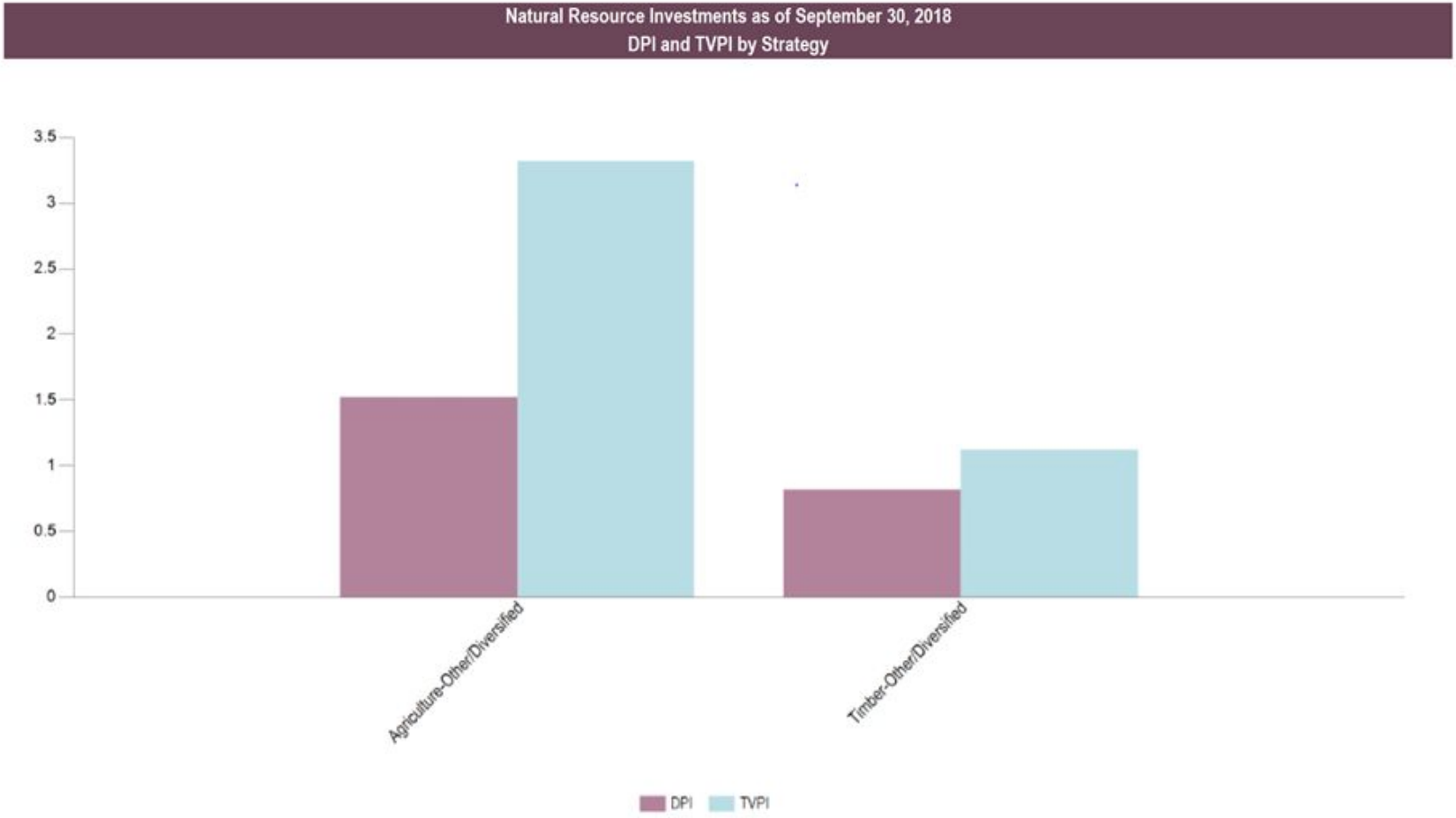


1. Timber 'Other/Diversified' is composed of domestic and global timber exposure.
2. Agriculture 'Other/Diversified' is composed of permanent and row crops exposure.
3. Private markets performance reflected is composed of active investments only

Dallas Police & Fire Pension System

Natural Resources

As of September 30, 2018



1. Timber 'Other/Diversified' is composed of domestic and global timber exposure.
2. Agriculture 'Other/Diversified' is composed of permanent and row crops exposure.
3. Private markets performance reflected is composed of active investments only

Dallas Police & Fire Pension System

Natural Resources

As of September 30, 2018

Natural Resource Investments Overview

Active Funds		Commitments		Valuations				Performance			
Investment Name	**Vintage Year**	**Commitment ($)**	**Paid In Capital ($)**	**Distributions ($)**	**Valuation ($)**	**Total Value ($)**	**Unrealized Gain/Loss ($)**	**Call Ratio**	**DPI**	**TVPI**	**IRR (%)**
Agriculture											
Hancock Agricultural	1998	74,420,001	74,420,001	115,359,132	130,494,890	245,854,022	171,434,021	1.00	1.55	3.30	15.18
Total Agriculture		**74,420,001**	**74,420,001**	**115,359,132**	**130,494,890**	**245,854,022**	**171,434,021**	**1.00**	**1.55**	**3.30**	**15.18**
Timber											
BTG Pactual	2006	81,917,851	81,917,851	16,500,000	32,634,514	49,134,514	-32,783,337	1.00	0.20	0.60	-8.04
Forest Investment Associates	1992	59,649,696	59,649,696	100,330,209	8,728,068	109,058,277	49,408,581	1.00	1.68	1.83	7.72
Total Timber		**141,567,547**	**141,567,547**	**116,830,209**	**41,362,582**	**158,192,791**	**16,625,244**	**1.00**	**0.83**	**1.12**	**2.10**
Total		**215,987,548**	**215,987,548**	**232,189,341**	**171,857,472**	**404,046,813**	**188,059,265**	**1.00**	**1.08**	**1.87**	**9.06**

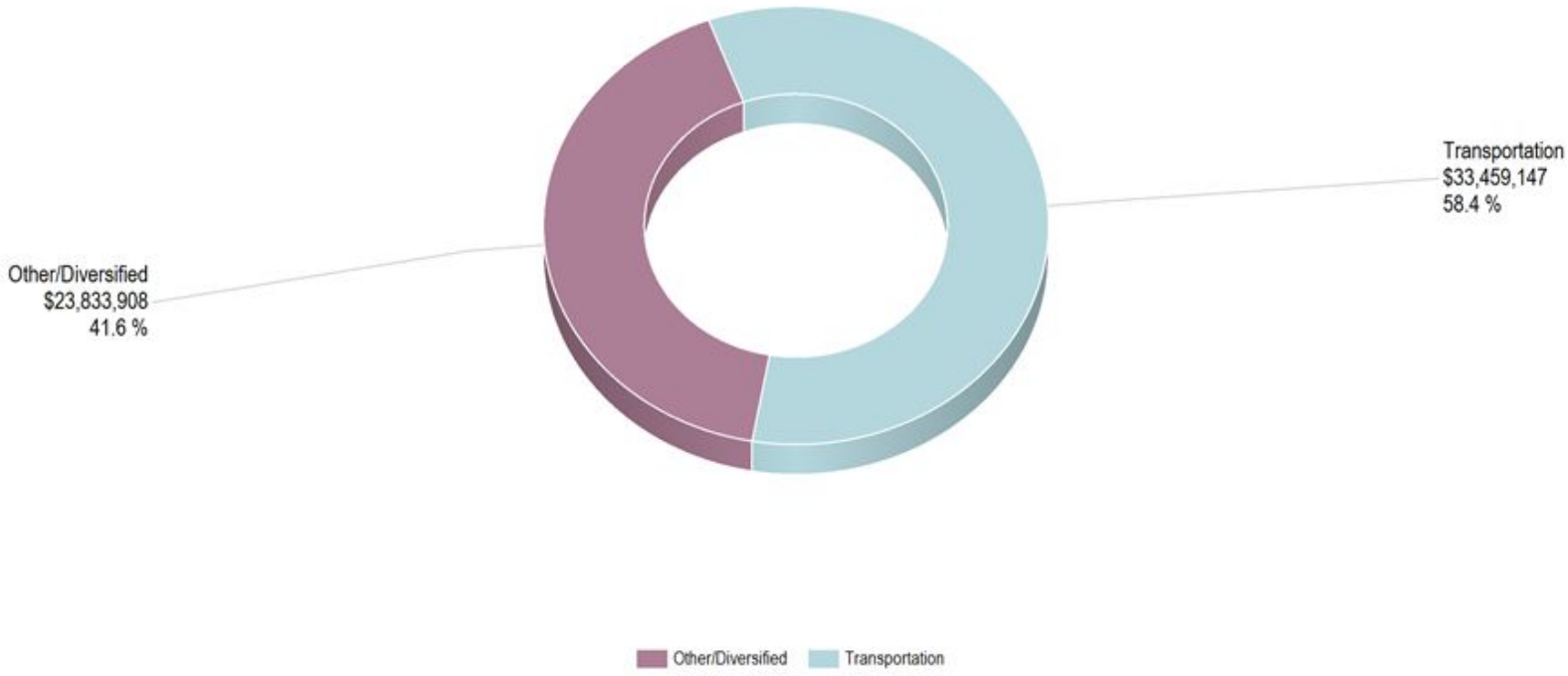
1. Private markets performance reflected is composed of active investments only

2. Commitment value is equal to paid in capital for direct investments made outside of a traditional limited partnership fund structure.

Infrastructure

As of September 30, 2018

Infrastructure Investments as of September 30, 2018
Market Value Allocation by Strategy

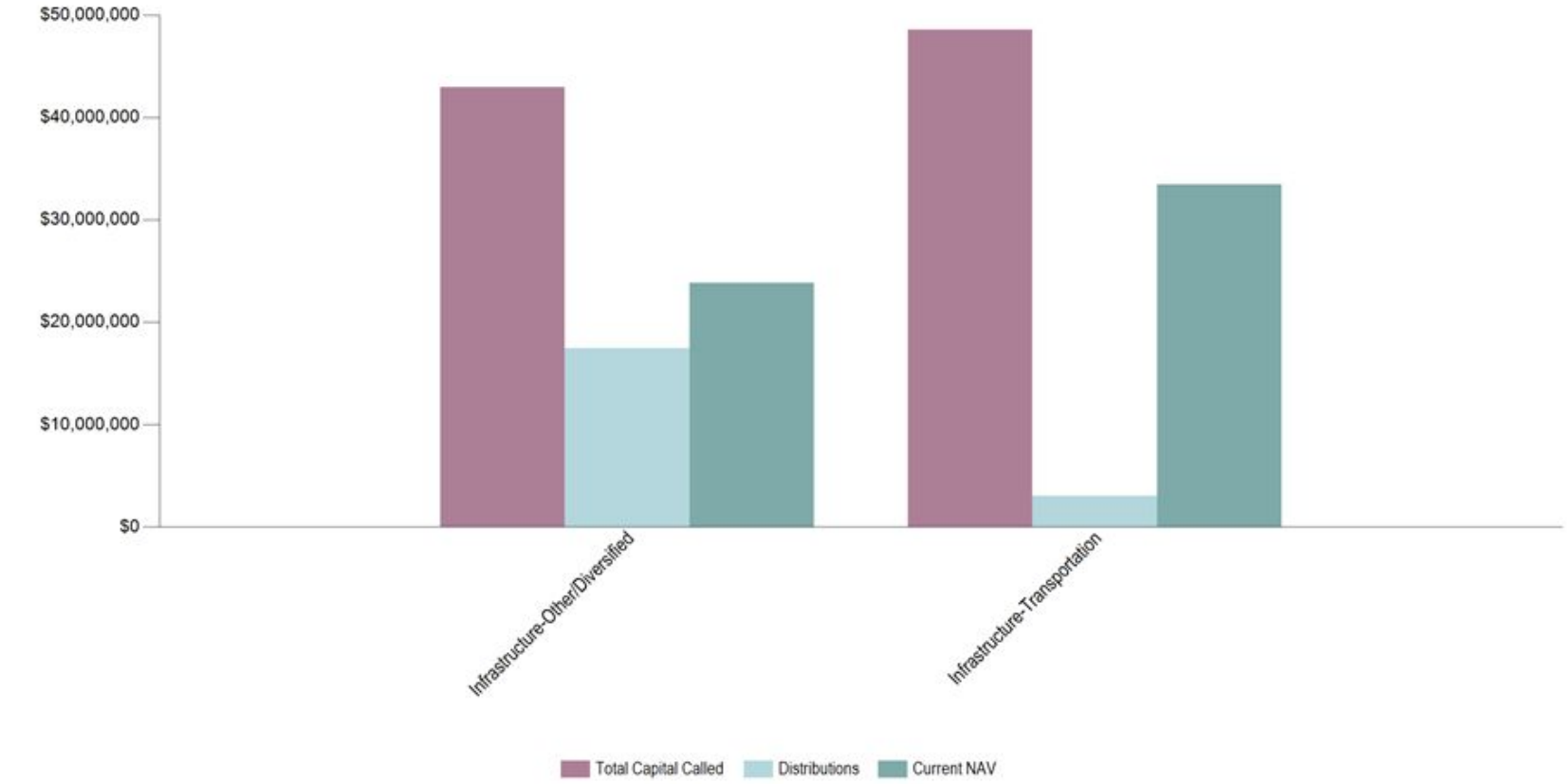


1.'Other/Diversified' is composed of various operating and developing infrastructure project exposure

Infrastructure

As of September 30, 2018

Infrastructure Investments as of September 30, 2018
Total Capital Called, Distributions, and Current NAV by Strategy



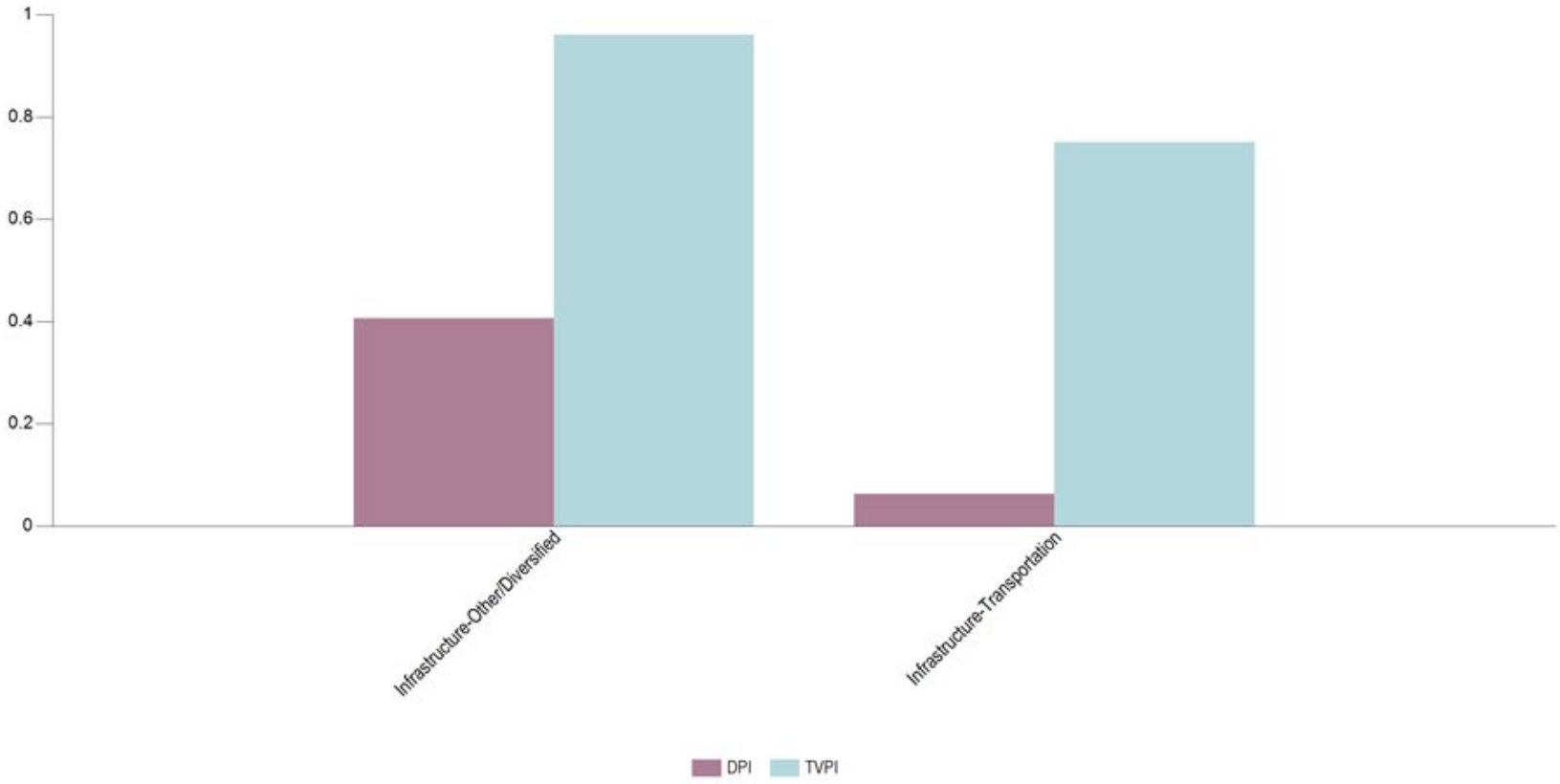
1'Other/Diversified' is composed of various operating and developing infrastructure project exposure
2. Private markets performance reflected is composed of active investments only

