



# UNIVERSITY OF CALIFORNIA

Office of the Chief Investment Officer

## Pension

Investment Review as of June 30, 2016

**Growing Portfolios** Building Partnerships

**UC Investments**



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Office of the Chief Investment Officer

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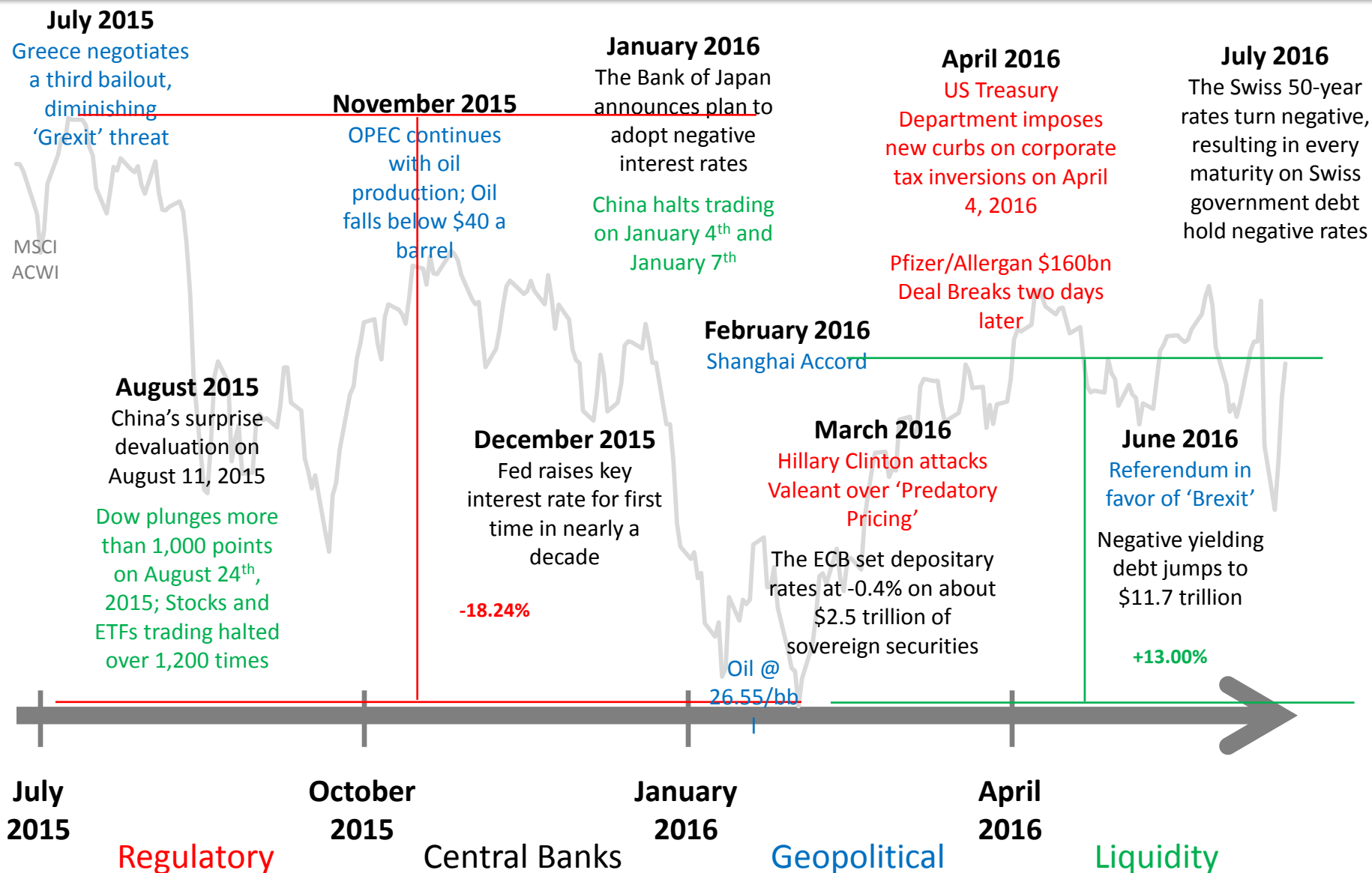
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# Market Environment



# Summary of the Year – Four Sources of Risk





# Market Drivers and Themes

*Elevated geopolitical, regulatory and market factors culminated in a macro-driven environment characterized by volatility swings, exogenous shocks, and valuation dislocations*

## Geopolitical

(The Rise of Nationalism)

## Central Banks

(QE, Helicopter Money)

## Regulatory

(Volcker Rule, Drug pricing, Tax Inversion Regulations)

## Liquidity

(Declining Bank Inventories)

## Macro vs. fundamental focus

Capital chasing risk assets and yield/quality in slower growth, low rate environment; valuation distortion

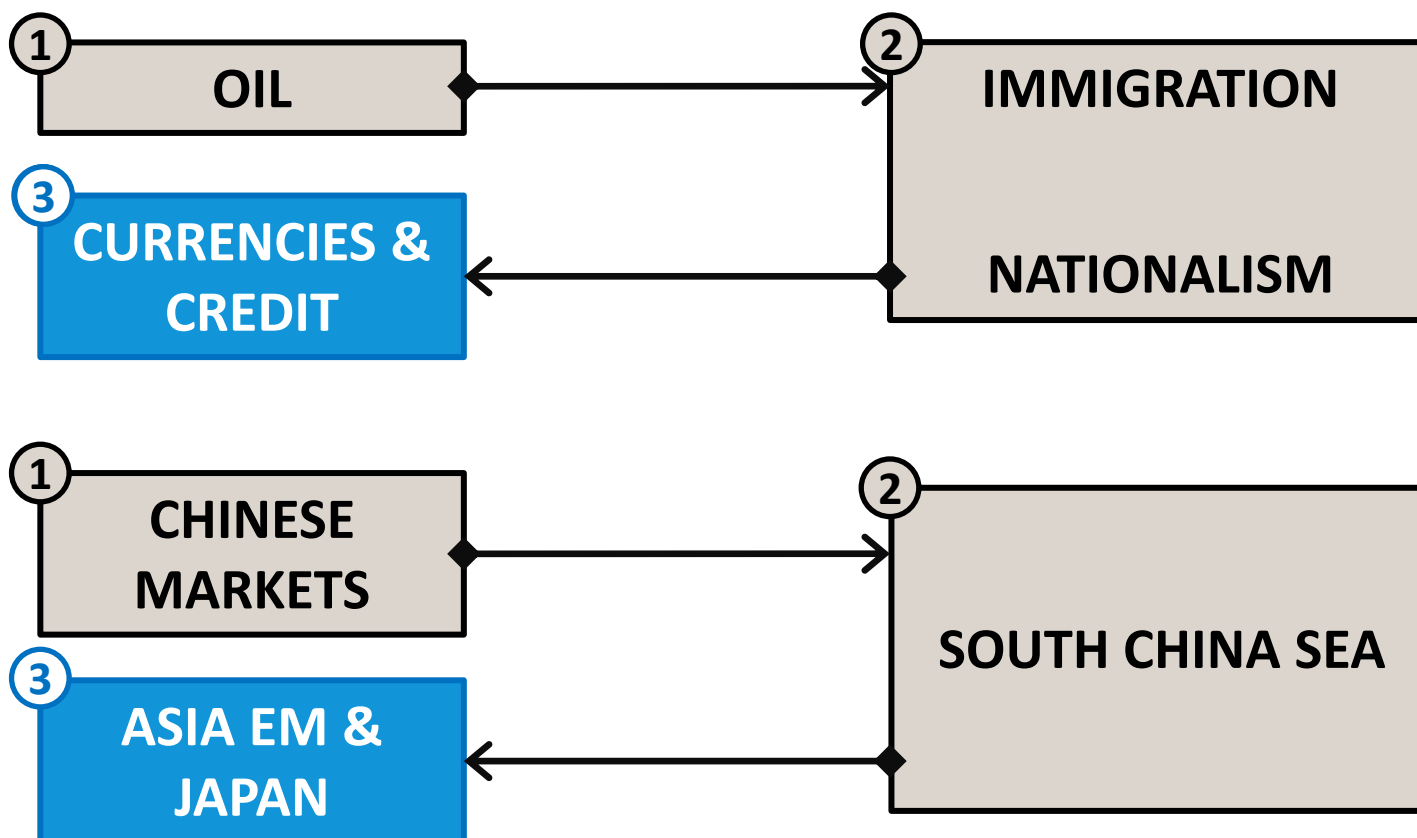
Bank deleveraging forcing asset sales, exit from “riskier” markets  
Regulatory uncertainty pressuring valuation of financial, healthcare sectors; M&A deal breaks

Dislocations in structured credit and equity markets – forced selling  
Index/ETF flows impacting pricing



