



UNIVERSITY OF CALIFORNIA

Office of the Chief Investment Officer

Pension

Investment Review as of September 30, 2017

Growing Portfolios Building Partnerships

UC Investments



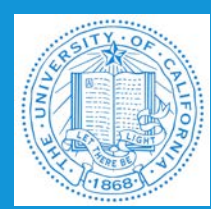
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UCRP Executive Summary

How is our Pension positioned?

How did our Pension perform?

How are we managing risk in our Pension?



Office of the Chief Investment Officer

- 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.



Office of the CIO at a glance

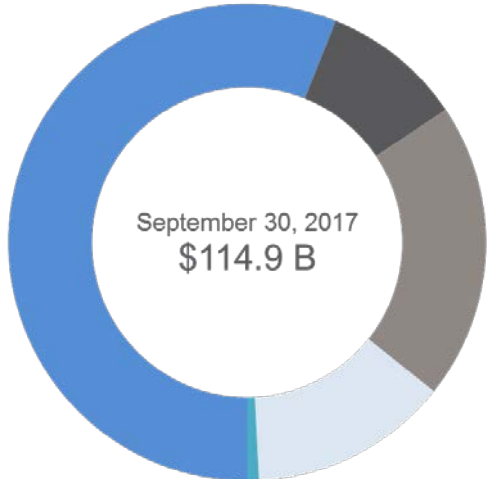
Office of the Chief Investment Officer

Growing Portfolios. Building Partnerships.
Delivering value through values.

Office of the CIO Facts

- ▶ Pension assets: \$64.4 billion (as of 9/30/17)
- ▶ Investing pension assets since 1961 (56 years)
- ▶ Investing defined contribution assets since 1967 (50 years)
- ▶ Serving more than 150,000 pension members
- ▶ Serving more than 300,000 DC participants
- ▶ Investing Endowment assets since 1933 (84 years)

\$114.9 billion across 6 products

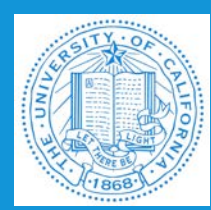


- **Pension: 56%, \$64.4B**
- Endowment: 10%, \$11.0B
- Retirement Savings: 20%, \$23.1B
- Working Capital: 13%, \$15.5B
- TRIP: \$9.0B
- STIP: \$6.5B
- Fiat Lux: 1%, \$0.9B

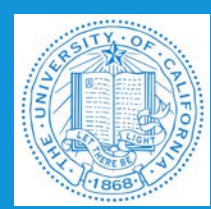


The team managing your money





UCRP Executive Summary



UCRP at a Glance

Global Markets

- Global equities closed at new all time highs, first time in decade with synchronized expansions.
- High Yield spreads continue to tighten driving strong performance. Yield curve slightly shifted upward.

Assets Under Management

- Assets of \$64.4 billion have grown by 49% over 5 years

Asset Allocation

- Overweight Public Equities
- Overweight Cash
- Underweight Other Investments (Private Equity, Absolute Return, Real Estate, and Real Assets)

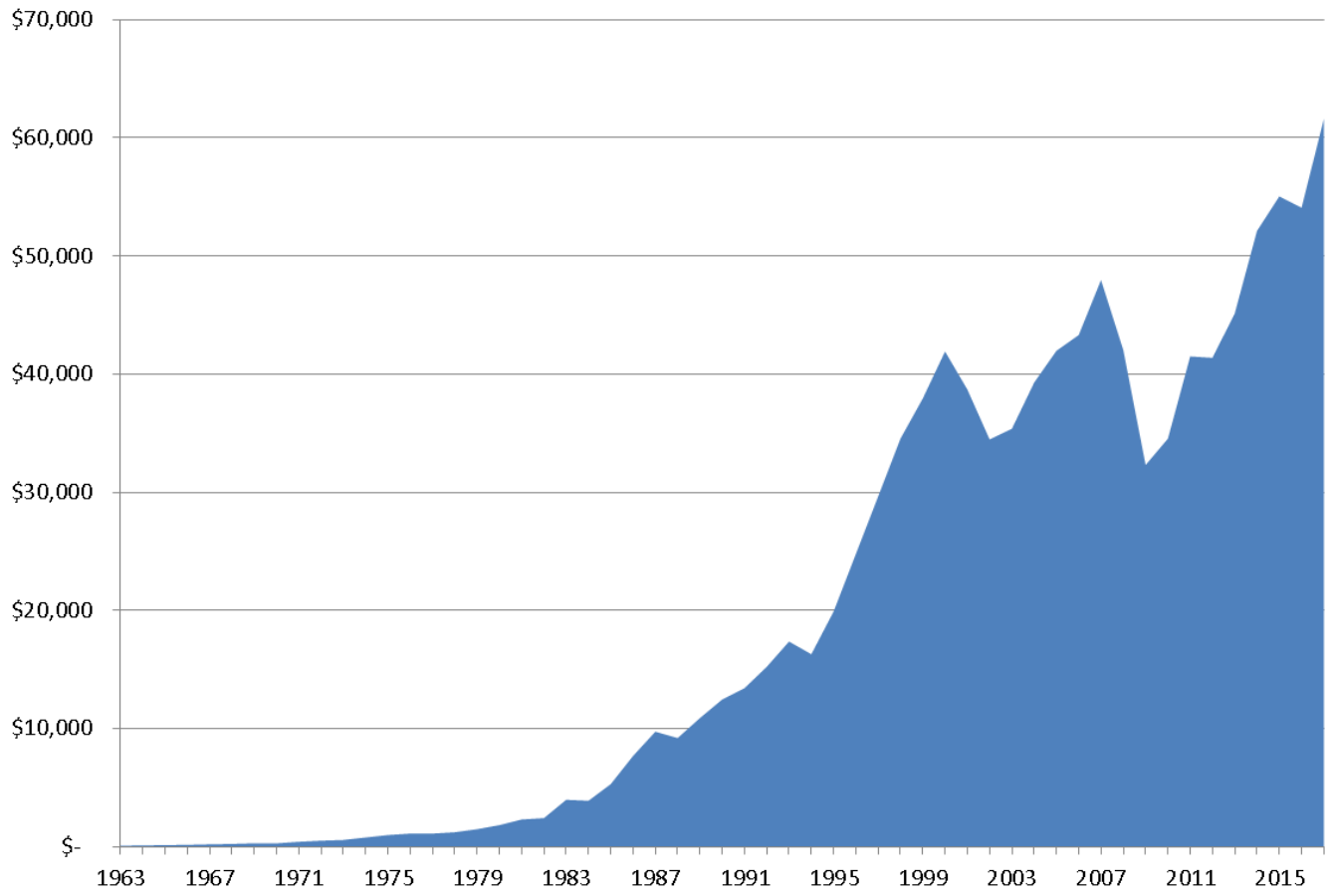
Performance

- Strong absolute performance driven by equity markets
- Active management particularly in developed international markets paid off



