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2016 Asset Allocation

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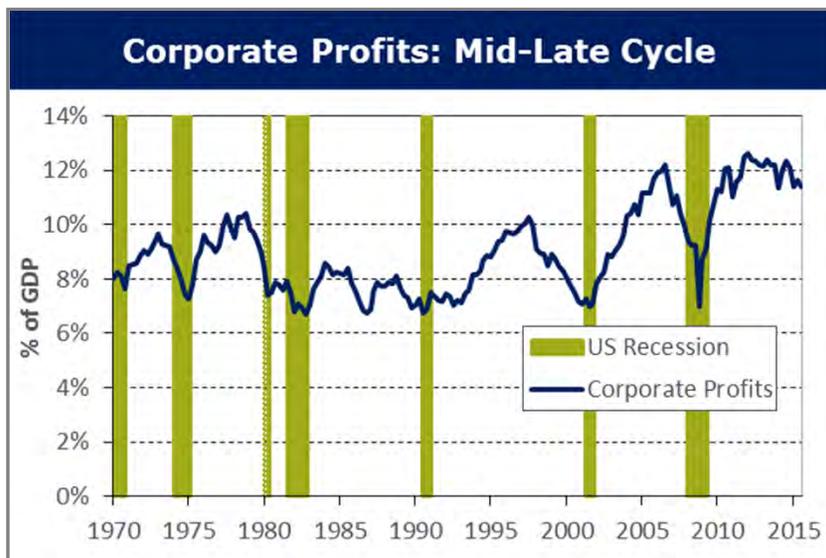
Context for Capital Market Assumptions



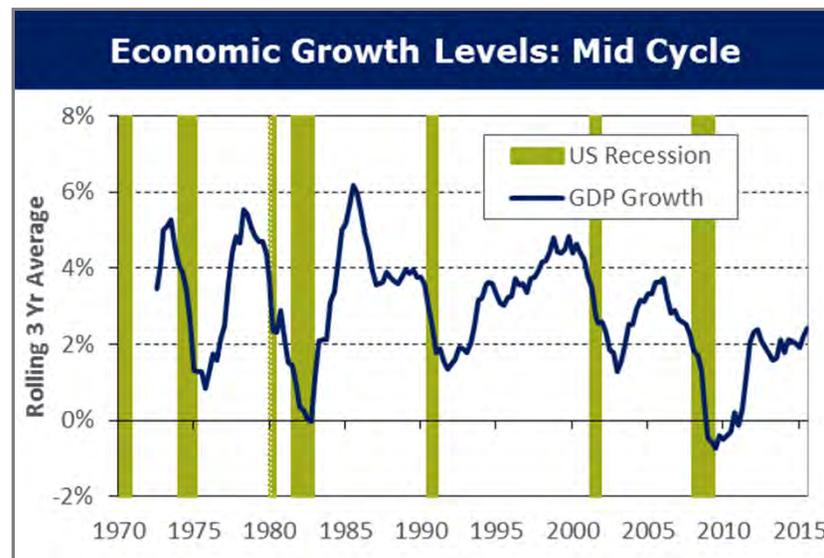
Key Themes and Background for 2016

- **NEPC's 2016 Assumptions and Actions cover both an intermediate (5-7 years) and long term (30 years) forecast horizon**
 - Similar to prior years, November 30 market data is used for all assumption inputs
- **US economic cycle and US central bank policy are at the forefront of major cyclical and secular forces informing our Assumptions and Actions**
 - These factors interact to create a supportive environment for risk assets in the near term but ultimately push long term capital market forecasts lower relative to history
- **The US economy is nearly 7 years removed from the previous recession but the health of US consumers can extend the expansion**
 - Prolonged US economic cycle has the potential to push the US dollar higher straining commodity markets and international borrowers with dollar based debt
- **Influence of central bank policies in the developed world remain broadly supportive for risk assets but come with long term effects**
 - US policy is diverging from Europe and Japan but slow expected pace of hikes provides a positive backdrop for US equities and credit in the near term
- **Emerging Market growth compressed yet still stronger than developed; fears of further adjustments in China remain a near-term concern**
 - Large currency adjustments across most emerging countries healthy for future prospects
 - Chinese Yuan (RMB) devaluation has been incremental relative to other EM FX adjustments

Tale of Two Economies: Corporate Sector and the US Consumer



Source: St. Louis Federal Reserve



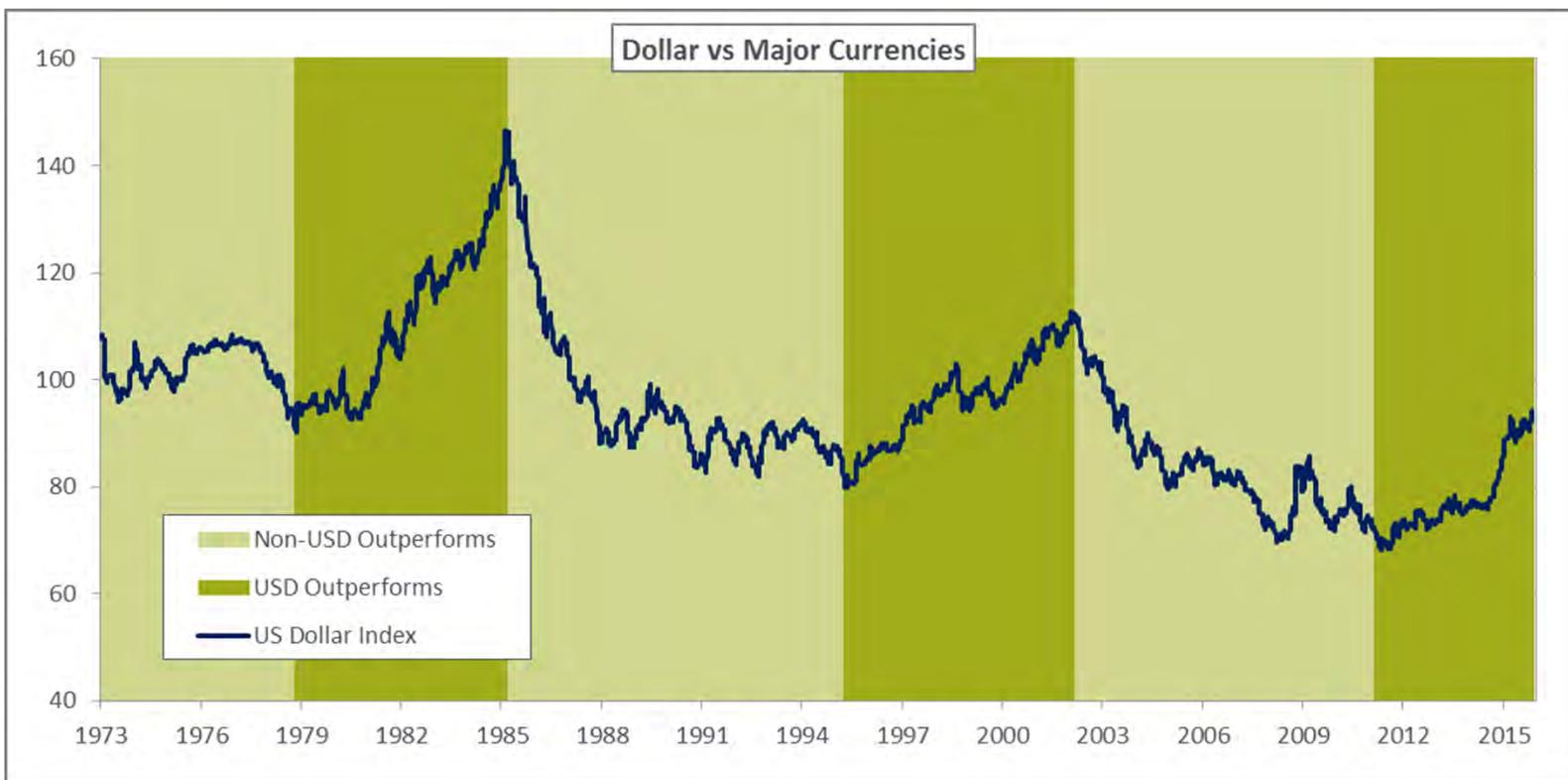
Source: St. Louis Federal Reserve



Source: St. Louis Federal Reserve

- ### Where Are We In the Economic Cycle?
- **Relative to the average length of economic cycles the US expansion is in its later stages**
 - **Improvements in wage growth and consumer spending can potentially extend expansion**
 - **Continued US expansion provides a positive foundation for US risk assets**

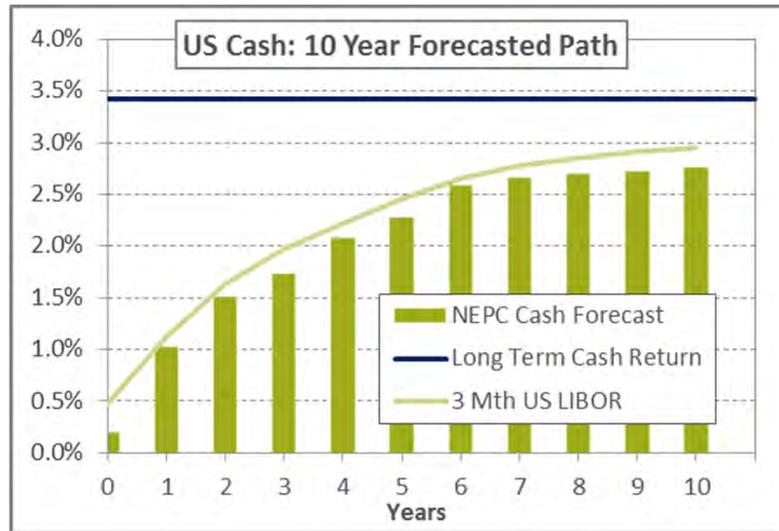
US Dollar Cycle Characterized by Peaks of Overvaluation



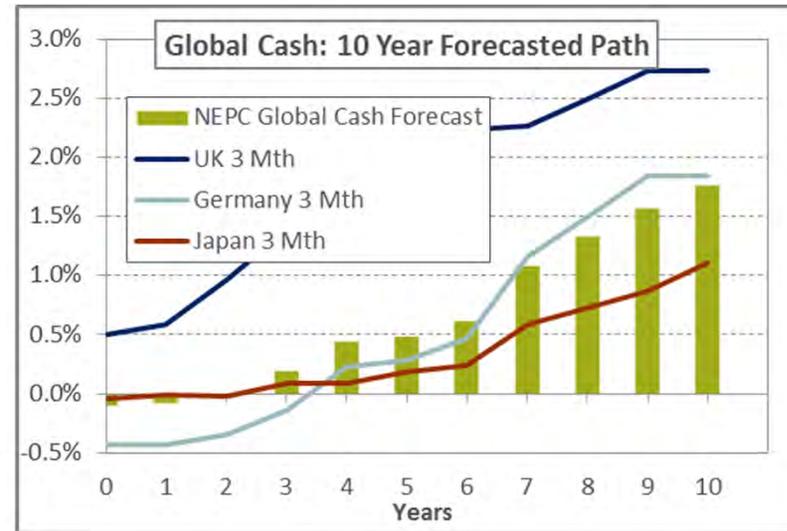
Source: Bloomberg, NEPC

- **A prolonged US economic expansion is likely to have a significant influence on the US dollar cycle**
 - Continued growth in consumer spending and US economy have the potential to push the US dollar to levels last seen in the late 1990's
- **US dollar strength is interconnected with US Federal Reserve policy**
 - Fed must balance the path of future interest rate increases relative to the disruptive effects of a strong dollar on global markets

Global Central Bank Policy: "Lower for Longer"



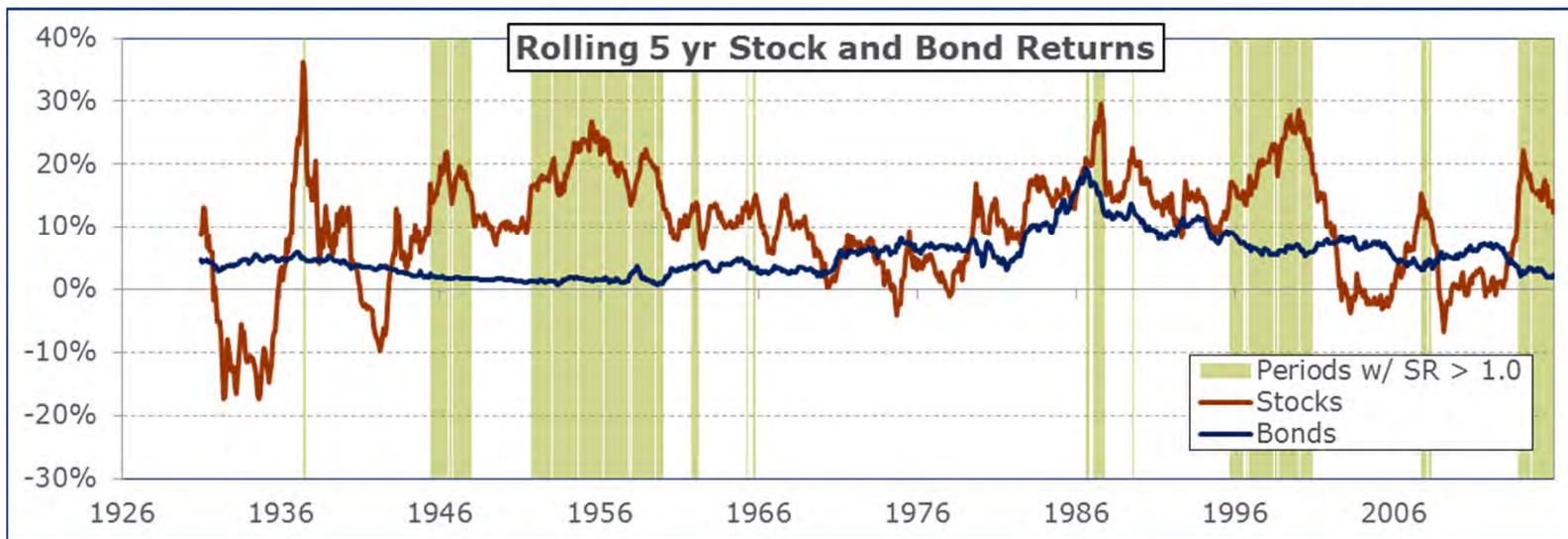
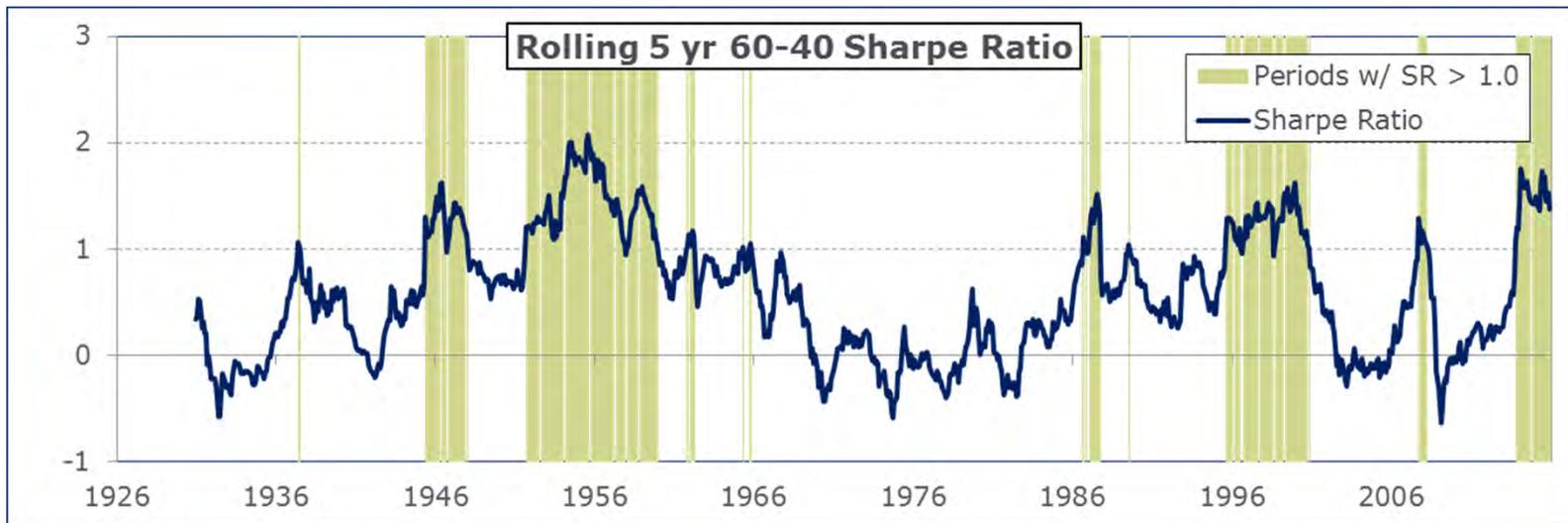
Source: Bloomberg, NEPC



Source: Bloomberg, NEPC

- **Accommodative global monetary policies flow through to markets distorting the traditional asset return profile**
 - QE and negative interest rates suppress income while supporting higher valuations
 - Provides near term support for market conditions in Europe and Japan
- **Potential extended period of low cash rates beyond the market expectations pose challenges for all investors**
 - Subdued long term cash expectations in the developed world compress long term expected returns for both fixed income and equity

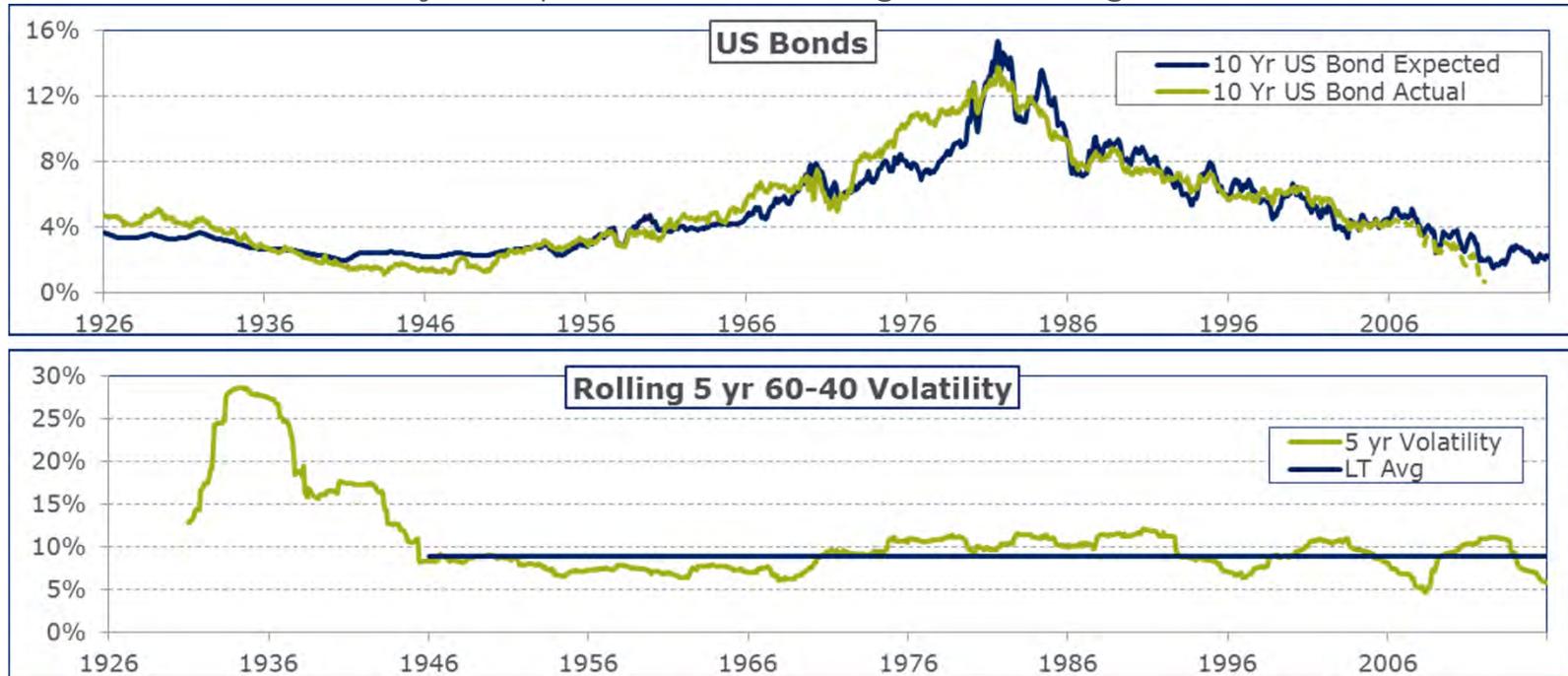
Maybe Occam is Right...Is The Simplest Solution the Best?



Source: Shiller, Bloomberg, NEPC

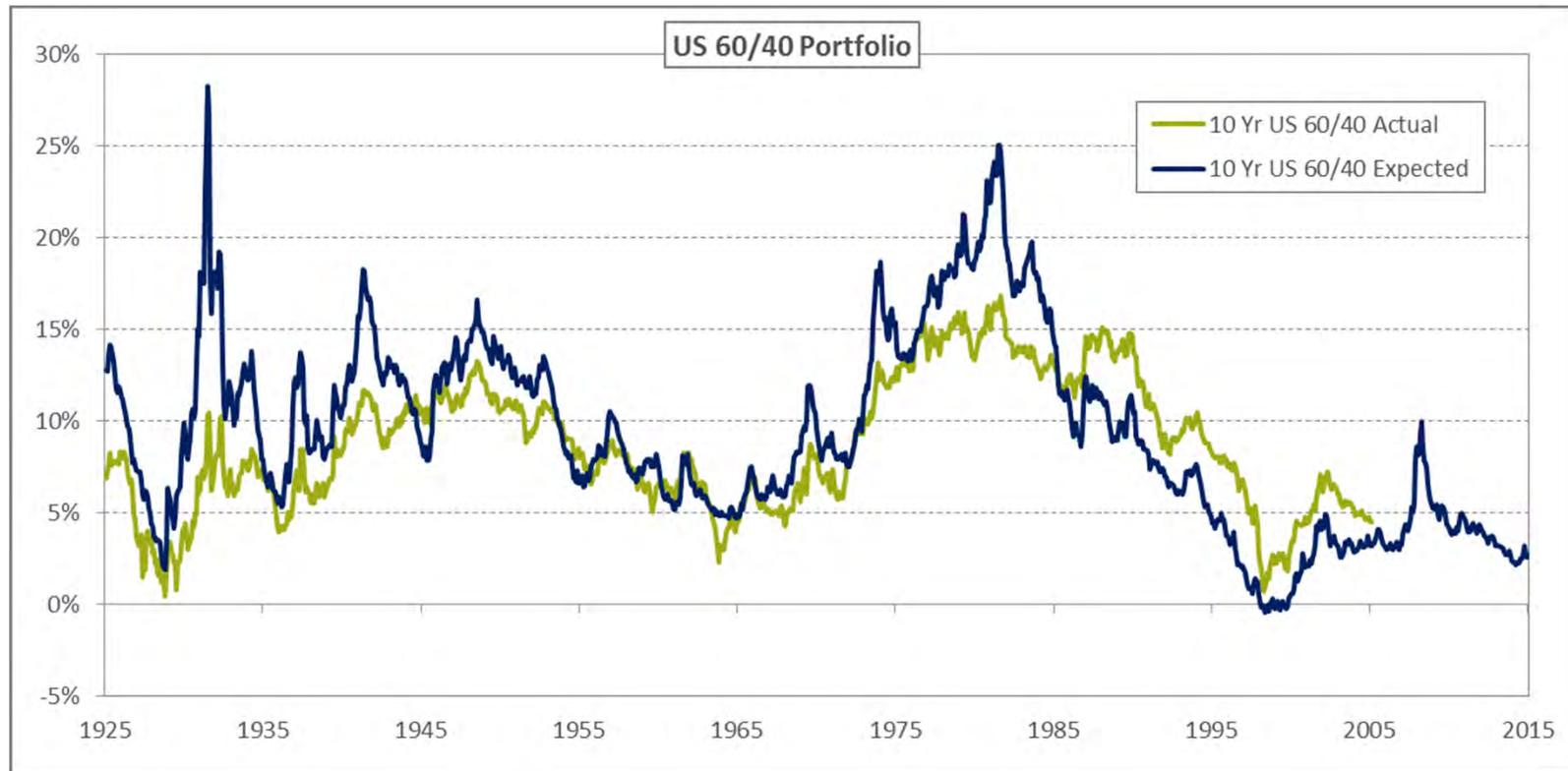
Occam's Razor Unpacked...

- **Occam's razor (in Latin *lex parsimoniae*: 'law of parsimony')**:
 - Among competing hypotheses, the one with the fewest assumptions should be selected
 - Interpretation: preference for fewer unknowns
 - But on any assumption – **better to be right than wrong**



- **What must you believe to expect 60/40 provides a 5 year Sharpe Ratio greater than 1.0?**
 - Assume Bonds return roughly 2.25% = 0.9% return contribution
 - Assume cash returns are in line with expectations (5-7 year assumption = 1.50%)
 - Assume volatility of 60-40 portfolio stays within a reasonable historical range
- **Equities must return 11-21% annualized over 5 years!**
 - Assuming range of 6-12% for 5 year annualized 60-40 volatility

Low Global Cash Rates Suppress Long Term Return Expectations



Source: Shiller Data, NEPC

- **US centric portfolios like 60/40 have worked historically but forward looking return prospects are subdued**
 - Asset prices can be sustained but low yields portend below average expected returns
- **Conventional investment approaches may fall short going forward**
 - Index focused approaches, such as core bonds, suboptimal in current environment
 - Adjustments will be necessary to effectively meet and exceed long-term objectives

NEPC 2016 Observations and Actions



- **US economic expansion continues as Federal Reserve begins policy shift**
 - Economic conditions and health of US consumers remain supportive for growth
 - Profit margin declines and strong dollar are a challenge to corporate profitability
- **Central Banks continue to dictate the global investment outlook**
 - Path of Fed policy over next two years matters more than timing of the next Fed action
 - ECB and BoJ likely to maintain and extend accommodative policies
 - Easing in China is broadly stimulative but currency policy is unpredictable
- **Persistent strength of US dollar reveals global market weakness**
 - World economy has experienced a “dollar recession” as global output slows
 - Dollar strength tightens global monetary conditions and strains global growth
- **Weak growth should not lead to a financial crisis in emerging markets**
 - Negative asset returns reflect adjustments necessary for future economic success
 - Further political and market reforms are necessary for improved economic conditions
- **Stressed credit liquidity magnifies the scale of price movements**
 - Central bank easing and positive investor sentiment have masked deterioration in liquidity
 - Credit markets ability to absorb an exodus from crowded positions could be challenged

- **Maintain exposure to US risk assets in a low return environment**
 - Lower returns expected but risk premia can still be harvested as cycle extends
 - Economic cycle is in the advanced stages but macro policy remains supportive
 - Low core bond returns warrant a more positive tilt to equity, especially after sell-offs
- **Overweight non-US developed market equities**
 - Central bank support and dollar strength provide a positive economic backdrop
 - Corporate earnings remain well below 2007 levels despite recent earnings recovery
 - EAFE equity markets offer the potential for outsized returns relative to US equities
- **Reaffirm commitment to emerging market equities**
 - Valuations and long-term fundamentals suggest an overweight
 - China uncertainty, dollar pressure and idiosyncratic country risks temper excitement
 - Overweight small-cap and consumer focused strategies relative to broad mandates
- **Seek tactical fixed income strategies but preserve duration exposure**
 - Spreads have widened but credit selection is critical as credit cycle matures
 - US duration continues to have a role in a diversified and risk-aware portfolio
 - TIPS offer an attractive duration profile with inflation expectations at secular lows
- **Explore positive yielding assets revealed from energy market distress**
 - Private strategy returns are compelling but suggest patience
 - Focus on segments of the public markets that offer a yield

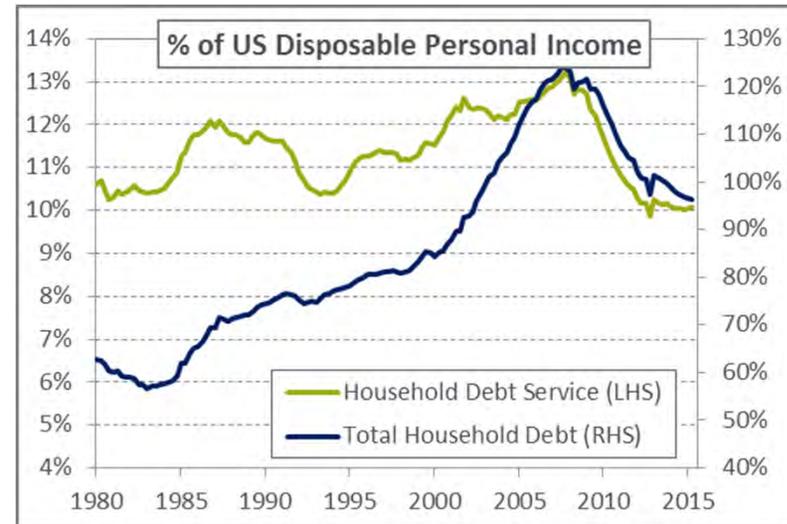
- **Return Assumption: Continue to evaluate long-term feasibility of actuarial rate of return assumption**
 - Longer-term yields and risk premiums remain muted compared to historical (30-year) return expectations for most asset classes
- **Equities vs. Bonds: U.S. equities still appear attractive relative to core bonds**
 - Look for opportunities to rebalance during periods of increasing volatility
- **Non-US Equity: Within the overall equity portfolio, continue to consider an overweight target allocation to developed non-U.S. equity**
 - Continued stimulative monetary policy in Europe and Japan should support an improved economic environment and offers potential for upside surprises
- **Emerging Markets: Revisit total emerging exposure (equity and debt) for your plan**
 - Determine total emerging markets exposure on a “look through” basis (including underlying EM exposure of GAA, Global Equity, Absolute Return Fixed Income, etc.)
 - Reaffirm comfort with amount of direct and indirect exposure
- **Core Fixed Income: Enhance, don’t abandon, core fixed income**
 - Treasury bond and TIPS exposure in traditional core portfolios provides important downside protection in volatile “risk-off” environments
 - Use of multi-sector/unconstrained fixed income can provide a good compliment to core, but should not be viewed as a stand-alone replacement
- **Commodities: Evaluate total exposure in the portfolio to commodity price volatility**
 - Real assets (public and private), Risk Parity, GAA, and emerging markets allocations have varying degrees of commodity exposure
 - Return expectations for direct commodity exposure have continued to decline