# The Dynamics of Risk

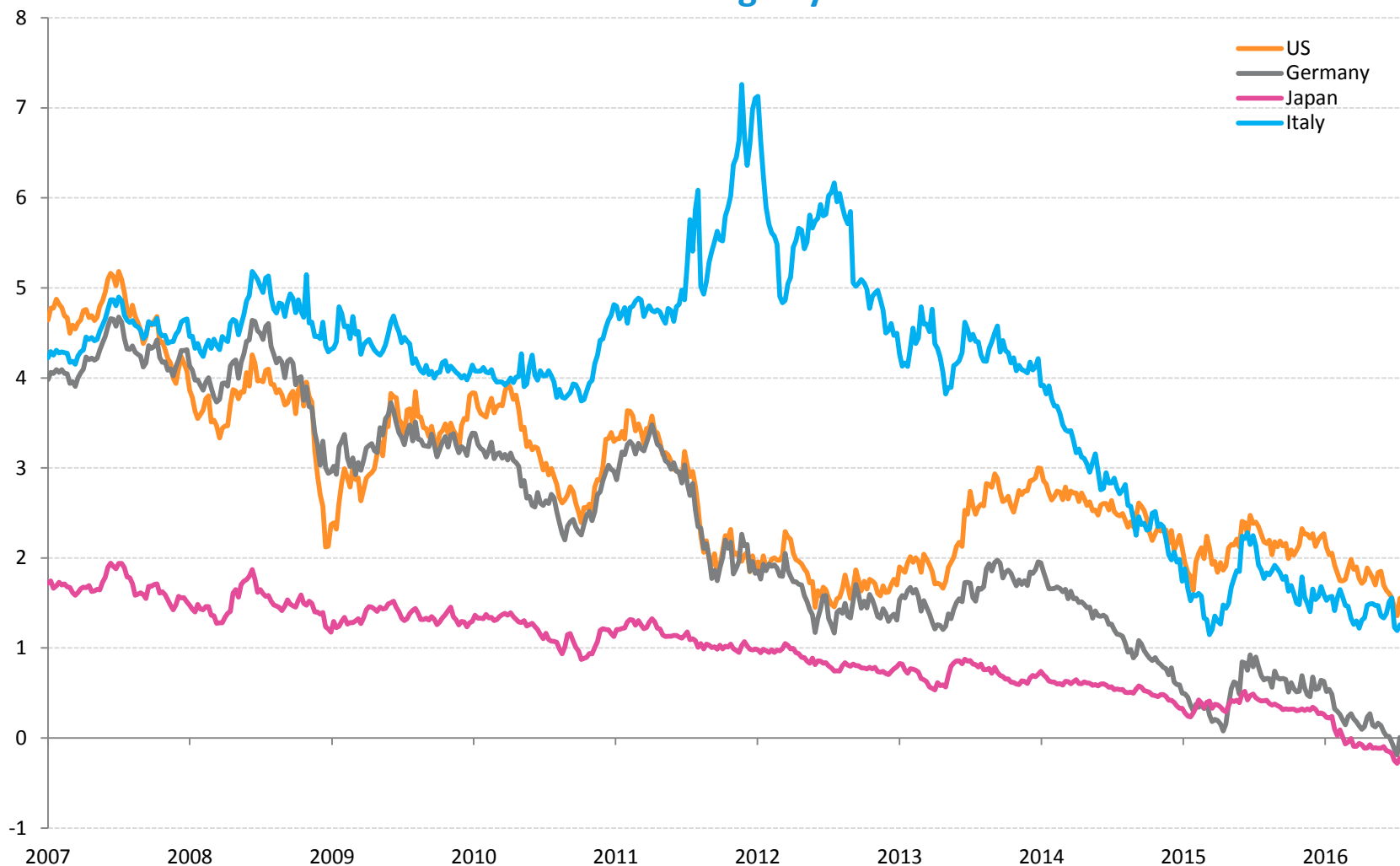
## MARKET RISKS ↔ GEOPOLITICAL RISKS





# Global Bond Yields

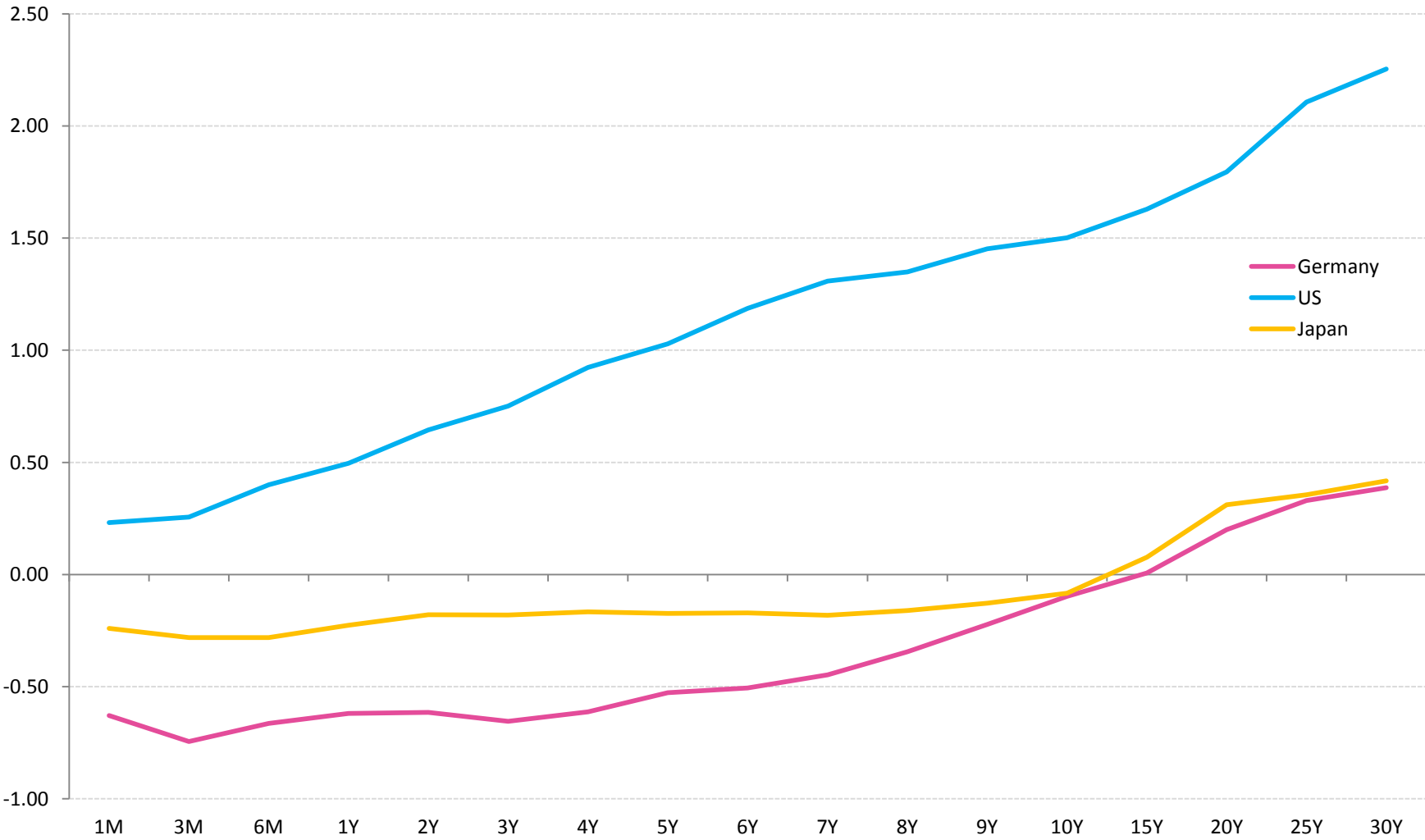
Bond Yields have declined around the world  
US now a "high" yielder





# Negative Global Rates

Yield Curves Dip Below Zero

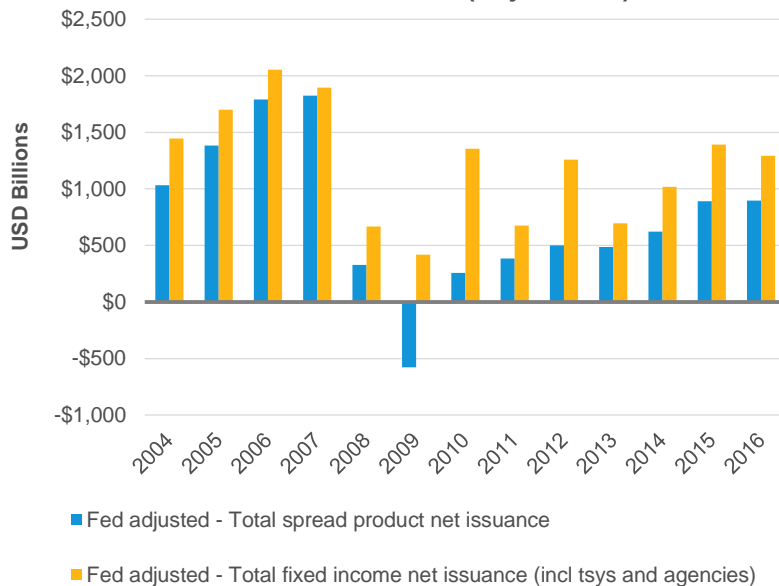




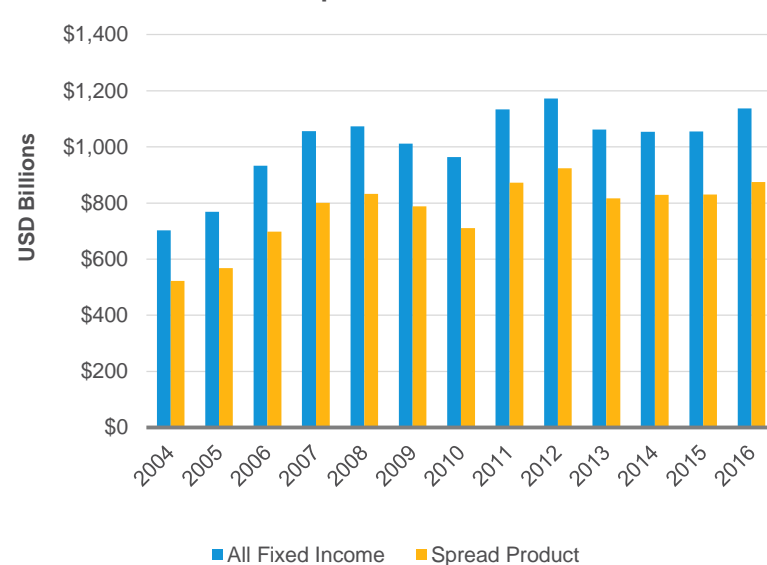


# Lack of Investable Assets

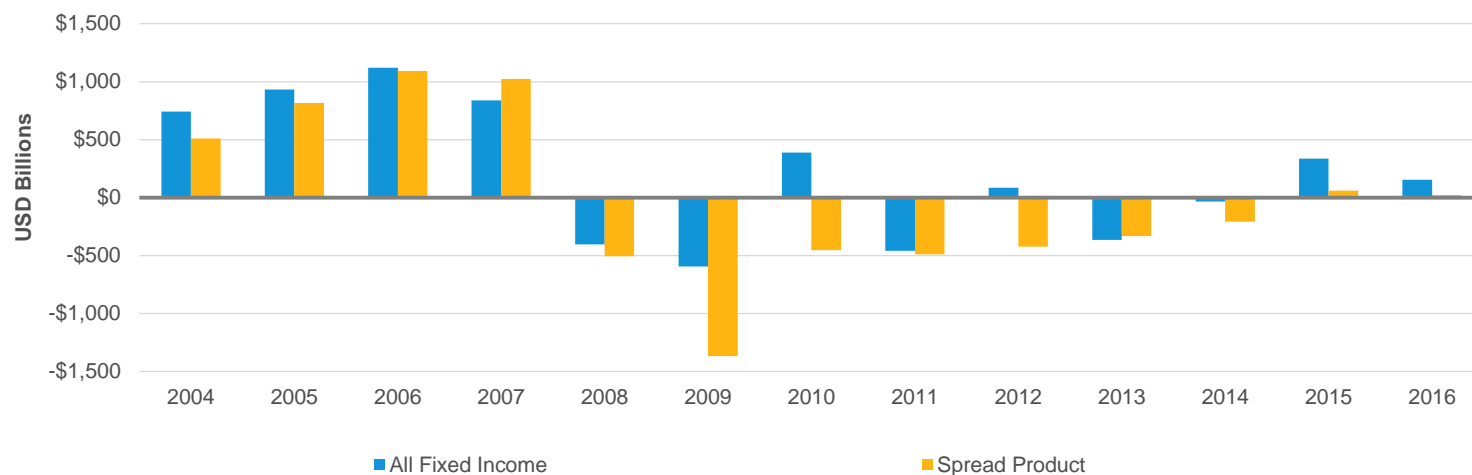
## Net Net Issuance (Adj. for Fed)



