CalPERS Trust Level Review

Period Ending December 31, 2016

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Investment Committee

February 2017

CalPERS | Investment Office

Review Outline

I. Economic and Market Overview

II. Investment Review
   i. Performance
   ii. Positioning and Risk

I. Economics and Market Overview

Trends since last review

Positive	Same Trend	Negative
- Stronger consumer Real consumer spending +2.8% during 2016, nearly a point above the expansion average.	**- US jobs growth** Averaged 180K during 2016, little different to 205K per month during the prior five years.	**- Productivity** Averages only 1% in this expansion so far, and 0% right now.
- Confidence surge Consumer, business and CEO confidence indicators all up sharply.	**- US household incomes and balance sheet** Income growth+4% pa, with household savings providing steady supply to asset markets.	**- No guarantees that potential GDP will rise** Even should GOP deliver on its platform, potential growth still captive to demographics and innovation
- Many indicators are still mid cycle Of the 17 indicators that we watch, many are still mid rather than late cycle.	**- Global growth in low 3s** US around 2%, Euro area 1-2%, China 6-7%	**- Tighter labor markets** Scarcity of potential workers vs openings + skills mismatch. Employed/pop arguably has upside.
- Labor force and household formation +800K households in '16 and more owners than renters in 2H. 25-34 labor force +3.2% in 2H16.	**- Global trade balances** US deficit in 2-3%/GDP range whilst Euro area, Japan and China all at 2-3% surpluses.	**- Inflation** US headline inflation should exceed its 2% target this year, making the Fed's job more difficult.
- Housing affordability and opportunity Still elevated relative to last cycle although extended in some Cali markets.		**- Weak net revenue for state and local** S&L government revenue base has slowed, potentially stifling the rebound in spending.
- Mining drag dissipates Mining investment (GDP impact -0.4% in '15, -0.2% in '16) may switch to small positive in '17.		**- Multiple global economic downside risks** Includes … Brexit, European banking, French and German elections, Chinese trilemma.
- Further policy responses abroad US, UK, BoJ, ECB, BoE, China and other PacRim all still in easing mode		**- Geopolitical challenges** Isolationism/ protectionism usually a negative sum game. US starts with 40%/GDP net foreign liabilities.

Many of the indicators below are still mid-cycle

Labor Market	Early	Late	%
Want A Job per Job Offer			94%
Unemployment Rate			84%
Jobs Growth 12mo			36%
Labor Market Conditions Index			49%
Emp/Pop 16-24			34%
Emp/Pop 25-54			48%
Emp/Pop 55+			97%
Activity	**Early**	**Late**	**%**
National Activity Index			45%
Private Savings Ratio			62%
Consumer confidence			70%
Real Personal Disp. Income			41%
10yr UST vs 3mo LIBOR			45%
Quarterly	**Early**	**Late**	**%**
Profit share			22%
Current Account/GDP			43%
Leverage YoY - HH			35%
Leverage YoY - NFC			61%
Housing affordability			43%

US policy engagement is key unknown says IMF

Interplay between Administration and Congressional Budget Committees

Potential passage of 'Audit the Fed' bills and appointees to two Fed vacancies

Do reforms promote potential growth or crowding out?

Is the Administration's proposed international engagement a negative sum game?

Scenarios for Market Returns

DOWNSIDE (30%)	CENTRAL (40%)	UPSIDE (30%)
"Negative Sum Game Policies"	"Challenging Returns"	"Headwinds Recede"
Isolationist and protectionist policies build and invite retaliation.	US GDP growth stays in the low 2s'	US regulatory and tax reforms encouraged by the single party sweep
Fed decisions becomes more politcized.	Labor force and household formation continue to feed activity.	Productivity improves from current 0% and cycle average 1%.
Higher rates/ strong $/ confusion in healthcare offset impact of US reforms.	Some purchasing power eroded by higher inflation.	Possible incentives to put corporate cash to work.
Hard Brexit, anti union results in European elections.	The Fed implements the rate hikes in its guidance including 3 in 2017	BRIC cycle turns positive after rebalancing phase.
China's 'impossible trinity' worries return as capital flight resumes.	Incremental gains in the labor market become gradually smaller.	
Uncertain reaction function in Washington to geopolitical events.	Japan, Euro Area, UK, China and other PacRim remain in easy mode.	

II. Investment Review

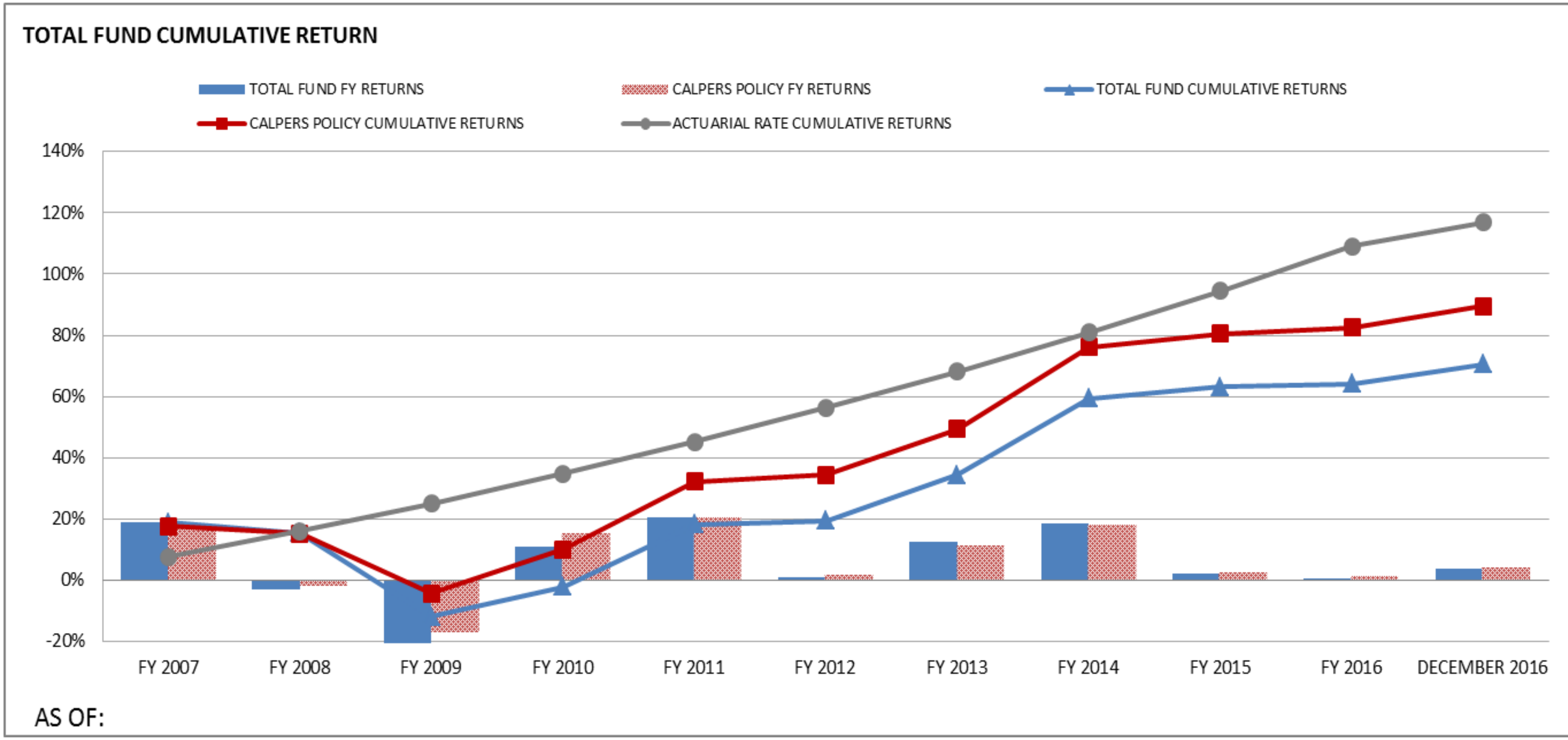
Executive Summary

- Public Employees' Retirement Fund (PERF) returned 7.7% for the calendar year ending December 31, 2016. 10-year PERF returns were 4.4%
- PERF calendar year excess returns were -82 bps, of which -86 bps came from Private Equity performance relative to its benchmark
    - Private Equity returns were 6.6% for the period compared to 16.6% for its benchmark, a lagged public market index that included a 7.8% one month return from the October 2015 equity market rally
- Affiliate Plans experienced positive returns over one year and ten year periods, consistent with their respective asset allocations. The plans have tracked their benchmarks closely
- PERF expected volatility of 9.3% is roughly 1% lower than 6 months ago, reflecting the impact of changes in market conditions and the October interim allocation change