Dallas Police & Fire Pension System

Infrastructure

As of September 30, 2018

Infrastructure Investments as of September 30, 2018
DPI and TVPI by Strategy



1'Other/Diversified' is composed of various operating and developing infrastructure project exposure
2. Private markets performance reflected is composed of active investments only

Infrastructure

As of September 30, 2018

Infrastructure Investments Overview

Active Funds		Commitments		Distributions & Valuations				Performance			
Investment Name	Vintage Year	Commitment ($)	Paid In Capital ($)	Distributions ($)	Valuation ($)	Total Value ($)	Unrealized Gain/Loss ($)	Call Ratio	DPI	TVPI	IRR (%)
Infrastructure											
JP Morgan Asian Infrastructure	2008	37,000,000	36,408,196	17,873,234	19,515,910	37,389,144	980,948	0.98	0.49	1.03	0.44
JP Morgan Asian Infrastructure & Related Resources II	2013	10,000,000	7,048,417	58,731	4,317,998	4,376,729	-2,671,688	0.70	0.01	0.62	-9.56
JP Morgan Maritime Fund, LP	2009	50,000,000	48,613,416	3,032,234	33,459,147	36,491,381	-12,122,035	0.97	0.06	0.75	-7.60
Total Infrastructure		**97,000,000**	**92,070,029**	**20,964,199**	**57,293,055**	**78,257,254**	**-13,812,775**	**0.95**	**0.23**	**0.85**	**-3.51**

1. Private markets performance reflected is composed of active investments only

Private Markets Review
List of Completed Funds

Dallas Police & Fire Pension System

Private Markets Review

As of September 30, 2018

Total Real Assets Program[1]

Completed Funds	Vintage Year	Commitment Amount	Paid in Capital	Capital to be Funded	Addtnl Fees	Cumulative Distributions	Valuation	Total Value	Unrealized Gain/Loss	DPI Ratio	TVPI Ratio	IRR
AEW Creative Holdings	2007	13,035,849	13,035,849	0	0	0	0	0	-13,035,849	0.00	0.00	N/A
BTG U.S. Timberland	2007	22,230,000	22,230,000	0	0	33,065,920	0	33,065,920	10,835,920	1.49	1.49	4.82%
CDK Multifamily I	2014	10,559,876	10,617,376	0	0	10,025,434	0	10,025,434	-591,942	0.94	0.94	-1.99%
Clarion 1210 South Lamar	2014	10,500,000	10,201,489	0	0	13,214,065	0	13,214,065	3,012,576	1.30	1.30	12.85%
Clarion 4100 Harry Hines Land	2006	3,088,810	3,092,788	0	0	3,641,946	0	3,641,946	549,158	1.18	1.18	1.69%
Clarion Beat Lofts	2005	8,729,783	8,730,183	0	0	1,137,817	0	1,137,817	-7,592,366	0.13	0.13	-30.76%
Clarion Four Leaf	2005	16,892,767	16,892,767	0	0	3,733,148	0	3,733,148	-13,159,619	0.22	0.22	-39.69%
Hearthstone Dry Creek	2005	52,303,043	52,303,043	0	0	8,973,059	0	8,973,059	-43,329,984	0.17	0.17	-38.78%
Hearthstone Nampa	2006	11,666,284	11,666,284	0	0	2,562,654	0	2,562,654	-9,103,630	0.22	0.22	-31.90%
JP Morgan Infrastructure Investments Fund	2007	37,000,000	37,000,000	0	-5,658	44,302,131	0	44,302,131	7,307,789	1.20	1.20	2.48%
L&B Realty Advsiors Beach Walk	2006	33,013,796	33,013,796	0	0	36,752,690	0	36,752,690	3,738,894	1.11	1.11	2.19%
L&B Realty Advisors KO Olina	2008	28,609,658	28,609,658	0	0	30,529,136	0	30,529,136	1,919,478	1.06	1.06	1.11%
L&B Realty Advisors West Bay Villas	2007	8,712,411	8,712,411	0	0	3,785,480	0	3,785,480	-4,926,931	0.43	0.43	-8.29%
LBJ Infrastructure Group Holdings, LLC (LBJ)	2009	50,000,000	44,346,229	0	0	77,892,000	0	77,892,000	33,545,771	1.76	1.76	12.77%
Lone Star Fund III (U.S.), L.P.	2000	20,000,000	19,827,576	0	0	40,701,250	0	40,701,250	20,873,674	2.05	2.05	31.88%
Lone Star Fund IV (U.S.), L.P.	2001	20,000,000	19,045,866	0	0	43,898,442	0	43,898,442	24,852,576	2.30	2.30	30.15%
Lone Star Fund V (U.S.), L.P.	2005	22,500,000	22,275,229	0	0	20,605,895	0	20,605,895	-1,669,334	0.93	0.93	-1.41%
Lone Star Fund VI (U.S.), L.P.	2008	25,000,000	20,034,018	0	0	31,712,968	0	31,712,968	11,678,950	1.58	1.58	21.76%
Lone Star Real Estate Fund (U.S.), L.P.	2008	25,000,000	20,743,769	0	0	25,403,707	0	25,403,707	4,659,938	1.23	1.23	5.15%
Lone Star Real Estate Fund II	2011	25,000,000	22,169,907	0	0	32,789,371	0	32,789,371	10,619,464	1.48	1.48	24.73%
Lone Star Real Estate Fund III	2014	25,000,000	23,490,784	0	0	26,638,028	0	26,638,028	3,147,244	1.13	1.13	8.20%
M&G Real Estate Debt Fund II	2013	29,808,841	21,523,663	0	0	17,088,107	0	17,088,107	-4,435,556	0.79	0.79	-15.04%
NTE 3a-3b	2012	50,000,000	23,794,565	0	0	28,186,978	0	28,186,978	4,392,413	1.18	1.18	16.03%
NTE Mobility Partners Holding, LLC (NTE)	2009	50,000,000	43,397,054	0	0	105,890,000	0	105,890,000	62,492,946	2.44	2.44	19.33%
Olympus II-Hyphen Solutions	2007	836,511	836,511	0	0	1,418,149	0	1,418,149	581,638	1.70	1.70	5.96%
P&F Housing IV	2006	134,015,889	134,015,889	0	0	83,179,802	0	83,179,802	-50,836,087	0.62	0.62	-8.44%
RREEF North American Infrastructure Fund	2007	50,000,000	50,000,000	0	846,289	55,238,755	0	55,238,755	4,392,466	1.09	1.09	12.59%
Sungate	2005	6,481,568	6,481,568	0	0	308,624	0	308,624	-6,172,944	0.05	0.05	-22.30%
Total Completed Funds		**789,985,086**	**728,088,272**	**0**	**840,631**	**782,675,556**	**0**	**782,675,556**	**53,746,653**	**1.07**	**1.07**	

[1] Data on Completed Funds as provided by former investment consultant.

Dallas Police & Fire Pension System

Private Markets Review

As of September 30, 2018

Private Equity & Debt Funds[1]

Completed Funds	Vintage Year	Commitment Amount	Paid in Capital	Capital to be Funded	Additional Fees	Cumulative Distributions	Valuation	Total Value	Unrealized Gain/Loss	DPI Ratio	TVPI Ratio	IRR
Ashmore Global Special Situations Fund IV	2007	70,000,000	70,012,300	0	0	39,652,711	0	39,652,711	-30,359,589	0.57	0.57	-10.12%
BankCap Partners Fund I	2007	20,000,000	20,000,000	0	0	24,960,986	0	24,960,986	4,960,986	1.25	1.25	2.58%
BankCap Partners Opportunity Fund, LP	2013	20,000,000	19,587,052	0	0	18,266,454	0	18,266,454	-1,320,598	0.93	0.93	-5.69%
CDK Southern Cross	2008	1,535,316	1,535,316	0	0	0	0	0	-1,535,316	0.00	0.00	-20.08%
Highland Credit Ops	2006	35,348,165	35,348,165	0	0	29,994,190	0	29,994,190	-5,353,975	0.85	0.85	-2.06%
HM Capital Sector Performance Fund	2008	47,300,000	44,354,248	0	1,933,378	39,792,545	0	39,792,545	-6,495,081	0.86	0.86	-4.01%
Huff Alternative Income Fund	1994	40,000,000	40,000,000	0	2,018,676	66,940,198	0	66,940,198	24,921,522	1.59	1.59	17.82%
Kainos Capital Partners, L.P.	2013	35,000,000	30,316,015	0	0	43,263,688	0	43,263,688	12,947,673	1.43	1.43	24.76%
Levine Leichtman Capital Partners IV	2008	50,000,000	38,009,085	0	0	78,916,788	0	78,916,788	40,907,703	2.08	2.08	20.12%
Levine Leichtman Capital Partners V, L.P.	2013	25,000,000	19,181,272	0	-4,405	24,506,336	0	24,506,336	5,329,469	1.28	1.28	15.26%
Levine Leichtman Deep Value Fund	2006	75,000,000	75,000,000	0	11,025,662	88,688,224	0	88,688,224	2,662,562	1.03	1.03	0.73%
Levin Leichtman Private Capital Solutions II, L.P.	2012	25,000,000	17,961,807	0	-175	18,691,764	0	18,691,764	730,132	1.04	1.04	1.30%
Lone Star Fund IX (U.S.), L.P.	2014	35,000,000	24,241,467	0	0	23,459,730	0	23,459,730	-781,737	0.97	0.97	-3.28%
Lone Star Fund VII (U.S.), L.P.	2011	25,000,000	23,469,024	0	0	41,624,566	0	41,624,566	18,155,542	1.77	1.77	47.54%
Lone Star Fund VIII (U.S.), L.P.	2013	25,000,000	22,564,537	0	0	28,017,551	0	28,017,551	5,453,014	1.24	1.24	16.26%
Merit Energy Partners E-I	2004	7,018,930	7,031,052	0	-1,741	14,975,776	0	14,975,776	7,946,465	2.13	2.13	14.48%
Merit Energy Partners F-I	2005	8,748,346	8,749,275	0	0	3,801,206	0	3,801,206	-4,948,069	0.43	0.43	-17.19%
Merit Energy Partners G, LP	2008	39,200,000	39,320,050	0	0	26,756,651	0	26,756,651	-12,563,399	0.68	0.68	-9.96%
Merit Energy Partners H, LP	2010	10,000,000	10,033,415	0	0	6,870,451	0	6,870,451	-3,162,964	0.68	0.68	-13.78%
Oaktree Fund IV	2001	50,000,000	50,000,000	0	0	82,516,590	0	82,516,590	32,516,590	1.65	1.65	28.36%
Oaktree Loan Fund 2X	2007	60,000,000	60,004,628	0	0	65,066,951	0	65,066,951	5,062,323	1.08	1.08	2.24%
Oaktree Power Fund III	2011	30,000,000	16,167,147	0	0	23,839,959	0	23,839,959	7,672,812	1.47	1.47	12.35%
Pharos Capital Co-Investment, LLC	2007	20,000,000	20,000,000	0	0	10,019,157	0	10,019,157	-9,980,843	0.50	0.50	-9.92%
Pharos Capital Co-Investment, LP	2008	40,000,000	40,000,000	0	0	67,459,271	0	67,459,271	27,459,271	1.69	1.69	8.42%
Pharos Capital Partners IIA, L.P.	2005	20,000,000	20,080,306	0	0	17,715,199	0	17,715,199	-2,365,107	0.88	0.88	-2.39%
Pharos Capital Partners III, LP	2012	50,000,000	28,397,038	0	-54,286	20,196,932	0	20,196,932	-8,145,820	0.71	0.71	-19.95%
Total Completed Funds		**864,150,757**	**781,363,199**	**0**	**14,917,109**	**905,993,874**	**0**	**905,993,874**	**109,713,566**	**1.16**	**1.16**	

[1] Data on Completed Funds as provided by former investment consultant.

Disclaimer

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PERFORMANCE DATA CONTAINED HEREIN REPRESENT PAST PERFORMANCE. PAST PERFORMANCE IS NO GUARANTEE OF FUTURE RESULTS.

DALLAS POLICE & FIRE PENSION SYSTEM

DISCUSSION SHEET

ITEM #C4

Topic: **Securities Lending**

Discussion: In response to questions from the February 14, 2019 meeting, Staff will provide perspective on recent drivers of securities lending income.

DISCUSSION SHEET

ITEM #C5

Topic: **AIRRO Update and Potential Funding**

Discussion: DPFP has a $37 million commitment to the Asian Infrastructure and Related Resources Opportunity (AIRRO) fund. As of September 30, 2018, DPFP had received $17.9 million in distributions and our remaining interest was valued at $19.5 million. In early 2018 the General Partner role transferred from JP Morgan to The Rohatyn Group (TRG). Staff will update the Board on recent events within the AIRRO fund and a potential capital raise that may be dilutive to LPs unless they participate. The structure and terms have not yet been finalized. Staff may make a recommendation at the Board meeting regarding AIRRO funding.

DISCUSSION SHEET

ITEM #C6

Topic: **Lone Star Investment Advisor Funds**

Portions of the discussion under this topic may be closed to the public under the terms of Section 551.071 of the Texas Government Code.

Discussion: The Lone Star Growth Capital fund and the Lone Star CRA fund terms expire in April 2019. The General Partner has proposed a one-year extension of each fund term with no management fee.

Staff Recommendation: **Authorize** the Executive Director to enter into extensions of up to one year with no management fee on the Lone Star Growth Capital and Lone Star CRA funds.

DISCUSSION SHEET

ITEM #C7

Topic: **Portfolio Update**

Discussion: Investment Staff will brief the Board on recent events and current developments with respect to the investment portfolio.

2019 Investment Review Calendar*

January ✓	• Real Estate: Staff review of Vista 7, King's Harbor, and Museum Tower
February ✓	• Real Estate: Clarion Presentation • Global Equity Structure Review (Staff/Meketa)
March	• Real Estate: AEW Presentation
April	• Real Estate: Hearthstone Presentation • Private Equity: Staff review of Lone Star, Huff, Hudson, and Industry Ventures
May	• Natural Resources: Hancock Presentation, Staff review of Forest Inv. Assoc. and BTG Pactual
June	• Infrastructure: Staff review of AIRRO (Asia Infrastructure) and JPM Maritime
2H19	• Global Equity Manager Reviews • Fixed Income Manager Reviews

*Future presentation schedule is subject to change.

Updated 3/8/19

DALLAS POLICE & FIRE PENSION SYSTEM

DALLAS POLICE & FIRE PENSION SYSTEM

DISCUSSION SHEET

ITEM #C8

Topic: **Real Estate Overview - AEW Portfolio**

Portions of the discussion under this topic may be closed to the public under the terms of Section 551.072 of the Texas Government Code.

Attendees: Ron Pastore - Senior Portfolio Manager, AEW Capital Management
Mark Morrison - Assistant Portfolio Manager, AEW Capital Management

Discussion: Representatives of AEW Capital Management ("AEW") will update the Board on the status and plans for DPFP's investments in RED Consolidated Holdings ("RCH") and Camel Square, an office development in Phoenix. AEW took over management of these investments in February of 2015. AEW last presented to the Board in July 2018.

Staff Recommendation: **Authorize** AEW to consummate the sale of Camel Square through either a single sale or separate sales, subject to final approval by the Executive Director, with the requirement that any transaction which calls for any reinvestment or participation in redevelopment by DPFP will require Board approval.

AEW

DALLAS POLICE & FIRE PENSION SYSTEM

BOARD PRESENTATION
March 14, 2019

FOCUSED ON **THE FUTURE OF REAL ESTATE**

aew.com

OVERVIEW OF AEW'S ROLE

- Hired on March 1, 2015 by Dallas Police and Fire Pension System ("DPFP") as strategic advisor and successor investment manager for three of DPFP's real estate and private equity investments. The three investments include:
  - **RED Consolidated Holdings** ("RCH"), a 50/50 operating company joint venture with RED Development ("RED"), a Phoenix-based retail and mixed-use development, management and leasing firm with owned and/or managed assets located throughout the southwest and midwest;
  - **Camel Square**, a 100% fee ownership interest in a 290,000-square-foot suburban office complex located on the corner of Camelback and 44th Street in Phoenix, Arizona that is slated for redevelopment into a mixed-used property that could feature a combination of residential, office, hotel, or restaurant uses; and
  - **Creative Attractions** ("CA"), a 45% private equity investment in a restaurant development and operating company that opened the 14,000-square-foot Boathouse Restaurant in the Disney Springs development in Orlando, Florida in April 2015. DPFP exited the CA investment upon the successful sale of the Boathouse Restaurant in May 2017.
- AEW is the strategic oversight manager on DPFP's operating company investment in RCH, with RED serving as asset manager, and AEW holding three of six seats on the RCH Management Committee
  - AEW directly asset manages Camel Square and has retained RED on a consulting basis for the rezoning effort.
- AEW's role is to clarify and meet DPFP's goals and objectives while providing transparency in its strategic oversight of the investments, including:
  - maximizing proceeds from sales, refinancing(s), and development projects while reducing the portfolio's overall risk profile and DPFP liabilities with a significant downsizing of DPFP's position in RCH over a 3-5 year period.
  - developing a recapitalization strategy for DPFP's 50% ownership in the RCH operating platform, with special emphasis on reducing DPFP company level guarantees.
  - Identifying and implementing key corporate-level process and policy changes at RCH, specifically to establish institutional quality "best practices" to improve governance, balance sheet management, operational efficiency and profitability to position the company for recapitalization at the highest possible value.