Observations – Supporting Details

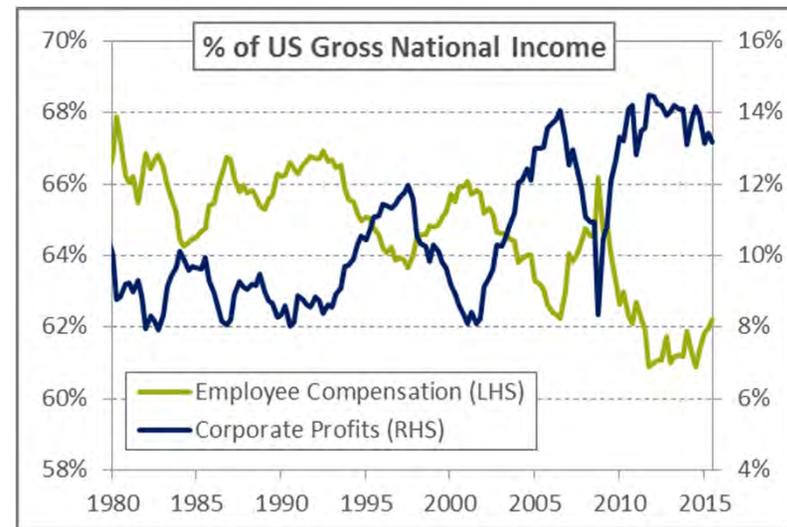


Slow and Steady for US Economy as Cycle Extends

- **US GDP continues to strengthen modestly**
 - Consumer spending supported by healthy balance sheets
 - Low energy prices and debt service have provided stimulation
- **US economy shows resilience against headwinds**
 - Fed support through quantitative easing has been removed
 - Dollar strength pressures profit margins of global companies
 - Subdued global growth and challenges in certain emerging markets
- **Corporate profits begin to lag from secular highs**
 - Buybacks and financial engineering have buttressed earnings per share
 - Profitability has begun to slow from rising dollar and wage pressures



Source: St. Louis Federal Reserve

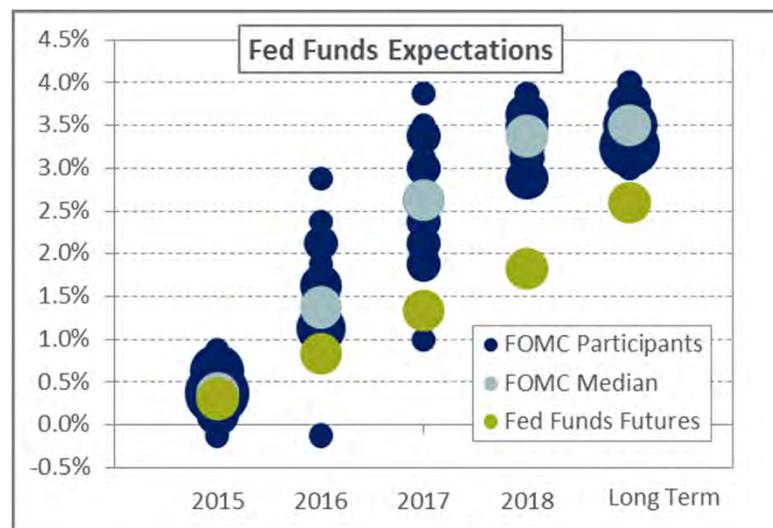


Source: St. Louis Federal Reserve

Follow The Money – Central Banks Continue to Drive Capital Market Results

- **Next steps in Fed policy closely watched but path is a bigger (and more important) unknown**

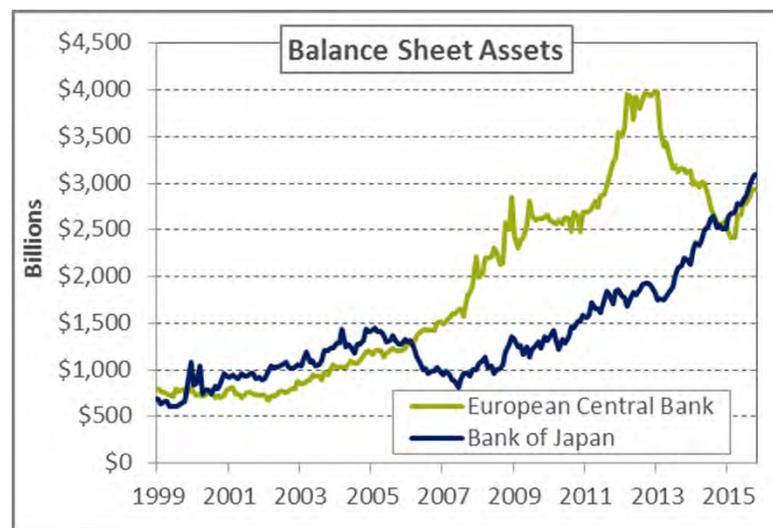
- 25 basis point increase unlikely to cause economic slowdown
- Rate increases beyond market expectations could prove challenging for asset prices
- Long-term terminal Fed Funds rate determines pricing for all assets



Source: FOMC, Bloomberg

- **Monetary stimulation in Europe and Japan has been effective**

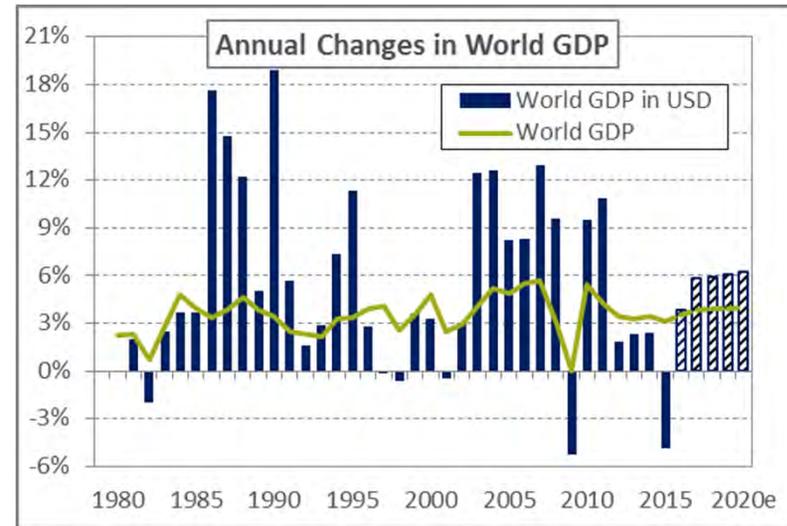
- Both regions require further accommodation to continue gradual economic recovery
- Effectiveness of easing may be challenged with bond yields and credit spreads relatively low
- However, zero interest rate bound has been broken, offering room for further easing



Source: European Central Bank, Bank of Japan, Bloomberg

Sustained US Dollar Appreciation is Globally Disruptive

- **Positive global GDP growth masks challenges of a strong dollar**
- **World economy has suffered a “dollar recession” as global GDP in USD terms has declined by nearly \$4 trillion**
 - Appreciation in US dollar strains global liquidity and reveals underlying market weakness
 - Pressures commodity markets and credit growth for international borrowers holding dollar based debt
- **Dollar strength impacts global economy in meaningful ways**
 - Improves competitiveness for countries and companies heavily reliant on exports to the US
 - Represents a headwind to US corporate earnings and exports
 - Fed is forced to balance slower interest rate increases or pushing the dollar higher



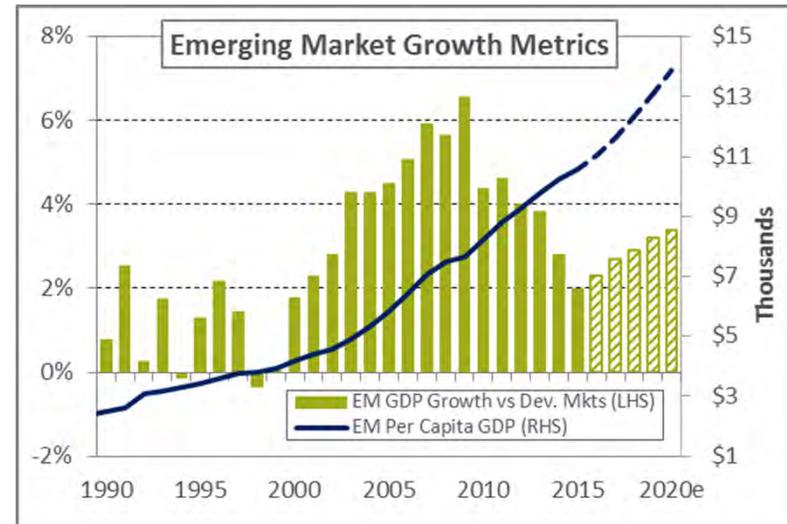
Source: IMF



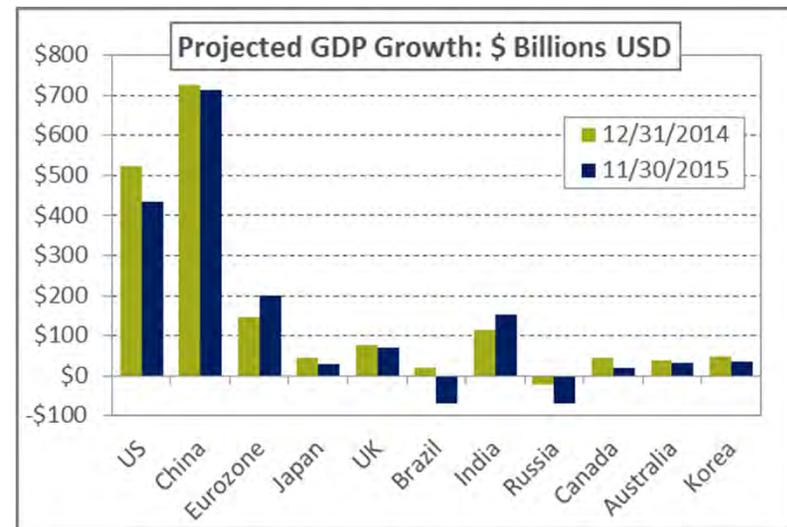
Source: St. Louis Federal Reserve

Emerging Market Growth Dependent on China and Rising Consumer Spending

- **Emerging market growth premium relative to developed world remains but is subdued**
 - Per Capita GDP continues to rise, pushing standard of living higher and supporting consumer growth
- **Initiative to reform reflects the distinct and varied outlook across countries**
 - Political challenges and commodity market distress are material risks for both Russia and Brazil
 - Reform minded countries are realizing economic adjustments necessary for sustainable growth and economic success
- **Economic conditions across emerging world are distinct but China is the focus**
 - China remains the growth engine for the world but is transitioning to a new economic model



Source: IMF



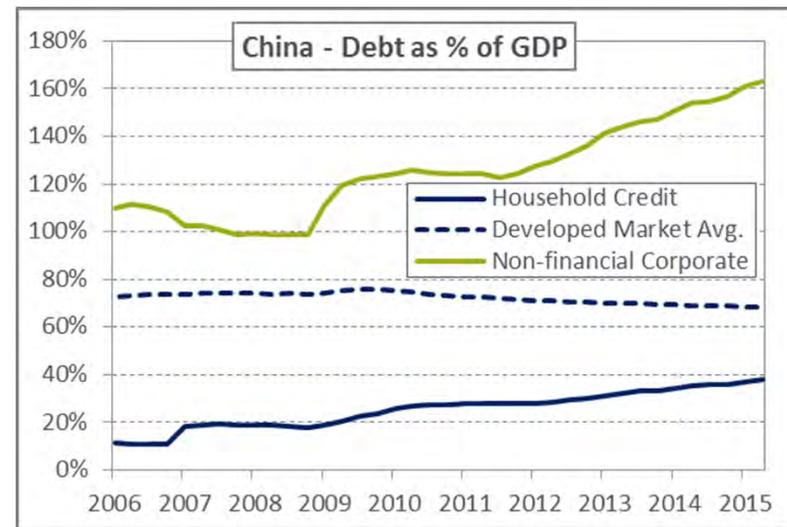
Source: Bloomberg

Structural Economic Change in China has Global Implications

- **Decline in fixed investment is lowering China's growth rate**
 - Broad implications for many emerging economies and commodity producers
- **Shift is underway from an export and investment led economy to a consumer focus**
 - Adjustment is paired with ongoing market reforms to liberalize currency and financial markets
 - Continued strength of the US dollar may force a more aggressive currency adjustment from China
- **Consumer spending likely to be the economic growth engine**
 - Retail sales have been immune to the extreme stock market volatility
 - Significant capacity for long-term credit growth among households



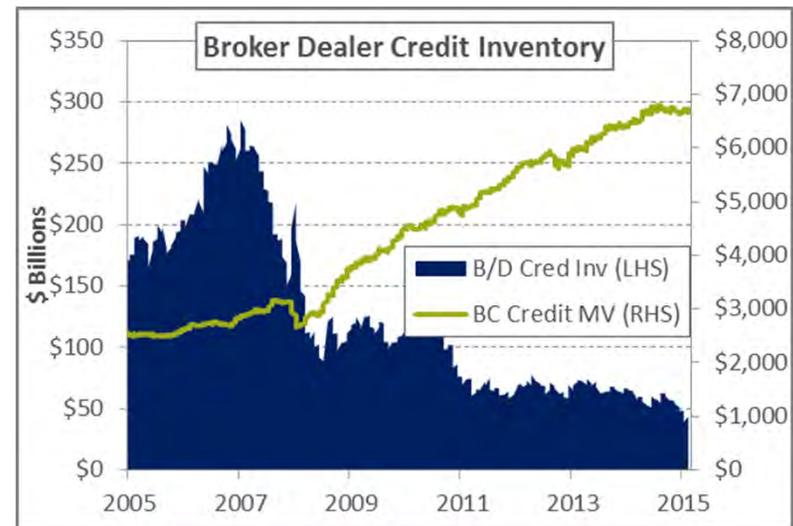
Source: Bloomberg



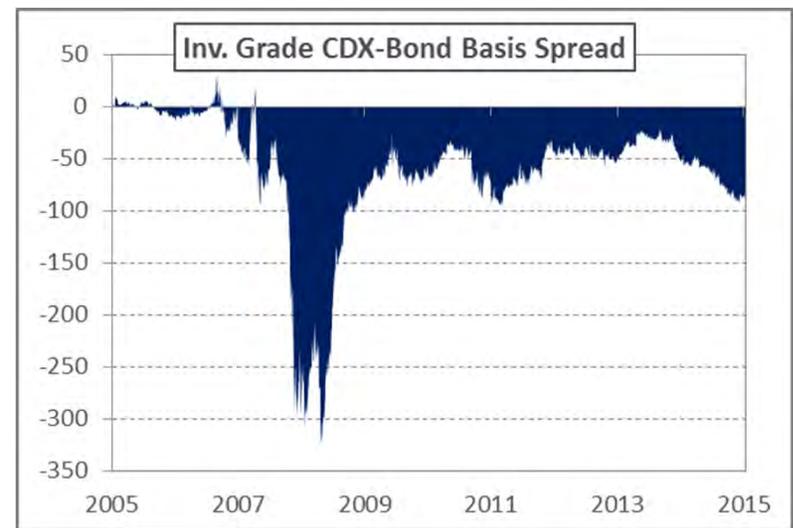
Source: Bank for International Settlements

Credit Market Liquidity Warrants Caution

- **Underlying market conditions remain fragile despite rebound from August sell-off**
 - Credit markets' could be challenged to absorb exodus from crowded positions
- **Credit inventories lower today with less bank capital at risk**
 - Liquidity provisions of new regulatory model are untested in true crisis
- **Derivative exposure less reliable**
 - Variable and negative CDX basis makes hedging unpredictable
- **Certain factors in place that can help stave off a liquidity crisis**
 - Low rate policies, bullish sentiment, positive economic results
- **Dynamic active strategies with disciplined credit approach can exploit periods of stress**



Source: NY Federal Reserve



Source: Barclays Capital

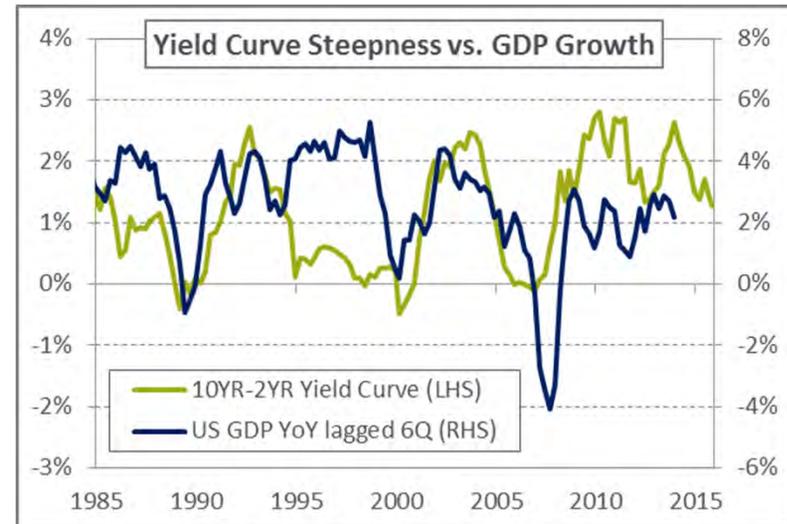
Recommended Actions – Supporting Details



Extended US Economic Cycle Supports US Risk Assets

- **Influence of monetary policy provides basis for extended US economic cycle**

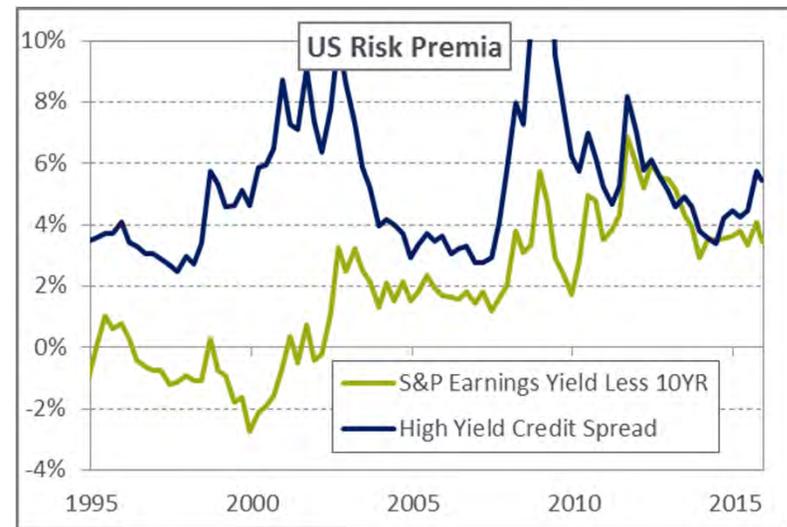
- Continued growth supports accrual of risk premia even in a low expected return environment
- Profit margin pressures and enhanced credit risk are challenges of a maturing economic cycle



Source: Bloomberg

- **US equity and credit markets offer reasonable risk premia**

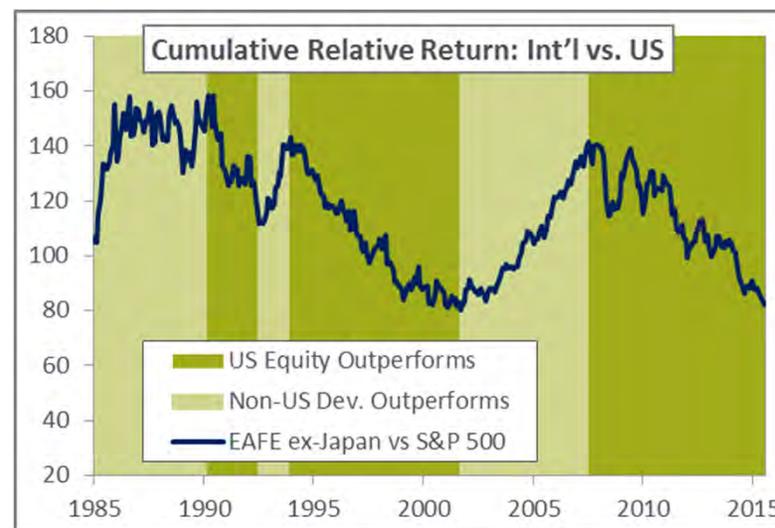
- Equity markets are near fair value but distortion from monetary policy supports continued positive returns
- Pressure of stronger dollar and energy market distress are a headwind for returns
- Focus on niche strategies and hedge funds to exploit potential volatility in equity and credit markets



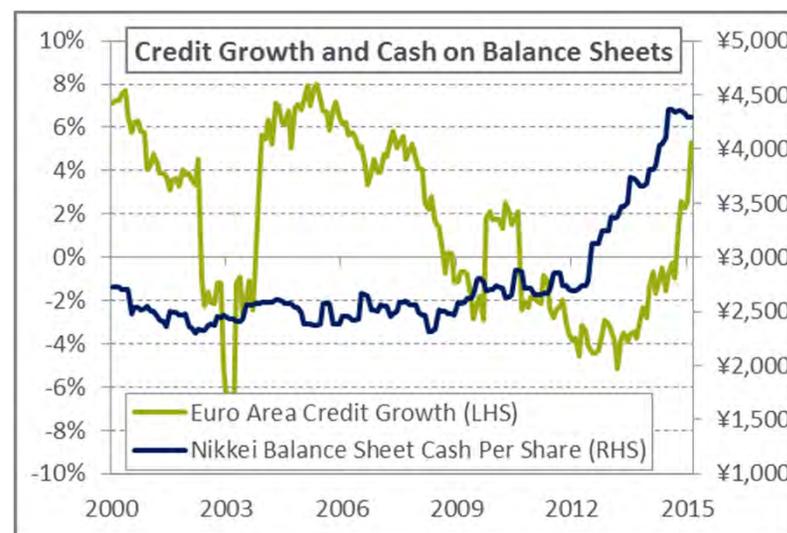
Source: Bloomberg

Non-US Developed Equities Remain Attractive Given Monetary Support

- **Europe and Japan have faced major economic challenges**
 - For Japan, these challenges extend over the previous two decades
 - Non-US equity returns relative to domestic are highly cyclical
- **Success of US monetary action galvanized unprecedented action by the European Central Bank and Bank of Japan**
 - Seeking positive response in both capital markets and real economy
- **Equities and other risky asset markets likely to benefit**
 - Stimulus promotes credit growth, spending and earnings
 - Japanese companies flush with cash also seeking improved profitability
- **Hedging a portion of non-US developed currency exposure remains a strategic goal**
 - Dollar strength likely to persist as Fed policy lifts off



Source: Standard & Poors, MSCI, Bloomberg



Source: TSE, ECB, Bloomberg

Emerging Markets Present Interesting Opportunity.. But Require Patience

- **Fundamentals of emerging markets suggest higher return potential than developed world**

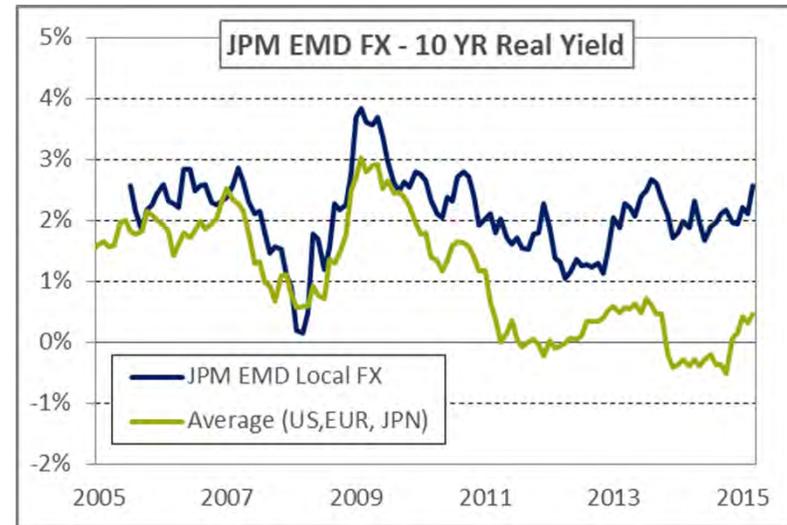
- Valuations appear reasonable especially versus developed world
- Superior real yields and fundamentals expected to flow through to higher returns over time



Source: MSCI, Bloomberg

- **Unique risks across countries suggest caution and patience**

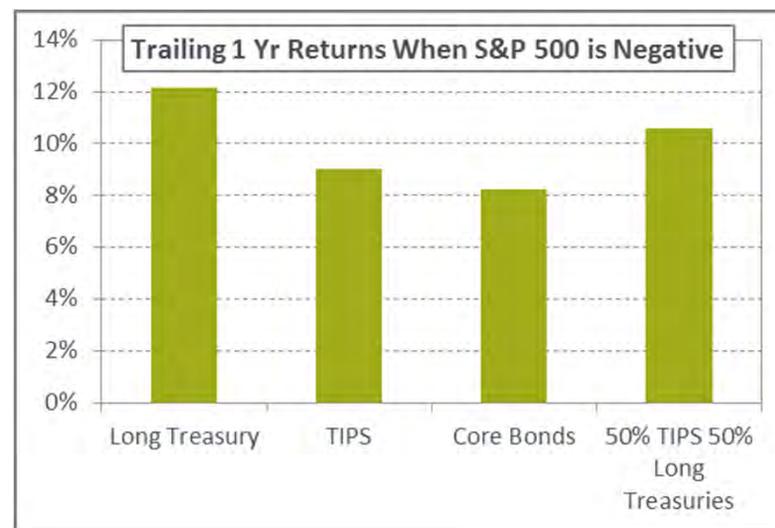
- China continues slow process to delicately rebalance economy
- Commodity dependent countries face financial challenges as they adjust to lower prices
- Credit dependence, particularly for dollar based borrowers could cause further strain



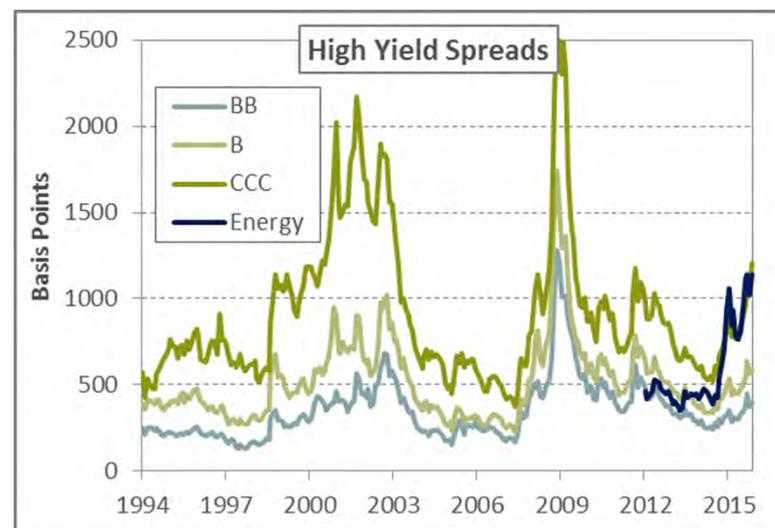
Source: JP Morgan, Bloomberg

Seek Differentiated Fixed Income Strategies but Don't Abandon Safe Havens

- **Safe haven exposure is critical as an asset allocation building block**
 - Provides unique stability in times of equity market stress
- **Partial allocation to TIPS diversifies safe haven exposure**
 - Current low inflation breakevens make TIPS attractive relative to nominal US Treasuries
- **Tactical bond strategies and unique credit exposures are key portfolio components**
 - Mitigate the impact of a rising interest rate environment
 - Credit selection is key given challenging environment today across credit qualities and sectors
 - Global multi-sector credit, absolute return fixed income, credit hedge funds, private lending are a focus



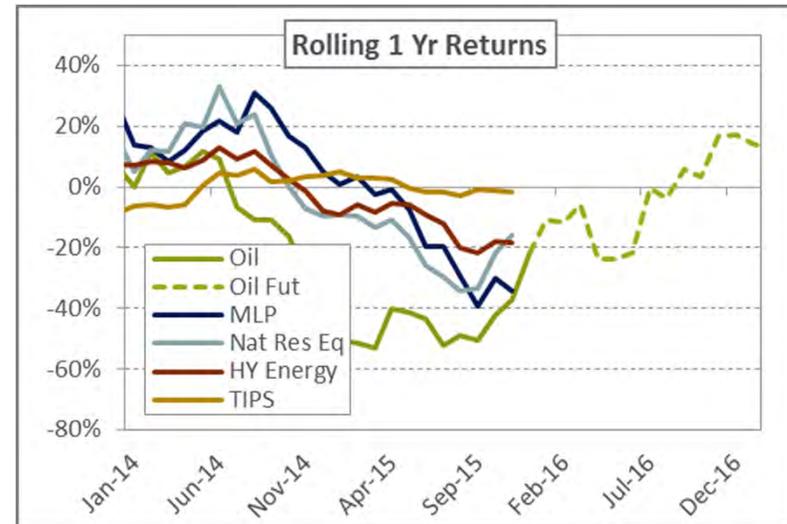
Source: Barclays, Bloomberg



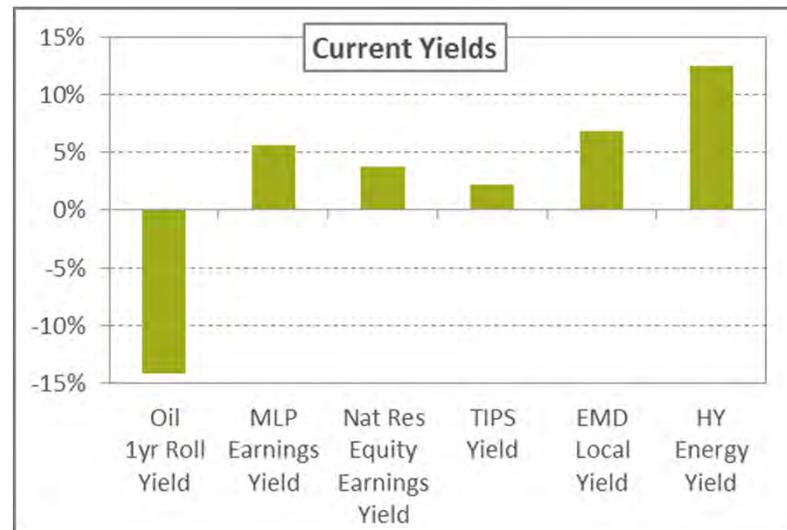
Source: Barclays, Bloomberg

Seek Opportunities from Energy Distress Outside of Traditional Commodity Vehicles

- **Massive oil selloff generated distress across commodity markets**
 - Impacted oil-related and other inflation sensitive assets
 - Selloff in related asset classes may present opportunities for active managers and private strategies
- **Seek inflation sensitive asset classes that offer positive yield**
 - Oil futures commodity roll yield is strongly negative
 - Other asset classes may offer attractive price upside
- **Private market strategies may be more attractive**
 - Patient capital can seize high return opportunities as they materialize