UCRP Assets grew by 49% in 5 years

UCRP Assets 1963 - 2017



5 Year Growth

September 30, 2017
\$64.4 billion

1 Year ago
\$56.1 billion

5 Years ago
\$43.1 billion

As of September 30, 2017



AUM growth driven by markets

Assets Under Management Attribution

Assets Under Management June 30, 2017	\$61.6 billion
Market Gains	\$2.3 billion
Value Added	\$0.0 billion
Net Cash Flow	\$0.5 billion
Assets Under Management September 30, 2017	\$64.4 billion



How is our Pension Positioned?



Asset Allocation

Relative Weight As of September 30, 2017

Market Value
in \$ Billions

Percentage

Over/Underweight
Relative to Policy

Policy Weight



Public Equity	36.0	55.9%	3.7%	52.2%
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Fixed Income	13.5	21.0%	-0.5%	21.5%
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Core	8.2	12.8%	-0.6%	13.4%
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High Yield	2.1	3.3%	0.4%	2.9%
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Emerging Market Debt	1.5	2.3%	-0.1%	2.4%
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TIPS	1.7	2.6%	-0.2%	2.8%
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Other Investments	9.8	15.2%	-8.3%	23.5%
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Absolute Return	3.1	4.8%	-2.5%	7.3%
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Private Equity	2.8	4.3%	-3.2%	7.5%
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Real Estate	3.0	4.7%	-1.6%	6.3%
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Real Asset	0.9	1.4%	-1.0%	2.4%
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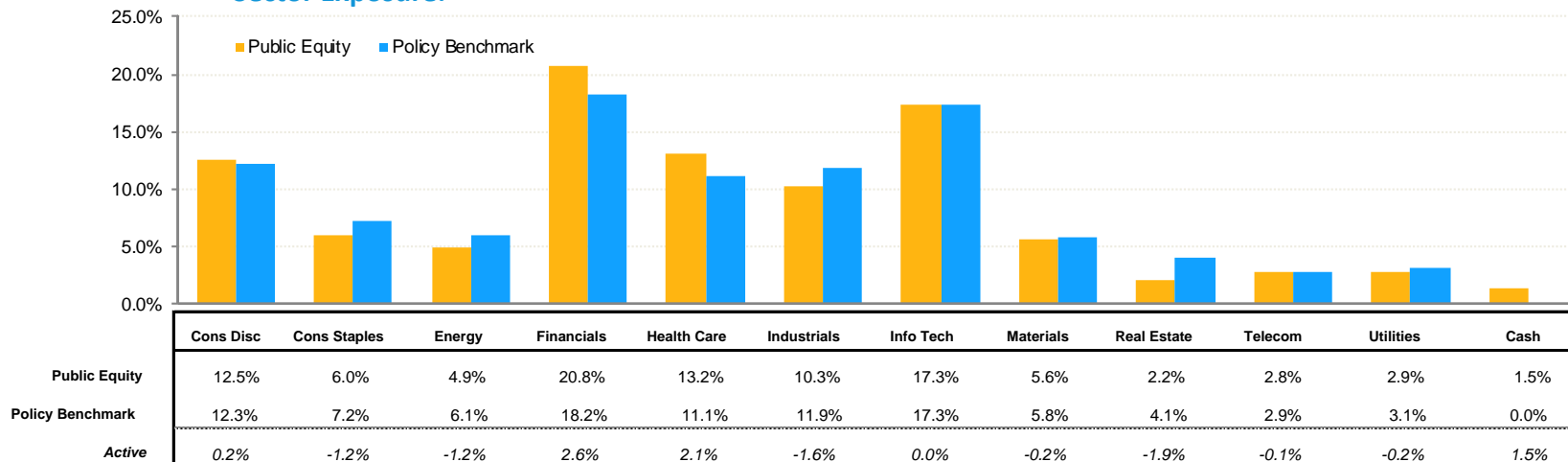
Cash	5.1	7.9%	5.1%	2.8%
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Total	64.4	100.0%	0.0%	100.0%
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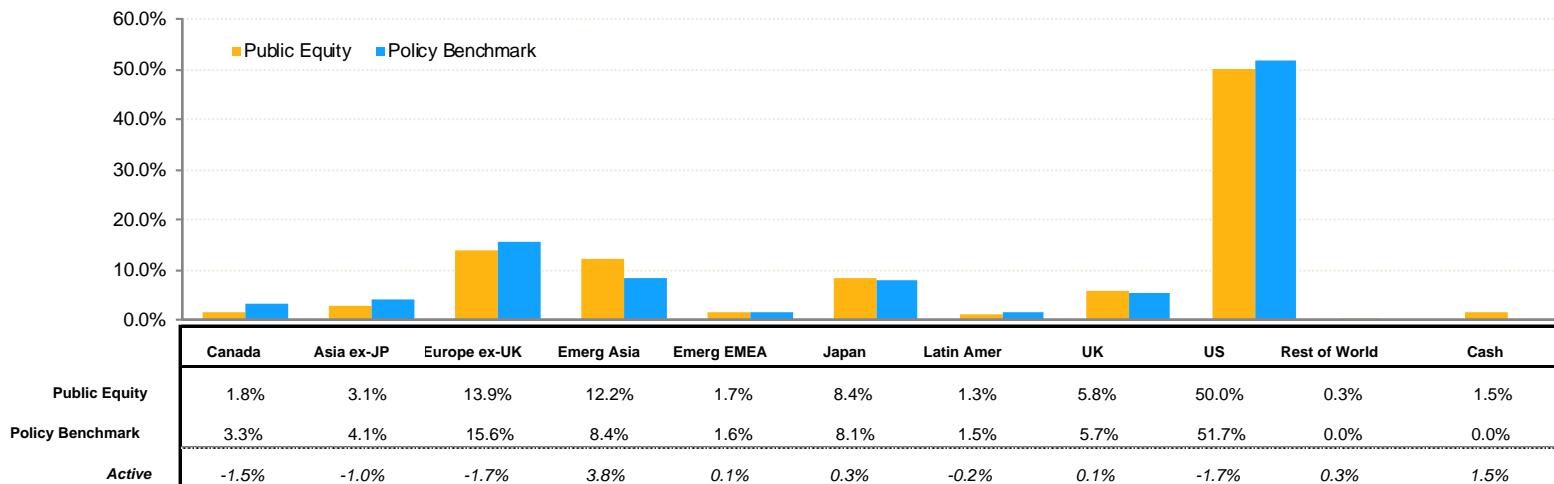


