



TRS Risk Management Committee



September 2015

**TEACHER RETIREMENT SYSTEM OF TEXAS MEETING
BOARD OF TRUSTEES
AND
RISK MANAGEMENT COMMITTEE**

(Committee Chair and Members are Subject to Change at the September Board Meeting — Ms. Charleston, Committee Chair; Mr. Barth; Mr. Corpus; Mr. Kelly; & Mr. Moss, Committee Members)

AGENDA

**September 24, 2015 – 12:15 p.m.
TRS East Building, 5th Floor, Boardroom**

1. Consider the approval of the proposed minutes of the June 11, 2015 committee meeting – Committee Chair.
2. Review the Investment Risk Report – Jase Auby.

NOTE: The Board of Trustees (Board) of the Teacher Retirement System of Texas will not consider or act upon any item before the Risk Management Committee (Committee) at this meeting of the Committee. This meeting is not a regular meeting of the Board. However, because the full Risk Management Committee constitutes a quorum of the Board, the meeting of the Committee is also being posted as a meeting of the Board out of an abundance of caution.

Minutes of the Risk Management Committee

June 11, 2015

The Risk Management Committee of the Board of Trustees of the Teacher Retirement System of Texas met on June 11, 2015 in the boardroom located on the fifth floor of the TRS East Building offices located at 1000 Red River Street, Austin, Texas.

The following committee members were present:

Karen Charleston, Chair
Todd Barth
David Corpus
David Kelly
Christopher Moss

Others present:

Anita Palmer, TRS Trustee	Barbie Pearson, TRS
Dolores Ramirez, TRS Trustee	Rob Dunn, TRS
Nanette Sissney, TRS Trustee	Dan Junell, TRS
Brian Guthrie, TRS	Lynn Lau, TRS
Ken Welch, TRS	Jay LeBlanc, TRS
Amy Barrett, TRS	Scot Leith, TRS
Janet Bray, TRS	Michelle Pagán, TRS
Carolina de Onís, TRS	Heather Traeger, TRS
Howard Goldman, TRS	Steve Huff, Fiduciary Counsel, Reinhart Boerner Van Deuren s.c.
Don Green, TRS	Philip Mullins, Texas Retired Teachers Association
	Ted Melina Rabb, Texas American Federation of Teachers

Ms. Charleston called the meeting to order at 4:20 p.m. A quorum of the committee was present.

1. Consider the approval of the proposed minutes of the March 26, 2015 committee meeting – Karen Charleston.

On a motion by Mr. Moss, seconded by Mr. Barth, the committee approved the proposed minutes of the March 26, 2015 meeting, as presented.

2. Receive report on Enterprise Risk Management – Jay LeBlanc and Michelle Pagán.

Mr. LeBlanc described the April 2015 meeting of the Enterprise Risk Management (ERM) Peer Group that TRS ERM staff attended with representatives of 12 other public pension systems. He next outlined the three levels of ERM reporting — the stoplight, risk profile, and risk reports, all of which were included in the committee's meeting materials. Mr. LeBlanc then turned the presentation over to Ms. Pagán.

Ms. Pagán presented the ERM reports. She explained that the stoplight report projected risk-level trends over the next 12 to 24 months. She highlighted four risk categories in the stoplight report — active health care affordability, investment operations, pension funding, and the TEAM program. She pointed out that the risk level for active health care affordability would remain elevated over the 12-to-24 month period because of static district and state contribution rates coupled with rising healthcare costs. She said that the risk level for investment operations had decreased from caution to guarded, where it would remain during the period because of

reconciliations and service level agreements with the custodian. She also attributed the lowered risk level to key performance indicators that would help monitor and manage investment operations. Pension funding risk, she said, was not projected to increase, but would remain guarded, because higher contribution rates enacted by the legislature and strong investment returns would help keep the pension fund actuarially sound. She reported that the risk level for the TEAM program would decrease over the period because of a new risk mitigation process. She also noted that the names of two risk categories had changed: “facilities planning” had been renamed “facilities management and planning” and “workforce continuity” had become “talent continuity.”

Ms. Pagán reviewed the risk heat map, risk level trend and summary chart, risk profiles, and latest risk assessments. She said that the completed risk assessments for the reporting period indicated that the risk level for retiree health care funding would continue to be high, while active health care and employer reporting would remain at elevated risk levels. For more details on each risk category, she referred committee members to the individual risk reports in the appendix to the presentation materials. Those detailed risk reports, she noted, specified risk mitigations and action plans. Finally, she informed the committee of ongoing enterprise risk management activities for the November 2015 meeting, including working with management and staff on the data protection project and strategic planning.

Without further discussion, the meeting adjourned at 4:28 p.m.

APPROVED BY THE **RISK MANAGEMENT COMMITTEE** OF THE BOARD OF TRUSTEES OF THE TEACHER RETIREMENT SYSTEM OF TEXAS ON THE 24TH DAY OF SEPTEMBER, 2015.

ATTESTED BY:

Dan Junell
Secretary to the TRS Board of Trustees

Date





Investment Risk Report

Jase Auby
Chief Risk Officer
September 2015

Agenda

Policy Requirements

1. Asset Allocation
2. Value at Risk (VaR)
3. Tracking Error
4. Leverage
5. Liquidity
6. Counterparty Risks
7. Derivatives

Conclusion

Appendix

Securities Lending

Policy Requirements

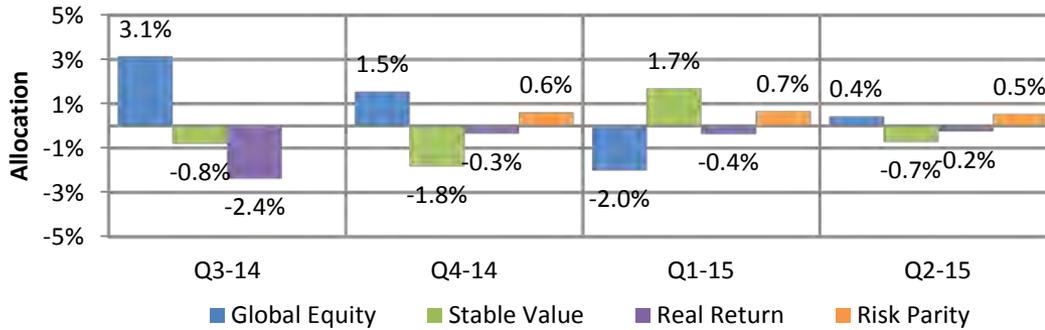
As of June 30, 2015

Policy Requirements	Description	In compliance?
1. Asset Allocation	In compliance with policy	✓
2. Value at Risk	7.1% (53% of the VaR limit range)	✓
3. Tracking Error	65 bp (22% of maximum)	✓
4. Leverage	In compliance with policy	✓
Total Trust		
Net Leverage	99.5% (Within historical norm)	✓
Gross Leverage	120.8% (Within historical norm)	✓
Securities Lending		
Net Leverage	100.3% (Within historical norm)	✓
Gross Leverage	114.3% (Within historical norm)	✓
Hedge Fund		
Net Leverage	64.7% (Within historical norm)	✓
Gross Leverage	266.1% (Within historical norm)	✓
Strategic Partners		
Net Leverage	99.3% (Within historical norm)	✓
Gross Leverage	214% (Within historical norm)	✓
Real Assets		
Loan to Value	39.5% (Within historical norm)	✓
5. Liquidity	In compliance with policy	✓
6. Counterparty	In compliance with policy	✓
Exposure	In compliance with policy	✓
Rating	In compliance with policy	✓
7. Derivative Exposures	In compliance with policy	✓