Performance Summary

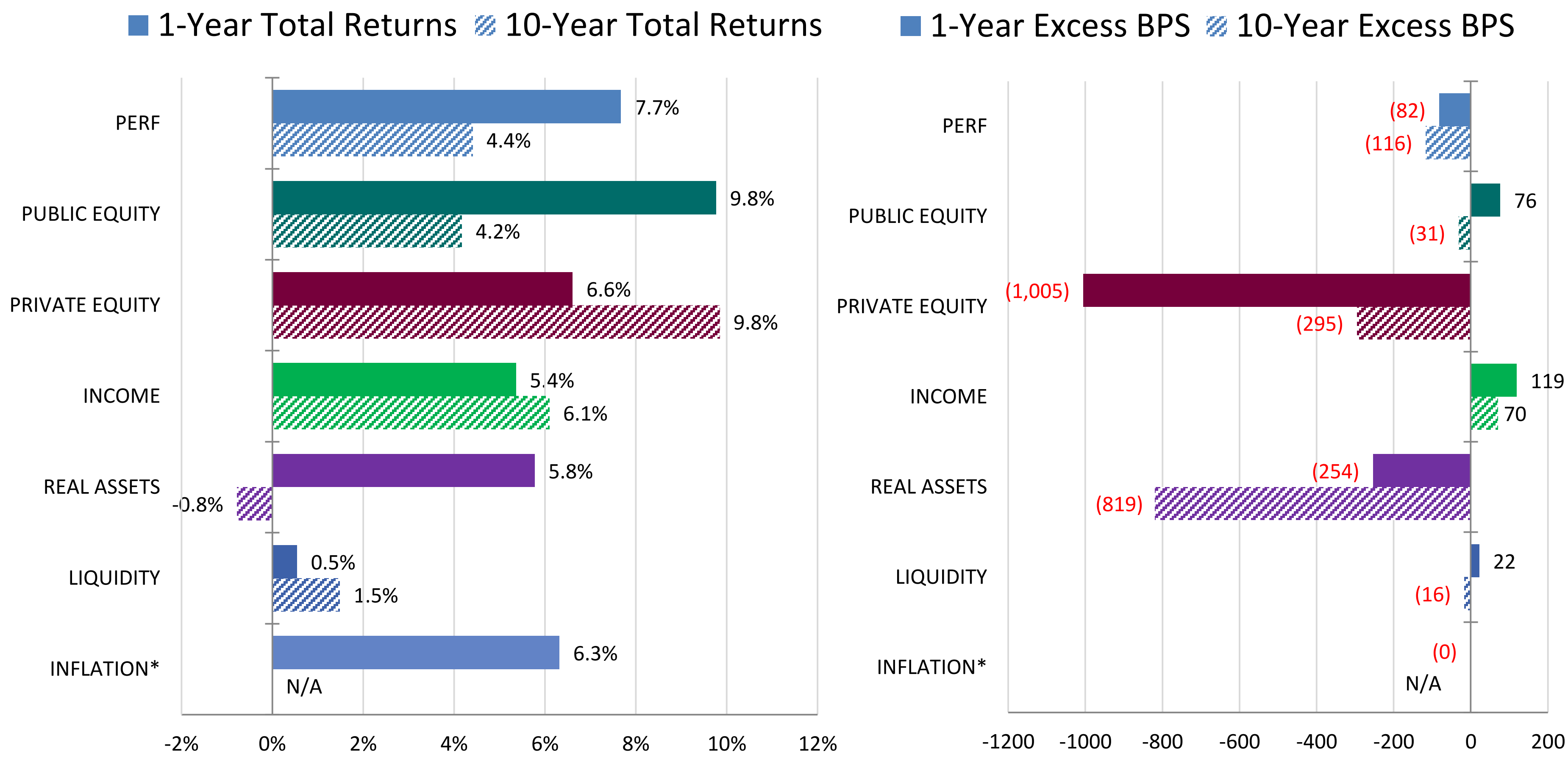
As of December 31, 2016		1 YR		3 YR		5 YR		10 YR	
Trust Assets Managed	Ending Market Value (MM)	Net Return	Excess BPS	Net Return	Excess BPS	Net Return	Excess BPS	Net Return	Excess BPS
PUBLIC EMPLOYEES' RETIREMENT FUND	302,924	7.7%	(82)	4.6%	(19)	8.6%	(7)	4.4%	(116)
JUDGES' RETIREMENT FUND	41	0.6%	22	0.3%	12	0.2%	5	1.0%	15
JUDGES' RETIREMENT SYSTEM II FUND	1,218	7.6%	44	3.6%	15	7.9%	28	4.8%	(1)
LEGISLATORS' RETIREMENT SYSTEM FUND	115	6.5%	44	3.6%	16	5.6%	42	5.2%	25
CERBT STRATEGY 1	4,866	7.6%	66	3.5%	38	7.8%	35	-	-
CERBT STRATEGY 2	743	7.0%	69	3.4%	29	6.6%	35	-	-
CERBT STRATEGY 3	226	6.2%	59	3.6%	30	5.3%	34	-	-
CALPERS HEALTH CARE BOND FUND	435	2.6%	(2)	3.2%	21	2.9%	67	4.6%	21
LONG-TERM CARE FUND	4,226	5.2%	(21)	3.2%	12	4.4%	28	3.7%	8

PERF 10 Year Cumulative Returns



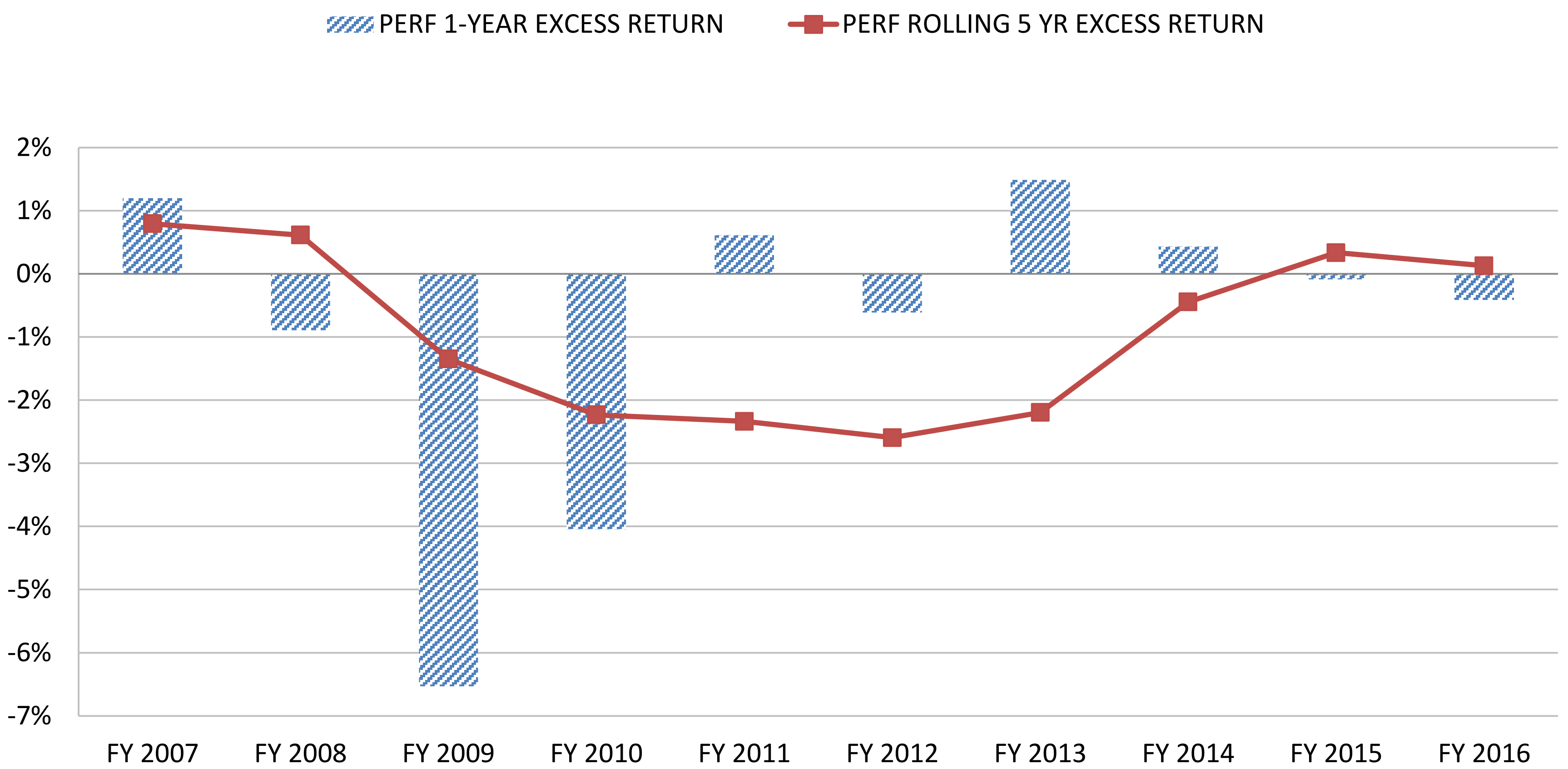
Note: Actuarial Rate of Return FY 2007-12 was 7.75%. FY 2013-16 rate is 7.5%. :

PERF Short-Term vs. Long-Term Performance



*Inflation has an inception date of October 2007, therefore 10-year returns and excess BPS are unavailable

PERF Rolling 5-Year Excess Returns



Excess Returns Attribution

As of : December 31, 2016 (Annualized)

	Average Weight in Plan	Program Excess Return (bps)			Contribution to Plan Excess (bps) [1]		
	5 Year	1 Year	3 Year	5 Year	1 Year	3 Year	5 Year
Total Excess Return (bps)					**(82)**	**(19)**	**(7)**
Program Contributions [2]					**(54)**	**8**	**(23)**
PUBLIC EQUITY	53%	76	17	30	35	8	14
PRIVATE EQUITY	11%	(1,005)	(140)	(489)	(86)	(15)	(60)
INCOME	18%	119	52	96	23	10	16
REAL ESTATE	9%	(230)	33	88	(21)	1	6
FORESTLAND	1%	(1,267)	(967)	(866)	(10)	(7)	(7)
INFRASTRUCTURE	1%	281	894	667	3	5	4
INFLATION	4%	(0)	83	26	(0)	4	2
OTHER					1	2	2
Allocation Management [2]					**(14)**	**(7)**	**2**
Public Proxy Performance [3]					**(5)**	**(18)**	**(12)**
Other/Residual [4]					**(9)**	**(2)**	**26**

[1] Contribution figures are calculated on monthly basis and aggregated over the respective period.

[2] Contribution from MAC and ARS Programs are inlcuded in Allocation Impact.

[3] Impact of not obtaining full desired interim policy exposure to private asset classes and proxying these with public assets. Includes the impact of lagged reporting of private asset benchmarks relative to current month reporting of public proxies.

[4] Includes impact of 2009-2013 benchmark currency hedge calculation and compounding residual.