## Coupons Reinvested

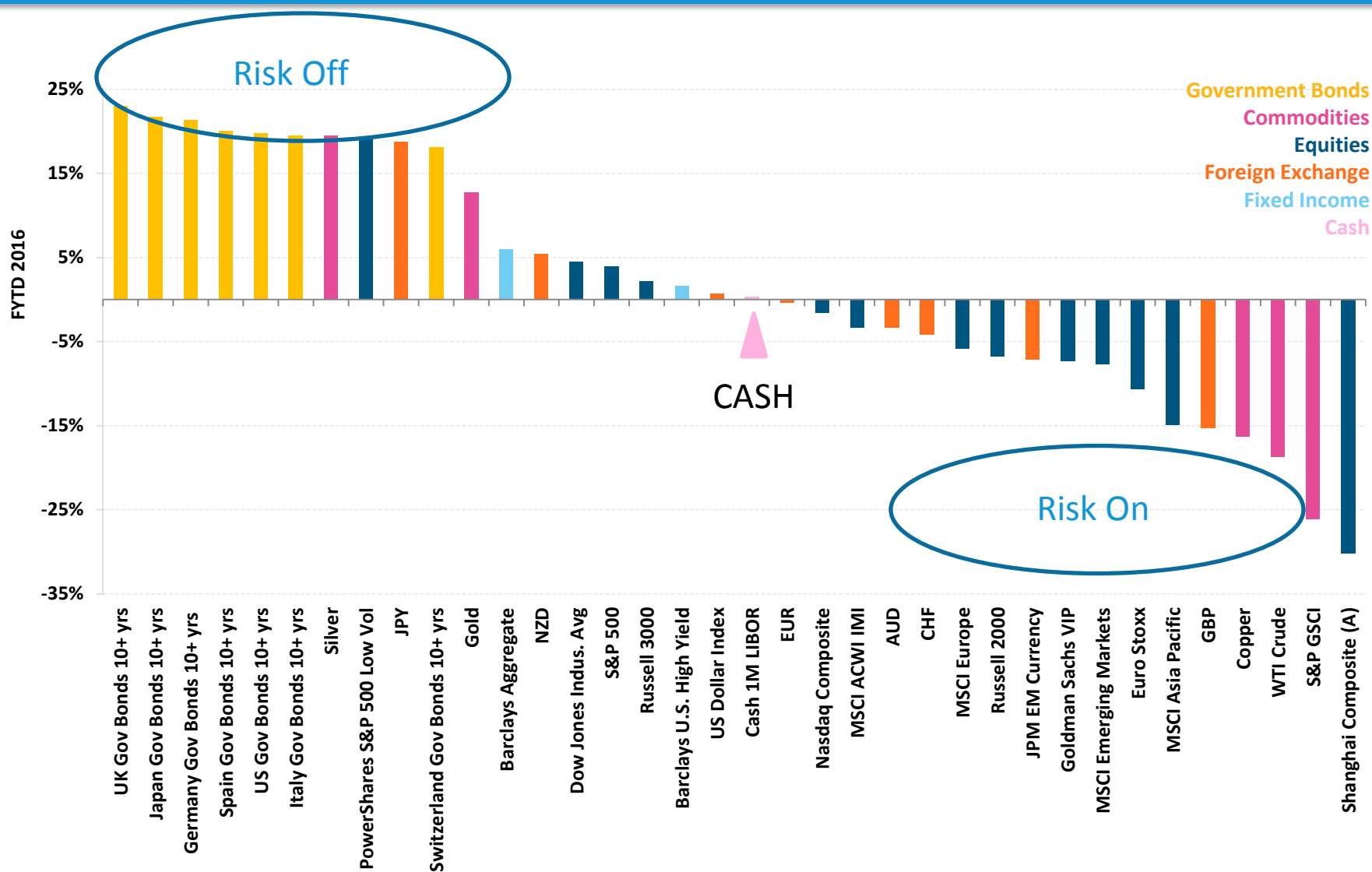


## Net Net Issuance Net of Coupon





# Capital Markets Performance





# Office of the Chief Investment Officer



# Our Products: \$54.1 Billion Pension represents 55% of our \$98 Billion of assets

	Market Value in Billions (\$)		
		1 Year Ago	5 Years Ago
	June 30, 2016	June 30, 2015	June 30, 2011
Endowment	\$9.1	\$8.9	\$6.7
Pension	\$54.1	\$55.0	\$41.5
Retirement Savings	\$20.2	\$20.1	\$13.9
Working Capital Total Return	\$8.9	\$7.4	\$3.1
Short Term	\$5.3	\$6.8	\$7.9
Total	\$97.6B	\$98.2B	\$73.1B



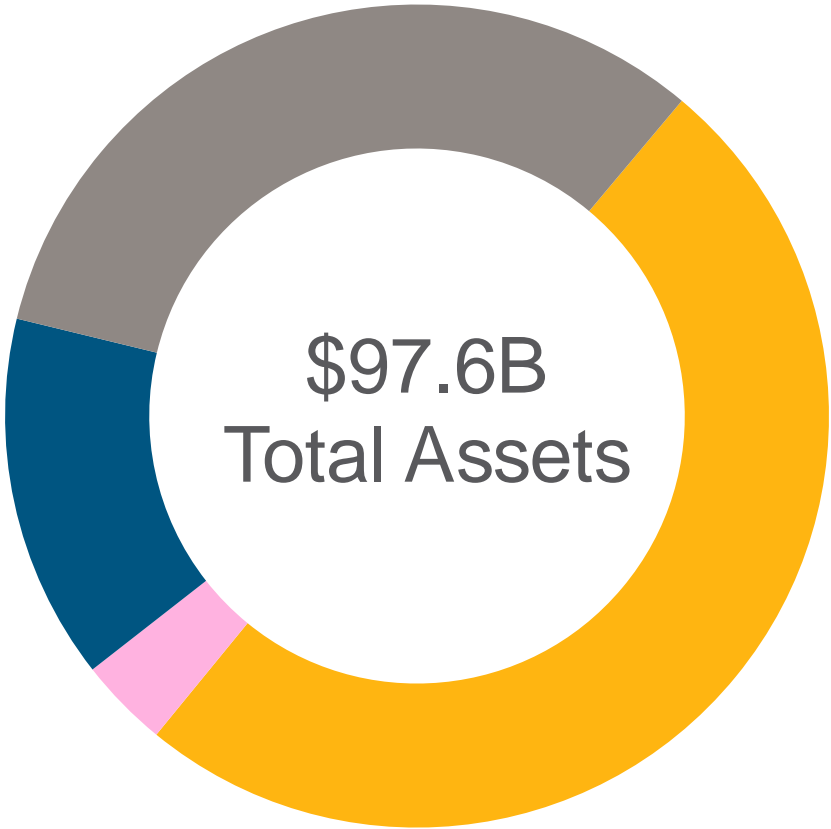
# How we invest our assets

As of June 30, 2016

●	Public Equity: \$48.5B	50%
●	Fixed Income: \$31.4B	32%
●	Other Investments: \$14.1B	14%
	Absolute Return: \$5.3B	5%
	Private Equity: \$4.0B	4%
	Real Estate: \$3.6B	4%
	Real Asset: \$1.2B	1%
●	Cash: \$3.6B	4%

**\$97.6 Billion**

**100%**





# How we invest: Fixed Income mostly internally managed and public equity and all other investments externally managed

			Active		Passive		External		Internal	
	\$ Billions	% of Entity	\$ Billions	%	\$ Billions	%	\$ Billions	%	\$ Billions	%
Public Equity	\$ 48.5	50%	\$27.2	56%	\$21.3	44%	\$48.5	100%	\$0.0	0%
Fixed Income	\$ 31.4	32%	\$30.7	98%	\$0.7	2%	\$2.1	7%	\$29.3	93%
Other Investments	\$ 14.1	14%	\$14.1	100%	\$0.0	0%	\$14.1	100%	\$0.0	0%
Absolute Return	\$ 5.3	5%	\$5.3	100%	\$0.0	0%	\$5.3	100%	\$0.0	0%
Private Equity	\$ 4.0	4%	\$4.0	100%	\$0.0	0%	\$4.0	100%	\$0.0	0%
Real Estate	\$ 3.6	4%	\$3.6	100%	\$0.0	0%	\$3.6	100%	\$0.0	0%
Real Assets	\$ 1.2	1%	\$1.2	100%	\$0.0	0%	\$1.2	100%	\$0.0	0%
Cash	\$ 3.6	4%	\$3.6	0%	\$0.0	100%	\$0.0	0%	\$3.6	100%
Total	\$97.6	100%	\$75.6	77%	\$22.0	23%	\$64.7	66%	\$32.9	34%



# Investment Highlights



The overall **investment objective** for all University of California Retirement Plan (“UCRP”) assets is to maximize real, long-term total returns (income plus capital appreciation adjusted for inflation), while assuming appropriate levels of risk.

UCRP’s specific objective is to maximize the probability of meeting the Plan’s liabilities, subject to the Regents’ funding policy, and to preserve the real (inflation adjusted) purchasing power of assets.





# Pension Change in Assets

## Assets Under Management Attribution

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Assets Under Management June 30, 2015	\$55.04 billion
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Market Gains	(\$0.48 billion)
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Value Added	(\$0.63 billion)
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Net Cash Flow	\$0.15 billion
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<b>Assets Under Management June 30, 2016</b>	<b>\$54.08 billion</b>
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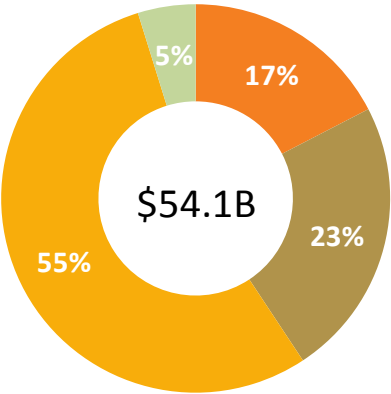
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# Pension Shifts in Asset Allocation