PORTFOLIO OVERVIEW

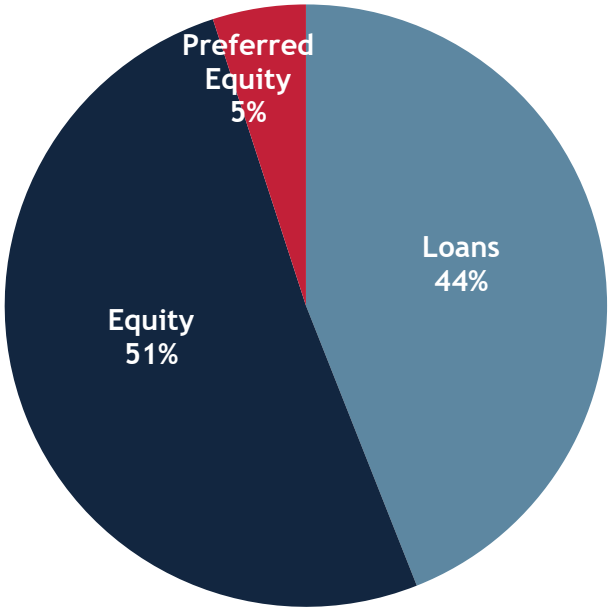
The DFP/AEW managed portfolio includes the following investments:

- **RED Consolidated Holdings, LLC ("RCH") -** a 50% joint venture with RED Development ("RED"), a Phoenix-based retail and mixed-use real estate development, leasing and management firm including interests in 23 retail centers, a mixed-use complex in downtown Phoenix, 4 retail developments that are in final lease-up, The Union mixed-use development in Uptown Dallas, outparcels held for sale, and land in Colorado.
  - After completing successful one off joint ventures during the early 2000's with RED, DPFP elected to enter into a programmatic joint venture with RED to develop additional retail centers in 2008. In 2011, DPFP invested in the RCH operating platform (a 50/50 joint venture) with both parties jointly owning projects and sharing in fees generated by the company, including incentive fees. Growing the company's asset base and positioning it for a future IPO or sale was the identified exit strategy.
- **Camel Square-** a wholly-owned 290,000 square foot suburban office complex on a 15.5 acre site on the corner of 44th Street and Camelback Road in Phoenix, Arizona. The asset is 50% leased to short term tenants while the property is rezoned to maximize its value as a mixed use redevelopment.
  - DPFP made its initial investment in Camel Square in 2000.
  - Maintain short term leases with termination rights while minimizing capital investments (other than life safety or code requirements) to facilitate future redevelopment.
  - Rezoning effort currently underway and expected to be substantially complete in mid 2019.
- **Creative Attractions("CA")** - DPFP held a 45% equity and debt interest in a theme restaurant development and management company that developed and owned the 18,000 SF Boathouse Restaurant in Disney Springs/ Orlando, licensed a concept to another small food venue, and held the franchise rights to a future Boathouse restaurant in Disney's Shanghai China amusement park.
  - DPFP exited the CA investment following its exit from the potential Shanghai venture, unwinding of a partially completed EB5 financing effort related to the Orlando Boathouse restaurant and sale of the Orlando Boathouse in May 2017.

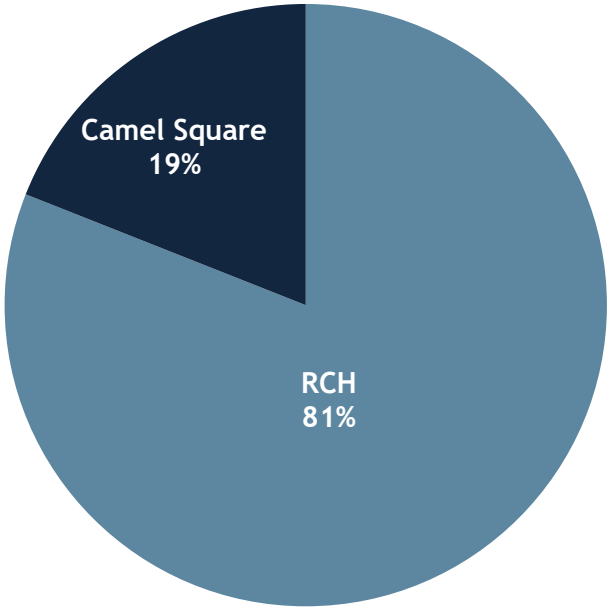
PORTFOLIO OVERVIEW (CONTINUED)

Total DPFP Net Investment Value

BY INVESTMENT TYPE
as of 12/31/18



BY HOLDING
as of 12/31/18



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DALLAS POLICE & FIRE PENSION SYSTEM

DISCUSSION SHEET

ITEM #C9

Topic: **Real Estate Manager Discretion**

Discussion: AEW and Clarion took over management of a portion of DPFP's real estate portfolio in 2015. Both AEW, in the case of RED Consolidated Holdings ("RCH"), and Clarion, with CCH Lamar and The Tribute, manage DPFP's interest in joint-ventures with operating partners that hold many underlying properties in various states of operations and development. Staff is seeking to confirm with the Board staff's understanding of the discretion granted to AEW and Clarion on these investments.

Staff Recommendation: **Confirm the discretion of** AEW and Clarion to manage DPFP's interest in RCH, and CCH Lamar and The Tribute, respectively, including dispositions, subject to Executive Director approval, except that a sale of all or substantially all of DPFP's interest in these investments will require Board approval.

DISCUSSION SHEET

ITEM #C10

Topic: **Legislative Update**

Discussion: Staff will brief the Board on pending legislation which would affect DPFP.

By: Flynn H.B. No. 2649

A BILL TO BE ENTITLED

AN ACT

relating to requiring the reporting of certain commissions and fees paid by public retirement systems.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Section 802.103, Government Code, is amended by amending Subsection (a) and adding Subsection (c) to read as follows:

(a) The [~~Except as provided by Subsection (c), the~~] governing body of a public retirement system shall publish an annual financial report showing the financial condition of the system as of the last day of the fiscal year covered in the report. The report must include:

(1) the financial statements and schedules examined in the most recent audit performed as required by Section 802.102;

(2) [~~and must include~~] a statement of opinion by the certified public accountant as to whether or not the financial statements and schedules are presented fairly and in accordance with generally accepted accounting principles; and

(3) a statement that details the commissions and fees paid by the retirement system to outside consultants or investment managers during the fiscal year covered by the report.

(c) Notwithstanding Sections 801.209 and 802.107, the board and the governing body of a public retirement system shall post the statement required by Subsection (a)(3) on their respective

Internet websites.

SECTION 2. This Act takes effect September 1, 2019.

By: Flynn H.B. No. 2657

A BILL TO BE ENTITLED

AN ACT

relating to the funding soundness restoration plans required for certain public retirement systems.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Sections 802.2015(c), (d), and (e), Government Code, are amended to read as follows:

(c) A public retirement system shall notify the associated governmental entity in writing if the retirement system receives an actuarial valuation indicating that the system's actual contributions are not sufficient to amortize the unfunded actuarial accrued liability within 30 [~~40~~] years. If a public retirement system's actuarial valuation shows that the system's amortization period has exceeded 30 [~~40~~] years for three consecutive annual actuarial valuations, or two consecutive actuarial valuations in the case of a system that conducts the valuations every two or three years, the governing body of the public retirement system and the associated governmental entity shall formulate a funding soundness restoration plan under Subsection (e) in accordance with the system's governing statute.

(d) The governing body of a public retirement system and the associated governmental entity that have formulated a funding soundness restoration plan under Subsection (e) shall formulate a revised funding soundness restoration plan under that subsection, in accordance with the system's governing statute, if the system

conducts an actuarial valuation showing that:

(1) the system's amortization period exceeds 30 [~~40~~] years; and

(2) the previously formulated funding soundness restoration plan has not been adhered to.

(e) A funding soundness restoration plan formulated under this section must:

(1) be developed by the public retirement system and the associated governmental entity in accordance with the system's governing statute; and

(2) be designed to achieve a contribution rate that will be sufficient to amortize the unfunded actuarial accrued liability within 30 [~~40~~] years not later than the 10th anniversary of the date on which the final version of a funding soundness restoration plan is agreed to.

SECTION 2. Sections 802.2016(c), (d), and (e), Government Code, are amended to read as follows:

(c) A public retirement system shall notify the associated governmental entity in writing if the retirement system receives an actuarial valuation indicating that the system's actual contributions are not sufficient to amortize the unfunded actuarial accrued liability within 30 [~~40~~] years. If a public retirement system's actuarial valuation shows that the system's amortization period has exceeded 30 [~~40~~] years for three consecutive annual actuarial valuations, or two consecutive actuarial valuations in the case of a system that conducts the valuations every two or three years, the associated governmental entity shall formulate a funding

soundness restoration plan under Subsection (e) in accordance with the public retirement system's governing statute.

(d) An associated governmental entity that has formulated a funding soundness restoration plan under Subsection (e) shall formulate a revised funding soundness restoration plan under that subsection, in accordance with the public retirement system's governing statute, if the system conducts an actuarial valuation showing that:

(1) the system's amortization period exceeds 30 [~~40~~] years; and

(2) the previously formulated funding soundness restoration plan has not been adhered to.

(e) A funding soundness restoration plan formulated under this section must:

(1) be developed in accordance with the public retirement system's governing statute by the associated governmental entity; and

(2) be designed to achieve a contribution rate that will be sufficient to amortize the unfunded actuarial accrued liability within 30 [~~40~~] years not later than the 10th anniversary of the date on which the final version of a funding soundness restoration plan is formulated.

SECTION 3. A public retirement system and an associated governmental entity subject to Section 802.2015, Government Code, as amended by this Act, or a governmental entity subject to Section 802.2016, Government Code, as amended by this Act, shall formulate a funding soundness restoration plan, if required to do so under the

applicable section, based on the most recent actuarial valuation study conducted under Section 802.101, Government Code, not later than November 1, 2020.

SECTION 4. This Act takes effect September 1, 2019.

By: Bettencourt, Huffman S.B. No. 957

A BILL TO BE ENTITLED

AN ACT

relating to voter approval of the issuance of certain obligations by municipalities to pay their unfunded liabilities to a public pension fund.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Section 107.003(a), Local Government Code, is amended to read as follows:

(a) Subject to Section 107.0035, a [~~A~~] municipality may issue obligations to fund all or any part of an unfunded liability.

SECTION 2. Chapter 107, Local Government Code, is amended by adding Section 107.0035 to read as follows:

Sec. 107.0035. VOTER APPROVAL REQUIRED FOR CERTAIN PENSION FUND OBLIGATIONS. A municipality may issue an obligation under Section 107.003 in an amount that exceeds $50 million only if the issuance is approved by a majority of the qualified voters of the municipality voting at an election held for that purpose.

SECTION 3. Section 107.0036, Local Government Code, is repealed.

SECTION 4. Section 107.0035, Local Government Code, as added by this Act, applies only to obligations for which the governing body of a municipality executes an agreement under Section 107.003(b), Local Government Code, on or after the effective date of this Act.

SECTION 5. This Act takes effect immediately if it receives

a vote of two-thirds of all the members elected to each house, as provided by Section 39, Article III, Texas Constitution. If this Act does not receive the vote necessary for immediate effect, this Act takes effect September 1, 2019.

By: Huffman S.B. No. 322

A BILL TO BE ENTITLED

AN ACT

relating to the evaluation and reporting of investment practices and performance of certain public retirement systems.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Section 801.209(a), Government Code, is amended to read as follows:

(a) For each public retirement system, the board shall post on the board's Internet website, or on a publicly available website that is linked to the board's website, the most recent data from reports received under Sections 802.101, 802.103, 802.104, 802.105, 802.108, 802.109, 802.2015, and 802.2016.

SECTION 2. Section 802.103(a), Government Code, is amended to read as follows:

(a) The [~~Except as provided by Subsection (c), the~~] governing body of a public retirement system shall publish an annual financial report showing the financial condition of the system as of the last day of the fiscal year covered in the report. The report must include:

(1) the financial statements and schedules examined in the most recent audit performed as required by Section 802.102;

(2) [~~and must include~~] a statement of opinion by the certified public accountant as to whether or not the financial statements and schedules are presented fairly and in accordance with generally accepted accounting principles;

(3) a listing, by asset class, of all direct and indirect commissions and fees paid by the retirement system during the system's previous fiscal year for the sale, purchase, or management of system assets; and

(4) the names of investment managers engaged by the retirement system.

SECTION 3. Subchapter B, Chapter 802, Government Code, is amended by adding Section 802.109 to read as follows:

Sec. 802.109. INVESTMENT PRACTICES AND PERFORMANCE REPORTS. (a) Except as provided by Subsection (d), a public retirement system shall select an independent firm with substantial experience in evaluating institutional investment practices and performance to evaluate the appropriateness, adequacy, and effectiveness of the retirement system's investment practices and performance and to make recommendations for improving the retirement system's investment policies, procedures, and practices. Each evaluation must include:

(1) an analysis of any investment policy or strategic investment plan adopted by the retirement system and the retirement system's compliance with that policy or plan;

(2) a detailed review of the retirement system's investment asset allocation, including:

(A) the process for determining target allocations;

(B) the expected risk and assumed rate of return, categorized by asset class;

(C) the appropriateness of selection and

valuation methodologies of alternative and illiquid assets; and

(D) future cash flow and liquidity needs;

(3) a review of the appropriateness of investment fees and commissions paid by the retirement system;

(4) a review of the retirement system's governance processes related to investment activities, including investment decision-making processes, delegation of investment authority, and board investment expertise and education; and

(5) a review of the retirement system's investment manager selection and monitoring process.

(b) The governing body of a public retirement system may determine additional specific areas to be evaluated under Subsection (a) and may select particular asset classes on which to focus, but the first evaluation must be a comprehensive analysis of the retirement system's investment program that covers all asset classes.

(c) A public retirement system shall conduct the evaluation described by Subsection (a):

(1) once every three years, if the retirement system has total assets the book value of which, as of the last day of the last fiscal year considered in an evaluation under this section, was at least $100 million; or

(2) once every six years, if the retirement system has total assets the book value of which, as of the last day of the last fiscal year considered in an evaluation under this section, was at least $30 million and less than $100 million.

(d) A public retirement system is not required to conduct

the evaluation described by Subsection (a) if the retirement system has total assets the book value of which, as of the last day of the preceding fiscal year, was less than $30 million.

(e) A report of an evaluation under this section must be filed with the governing body of the public retirement system not later than December 1 of each year in which the system is evaluated under Subsection (c).

(f) Not later than the 31st day after the date the governing body of a public retirement system receives a report of an evaluation under this section, the governing body shall submit the report to the board.

(g) A public retirement system shall pay the costs of each evaluation of the system under this section.

(h) Not later than February 1 of each year, the board shall submit an investment performance report to the governor, the lieutenant governor, the speaker of the house of representatives, and the legislative committees having principal jurisdiction over legislation governing public retirement systems. The report must compile and summarize the information received under this section by the board during the preceding calendar year.

(i) A report of an evaluation by the Teacher Retirement System of Texas and an investment report that includes the Teacher Retirement System of Texas under this section satisfies the requirements of Section 825.512.

SECTION 4. Notwithstanding Section 802.109(c), Government Code, as added by this Act, a report of the first evaluation of a public retirement system, as required by Section 802.109,

Government Code, as added by this Act, must be filed with the governing body of the system not later than January 1, 2020.

SECTION 5. This Act takes effect immediately if it receives a vote of two-thirds of all the members elected to each house, as provided by Section 39, Article III, Texas Constitution. If this Act does not receive the vote necessary for immediate effect, this Act takes effect September 1, 2019.

By: Bettencourt S.B. No. 1335

A BILL TO BE ENTITLED

AN ACT

relating to municipal control of certain local public retirement systems.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Chapter 810, Government Code, is amended by adding Section 810.0015 to read as follows:

Sec. 810.0015. MUNICIPAL CONTROL OF RETIREMENT SYSTEM PROVISIONS. (a) In this section:

(1) "Hybrid retirement plan" means a retirement plan that combines elements of a defined benefit plan, a defined contribution plan, or an individual retirement savings account.

(2) "Public retirement system" has the meaning assigned by Section 802.001.

(b) Except as provided by Sections 66 and 67, Article XVI, Texas Constitution, and notwithstanding any other law, a municipality that is the sponsoring authority of a public retirement system that was created under and is governed by a state statute, but is not a part of a statewide retirement system, may adopt by ordinance or resolution, as applicable, provisions that supplement or supersede the operative provisions of the public retirement system's governing statute.

(c) Provisions adopted under Subsection (b):

(1) must apply only to a person who becomes eligible for membership in the public retirement system after December 31,

2019; and

(2) may:

(A) subject to Subsections (d), (e), and (f), create a defined contribution plan, hybrid retirement plan, or other alternative retirement plan instead of a defined benefit plan or other retirement plan required or authorized under the system's governing statute; and

(B) apply to:

(i) benefits, participation, or eligibility requirements of the system;

(ii) the source or amount of funding for the system; and

(iii) the administration of the system.

(d) A defined contribution plan, hybrid retirement plan, or other alternative retirement plan created under Subsection (b) must be funded 100 percent by the municipality not later than the 180th day after the last day of the municipality's fiscal year.

(e) Contributions by an employee described by Subsection (c)(1) to a plan described by Subsection (d) must be deposited with:

(1) the trustees of a retirement plan for which the employee would have been eligible for participation in but for the municipality's action under Subsection (b); or

(2) the custodian of an individual retirement account designated by the employee.

(f) A municipality may not retain custody of contributions made under Subsection (e) or determine the manner in which the contributions are invested.

SECTION 2. To the extent of any conflict, this Act and a municipal ordinance or resolution adopted by the governing body of the sponsoring municipality of a public retirement system under Section 810.0015(b), Government Code, as added by this Act, prevail over another Act of the 86th Legislature, Regular Session, 2019, relating to a public retirement system subject to that section.