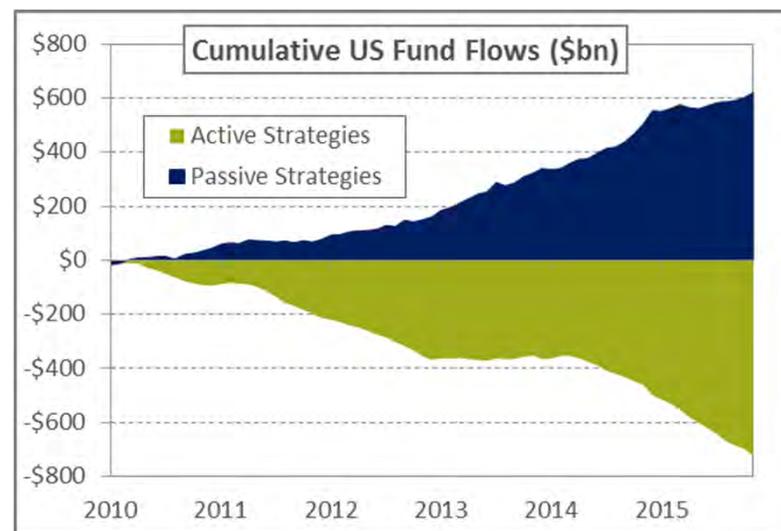
Source: Alerian, Standard & Poors, Barclays, JP Morgan, Bloomberg



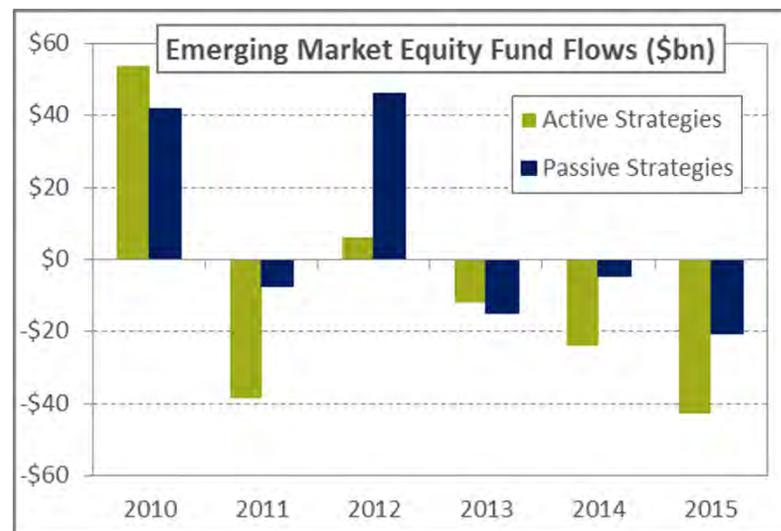
Source: Alerian, Standard & Poors, Barclays, JP Morgan, Bloomberg

Active Management – An Accelerating Trend to Passive Implementation

- **Passive trends a headwind for traditional active management**
 - Remain committed to high conviction active managers
 - Give managers greater discretion, but evaluate effectiveness of investment thesis over time
 - Reduced regional constraints provide expanded opportunity for alpha in global equity strategies
- **Untether exposures from traditional benchmark risks and bias in Emerging Markets**
 - Make use of small cap and consumer focused equity strategies
 - Use non-traditional strategies with reduced constraints across markets to capitalize on divergences
- **Conviction in ability to generate alpha as well as uniqueness of strategy must align with fees**



Source: EPFR Global



Source: EPFR Global

- **Global Equity**
 - Global strategies can exploit regional divergences but is not a total equity replacement
- **Non-US Developed Equity**
 - Make use of currency hedged to fund overweight allocation
- **Emerging Market Equity**
 - Small cap and Consumer focused approach
- **Core Fixed Income**
 - Barbell Unconstrained with TIPS/Long Bonds
- **Credit Exposure**
 - Think outside the “benchmark box” dynamic credit strategies, Private Lending
- **Emerging Market Debt**
 - Blended approach and consider complementing with EM Macro HF
- **Overlay**
 - Provides disciplined rebalance approach
- **Risk Parity**
 - Risk balanced inflation-sensitive assets exposure preferable to long only commodities
- **Inflation-Sensitive Assets**
 - Make use of multi-asset inflation focused strategies to fund private real assets
- **Opportunistic Allocations**
 - Create an opportunistic “bucket” to exploit future market dislocations

2016 Asset Class Assumptions



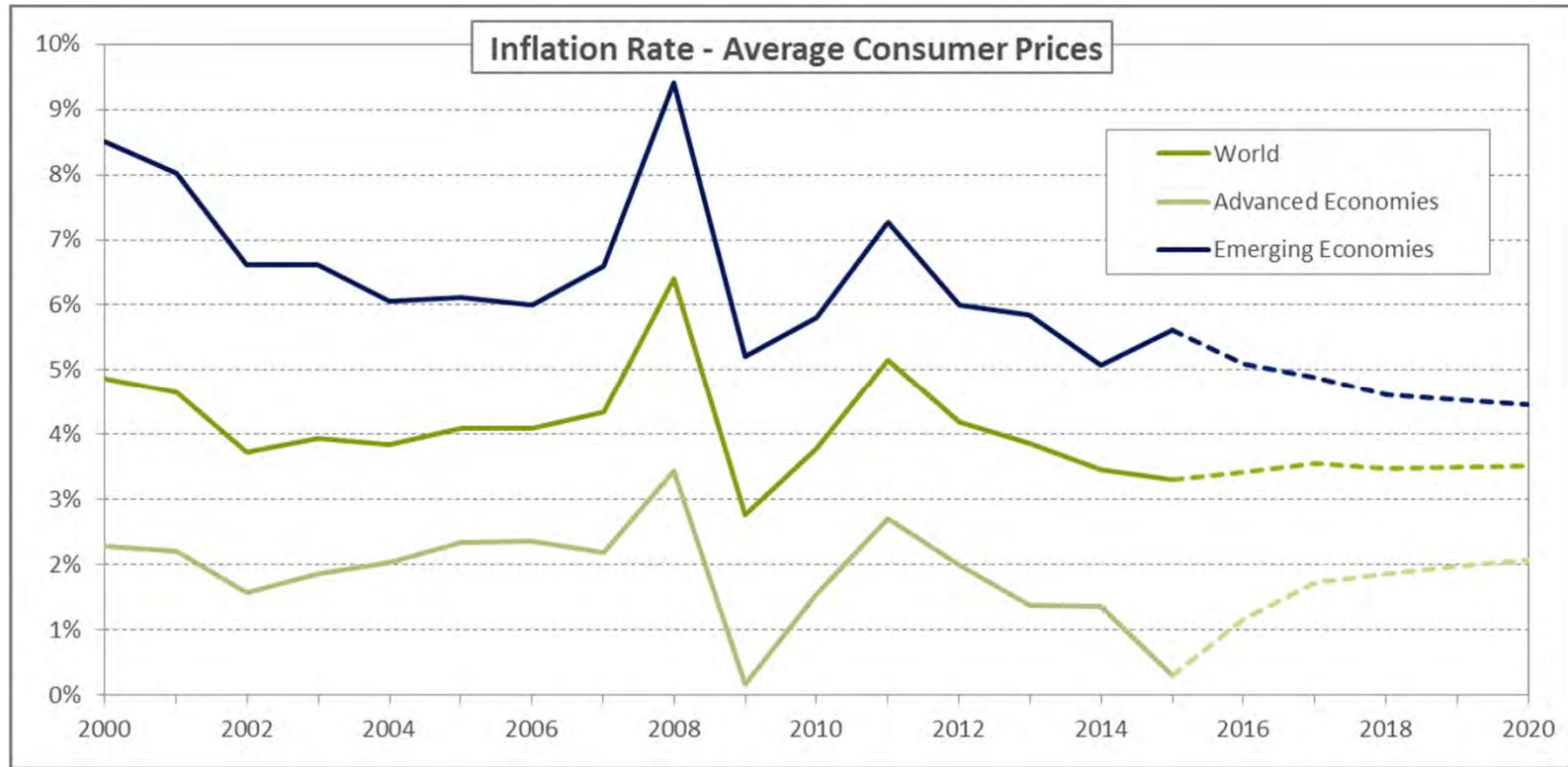
- **We use November 30 market data for all asset class assumptions**
- **Combination of historical data and forward looking analysis**
 - Expected returns based on current market pricing and forward looking estimates
 - Volatility and correlations based on history, while recognizing current uncertainty
- **Historical data is used to frame current market environment as well as to compare to similar historical periods**
 - Incorporates historical index returns, volatility, correlations, valuations, and yields
- **Forward-looking analysis is based on current market pricing and a building blocks approach**
 - Return equals yield + changes in price (valuation, defaults, etc.)
 - Use of key economic observations (inflation, real growth, dividends, etc.)
 - Structural themes (supply and demand imbalances, capital flows, etc.)
- **Assumptions prepared by Asset Allocation Committee**
 - Asset Allocation team plus members of various consulting practice groups meet to develop themes and assumptions
 - Public markets, hedge fund and private market research teams provide insights
- **Assumptions and Actions reviewed and approved by Partners Research Committee**

Changes To Assumption Development

- **We continue to refine and enhance our process where appropriate**
 - Changes are evolutionary rather than revolutionary
 - Addition of a dedicated 20+ Year STRIPS assumption
- **Added international small cap equity and emerging market small cap**
 - Recognizes the differentiated opportunity set associated with global small-cap equities
- **Fixed income model redesigned to highlight underlying building block market assumptions**
 - Includes major fixed income market drivers (yield, roll down, price change, credit, etc)
- **Broadened global bond country list to reflect index market exposure**
 - Inclusion of higher yielding government bond markets (Australia, Canada, Mexico, etc)
- **Refined commodity model to better account for market contango**
 - Developed improved curve forecast for each major commodity
 - Accounts for the significant negative roll yield of select commodities
- **Further refined development of asset class volatility assumptions**
 - Asset classes with evidence of autocorrelation adjusted to reflect experienced volatility

- **Inflation is an integral component of our asset allocation assumptions**
 - An essential building block for projecting returns in stocks, bonds, and commodities
- **There are several measures of inflation used to inform our view, all with some type of shortcoming**
 - Global forecasts, local consumer and producer price indices, TIPS break-even inflation
- **Institutional investment pools will experience asset inflation globally, encompassing both developed and emerging countries**
 - We use a 3% global inflation forecast over 5-7 years for our equity building blocks
 - Akin to assuming purchasing power parity holds across markets
 - Can be different from inflation experienced in local country liabilities or spending needs
 - Our expectation of US CPI is 2.25% over 5-7 years and 2.75% over 30 years
- **Muted credit growth leaves inflation expectations unchanged in the near term, pressure for higher long-term inflation continues to build**
 - Money supply (M2) continued to expand while velocity remains depressed
 - Global monetary policy likely to remain stimulative in 2016
- **Given long-term inflation pressures, a modestly higher inflation assumption (3.25%) is used for determining 30 year equity return expectations**

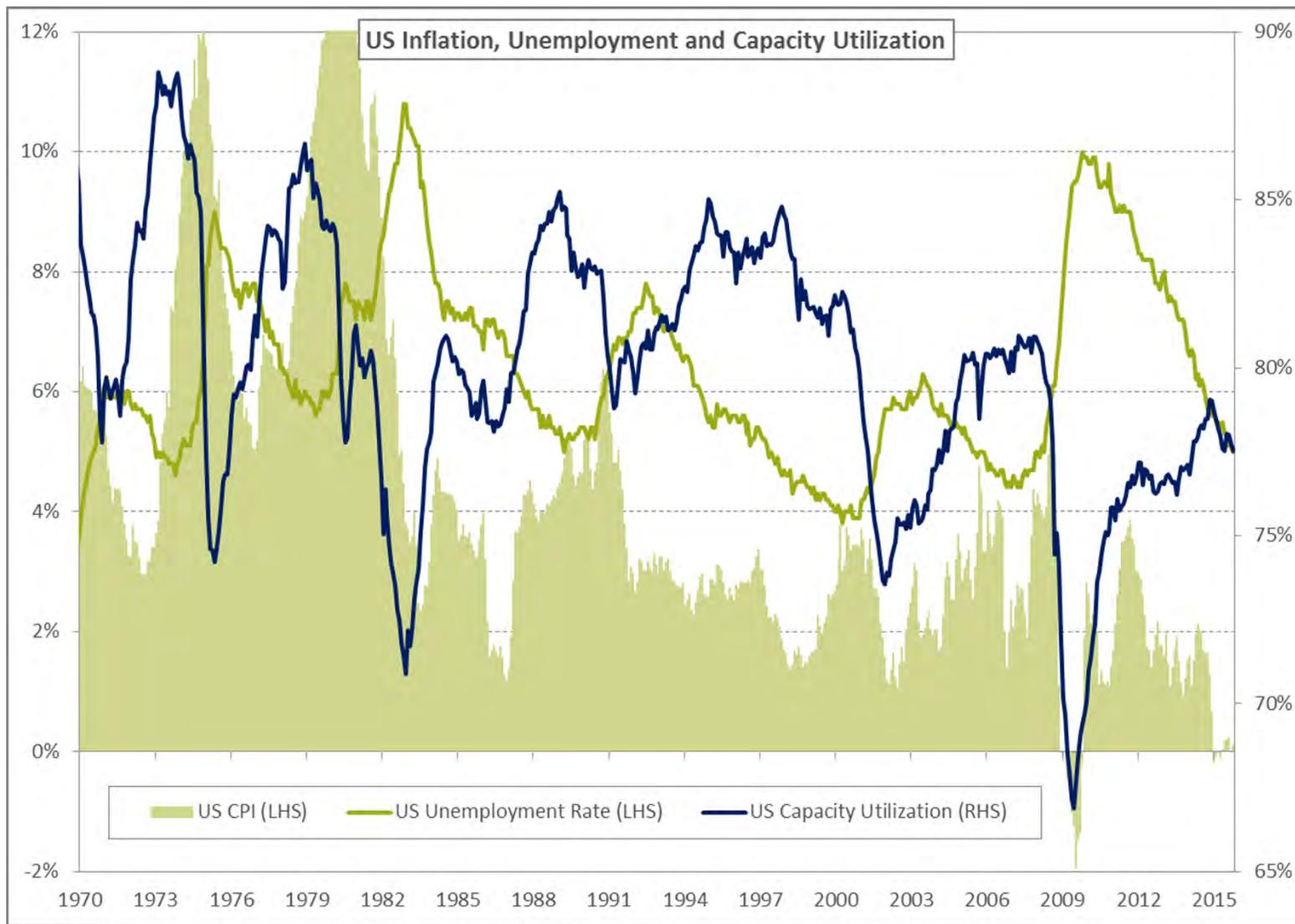
Global Inflation Forecasts



Source: IMF

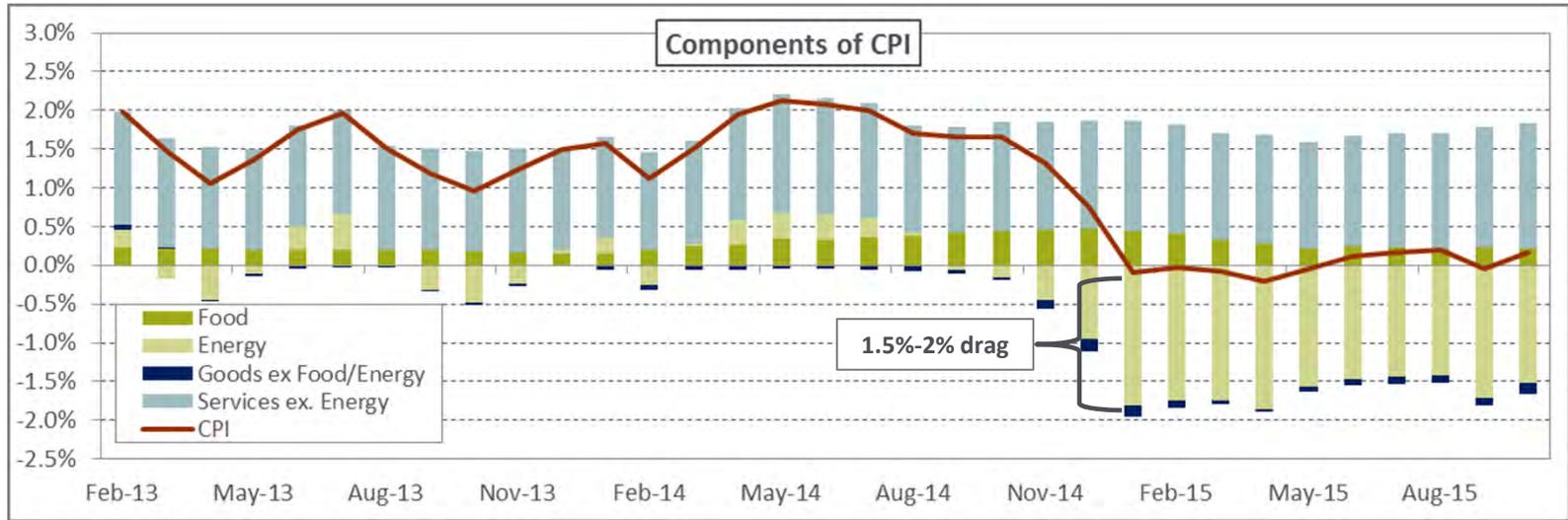
- **World inflation forecasts range from 3.4-3.6% annually over the next five years**
 - Investment programs with a developed markets bias likely to experience less inflation than the global average

Realized US Inflation Has Stayed Low Despite Economy Showing Capacity Improvements

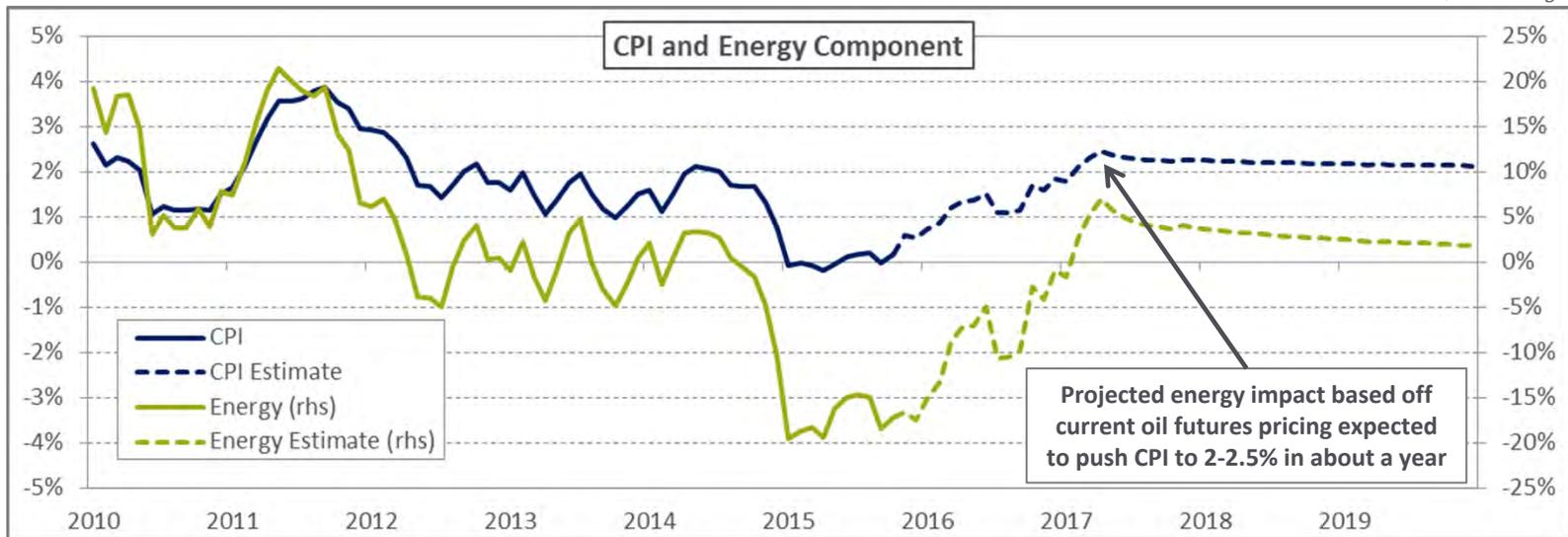


Source: Bureau of Labor Statistics, Federal Reserve, Bloomberg

Negative Energy Impact on CPI Expected to Fall Off in Early 2016

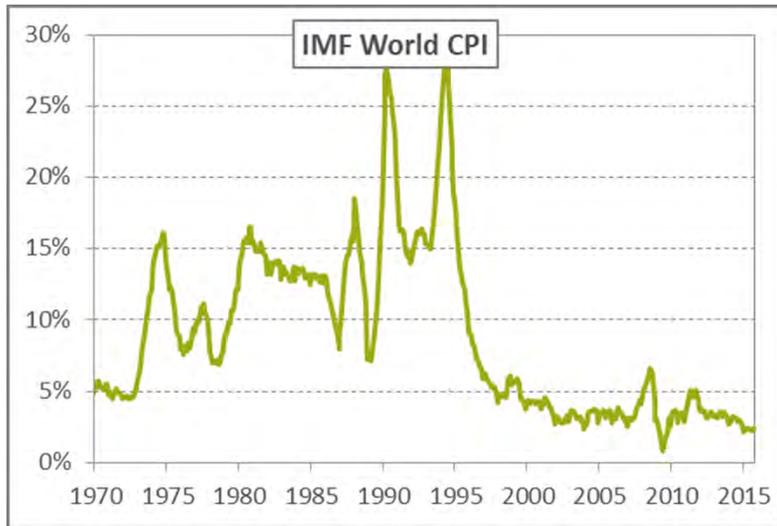


Source: Bureau of Labor Statistics, Bloomberg

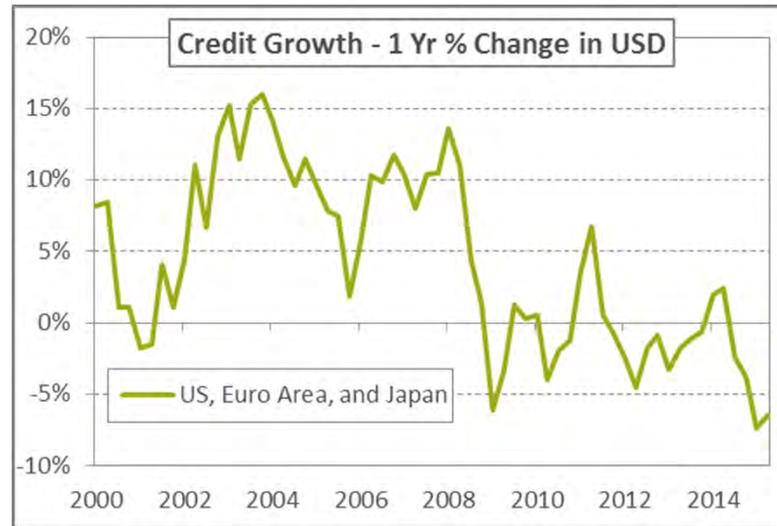


Source: Bureau of Labor Statistics, Bloomberg

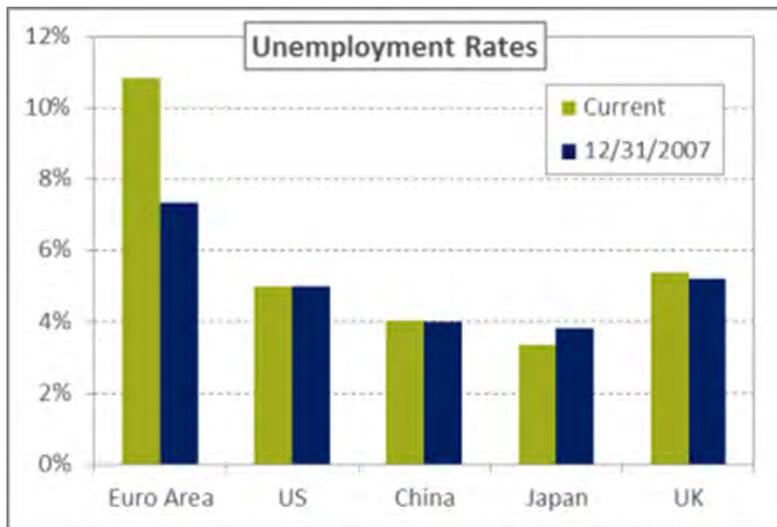
Global Economic Factors Driving Inflation Remain Subdued



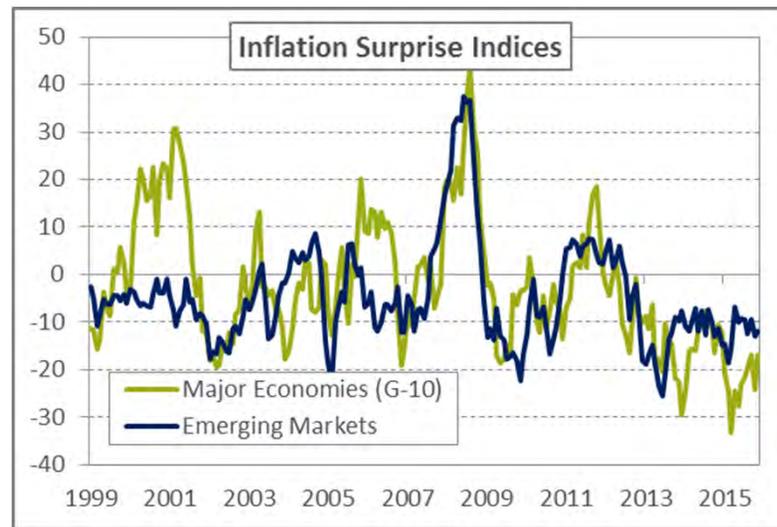
Source: IMF, Bloomberg



Source: Bank for International Settlements



Source: Bloomberg



Source: Citigroup, Bloomberg

2016 5-to-7 Year Return Forecasts

Geometric Expected Return			
Asset Class	2015	2016	2016-2015
Cash	1.75%	1.50%	-0.25%
Treasuries	1.75%	1.75%	
IG Corp Credit	3.25%	3.75%	0.50%
MBS	2.00%	2.00%	
Core Bonds*	2.30%	2.46%	0.16%
TIPS	2.25%	2.50%	0.25%
High-Yield Bonds	4.00%	5.25%	1.25%
Bank Loans	4.50%	5.50%	1.00%
Global Bonds (Unhedged)	1.00%	1.00%	
Global Bonds (Hedged)	1.13%	1.09%	-0.04%
EMD External	4.50%	4.75%	0.25%
EMD Local Currency	5.50%	6.50%	1.00%
Large Cap Equities	6.00%	6.00%	
Small/Mid Cap Equities	6.00%	6.25%	0.25%
Int'l Equities (Unhedged)	7.00%	7.25%	0.25%
Int'l Equities (Hedged)	7.39%	7.57%	0.18%
Emerging Int'l Equities	9.00%	9.75%	0.75%
Global Equity	7.05%	7.23%	0.18%
Risk Parity	5.91%	5.77%	-0.14%
GTAA	5.51%	5.59%	0.08%
Private Equity	8.50%	8.50%	
Private Debt	7.50%	7.50%	
Private Real Assets	8.00%	8.25%	0.25%
Liquid Real Assets	5.96%	5.85%	-0.11%
Real Estate	6.50%	6.50%	
Commodities	5.25%	4.50%	-0.75%
Hedge Funds	5.75%	5.75%	
Hedge Funds - Credit	5.25%	5.25%	

* Core Bonds assumption based on market weighted blend of components of Aggregate Index (Treasuries, IG Corp Credit, and MBS).