## Current

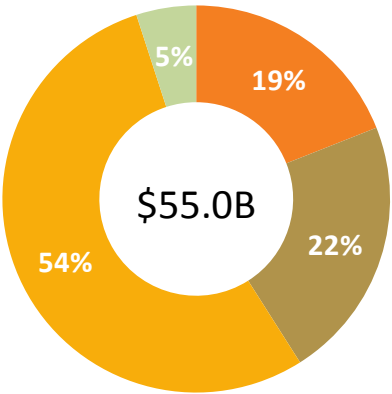
June 30, 2016



● Equity

## 1 Year Ago

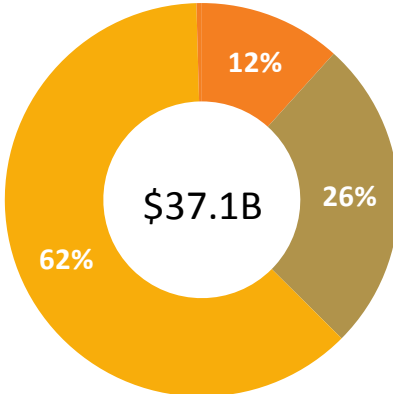
June 30, 2015



● Fixed Income

## 5 Years Ago

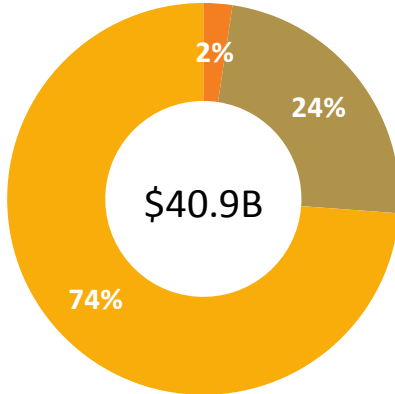
June 30, 2011



● Other Investments

## 10 Years Ago

June 30, 2006



● Cash



# Pension Asset Allocation

As of June 30, 2016	Market Value in \$ Billions	Percentage	Over/Underweight Relative to Policy	Policy Weight
<b>Public Equity</b>	<b>29.5</b>	<b>54.5%</b>	<b>-0.4%</b>	<b>54.9%</b>
<b>Fixed Income</b>	<b>12.6</b>	<b>23.3%</b>	<b>1.0%</b>	<b>22.3%</b>
Core	7.6	14.0%	1.6%	12.4%
High Yield	1.8	3.3%	0.7%	2.6%
Emerging Market Debt	1.3	2.4%	-0.2%	2.6%
TIPS	1.9	3.5%	-1.2%	4.7%
<b>Other Investments</b>	<b>9.4</b>	<b>17.4%</b>	<b>-5.4%</b>	<b>22.8%</b>
Absolute Return	2.6	4.8%	-1.4%	6.2%
Private Equity	2.7	5.0%	-3.0%	8.0%
Real Estate	3.1	5.7%	0.2%	5.5%
Real Asset	1.0	1.8%	-1.3%	3.1%
<b>Cash</b>	<b>2.6</b>	<b>4.8%</b>	<b>4.8%</b>	<b>0.0%</b>
<b>Total</b>	<b>54.1</b>	<b>100.0%</b>	<b>0.0%</b>	<b>100.0%</b>



# Pension Performance

Net Returns (%) As of June 30, 2016	Annualized Returns							
	3 Month	6 Month	1 Year	3 Year	5 Year	7 Year	10 Year	20 Year
UC Pension	1.3	0.8	(2.0)	6.3	6.1	9.3	5.4	7.2
UC Pension Benchmark	1.3	2.3	(0.8)	5.9	5.5	8.5	4.9	6.9
<i>Value Added</i>	0.0	(1.5)	(1.2)	0.4	0.6	0.8	0.5	0.3

Net Returns (%) As of June 30	Fiscal Year Returns								
	2016	2015	2014	2013	2012	2011	2010	2009	2008
UC Pension	(2.0)	4.5	17.4	11.7	0.4	22.4	12.7	(18.8)	(5.7)
UC Pension Benchmark	(0.8)	2.2	17.1	10.7	(0.6)	21.6	11.6	(18.9)	(4.7)
<i>Value Added</i>	(1.2)	2.3	0.3	1.0	1.0	0.8	1.1	0.1	(1.0)

- The Policy Benchmark is a weighted average of investment policy targets



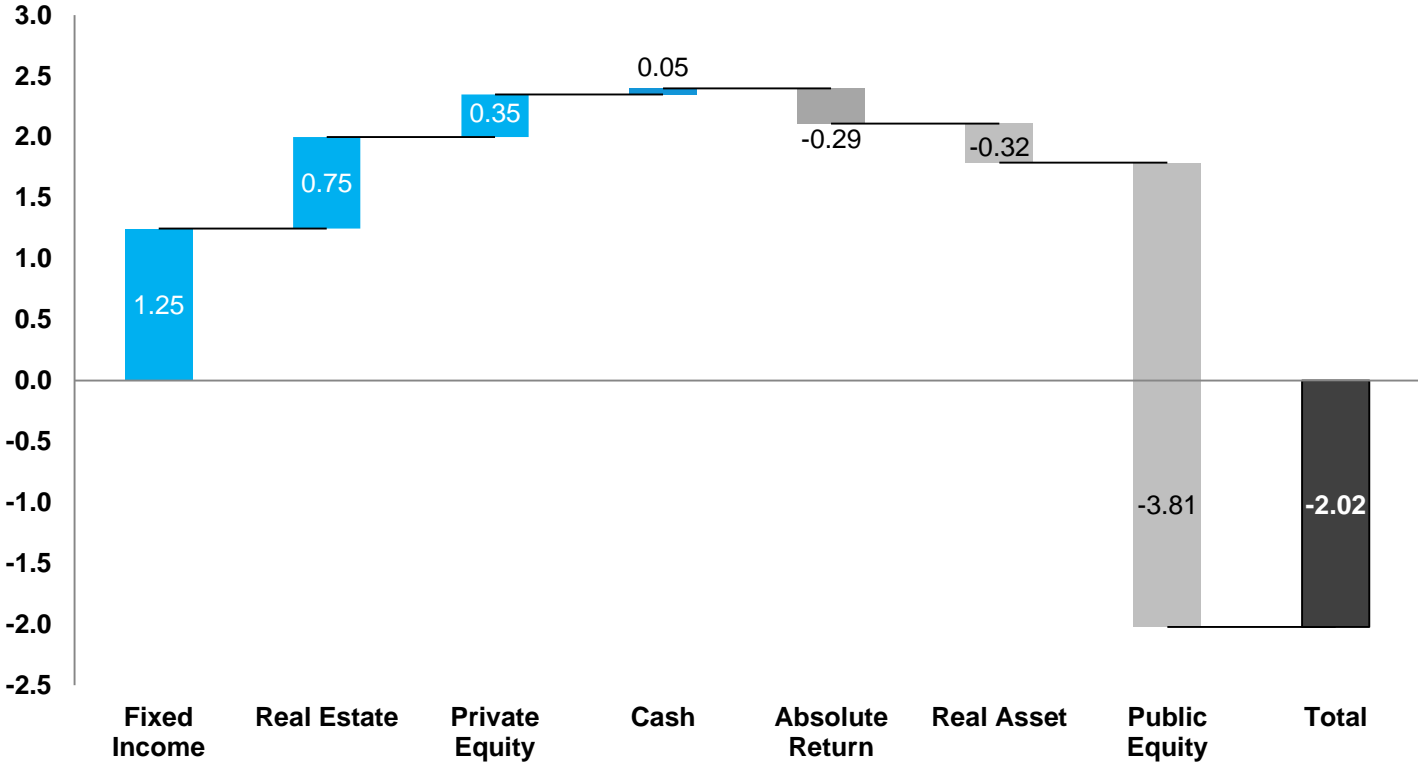
# Pension Policy Benchmark

Asset Class	Policy Benchmark Component	June 30, 2016 Target	July 1, 2016 Target
<b>Total Public Equity</b>		<b>54.9%</b>	<b>52.3%</b>
U.S. Equity	Russell 3000 Tobacco Free Index	24.1%	27.9%
Developed Equity	MSCI World ex-U.S. (net dividends) Tobacco Free	15.0%	18.9%
Emerging Market Equity	MSCI Emerging Market (net dividends)	7.0%	5.5%
Opportunistic Equity	MSCI All Country World Index (net dividends)	8.8%	-
<b>Total Fixed Income</b>		<b>22.3%</b>	<b>21.5%</b>
U.S. Core Fixed Income	Barclays U.S. Aggregate Bond Index	12.4%	13.4%
High Yield Debt	Merrill Lynch High Yield Cash Pay Index	2.6%	2.9%
Emerging Market Debt	JP Morgan Emerging Markets Bond Index Global Diversified	2.6%	2.4%
TIPS	Barclays U.S. TIPS	4.7%	2.8%
<b>Total Other Investments</b>		<b>22.8%</b>	<b>23.5%</b>
Private Equity	Actual Private Equity Returns	8.0%	7.5%
Absolute Return	HFRF Fund of Funds Index effective July 2016. Prior was a combination of weighting of HFRX Absolute Return and HFRX Absolute Return Market Directional since 2009	6.2%	7.3%
Real Estate	NCREIF Funds Index-Open End Diversified Core Equity Index	5.5%	6.3%
Real Assets	None	3.1%	2.4%
<b>Cash</b>		<b>0.0%</b>	<b>2.7%</b>



# Contribution to Pension Return

1 Year Contribution to Return - Percentage (%)





# Pension Attribution – Fiscal Year 2015-16

As of June 30, 2016	Average Weight	Active Weight	Allocation Attribution	Selection Attribution	Total Attribution
<b>Public Equity</b>	54.1	-0.8	+0.5	-1.8	-1.3
<b>Fixed Income</b>					
Core	13.6	+1.2	+0.0	-0.1	-0.1
High Yield	3.1	+0.5	+0.0	+0.0	+0.0
Emerging Market Debt	2.4	-0.2	+0.0	-0.1	-0.1
TIPS	4.0	-0.7	+0.0	+0.0	+0.0
<b>Other Investments</b>					
Absolute Return	5.6	-0.6	+0.1	+0.3	+0.4
Private Equity	5.3	-2.7	-0.2	+0.0	-0.2
Real Estate	6.0	+0.5	+0.0	+0.0	+0.0
Real Asset	2.0	-1.1	+0.1	+0.0	+0.1
Cash	3.9	3.9	+0.0	+0.0	+0.0
<b>Total</b>	<b>100%</b>	<b>+0.0%</b>	<b>+0.5%</b>	<b>-1.7%</b>	<b>-1.2%</b>