1. Asset Allocation

As of June 30, 2015

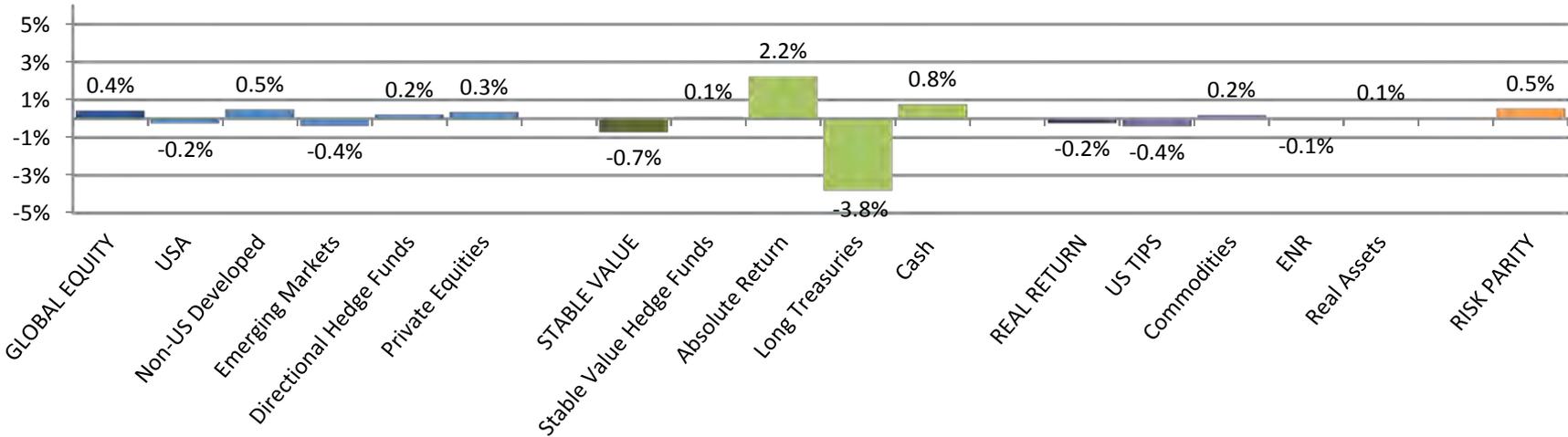
Group Active Allocation



Top Three Overweights	
Absolute Return	2.2%
Cash	0.8%
Risk Parity	0.5%

Top Three Underweights	
Long Treasuries	-3.8%
US TIPS	-0.4%
Emerging Markets	-0.4%

Asset Group/Class Active Allocation (In Compliance with Policy)

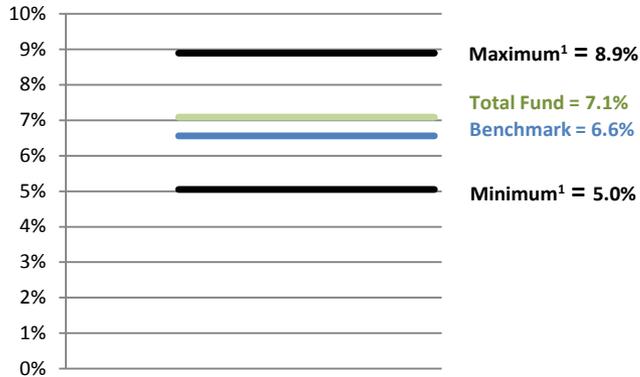


Source: State Street Bank

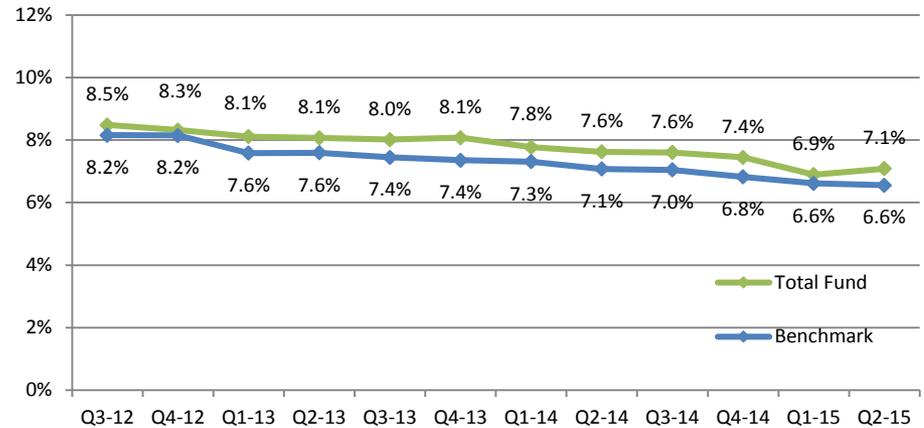
2. Value at Risk (VaR)

As of June 30, 2015

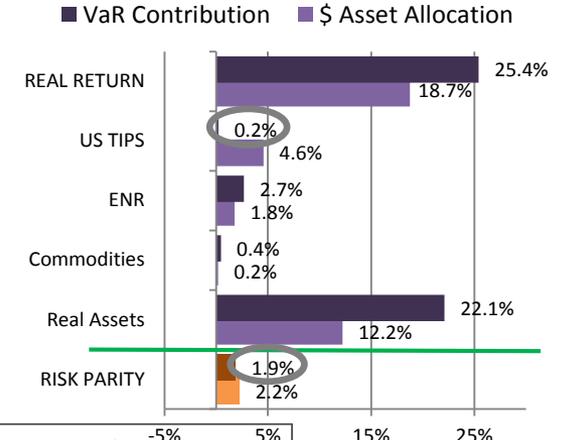
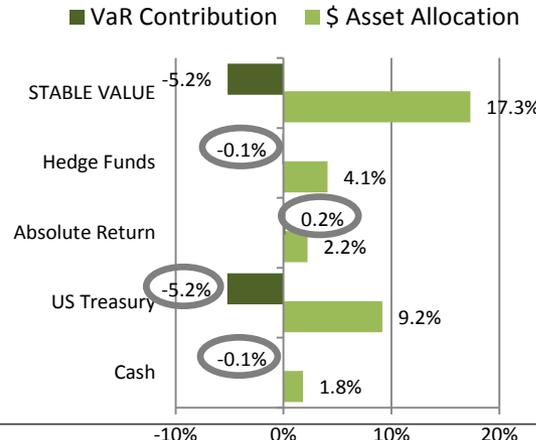
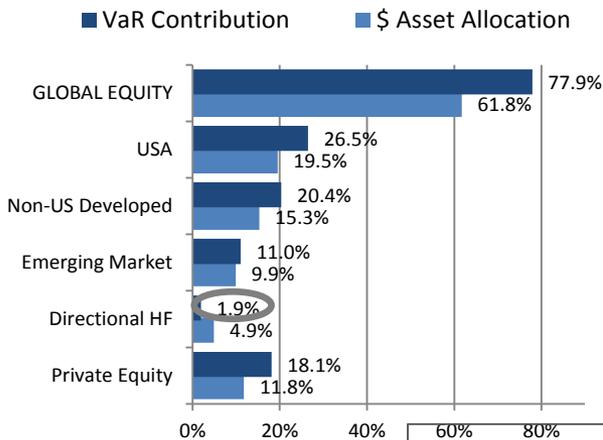
VaR as a Percent of Market Value (One Month, 95% Confidence)



VaR History (as Percent of Market Value)