2016 30-Year Return Forecasts

Geometric Expected Return			
Asset Class	2015	2016	2016-2015
Cash	3.25%	3.00%	-0.25%
Treasuries	3.50%	3.25%	-0.25%
IG Corp Credit	4.75%	5.00%	0.25%
MBS	3.75%	3.50%	-0.25%
Core Bonds*	3.98%	3.89%	-0.09%
TIPS	4.00%	4.00%	
High-Yield Bonds	5.75%	5.75%	
Bank Loans	6.00%	6.00%	
Global Bonds (Unhedged)	2.25%	2.75%	0.50%
Global Bonds (Hedged)	2.41%	2.87%	0.46%
EMD External	6.00%	6.00%	
EMD Local Currency	6.75%	6.50%	-0.25%
Large Cap Equities	7.50%	7.50%	
Small/Mid Cap Equities	7.75%	7.75%	
Int'l Equities (Unhedged)	8.00%	8.00%	
Int'l Equities (Hedged)	8.47%	8.39%	-0.08%
Emerging Int'l Equities	9.25%	9.50%	0.25%
Global Equity	8.31%	8.32%	0.01%
Risk Parity	6.99%	6.99%	
GTAA	6.80%	6.79%	-0.01%
Private Equity	9.50%	9.50%	
Private Debt	8.00%	8.00%	
Private Real Assets	7.75%	7.75%	
Liquid Real Assets	7.04%	7.00%	
Real Estate	6.50%	6.50%	
Commodities	5.75%	5.50%	-0.25%
Hedge Funds	6.75%	6.50%	-0.25%
Hedge Funds - Credit	5.75%	5.50%	-0.25%

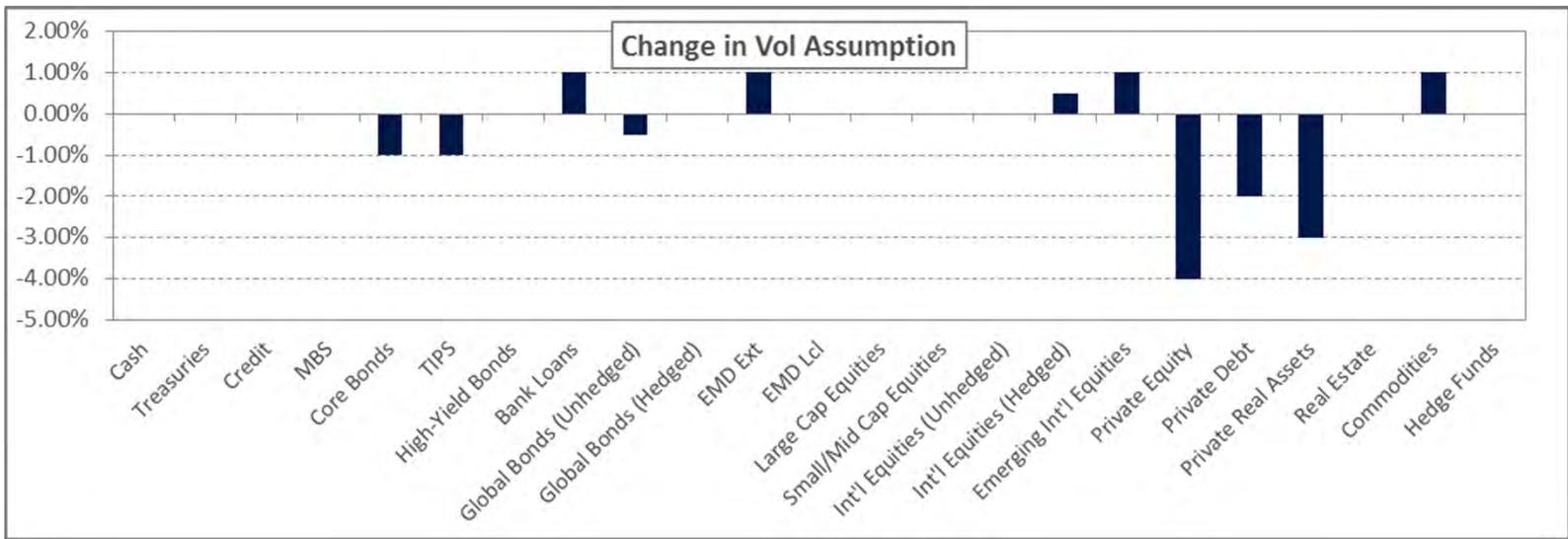
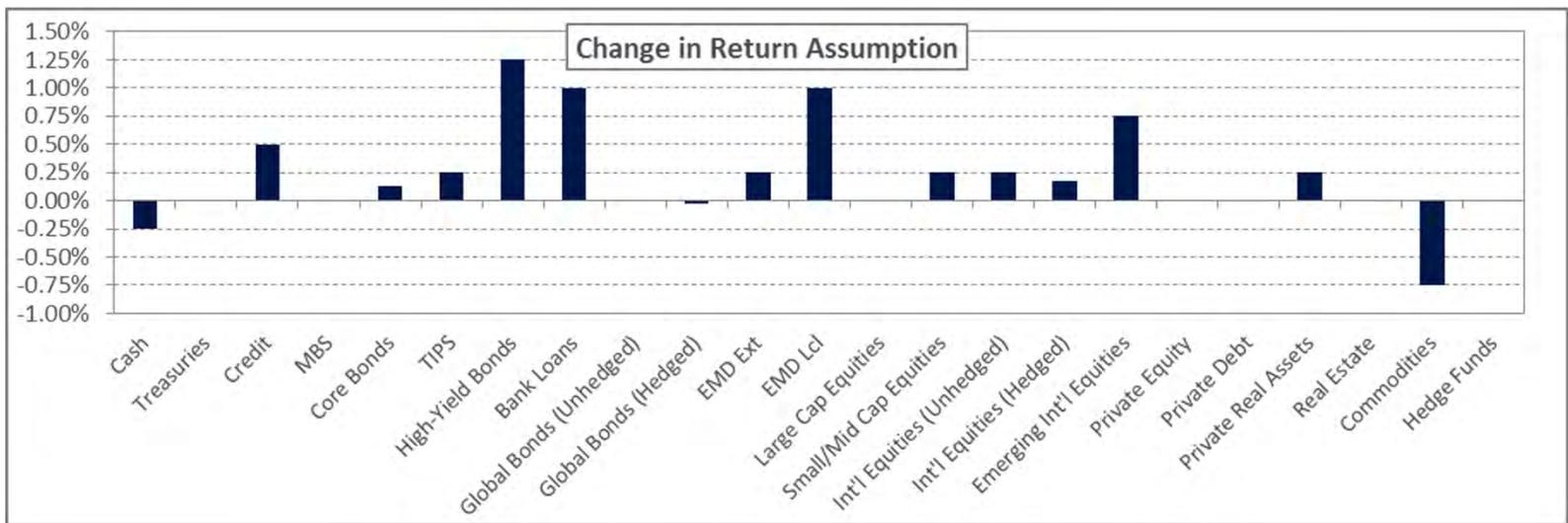
* Core Bonds assumption based on market weighted blend of components of Aggregate Index (Treasuries, IG Corp Credit, and MBS).

2016 Volatility Forecasts

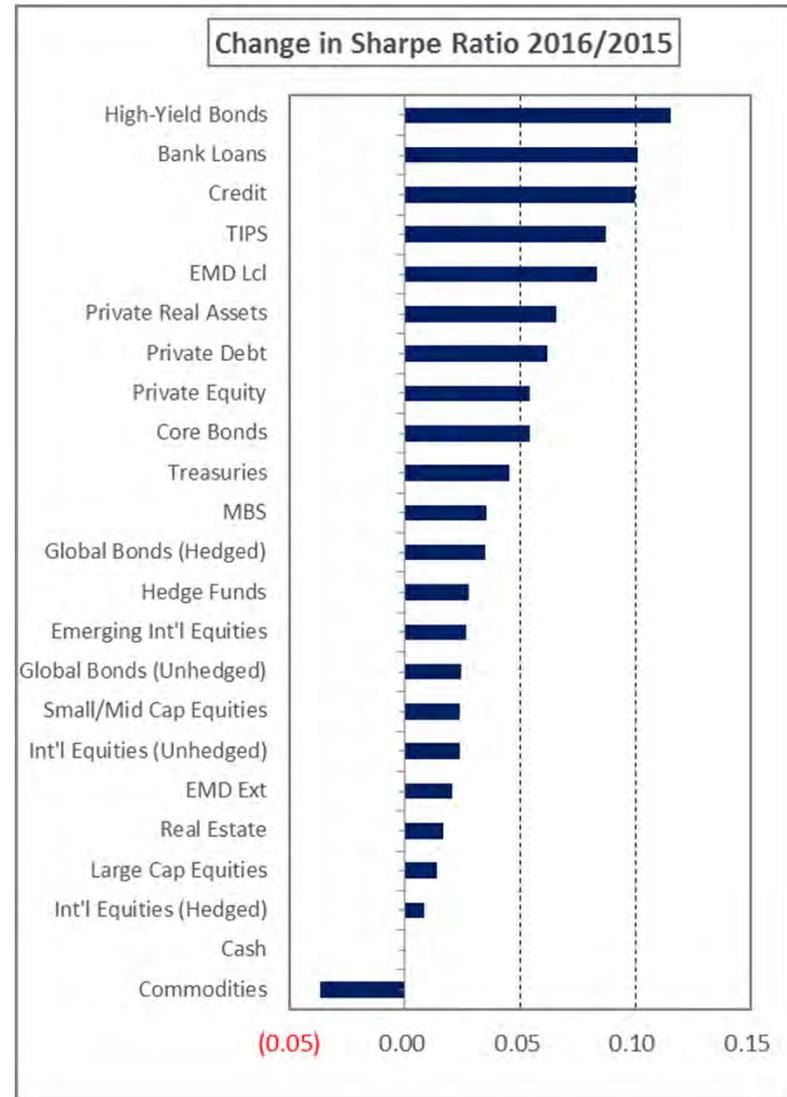
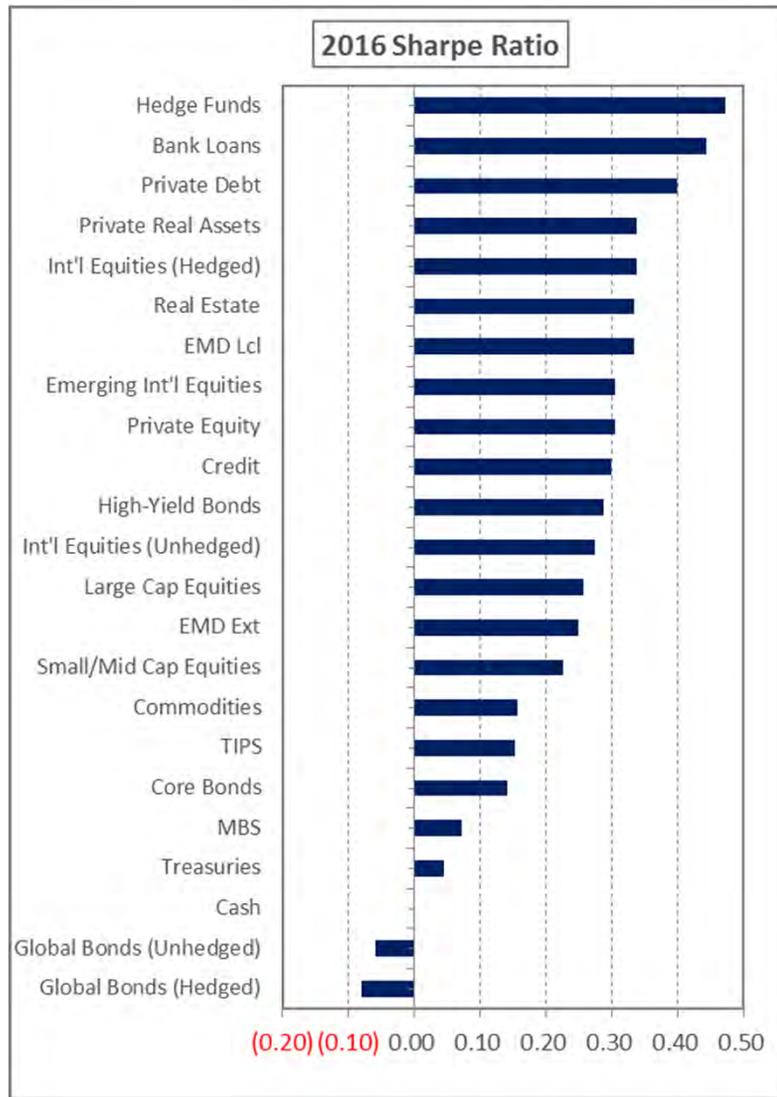
Volatility			
Asset Class	2015	2016	2016-2015
Cash	1.00%	1.00%	
Treasuries	5.50%	5.50%	
IG Corp Credit	7.50%	7.50%	
MBS	7.00%	7.00%	
Core Bonds*	6.03%	6.03%	
TIPS	7.50%	6.50%	-1.00%
High-Yield Bonds	13.00%	13.00%	
Bank Loans	8.00%	9.00%	1.00%
Global Bonds (Unhedged)	9.00%	8.50%	-0.50%
Global Bonds (Hedged)	5.00%	5.00%	
EMD External	12.00%	13.00%	1.00%
EMD Local Currency	15.00%	15.00%	
Large Cap Equities	17.50%	17.50%	
Small/Mid Cap Equities	21.00%	21.00%	
Int'l Equities (Unhedged)	21.00%	21.00%	
Int'l Equities (Hedged)	17.50%	18.00%	0.50%
Emerging Int'l Equities	26.00%	27.00%	1.00%
Global Equity	17.94%	17.95%	0.01%
Risk Parity	11.44%	11.09%	-0.35%
GTAA	9.51%	9.71%	0.20%
Private Equity	27.00%	23.00%	-4.00%
Private Debt	17.00%	15.00%	-2.00%
Private Real Assets	23.00%	20.00%	-3.00%
Liquid Real Assets	12.43%	12.79%	0.36%
Real Estate	15.00%	15.00%	
Commodities	18.00%	19.00%	1.00%
Hedge Funds	9.00%	9.00%	
Hedge Funds - Credit	8.00%	8.00%	

* Core Bonds assumption based on market weighted blend of components of Aggregate Index (Treasuries, IG Corp Credit, and MBS).

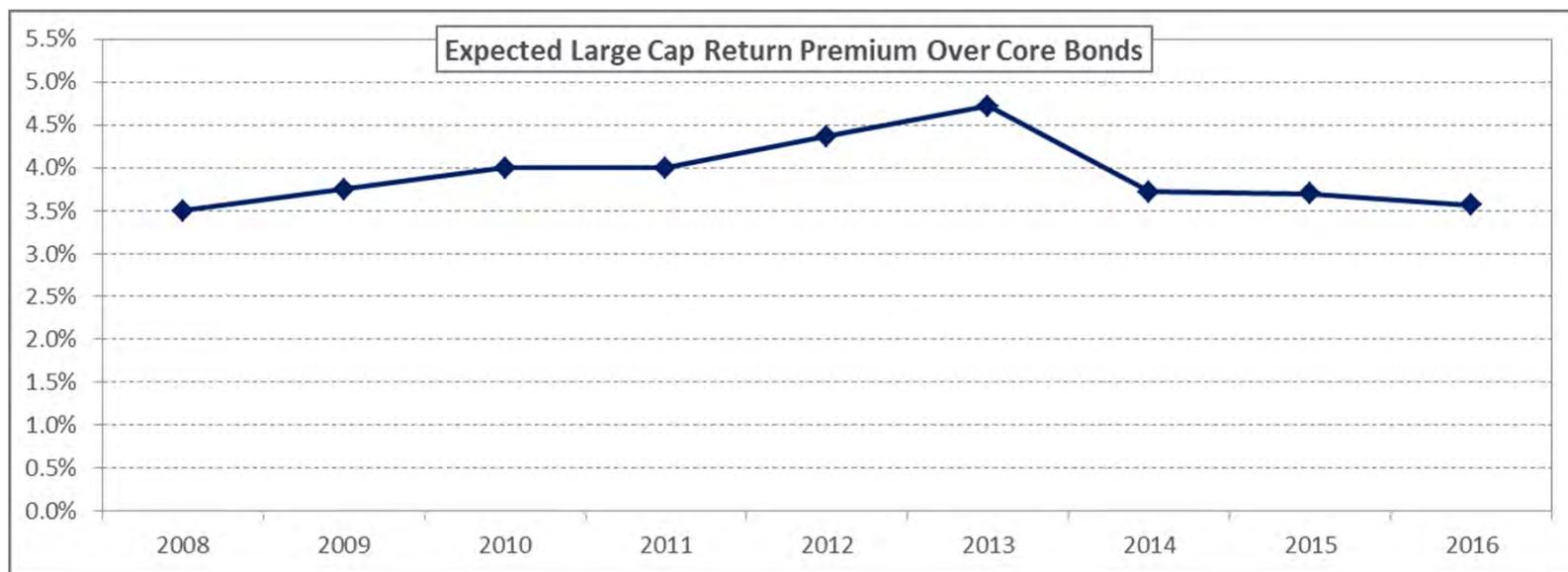
Summary of Changes to 2016 Return and Volatility Expectations



Relative Asset Class Attractiveness



Major Asset Class Review (Geometric)



Source: Bloomberg, Morningstar Direct, NEPC

NEPC 5-7 Year Assumptions

	Long Term Avg	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cash	3.42% ¹	4.00%	3.00%	2.00%	2.00%	1.25%	0.75%	1.50%	1.75%	1.50%
Core Bonds	7.70% ²	5.00%	5.50%	3.75%	3.00%	2.88%	2.03%	2.53%	2.30%	2.43%
Large Cap	10.05% ¹	8.50%	9.25%	7.75%	7.00%	7.25%	6.75%	6.25%	6.00%	6.00%
Int'l Developed	8.84% ³	9.00%	9.75%	8.00%	7.00%	7.75%	7.75%	7.25%	7.00%	7.25%

1. Reflects average annual return since 1926
 2. Reflects average annual return since 1976
 3. Reflects average annual return since 1970

Comparison of International Equity and US Large Cap Equity Expectations



- **Total return expectations for non-US equities are higher vs. last year**
- **Expectations for US equities are the same despite a relatively flat year**
 - Increased spread of 1.25% for developed non-US relative to US large cap
 - Increased premium for emerging equity as valuations have become more attractive
- **Meaningful downside risks remain in developed and emerging world**
- **While we expect investors to be compensated over 5-7 years with a higher relative return for holding non-US equities, it is appropriate to use active management to mitigate exposure to downside risks**

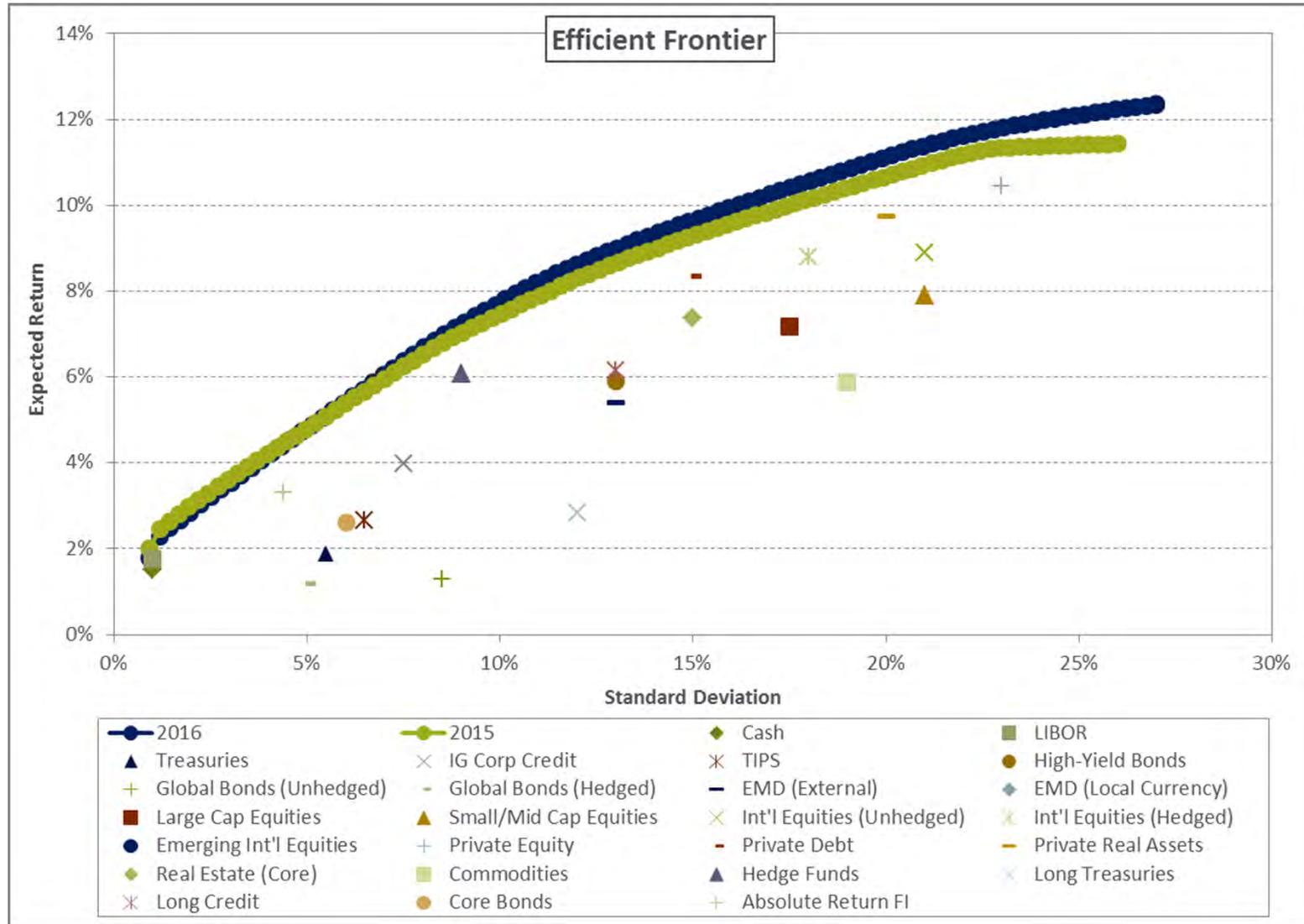
2016 Correlations

Asset Class	Cash	Treas	Credit	MBS	TIPS	HY	Glob Bonds	Glob (H)	EMD (Ext)	EMD (Loc)	Large Cap	Sm/Mid	Intl Eq	Intl Eq (H)	EM Eq	Priv Eq	Priv Debt	Priv Real	Real Estate	Cmdy	Hedge Funds
Cash	1.00																				
Treasuries	0.20	1.00																			
IG Corp Credit	0.10	0.65	1.00																		
MBS	0.25	0.90	0.75	1.00																	
TIPS	0.00	0.65	0.60	0.70	1.00																
High-Yield Bonds	-0.05	0.20	0.55	0.30	0.20	1.00															
Global Bonds (Unhedged)	0.10	0.50	0.50	0.45	0.40	0.10	1.00														
Global Bonds (Hedged)	0.15	0.80	0.65	0.70	0.65	0.20	0.60	1.00													
EMD (External)	0.05	0.35	0.65	0.35	0.30	0.60	0.25	0.35	1.00												
EMD (Local Currency)	0.05	0.30	0.60	0.25	0.25	0.60	0.30	0.25	0.80	1.00											
Large Cap Equities	-0.10	-0.10	0.45	0.10	0.00	0.65	0.00	-0.10	0.55	0.65	1.00										
Small/Mid Cap Equities	-0.15	-0.15	0.45	0.10	-0.10	0.70	-0.05	-0.15	0.55	0.60	0.90	1.00									
Int'l Equities (Unhedged)	-0.10	0.00	0.30	0.05	-0.05	0.65	0.35	0.00	0.60	0.70	0.70	0.60	1.00								
Int'l Equities (Hedged)	0.00	0.00	0.30	0.05	-0.05	0.65	0.05	0.00	0.60	0.65	0.75	0.65	0.85	1.00							
Emerging Int'l Equities	-0.10	-0.10	0.25	-0.10	-0.10	0.70	0.05	-0.05	0.70	0.80	0.60	0.65	0.70	0.70	1.00						
Private Equity	-0.20	-0.15	0.30	0.10	-0.10	0.60	-0.15	-0.20	0.35	0.40	0.70	0.75	0.60	0.65	0.45	1.00					
Private Debt	0.00	-0.35	0.15	-0.15	-0.10	0.65	-0.10	-0.10	0.50	0.60	0.60	0.65	0.75	0.75	0.80	0.65	1.00				
Private Real Assets	0.15	-0.20	0.05	-0.15	0.00	0.40	-0.05	-0.05	0.40	0.40	0.55	0.60	0.50	0.50	0.50	0.65	0.60	1.00			
Real Estate (Core)	0.25	-0.05	0.15	0.05	0.10	0.25	0.05	-0.05	0.20	0.30	0.40	0.40	0.35	0.40	0.30	0.50	0.40	0.40	1.00		
Commodities	0.10	-0.10	0.10	-0.10	0.30	0.20	0.10	-0.10	0.35	0.45	0.30	0.30	0.35	0.35	0.40	0.25	0.30	0.45	0.30	1.00	
Hedge Funds	0.00	-0.20	0.35	-0.15	0.20	0.60	0.05	-0.20	0.55	0.60	0.60	0.65	0.70	0.65	0.70	0.75	0.80	0.65	0.25	0.50	1.00

Diversified Portfolio Return/Risk Comparison

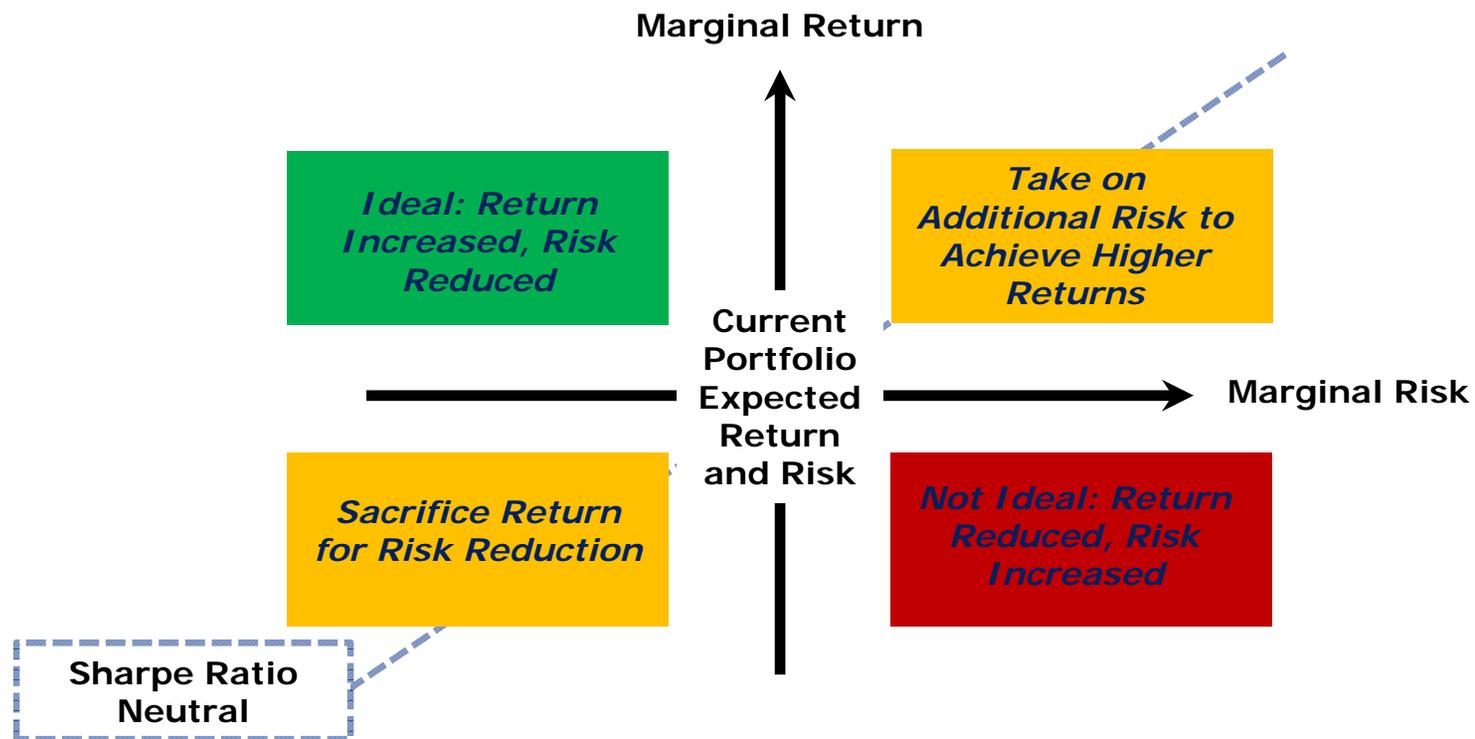
	65/35	Risk Parity ¹	Progressive Allocation
Large Cap Equities	35%	0%	15%
Small/Mid Cap Equities	15%	0%	5%
Int'l Equities (Hedged)	0%	0%	5%
Int'l Equities (Unhedged)	12%	0%	5%
Emerging Int'l Equities	3%	0%	5%
Total Equity	65%	0%	35%
Core Bonds	25%	0%	0%
High-Yield Bonds	5%	0%	0%
Global Bonds (Unhedged)	5%	0%	0%
Global Multi-Sector	0%	0%	10%
Absolute Return FI	0%	0%	5%
Long Treasuries	0%	0%	5%
Total Fixed Income	35%	0%	20%
Private Equity	0%	0%	10%
Private Debt	0%	0%	5%
Hedge Funds	0%	0%	10%
Total Alternatives	0%	0%	25%
Global Asset Allocation	0%	0%	10%
Risk Parity	0%	100%	10%
Total Other	0%	100%	20%
<i>2015 Expected Return (5-7 years)</i>	<i>5.4%</i>	<i>5.7%</i>	<i>6.5%</i>
<i>2015 Expected Return (30 years)</i>	<i>6.9%</i>	<i>7.0%</i>	<i>7.6%</i>
<i>2015 Standard Deviation</i>	<i>12.4%</i>	<i>12.4%</i>	<i>12.2%</i>
<i>2016 Expected Return (5-7 years)</i>	<i>5.5%</i>	<i>6.1%</i>	<i>6.5%</i>
<i>2016 Expected Return (30 years)</i>	<i>6.9%</i>	<i>7.5%</i>	<i>7.6%</i>
<i>2016 Standard Deviation</i>	<i>12.4%</i>	<i>13.2%</i>	<i>11.9%</i>

Efficient Frontier Comparison

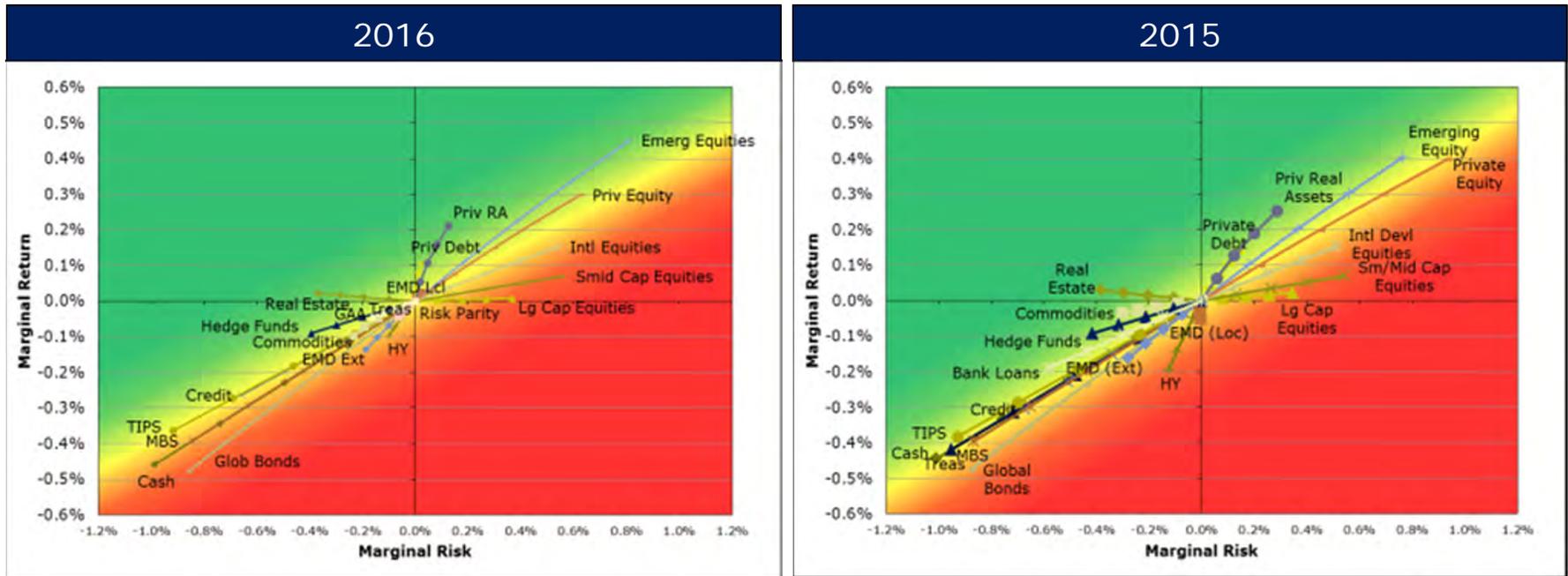


Portfolio Efficiency: Marginal Risk and Return

- **Thinking about the marginal impact on risk and return from each asset class can be useful in evaluating asset allocation decisions**
 - In the analysis that follows, the marginal impact of increasing an allocation to a given asset class is plotted for a progressive portfolio and a traditional 65/35 allocation
- **Uses mean-variance assumptions**
 - Certain limitations (particularly liquidity) should be considered outside of this framework