# Pension – Cash Flows and Projections

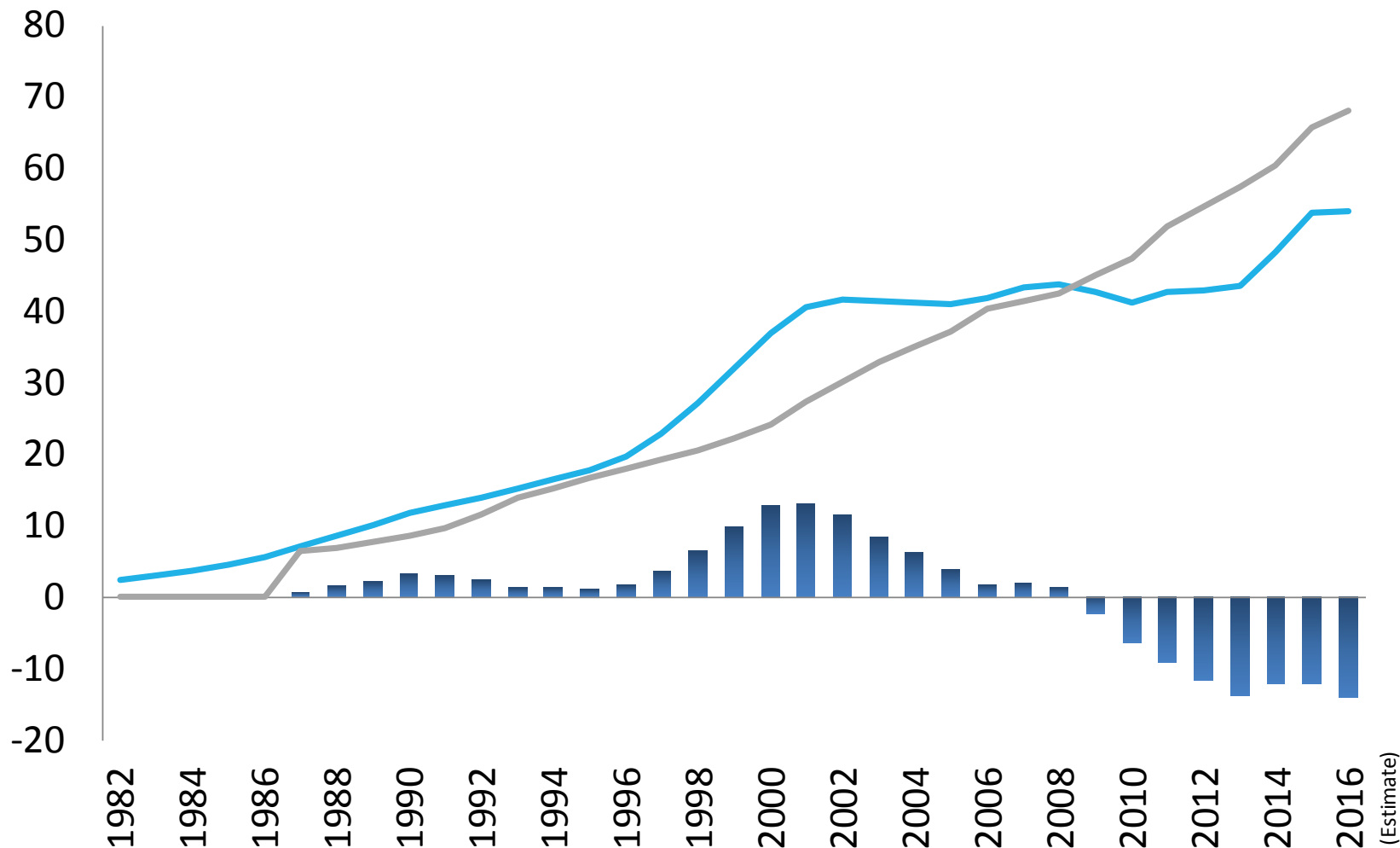
Inflows	2011	2012	2013	2014	2015	2016	2017E	2018E
Short Term Internal Borrowing	\$1.1				\$0.7	\$0.6	\$0.5	\$0.4
Short Term External Borrowing		\$0.9						
State Contributions						\$0.1	\$0.2	\$0.2
<b>Total Contributions</b>	<b>\$1.8</b>	<b>\$2.1</b>	<b>\$1.2</b>	<b>\$2.2</b>	<b>\$3.3</b>	<b>\$3.3</b>	<b>\$3.3</b>	<b>\$3.3</b>
Employer	\$1.7	\$1.8	\$0.8	\$1.6	\$2.5	\$2.5	\$2.5	\$2.5
Employee	\$0.1	\$0.3	\$0.4	\$0.6	\$0.8	\$0.8	\$0.8	\$0.8
<b>Total Inflows</b>	<b>\$2.9</b>	<b>\$3.0</b>	<b>\$1.2</b>	<b>\$2.2</b>	<b>\$4.0</b>	<b>\$4.0</b>	<b>\$4.0</b>	<b>\$4.0</b>
<b>Outflows</b>								
Benefit Payments	\$2.0	\$2.2	\$2.5	\$2.7	\$3.0	\$3.2	\$3.4	\$3.6
<b>Net Cash Flow</b>	<b>\$0.9</b>	<b>\$0.8</b>	<b>(\$1.3)</b>	<b>(\$0.5)</b>	<b>\$1.0</b>	<b>\$0.8</b>	<b>\$0.6</b>	<b>\$0.3</b>





# Pension – Assets and Liabilities

● Assets ● Liabilities ● Surplus/Deficit (all values in \$ Billions)

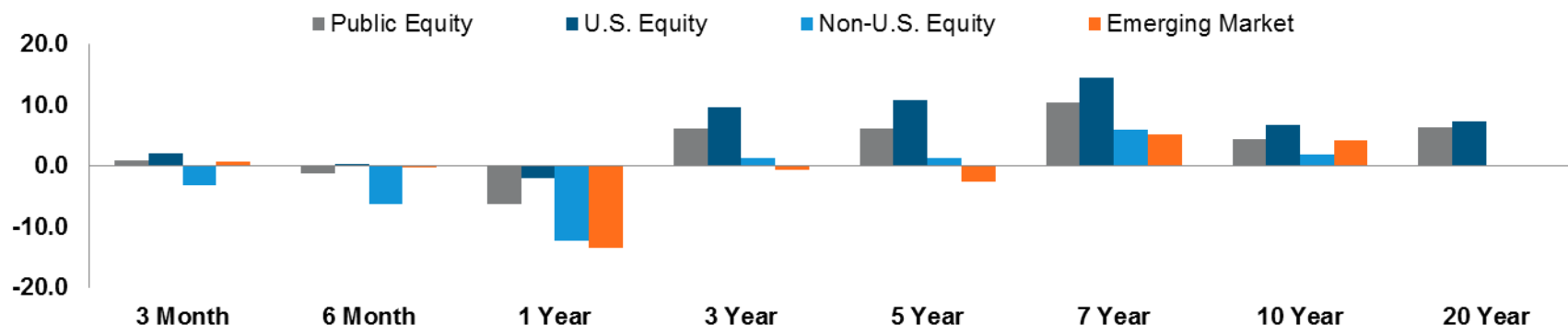




# Pension Public Equity Performance

Net Returns (%) As of June 30, 2016	Market Value (\$ Million)	% Allocation	Annualized Returns							
			3 Month	6 Month	1 Year	3 Year	5 Year	7 Year	10 Year	20 Year
Public Equity	29,483	100%	0.9	(1.2)	(6.4)	6.2	6.0	10.4	4.4	6.3
Policy Benchmark			1.1	1.6	(4.2)	5.2	5.2	9.6	4.0	6.7
Value Added			(0.2)	(2.8)	(2.2)	1.0	0.8	0.8	0.4	(0.4)
U.S. Equity	15,652	53%	2.0	0.2	(2.0)	9.7	10.8	14.4	6.8	7.3
Russell 3000 Tobacco Free Index			2.6	3.4	1.7	11.0	11.5	14.8	7.3	8.1
Value Added			(0.6)	(3.2)	(3.7)	(1.3)	(0.7)	(0.4)	(0.5)	(0.8)
Non-U.S. Equity	9,482	32%	(3.3)	(6.3)	(12.3)	1.3	1.2	5.9	1.8	-
MSCI World ex-U.S. (net dividends) Tobacco Free			(1.1)	(3.2)	(10.3)	1.7	1.1	5.6	1.5	-
Value Added			(2.2)	(3.1)	(2.0)	(0.4)	0.1	0.3	0.3	-
Emerging Market	4,349	15%	0.6	(0.1)	(13.5)	(0.7)	(2.6)	5.2	4.2	-
MSCI Emerging Market (net dividends)			0.7	6.4	(12.1)	(1.6)	(3.8)	3.8	3.5	-
Value Added			(0.1)	(6.5)	(1.4)	0.9	1.2	1.4	0.7	-

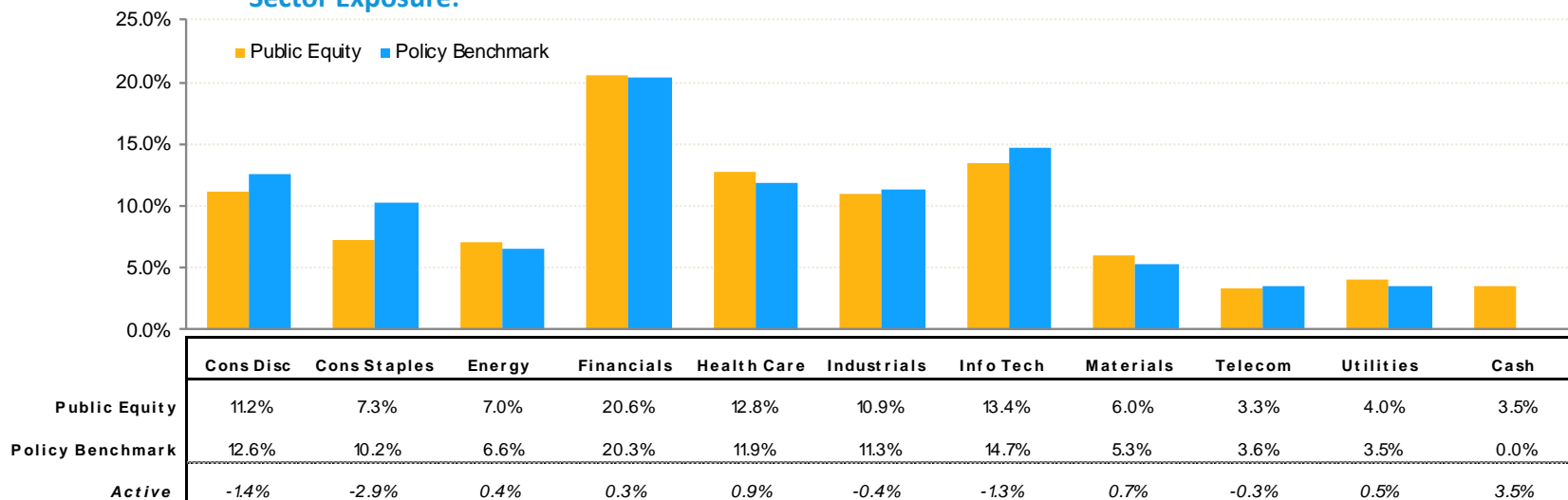
- The Policy Benchmark is a weighted average of investment policy targets