SECTION 3. This Act takes effect immediately if it receives a vote of two-thirds of all the members elected to each house, as provided by Section 39, Article III, Texas Constitution. If this Act does not receive the vote necessary for immediate effect, this Act takes effect September 1, 2019.

DISCUSSION SHEET

ITEM #C11

Topic: **Legal issues - In accordance with Section 551.071 of the Texas Government Code, the Board will meet in executive session to seek and receive the advice of its attorneys about pending or contemplated litigation, including potential lawsuits involving collection of overpayments, USERRA contributions owed by the City of Dallas or any other legal matter in which the duty of the attorneys to DPFP and the Board under the Texas Disciplinary Rules of Professional Conduct clearly conflicts with Texas Open Meeting laws, including discussion about interpretation of Section 6.13 of Article 6243a-1 and Section 551.143 of the Texas Open Meetings Act.**

Discussion: Counsel will brief the Board on these issues.

DISCUSSION SHEET

ITEM #C12

Topic: **Correction of Errors in Benefit Payments Policy**

Discussion: Staff is proposing an amendment to the Correction of Errors in Benefit Payments Policy to limit the period interest is payable in the case where a payee cannot be located. The amendment would end the period interest is due to 30 days after a notice is sent to the last known address in DPFP's records.

Staff Recommendation: **Adopt** the Correction of Errors in Benefit Payments Policy, as amended.

DALLAS POLICE & FIRE PENSION SYSTEM

CORRECTION OF ERRORS IN BENEFIT PAYMENTS POLICY

~~Adopted February 14, 2019~~ Amended Through March 14, 2019

DALLAS POLICE AND FIRE PENSION SYSTEM

CORRECTION OF ERRORS IN BENEFIT PAYMENTS POLICY
Adopted February 14, 2019
As Amended Through March 14, 2019

Supersedes the Recapture of Overpayments Policy
as amended through February 13, 2004

A. Purpose

In order to preserve the financial integrity of DPFP and comply with the Board's fiduciary duty, IRS rules and regulations governing overpayment and underpayment of benefit payments known as the Employee Plans Compliance Resolution System (EPCRS) and Section 802.1024 of the Texas Government Code, it is the Board's policy to investigate any overpayment or underpayment promptly and diligently and to recover the overpayment or pay the underpayment in a timely manner. The purpose of this Policy is to provide guidelines and a process for evaluation and collection or payment of overpaid and underpaid benefits made to members and beneficiaries (collectively "Members," for purposes of this Policy).

B. Benefit Underpayments

When a wrongful underpayment of benefits has been identified, the following guidelines and procedures shall be followed:

1. Board Notification

   The Executive Director shall report any underpayment in excess of $10,000 to the Board at the next regularly scheduled Board meeting.

2. Investigation

   When an underpayment of benefits is identified, the Executive Director shall investigate the facts and circumstances surrounding the underpayment.

3. Resolution

   a. Staff shall notify the affected Member of the underpaid benefit in writing and DPFP shall pay any underpaid benefits as soon as reasonably possible.

   b. Interest

      i. DPFP shall include interest in its repayment only if the underpayment of benefits is not paid within the same fiscal year in which the error was made.

B. Benefit Underpayments (continued)

ii. Interest is due from the date(s) of the underpayment to the date the Member is paid.

iii. Interest shall be calculated using the actuarially assumed rate of return in effect when the underpayment of benefits is paid or commenced to be paid. Interest shall accrue from the time the payment should have been paid until thirty days after the time notice is given to the party entitled to the payment at the last known address in the records of DPFP.

iv. Interest shall not be paid if not required by EPCRS.

C. Benefit Overpayments

1. Notification

The Executive Director shall report any overpayments in excess of $10,000 to the Board at the next regularly scheduled Board meeting. The Executive Director shall report back to the Board on the progress of the investigation and collection of the overpayment within six months if payment in full including interest, if any, is not achieved.

2. Investigation

When an overpayment of benefits is identified, the Executive Director shall immediately investigate the facts and circumstances surrounding the overpayment.

3. Collection

a. Overpayment of Benefits Exceeding $10,000 – Approval by the Board

i. Resolution of an overpayment of benefits that exceeds $10,000 should result in immediate full payment of the entire amount, plus interest, whenever feasible. For purposes of this Policy, full repayment may include an installment repayment plan for the full amount owed, including interest at the actuarially assumed rate. A resolution on these terms does not need Board approval, except for repayment plans exceeding one year which do require Board approval.

C. Benefit Overpayments (continued)

ii. Any resolution of an overpayment of benefits exceeding $10,000 that does not result in full payment of the entire amount, plus interest, must be approved by the Board.

b. Overpayment of Benefits of $10,000 or Less – Approval by the Executive Director

i. Resolution of an overpayment of benefits of $10,000 or less should result in immediate full payment of the entire amount, plus interest, whenever feasible. For purposes of this Policy, full repayment may include an installment repayment plan for the full amount owed, including interest at the actuarially assumed rate.

ii. Subject to the procedures and objectives in this Policy, the Executive Director shall have sole discretion to resolve any overpayment of benefits of $10,000 or less.

c. The Board and Executive Director shall use reasonable efforts to resolve an overpayment of benefits. Reasonable efforts include consideration of the facts and circumstances, IRS guidelines for correction of Plan errors and costs and benefits of collection efforts. The plan sponsor has indicated to the Board that it has no statutory authority to make additional payments to DPFP to cover any overpayments.

d. Interest

i. DPFP shall charge the Member interest only if the overpayment of benefits is not fully paid within the same fiscal year in which the error was made.

ii. Interest is assessed from the date(s) of the overpayment to the date the overpayment is resolved. "Resolved," for purposes of including interest for overpayment, means the date when DPFP collects or begins collecting any overpayment.

iii. Interest shall be calculated using the actuarially assumed rate in effect when the overpayment of benefits is resolved.

C. Benefit Overpayments (continued)

e. General Rules on Recovery of Overpayments

i. Future payments due to a Qualifying Survivor or an Estate and/or a DROP annuity beneficiary will be reduced to recover the overpayment whenever possible.

ii. If there is more than one Qualified Survivor or Beneficiary receiving the future payment, the recovery of overpayment will be applied on a pro-rata basis.

iii. The Executive Director may choose to not pursue collections of overpayments that are below the EPCRS de minimis level of $100.

D. Procedures

The Executive Director may develop written procedures to implement this policy.

APPROVED on ~~**February 14, 2019**~~ March 14, 2019 the Board of Trustees of the Dallas Police and Fire Pension System.

William Quinn
Chairman

Attested:

Kelly Gottschalk
Secretary

DALLAS POLICE & FIRE PENSION SYSTEM

DISCUSSION SHEET

ITEM #C13

Topic: **Pension Obligation Bond Research**

Discussion: The Board requested information about Pension Obligation Bonds (POBs). Staff will provide a general overview of POBs, provide information about the POBs issued in 2005 by the City of Dallas to provide funding for the City of Dallas Employees Retirement Fund and the potential impact on DPFP's funding of a POB issuance by the City of Dallas.

DALLAS POLICE & FIRE PENSION SYSTEM

Pension Obligation Bond Research

March 14, 2019

Pension Obligation Bonds (POBs)

- Pension Obligation Bonds (POBs) are General Obligation debt issued by the plan sponsor, (e.g. the City of Dallas).
- The Pension Plan has no statutory authority to issue POBs
- POBs are issued on a taxable basis. The interest rate is higher than typical tax-exempt municipal debt.
- The goal of a POB is to earn a rate of return on the proceeds that exceeds the interest rate paid on the debt.
- The actual POB debt structure can take many forms.
- Contributions due from the plan sponsor are sometimes modified to adjust for the debt service on the bonds.

Ability to modify City Contributions to DPFP

Article 6243a-1, Section 4.02 (b)

Any change to the contributions required to be made to the pension system by the city may only be made:

(1) by the legislature;

(2) by a majority vote of the voters of the city; or

(3) in accordance with a written agreement entered into between the pension system, by at least a two-thirds vote of all trustees of the board, and the city, provided that a change made in accordance with this subdivision may not increase the period required to amortize the unfunded actuarial accrued liability of the fund.

Pension Obligation Bonds (POBs)

- The City has a history of issuing POBs
  - 2005 Employees Retirement Fund (ERF)
  - 2010 Refunding a portion of the 2005 ERF issuance

- The Government Finance Officers Association (GFOA) recommended that state and local governments do not issue POBs in a 2015 advisory. The GFOA advisory, including the reasons for the GFOA recommendation, are included with the agenda materials.

- The Center for State & Local Government Excellence issued a brief in 2014 titled An Update on Pension Obligation Bonds, in which, many of the risks of issuing POBs are identified. The brief also includes the following statement: "POBs could be implemented as part of a larger pension reform plan in which the POB helps provide immediate relief while other reforms put the plan on the path to long-term sustainability." The issue brief has been provided with the agenda materials.

Dallas Employees Retirement (ERF) Plan Experience

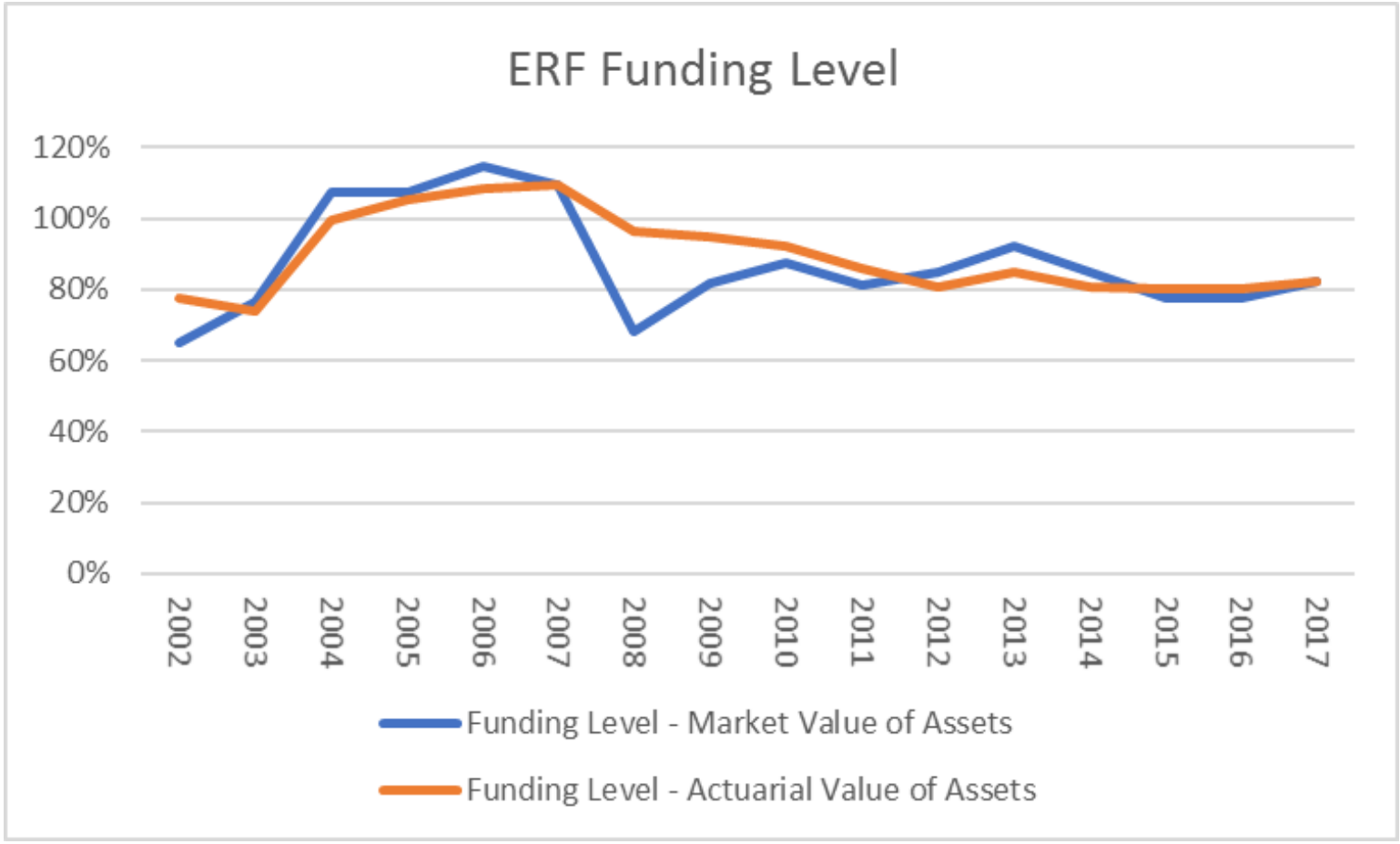
- City issued taxable Pension Obligation Bonds (POBs) on February 16, 2005
  - The bonds were issued in 3 series (A, B & C)
  - Proceeds - $533,397,000
  - True Interest Cost (TIC) - 5.398%
- $75 million of the bonds (Series C) were refunded on November 18, 2010 to achieve interest rate savings.
  - The TIC on the refunding issue - 4.640%
- At the time the POBs were issued ERF's rate of return assumption was 8.25%. The assumed rate of return was lowered to 8.00% for the 12-31-2014 valuation and to 7.75% beginning with the 12-31-2016 valuation.

- The comments and conclusions on the following slides are DPFP staff's assessment of information and data and do not represent comments from ERF or the City of Dallas.

Dallas Employees Retirement (ERF) Plan Experience – as of 12-31-2018

- Did issuing the POB's achieve the goal of fully funding the ERF unfunded liability?
  - Yes, the funding level of the plan was greater than 100% until 2008.
- Is the fund in a better position because of the issuance of the POB's?
  - Yes, the assets of the fund are more than they would be without the issuance of the POBs.
- Hypothetically, if instead of paying debt service, the same amount of money went into the plan as additional contributions, would the fund have been better off than issuing the POBs?
  - No, the assets of the fund are more with the POB proceeds and earnings (after giving effect to lower contributions to pay debt service) than they would have been with the additional contributions and the earnings on the additional contributions.

ERF Funding Level

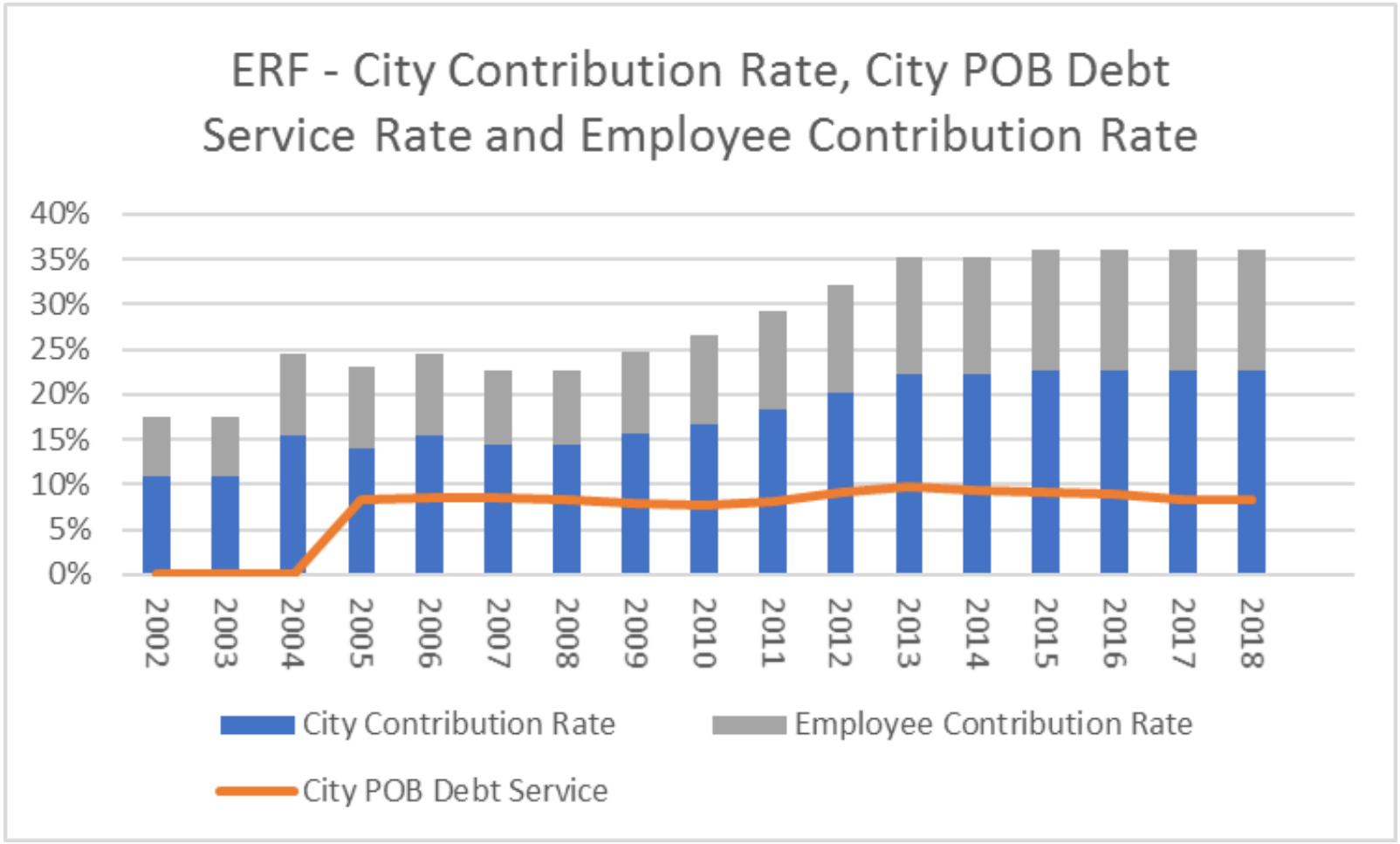


Source: ERF Annual Actuarial Valuation Reports

Dallas Employees Retirement (ERF) Plan Experience – as of 12-31-2018

- Has the City paid more as a result of the POBs?
  - No, contributions due the fund are reduced by the debt service. However, this answer assumes the City would have altered their prior fixed rate contribution structure to the actuarial determined contribution (ADC) sharing structure that was implemented with the 2005 plan changes. The fund would not have been sustainable under the original fixed rate contribution structure.
  - Having the additional assets from the POBs reduced the actuarial determined contribution (ADC) rate, saving the City more money than had the ADC been calculated without the additional assets.
- Are contribution rates higher than prior to the POB issuance?
  - Yes, contributions were 11% City and 6.5% employee prior to the POBs. Contribution rates have increased. Rates are determined by a sharing of the actuarial determined contribution less debt service with a cap of 36% from the City and employee combined. The cap has limited contributions to the fund since 2015. For Fiscal Year 2019 the employee contribution rate is 13.32%, the City Contribution rate to the fund is 22.68%. Regardless of the POB issuance, higher contribution rates were required.