VaR vs. \$ Allocation

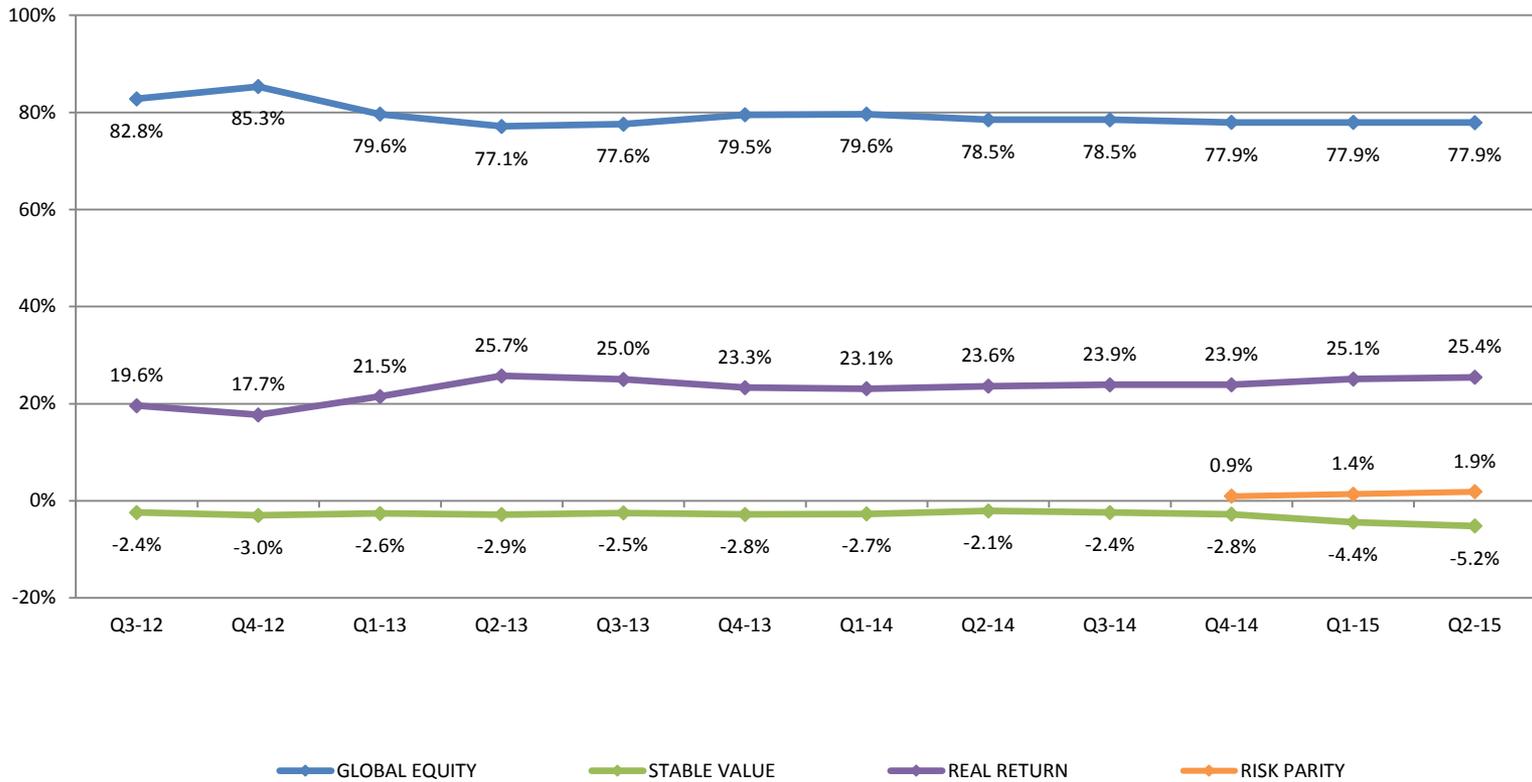


Risk-reducing assets are circled in grey and have risk contributions less than their portfolio weights

VaR Contribution by Asset Groups

As of June 30, 2015

History of VaR Contribution



Source: State Street Bank

3. Tracking Error

Annualized as of June 30, 2015

Policy Asset Class Tracking Error

Policy Assets	Market Value (\$, billions)	Current Forecast (bp) ¹	3-Year Realized (bp)
USA	\$25.6	195	118
Non-US Developed	20.1	290	214
Emerging Market	13.0	165	157
Directional Hedge Funds	6.4	289	189
US Treasuries	12.0	252	197
Absolute Return	2.9	431	1340
Stable Value Hedge Funds	5.4	235	205
Cash	2.4	19	87
Global Inflation Linked Bonds	6.0	24	12
Commodities	0.2	4070	1834
Total Public Assets	\$94.1	111	65
Private Equity	15.5	177	193
Energy and Natural Resources	2.3	293	NA ²
Real Assets	16.1	584	134
Total Private Assets	\$33.9	337	93
Total Risk Parity	\$3.0	194	NA ²
Total Assets	\$131.0	138	46

Policy neutral is 100 bp and policy maximum is 300 bp

Source: State Street Bank

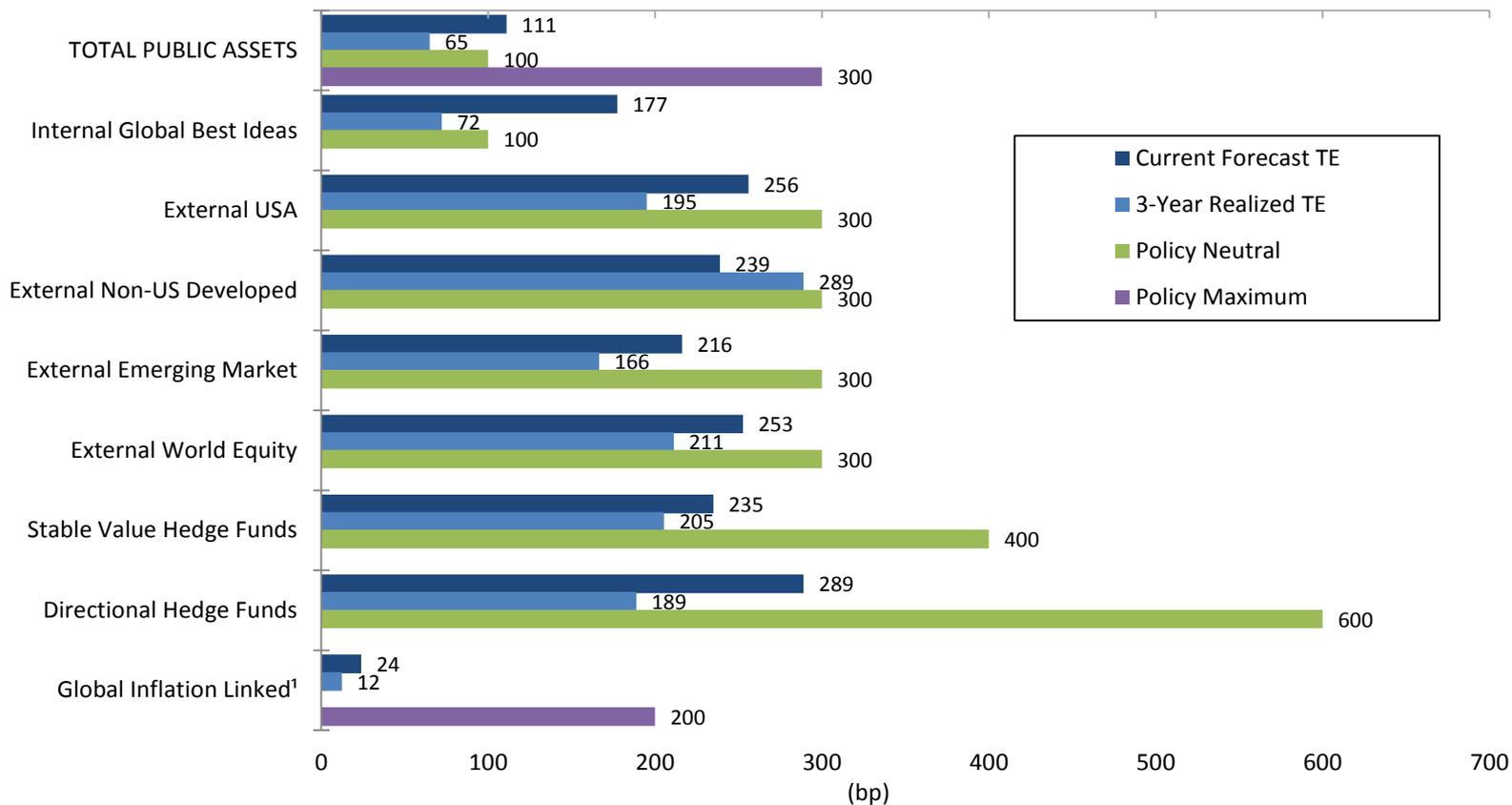
¹Current forecast uses past experiences from January 1, 2008 to today and therefore includes the effects of the Global Financial Crisis.