- + Public programs contributed positive excess returns
- +/- Roughly neutral impact from allocation management & rebalancing
- - Private Equity was dominating negative driver of excess returns
- - Proxying to cover underweights in private assets also impacted slightly
- Over 5-year period Other/Residual added +26bps

PERF Risk Highlights

One Year Volatility Estimates

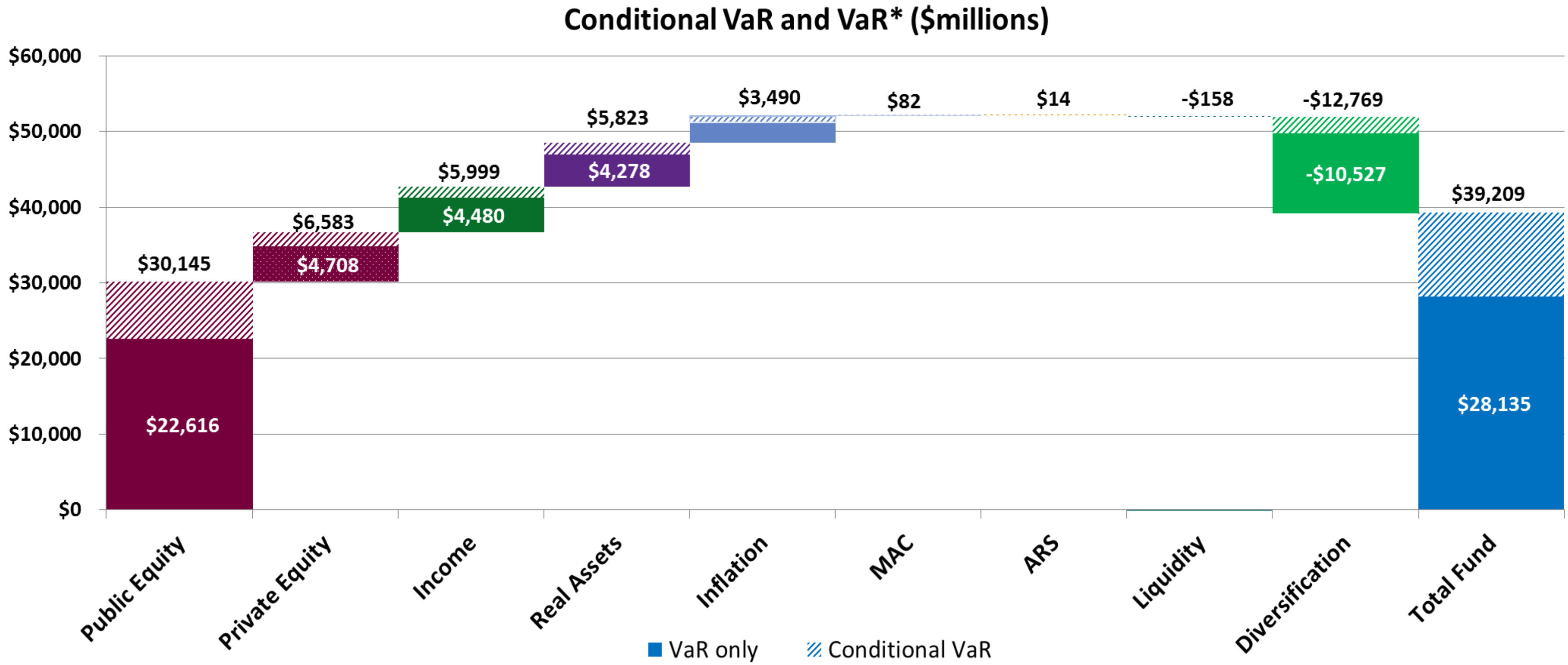
- Current forecast volatility of 9.3% vs. 10.3% 6 months prior
  - Lower volatility reflects changes in recent market conditions and impact of October allocation change
  - 26% chance of negative returns in a given year
  - 5% chance of losing at least $28b in a given year (Value at Risk)
- Growth risk, especially equities, is the primary driver of total volatility
- Current forecast active tracking error of 0.6%, within guidelines of 1.5%

Fundamental

- Well diversified across individual issuers/companies
- Geographically tilted to US
- Liquidity profile & coverage currently adequate
- Counterparty risk remains modest

Absolute Value at Risk Estimate (1-year)

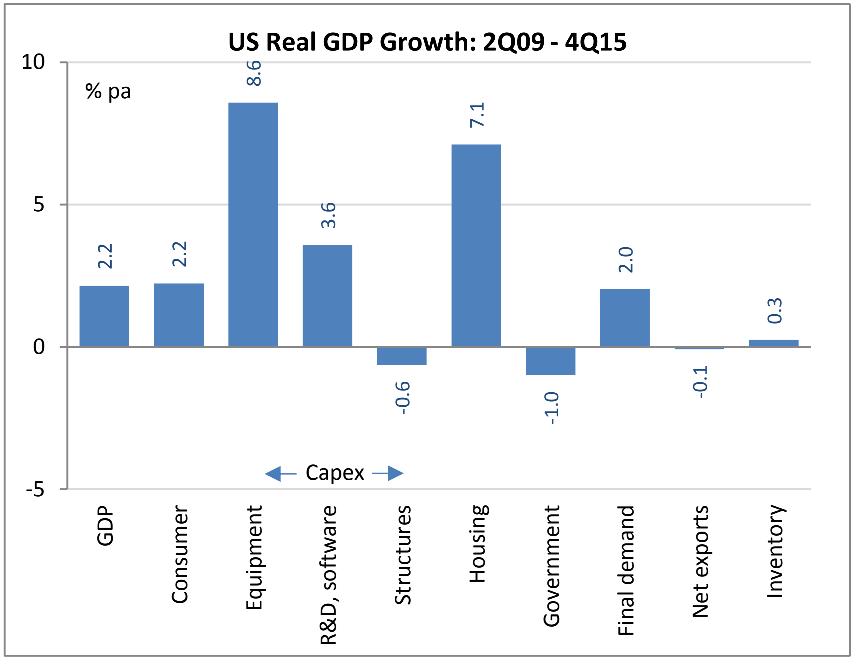
As of November 30, 2016

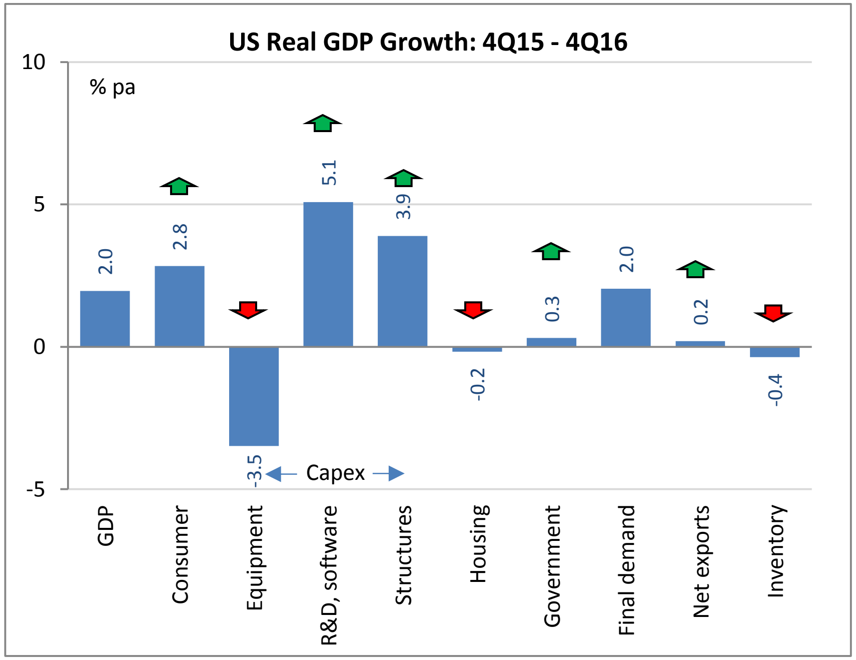


*1-year, 95% confidence Value at Risk. Conditional Value at Risk measures the mean of the tail distribution beyond the 95% confidence level. Both are adjusted to account for expected returns of each asset class and the PERF using Wilshire June 2016 expected return assumptions.