Public Equity Exposures

Sector Exposure:



Regional Exposure:

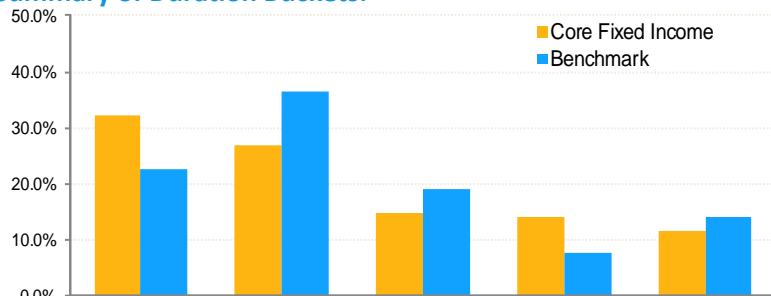




Pension Fixed Income Exposures

Core Fixed Income – \$8,232M

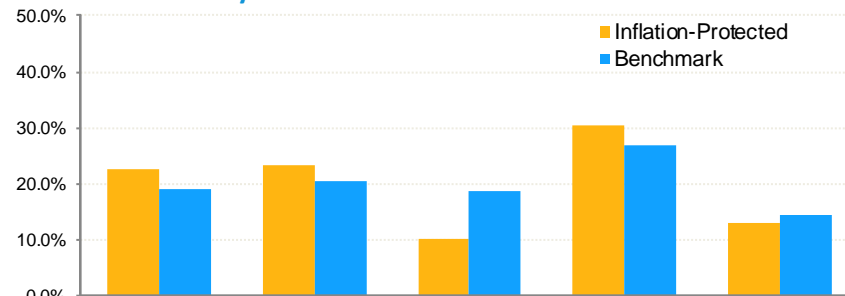
Summary of Duration Buckets:



Core Fixed Income
Benchmark
Active

Treasury Inflation-Protected Securities – \$1,704M

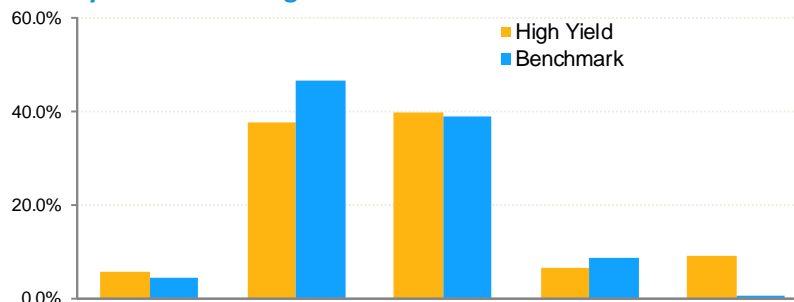
Summary of Duration Buckets:



Inflation-Protected
Benchmark
Active

High Yield – \$2,095M

Summary of Credit Rating

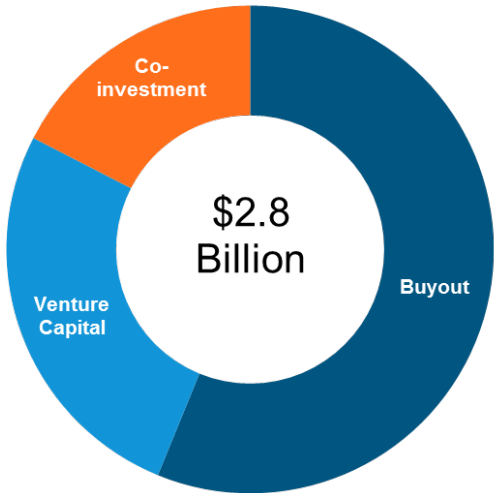


High Yield
Benchmark
Active



Private Equity Exposures

Private Equity



● Buyout: 56%
\$1.6B

● Venture Capital: 26%
\$0.7B

● Co-investment: 18%
\$0.5B



Absolute Return Exposures

Absolute Return

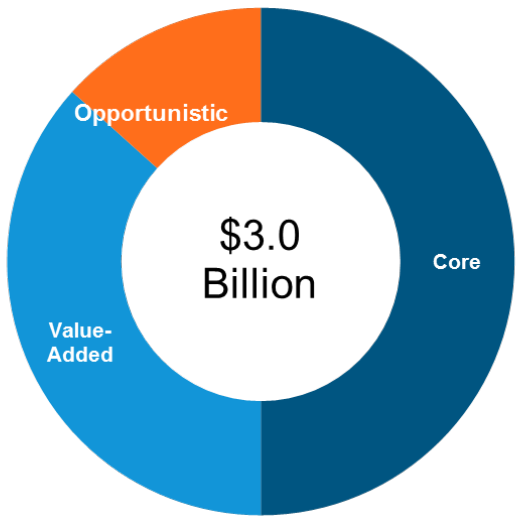


- **Opportunistic: 22%**
\$0.7B
- **Alternative Risk Premia: 10%**
\$0.3B
- **Relative Value: 35%**
\$1.1B
- **Global Macro: 20%**
\$0.6B
- **Event Driven: 12%**
\$0.3B
- **Fund of Funds: 0%**
\$0.0B
- **Distressed: 1%**
\$0.0B