²Realized tracking error cannot be calculated due to the short history of these portfolios.

Policy Tracking Error

Annualized as of June 30, 2015

Tracking Error vs. Policy Requirement



Source: State Street Bank

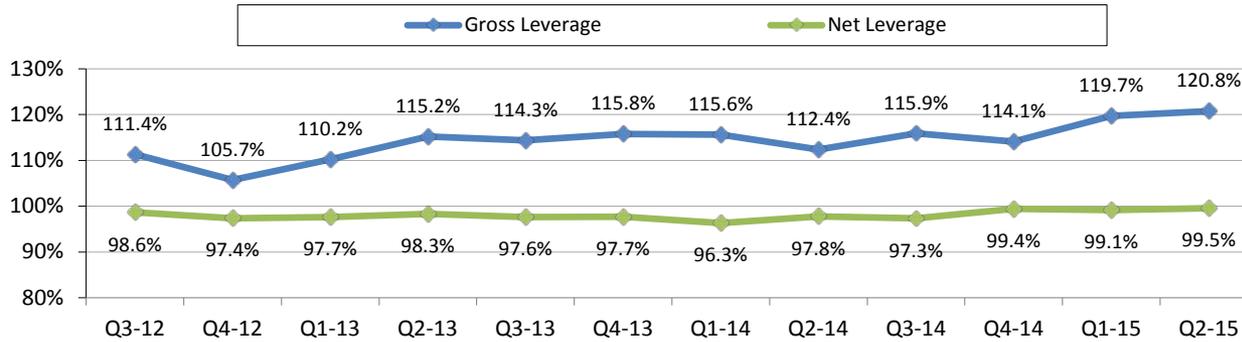
¹No policy neutral tracking error is set for Global Inflation Linked Bonds



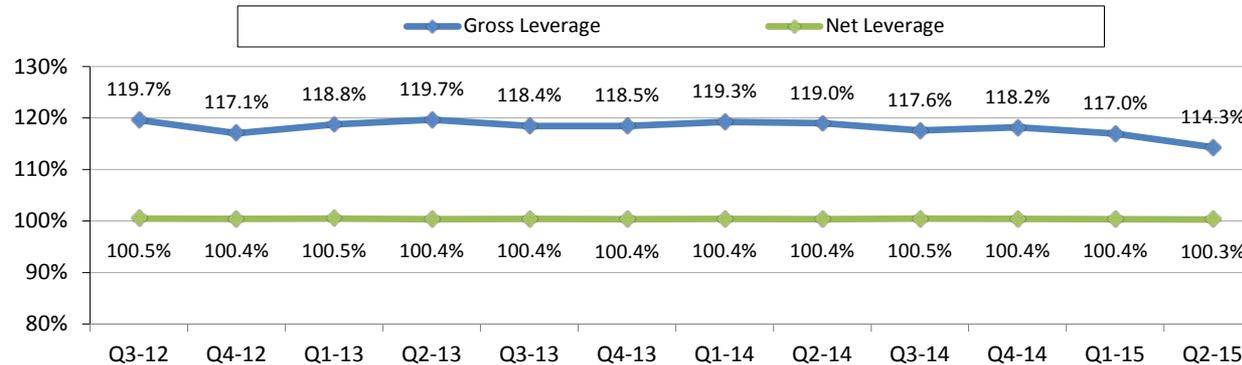
4. Leverage

As of June 30, 2015

Trust-Level Leverage (Excludes Securities Lending)