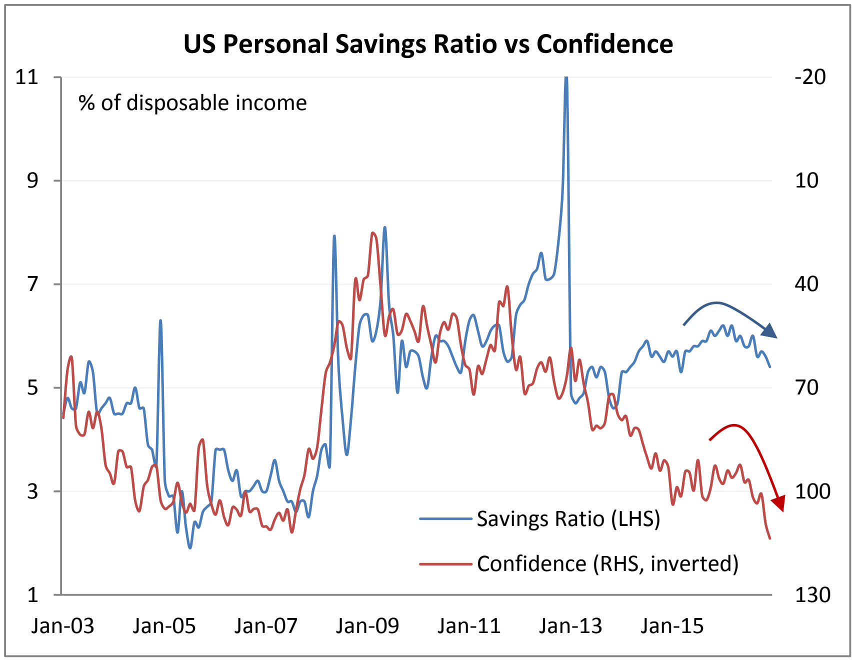
Appendix

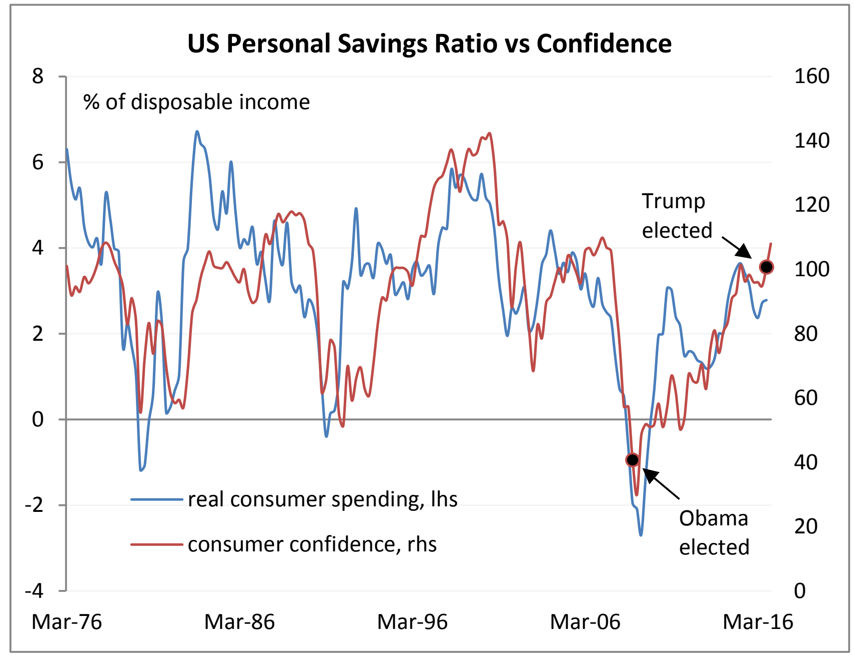
Different composition for GDP during 2016



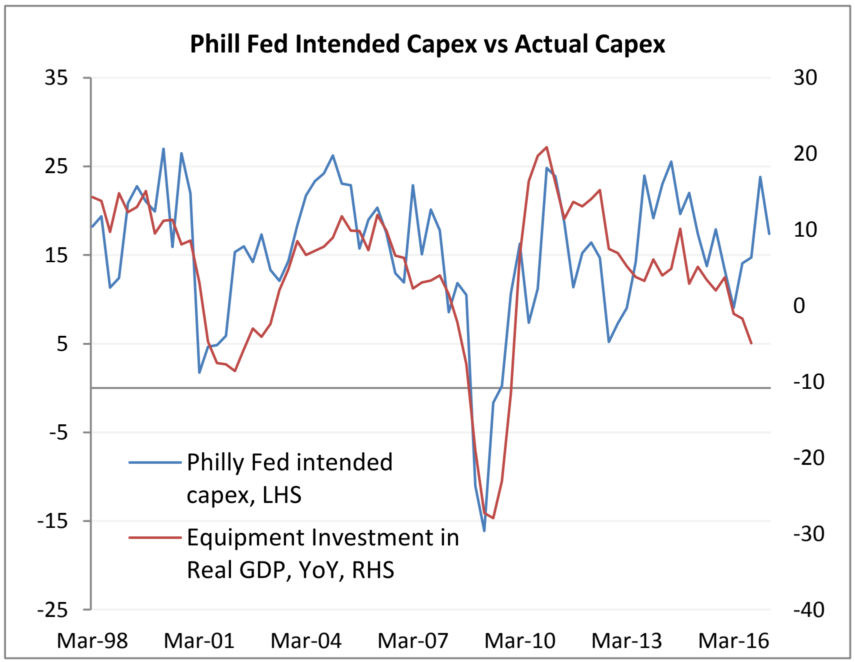


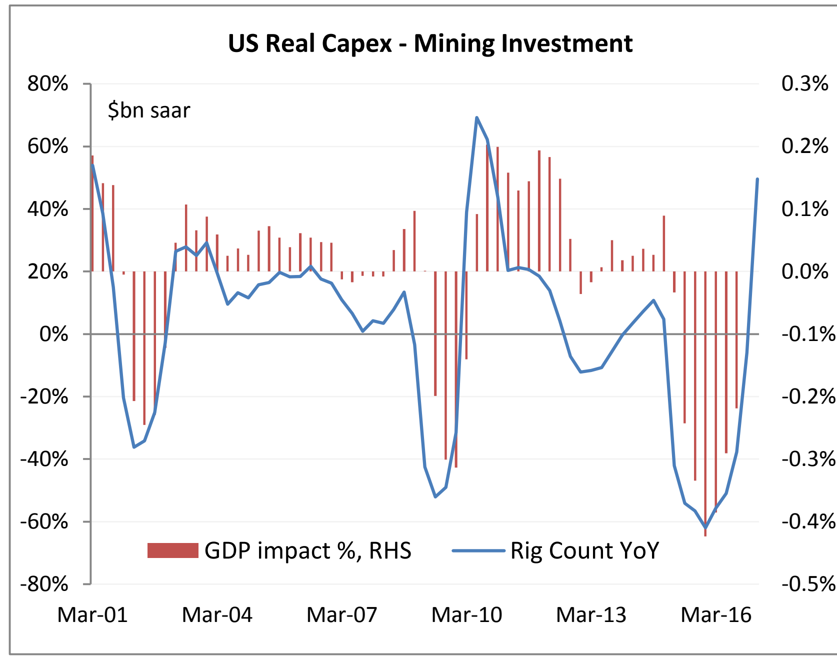
Rising confidence has encouraged spending



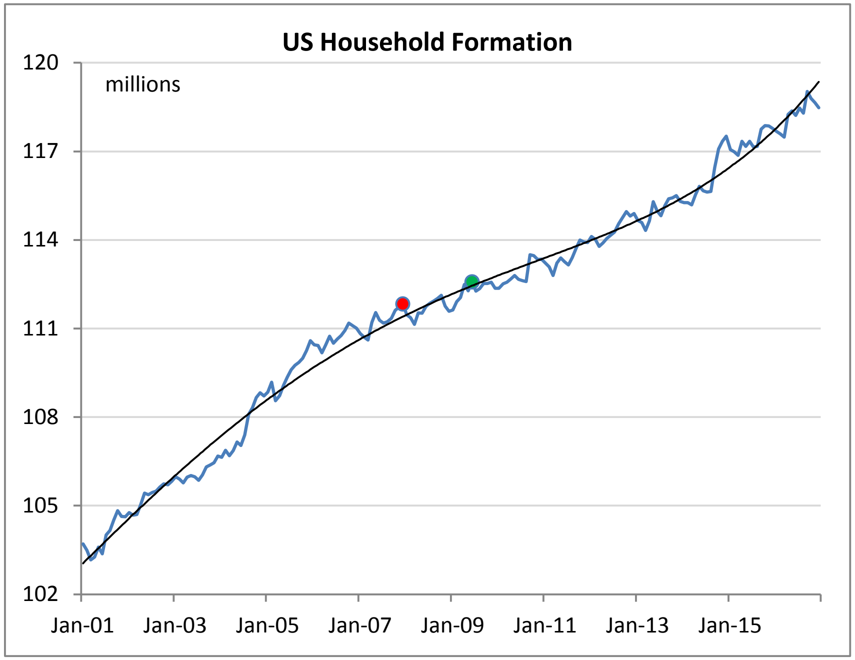


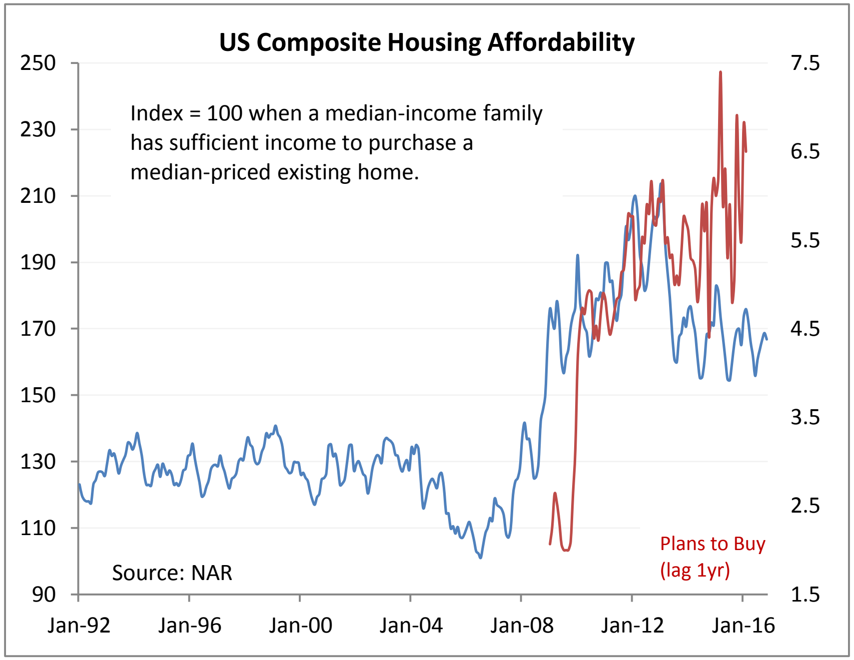
Intended capex, and mining, have turned up