Contribution Rates and Debt Service as a Rate of Payroll



Dallas Employees Retirement (ERF) Plan Experience – as of 12-31-2018

- Have benefit changes been made to the ERF plan since the POB issuance?
  - Yes, a new tier of lower benefits was added for employees hired after December 31, 2016.

- Has the ERF earned a higher return on the proceeds from the POB issuance than the City has paid in debt service?
  - Yes, through 2018, the return on the proceeds have exceeded the debt service paid by the City. However, due to the 2008 financial crisis, when comparing the earnings on the proceeds and the debt service paid, there was not a material difference until the end of 2012.

POB Authorization Statute

Sec. 107.003.

(a) A municipality may issue obligations to fund all or any part of an unfunded liability.

(b) Before authorizing issuance and delivery of an obligation under this section, the governing body of the municipality must enter into a written agreement with the governing body of the public retirement system that:

> (1) has fiduciary responsibility for assets of the public pension fund or public pension funds that are to receive the net proceeds of the obligations to be issued; and
>
> (2) has the duty to oversee the investment and expenditure of the assets of the public pension fund.

(c) The written agreement must state the amount of the unfunded liability and the date or dates on which the public pension fund will accept the net proceeds of the obligations to be issued in payment of all or a portion of the unfunded liability.

Current Texas Legislation

- Senate Bill 957 – if passed by the legislature, will require voter approval for the City to issue POBs greater than $50 million.

- Voters approved the ERF POBs.
  - Altering the contribution rates required voter approval even without the POB issuance

Potential Impact of a POB for DPFP

(based on 1-1-2018 valuation – assumes all assumptions realized)

- Assumptions:
  - Estimated debt service
    - Based on current rates, City of Dallas AA- S&P bond rating, 30-year term, TIC 4.54%.
    - Debt service increases at 2.75% per year to match projected payroll increases
    - Debt issued in 2020, in one issuance (for modeling purposes to assess the overall potential impact)
- <u>If City contributions are reduced to pay debt service:</u>
  - $1 billion
    - Debt service is 28%-31% of contributions, $46 million in 2020
    - Improves the fully funded date from 2063 to 2055: 8-year improvement, 38 years-to-fund
    - Funding level after proceeds are received is 66%, drops to a low of 63% and begins to increase in 2031
  - $2 billion
    - Debt service is 57%-63% of contributions, $92 million in 2020
    - Improves the fully funded date from 2063 to 2045: 18-year improvement, 29 years-to-fund
    - Funding level after the proceeds are received is 87%, drops to a low funding level of 85% and begins to increase in 2023

Potential Impact of a POB for DPFP

(based on 1-1-2018 valuation – assumes all assumptions are realized)

- <u>If City contributions are *not* reduced to pay debt service:</u>
  - $1 billion
    - Debt service is 28%-31% of contributions, $46 million in 2020
    - Improves the fully funded date from 2063 to 2039: 25-year improvement, 21 years-to-fund
    - Funding level after proceeds are received is 66% and continues to rise
  - $2 billion
    - Debt service is 57%-63% of contributions, $92 million in 2020
    - Improves the fully funded date from 2063 to 2027: 36-year improvement, 10 years-to-fund
    - Funding level after the proceeds are received is 87% and continues to rise

Conclusion

- ERF has benefited from a POB issuance.
- ERF has increased both City and employee contribution rates and made benefit changes – the POB issuance was one piece of the funding actions necessary for ERF.
- A POB issuance for DPFP could result in overall savings to the City. The City and member contribution levels decrease significantly when there is no unfunded liability:
  - 6243a-1, Section 4.025: if the pension system has no unfunded actuarial liability according to the most recent actuarial valuation, the annual normal costs must be equally divided between the city and the members.
  - The normal cost in the 1-1-2018 valuation report was 17.89%.
- There are several considerations and risks that could impact the City in a POB issuance.
- DPFP has made contribution and benefit changes, both first as a new tier and then significant changes for current employees and retirees.
- It is reasonable to consider POBs as a part of a larger pension reform plan.
- Interest rates are low now and they may not be as low in 2024 when additional funding or changes will likely be required.

Government Finance Officers Association

ADVISORY

Pension Obligation Bonds

Advisory:

GFOA Advisories identify specific policies and procedures necessary to minimize a government's exposure to potential loss in connection with its financial management activities. It is not to be interpreted as GFOA sanctioning the underlying activity that gives rise to the exposure.

BACKGROUND:

Pension obligation bonds (POBs) are taxable bonds[1] that some state and local governments have issued as part of an overall strategy to fund the unfunded portion of their pension liabilities by creating debt. The use of POBs rests on the assumption that the bond proceeds, when invested with pension assets in higher-yielding asset classes, will be able to achieve a rate of return that is greater than the interest rate owed over the term of the bonds. However, POBs involve considerable investment risk, making this goal very speculative.[2] Failing to achieve the targeted rate of return burdens the issuer with both the debt service requirements of the taxable bonds and the unfunded pension liabilities that remain unmet because the investment portfolio did not perform as anticipated. In recent years, local jurisdictions across the country have faced increased financial stress as a result of their reliance on POBs, demonstrating the significant risks associated with these instruments for both small and large governments.

RECOMMENDATION:

The Government Finance Officers Association (GFOA) recommends that state and local governments do not issue POBs for the following reasons:

1. The invested POB proceeds might fail to earn more than the interest rate owed over the term of the bonds, leading to increased overall liabilities for the government.
2. POBs are complex instruments that carry considerable risk. POB structures may incorporate the use of guaranteed investment contracts, swaps, or derivatives, which must be intensively scrutinized as these embedded products can introduce counterparty risk, credit risk and interest rate risk.[3]
3. Issuing taxable debt to fund the pension liability increases the jurisdiction's bonded debt burden and potentially uses up debt capacity that could be used for other purposes. In addition, taxable debt is typically issued without call options or with "make-whole" calls, which can make it more difficult and costly to refund or restructure than traditional tax-exempt debt.
4. POBs are frequently structured in a manner that defers the principal payments or extends repayment over a period longer than the actuarial amortization period, thereby increasing the sponsor's overall costs.

5. Rating agencies may not view the proposed issuance of POBs as credit positive, particularly if the issuance is not part of a more comprehensive plan to address pension funding shortfalls.

Notes:

1 The Tax Reform Act of 1986 eliminated the tax exemption for pension obligation bonds.

2 Alicia H. Munnell, Jean-Pierre Aubry, and Mark Cafarelli, “An Update on Pension Obligation Bonds,” Center for Retirement Research at Boston College, July 2014.

3 See GFOA Advisory – *Using Debt-Related Derivatives and Developing a Derivatives Policy (2015)*

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Center for State & Local Government Excellence

Issue Brief

An Update on Pension Obligation Bonds

July 2014

How have pension obligation bonds (POBs) fared since the financial crisis? This issue brief examines the rationale for issuing POBs and evaluates the factors affecting the probability that a government will issue a POB.

The analysis by Alicia H. Munnell, Jean-Pierre Aubry, and Mark Cafarelli from the Center for Retirement Research at Boston College found that governments are more likely to issue POBs if their debt levels are high, they are short of cash, and the pension plan represents a substantial obligation to government. If their timing is good, governments will earn more on the proceeds than they have to pay in interest.

The encouraging news is that four years of economic recovery have improved the performance of POBs. Fiscally sound governments that issue POBs, and understand the risks involved, find them to be a useful tool. Likewise, governments facing severe fiscal stress could use them strategically as part of a broader pension reform effort.

However, just as the researchers found in their 2010 study, many of the jurisdictions that have issued POBs could ill afford the risk. Detroit is a prime example of such a jurisdiction, issuing POBs in 2005 and 2006 just as the market was approaching a peak.

The Center for State and Local Government Excellence gratefully acknowledges the financial support from ICMA-RC to undertake this research project.

Elizabeth K. Kellar
President and CEO
Center for State and Local Government Excellence

An Update on Pension Obligation Bonds

By Alicia H. Munnell, Jean-Pierre Aubry, and Mark Cafarelli*

Introduction

This update shows how Pension Obligation Bonds (POBs) have fared since the financial crisis. This instrument, which is a general obligation of the government, alleviates pressure on the government's cash position; and it may offer cost savings if the bond proceeds are invested, through the pension fund, in assets that realize a return higher than the cost of the bond. At the time of our last study, 2009 data showed that most issuers had lost money by issuing a POB.[1] One question is the extent to which five additional years have changed that picture. The earlier study also looked at the factors leading a state or locality to issue a POB and concluded that those least able to absorb the risk were the most likely to do so. The second question is whether that continues to be the story.

The *brief* proceeds as follows. The first section presents a brief history of POBs from their introduction in 1985 to the present. The second section introduces the rationale for, and possible risks associated with, issuing a POB. The third section evaluates POBs at three points in time: 2007 (at the height of the stock market), 2009 (in the midst of the financial crisis), and 2014 (today). The fourth section summarizes the regression results—using an expanded sample that includes cities that do not administer their own pension plan—that relate the probability of issuing a POB to the financial pressures of the sponsor, the economic environment, and financial conditions such as the "expected spread" between interest rates and stock market returns. The fifth section presents a two-fold conclusion. On the one hand, five years of economic recovery have improved the performance of POBs; on average they have produced a real internal rate of return of 1.5 percent. On the other hand, while POBs could potentially be a useful tool under the right circumstances, evidence to date suggests that the jurisdictions that issue POBs tend to be the financially most vulnerable with little control over the timing.

Background

In 1985, the city of Oakland, CA, issued the first POB.[2] At the time, POBs offered city, municipal, and state governments a classic arbitrage opportunity. Issued on a tax-exempt basis, the government could immediately invest the proceeds through the pension fund in higher-yielding taxable securities, such as U.S. Treasury bonds, which would lock in a positive net return from the transaction.[3] However, because POBs (and all "arbitrage bonds") deprived the federal government of tax revenues, Congress stopped state and local governments from issuing tax-exempt bonds solely to reinvest the proceeds in higher-yielding securities. Indeed, the Tax Reform Act of 1986 (TRA86), which did away with the tax exemption for POBs, appeared to mark an end for this instrument.

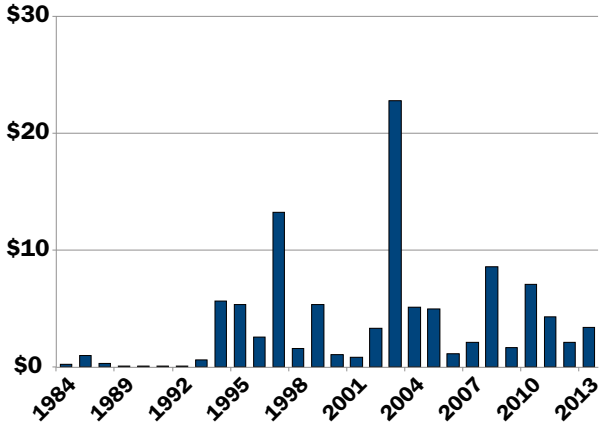
Surprisingly, POBs re-emerged in the 1990s. The strong performance of the stock market led some governments (and bankers) to see a potential arbitrage opportunity for taxable POBs. Two factors were important. First, taxable interest rates had come down considerably, which meant that POB borrowing costs were lower as well. Second, pension funds had increased their equity holdings substantially over the decade,[4] which generated higher returns for the plans and, thus, led actuaries to assume higher future returns. The combination of these two factors was enough to convince some governments that POBs offered an attractive "actuarial arbitrage."[5]

Since TRA86 and the end of arbitrage bonds, governments have issued about $105 billion in taxable POBs. The most notable characteristic of the pattern of new issues is the spike in POB dollars issued in 2003 (see Figure 1, pg. 4), which is partly due to a single

*Alicia H. Munnell is director of the Center for Retirement Research at Boston College (CRR) and the Peter F. Drucker Professor of Management Sciences at Boston College's Carroll School of Management. Jean-Pierre Aubry is assistant director of state and local research at the CRR. Mark Cafarelli is a research associate at the CRR. The authors wish to thank David Blitzstein and Keith Brainard for helpful comments.

POB issuance worth almost $10 billion ($12.4 billion in 2013 dollars) by the state of Illinois.[6]

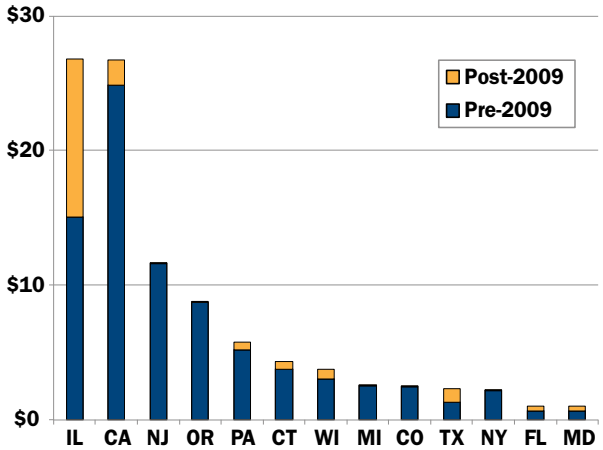
Figure 1. *Pension Obligation Bonds Issued from 1985–2013, Billions of 2013 Dollars*



Source: Data set compiled from Bloomberg Online Service (2012), and SDC Thomson Reuters (2013) databases.

Even with the 2003 spike, the total amount of POBs issued in any given year has never been more than 1 percent of the total assets in public pensions. However, certain states and localities are more active in the POB market than others. Figure 2 shows total issuances by state from 1985 to 2013.[7] It is clear that the bulk of activity in POBs has been centered in about 10 states, with Illinois and California being major players.[8]

Figure 2. *Pension Obligation Bonds Issued from 1985-2013 for States with More Than $1 Billion Issued, Billons of 2013 Dollars*



Source: Data set compiled from Bloomberg Online Service (2012), and SDC Thomson Reuters (2013) databases.

The Pros and Cons of Issuing a POB

While the market remains small, it is clear that certain jurisdictions see POBs as attractive policy instruments. The available literature suggests two primary reasons for their appeal:[9]

- Budget relief: During periods of economic stress, governments use POBs for budget relief. State and local governments often face legal requirements to reduce underfunding. With declining revenues, officials may see POBs as the "least bad alternative" among a variety of tough fiscal choices.
- Cost savings: POBs offer issuers an actuarial arbitrage opportunity, which, in theory, can reduce the cost of pension obligations through the investment of the bond proceeds in higher risk/higher return assets. By commingling POB proceeds with pension assets, the assumption is that bond proceeds will return whatever the pension returns. Given that actuarial practice assumes public pensions will return about 8 percent, POBs can be a compelling proposition (especially to governments whose taxable borrowing costs are in the 5-6 percent range).