Securities Lending Leverage

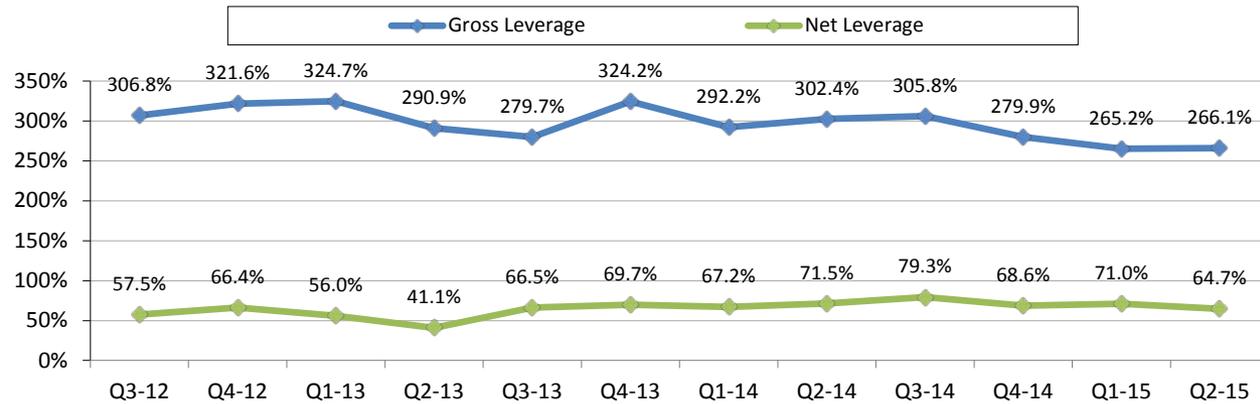


Source: State Street Bank

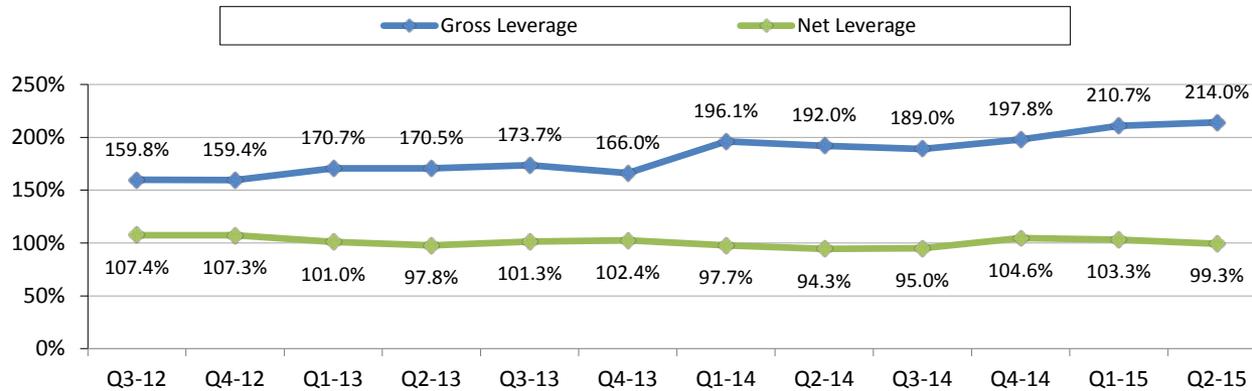
Leverage

As of June 30, 2015

Hedge Fund Leverage



Strategic Partners Leverage

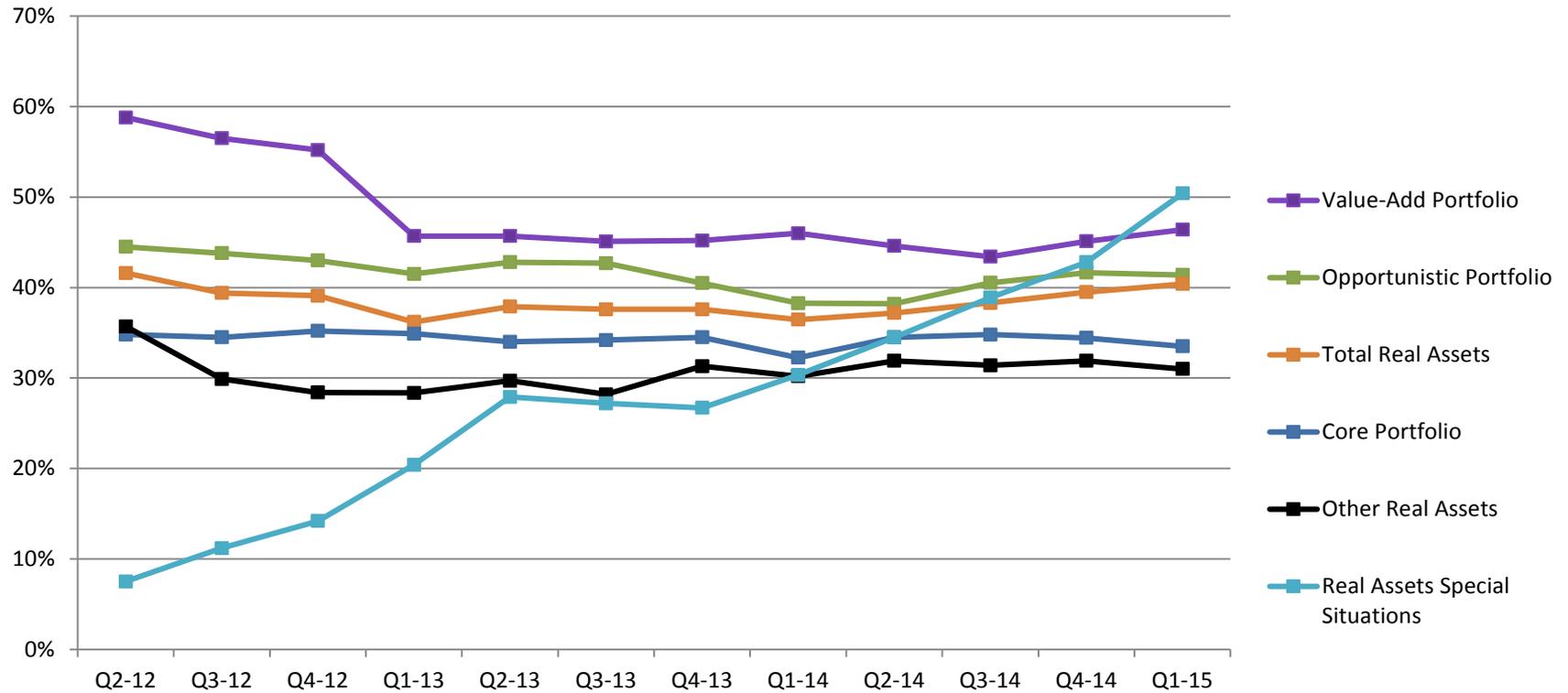


Source: State Street Bank

Leverage

As of March 31, 2015

Real Assets Leverage (Loan to Value)



5. Liquidity

As of June 30, 2015

Sources of Liquidity (\$, billions)	Market Value	Stressed Value
Liquid Assets Not on Loan (Cash, UST, TIPS, Equity, Commodities)	65.0	36.9
Securities Lending Collateral (Cash, Fixed Income)	22.1	17.2
Total Sources of Liquidity	87.1	54.1
<i>Note: Excluded Illiquid Assets (Private Equity, Real Assets, Hedge Funds, Other)</i>	50.2	NA
<i>Note: Excluded Liquid Assets remaining on loan</i>	16.3	NA

Uses of Liquidity (\$, billions)	Market Value	Stressed Value
Normal Uses of Liquidity	-0.8	-0.8
Stressed Securities Lending		-2.1
Stressed Derivatives		-1.4
Stressed Private Markets		-2.8
Total Uses of Liquidity	-0.8	-7.0

Liquidity Ratio	
Sources of Liquidity	54.1
Uses of Liquidity	-7.0
Ratio (Sources/Uses)	7.7
Alert Threshold	4.0
Fail Threshold	3.0
Test Result	Pass
<i>Note: Net Liquidity (Sources less Uses)</i>	47.1
<i>Note: 12 Months Benefit Payments (at 3% Annual)</i>	3.9

Source: State Street Bank

Assumptions: In the stress case, Liquid Assets are valued at 57% and Securities Lending collateral is valued at 78% which is meant to approximate 1.5x the worst monthly performance of these assets in the past ten years plus an additional liquidity stress. Within Securities Lending, 50% of equity on loan and 0% of US Treasuries on loan are assumed to be returned to TRS. Derivatives are assumed to experience the same market stress applied to the Liquid Assets. Private Market investment are assumed to not return any capital and experience capital calls at 6x the normal amount expected for a month.



6. Counterparty

As of June 30, 2015

Counterparty Exposure

Counterparty	Number of Contracts				Counterparty Exposure (\$, millions)
	Swaps	Forwards	Futures	OTC Options	
Over the Counter¹					
Bank of America, N.A	25	4		3	\$2.3
Barclays Bank PLC	4	40			0.0
Citibank N.A.	8	95			0.0
Credit Suisse International		1	1		0.0
Deutsche Bank AG	10	54			5.8
Goldman Sachs International	33	97		45	7.5
JPMorgan Chase Bank N.A	50	173	1	11	7.6
Macquarie Bank Limited	3				0.0
Morgan Stanley	6	34		12	2.0
Societe Generale	1	35		2	0.0
Toronto Dominion Bank		2			0.3
UBS AG	4	165			2.5
Exchange Traded Futures²					
Credit Suisse Securities (USA) LLC			154		36.2
Goldman Sachs & Co.	19		50		363.8
JP Morgan Securities LLC			169		105.3
Grand Total	163	700	375	73	\$533.5

Source: State Street Bank

¹Counterparty exposure is positive market value of all OTC derivative positions less collateral posted. Policy limits this value to \$500 million per counterparty.

²Counterparty exposure is initial margin posted.



Counterparty

As of June 30, 2015

Counterparty Ratings and Capital Assessment

Counterparty	S&P	Moody's	Fitch	Capital Ratios ¹	
				Tier 1	Common
Over the Counter²					
Bank of America, N.A	A	A1	A+	13.8	11.9
Barclays Bank PLC	A-	A2	A	13.0	13.8
Citibank, N.A.	A	A1	A+	13.1	13.3
Credit Suisse International	A	A1	A	17.1	12.0
Deutsche Bank AG	BBB+	A3	A	16.1	14.6
Goldman Sachs International	A	A1	A	13.8	12.2
JPMorgan Chase Bank N.A	A+	Aa3	AA-	11.6	10.1
Macquarie Bank Limited	A	A2	A	11.0	14.7
Morgan Stanley International PLC	A	A1	A	14.1	12.1
Societe Generale	A	A2	A	12.6	11.5
Toronto-Dominion Bank	AA-	Aa1	AA-	13.8	10.3
UBS AG	A	A2	A	19.4	20.5
Exchange Traded Futures³					
Credit Suisse Securities (USA) LLC	A	NR	NR	17.1	12.0
Goldman Sachs & Co.	A	NR	A+	13.8	12.2
JP Morgan Securities LLC	A+	Aa3	AA-	11.6	10.1

Source: Ratings Agencies and Bloomberg

¹ When fully implemented, Basel 3 will require 8.5% Tier 1 capital and 7.0% Common capital.

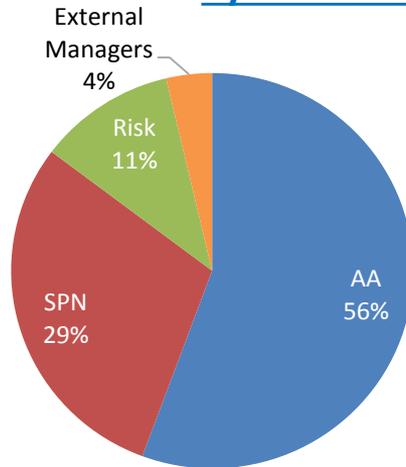
² Rating of counterparty or counterparty's credit support provider. Policy requirement is A- or A3 by at least one of Fitch, Moody's or S&P.