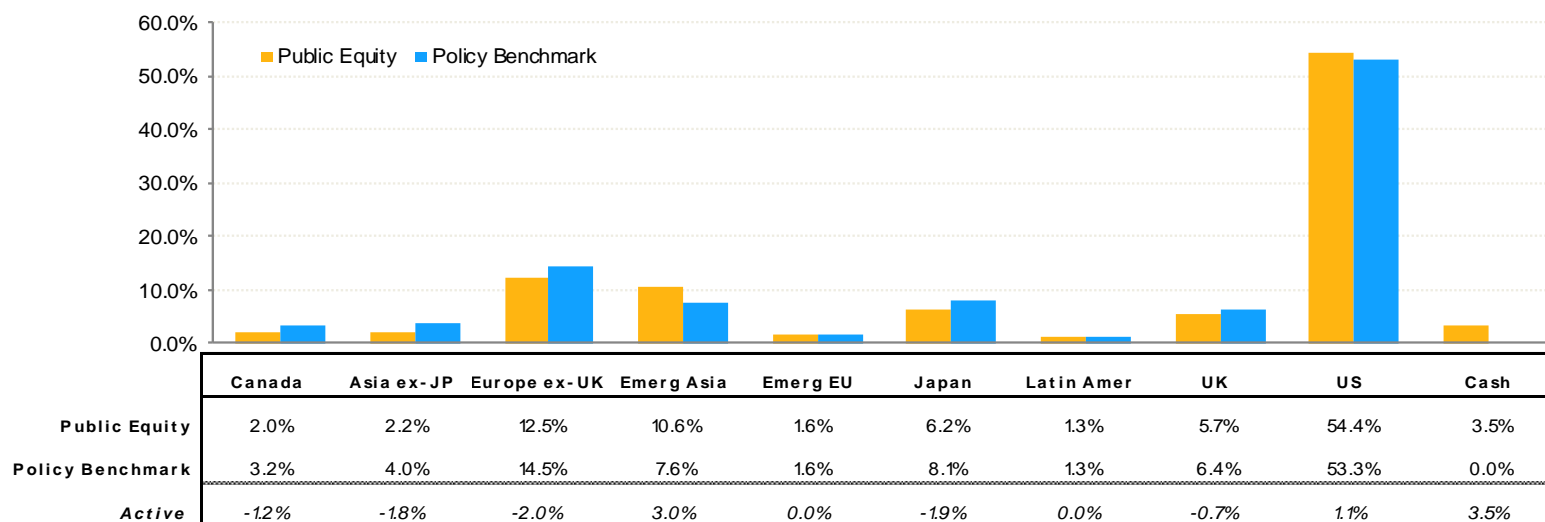


# Pension Public Equity Sector and Regional Allocation

## Sector Exposure:



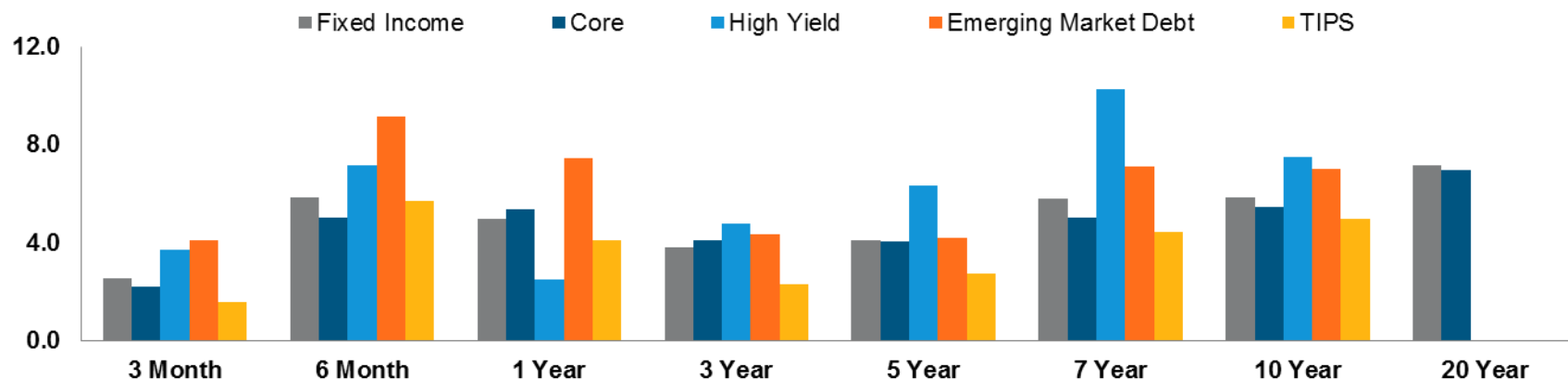
## Regional Exposure:





# Pension Fixed Income Performance

Net Returns (%) As of June 30, 2016	Market Value		Annualized Returns							
	(\$ Million)	% Allocation	3 Month	6 Month	1 Year	3 Year	5 Year	7 Year	10 Year	20 Year
<b>Fixed Income</b>	12,646	100%	2.5	5.9	5.0	3.8	4.1	5.8	5.9	7.2
Policy Benchmark			2.8	6.5	5.6	4.1	4.0	5.5	5.8	6.5
<i>Value Added</i>			(0.3)	(0.6)	(0.6)	(0.3)	0.1	0.3	0.1	0.7
<b>Core</b>	7,574	60%	2.2	5.1	5.4	4.1	4.1	5.1	5.5	7.0
Barclays U.S. Aggregate Bond Index			2.2	5.3	6.0	4.1	3.8	4.6	5.4	6.3
<i>Value Added</i>			0.0	(0.2)	(0.6)	0.0	0.3	0.5	0.1	0.7
<b>High Yield</b>	1,796	14%	3.7	7.2	2.5	4.8	6.4	10.3	7.5	-
Merrill Lynch High Yield Cash Pay Index			5.8	9.2	1.7	4.2	5.7	9.9	7.4	-
<i>Value Added</i>			(2.1)	(2.0)	0.8	0.6	0.7	0.4	0.1	-
<b>Emerging Market Debt</b>	1,320	10%	4.1	9.2	7.5	4.4	4.2	7.1	7.1	-
JP Morgan Emerging Markets Bond Index Global Diversified			5.0	10.3	9.8	7.2	5.9	8.4	7.9	-
<i>Value Added</i>			(0.9)	(1.1)	(2.3)	(2.8)	(1.7)	(1.3)	(0.8)	-
<b>TIPS</b>	1,956	16%	1.6	5.7	4.1	2.3	2.8	4.5	5.0	-
Barclays U.S. TIPS			1.7	6.2	4.4	2.3	2.6	4.3	4.7	-
<i>Value Added</i>			(0.1)	(0.5)	(0.3)	0.0	0.2	0.2	0.3	-

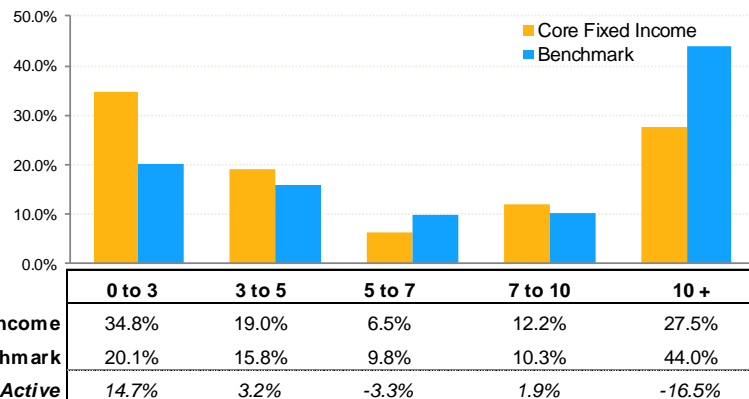




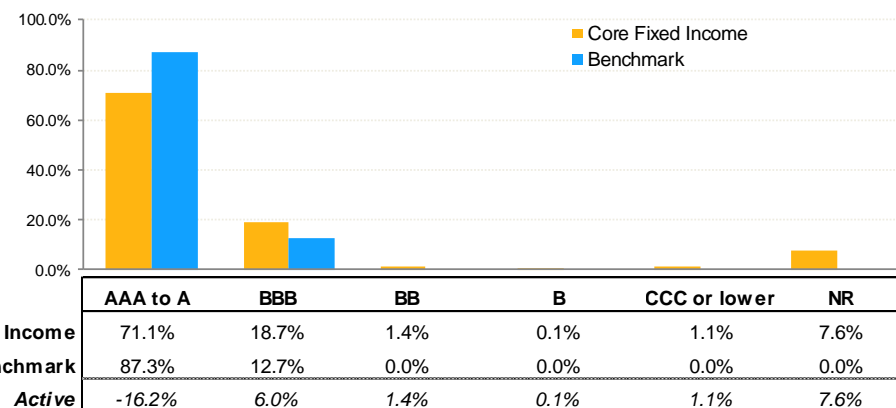
# Pension Fixed Income Exposures

## Core Fixed Income – \$7,574M

### Summary of Duration Buckets:

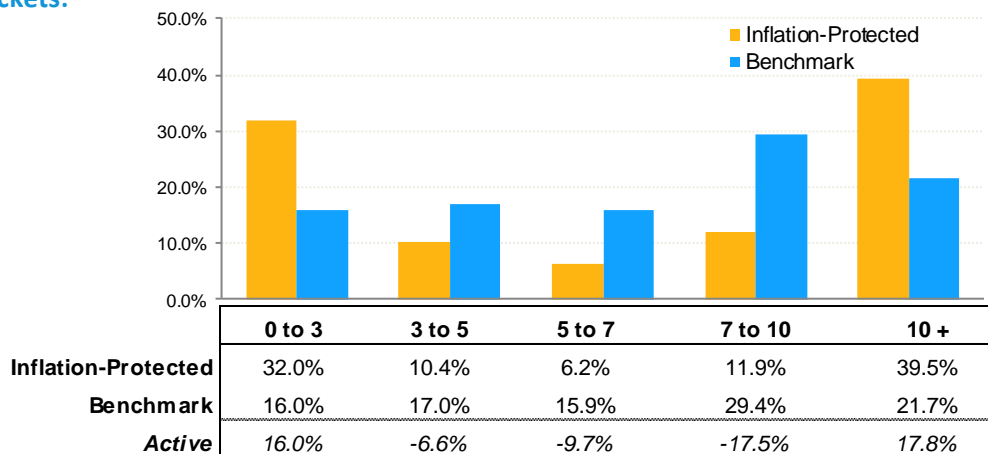


### Summary of Credit Rating



## Treasury Inflation-Protected Securities – \$1,956M

### Summary of Duration Buckets:





# Pension Fixed Income Exposures

## Emerging Market Debt – \$1,320M

### Top 10 Country Active Weight vs. the Benchmark

Mexico	2.4%
Indonesia	2.2%
United States	2.2%
Hungary	1.7%
Colombia	1.5%
Croatia	1.4%
Romania	0.9%
Philippines	0.8%
Slovenia	0.8%
Dominican Republic	0.7%

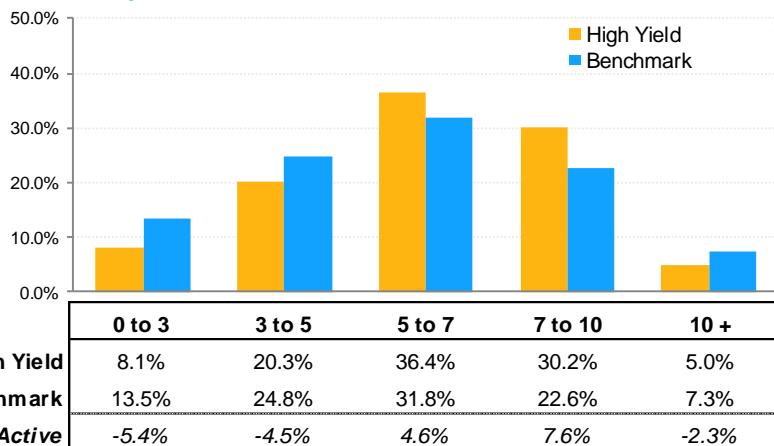
### Bottom 10 Country Active Weight vs. the Benchmark

Cote D'Ivoire	-0.6%
India	-0.7%
Russian Federation	-0.8%
Azerbaijan	-0.8%
Jamaica	-0.8%
Kazakhstan	-0.8%
Ukraine	-0.9%
Venezuela	-1.4%
Lebanon	-1.7%
Malaysia	-2.7%