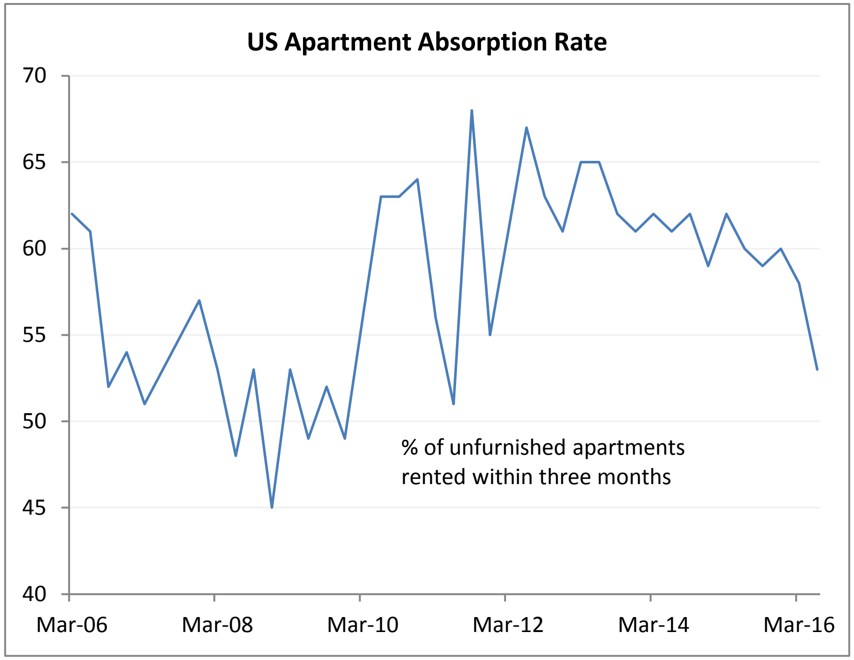


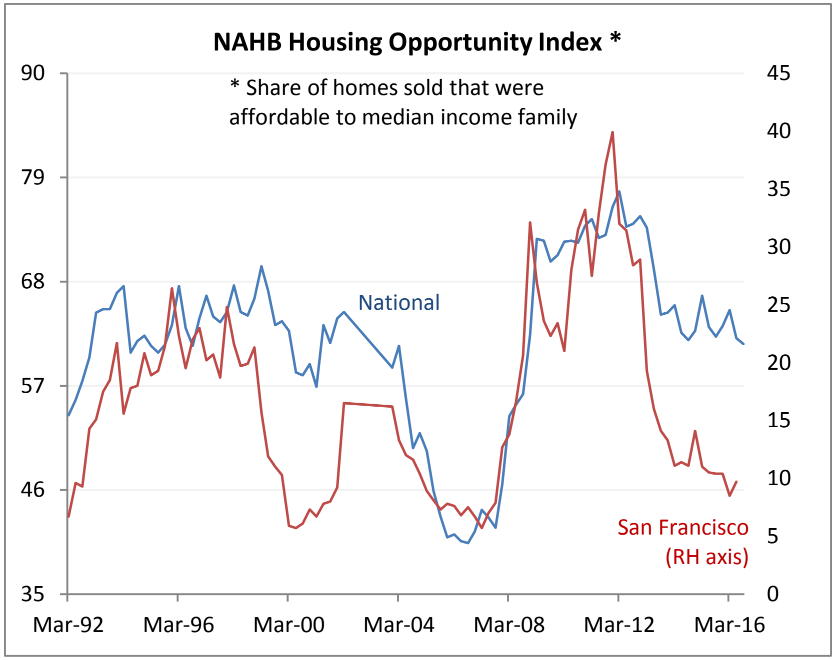
Housing cycle is still positive



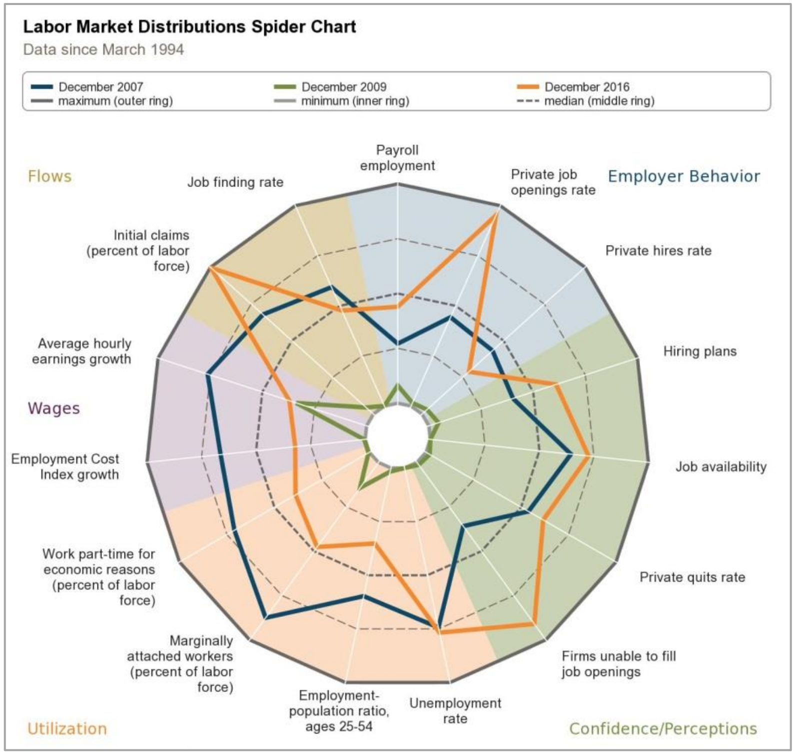


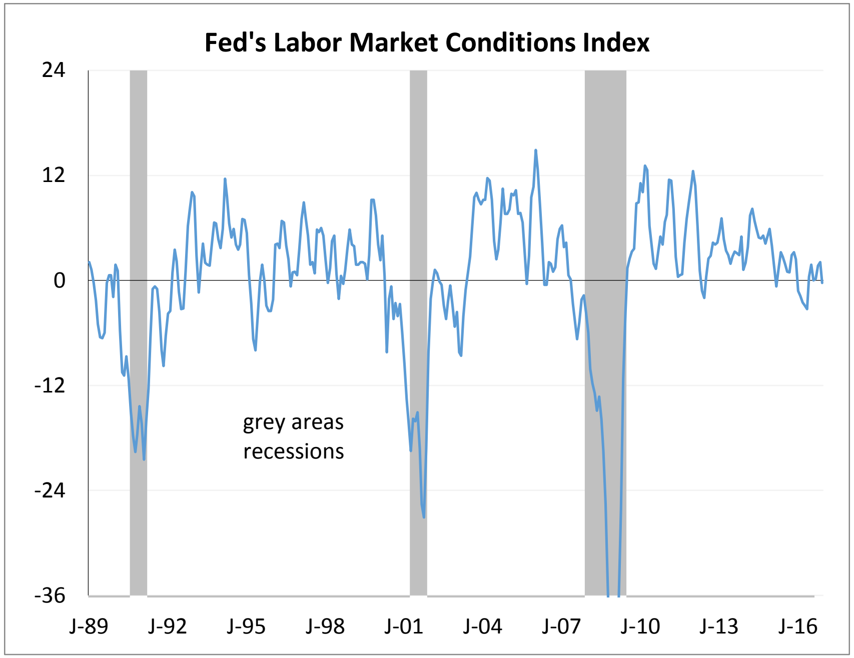
Caveat: multis and west coast getting ‘rich’



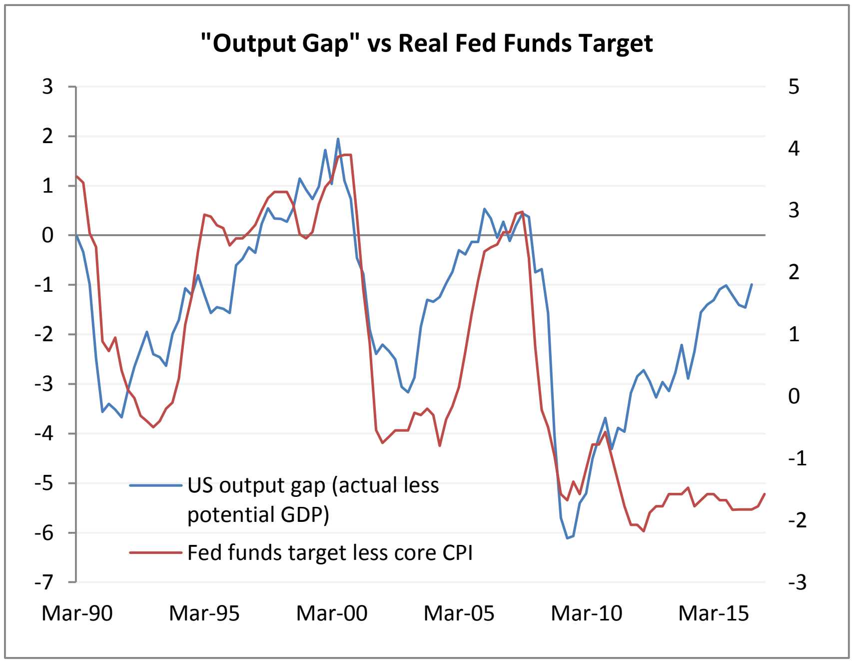


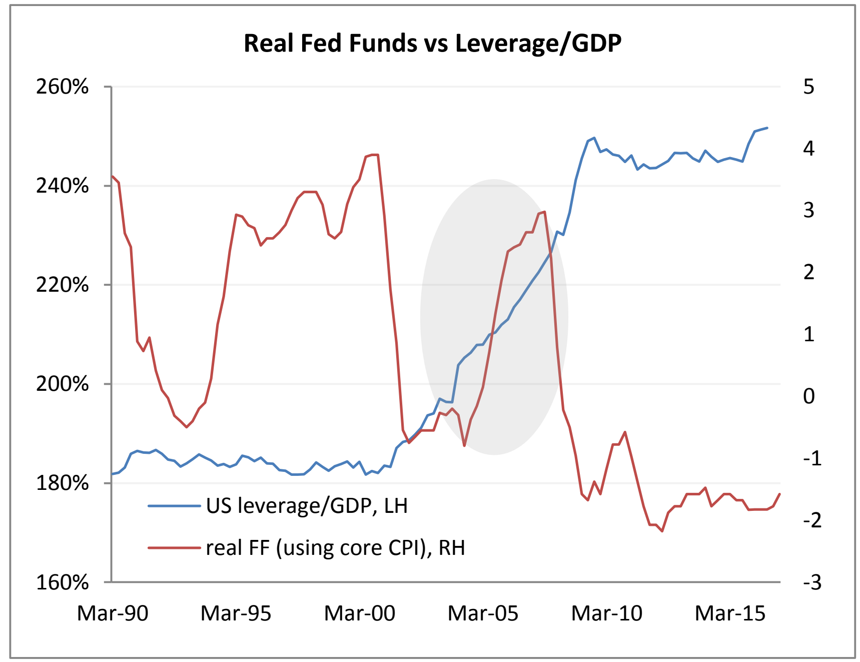
Janet Yellen: Labor utilization is close to normal