Real Estate Exposures

Real Estate

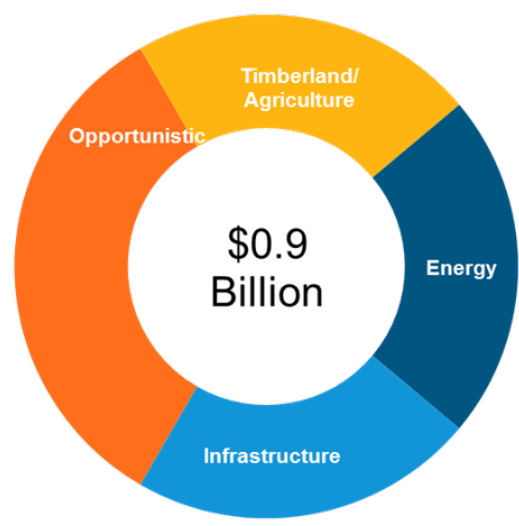


- Core: 49%
\$1.5B
- Value-Added: 38%
\$1.1B
- Opportunistic: 13%
\$0.4B



Real Assets Exposures

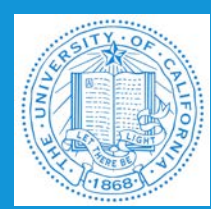
Real Assets



- Energy: 19%
\$0.2B
- Infrastructure: 25%
\$0.2B
- Opportunistic: 37%
\$0.3B
- Timberland/Agriculture: 19%
\$0.2B



How did our Pension Perform?



Performance: Strong absolute return

Net Returns (%) As of September 30, 2017	Annualized Returns							
	3 Month	YTD	1 Year	3 Year	5 Year	7 Year	10 Year	20 Year
UC Pension	3.6	12.4	14.0	6.9	8.7	8.7	5.1	6.6
UC Pension Benchmark	3.9	12.0	12.8	6.1	8.0	7.9	4.6	6.2
<i>Value Added</i>	<i>(0.3)</i>	<i>0.4</i>	<i>1.2</i>	<i>0.8</i>	<i>0.7</i>	<i>0.8</i>	<i>0.5</i>	<i>0.4</i>

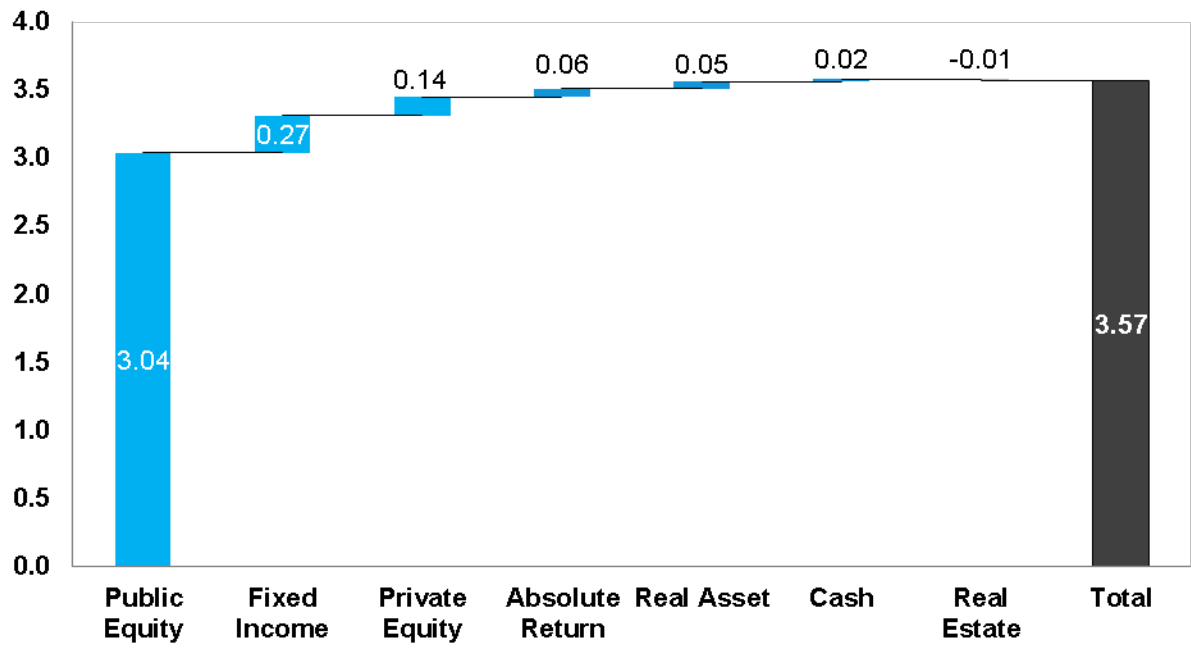
Net Returns (%) As of June 30	One Year Returns									
	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
UC Pension	14.5	(2.0)	4.5	17.4	11.7	0.4	22.4	12.7	(18.8)	(5.7)
UC Pension Benchmark	12.5	(0.8)	2.2	17.1	10.7	(0.6)	21.6	11.6	(18.9)	(4.7)
<i>Value Added</i>	<i>2.0</i>	<i>(1.2)</i>	<i>2.3</i>	<i>0.3</i>	<i>1.0</i>	<i>1.0</i>	<i>0.8</i>	<i>1.1</i>	<i>0.1</i>	<i>(1.0)</i>

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



Fiscal YTD return driven by Public Equity

FYTD Contribution to Return - Percentage (%)

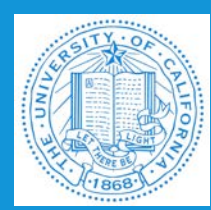




Pension – FY 2017/18

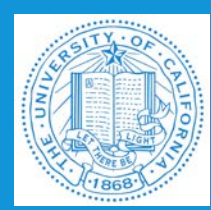
As of September 30, 2017

	Average Weight	Average Active Weight	Allocation Attribution	Selection Attribution	Total Attribution
Public Equity	56.0	+3.8	+0.3	+0.2	+0.5
Fixed Income					
Core	13.1	-0.3	-0.1	+0.0	-0.1
High Yield	3.3	+0.4	-0.1	+0.0	-0.1
Emerging Market Debt	2.4	+0.0	+0.0	+0.0	+0.0
TIPS	2.7	-0.1	+0.0	+0.0	+0.0
Other Investments					
Absolute Return	4.8	-2.5	+0.0	-0.1	-0.1
Private Equity	4.4	-3.1	-0.1	-0.1	-0.2
Real Estate	4.9	-1.4	+0.0	-0.1	-0.1
Real Asset	1.4	-1.0	+0.0	+0.0	+0.0
Cash	7.0	4.2	-0.2	+0.0	-0.2
Total	100%	+0.0%	-0.2%	-0.1%	-0.3%