While the actuarial arbitrage highlighted above may be persuasive, the issuance of POBs poses serious risks:[10]

- Financial: The success of POBs depends on pension returns averaging more than the cost of financing the debt. However, these assumptions may not turn out to be correct.
- Timing: POBs involve considerable timing risk, as the proceeds from the issuance are invested en masse into the pension plan. Dollar-cost averaging would be the more measured approach to investing large sums of money.[11]
- Flexibility: While the issuance of a POB does not change the total indebtedness of the sponsor, it does change the nature of the indebtedness.[12] Requirements to amortize unfunded pension liabilities may be relatively flexible obligations that can be smoothed over time, while the POB is an inflexible debt with required annual payments.
- Political: If the government uses the POB to fully fund the pension, it may end up with a pension system having more assets than liabilities. Such overfunding may create the political risk that unions and other interest groups will call for benefit increases, despite the fact that the underfunding just moved from the pension plan's balance sheet to the sponsor's balance sheet.[13]

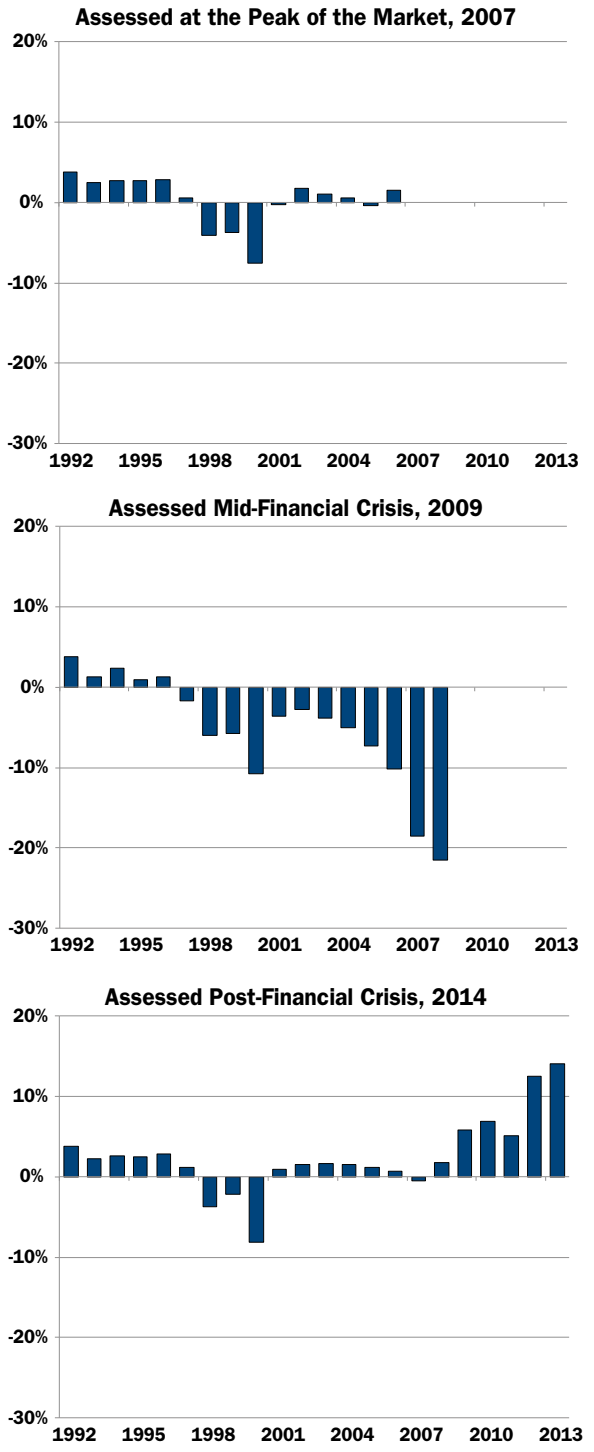
Evidence to Date

In order to assess the extent to which POBs have met issuers' expectations, we calculate the internal rate of return for all POBs issued in a given year. This analysis is based on the universe of taxable POBs issued since the passage of TRA86 through 2013.[14] The universe includes 5,109 POBs issued from 529 different governing entities, totaling approximately $98 billion in 2013 dollars.

We begin by looking at each bond issued in a given year. Of the 5,109 bond issuances in our data, 4,538 provide the detailed data needed to perform a meaningful assessment—the date of issuance, the date of maturity, the coupon rate, the par value, and the purchase price as a percent of par. The assumption is that the proceeds from each bond are invested in accordance with the allocation of the aggregate assets of state and local pensions from the Federal Reserve's *Flow of Funds*—approximately 65 percent in equities and 35 percent in bonds. Accordingly, we use the S&P 500 total return index and the Barclays 10-year bond total return index to approximate how the POB proceeds have grown over time. For each bond, beginning in year one, we calculate the growth of the invested bond proceeds for that year, then subtract the interest payment (using the stated coupon rate) to get a new beginning balance for the following year, and this process is repeated until the bond matures. For bonds that have not yet matured, the process is repeated until the date of the assessment. At maturity or date of assessment, we compare the ending balance with the initial proceeds to calculate an internal rate of return (IRR). These IRRs are then weighted by the size of the bond and the maturity (or, if the bond has not yet matured, the number of years between the date of issue and the assessment date) in order to calculate an aggregate IRR for each annual cohort of POBs.

The results demonstrate the risk associated with a POB strategy. If the assessment date is the end of 2007—the peak of the stock market—the picture looks fairly positive (see Figure 3). If assessed in the middle of 2009—right after the market crash—most POBs appear to be a net drain on government revenues. And, as of February 2014, the majority of POBs have produced positive returns due to the large market gains that followed the crisis. Only those bonds issued at the end of the market run-up of the 1990s, and those issued right before the crash in 2007, have produced a negative return; all others are in the black.

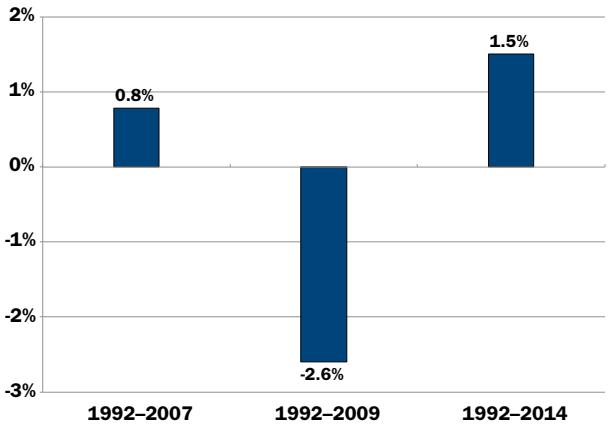
Figure 3. *Internal Rate of Return on Pension Obligation Bonds, by Year Issued*



Source: Authors' calculations based on total monthly returns of the S&P 500 from Standard and Poor's Index Services (1992–2014); total monthly returns of U.S. Treasuries from the *Ibbotson SBBI Classic Yearbook* (2013); and the Barclays U.S. Treasury 10-year Term Index (2014). POB data are from Bloomberg Online Service (2012); and SDC Thomson Reuters (2013).

Weighting the bonds by their dollar amount and maturity (or, if the bond has not yet matured, the number of years between the date of issue and the assessment date), Figure 4 shows the average IRR for the three periods. Between 1992 and the peak in 2007, the average real return was 0.8 percent; by 2009 the average return had dropped to -2.6 percent; and over the period 1992-2014—which includes both the financial crisis and the subsequent market rebound—the return was 1.5 percent. The story is still far from over, however, since many of these POBs have a 30-year life.

Figure 4. *Average Internal Rate of Return on Pension Obligation Bonds, 1992–2007, 1992–2009, and 1992–2014*



Source: See Figure 3.

What Contributes to the Issuance of a POB?

In theory, governments with well-funded pension plans and sound fiscal health might find POBs advantageous if issued at periods when interest rates are particularly low. This type of issuer could shoulder the additional risk of a POB without jeopardizing its fiscal health. Or, for governments facing severe fiscal stress, POBs could be implemented as part of a larger pension reform plan in which the POB helps provide immediate relief while other reforms put the plan on the path to long-term sustainability.[15] So, the question is which governments issue POBs and why. The following regression analysis attempts to answer that question.

The Data

The first step is to define the sample. The sample of issuers used in this analysis is larger than in the earlier study, because it includes both governments that sponsor their own pension plans and cities that participate in state cost-sharing plans. This broadening of the sample is important, because most of the POB occurrences come from local governments that only participate in a state-administered retirement system. Plan data for cities not administering their own plan are constructed based on the methods stipulated in the Governmental Accounting Standards Board's Statement 68.

The second step is to construct the dependent variable—a government issuing a POB in a given year. This step requires consolidating the multiple POB bonds into a single observation. For example, in 1997, the New Jersey state government issued 31 bonds; in this exercise, this information is consolidated to indicate that the New Jersey state government was a POB issuer in 1997. This process of consolidation results in 733 observations. Data limitations reduce the number of issues considered to 270.[16]

Analysis and Results

The probability of being one of the 270 POB issuances among the 140,000 states and localities is then assumed to depend on fiscal pressures facing the government, the economic environment, and financial variables such as the expected spread between interest costs and stock market returns.[17] The specific variables in the model included:[18]

Fiscal Pressure on Government

- *Contributions/revenue:* Government contributions to the pension plan as a percent of total own-source government revenue. The assumption is that as the pension expenditure increases as a percentage of total government spending, the more likely the government is to issue a POB.
- *Debt/revenue:* Government debt as a percent of own-source revenue. The effect could go either way. A government with substantial debt may find it costly to issue a POB and therefore would not find it profitable. On the other hand, governments with high debt burdens could also be those facing large pension payments for unfunded liabilities, since the government may be more likely to defer pension contributions to make fixed required debt payments.
- *Cash/revenue:* Government cash and securities outside of trusts as a percent of total own-source revenue. The more cash on hand, the less likely a government would be pressed to issue a POB.

- *Carry deficit.* States where it is possible to carry deficits from one year to another are likely to be in more fiscal stress than those states with a strict balanced budget requirement.

Economic Environment

- *Unemployment rate:* The average unemployment rate by county over 2000-2007. The higher the unemployment rate, the more likely a government would be to issue a POB.

Financial Conditions

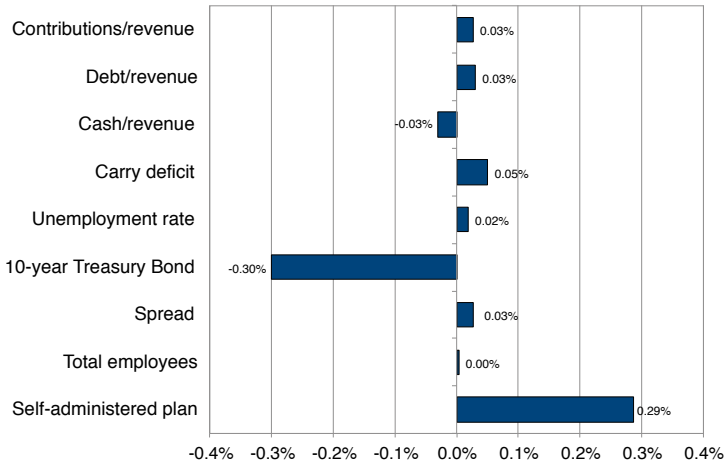
- *10-Year Treasury Bond.* In times of low interest rates, localities would be more likely to issue POBs as their cost of borrowing would be lower.
- *Spread:* The difference between the actual investment returns that each retirement system experienced in the previous three years and the 10-year Treasury rate. The greater the spread, the more likely to issue a POB.

Control Variables

- *Total Employees.* The expected outcome is that larger localities would be more likely to issue a POB as they could spread the transaction cost over a larger base.
- *Self-Administered Plan.* The Census identifies governments that administer their own pension plan. This variable could be positively related to issuing a POB because POBs are generally issued by governments in order to shore up the unfunded liabilities of their own plan. On the other hand, local governments that participate in state plans have less flexibility regarding required contributions demanded by the plan, and may issue a POB when unable to make payments.
- *Individual years.* Year dummies were included to control for changes in the health of the national economy.

The results show that governments are more likely to issue POBs if the plan represents a substantial obligation to the government, they have substantial debt outstanding, and they are short of cash (see Figure 5). That is, financial pressures play a major role. Additionally, governments are more likely to issue a POB if they are in a relatively high unemployment state. Sponsors also appear to respond to financial conditions, being more likely to issue a POB when interest rates are low and the spread is high. Finally, governments that administer their own plan are much more likely to issue POBs than those participating in a state plan.

Figure 5. *Factors Affecting the Probability of Government Issuing a Pension Obligation Bond, 1992–2013*



Note: All results are statistically significant at least at the 95 percent level. For dummy variables, the effects illustrated reflect a shift from 0 to 1. In the case of continuous variables, the effects illustrated reflect a one-standard-deviation change across the mean in one variable while holding the others at their mean (see Appendix Table A1). For detailed regression results, see Appendix Table A2.[19]

Sources: Authors' calculations based on government financial data and retirement plan data from the U.S. Census Bureau (2011, 2012a, and 2012b); POB data from Bloomberg Online Service (2012); SDC Thomson Reuters (2013); and the St. Louis Federal Reserve (2014).

While the magnitudes of the effects appear small, they are meaningful given that only 0.2 percent of governments in our sample issued a POB.

Conclusion

When plan sponsors issue a pension obligation bond, the bond proceeds are invested with pension plan assets. The question then is whether the government will earn more on the proceeds than it will have to pay in interest. Immediately after the financial crisis, governments appeared to have lost money on their POBs. Four years of economic recovery have improved the performance of POBs; today these bonds have netted 1.5 percent. But the story is far from over since many of these bonds have a 30-year life. And, because POBs turn a somewhat flexible commitment into a firm commitment, governments that have issued a POB have reduced their financial flexibility.

The second finding from this update—which includes a greatly expanded number of POB issuers—is that financial pressures continue to play a major role in the issuance of these securities. But the transaction also contains an element of investment speculation in that the spread—based on the plan's historical returns and current interest rate—is also positively related to the probability of issuing a POB. POBs could potentially be used responsibly by fiscally sound governments who understand the risks involved or could play a role as part of a broader pension reform package for fiscally stressed governments. But the results from this *brief* suggest that POB usage to date has not followed this formula—think Detroit, which issued POBs in 2005 and 2006 just as the market was approaching a peak.

Endnotes

1 Munnell et al. (2010).

2 Scanlan and Lyon (2006).

3 The decrease in borrowing costs in issuing tax-exempt state and municipal POBs often exceeds the differential in the risk premium of state and local bonds over federal bonds of the same duration.

4 See Peng (2004).

5 Bader and Gold (2003).

6 Thad Calabrese generated the POB data set from raw data on government bond issues from Bloomberg.

7 States with less than $1 billion in POB issuances are not shown in the figure.

8 California and Illinois are, of course, large states. On a per-capita basis, the biggest players are Oregon, Illinois, and Connecticut. California is number six.

9 Burnham (2003); Davis (2006); and Calabrese (2009).

10 Burnham (2003); Davis (2006); Calabrese (2009); Block and Prunty (2008); and Hitchcock and Prunty (2009).

11 Timing risk could be mitigated if the POB proceeds were applied more strategically, for example for purposes of matching retiree liabilities. This approach would be contrary to the principal of performance arbitrage but, in addition to avoiding timing risk, it would also reduce plan leverage and possibly improve funding.

12 Hitchcock and Prunty (2009).

13 Government Finance Officers Association (2005). The political risk of unnecessary benefit increases can be mitigated by legislatures and boards building in governance protections. For example, benefit increases could be prohibited until funding exceeds 115–125 percent.

14 A data set containing only non-federal pension financing bonds issued from 1992-2009 was drawn from municipal bond data from Bloomberg Online Service. This data set was combined with data on POB issuances from 1986–2013 from SDC Thomson Reuters.

15 A recent report by The PFM Group (2014) on the use of POBs states that they "should be considered only in conjunction with refining the ongoing benefit structure and investment policy of the fund or trust in order to position the issuer and employees for future sustainability." The report goes on to say that issuers who wish to take advantage of the appropriate window to issue a POB should lay the groundwork early by preparing legal documents and considering the size and structure of the issuance in advance.

16 Of the 270 POB occurrences used in the regression analysis, 157 come from jurisdictions that do not administer their own plan.

17 We apportion the pension finances of state plans to these localities according to the ratio of the locality's payroll to the total payroll of all localities in the same state that also do not administer their own plan. If the state-administered plan is employee-specific (i.e. a police and fire plan, or a teachers plan), then we apportion based on the ratio of the locality's payroll for that employee type to the total payroll for that employee type.

18 In addition to the variables described, it would also be useful to include the funding status of the plan. Presumably, poorly funded plans would be more likely to issue a POB. Unfortunately, historical funding data are not available for most plans in the sample.

19 Census data regarding state and local government and pension finances are only available up to fiscal years 2011 and 2012, respectively. For the regression, the most recent Census data—2011 for government finances and 2012 for pension finances—were duplicated and used for 2012 and 2013. Limiting the regression to only years with Census data does not change the results.

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Appendix

Table A1. *Summary Statistics of Factors Affecting the Probability of Government Issuing a Pension Obligation Bond, 1992–2013*

Variable	Mean	Standard Deviation	Maximum	Minimum
Contributions/revenue	1.87	2.79	0	21.09
Debt/revenue	4.34	5.65	0	36.82
Cash/revenue	99.35	87.34	4.30	717.90
Carry de cit	0.20	0.40	0	1
Unemployment rate	5.18	1.13	2.53	7.58
10-year Treasury Bond	4.99	1.07	1.80	7.01
Spread	2.18	9.00	-33.97	26.94
Total employees	1,148	8,762	0	405,810
Self-administered plan	0.09	0.28	0	1

Source: Authors' calculations.

Table A2. *Marginal Impact of Factors Affecting the Probability of Government Issuing a Pension Obligation Bond, 1992–2013*

Variable	Marginal effects
Contributions/revenue	0.00027 *** (0.000)
Debt/revenue	0.00030 *** (0.000)
Cash/revenue	-0.00030 *** (0.000)
Carry de cit	0.00050 ** (0.041)
Unemployment rate	0.00018 *** (0.008)
10-year Treasury Bond	-0.00203 *** (0.000)
Spread	0.00027 *** (0.000)
Total employees	0.00005 ** (0.025)
Self-administered plan	0.00286 *** (0.000)
Pseudo R^2	0.1396
Number of observations	139,323

Note: Standard errors are in parentheses and adjusted for within-plan correlation. The model includes year fixed effects. The coefficients report marginal effects from a probit estimation computed at sample means of the independent variables and are significant at the 95 percent (**) or 99 percent (***) level. The dependent variable is 1 for governments that issued a POB in a given year, and 0 otherwise.

Source: Authors' calculations.