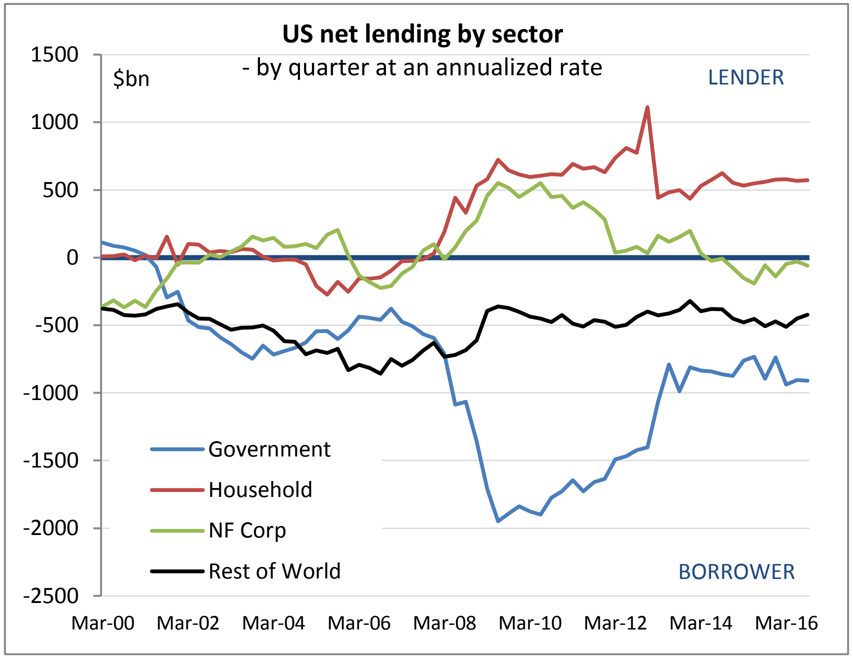


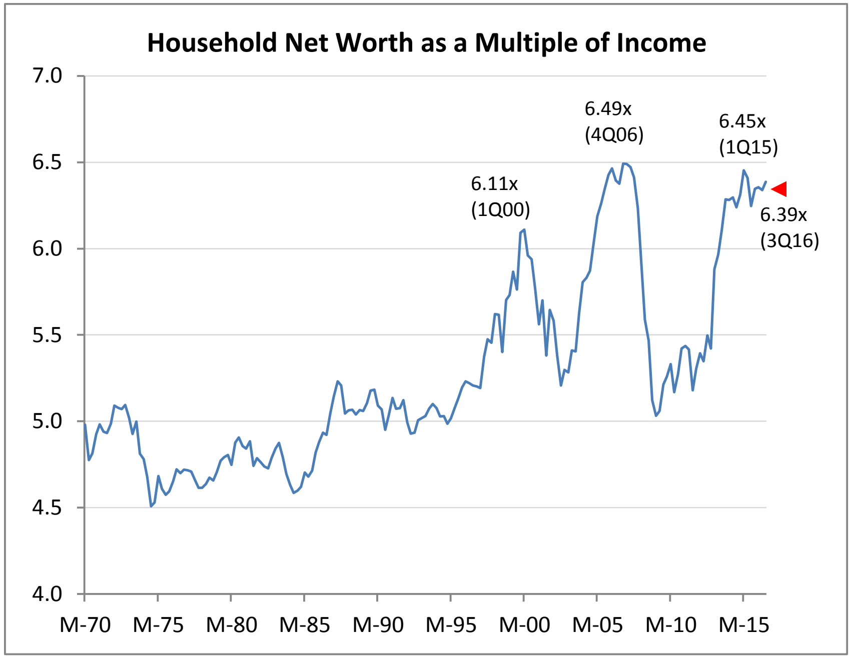
Fed is unusually 'easy' but leverage is stable



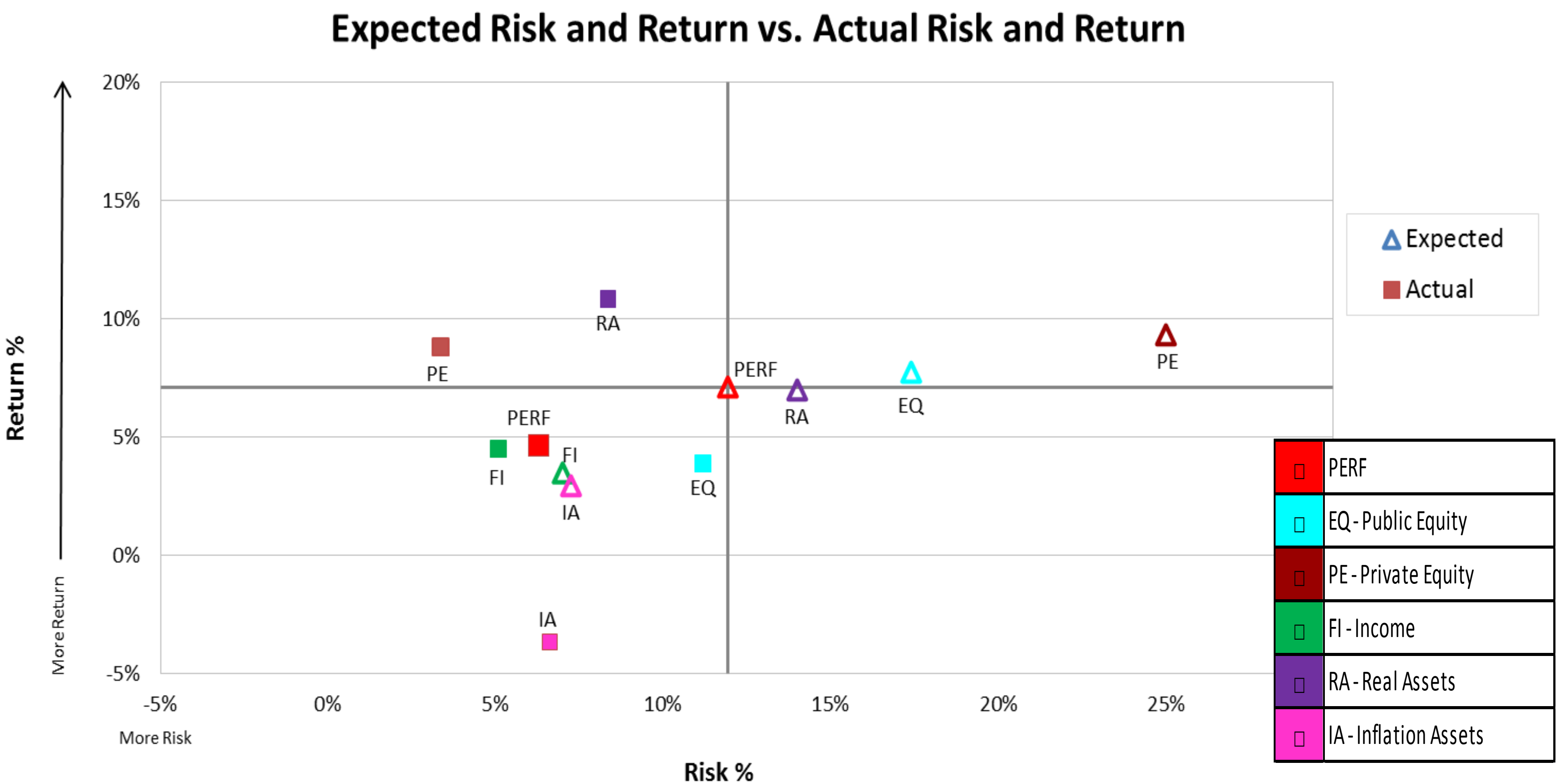


Households still a supplier to asset markets





PERF Performance vs. ALM Assumptions



*Expected risk and return is based on the 2013 ALM Workshop and uses the short-term (1-10year) expected return from capital market assumptions; actual risk and return figures are 3 year figures

PERF Contribution to Return

Asset Class	Average Weight (%)	1-Year Return (%)	Year Ended Contribution to Return (%)
GROWTH	**59.7**	**9.3**	**5.7**
PUBLIC EQUITY	*50.7*	*9.8*	*5.1*
PRIVATE EQUITY	*8.9*	*6.6*	*0.6*
INCOME	**19.6**	**5.4**	**1.0**
REAL ASSETS	**10.7**	**5.8**	**0.6**
REAL ESTATE	*9.1*	*6.8*	*0.6*
FORESTLAND	*0.7*	*-9.4*	*-0.1*
INFRASTRUCTURE	*0.9*	*8.3*	*0.1*
LIQUIDITY	**2.8**	**0.5**	**0.0**
INFLATION	**6.4**	**6.3**	**0.4**
TRUST LEVEL	**0.8**	**-0.0**	**0.0**
TOTAL FUND	**100**	**7.7**	**7.7**

All the major asset classes had solid returns for the year

Public equity was largest contributor as a function of its weight in the plan + very strong returns (9.8%)