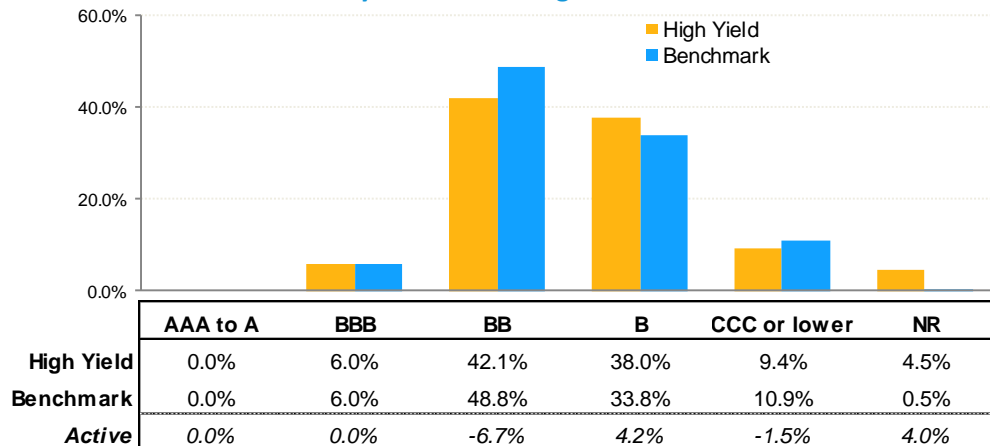
- The Benchmark for Emerging Market Debt is the JP Morgan EMBI Global Diversified

## High Yield – \$1,796M

### Summary of Duration Buckets:



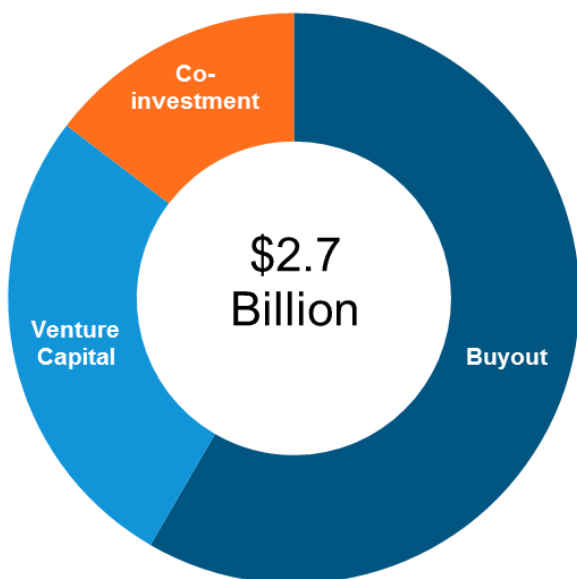
### Summary of Credit Rating





# Pension Other Investments: Private Equity

Net Returns (%) As of June 30, 2016	Market Value		Annualized Returns							
	(\$ Million)	% Allocation	3 Month	6 Month	1 Year	3 Year	5 Year	7 Year	10 Year	20 Year
Private Equity	2,676	100%	0.0	2.2	6.2	14.4	12.2	13.9	9.8	16.6
Actual Private Equity Returns			0.0	2.2	6.2	14.4	12.2	13.9	9.8	16.6
Buyout	1,562	58%	1.1	3.9	5.9	11.5	9.6	12.7	9.3	11.8
Venture Capital	722	27%	(2.9)	(1.7)	3.8	15.2	14.2	14.4	9.5	23.1
Co-investment	392	15%	2.6	4.9	16.5	39.1	34.2	-	-	-



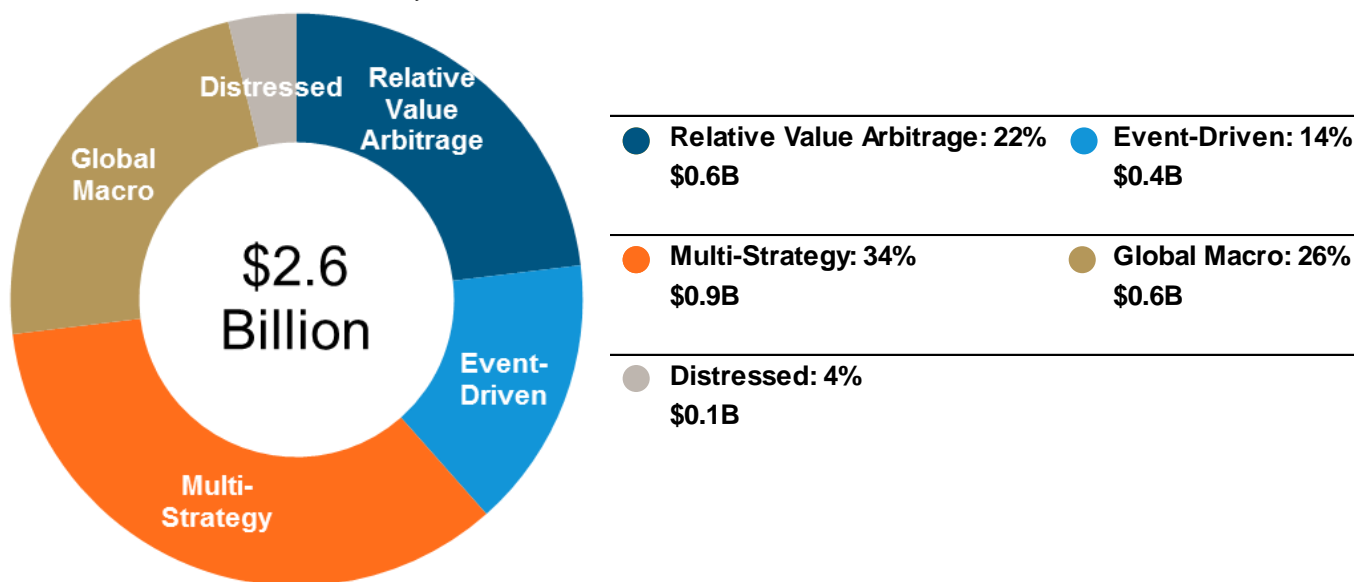
- Buyout: 58%  
\$1.6B
- Venture Capital: 27%  
\$0.7B
- Co-investment: 15%  
\$0.4B



# Pension Other Investments: Absolute Return

Net Returns (%)	Market Value		Annualized Returns						
As of June 30, 2016	(\$ Million)	% Allocation	3 Month	6 Month	1 Year	3 Year	5 Year	7 Year	Since Inception
Absolute Return	2,587	100%	0.5	(1.5)	(4.9)	5.2	4.4	6.2	3.5
Custom Absolute Return Index			0.3	(4.5)	(9.4)	(0.3)	(1.1)	0.4	3.5
<i>Value Added</i>			<i>0.2</i>	<i>3.0</i>	<i>4.5</i>	<i>5.5</i>	<i>5.5</i>	<i>5.8</i>	<i>0.0</i>
Relative Value Arbitrage	573	22%	3.1	2.8	2.0	5.1	5.3	7.2	0.0
Event-Driven	367	14%	0.6	-6.8	-14.9	1.7	3.9	7.2	5.3
Multi-Strategy	871	34%	-0.2	2.8	-6.0	7.6	0.4	-	-
Global Macro	660	26%	-1.8	-3.1	5.9	4.5	3.0	3.1	0.0
Distressed	116	4%	0.2	-1.2	-3.0	0.3	2.5	6.0	1.8

\* Inception date for Absolute Return was July 1, 2007. Prior to March 1, 2009, the portfolio benchmark was 1 Month T-Bill+4.5%; thereafter it was 50% HFRX Absolute Return/50% HFRX Market Directional, until February 2016 when it became HFRX Absolute Return

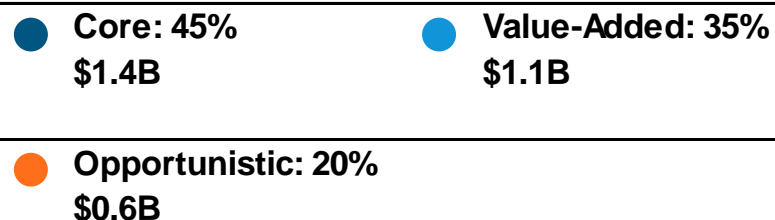
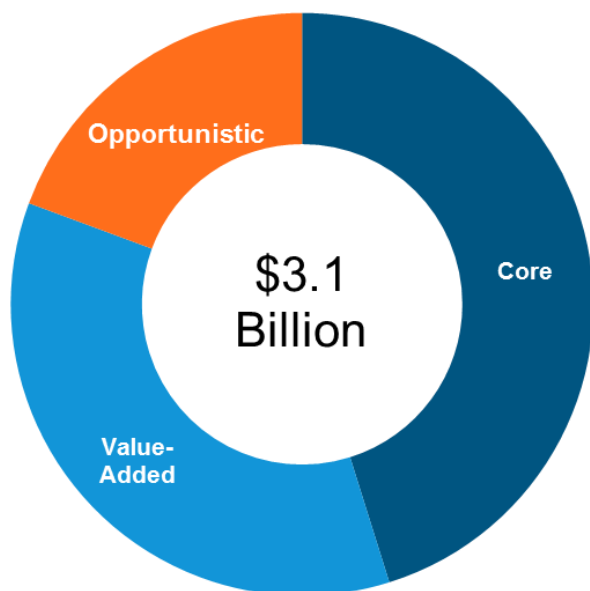






# Pension Other Investments: Real Estate

Net Returns (%) As of June 30, 2016	Market Value		Annualized Returns						
	(\$ Million)	% Allocation	3 Month	6 Month	1 Year	3 Year	5 Year	7 Year	10 Year
Real Estate	3,143	100%	3.7	6.0	11.6	14.2	13.5	7.2	2.2
NCREIF Funds Index-Open End Diversified Core Equity Index (lagged 3 months)			2.0	5.1	12.6	12.7	12.3	6.5	1.8
Value Added			1.7	0.9	(1.0)	1.5	1.2	0.7	0.4
Core	1,411	45%	2.8	6.5	14.5	13.9	13.5	-	-
Value-Added	1,101	35%	3.8	6.3	13.0	13.4	13.6	-	-
Opportunistic	631	20%	2.2	3.2	3.7	12.0	10.7	-	-