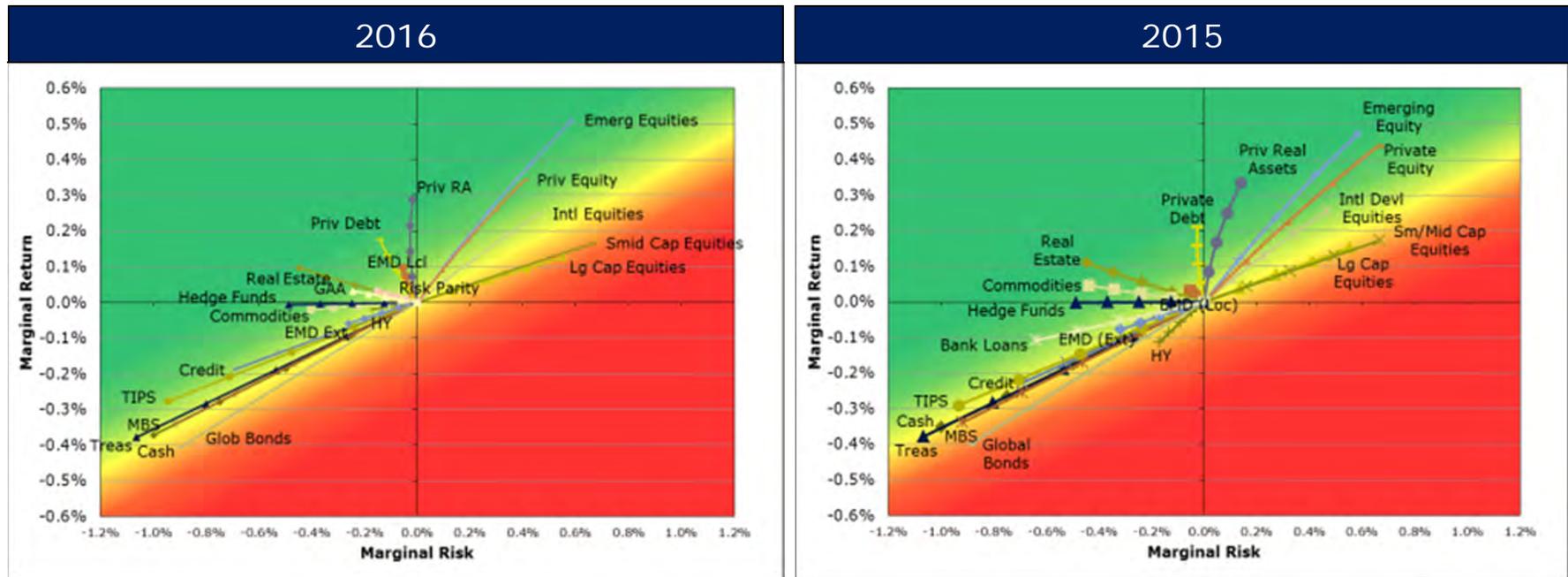
2016 vs. 2015 (Progressive Allocation; 2% Increments)



- **General takeaways for a progressive allocation**

- Emerging equities are the most attractive liquid asset classes on the margin
- Private real assets are a beneficial complement to a private equity and debt program
- Real estate provides a meaningful level of diversification

2016 vs. 2015 (65/35 Allocation; 2% Increments)



- **Lower Sharpe ratio of 65/35 means a flatter diagonal**
 - Easier to make improvements from a lower starting point
- **More dispersion around diagonal = larger opportunity set for improving efficiency**
 - More balanced global equity allocation
 - Emerging market local debt provides return and diversification benefits
 - If appropriate, increased return through illiquid alternatives program
 - TIPS relative to other safe haven fixed income assets improves the risk/return profile

2015 and 2016 Efficient Frontier Portfolios: 10% Standard Deviation

	2015 Unconstrained	2015 Constrained	2016 Unconstrained	2016 Constrained
Large Cap Equities	0%	8%	0%	9%
Int'l Equities (Unhedged)	0%	4%	0%	5%
Int'l Equities (Hedged)	0%	4%	0%	5%
Emerging Int'l Equities	11%	5%	9%	6%
Total Equity	11%	21%	9%	24%
IG Corp Credit	0%	0%	0%	7%
Long Treasuries	0%	8%	0%	6%
Long Credit	29%	25%	36%	25%
Total Fixed Income	29%	33%	36%	38%
Private Equity	2%	1%	3%	0%
Private Debt	0%	4%	4%	2%
Private Real Assets	9%	6%	13%	13%
Real Estate (Core)	31%	23%	27%	19%
Hedge Funds	18%	1%	7%	0%
Total Alternatives	60%	35%	55%	35%
Commodities	0%	11%	0%	3%
Total Other	0%	11%	0%	3%
<i>Expected Return (5-7 years)</i>	<i>7.2%</i>	<i>6.8%</i>	<i>7.4%</i>	<i>6.9%</i>
<i>Expected Return (30 years)</i>	<i>7.5%</i>	<i>7.3%</i>	<i>7.6%</i>	<i>7.4%</i>
<i>Standard Dev of Asset Return</i>	<i>10.0%</i>	<i>10.0%</i>	<i>10.0%</i>	<i>10.0%</i>

- **5-7 year return expectations moderately higher among global equity and credit assets relative to prior year**
 - Expected return outlook broadly remains subdued
 - Recent performance of emerging markets leads to increase in expectations
 - Expectations of slow Fed policy tightening reduce cash forecasts
 - Increase in expectations for credit markets reflect higher credit spread levels
 - Hedge Fund expectations unchanged but incorporate anticipation of greater divergences across and within global markets
- **30-year returns have similar themes to 5-7 year forecasts**
 - Lower cash assumption flows through to long-term fixed income returns
 - Equity market assumptions largely unchanged
- **Volatility expectations reduced incrementally in certain asset classes**
 - Private Market reductions echo normalized environment and asset class experience
 - Volatility for emerging markets and commodities increased to reflect probability of higher risk moments

DPFP: 2016 Asset Allocation & Risk Budgeting



Current Asset Allocation Policy with Recommended Mix Illustrated

	Global 60/40	DPFP Current Target	Recommended Mix
Cash	0%	0%	2%
Equity	60%	15%	25%
Global Equity	60%	15%	20%
Emerging Markets	0%	0%	5%
Fixed Income	40%	15%	28%
Core Bonds	0%	0%	2%
Global Bonds	40%	4%	3%
High Yield	0%	6%	5%
EMD (50/50)	0%	3%	6%
Bank Loans	0%	2%	6%
Absolute Return & Structured Credit	0%	0%	6%
Global Asset Allocation	0%	20%	10%
Risk Parity	0%	14%	5%
GTAA	0%	6%	3%
Absolute Return	0%	0%	2%
Total Liquid	100%	50%	65%
Private Markets	0%	15%	10%
Private Equity	0%	7.5%	5%
Private Debt	0%	7.5%	5%
Real Assets	0%	35%	25%
Real Estate	0%	15%	12%
Natural Resources	0%	10%	5%
Infrastructure	0%	10%	5%
Liquid Real Assets	0%	0%	3%
Total Real & Illiquids	0%	50%	35%
Expected Return (5-7 years) ¹	5.1%	7.2%	6.9%
Expected Return (30 years) ²	6.5%	7.9%	7.7%
Standard Dev of Asset Return³	11.8%	12.7%	12.1%
Sharpe Ratio⁴	0.30	0.45	0.45

¹Defined as the 5-year geometric mean (compounded return), based on NEPC's 2016 5-7 year Market Assumptions, with adjustments in the Appendix.

²Defined as the 30-year geometric mean (compounded return), based on NEPC's 2016 30-year Market assumptions, with adjustments in the Appendix.

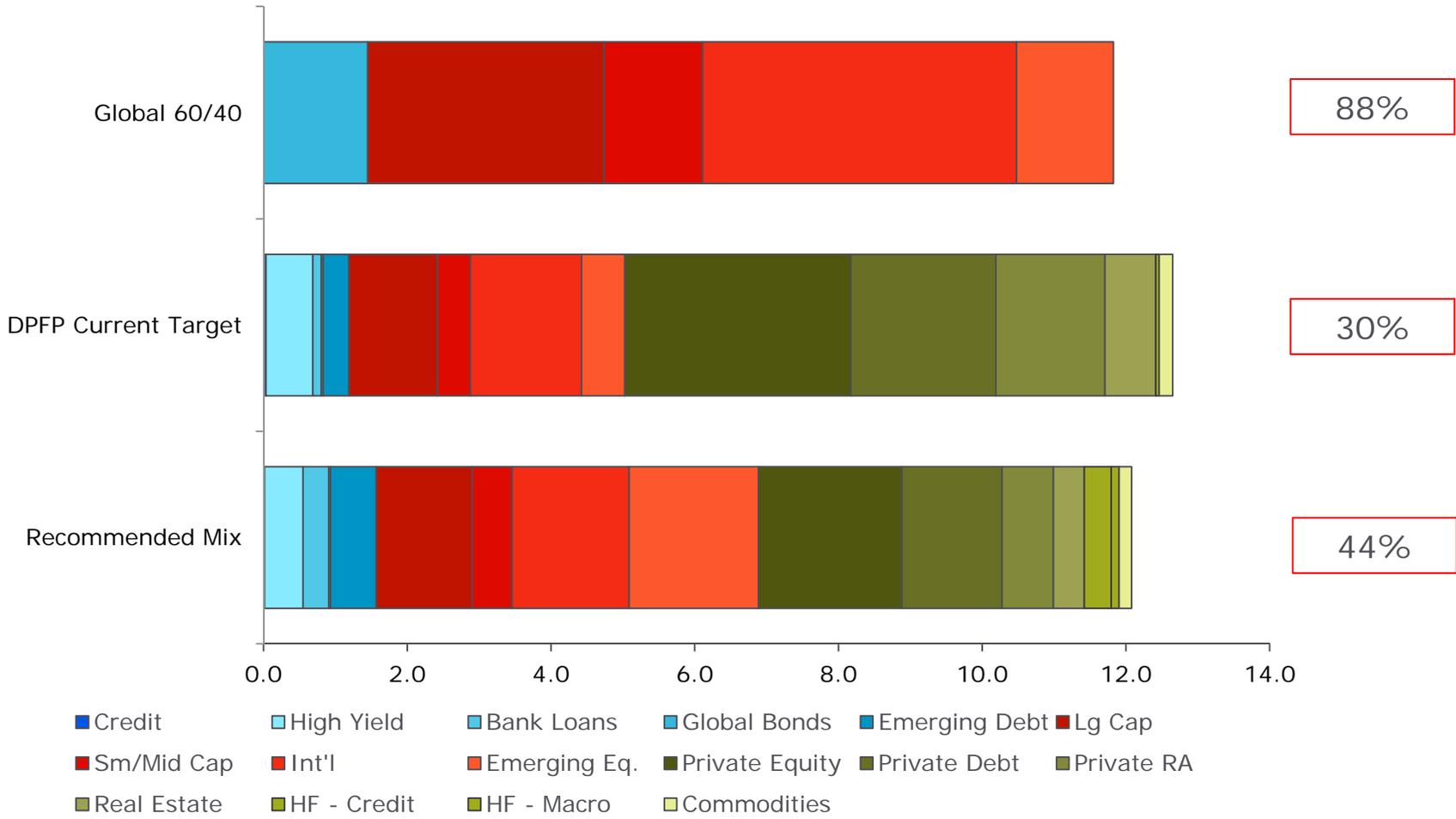
³Defined as the standard deviation of returns, based on NEPC's 2016 Market Assumptions, with adjustments in the Appendix.

⁴Measures return per unit of risk.

- **Risk budgeting considers the portfolio from a total risk perspective rather than total return**
- **A way to determine the contribution to overall portfolio risk by each asset class in the portfolio, based on**
 - Asset class volatility assumptions
 - Correlations between asset classes
- **Shows the benefit of diversification within a portfolio**
 - Risk exposures in relation to allocation size

Risk Budgeting

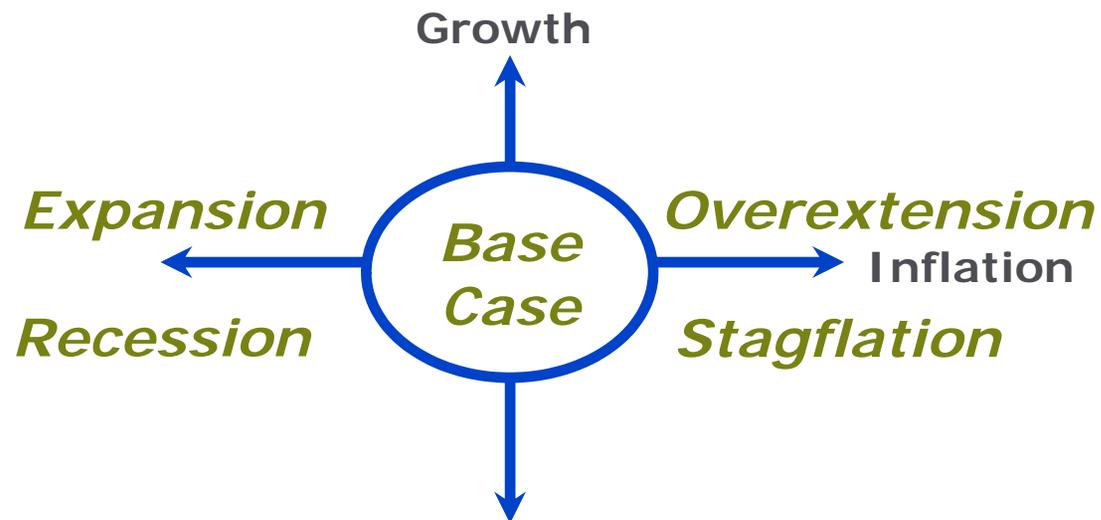
Public Equity Risk %



Scenario Analysis

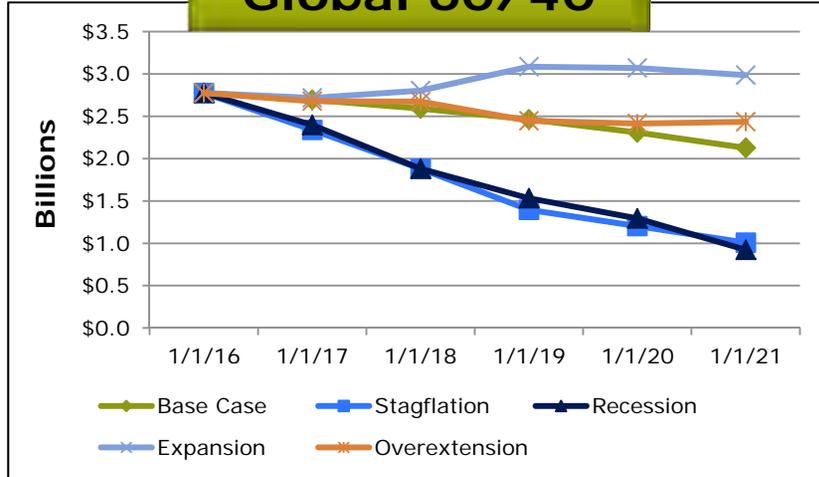


- **NEPC Scenario Analysis tests the viability of alternative asset mixes under multiple economic scenarios**
 - Allows better understanding of risk exposures under contrasting inflation and economic growth regimes
 - Can understand the effect on both assets and liabilities (funded status)

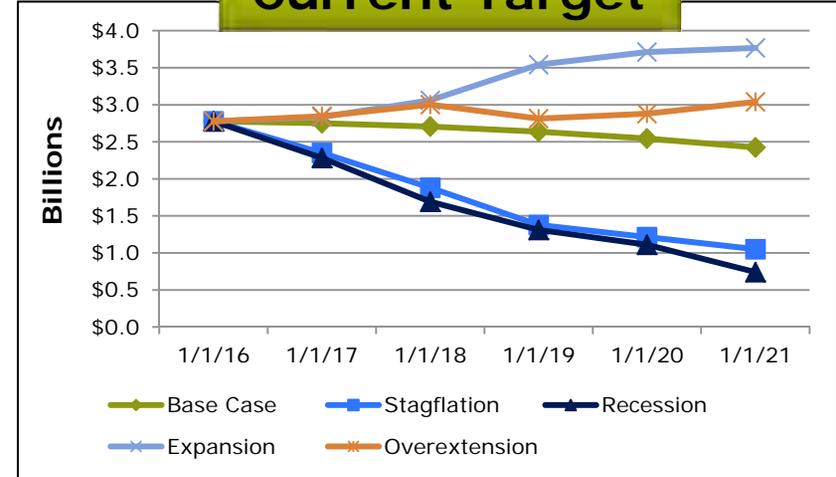


Economic Scenario Analysis – Market Value

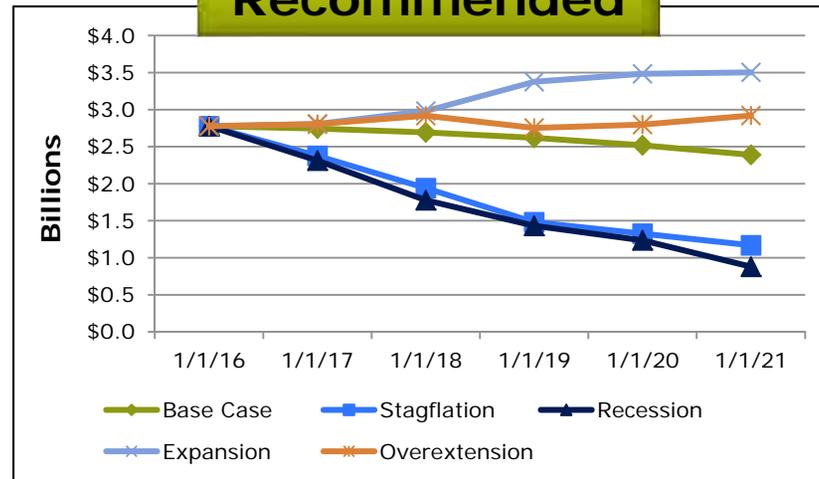
Global 60/40



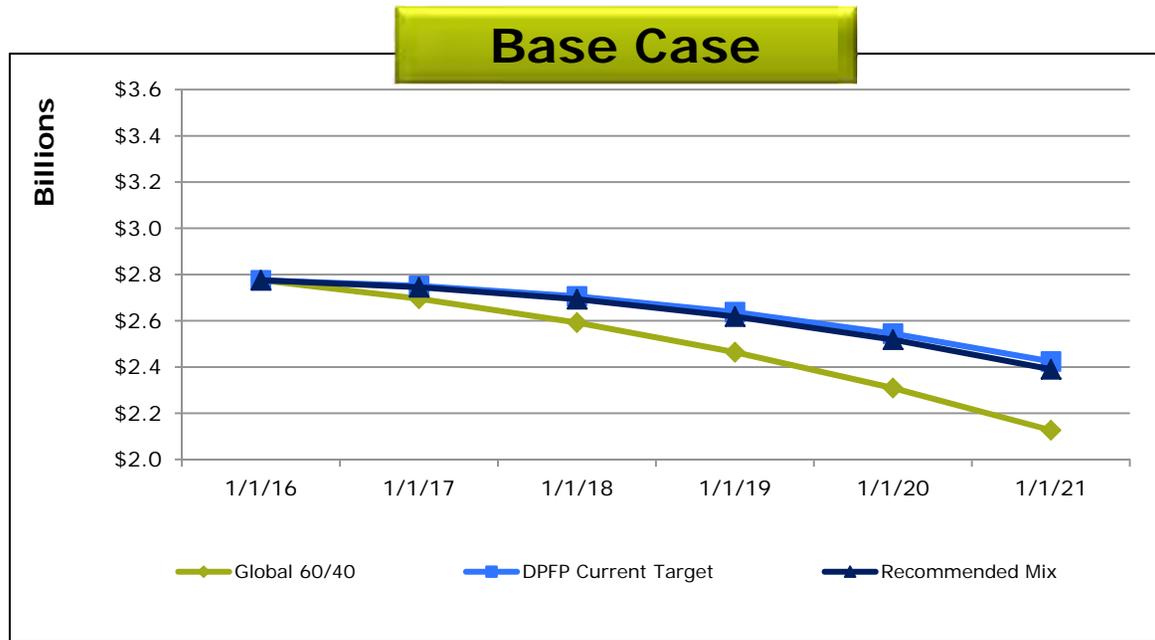
Current Target



Recommended

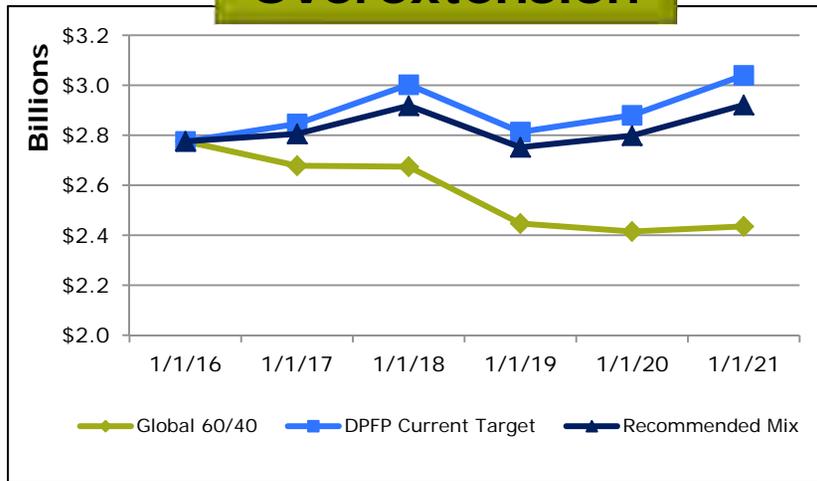


Economic Scenario Analysis – Market Value, Base Case



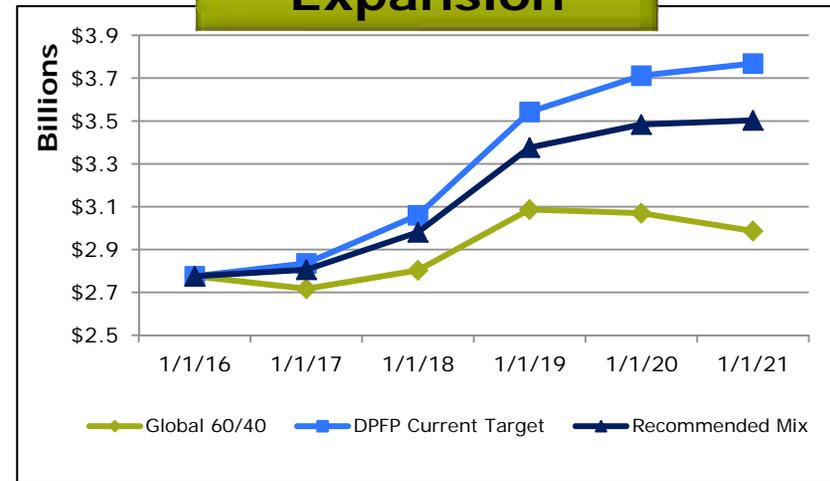
- DFPF current and recommended allocations show declines in plan market value to \$2.42 Billion and \$2.39 Billion by 2021, respectively, under a base case scenario.
- A global 60/40 allocation would be expected to fall to \$2.1 Billion.

Overextension



- DFPF current and recommended allocations show increases in plan market value to \$3.04 Billion and \$2.92 Billion by 2021, respectively, under an overextension scenario.
- A global 60/40 allocation would be expected to decrease to \$2.44 Billion.

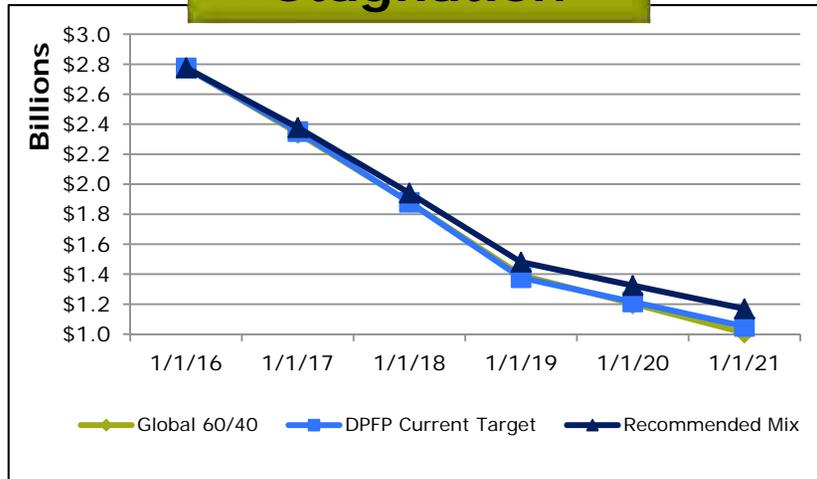
Expansion



- DFPF current and recommended allocations show increases in plan market value to \$3.77 Billion and \$3.5 Billion by 2021, respectively, under an expansionary scenario.
- A global 60/40 allocation would be expected to increase to \$3.0 Billion.

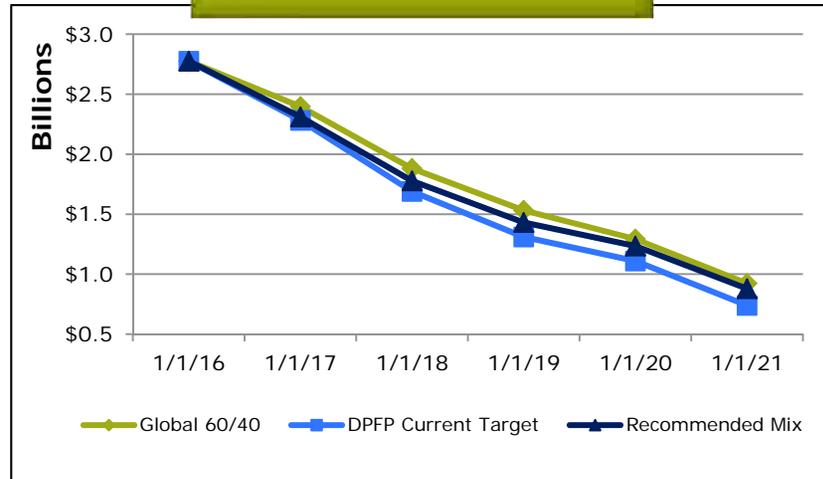
Economic Scenario Analysis – Market Value, Negative Outcome

Stagflation



- All three allocation mixes under a stagflation scenario show declines in plan market value to \$1-\$1.2 Billion by 2021.
- The spread between the current target and recommended target is expected to be approximately \$118 Million.

Recession



- All three allocation mixes under a recession scenario show declines in plan market value to \$700-\$900 Million by 2021.
- The spread between the current target and recommended target is expected to be approximately \$138 Million.