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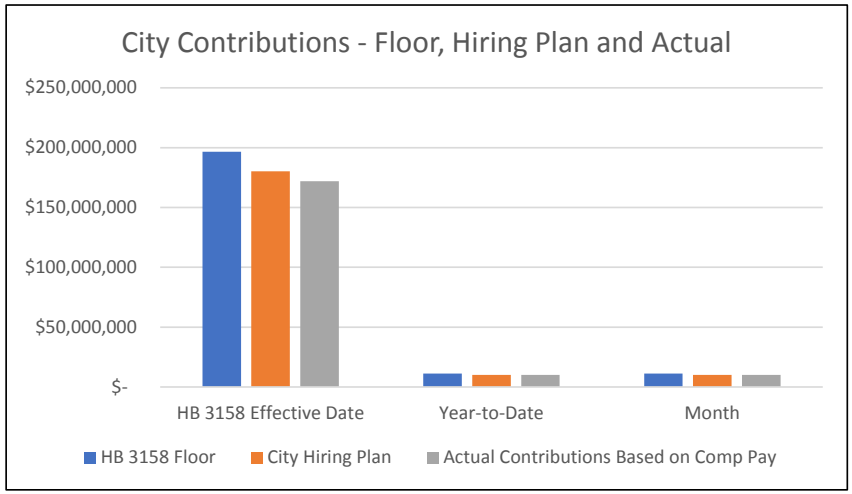
DISCUSSION SHEET

ITEM #C14

Topic: **Monthly Contribution Report**

Discussion: Staff will review the Monthly Contribution Report.

Contribution Tracking Summary - March 2019 (January 2019 Data)

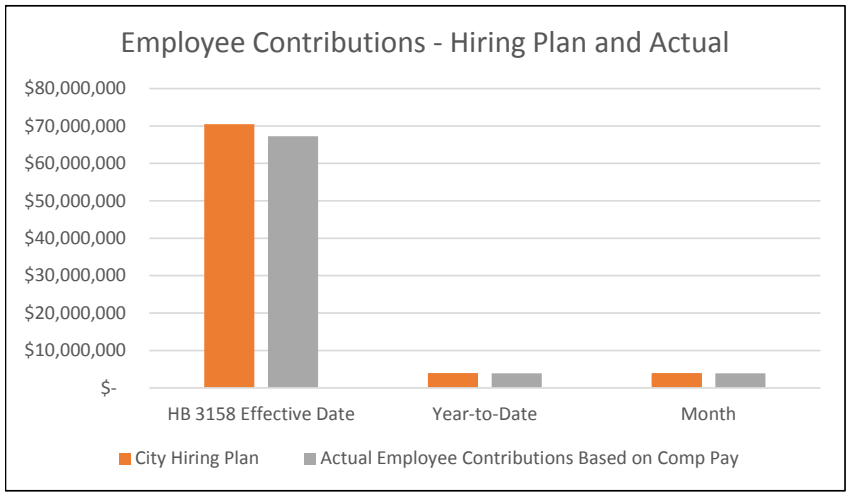


Actual Comp Pay was 95% of the Hiring Plan estimate since the effective date of HB 3158.

In the most recent month Actual Comp Pay was 99% of the Hiring Plan estimate.

The Hiring Plan Comp Pay estimate increased by 5.22% in 2019.

Through 2024 the HB 3158 Floor is in place so there is no City Contribution shortfall.



Since the effective date of HB 3158 actual employee contributions have been $3.2 million less than the Hiring Plan estimate. Potential earnings loss due to the contribution shortfall is $206k at the Assumed Rate of Return.

There is no Floor on employee contributions.

Contribution Summary Data

City Contributions

Jan-19	Number of Pay Periods Beginning in the Month	HB 3158 Floor	City Hiring Plan	Actual Contributions Based on Comp Pay	Additional Contributions to Meet Floor Minimum	Comp Pay Contributions as a % of Floor Contributions	Comp Pay Contributions as a % of Hiring Plan Contributions
Month	2	$ 11,142,000	$ 10,164,231	$ 10,034,044	$ 1,107,956	90%	99%
Year-to-Date		$ 11,142,000	$ 10,164,231	$ 10,034,044	$ 1,107,956	90%	99%
HB 3158 Effective Date		$ 196,643,000	$ 180,169,615	$ 171,915,257	$ 24,727,743	87%	95%

Due to the Floor through 2024, there is no cumulative shortfall in City Contributions
Does not include the flat $13 million annual City Contribution payable through 2024.
Does not include Supplemental Plan Contributions.

Employee Contributions

Jan-19	Number of Pay Periods Beginning in the Month	City Hiring Plan	Actual Employee Contributions Based on Comp Pay	Actual Contribution Shortfall Compared to Hiring Plan	Actuarial Valuation Contribution Assumption	Actual Contributions as a % of Hiring Plan Contributions	Actual Contributions as a % of Actuarial Val Assumption
Month	2	$ 3,977,308	$ 3,928,842	$ (48,466)	$ 3,692,278	99%	106%
Year-to-Date		$ 3,977,308	$ 3,928,842	$ (48,466)	$ 3,692,278	99%	106%
HB 3158 Effective Date		$ 70,501,154	$ 67,282,901	$ (3,218,252)	$ 67,791,074	95%	99%

Potential Earnings Loss from the Shortfall based on Assumed Rate of Return	$ (206,049)

Does not include Supplemental Plan Contributions.

Reference Information

City Contributions: HB 3158 Bi-weekly Floor and the City Hiring Plan Converted to Bi-weekly Contributions

	HB 3158 Bi-weekly Floor	City Hiring Plan-Bi-weekly	HB 3158 Floor Compared to the Hiring Plan	Hiring Plan as a % of the Floor	% Increase/ (decrease) in the Floor	% Increase/ (decrease) in the Hiring Plan
2017	$ 5,173,000	$ 4,936,154	$ 236,846	95%		
2018	$ 5,344,000	$ 4,830,000	$ 514,000	90%	3.31%	-2.15%
2019	$ 5,571,000	$ 5,082,115	$ 488,885	91%	4.25%	5.22%
2020	$ 5,724,000	$ 5,254,615	$ 469,385	92%	2.75%	3.39%
2021	$ 5,882,000	$ 5,413,846	$ 468,154	92%	2.76%	3.03%
2022	$ 6,043,000	$ 5,599,615	$ 443,385	93%	2.74%	3.43%
2023	$ 5,812,000	$ 5,811,923	$ 77	100%	-3.82%	3.79%
2024	$ 6,024,000	$ 6,024,231	$ (231)	100%	3.65%	3.65%

The HB 3158 Bi-weekly Floor ends after 2024

Employee Contributions: City Hiring Plan and Actuarial Val. Converted to Bi-weekly Contributions

		City Hiring Plan Converted to Bi-weekly Employee Contributions	Actuarial Valuation Assumption Converted to Bi-weekly Employee contributions	Actuarial Valuation as a % of Hiring Plan
2017		$ 1,931,538	$ 1,931,538	100%
2018		$ 1,890,000	$ 1,796,729	95%
2019		$ 1,988,654	$ 1,846,139	93%
2020		$ 2,056,154	**$ 2,056,154**	100%
2021		$ 2,118,462	**$ 2,118,462**	100%
2022		$ 2,191,154	**$ 2,191,154**	100%
2023		$ 2,274,231	**$ 2,274,231**	100%
2024		$ 2,357,308	**$ 2,357,308**	100%

The information on this page is for reference. The only numbers on this page that may change before 2025 are the Actuarial Valuation Employee Contributions Assumptions for the years 2019-2024 and the associated percentage.

Reference Information - Actuarial Valuation and GASB 67/68 Contribution Assumptions

Actuarial Assumptions Used in the Most Recent Actuarial Valuation - These assumptions will be reevaluated annually and may change.
City Contributions are based on the Floor through 2024, the Hiring Plan from 2025 to 2037, after 2037 an annual growth rate of 2.75% is assumed
Employee Contributions for 2018 are based on the 2017 actual employee contributions inflated by the growth rate of 2.75% and the Hiring Plan for subsequent years until 2038, when the 2037 Hiring Plan is increased by the 2.75 growth rate for the next 10 years

Actuarial/GASB Contribution Assumption Changes Since the Passage of HB 3158

	Actuarial Valuation	GASB 67/68
YE 2017 (1/1/2018 Valuation)		
2018 Employee Contributions Assumption - based on 2017 actual plus growth rate not the Hiring Plan Payroll	$ (2,425,047)	*
**90% of Hiring Plan was used for the Cash Flow Projection for future years in the 12/31/2017 GASB 67/68 calculation. At 12-31-17 this did not impact the pension liability or the funded percentage.*		

The information on this page is for reference. It is intended to document contribution related assumptions used to prepare the Actuarial Valuation and changes to those assumptions over time, including the dollar impact of the changes. Contribution changes impacting the GASB 67/68 liability will also be included.

City Hiring Plan - Annual Computation Pay and Numbers of Employees						
	Computation Pay			Number of Employees		
Year	Hiring Plan	Actual	Difference	Hiring Plan	Actual EOY	Difference
2017	$ 372,000,000	Not Available	Not Available	5,240	4,935	(305)
2018	$ 364,000,000	$ 349,885,528	$ (14,114,472)	4,988	4,983	(5)
2019	$ 383,000,000			5,038		
2020	$ 396,000,000			5,063		
2021	$ 408,000,000			5,088		
2022	$ 422,000,000			5,113		
2023	$ 438,000,000			5,163		
2024	$ 454,000,000			5,213		
2025	$ 471,000,000			5,263		
2026	$ 488,000,000			5,313		
2027	$ 507,000,000			5,363		
2028	$ 525,000,000			5,413		
2029	$ 545,000,000			5,463		
2030	$ 565,000,000			5,513		
2031	$ 581,000,000			5,523		
2032	$ 597,000,000			5,523		
2033	$ 614,000,000			5,523		
2034	$ 631,000,000			5,523		
2035	$ 648,000,000			5,523		
2036	$ 666,000,000			5,523		
2037	$ 684,000,000			5,523		

Comp Pay by Month - 2019	Annual Divided by 26 Pay Periods	Actual	Difference	2019 Cumulative Difference	Number of Employees EOM	Difference
January	$ 29,461,538	$ 29,084,185	$ (377,354)	$ (377,354)	4963	(75)
February	$ 29,461,538	$ -		$ (377,354)		
March	$ 29,461,538	$ -		$ (377,354)		
April	$ 29,461,538	$ -		$ (377,354)		
May	$ 44,192,308	$ -		$ (377,354)		
June	$ 29,461,538	$ -		$ (377,354)		
July	$ 29,461,538	$ -		$ (377,354)		
August	$ 29,461,538	$ -		$ (377,354)		
September	$ 29,461,538	$ -		$ (377,354)		
October	$ 44,192,308	$ -		$ (377,354)		
November	$ 29,461,538	$ -		$ (377,354)		
December	$ 29,461,538	$ -		$ (377,354)		

DISCUSSION SHEET

ITEM #C15

Topic: **Board approval of Trustee education and travel**

a. Future Education and Business-related Travel
b. Future Investment-related Travel

Discussion:

a. Per the Education and Travel Policy and Procedure, planned Trustee education and business-related travel and education which does not involve travel requires Board approval prior to attendance.

Attached is a listing of requested future education and travel noting approval status.

b. Per the Investment Policy Statement, planned Trustee travel related to investment monitoring, and in exceptional cases due diligence, requires Board approval prior to attendance.

There is no future investment-related travel for Trustees at this time.

Future Education and Business Related Travel
Regular Board Meeting – March 14, 2019

			ATTENDING	APPROVED
1.	**Conference:**	**TEXPERS Annual Conference**	**BD**, **SF**	12/13/2018
	Dates:	April 7-10, 2019		
	Location:	Austin, TX		
	Est. Cost:	$1,225		
2.	**Conference:**	**NCPERS Accredited Fiduciary Program**		
	Dates:	May 18-19, 2019		
	Location:	Austin, TX		
	Est. Cost:	TBD		
3.	**Conference:**	**NCPERS Annual Conference**	**SF**	02/14/2019
	Dates:	May 19-22, 2019		
	Location:	Austin, TX		
	Est. Cost:	$1,500		
4.	**Conference:**	**TEXPERS Summer Educational Forum**		
	Dates:	August 11-13, 2019		
	Location:	El Paso, TX		
	Est. Cost:	TBD		

DALLAS POLICE & FIRE PENSION SYSTEM

DISCUSSION SHEET

ITEM #D1

Topic: **Reports and concerns of active members and pensioners of the Dallas Police and Fire Pension System**

Discussion: This is a Board-approved open forum for active members and pensioners to address their concerns to the Board and staff.

DALLAS POLICE & FIRE PENSION SYSTEM

DISCUSSION SHEET

ITEM #D2

Topic: **Executive Director's report**

a. Associations' newsletters
- NCPERS PERSist (Winter 2019)

b. Open Records

c. City Payroll Issues Update

Discussion: The Executive Director will brief the Board regarding the above information.

PERSIST

The Voice for Public Pensions

Winter 2019 | Volume 32 | Number 1

Message from the President

Daniel Fortuna
NCPERS President

NCPERS has a robust online and onsite education programs lined up for 2019. NCPERS has hosted two webinars and the NCPERS Legislative Conference already and will host an additional webinar in the first quarter. In the second quarter we will host the new NCPERS University, which includes Trustee Educational Seminar (TEDS), the relaunched Program for Advanced Trustees (PATS), and NCPERS Accredited Fiduciary (NAF), along with the Annual Conference & Exhibition (ACE) programs in May and a new Chief Officers Summit workshops in June.

The first webcast of 2019 reviewed legislative activities at the state and federal levels including predictions of the 116th Congress and upcoming state legislation that will impact public pension plans. Held on January 8, NCPERS executive director, Hank Kim, moderated the live webcast, with Andrew Collier, the communications director of National Public Pension Coalition, and Anthony Roda, partner at Williams & Jensen.

The annual NCPERS Legislative Conference took place on January 27 to 29, 2019, where members met in Washington, D.C. for two and half days of advocacy, strategy, and networking on the most pressing policy issues facing public pension funds in 2019. You can view three presentations through Facebook Live. Sophia Nelson discussed an outlook on Washington, where she stressed a message of unity. NPPC executive director, Bridget Early, further discussed pension legislation in the states. The third Facebook Live recording is our 2018 Policymaker of the Year presentation to former California State Treasurer John Chiang.

The Center for Online Learning will continue to provide educational opportunities in February. On February 5, 2019, at 1:00 pm to 2:00 pm EST, NCPERS hosted a webinar on the 2018 NCPERS Public Retirement Systems Study and its dashboard. William SaintAmour, from Colbalt Community Research, discussed the findings of our survey and demonstrate how to use

CONTINUED ON PAGE 9

In This Issue

Will Closing the Plan Save Money?

By Brian B. Murphy

It is easy to think that if a Defined Benefit (DB) plan is closed and new hires are put into a replacement Defined Contribution (DC) Plan with a reduced contribution rate, there is an automatic savings. Is that really true? Let's think about that.

Photo Illustration © 2018 Shutterstock.com

Unfunded Liability Issues: First of all, the existing unfunded liabilities of the DB plan have to be financed no matter what, so there is no use thinking about them right? Well, no, not right. In an open plan, benefit payments will vary as a % of assets, but will tend to stabilize approximately in the 3% to 5% of assets area. That allows for an asset allocation based upon an income/gains-seeking approach and for an investment return assumption that reflects such an allocation. In a closed plan, benefit payout will not stabilize as a % of assets. It will eventually rise to very high levels – 10% or 15% of assets or more, until the last benefit is paid out. In that circumstance fiduciaries are likely to eventually shift toward a preservation of capital approach to asset allocation, reducing the expected return on assets and increasing the need for contributions from the plan sponsor. The effect on liabilities can be significant. Some estimates have shown it to be on the order of 15% to 20% of the liabilities that existed at plan closure. **The DB unfunded liability based on ongoing plan assumptions probably understates the unfunded liability if the plan is closed.**

Normal Cost Issues: If the DC contribution is less than the DB normal cost, there is a savings, right? The answer is "it depends". The annual cost to fund the DB benefit of a person who actually retires is usually higher than the DB normal cost. That happens because benefits of people who retire are funded by normal cost contributions made on their behalf, and by normal cost contributions made on behalf of other people who terminate employment and forfeit employer provided benefits. So, a DC plan, with contributions at a rate less than the DB normal cost, reduces benefits for people who retire disproportionately more than any potential savings that might accrue to the plan sponsor. The plan sponsor probably can save money in the near term, with this strategy, but it does so to the significant detriment of future career employees. As time passes, affected employees may eventually seek some type of relief that will reduce if not eliminate the savings. In addition, DC participants who can't afford to retire may work beyond the point where they are productive, or could

CONTINUED ON PAGE 9

Brian Murphy *is a Senior Consultant with Gabriel Roeder Smith and Company (GRS). He has more than 39 years of public sector actuarial and consulting experience in 15 states. His extensive experience in public employee benefits covers plans from the smallest to the largest in the country, all major employee groups (general, teachers, safety, and judges), and plan structures (single employer plans, agent multiple employer plans, and cost sharing multiple employer plans). In addition to annual valuation services, his expertise includes funding policy development, legislative testimony, experience studies, actuarial audits, plan redesign, projection work, and retiree health care funding solutions. Brian served as GRS' President from 2004 through 2014.*

US growth equities: Change is the fuel for growth

By Juliet Ellis

We believe there will be continued potential for positive US equity returns, but slowing economic growth may mean more frequent downhills. Observing the weight of the evidence, we have moved into a late-cycle environment. In our view, the path forward will not rely on choosing growth versus value. We believe it will rely on identifying "share-takers".

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Late cycle, but maybe longer cycle too

Economic data has continued to look positive and we are not seeing imminent signs of a downturn. The gloomy macro headlines of late 2018 are not materially different from those that we saw earlier in this nine-year run, and yet US stocks are up over 400% since March 2009.[1]

Slowing growth

Our base case expectation is for slowing growth over the next 12 to 18 months. The positive benefits of US tax stimulus and deregulation are being offset by higher interest rates, rising labor costs and trade pressures. While we see a natural deceleration in growth, we do not believe recession is imminent.