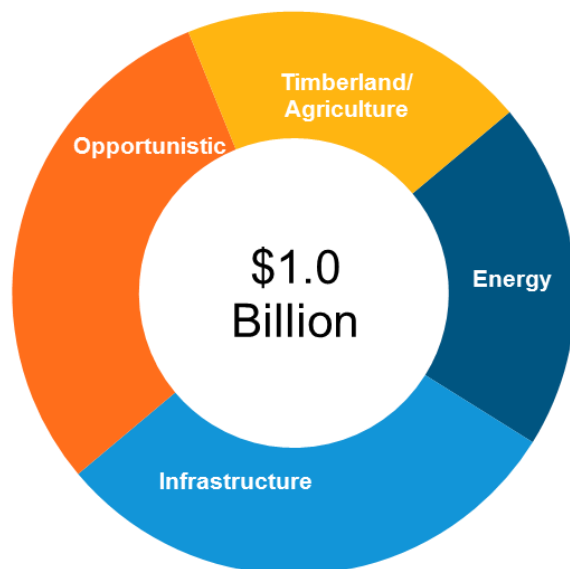




# Pension Other Investments: Real Assets

Net Returns (%)	Market Value		Annualized Returns					Since Inception
			3 Month	6 Month	1 Year	3 Year	5 Year	
As of June 30, 2016	(\$ Million)	% Allocation						
<b>Real Asset</b>	<b>961</b>	<b>100%</b>	<b>(1.8)</b>	<b>(10.8)</b>	<b>(14.6)</b>	<b>(3.6)</b>	<b>(1.3)</b>	<b>4.0</b>
Actual Real Asset Returns			(1.8)	(10.8)	(14.6)	(3.6)	(1.3)	4.0
Energy	206	21%	(8.6)	(37.4)	(45.6)	(24.3)	(14.2)	(5.5)
Infrastructure	301	31%	0.4	(2.6)	2.0	10.8	9.1	8.6
Opportunistic	295	31%	1.5	1.3	2.6	4.7	-	6.4
Timberland/Agriculture	159	17%	(1.5)	6.7	(3.0)	4.6	3.3	5.6

\* Inception date for Real Assets is April 1, 2010



● <b>Energy: 21%</b> <b>\$0.2B</b>	● <b>Infrastructure: 31%</b> <b>\$0.3B</b>
● <b>Opportunistic: 31%</b> <b>\$0.3B</b>	● <b>Timberland/Agriculture: 17%</b> <b>\$0.2B</b>

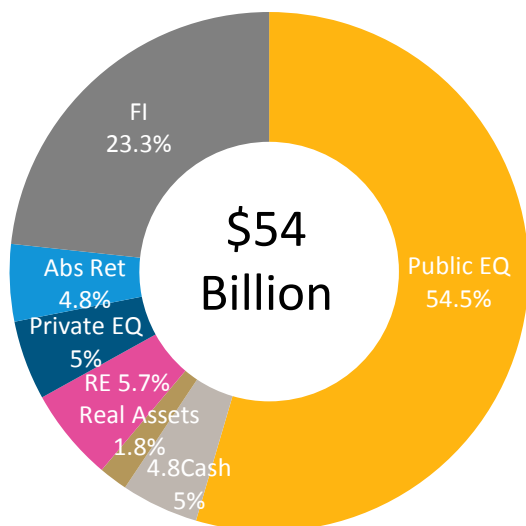


# Risk Management

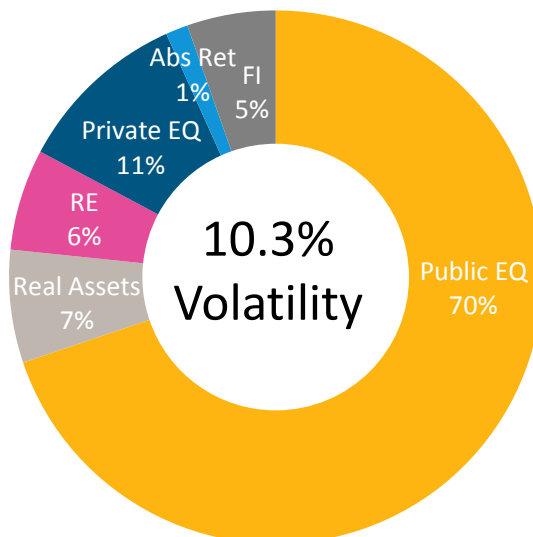


# UCRP Risk Exposure and Factors : dominant contribution from equity risk

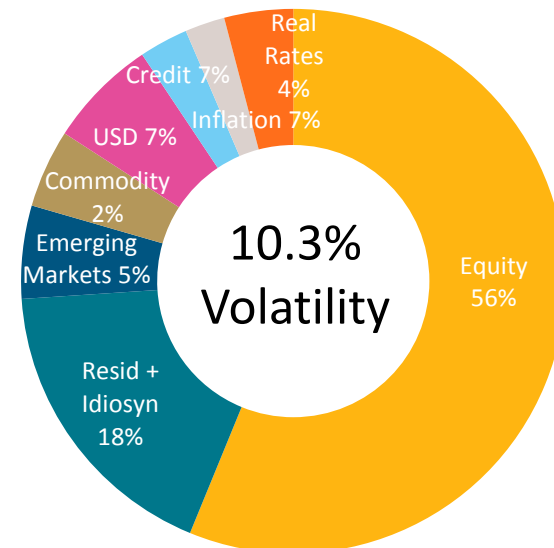
## 1. Asset Allocation



## 2. Asset Allocation adjusted for Standalone Volatility



## 3. Macro Factor Standalone Volatility Breakdown



1. The Asset allocation mix provides the lowest order view of risk of UCRP
2. Adjusting the asset allocation for the standalone volatility of each asset class shows the dominance of Equity risk.
3. Alternatively, decomposing the risk of the portfolio into seven fundamental “macroeconomic factors”, with “Equity” interpreted as proxy for general economic growth, provides another view of the factors contributing to the total risk of the portfolio.



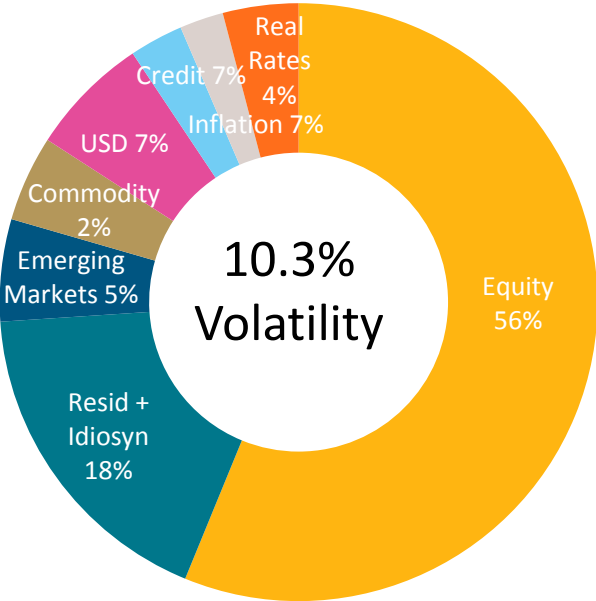
# UCRP Risk Measurement

Name	Beta vs Benchmark	Benchmark Risk (%)	Portfolio Risk (%)		Active Risk (%)	
		Standalone Volatility	Standalone Volatility	Volatility Contributions*	Tracking Error TE	TE Contributions*
<b>UCRP Total</b>	<b>0.98</b>	<b>10.5</b>	<b>10.3</b>	<b>10.3</b>	<b>0.9</b>	<b>0.9</b>
Public Equity	0.97	14.8	14.6	7.9	1.4	0.7
Fixed Income	0.67	3.0	2.6	0.2	0.5	0.1
Absolute Return	0.23	7.2	3.2	0.1	6.2	0.1
Private Equity	1.00	24.1	24.1	1.1	0.0	0.0
Private Real Estate	1.19	9.8	12.1	0.4	3.8	0.0
Real Assets	1.00	43.5	43.5	0.7	0.0	0.0
Cash	0.00	0.0	0.0	0.0	0.0	0.0

\* Additive to Total    \*\* PE and Real Assets do not contribute to total Tracking Error as per Policy



# Describing the Macro Factors

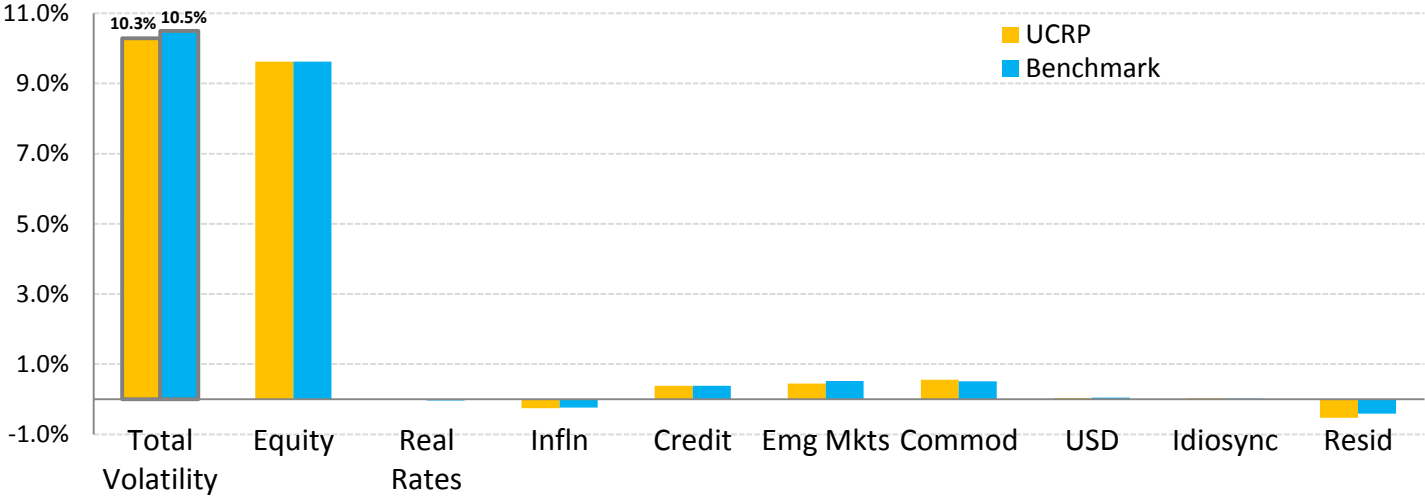


Factor Name	Factor Description
Equity	Broad-market equity index returns
Real Rates	Inflation-linked bond returns
Inflation	Return of long nominal bonds, short inflation-linked bonds portfolio
Credit	Return of long corporate bonds, short nominal bonds portfolio
Commodity	Weighted GSCI Commodity index returns
Emerging Markets	Equally weighted basket of EM Assets



# UCRP Factors and Stress Tests

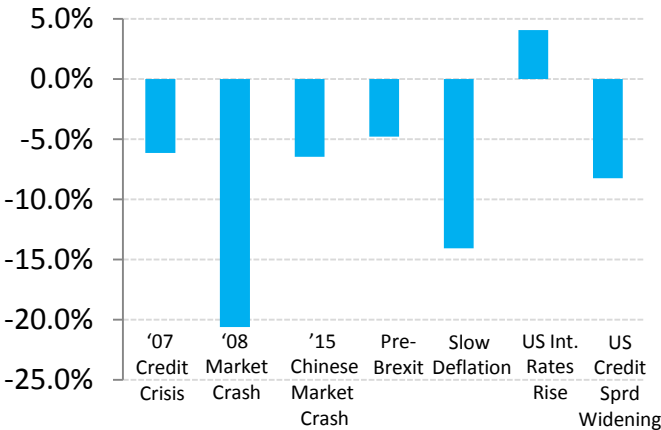
## Macro Factor Volatility Contributions



\*Each color additive to Total Volatility

## Historical Stress Tests and Scenario Analysis

### Portfolio



### Active