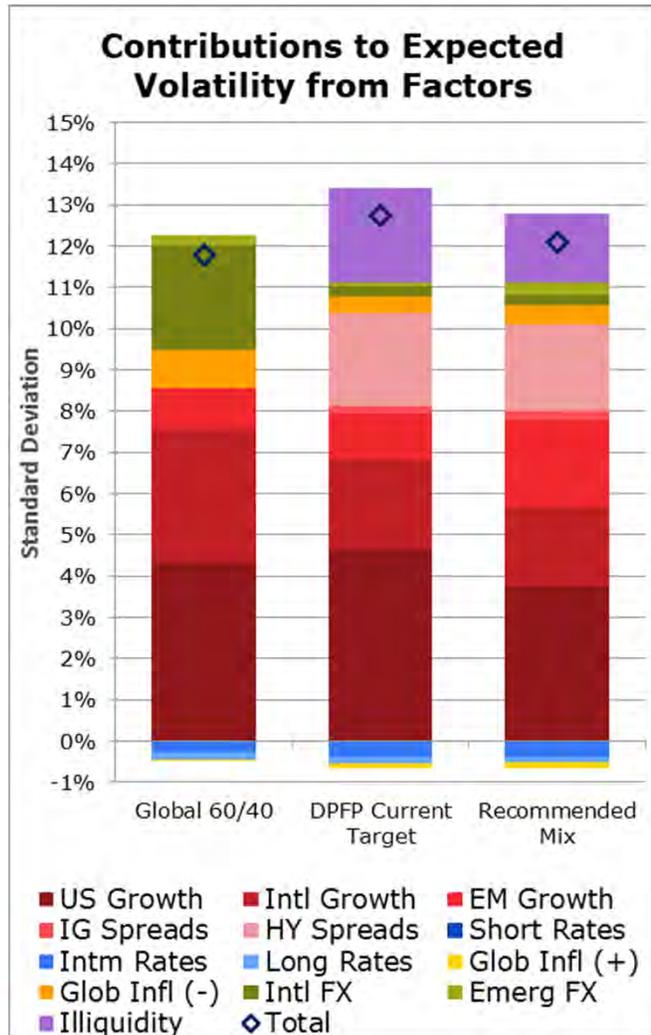
Factor Analysis



NEPC's Macroeconomic Risk Factors

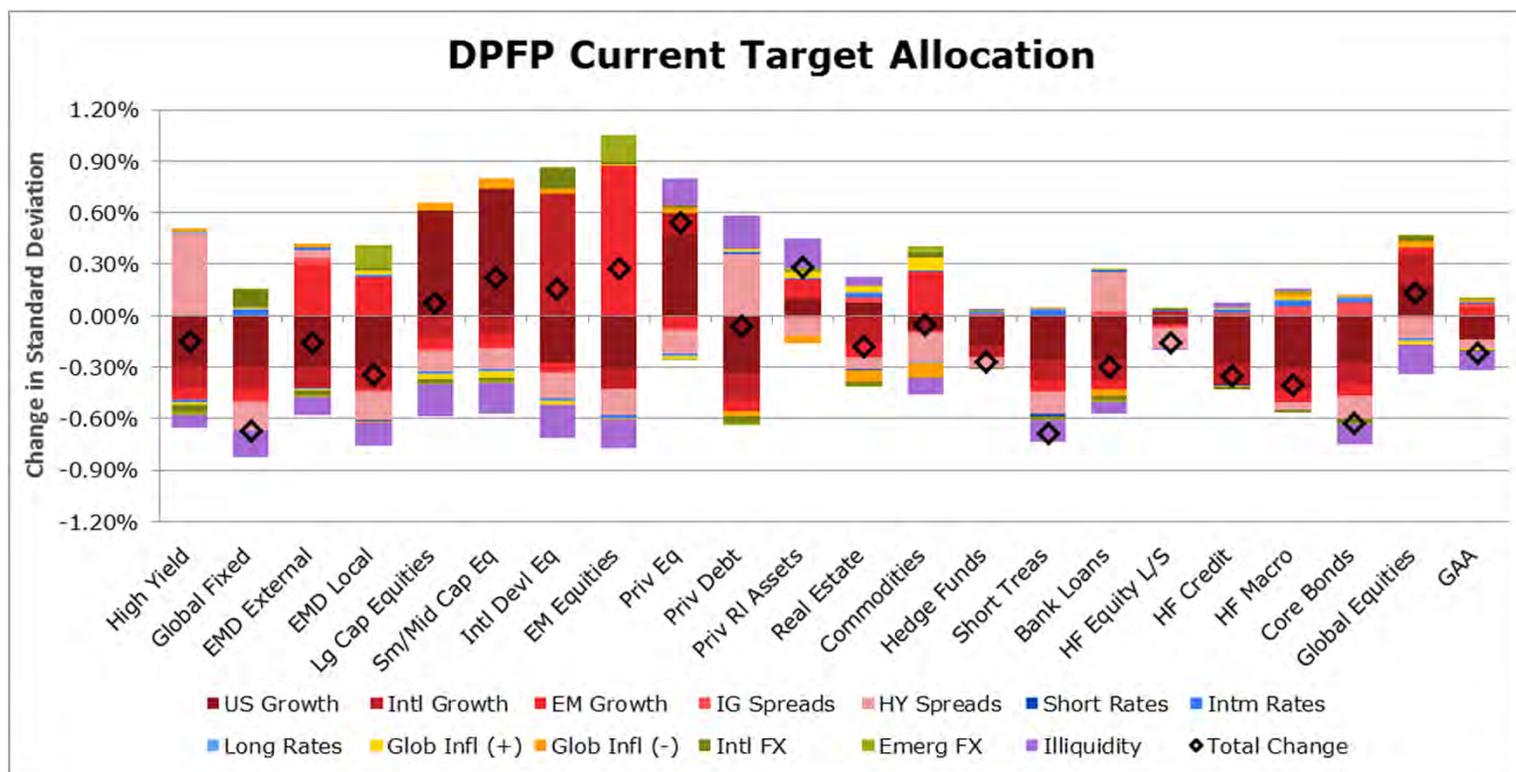
- **We focus on five key underlying macroeconomic risk factors**
 - Sub-factors used for modeling purposes in order to express differences in risk outlook
- **Volatility becomes a function of factor movements relative to expectations**
 - Example: Experience volatility when real rates rise more than expected; not necessarily when any rise occurs
- **Factor analysis is a risk exercise**
 - Investment recommendations also reflect how we expect an investor will be compensated for holding each risk factor

Growth	Real Rates	Inflation	Currency	Illiquidity
Domestic Growth	Short Real Rates	Rising Global Inflation	Developed vs. Base	Contractual Illiquidity
Developed Int'l Growth	Intermediate Real Rates	Falling Global Inflation	Emerging vs. Base	Pricing Illiquidity
Emerging Growth	Long Real Rates			
IG Credit Spreads				
HY Credit Spreads				



- **DPFP’s factor risk profile is dominated by growth and illiquidity**
 - Real rates diversified away at total portfolio level
 - Lower inflation and currency exposure than a global 60/40 portfolio
- **Recommended Mix provides slightly more balance**
 - Growth profile more balanced globally with dedicated allocation to EM equities
 - Illiquidity exposure reduced

Marginal Impact on Factor Exposures (5% Allocation Changes)

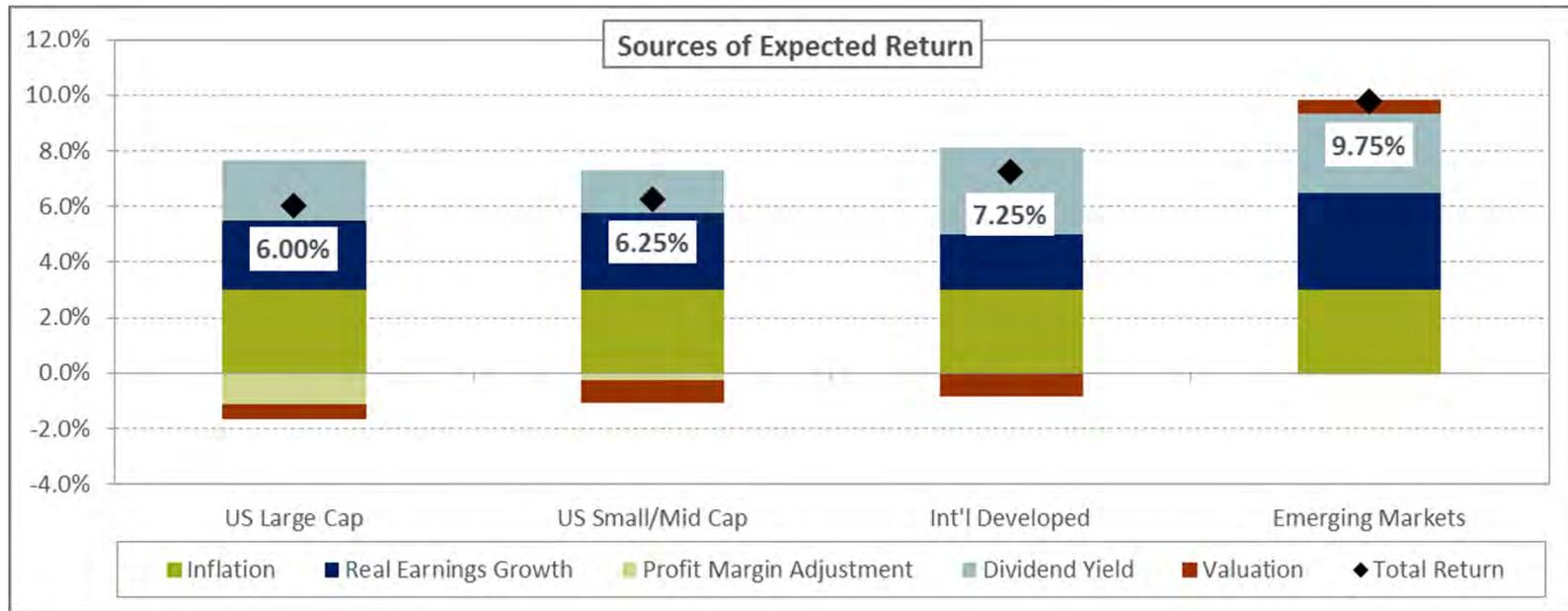


- **Asset classes still represent the means of accessing risk premia**
 - This quantifies the factor impact of increasing an allocation to each asset class by 5% with a pro rata reduction of the rest of the portfolio

Assumption Development



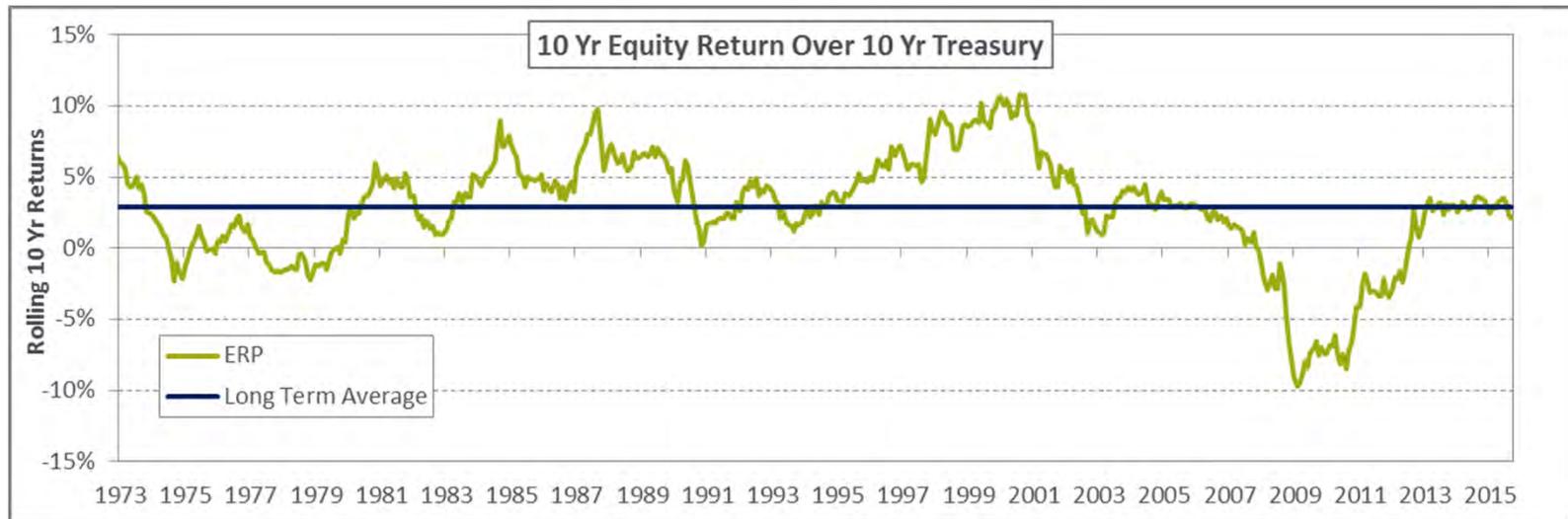
Assumption Development – Global Equities



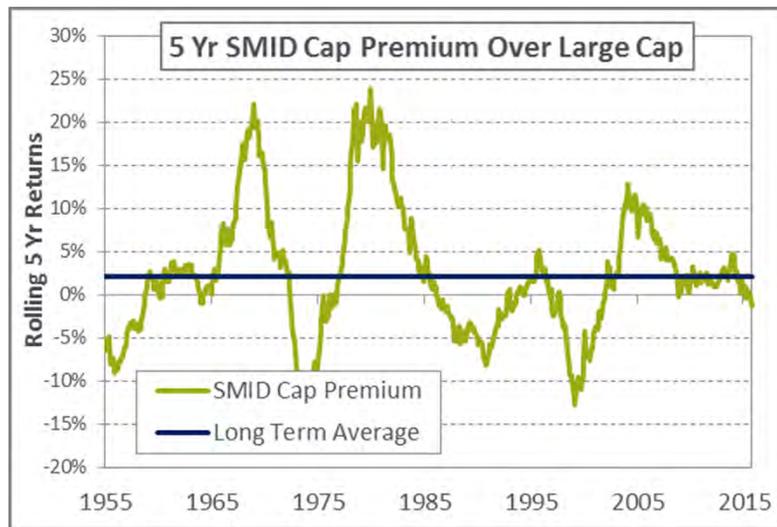
Index Current	US Large Cap	US Small/Mid Cap	Int'l Developed	Emerging Markets
Forward P/E	17.6	23.3	15.8	11.6
Profit Margins	8.3%	2.8%	6.0%	8.1%
Dividend Yield	2.1%	1.6%	3.2%	3.1%

- Real earnings growth assigned to each market over forecast period
- Valuation input based on current P/E trending to forecast value
- Profit margin adjustment shifts from current to forecast value
- Dividend yield based on current yield trending to forecast value
- Global inflation input of 3.0% flows through all global equity markets

Low Interest Rates Supportive of an Elevated US Risk Premium



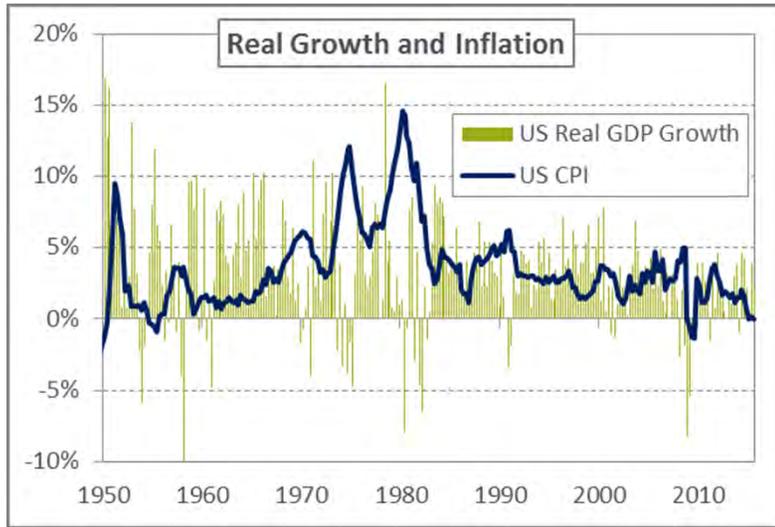
Source: Standard & Poors, Federal Reserve, NEPC, Bloomberg



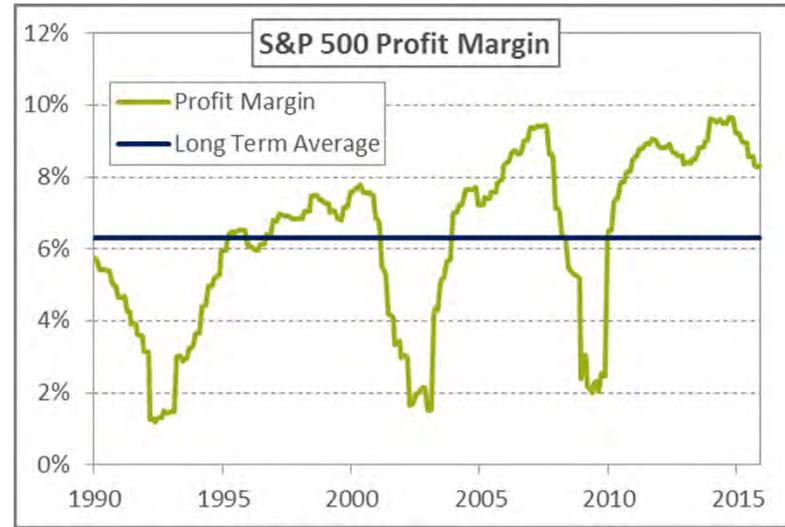
Source: Morningstar Direct, Bloomberg

- **Equity Risk Premium over 10 year Treasury is volatile**
 - Stock and bond forecasts imply an Equity Risk Premium of 4.25%
 - While above the long term average, about 37.50% of observations exceed this level since 1962
- **Small/Mid Cap equities have historically earned a premium over Large Cap equities**
 - Trailing 5 year premium below historical average

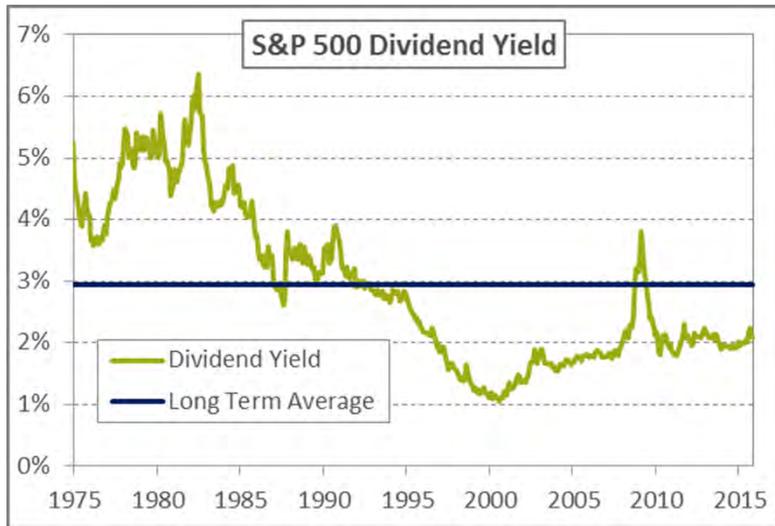
US Large Cap Equity Building Blocks



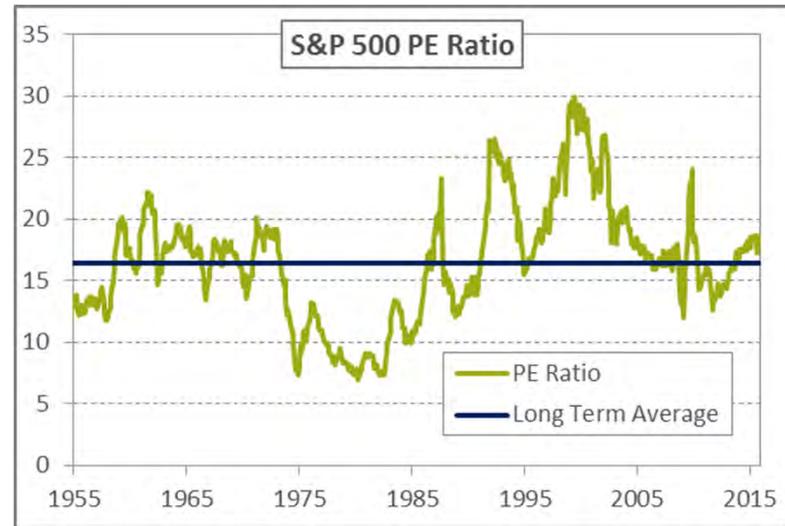
Source: Bureau of Labor Statistics, Bureau of Economic Analysis, Bloomberg



Source: Standard & Poors, Bloomberg

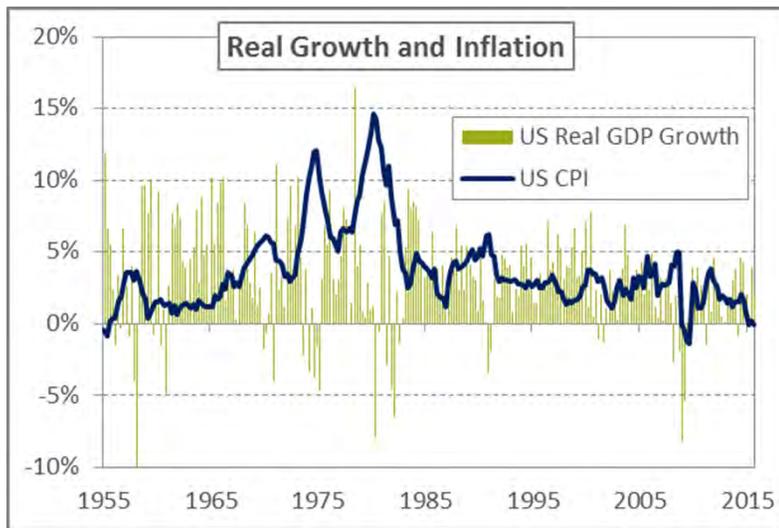


Source: Standard & Poors, Bloomberg

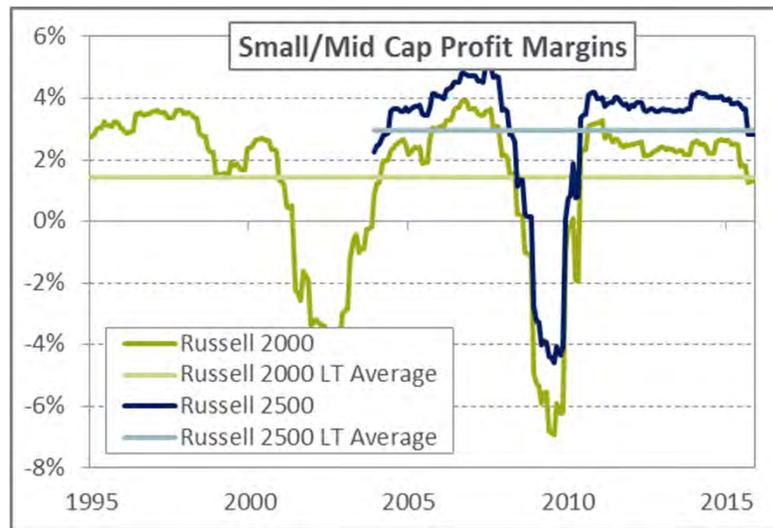


Source: Standard & Poors, Bloomberg

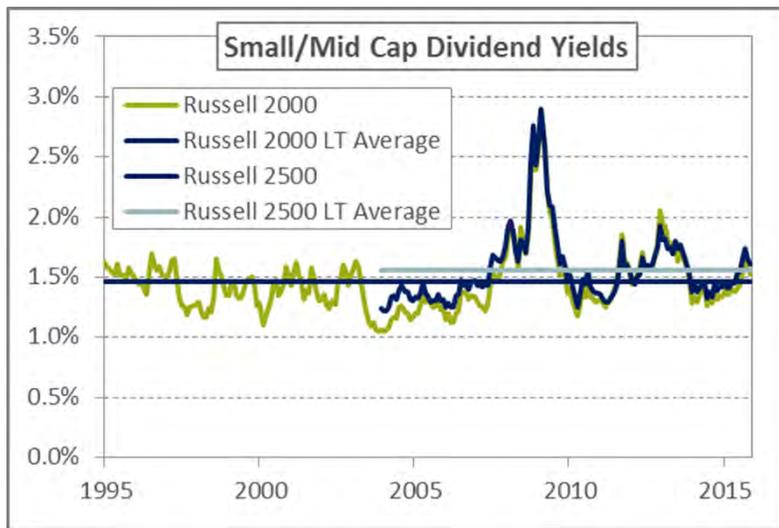
US Small/Mid Cap Equity Building Blocks



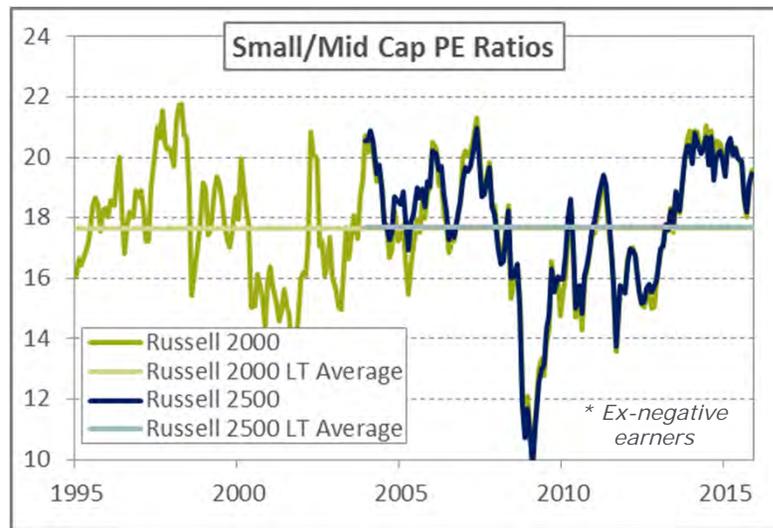
Source: Bureau of Labor Statistics, Bureau of Economic Analysis, Bloomberg



Source: Russell, Bloomberg

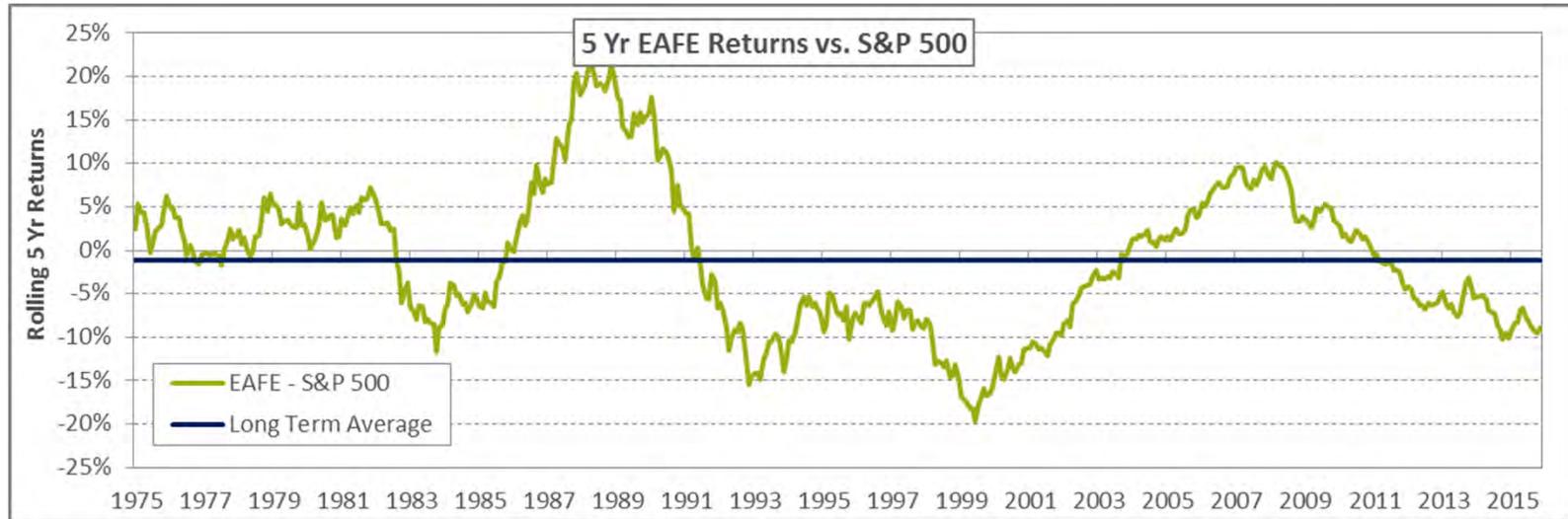


Source: Russell, Bloomberg

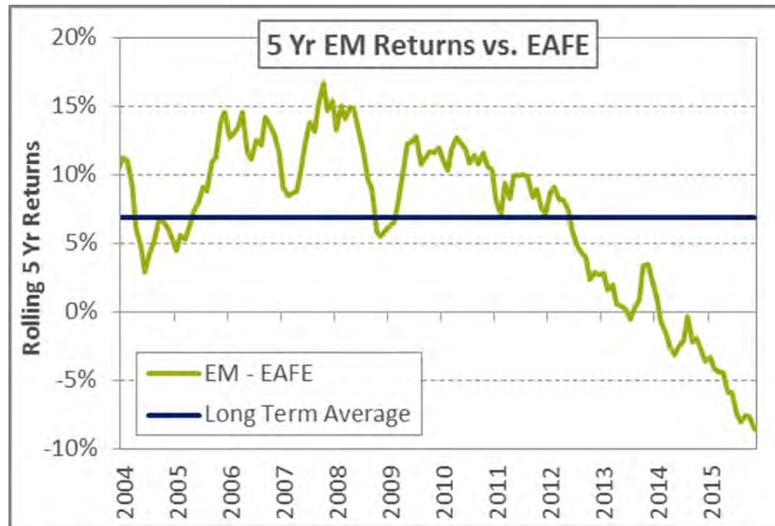


Source: Russell, Bloomberg

Recent Cyclical Underperformance of International Developed Market Equities Relative to US



Source: Standard & Poors, MSCI, Bloomberg



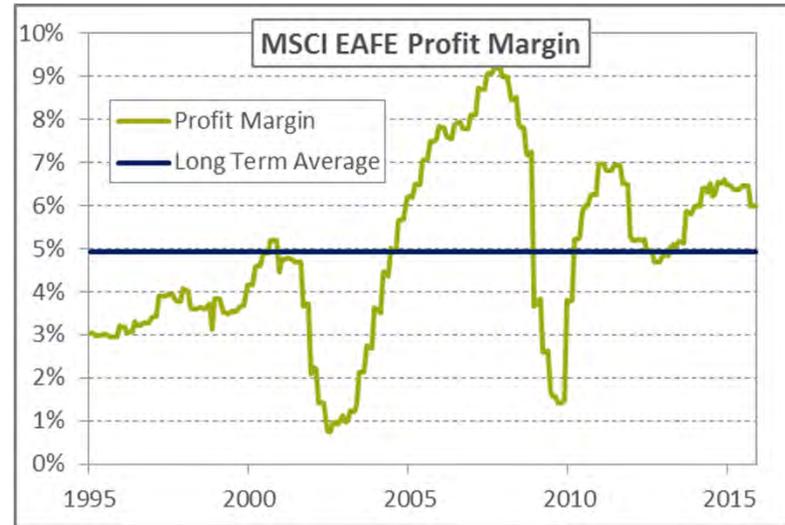
Source: MSCI, Bloomberg

- **Developed markets supported by central bank policy**
 - Low growth prospects but economic improvement can be found in Europe and Japan
 - Earnings and margins remain subdued relative to history
- **Emerging growth differential is less but remains well above developed world**
 - Valuations near long term average

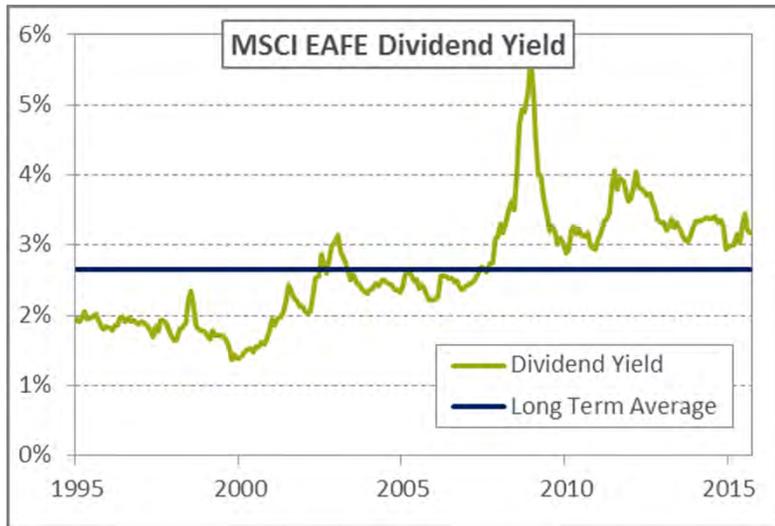
International Developed Equity Building Blocks



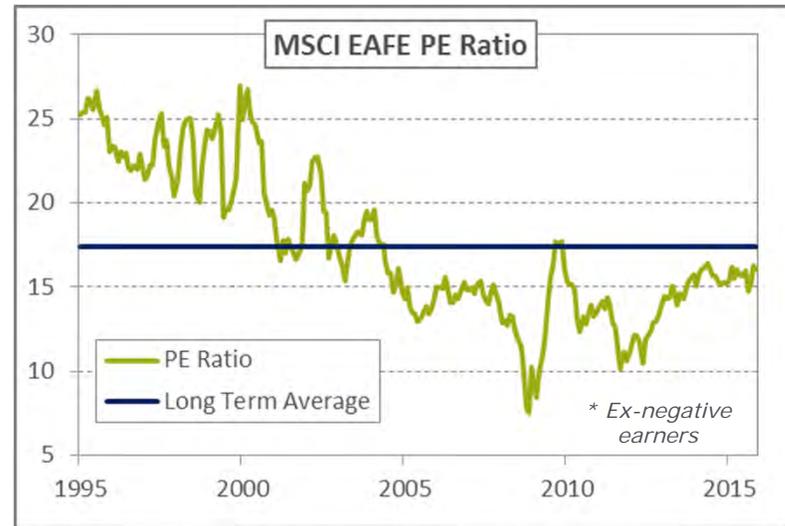
Source: Economic and Social Research Institute Japan, Bloomberg