The path forward: Identifying 'share-takers'

In such an environment, true growth will likely become an even scarcer commodity, and thus we believe the market will continue to favor companies that can produce growth and compound earnings despite the economic cycle. We believe today is a compelling time to invest in share-takers, because it is a period of massive change, and market share is shifting rapidly between companies. Consumer habits and business models are rapidly changing with the introduction of new technology. Today, technology is removing the barriers for global commerce. In our view, these changes are producing winners and losers, and creating an excellent environment for bottom-up fundamental research and stock picking — the keystone of our investment process on the US Growth Equities Team.

Here are several areas where technology is enabling disruption and creating opportunities:

- **Connectivity/mobile devices.** Mobile devices are driving an inflection point in internet connectivity. We estimate that over 4 billion people have access to the Internet globally, and we expect that another 1.3 billion people will gain Internet access over the next three years.[2]

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Prior to joining Invesco in 2004, Ms. Ellis was a managing director with JPMorgan Fleming Asset Management, where she served as senior portfolio manager of JPMorgan's small-cap equity and small-cap growth strategies. At JPMorgan, she was responsible for the management of mutual funds, sub-advised portfolios and institutional separate account portfolios. She joined JPMorgan in 1987 as an equity analyst and also served as assistant portfolio manager and director of equity research before being promoted to senior portfolio manager in 1993 and managing director in 2000. She began her investment career in 1981 with Merrill Lynch.

Ms. Ellis earned a BA degree in economics and political science, cum laude, from Indiana University, where she was a member of Phi Beta Kappa. She is a Chartered Financial Analyst® (CFA) charter holder.

Effective Board Member Orientation Pays Off

By Brad Kelly

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Boards spend an unbelievable amount of time, energy and financial resources trying to find the right nominees/candidates that can add value and enhance governance oversight, but for many boards, the momentum ends once the vacancy is filled or when the infamous "orientation binder" is sent to a newly elected board member. In practical terms, this is like an Olympic marathon runner training for years and then deciding to walk their race on the day of their Olympic event – ultimately, they are not utilizing or benefiting from the hard work they put in upfront.

By not following up with a strong orientation program, boards are not preparing their new members to become true board contributors from day one, which means that they will take roughly their first year to catch up and self-learn as much as they can. Alternatively, boards can be proactive and do their best to prepare new board members upfront and help ensure they hit the ground running and are contributing on day one.

As a bare minimum, your board should have an updated orientation package ready for new members the day they are elected. Ideally, this should be kept in an electronic format, updated regularly, and perpetually available to all members. Overall, this should include:

- A short historical overview of the organization including its mission, vision and values;
- A year-to-date list of organizational accomplishments;
- Staff organizational chart;
- Charter/articles of incorporation;
- Bylaws and committee mandates;
- Most recent financial statements (quarterly and audited annual);
- Most recent strategic plan and approved budget;
- Approved minutes from the last 3 to 6 meetings;
- Current board member bios and photos;
- A list of links to all overarching legislation;
- All applicable governance policies including the board's code of conduct;
- A copy of the director's & officers liability insurance policy;
- Yearly calendar of all upcoming board meetings, committee meetings and important events.

As well, a general orientation session should be offered as soon as possible to help review the high-level elements of the aforementioned documents and to review the board and management's roles and responsibilities. Understandably, it is the chair and committee chairs that attend and present at this session, but it is also a best practice to make these sessions open to all board members that can attend because it will not only provide a great opportunity for the new members to get to know the board, but also provide a discrete refresher for any board members who may feel that they could benefit but are afraid to ask. Also, in attendance should be key executive staff members who can walk participants through their roles and specific area of responsibility. As an alternative, if a general session is impossible to establish, the second-best option is to set up a day or two of individual meetings with the board chair, each of the committee chairs, and key executives.

Ideally, all of this needs to happen well in advance of the new members' first board meeting because, by doing so, there will be a higher probability of them participating and/or contributing at an impactful level right from the very beginning. They know that there was a lot of thought put into their election onto your board and that comes with an expectation that they are bringing value to your board. If you don't help them build momentum from the very beginning, you diminish their potential and full capacity that your board has in effectively overseeing your organization. ◆

Brad Kelly *is a Partner at Global Governance Advisors advising Boards and senior management on Executive Compensation, HR Strategy & Governance.*

Building Next-Generation Custody Services

By Tom Casteleyn

In recent years we have seen significant developments in both the structure of the investment industry and the products available to pension funds. Today there is more concentration and index-based passive investment vehicles have come to the fore. With the prospect of industry disruption from fintechs and the internet giants, asset managers are working hard to meet the challenge of providing the immediacy and intimacy that the trustees and administrators of pension schemes have come to expect in so many other areas of their digital lives.

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Custody providers have evolved in response to the demand from both pension funds and investment managers for new services and capabilities. But evolution may no longer be enough and a full upgrade to a next generation of custody services is required to remain relevant.

What will that look like? The next generation of custody services will be advanced in four ways.

First is the provision self-service tools to allow investors to consume information and insight when and however it suits them. Investors not only require bespoke tools that provide greater visibility across the entire post-trade value chain on a timely and responsive basis, but they want the ability to integrate those tools within their own systems.

Second is the enrichment and aggregation of data. By combining data on their own platforms with the data and applications of partners and third parties, custodians can give investors deeper insights to result in operational efficiency and strategic advantage. This involves sending information through APIs and widgets for both core and non-core custody services. As investors seek to leverage new sources of data, custodians become aggregated data service providers.

Third is the critical role custodians play in ensuring that investors can access a broad range of assets both securely and cost-effectively. Investors continue to adjust their asset mix to achieve higher returns, manage risks or comply with regulations. In doing so they seek new, often less-standardized assets.

The fourth area of enhancement is global access. A fundamental role of custodians is to supply infrastructure and local expertise to ensure that investors can access markets and operate on a worldwide scale. Custodians are there to bridge the gap between local and global, and provide transparency within an enterprise-wide structure to support informed decision-making. A comprehensive approach to servicing clients around the world also relies on the seamless supply of custody-enabled services, such as collateral management, transfer agency and fund accounting.

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Can the Right Insurance Help Mitigate Cyber Risk?

By Diane McNally

In today's hyper-connected world, the chance of losing valuable protected data to careless keystrokes or clever hackers is greater than ever. Even using the best and most secure industry software, it is impossible to eliminate the risk of a breach, especially since many breaches result from negligence or due to employee errors.

As cyber laws and regulations become more restrictive, expect even greater costs and responsibilities.

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Are Benefit Plans Fully Covered by Vendors' Insurance?

While vendor contracts should stipulate their obligation in a beach, trustees or committee members may be liable for their plan's data no matter where it resides and how protected. Even if vendors have cyber liability insurance with adequate policy limits and a well-maintained data incident plan, scenarios exist where a benefit plan's own coverage is needed, such as:

- The vendor improperly responds or neglects to respond to a breach.
- A large-scale breach is beyond insurance limits or forces a vendor into bankruptcy.
- Plan trustees inadvertently release sensitive data.

With these and other possible scenarios occurring, purchasing the right coverage is one cost-effective way for trustees to manage risks.

What is Cyber Liability Insurance?

Cyber liability insurance covers unauthorized (malicious or accidental) access to and/or disclosure of personal information. The policy provides experts to respond to a breach and pay associated direct notification costs. The policy also provides defense, settlement, and judgment coverage should a third party sue for financial damages. These services are not covered by other insurance, and their costs may become the responsibility of the public sector plan or the trustees.

Comprehensive cyber policies typically offer:

- **Breach Notification Teams**
  - In the event of a breach, the policy provides forensic, legal, and public relations experts.
- First-Party Breach Notification and Remediation Costs
  - Most Cyber liability policies will pay for notifications to those affected – no matter their residence location in compliance with applicable state, federal or even foreign country's laws – and provide discounted services for call centers, credit monitoring, and identity theft remediation. This avoids engaging expert services mid-crisis at inflated non-negotiable rates.
- Third-Party Liability Coverage and Fines
  - Even when first-party notifications are handled properly, litigation and fines may follow from impacted participants and governmental agencies. This liability coverage addresses allegations of negligently mishandling data as well as improperly notifying participants – the primary reason a separate cyber liability policy is sought.
- **Expert Technical Support**
  - Most insurers offer access to websites dedicated to reducing cyber liability exposures containing articles, statutory law reviews, forms and templates, sample information security policies, loss scenarios, and other relevant information.

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Bitcoin: Should plan sponsors consider it for retirement plans?

By Charles Hodge

Bitcoin, or cryptocurrencies in general, have received a lot of publicity in the last couple of years, leading some retirement plan sponsors to consider making an investment. Of course, one of the requirements of retirement plan fiduciaries is to remain diligent, looking for ways to generate returns and protect capital in a prudent manner; they frequently do so through investments that offer diversification and attractive risk-adjusted returns, on the basis of accurate information, transparency, and trust. Let's examine a few issues regarding cryptocurrencies:

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- **Valuation and Expected Return:** Asset owners want to know what their holdings are worth, and what return they can be expected to generate. It's unclear what the "value" of a cryptocurrency is because it's not tangible or anchored to a purpose like dollars, euros, platinum, silver, etc. Former Federal Reserve Chair Janet Yellen called cryptocurrencies a "highly speculative asset," saying they are not a stable source of value. And since they do not pay dividends or interest, any returns must come solely from an increase in price—but developing expected returns through analysis of historical returns, risk premia, or other factors is extremely difficult.

- **Custody and Capital preservation:** Cryptocurrencies are a form of electronic cash that is a digital representation of value functioning as a medium of exchange, but does not have legal tender status. Unlike gold, this "electronic cash" also cannot be held in custody and does not have any other non-financial use (industrial, jewelry, etc.); it exists only as lines of computer code. The role of the custodian is important to establish ownership, but how does one establish ownership of such an "asset?" The chance of it vanishing completely would be a concern to a plan sponsor, as access to a simple password could lead to untraceable and anonymous trades.

- **Diversification:** Plan sponsors are usually looking for asset classes that help their risk adjusted returns by producing a higher Sharpe Ratio. The available historical return series for cryptocurrencies would seem to provide diversification to traditional asset classes, but in times of global distress or market corrections, buying and selling cryptocurrencies will likely be even more difficult, thus raising questions about whether diversification will be there when plan sponsors really need it.

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Charles joined Milliman in 2000, working with defined benefit, defined contribution, endowment, and foundation clients. His responsibilities include investment policy statement design and review, asset/liability modeling, funding study analysis, investment manager research and selection, model portfolio construction, vendor searches, and performance monitoring. He has been an institutional investment consultant since 1991, having previously worked for Robert Harrell, Inc. and Arthur Andersen.

Charles earned a BA degree in Economics from the University of Texas at Austin. He is a Certified Investment Management Analyst (CIMA) and a member of the Investment Management Consultants Association, the CFA Institute, and the CFA Society of Dallas-Fort Worth.

Modernizing of your Pension Fund Setting Expectations

By John R. Reidy

Are you considering implementing or replacing a legacy Pension Administration System? If so, please consider the following article as you make your plans to acquire new technology.

Most public employee pension funds have very similar long-term technological goals which usually consist of most of the following action items:

- Modernization
- Automation
- Validation and storage of membership data
- Improvement of membership services
- Data Security
- Business Continuity Planning

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Many of the Request for Proposal's for public employee pension administration software systems have very similar requirements. As a matter of fact, for the past decade, several similar RFP's have been regurgitated in some form or fashion throughout the industry. Responding to these RFPs' is more an exercise in cutting and pasting than it is about highlighting a company's differentiating factors and how each vendor software solution can provide the greatest value to a pension fund and its membership.

Over the past few years, the biggest change that this industry has experienced is that public employee pension funds have begun to embrace "Web-Based" or "Hosted" solutions. These types of software systems are installed at a secure data center that is located outside the pension fund's physical office. These data centers generally provide a level of data security and protection that is far superior to anything that public employee organizations could hope to achieve and maintain on a consistent basis. For business continuity purposes, the software application should be running in multiple data centers. Another benefit of web-based applications is that these types of software applications can be deployed much more quickly, efficiently and cost effectively than the traditional installed software system. These are all very important benefits that a web-based pension software system can provide.

Unfortunately, many pension funds are reluctant to modernize their administration systems because they have become familiar

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John graduated from the Catholic University of America in Washington, D.C where he studied politics. John is the proud father of a 15-year-old daughter and a 12-year-old son and lives in South Boston, MA.

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the dashboard to wield and search the survey results so that the data is refined to your specifications. You can view the webinar here. On February 26, 2019, at 1:00 pm to 2:00 pm EST, NCPERS will be hosting a webinar on our new white paper, Pre-Funding Retiree Healthcare. Don Heilman, from Gallagher Benefit Services, will discuss the merits for pre-funding retiree health care costs, along with various vehicles available to the public sector for pre-funding. You can register for the webinar here.

To view or register for any of our webinars or conferences, please click on the links inside the article. We look forward to "seeing you" at our online and in person events!

ACTUARY CONTINUED FROM PAGE 2

become dependent upon publicly funded social programs during retirement, in either case, introducing hidden costs that are not subject to direct measurement. Of course, any death and disability coverage provided to DC participants will also offset savings. **The benefits provided by the replacement DC plan may prove to be unrealistically low and the savings may not persist.**

In conclusion, yes, closing the plan might produce savings because benefits are being reduced. It also introduces costs that are not necessarily obvious or easy to measure and that may actually eliminate the savings. A well-funded DB plan that provides meaningful secure benefits is much better for all stakeholders than a standalone DC plan.

ASSET MANAGER CONTINUED FROM PAGE 3

- **Artificial Intelligence.** In the health care sector alone, AI-enabled advancements such as robot-assisted surgery, have the potential to save $150 billion in costs by 2026.[3]
- **E-Commerce.** E-commerce is penetrating the largest commerce verticals of food, consumables and auto. We believe the share of e-commerce accounts could accelerate from 12% of retail spending today to more than 30% in the next few years.
- **Digital music.** The digital music industry is shifting from a single-serve distribution model to a subscription model — an avenue to capture value.
  - 53% of millennials spend over three hours a day listening to music.[4]
  - Streaming music revenue has grown more than 40% year-over-year for the last five years.[4]
- **Online advertising**
  - Online advertising is taking share from traditional print, radio and television advertising.
- **Video games.** Video game companies are well-positioned to expand their market and margins through more downloadable content.

CUSTODIAN BANK CONTINUED FROM PAGE 5

The next generation of custody services will take time to roll out and involves a significant investment in technology. And while important, this is not just about enhancing the service provided to investors. It is to ensure that the risks inherent in the global custody chain continue to be addressed. Essential to ensuring a robust global investment infrastructure is for custodians to be able to develop a reliable, adaptable and sustainable platform to meet the changing demands of pension fund investors.

The views expressed herein are those of the authors only and may not reflect the views of BNY Mellon.

INSURANCE CONTINUED FROM PAGE 6

In today's increasingly vulnerable environment, public sector plan sponsors need to view breaches not as "if" events but rather as "when" events and to consider all measures – including an appropriate cyber policy – to protect the data they hold and maintain. Legal counsel should be consulted to fully understand liability the trustees and plan may face were a breach to occur. As laws change, these conversations should happen on an annual basis. ◆

Diane McNally *is a Senior Vice President and Principal in Segal Select Insurance's New York office.*

INVESTMENT CONSULTANT CONTINUED FROM PAGE 7

- **Governance:** Because cryptocurrencies exist outside the oversight of banks and regulators, it's hard to know how disagreements can be resolved. As an owner of a cryptocurrency, would you have trust in the governance of the rules of ownership and trading?

At this time, bitcoin and other cryptocurrencies do not seem to be appropriate investments for retirement plan sponsors. Broader institutional market adoption, evidenced by activities such as trading in futures, shorting, and opportunities to arbitrage, might bring pricing efficiency and predictability that could make it an attractive asset class, but these market forces are in the early stages of development. To note, cryptocurrencies rely on blockchain technology; these are distinct concepts and should be viewed separately when considering retirement investment opportunities. Institutional investors will likely own businesses that take advantage of blockchain technology, but it's this author's opinion that bitcoin isn't ready for plan sponsor prime time. ◆

PENSION ADMINISTRATION CONTINUED FROM PAGE 8

with the past experiences of their peers. Traditionally, it has not been uncommon for these types of projects to take 36 – 60 months to complete. With a project of this duration, also comes a multi-million-dollar price tag. This is a daunting concept to overcome. However, the advancement in technologies has changed the game and opened a window for public employee pension funds to realize the many benefits of technology. Shorter projects should result in lower project fees.

The following table illustrates a basic guideline that your pension fund might use in order to determine the approximate length of a pension administration software project by participant size:

Pension Fund Membership Size	Estimated Project Duration
<500 members/retirees	3-6 months
500 -1,000 members/retirees	6-9 months
1,000-5,000 members/retirees	9-16 months
5,000-35,000 members/retirees	14-24 months
35,000 -50,000 members/retirees	24-36 months

Project duration times between each tier increase as the plan's membership size increases, and in turn creates the need for automation. Plan rule complexity can also be an outlier because some funds with multiple types of benefit formulas will require additional programming. It is also very important to note that that a shorter software project also reduce the funds exposure to financial and data security risks. ◆

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May 18 – 19
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Trustee Educational Seminar
May 18 – 19
Austin, TX

Annual Conference & Exhibition (ACE)
May 19 – 22
Austin, TX

June

Chief Officers Summit (COS)
June 13 – 14
Chicago, IL

September

Public Pension Funding Forum
September 11 – 13
New York, NY

October

NCPERS Accredited Fiduciary Program (All modules)
October 26 – 27
New Orleans, LA

Public Safety Conference
October 27 – 30
New Orleans, LA

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