PERF Volatility Profile

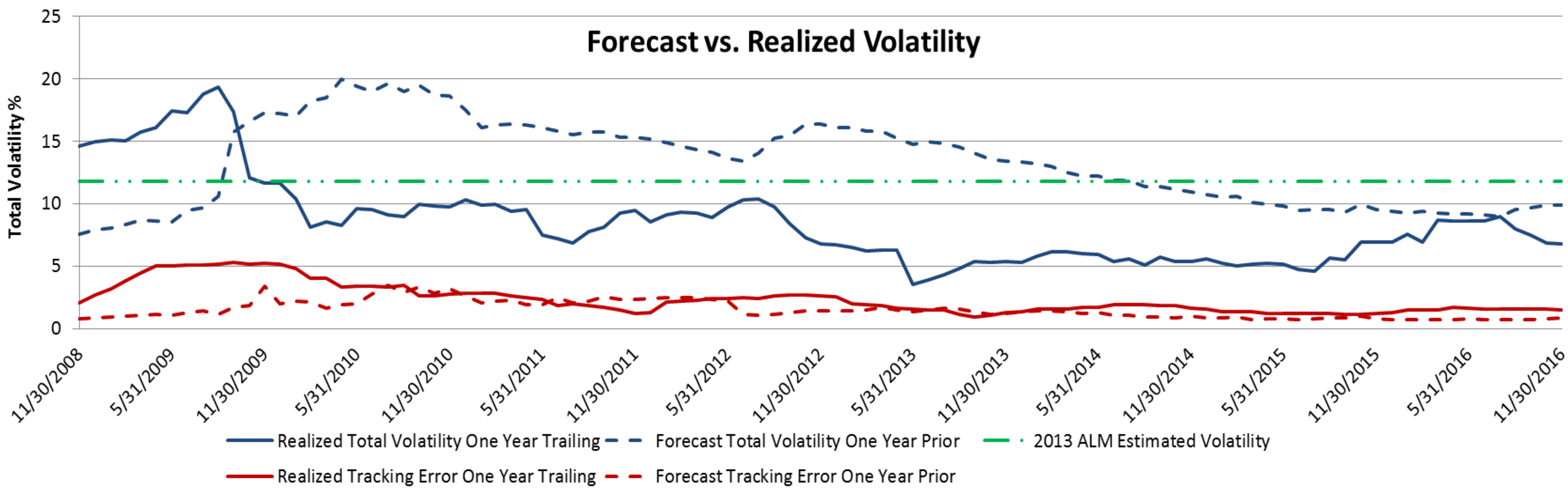
As of November 30, 2016

Total Volatility
9.3%

Benchmark Volatility
8.9%

Tracking Error
0.6%

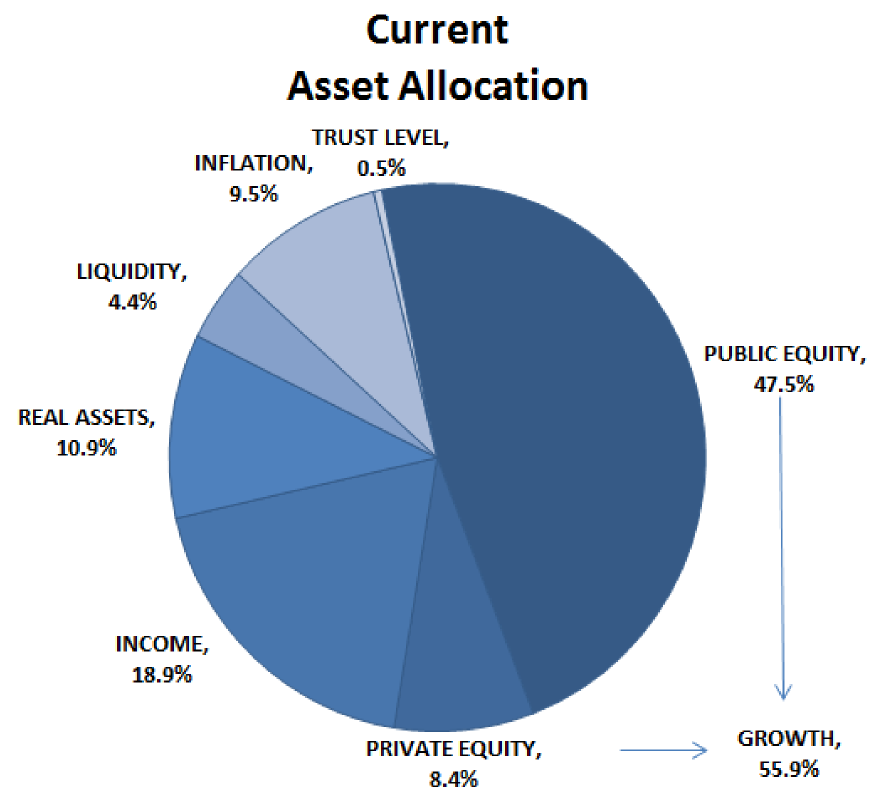
- Forecast Volatility of 9.3%, implies 26% chance of negative plan returns in a given year*
- Forecast Tracking Error of 0.6% is within guidelines of less than 1.5%
- Growth contributes to 83% of the Forecast Volatility



* Probability based on a 9.3% forecast volatility from BarraOne around a 5.8% expected geometric annual return for the interim Policy portfolio using 2016 Wilshire assumptions

PERF Asset Allocation

ASSET CLASS AS OF: December 31, 2016	Current Allocation(%)	Interim Strategic Target (%)	Variance(%)
GROWTH	55.9%	54%	1.9%
PUBLIC EQUITY	47.5%	*46%*	*1.5%*
PRIVATE EQUITY	8.4%	*8%*	*0.4%*
INCOME	18.9%	20%	(1.1%)
REAL ASSETS	10.9%	13%	(2.1%)
REAL ESTATE	9.2%	*11%*	*(1.8%)*
FORESTLAND	0.7%	*1%*	*(0.3%)*
INFRASTRUCTURE	1.0%	*1%*	*0.0%*
LIQUIDITY	4.4%	4%	0.4%
INFLATION	9.5%	9%	0.5%
TRUST LEVEL	0.5%	-	0.5%
ARS	0.1%	-	*0.1%*
MULTI-ASSET CLASS (MAC)	0.4%	-	*0.4%*
OVERLAY+TRANS+PLAN	0.0%	-	*0.0%*
TOTAL FUND	100.0%	100.0%	0.0%



*Interim strategic targets were adopted by the Board and effective October 1, 2016.

Changes to Interim Asset Allocation – September 2016

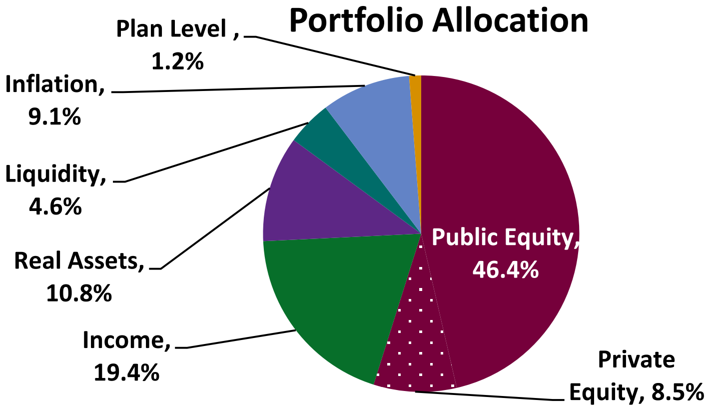
Asset Class	Previous	Current	Change	2014 ALM Strategic Policy
Total Growth	61%	54%	(7%)	59%
Global Equity	51%	46%	(5%)	47%
Private Equity	10%	8%	(2%)	12%
Income	20%	20%	0%	12%
Real Assets	12%	13%	1%	14%
Inflation	6%	9%	3%	6%
Liquidity	1%	4%	3%	2%