³ Credit Suisse Securities parent company is rated A1 by Moody's and A by Fitch. Goldman Sachs & Co. parent company is rated A3 by Moody's.

7. Derivatives

As of June 30, 2015

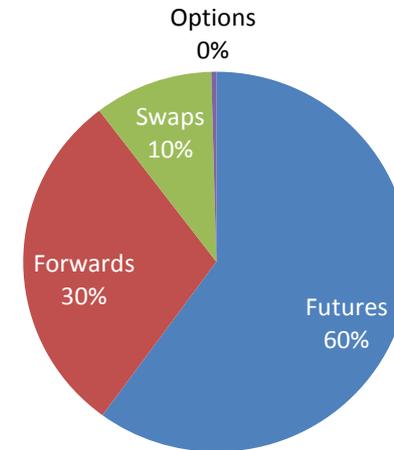
Gross Notional by Portfolio



The bulk of derivatives usage is AA (tactically adjusting the Trust's asset allocation) and the SPN's (TAA and benchmark replication)

Portfolio	Gross Notional (\$, millions)	Net Notional (\$, millions)
AA	\$18,014.8	-\$987.8
SPN	9,590.5	-300.4
Risk	3,575.0	1,095.1
External Managers	1,191.4	-675.2
Total	\$32,371.7	(\$868.3)

Gross Notional by Instrument Type



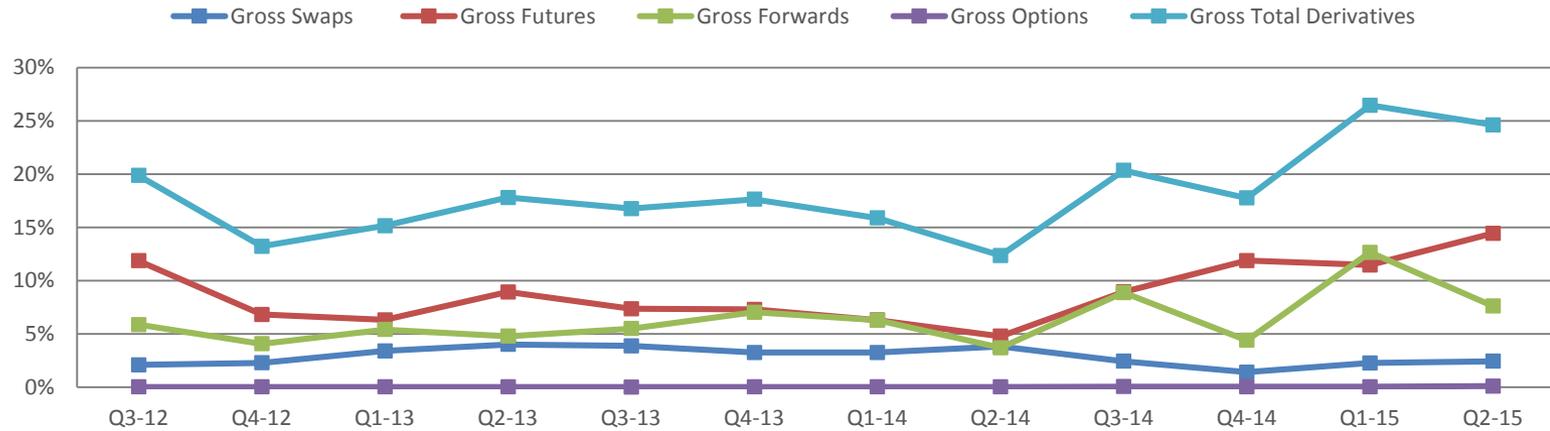
Futures and forwards, which are among the most liquid forms of derivatives, constitute the bulk of the Trust's derivatives portfolio

Instrument	Gross Notional (\$, millions)	Net Notional (\$, millions)
Futures	\$19,434.6	\$2,156.8
Forwards	9,582.7	-2,040.2
Swaps	3,218.5	-1,032.0
Options	135.9	47.0
Total	\$32,371.7	(\$868.3)

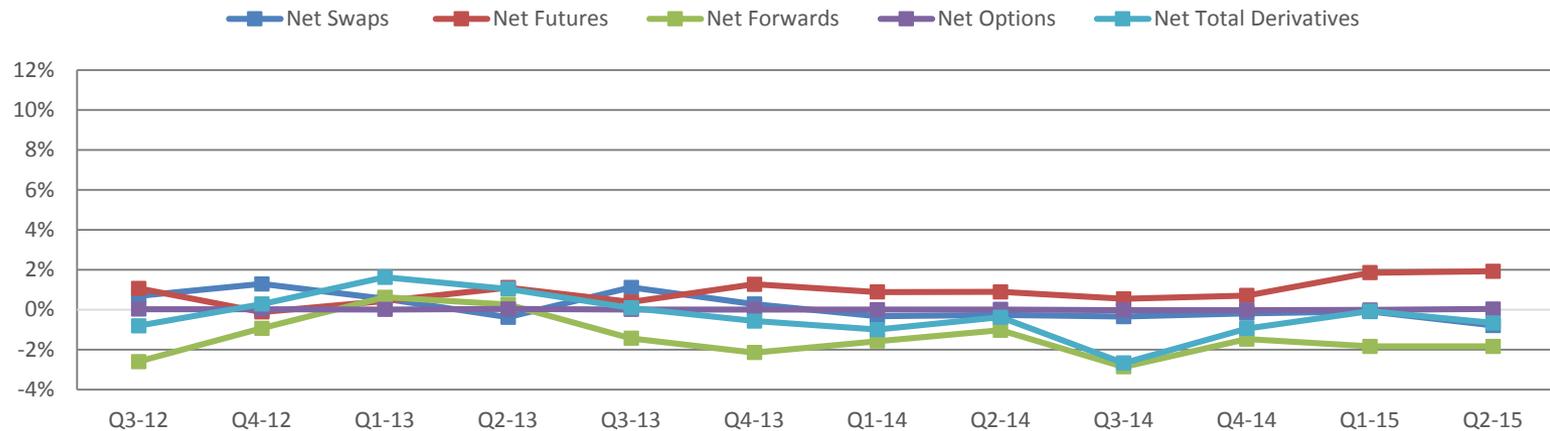
Derivatives

As of June 30, 2015

Gross Notional (% of Total Trust)