Pension Public Equity Performance

Net Returns (%) As of September 30, 2017	Market Value		Annualized Returns							
	(\$ Million)	% Allocation	3 Month	YTD	1 Year	3 Year	5 Year	7 Year	10 Year	20 Year
Public Equity	35,963	100.0%	5.7	18.6	21.8	8.7	11.4	10.4	4.8	6.1
MSCI All Country World Index Net - IMI - Tobacco Free			5.5	17.3	18.9	7.7	10.5	9.6	4.5	5.9
<i>Value Added</i>			<i>0.2</i>	<i>1.3</i>	<i>2.9</i>	<i>1.0</i>	<i>0.9</i>	<i>0.8</i>	<i>0.3</i>	<i>0.2</i>
U.S. Equity	18,348	51%	4.2	15.6	19.9	9.8	13.9	14.0	7.2	6.9
Russell 3000 Tobacco Free Index			4.8	13.9	18.7	10.7	14.2	14.2	7.5	7.2
<i>Value Added</i>			<i>(0.6)</i>	<i>1.7</i>	<i>1.2</i>	<i>(0.9)</i>	<i>(0.3)</i>	<i>(0.2)</i>	<i>(0.3)</i>	<i>(0.3)</i>
Non-U.S. Equity	12,114	34%	5.6	21.9	27.7	7.4	9.7	7.5	2.4	-
MSCI World ex-U.S. (net dividends) Tobacco Free			5.8	19.4	19.2	4.6	7.8	6.0	1.2	-
<i>Value Added</i>			<i>(0.2)</i>	<i>2.5</i>	<i>8.5</i>	<i>2.8</i>	<i>1.9</i>	<i>1.5</i>	<i>1.2</i>	<i>-</i>
Emerging Market	5,500	15%	7.6	29.0	18.2	4.0	3.8	2.6	1.5	-
MSCI Emerging Market (net dividends)			7.9	27.8	22.5	4.9	4.0	2.5	1.3	-
<i>Value Added</i>			<i>(0.3)</i>	<i>1.2</i>	<i>(4.3)</i>	<i>(0.9)</i>	<i>(0.2)</i>	<i>0.1</i>	<i>0.2</i>	<i>-</i>



Fixed Income Performance

Net Returns (%) As of September 30, 2017	Market Value		Annualized Returns							
	(\$ Million)	% Allocation	3 Month	YTD	1 Year	3 Year	5 Year	7 Year	10 Year	20 Year
Fixed Income	13,531	100.0%	1.3	4.5	2.6	3.5	2.6	4.1	5.3	6.1
Policy Benchmark			0.8	3.7	1.3	3.3	2.3	3.7	5.0	5.9
<i>Value Added</i>			<i>0.5</i>	<i>0.8</i>	<i>1.3</i>	<i>0.2</i>	<i>0.3</i>	<i>0.4</i>	<i>0.3</i>	<i>0.2</i>
Core	8,232	61%	1.0	3.7	1.5	3.1	2.6	3.5	4.7	5.8
Barclays U.S. Aggregate Bond Index			0.8	3.1	0.1	2.7	2.1	3.0	4.4	5.6
<i>Value Added</i>			<i>0.2</i>	<i>0.6</i>	<i>1.4</i>	<i>0.4</i>	<i>0.5</i>	<i>0.5</i>	<i>0.3</i>	<i>0.2</i>
High Yield	2,095	15%	2.0	6.6	8.1	5.8	6.6	7.6	7.6	-
Merrill Lynch High Yield Cash Pay Index			2.0	7.1	9.1	5.9	6.4	7.3	7.7	-
<i>Value Added</i>			<i>0.0</i>	<i>(0.5)</i>	<i>(1.0)</i>	<i>(0.1)</i>	<i>0.2</i>	<i>0.3</i>	<i>(0.1)</i>	<i>-</i>
Emerging Market Debt	1,500	11%	2.6	8.9	4.4	4.9	3.2	4.6	6.3	-
JP Morgan Emerging Markets Bond Index Global Diversified			2.6	9.0	4.6	6.5	5.0	5.9	7.3	-
<i>Value Added</i>			<i>0.0</i>	<i>(0.1)</i>	<i>(0.2)</i>	<i>(1.6)</i>	<i>(1.8)</i>	<i>(1.3)</i>	<i>(1.0)</i>	<i>-</i>
TIPS	1,704	13%	0.9	2.0	(0.1)	1.8	0.2	2.8	4.2	-
Barclays U.S. TIPS			0.9	1.7	(0.7)	1.6	0.0	2.6	3.9	-
<i>Value Added</i>			<i>0.0</i>	<i>0.3</i>	<i>0.6</i>	<i>0.2</i>	<i>0.2</i>	<i>0.2</i>	<i>0.3</i>	<i>-</i>

*total fixed income policy benchmark is an aggregate of underlying portfolio benchmarks



Private Equity Performance

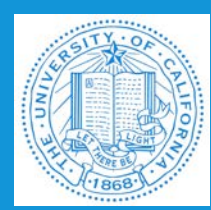
Net Returns (%) As of September 30, 2017	Market Value		Annualized Returns							
	(\$ Million)	% Allocation	3 Month	YTD	1 Year	3 Year	5 Year	7 Year	10 Year	20 Year
Private Equity	2,783	100.0%	3.2	12.9	16.2	10.4	13.8	13.7	9.4	15.4
UCRP Non-Lagged Private Eq Policy Index			5.1	15.1	18.5	11.1	14.2	14	9.6	9.4
<i>Value Added</i>			<i>(1.9)</i>	<i>(2.2)</i>	<i>(2.3)</i>	<i>(0.7)</i>	<i>(0.4)</i>	<i>(0.3)</i>	<i>(0.2)</i>	<i>6.0</i>
Buyout	1,563	56%	3.5	13.1	16.7	10.9	12.2	12.3	9.3	11.7
Venture Capital	734	26%	(0.1)	7.3	10.8	4.9	12.1	13.0	8.2	19.9
Co-investment	486	18%	12.9	31.3	34.5	26.7	36.1	32.2	-	-