Source: MSCI, Bloomberg

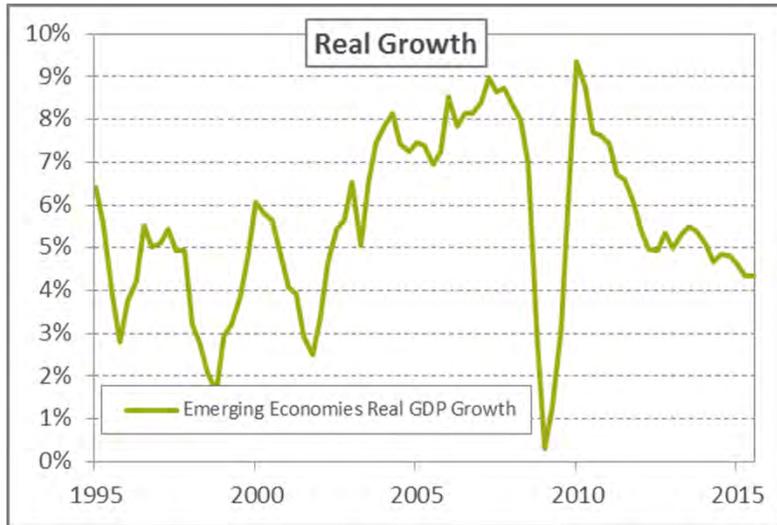


Source: MSCI, Bloomberg

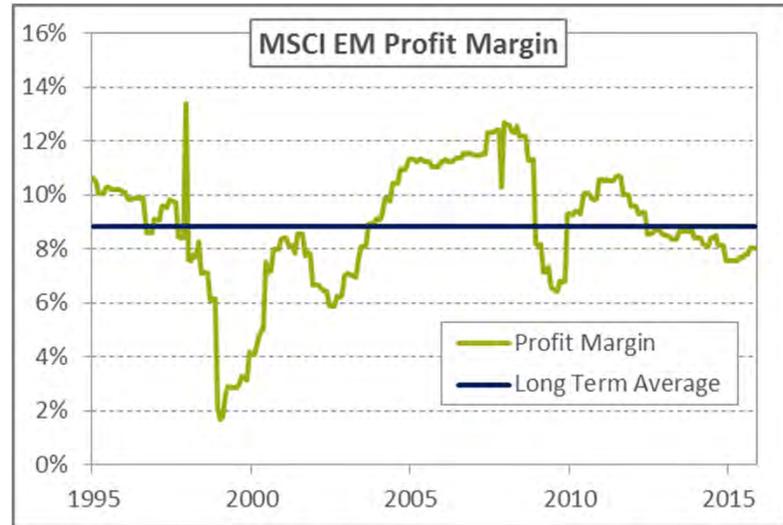


Source: MSCI, Bloomberg

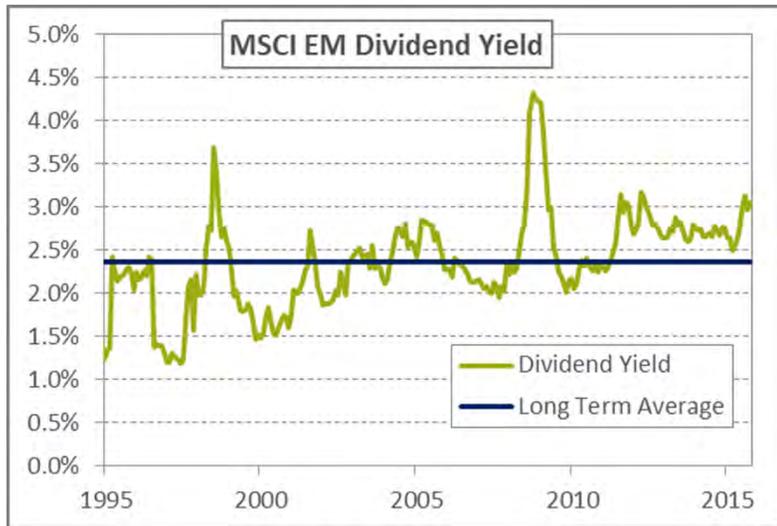
Emerging Equity Building Blocks



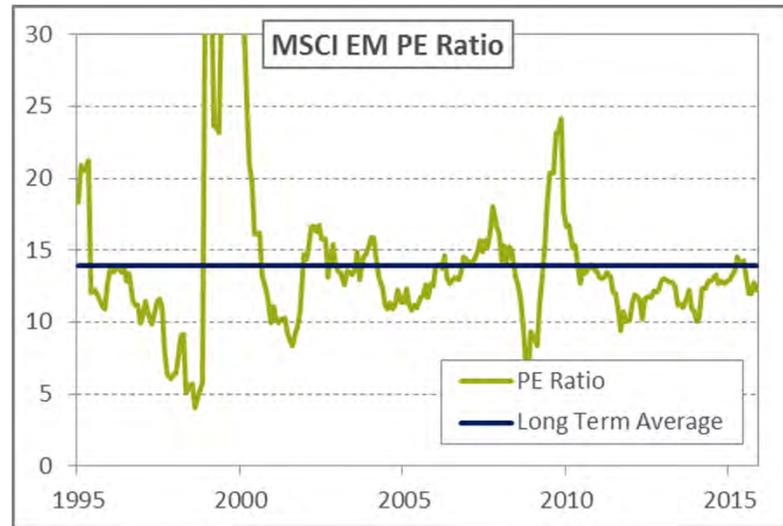
Source: Bloomberg



Source: MSCI, Bloomberg

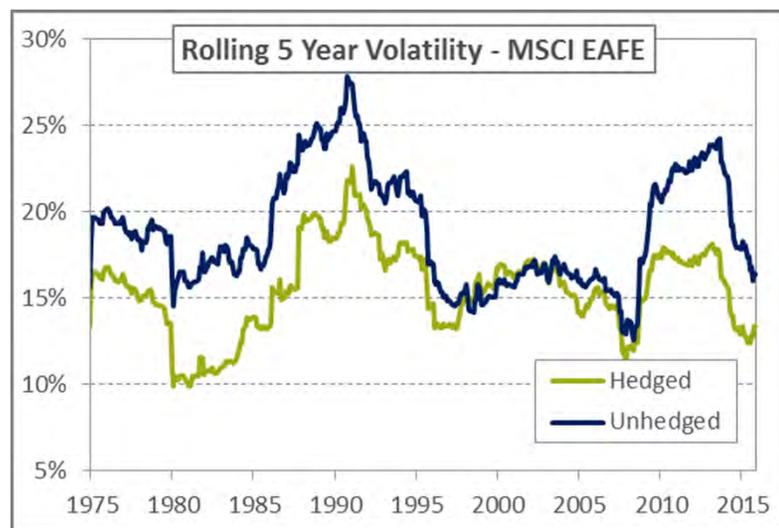


Source: MSCI, Bloomberg



Source: MSCI, Bloomberg

Currency Hedged Asset Class Assumptions



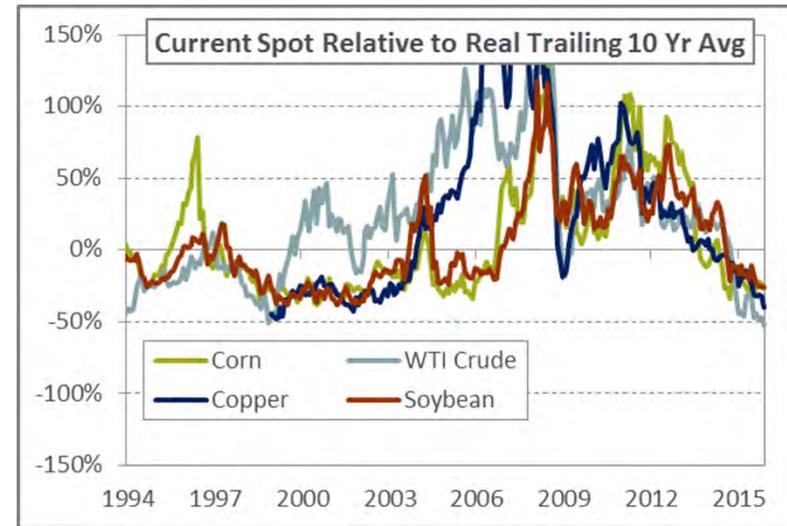
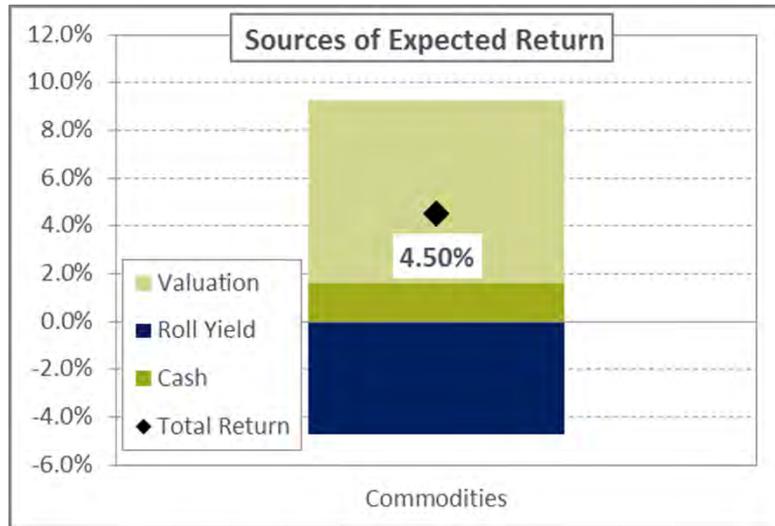
Source: MSCI, Bloomberg



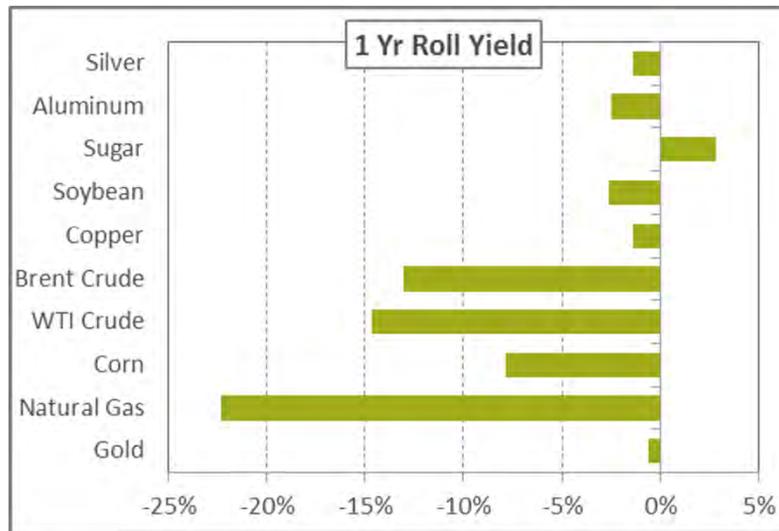
Source: Citigroup, Bloomberg

- **Developed market currency exposure has largely been an uncompensated risk over the last 25 years**
- **Historically it has been a source of volatility and provided limited diversification benefit**
 - Volatility differential (or currency impact on volatility) has persisted in recent history, most notably in MSCI EAFE
- **We use similar arithmetic returns (net of hedging costs) with lower expected volatility for hedged asset class based on relative risk contribution from currency exposure**

Assumption Development – Commodities



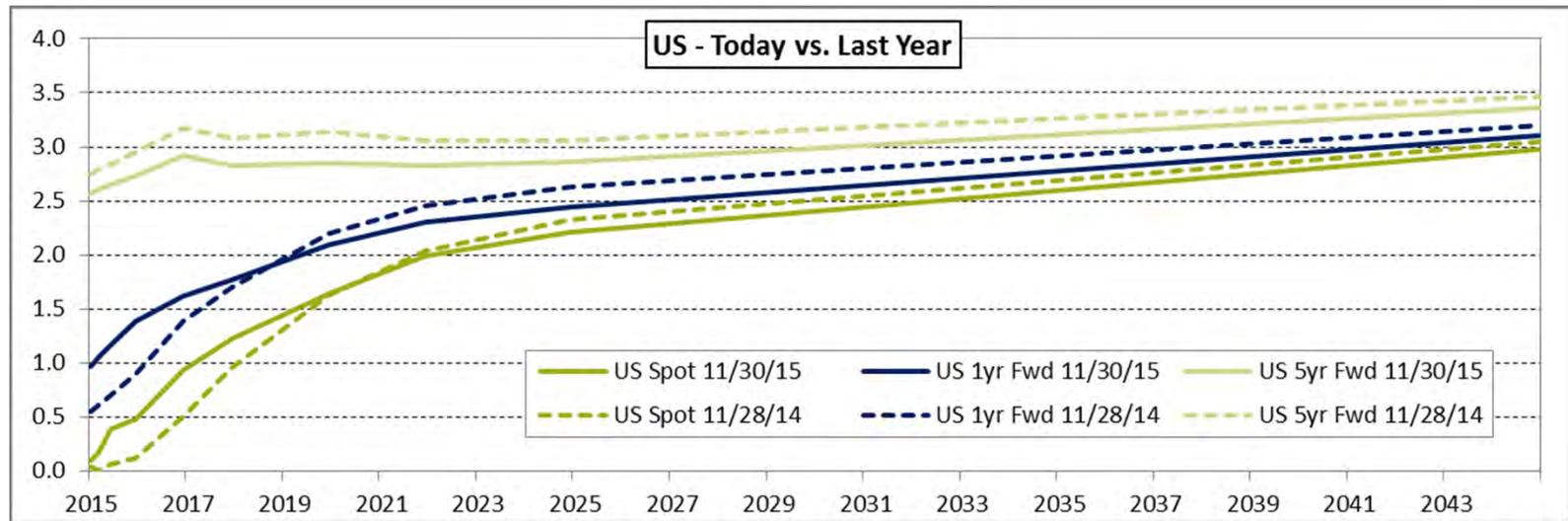
Source: Bloomberg, NEPC



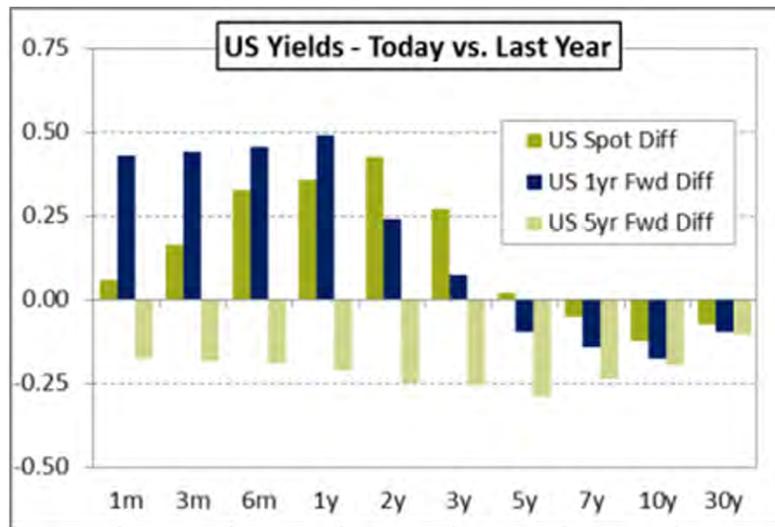
Source: Bloomberg

- Roll yield in contango is a significant drag on future commodity returns**
 - Current roll yield forecast to narrow over 5-7 years to -3.0%
 - Expectations for Fed Funds increase aids cash input
- Spot prices are trading well below long term averages**
 - Spot prices forecast to revert to long term average over 10 years

US Treasury Spot and Forward Curves are the Backdrop for Lower Bond Returns



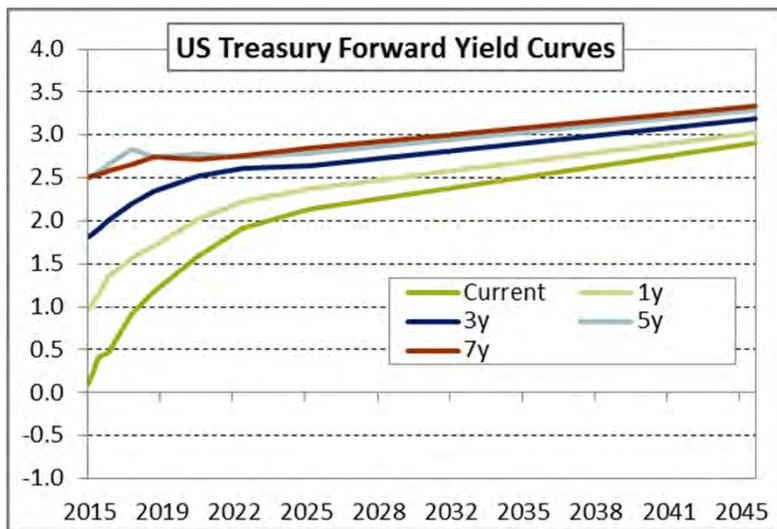
Source: Bloomberg



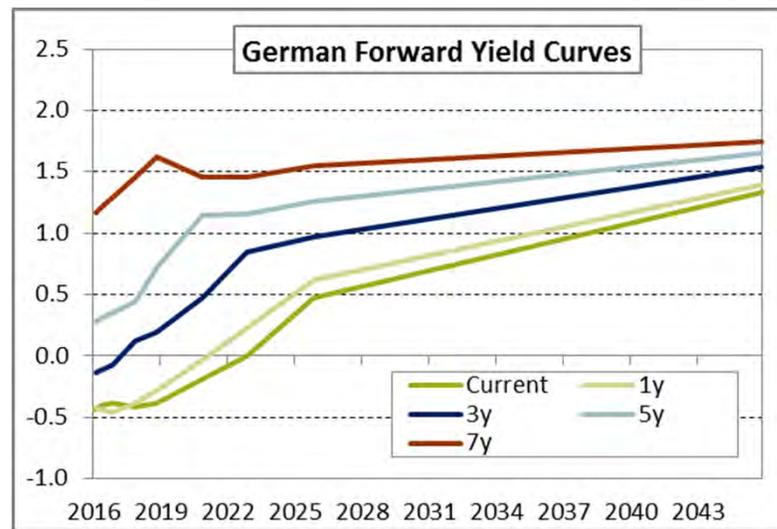
Source: Bloomberg

- **Spot curve elevated relative to prior year at the short end of the curve**
 - Reflects nearing of rate hike cycle but with changing expectations that increases will play out more slowly than previously anticipated
 - Extension of the same trend from one year ago
- **Five year forwards are lower**
 - Entire curve is lower driving lower cash and treasury assumptions

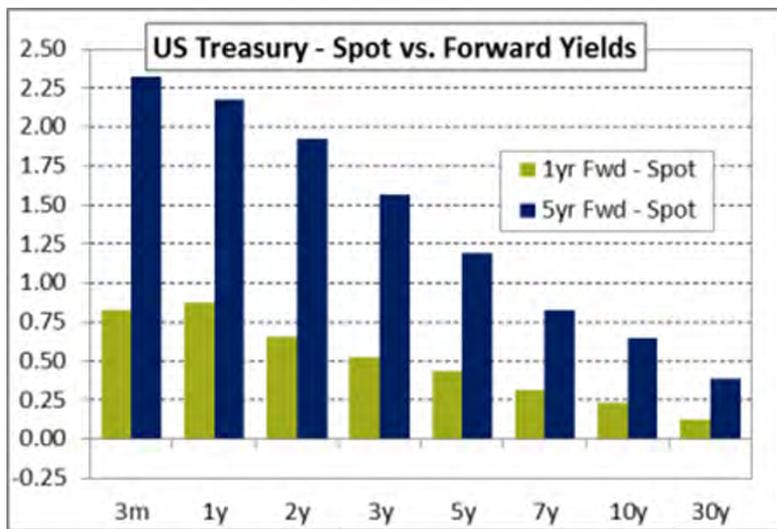
Rising Rates Expected to Impact Developed Market Fixed Income Returns



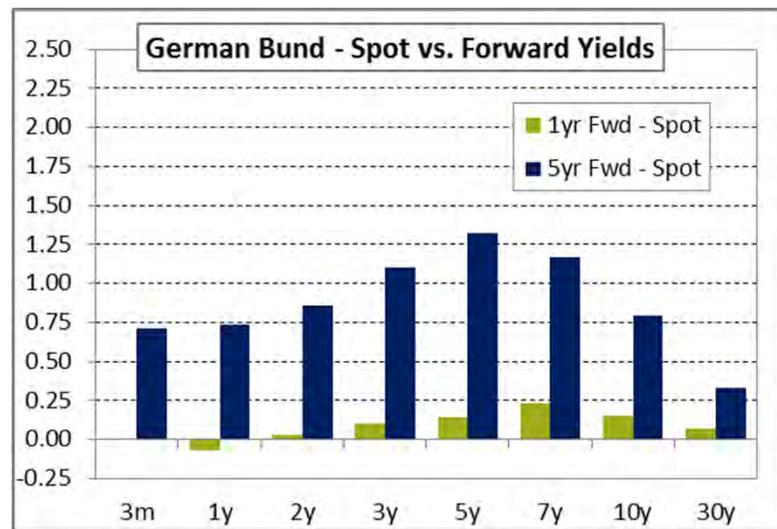
Source: Bloomberg



Source: Bloomberg

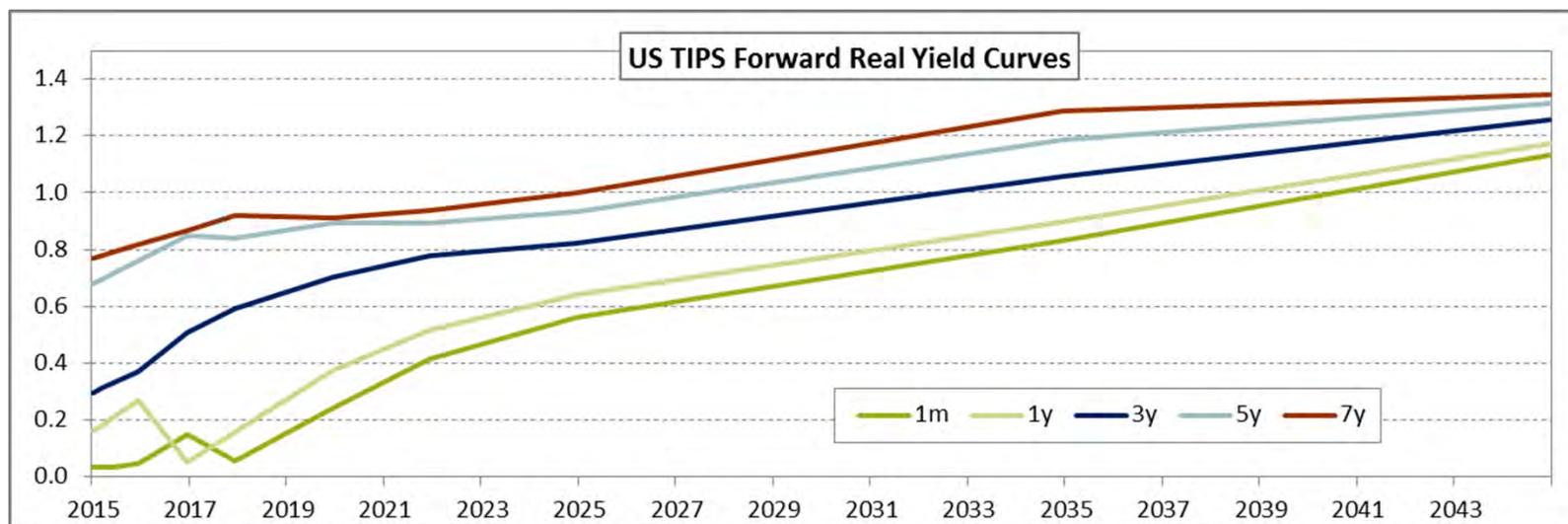


Source: Bloomberg

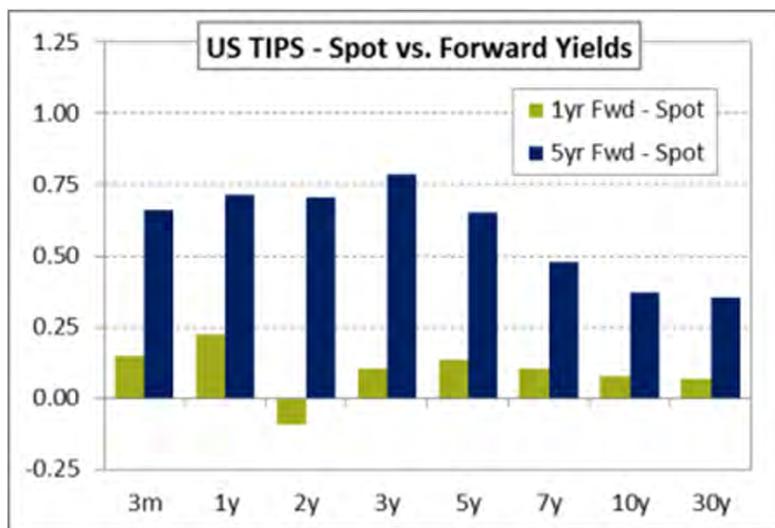


Source: Bloomberg

Low Real Yields in US Support Risky Asset Returns in the Near Term



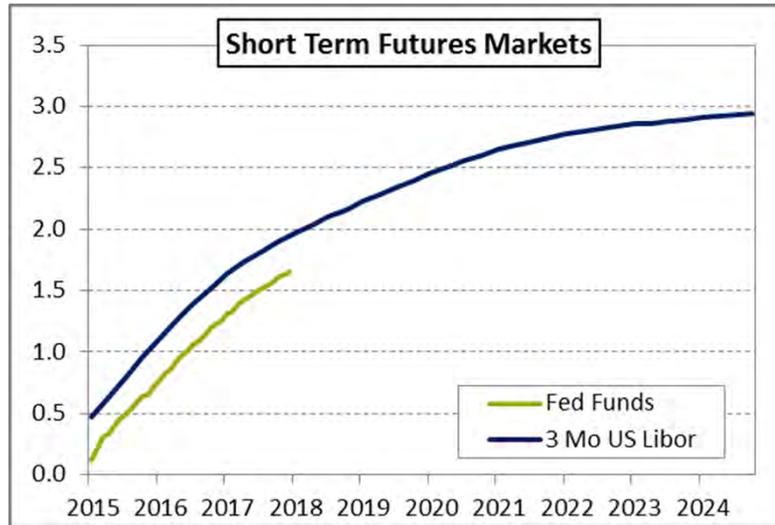
Source: Bloomberg



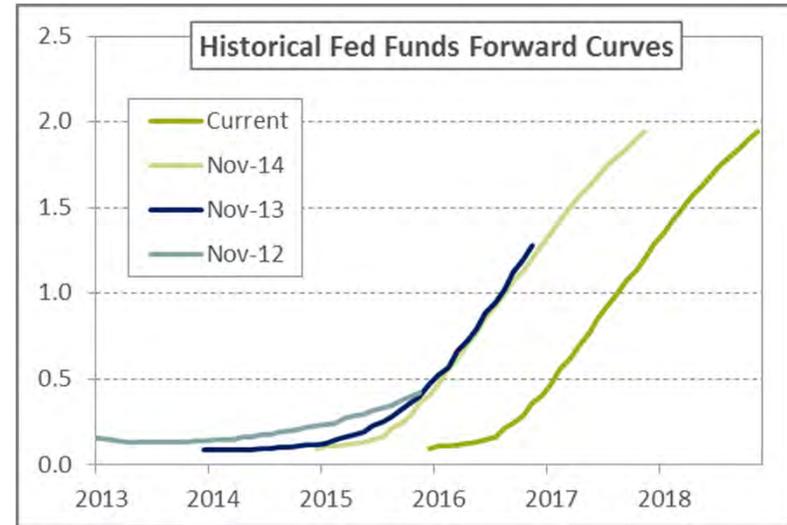
Source: Bloomberg

- **Market expects positive real yields going forward in US**
 - Hikes are slower than what has been priced in the last few years
- **Long term real yield is subdued**
 - Indicative of secular lower return expectations as real yields underlie all risk assets
- **Increase in real yields beyond expectations is a key risk**
 - Low risk today but likely an issue if inflation moves higher

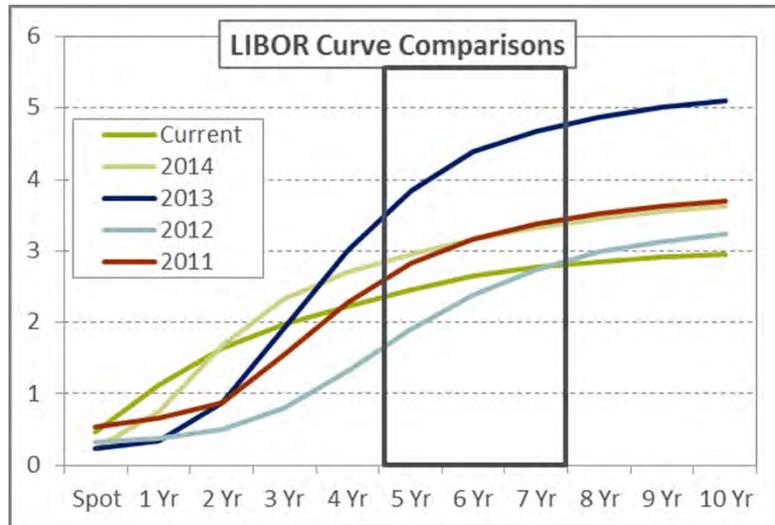
Assumption Development – Cash



Source: Bloomberg



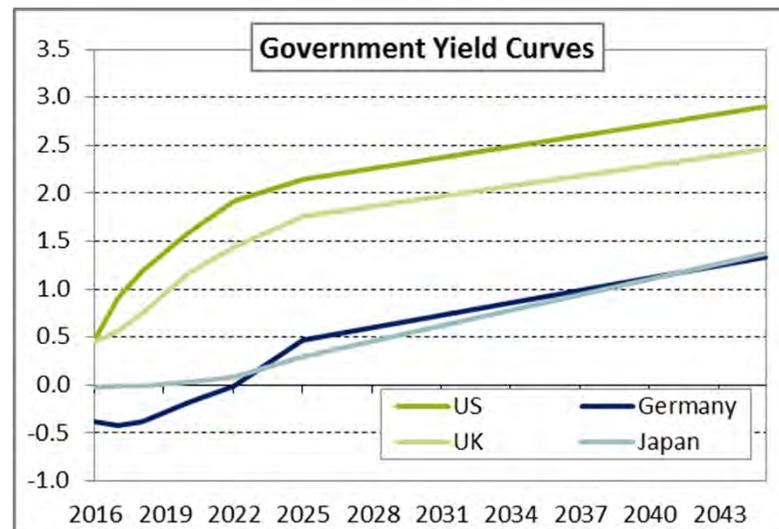
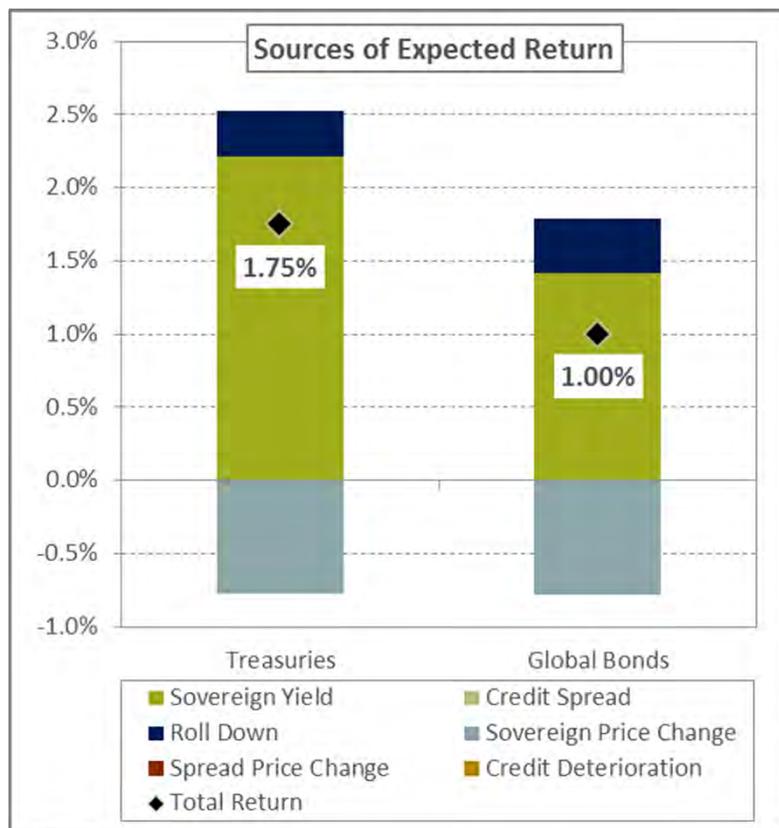
Source: Bloomberg