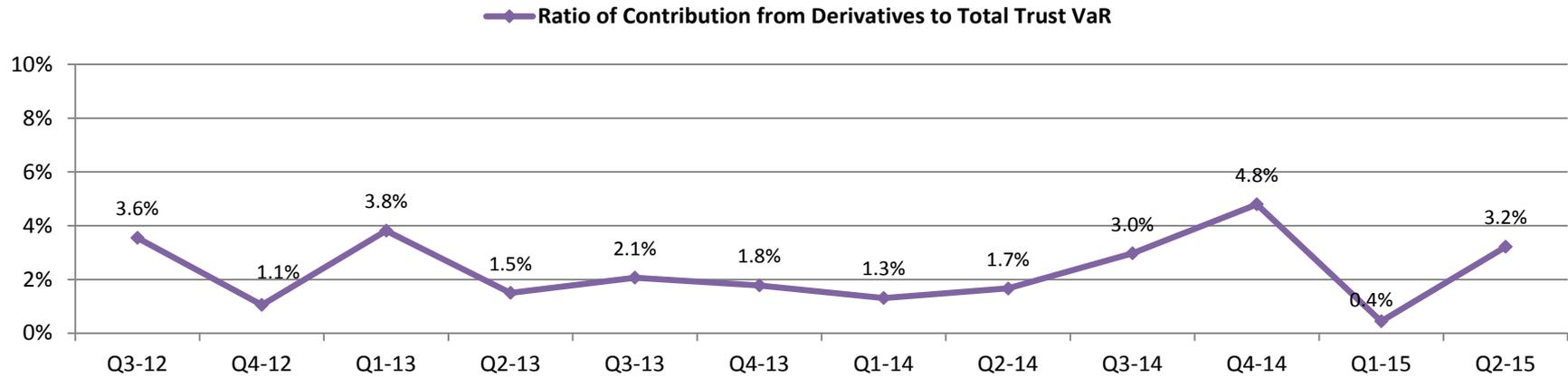
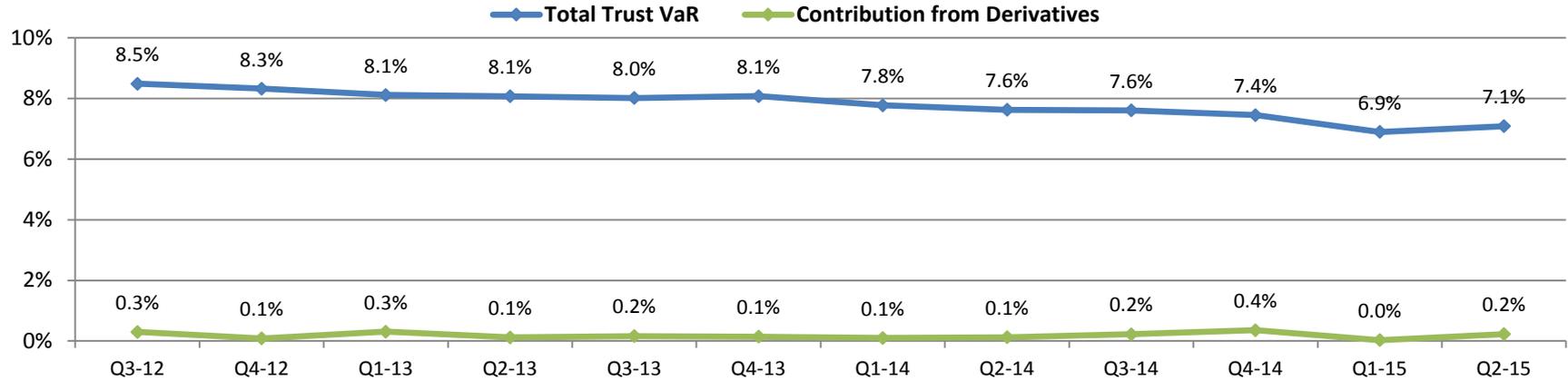
Net Notional (% of Total Trust)



Source: State Street Bank

Derivatives

As of June 30, 2015



Derivatives

As of June 30, 2015

Gross Notional

(\$, millions)	AA	SPN	Risk	External Managers	Total
Futures	13,140.8	4,792.6	1,339.8	161.4	19,434.6
Forwards	4,159.3	2,657.9	1,969.6	795.9	9,582.7
Swaps	714.7	2,136.0	199.1	168.7	3,218.5
Options	0.0	3.9	66.5	65.5	135.9
Total	\$18,014.8	\$9,590.5	\$3,575.0	\$1,191.4	\$32,371.7

The bulk of derivatives usage is AA (\$18.0 billion) and the SPN (\$9.6 billion)

Net Notional

(\$, millions)	AA	SPN	Risk	External Managers	Total
Futures	-141.0	1,083.1	1,301.3	-86.6	2,156.8
Forwards	-931.4	-12.9	-471.8	-624.1	-2,040.2
Swaps	84.6	-1,371.8	199.1	56.2	-1,032.0
Options	0.0	1.2	66.5	-20.6	47.0
Total	-\$987.8	-\$300.4	\$1,095.1	-\$675.2	-\$868.3

AA's \$18.0 billion gross notional nets to a much lower (-\$1.0 billion) net position.

The Trust's \$32.4 billion gross notional nets to a much lower (-\$0.9 billion) net position.

Derivatives

As of June 30, 2015

Mark-to-Market

(\$, millions)	AA	SPN	Risk	External Managers	Total
Futures	-44.3	-39.8	-9.9	1.3	-92.7
Forwards	21.4	5.7	-9.5	-3.9	13.7
Swaps	-6.2	10.9	-1.2	-0.1	3.4
Options	0.0	0.0	-0.1	-2.8	-2.8
Total	-\$29.2	-\$23.2	-\$20.7	-\$5.4	-\$78.5

Average Tenor in Years

	AA	SPN	Risk	External Managers	Total
Futures	0.22	0.23	0.22	0.22	0.15
Forwards	0.05	0.09	0.30	0.21	0.11
Swaps	0.19	2.25	3.58	0.63	1.11
Options	0.00	0.04	0.06	0.41	0.08
Total	0.12	0.65	0.97	0.37	0.36

Interest rate swaps and credit default swaps typically have longer tenors of 5-10 years

The low mark-to-market is mainly due to the short term maturity of the derivatives positions – on average 0.36 years

Conclusion

- As of June 30, 2015, TRS investment exposures are in compliance with the Investment Policy Statement
 - TRS was overweight Global Equity (+0.4%) and underweight Stable Value (-0.7%) and Real Return (-0.2%)
 - At the asset class level, TRS was overweight Absolute Return, Cash and Risk Parity while underweight Long Treasuries, USA, and Emerging Markets
- Risk metrics are within established perimeters

APPENDIX

Derivative Exposure

As of June 30, 2015

Futures Notional¹

Futures by Asset Class	Number of Contracts	Gross Exposure (\$, millions)	Gross Exposure (% of Asset Class)	Gross Exposure (% of Total Trust)
USA	23	\$1,196.9	62.9%	0.9%
Non-US Developed	64	4,805.4	41.2%	3.7%
Emerging Markets	14	603.0	57.2%	0.5%
US Treasury	33	9,953.0	99.8%	7.6%
Cash	5	163.1	8.7%	0.1%
Absolute Return	3	69.6	100.0%	0.1%
Inflation Linked Bonds	68	661.0	34.0%	0.5%
Commodities	7	518.7	39.6%	0.4%
World Equity	2	124.0	15.7%	0.1%
Risk Parity	156	1,339.8	75.0%	1.0%
Swap Total	375	\$19,434.6		14.8%

Source: State Street Bank

¹Exposures include TRS internally managed portfolios and externally managed separate accounts. Percent of Absolute Value.



Derivative Exposure

As of June 30, 2015

Swap Notional¹

Swaps by Asset Class	Number of Contracts	Gross Exposure (\$, millions)	Gross Exposure (% of Asset Class)	Gross Exposure (% of Total Trust)
USA	39	\$452.2	23.7%	0.3%
Non-US Developed	37	351.1	3.0%	0.3%
Emerging Markets	5	103.0	9.8%	0.1%
US Treasury	2	20.6	0.2%	0.0%
Cash	0	0.0	0.0%	0.0%
Absolute Return	0	0.0	0.0%	0.0%
Inflation Linked Bonds	29	1,269.6	65.2%	1.0%
Commodities	34	790.9	60.4%	0.6%
World Equity	9	32.1	4.1%	0.0%
Risk Parity	8	199.1	11.1%	0.2%
Swap Total	163	\$3,218.5		2.4%

Source: State Street Bank

¹Exposures include TRS internally managed portfolios and externally managed separate accounts. Percent of Absolute Value.