Absolute Return Performance

Net Returns (%) As of September 30, 2017	Market Value		Annualized Returns						
	(\$ Million)	% Allocation	3 Month	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
Absolute Return	3,079	100.0%	1.3	2.8	4.1	2.4	5.6	5.1	3.7
Custom Absolute Return Index			2.3	5.6	6.5	0.2	2.3	0.2	2.4
<i>Value Added</i>			<i>(1.0)</i>	<i>(2.8)</i>	<i>(2.4)</i>	<i>2.2</i>	<i>3.3</i>	<i>4.9</i>	<i>1.3</i>
Opportunistic	669	22%	1.2	6.3	6.5	7.5	-	-	-
Alternative Risk Premia	300	10%	1.0	-0.2	-2.6	-6.2	3.1	-	-
Relative Value	1,077	35%	3.3	6.6	9.5	5.5	7.2	-	-
Global Macro	622	20%	-1.9	-8.0	-5.8	1.9	1.6	-	-
Event Driven	367	12%	1.9	13.4	13.4	0.8	7.2	-	-
Fund of Funds	20	0%	3.0	6.5	6.4	-1.1	2.1	-	-
Distressed	24	1%	1.3	1.4	8.7	-2.0	3.1	-	0.60

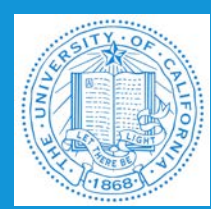
* Inception date for Absolute Return was July 1, 2007. Prior to March 1, 2009, the portfolio benchmark was 1 Month T-Bill+4.5%; thereafter it was 50% HFRX Absolute Return/50% HFRX Market Directional, until February 2016 when it became HFRX Absolute Return



Real Estate Performance

Net Returns (%) As of September 30, 2017	Market Value		Annualized Returns						
	(\$ Million)	% Allocation	3 Month	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
Real Estate	3,038	100.0%	(0.2)	5.4	7.8	11.3	11.6	13.3	0.4
NCREIF Funds Index-Open End Diversified Core Equity Index (lagged 3 months)			1.5	5.0	6.9	10.5	10.9	12.4	0.6
<i>Value Added</i>			<i>(1.7)</i>	<i>0.4</i>	<i>0.9</i>	<i>0.8</i>	<i>0.7</i>	<i>0.9</i>	<i>(0.2)</i>
Core	1,491	49%	1.6	4.4	6.1	11.6	11.9	13.2	6.1
Value-Added	1,139	38%	2.1	4.4	7.4	12.5	11.4	12.7	1.2
Opportunistic	408	13%	2.0	2.6	7.7	9.1	10.8	13.5	(1.6)

* Underlying strategy returns are calculated by an external consultant, and provided on a quarterly lag once quarterly values are finalized



Real Assets Performance

Net Returns (%) As of September 30, 2017	Market Value		Annualized Returns					Since Inception
	(\$ Million)	% Allocation	3 Month	YTD	1 Year	3 Year	5 Year	
Real Asset	888	100.0%	3.3	6.5	9.4	(5.8)	0.5	5.6
Actual Real Asset Returns			3.3	6.5	9.4	(5.8)	0.5	5.6
Energy	170	19%	3.0	(2.4)	6.3	(27.9)	(12.8)	(2.4)
Infrastructure	222	25%	11.3	26.3	27.4	11.4	14.0	11.8
Opportunistic	327	37%	1.7	5.5	7.8	6.0	5.6	7.1
Timberland/Agriculture	169	19%	(0.3)	4.7	4.3	3.1	4.0	5.2

* Inception date for Real Assets is April 1, 2010



How are we Managing Risk in our Pension?



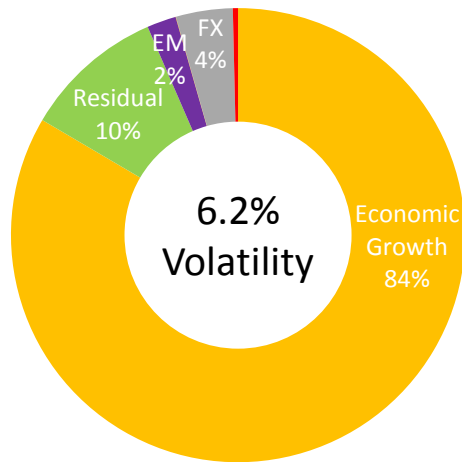
Pension Risk Measurement

Name	Beta vs Benchmark	Portfolio Risk (%)		Benchmark Risk (%)		Active Risk (%)	
	Current	Standalone Volatility	QoQ Change	Standalone Volatility	QoQ Change	Tracking Error	QoQ Change
UCRP Total		6.2	<i>(1.2)</i>	6.6	<i>(1.1)</i>	0.9	<i>0.0</i>
Public Equity	0.97	8.9	<i>(1.5)</i>	9.1	<i>(1.5)</i>	1.0	<i>(0.1)</i>
Fixed Income	0.90	2.4	<i>(0.3)</i>	2.6	<i>(0.4)</i>	0.3	<i>(0.1)</i>
Absolute Return	0.93	3.4	<i>0.1</i>	2.2	<i>(2.5)</i>	2.8	<i>(1.5)</i>
Private Equity ⁽¹⁾	1.00	18.5	<i>(2.2)</i>	18.5	<i>(2.2)</i>	0.0	<i>0.0</i>
Private Real Estate	1.27	10.3	<i>(1.6)</i>	7.5	<i>(1.2)</i>	4.3	<i>(0.3)</i>
Real Assets ⁽¹⁾	1.00	29.1	<i>(3.4)</i>	29.1	<i>(3.4)</i>	0.0	<i>0.0</i>
Cash	0.04	0.1	<i>(0.1)</i>	3.2	<i>(0.4)</i>	3.1	<i>(0.4)</i>

(1) Private Equity and Real Assets do not have standalone (line item) tracking error as per policy, but may contribute to contribute to total portfolio Tracking Error due to strategic asset allocation over/underweights