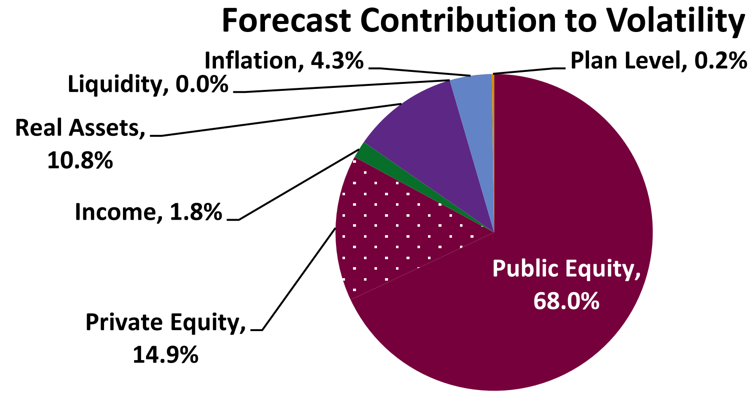
Considerations

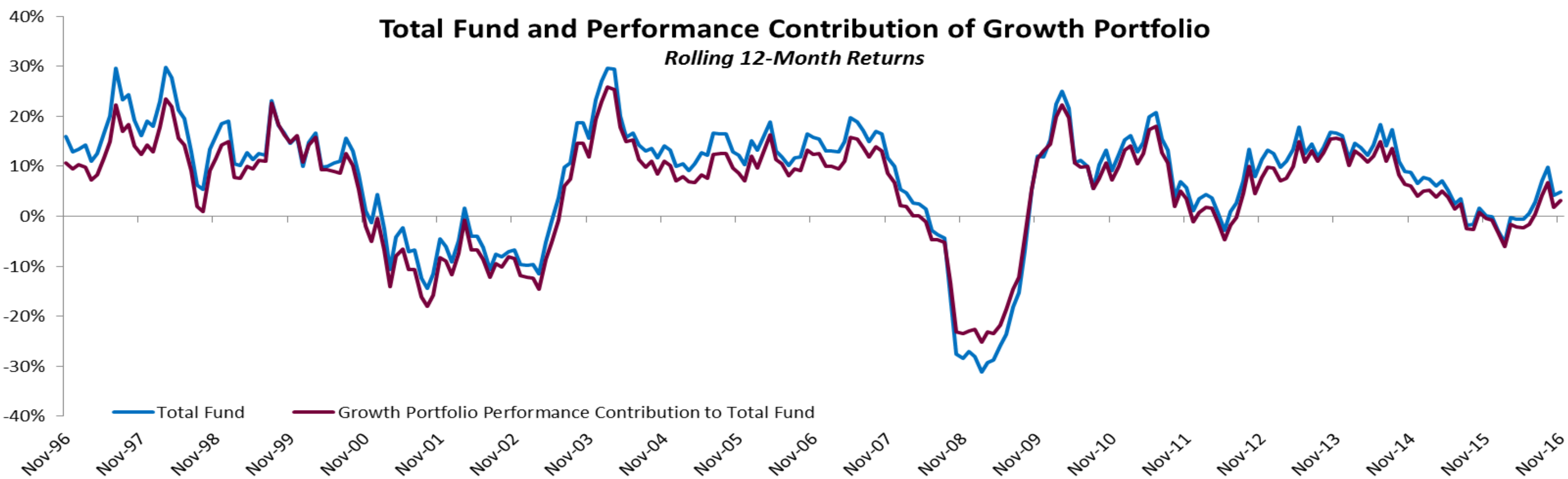
- Low realized FY 15 – 16 return
- Portfolio Priorities - protect Funded Ratio
- Market Valuation levels – subsequent return probabilities
- Relevant period is thru the next ALM
- Anticipated impacts reflective of Wilshire's 10-year expected returns
  - Annual expected return – down 31 basis points
  - Annual expected risk (Volatility) – down 115 basis points

Growth Assets Dominate Volatility

As of November 30, 2016







Recent Equity Market Volatility

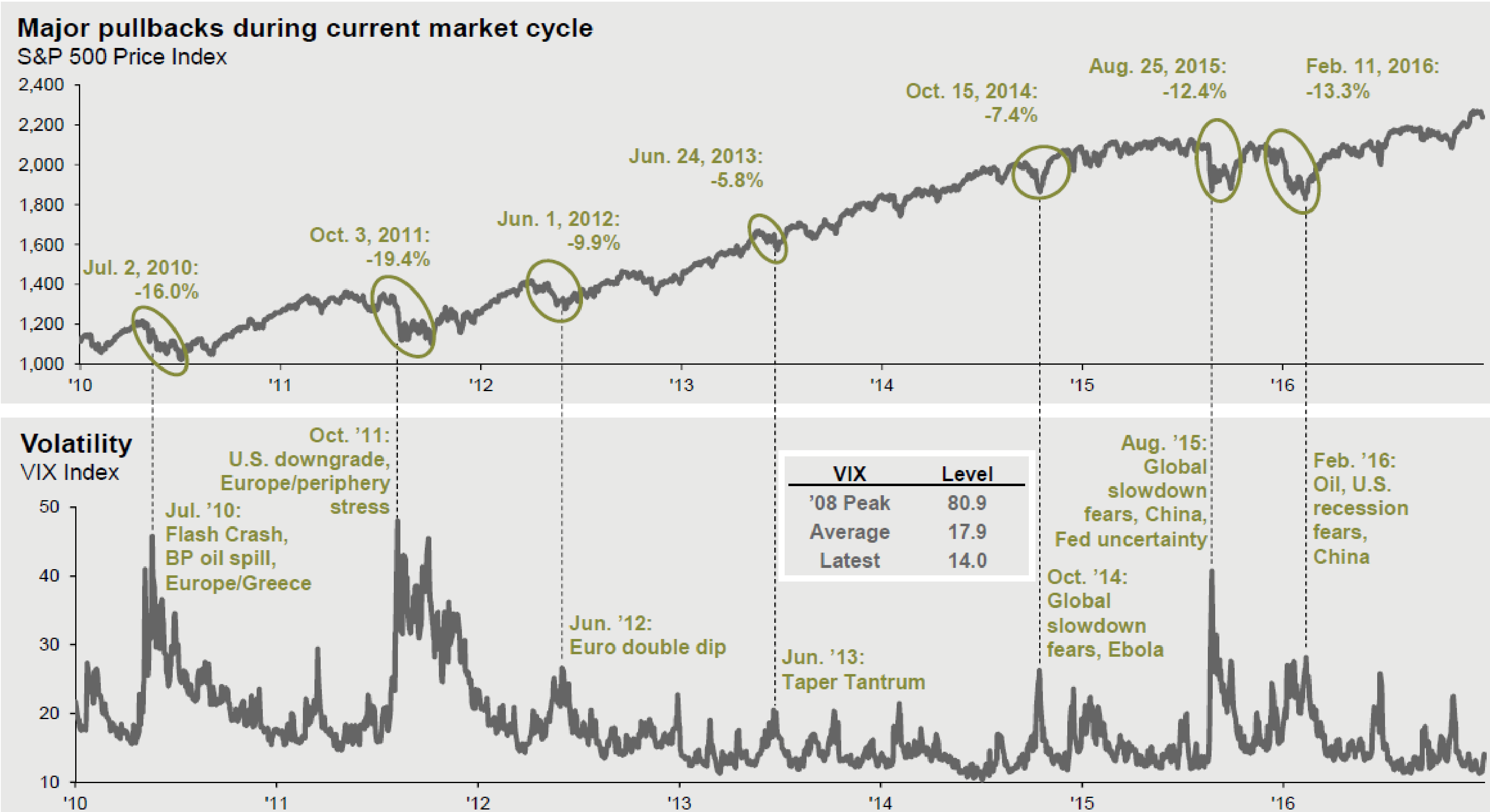
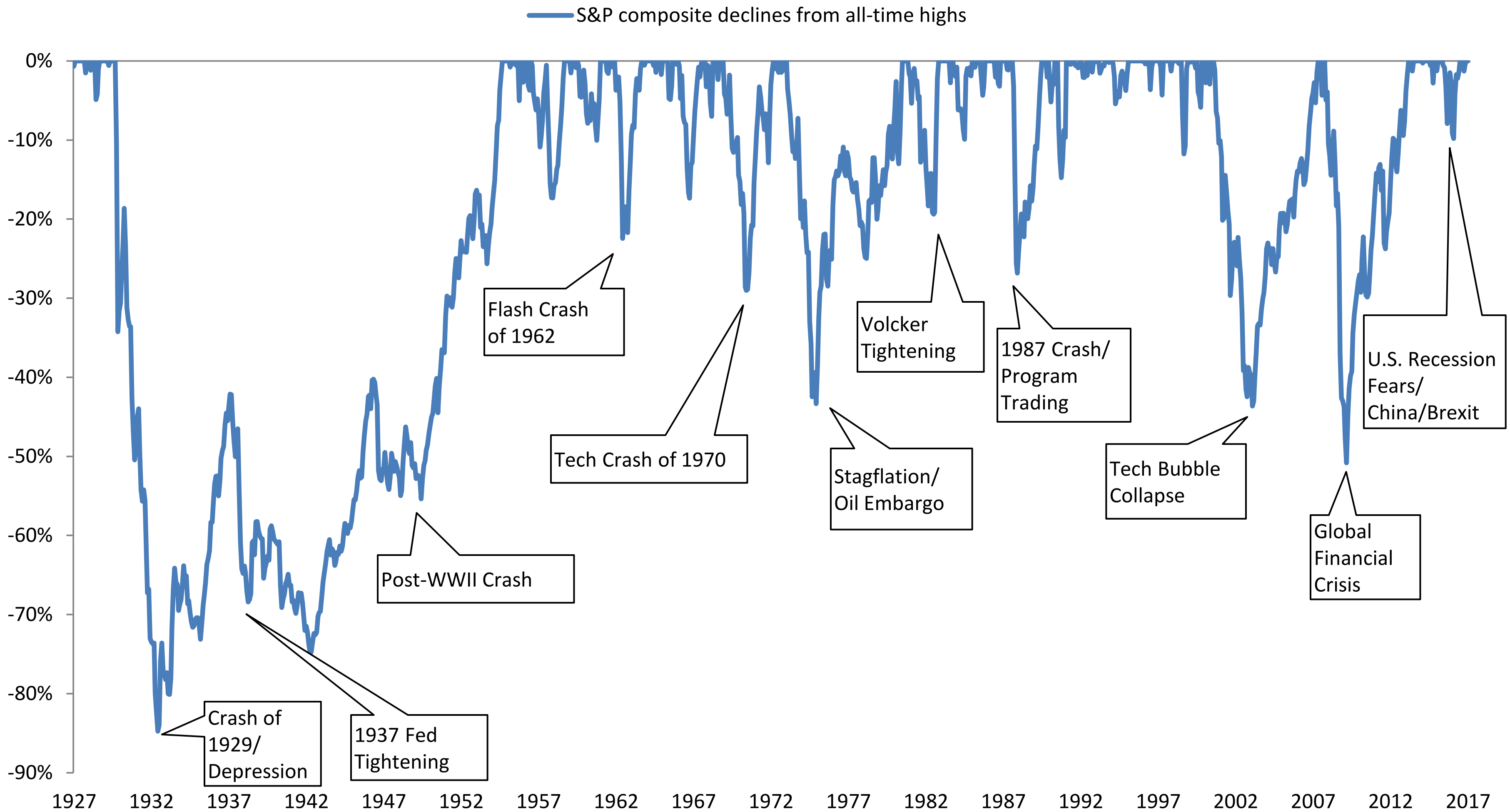


Chart Source: J.P. Morgan Asset Management's *Guide to the Markets,* December 31, 2016

Historical Equity Market Drawdowns



Source: Robert Shiller, Bloomberg, J.P. Morgan Asset Management, BarraOne