Derivative Exposure

As of June 30, 2015

Forwards and Options Notional¹

Non-Currency Forwards by Asset Class	Number of Contracts	Gross Exposure (\$, millions)	Gross Exposure (% of Total Trust)
Non-US Developed	0	\$0.0	0.0%
Emerging Markets	0	0.0	0.0%
Non-Currency Forward Total	0	0.0	0.0%
USA	67	132.0	0.1%
Global TIPS	6	3.9	0.0%
Options Total	73	135.9	0.1%
Euro Currency	157	2,011.6	1.5%
Japanese Yen	58	926.0	0.7%
Pound Sterling	126	1,565.3	1.2%
Canadian Dollar	58	1,750.3	1.3%
Other Non-US Developed	264	2,875.8	2.2%
Emerging Markets	37	453.7	0.3%
Forwards Total	700	\$9,582.7	7.3%

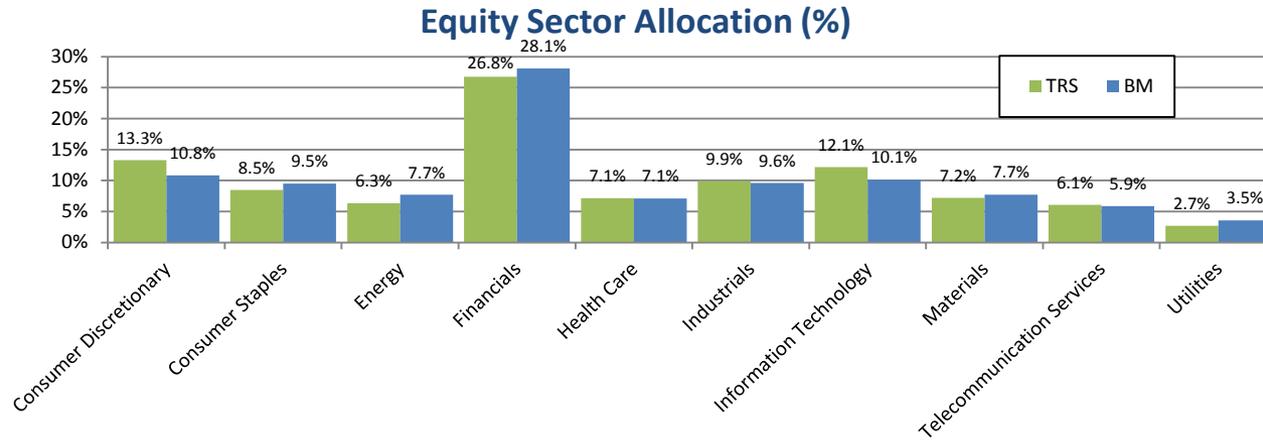
Source: State Street Bank

¹Exposures include TRS internally managed portfolios and externally managed separate accounts. Percent of Absolute Value.

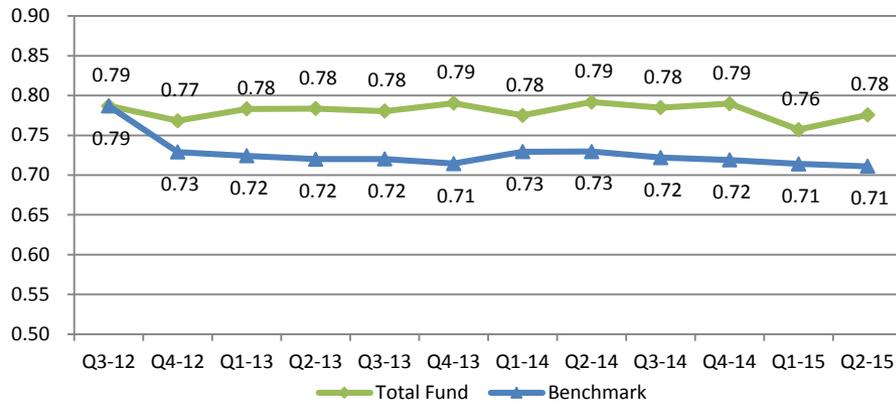


Sector Allocation, Beta and Scenario Analysis

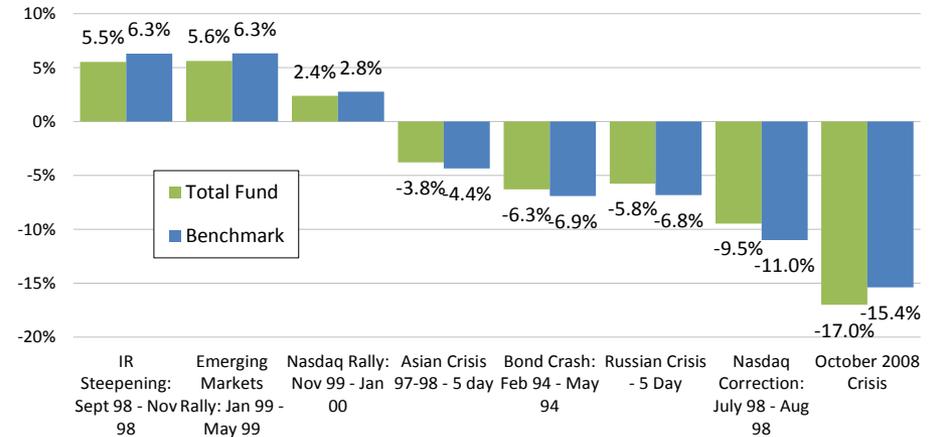
As of June 30, 2015



Beta Analysis MSCI World Index



Scenario Analysis (% Gain/Loss in Market Value)

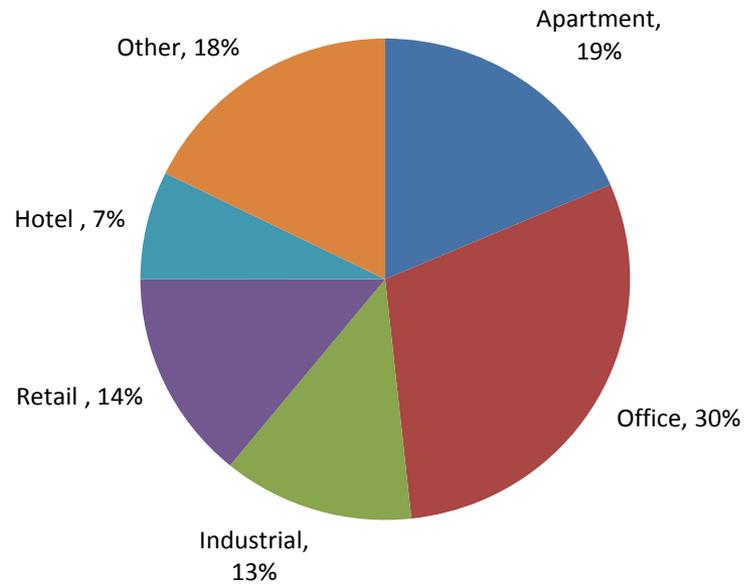


Source: State Street Bank

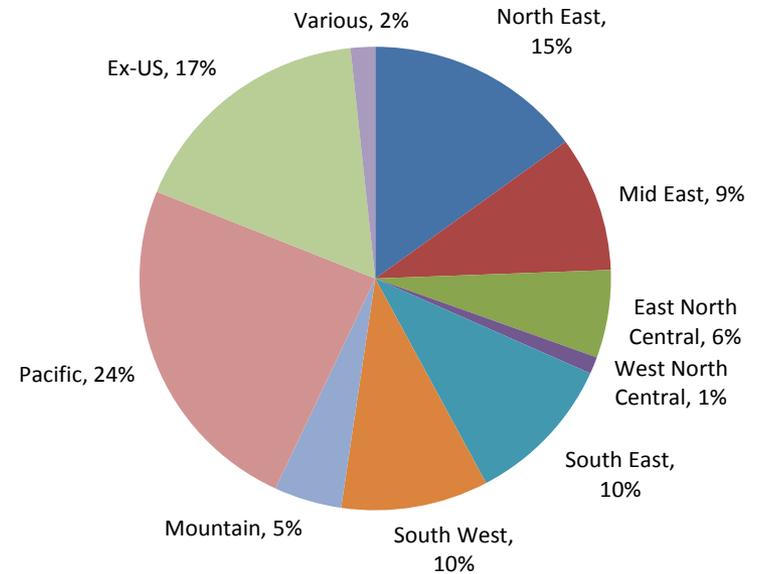
Real Estate Diversification

As of March 31, 2015

Property Type Diversification



Geographic Diversification



Securities Lending

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