High Level Macroeconomic Risk Factors



Portfolio Standalone Risk Factor Decomposition

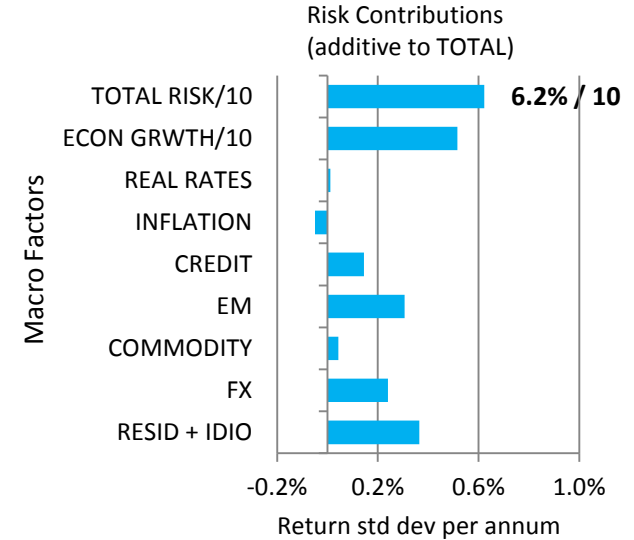
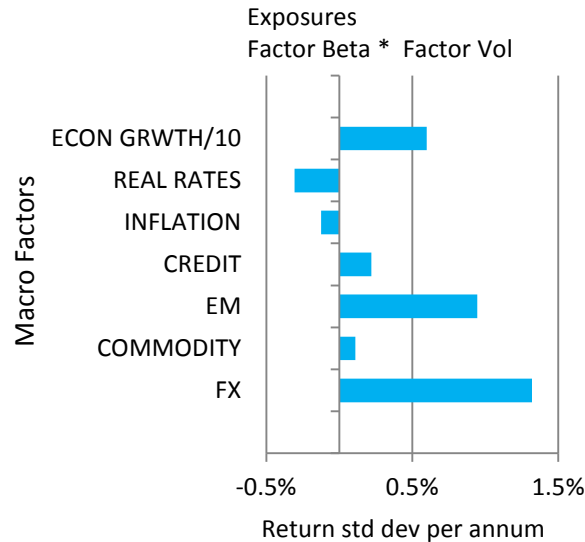
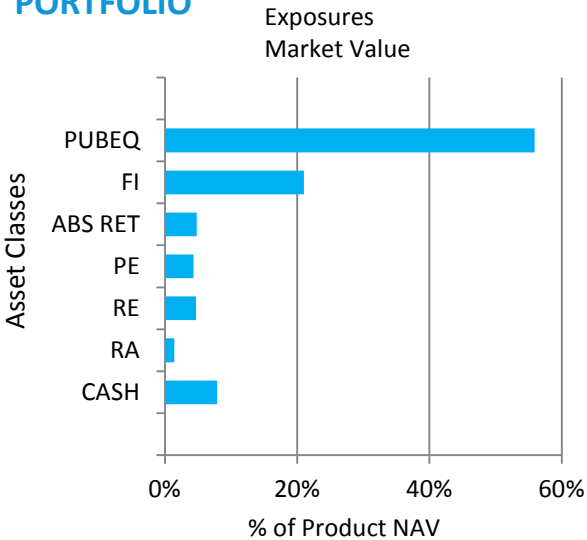
Factor Name	Factor Description
Economic Growth	Proxied by broad, developed market equity index returns
Real Rates	Inflation-linked bond returns
Inflation	Return of long nominal bonds, short inflation-linked bonds portfolio
Credit	Return of long corporate bonds, short nominal bonds portfolio
Commodity	Weighted GSCI Commodity index returns
Emerging Markets (EM)	Equally weighted basket of EM Assets

* "Residual Risk" is any risk which does not load on to the high level macro factors. This risk corresponds roughly to non-strategic, non-tactical level risk decisions, e.g. individual public equity manager sector tilts and stock selection decisions. This finer scale risk is captured separately, with more granular risk models.

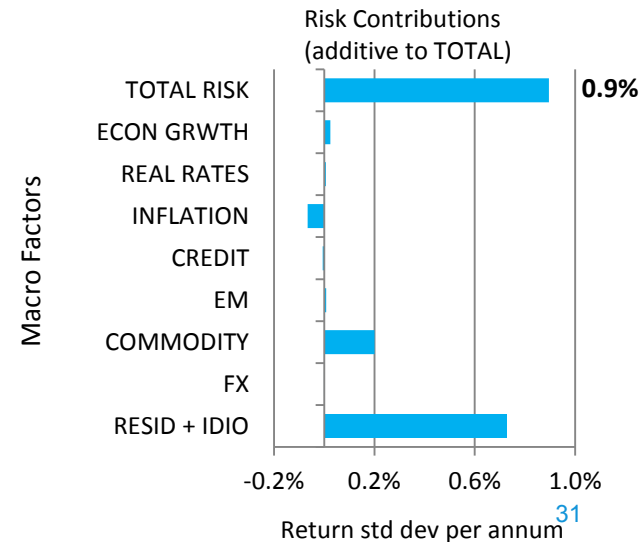
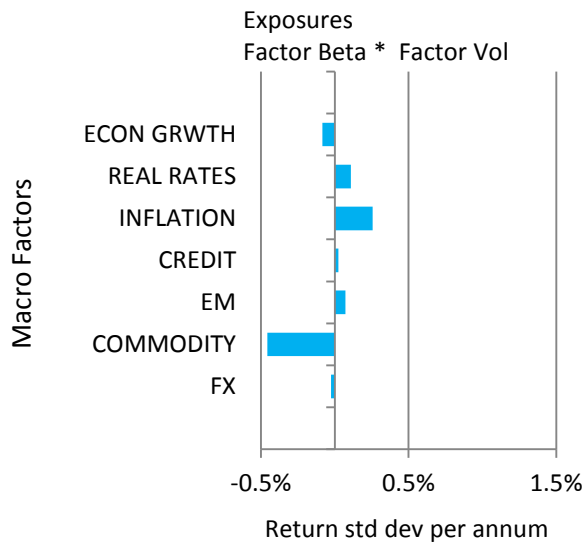
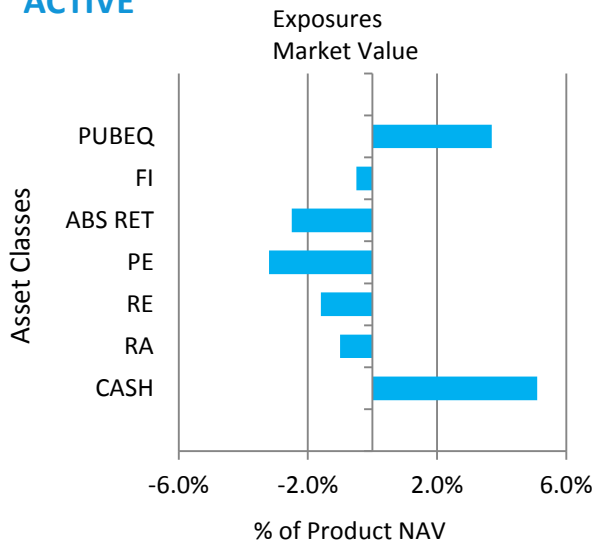


Asset Allocation vs Macroeconomic Risk Factors

PORTFOLIO



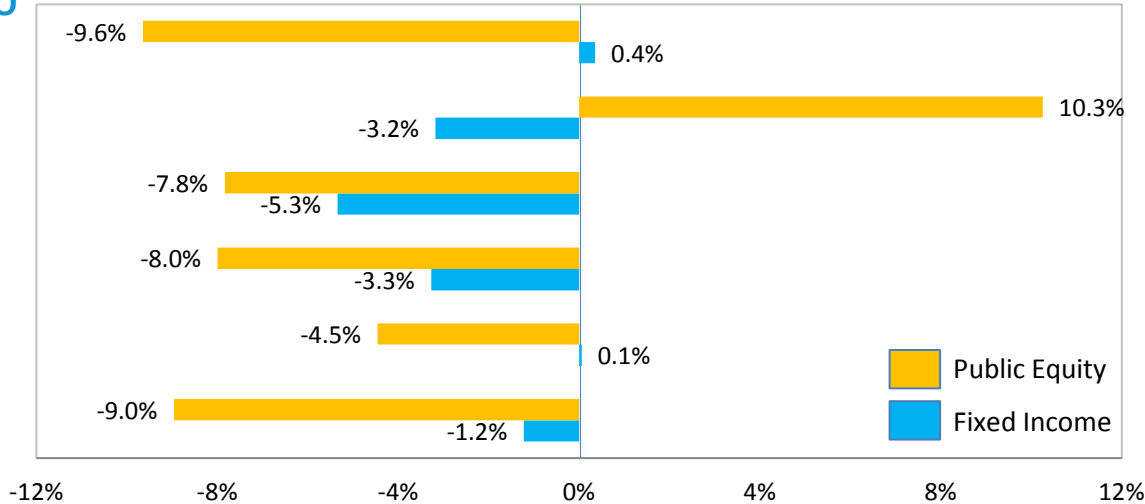
ACTIVE





Stress Tests and Scenario Analysis

PORTFOLIO



S&P -10%

US TSY +100BPS *

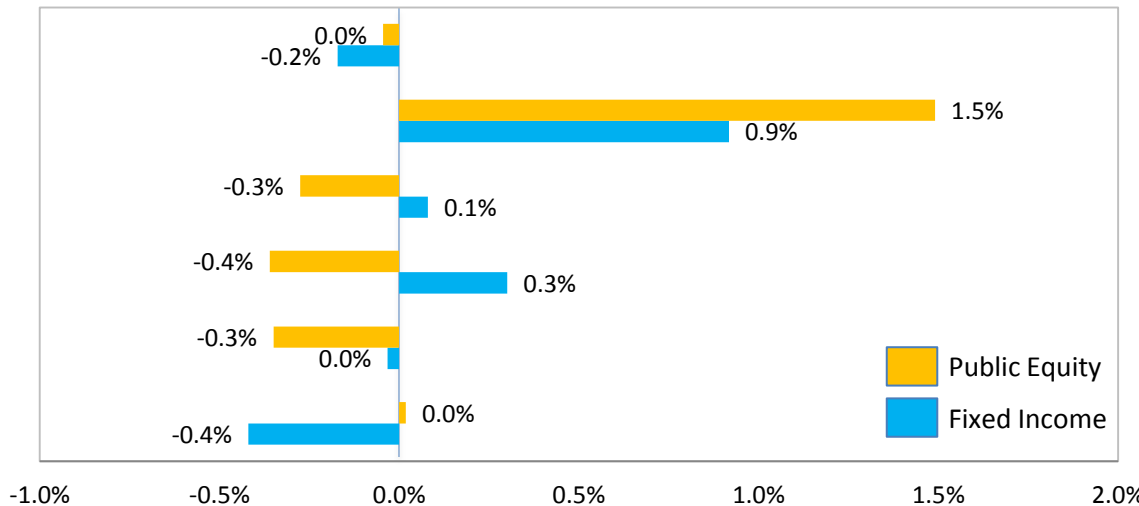
"Taper Tantrum" 2013

Volatility Regime Change (Hypothetical)

Value Reversal (Hypothetical)

China Credit Crunch (Hypothetical)

ACTIVE



S&P -10%

US TSY +100BPS *

"Taper Tantrum" 2013

Volatility Regime Change (Hypothetical)

Value Reversal (Hypothetical)

China Credit Crunch (Hypothetical)

As of September 30, 2017

• Public Equity P&L driven by more recent strong correlation between rates and : financials, IT, consumer discretionary and industrials. The rates/equity beta and correlation may not be robust across time .



Pension Policy Benchmark

Asset Class	Policy Benchmark Component	Target
Total Public Equity	MSCI All Country World Index Net – IMI – Tobacco Free	52.2%
Total Fixed Income		21.5%
U.S. Core Fixed Income	Barclays U.S. Aggregate Bond Index	13.4%
High Yield Debt	Merrill Lynch High Yield Cash Pay Index	2.9%
Emerging Market Debt	JP Morgan Emerging Markets Bond Index Global Diversified	2.4%
TIPS	Barclays U.S. TIPS	2.8%
Total Other Investments		23.5%
Private Equity	Russell 3000 + 1.5%	7.5%
Absolute Return	HFR1 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	7.3%
Real Estate	NCREIF Funds Index-Open End Diversified Core Equity Index	6.3%
Real Assets	Actual Real Asset Returns	2.4%
Cash		2.8%