Source: Bloomberg

- **Fed Funds market similar to past years**
 - Fed hike likely as economic data appears supportive of higher rates
- **Longer term cash rate expectations are subdued**
 - LIBOR curve provides evidence
- **Cash forecast lower at 1.5%**
 - Lower long term cash yields also portend lower expected returns

Assumption Development – Developed Market Government Debt

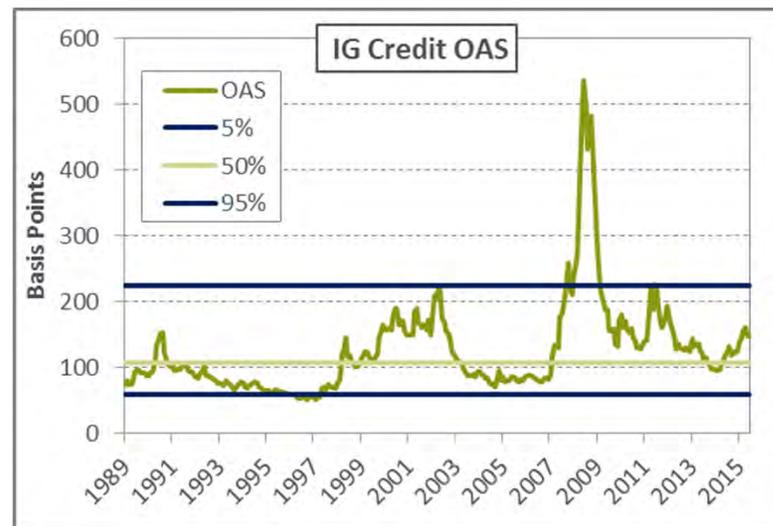
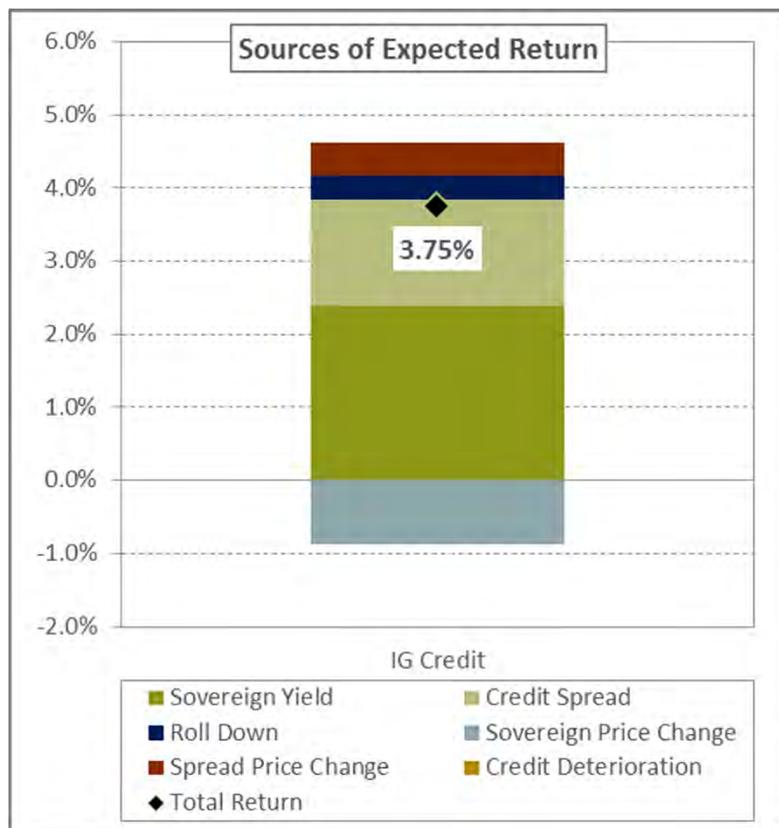


Source: Bloomberg

Index Current	US Treasury	Global Sovereign
Yield	1.6	1.1
OAS	-	-
Duration	5.9	7.5
Quality	AAA/AAA	AA2/AA3
MV (mm)	6,589,175	23,026,329

- **Depressed yields globally**
 - Negative through much of Europe
 - Rising rate expectations lower future returns relative to expected yield
- **US is most attractive safe haven market, despite expected rate hikes**
 - Correlation/liquidity benefits in times of crisis make treasuries an important asset allocation tool

Assumption Development – US Investment Grade Credit

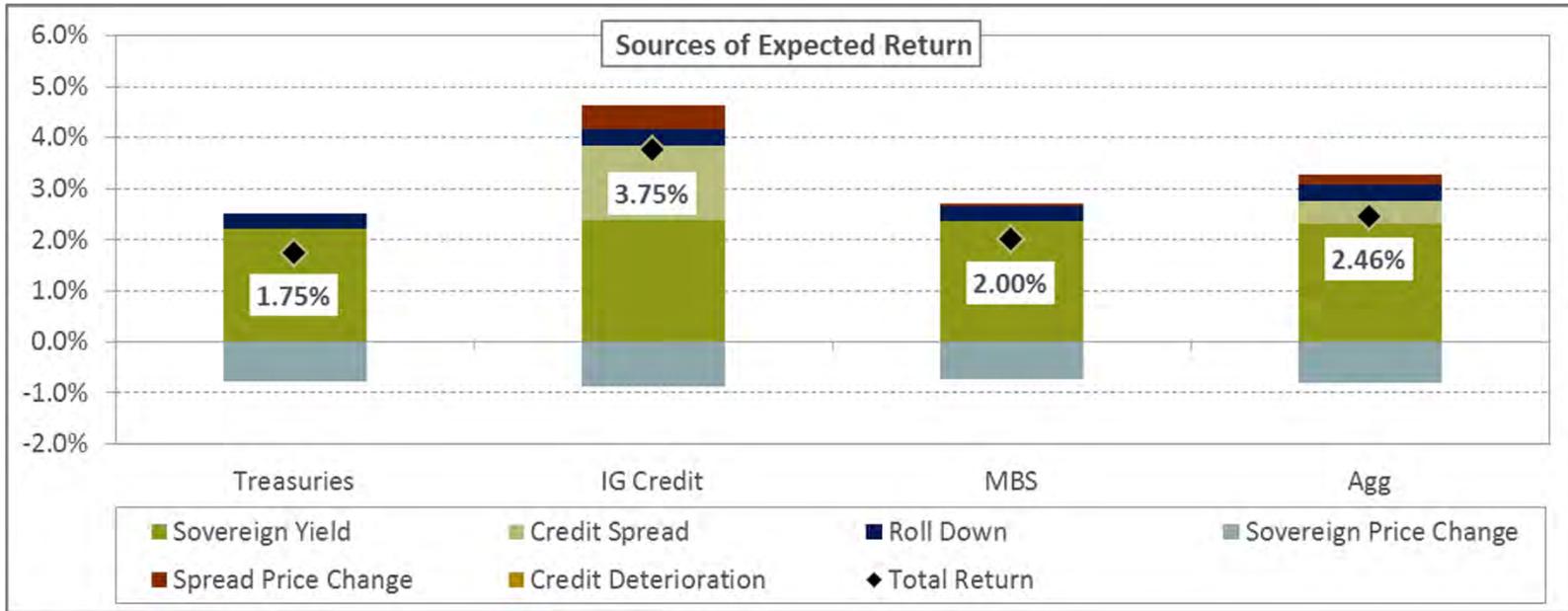


Source: Barclays, Bloomberg

Index Current	US Credit
Yield	3.4
OAS	1.5
Duration	7.0
Quality	A2/A3
MV (mm)	5,447,909

- Credit spreads have widened off cycle lows**
 - Market liquidity is lower relative to prior years and may be a challenge in later stages of credit cycle
 - Forecast assumes slower spread compression to long term median
- Relatively steep credit curve adds to return**
 - Roll return and spread price change benefits from steep credit curve

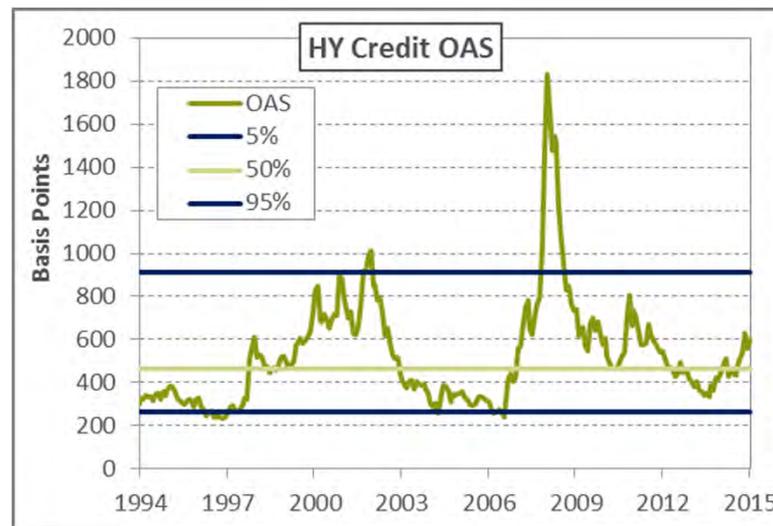
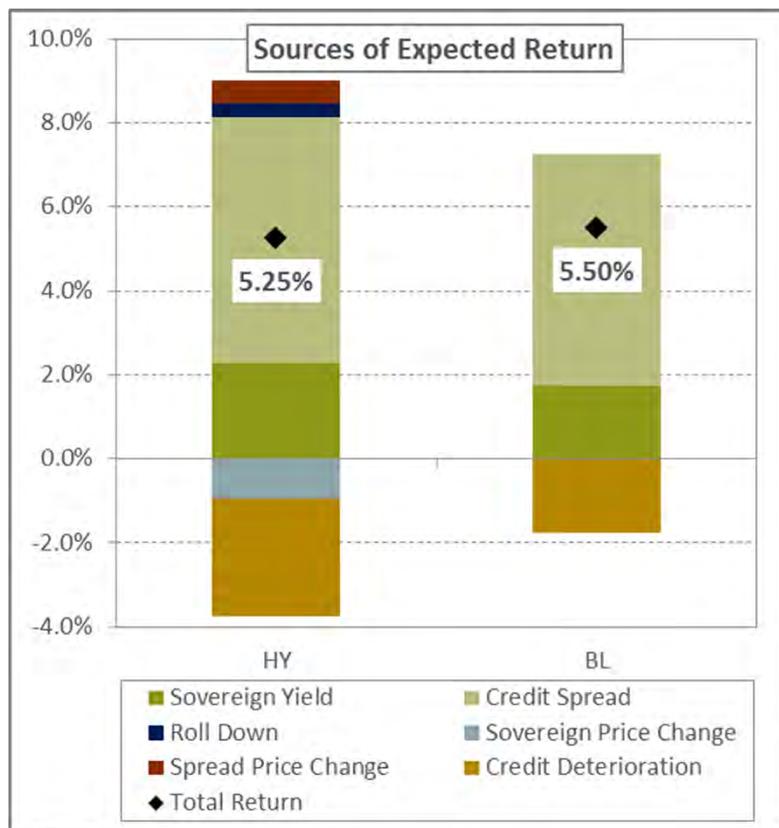
Assumption Development – Core Bonds



Index Current	US Treasury	US Credit	US Mortgage Backed Securities	US Aggregate
Yield	1.6	3.4	2.7	2.5
OAS	-	1.5	0.2	0.5
Duration	5.9	7.0	4.4	5.7
Quality	AAA/AAA	A2/A3	AAA/AAA	AA1/AA2
MV (mm)	6,589,175	5,447,909	5,192,695	18,204,827

- **Low yields persist throughout US investment grade universe**
- **Expectations of rising rates expected to be 50-75 basis point drag**
- **MBS returns continue to compress toward that of Treasuries**

Assumption Development – US High Yield and Bank Loans

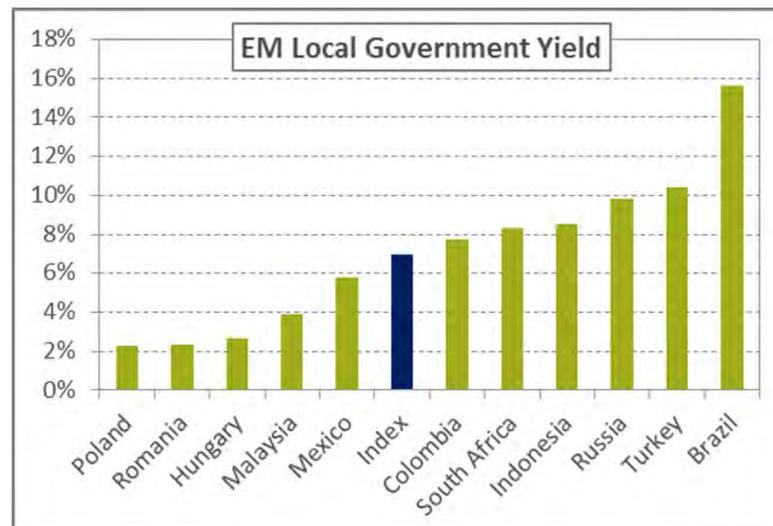
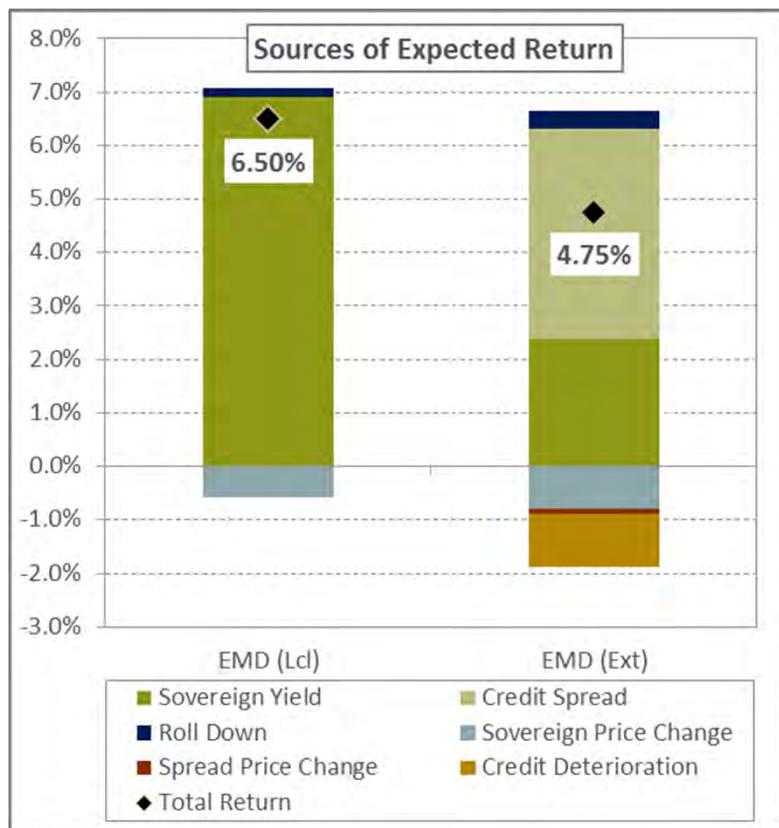


Source: Barclays, Bloomberg

- **High yield spreads attractive but well below crisis peaks**
 - Energy a key driver today
 - Default rates and downgrades likely to increase at this point in cycle
- **Bank loans not exposed to rate changes with floating rate**
 - Less liquid market with larger retail presence than pre-crisis

Index Current	BC US Corporate High Yield	Credit Suisse Levered Loan Index
Yield	8.0	6.9
OAS	6.0	6.2
Duration	4.3	0.1
Quality	Ba3/B1	Ba2
MV (mm)	1,261,041	944,881

Assumption Development – Emerging Market Debt

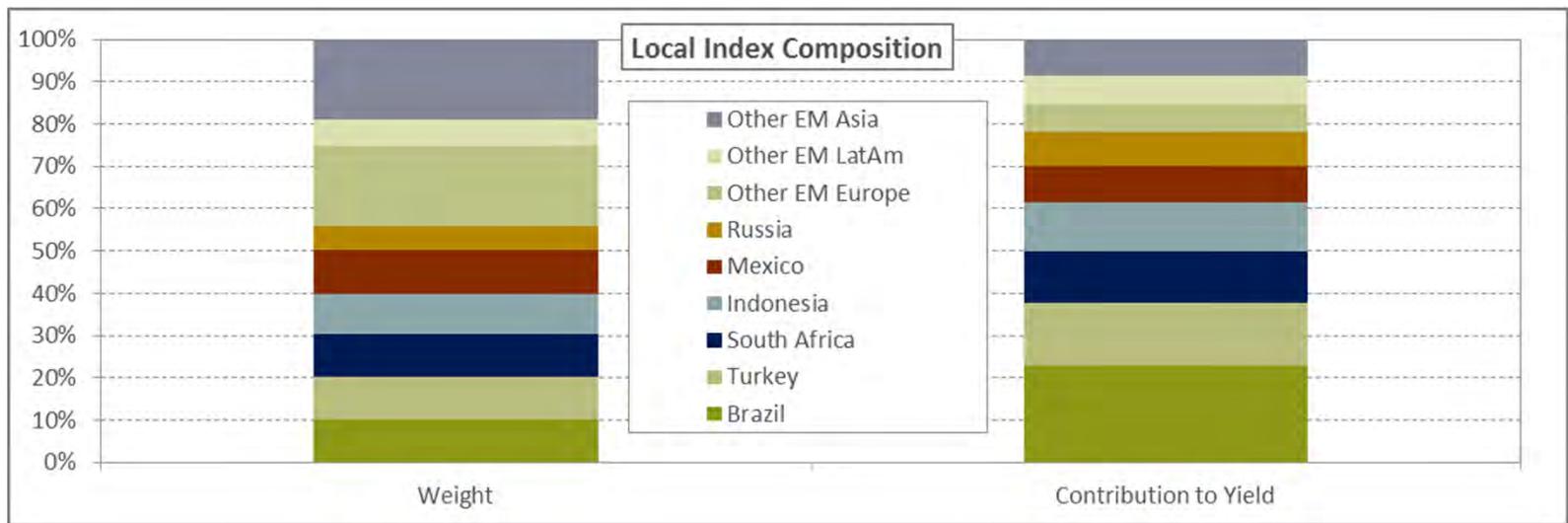


Source: Barclays, Bloomberg

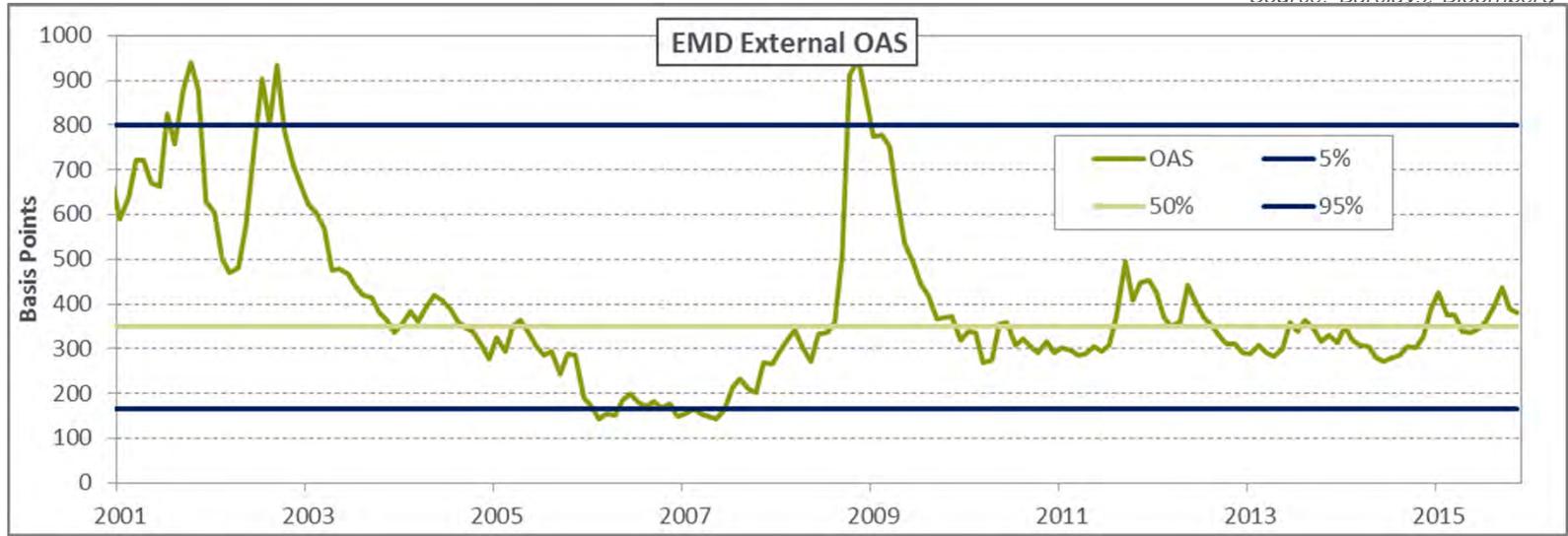
Index Current	JPM GBI EM Global Div	JPM EMBI Global Div
Yield	6.9	6.1
OAS	-	3.9
Duration	4.8	6.6
Quality	Baa2	Baa3
MV (mm)	840,908	687,743

- **Local yields high; average ≈7%**
 - Countries facing political/geopolitical pressures (Brazil, Turkey, Russia) account for 50% of the index yield
 - More stable countries included in low global yield back drop
- **Currencies at fair value to cheap**
 - Given uncertainty we make some accommodation for further deterioration in stressed currencies in near term
- **External debt priced at fair value**
 - Dollar denominated borrowers face repayment challenges due to dollar strength

Assumption Development – Emerging Market Debt (continued)



Source: Barclays, Bloomberg

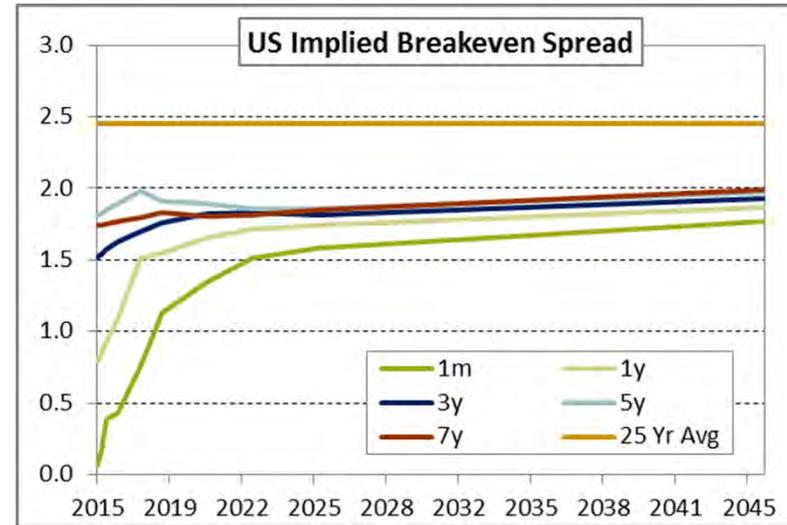


Source: JP Morgan, Bloomberg

Assumption Development – TIPS



Index Current	US Treasury: US TIPS
Yield	2.1
OAS	0.0
Duration	5.5
Quality	AAA/AAA
MV (mm)	984,892



Source: Bloomberg

- **Implied inflation breakevens are exceptionally low**
 - Average 1.75% over next 5-7 years
 - Fed targets approximately 2.0%
 - Average over last 25 years is 2.45%
 - NEPC assumes 2.25%
- **TIPS will appreciate if inflation is realized higher than expected**
 - Nominal Treasuries more exposed to interest rate increases should inflation expectations move higher
 - Current bias to TIPS but may not be as liquid in times of stress

Assumption Development – Hedge Funds

- **Hedge fund assumption constructed from building blocks of broad hedge fund categories**
 - Build up of 45% Equity, 45% Credit, and 10% Macro related strategies
 - Based on analysis of historical return, risk and correlation for underlying strategies and total universe
 - Use NEPC standard market betas as building blocks as well as an alpha component

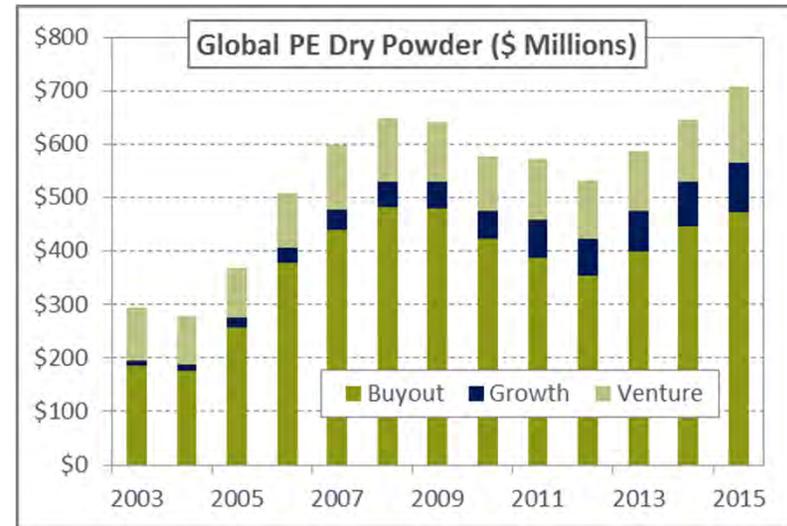
- **2016 hedge fund assumption is unchanged**
 - Higher return premia from equity and credit markets offset slightly lower cash expectations relative to prior year

	Hedge Funds	Equity Hedge Funds	Credit Hedge Funds	Macro Hedge Funds
Beta Exposure	0.5	0.5	0.5	0.5
Underlying Market Beta	Blended beta from equity, credit, macro	Global Equity	Global Credit	Relative Value (Rates, equity, Commodities)
Total Return (5-7 yr)	5.75%	6.25%	5.25%	6.00%
Volatility Expectation	9.00%	11.50%	8.00%	9.50%

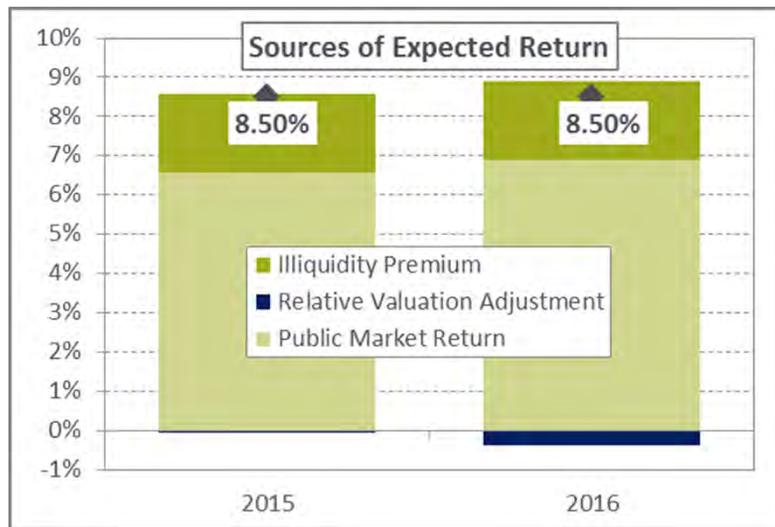
Assumption Development – Private Equity



Source: S&P Capital IQ



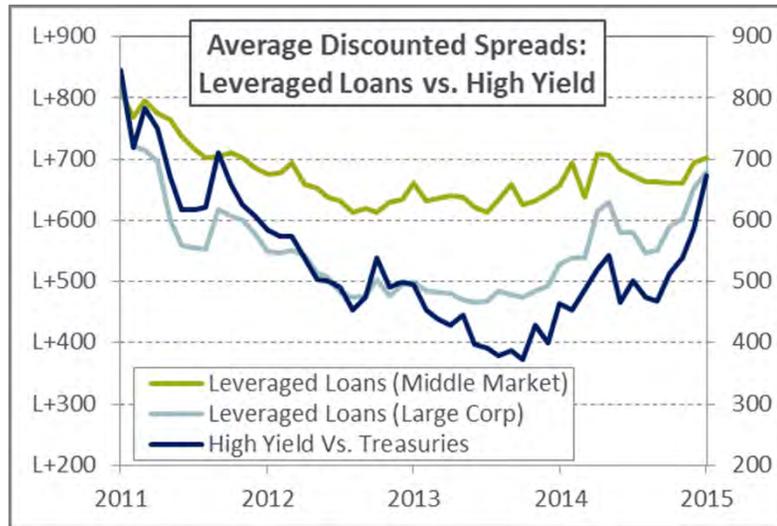
Source: Preqin



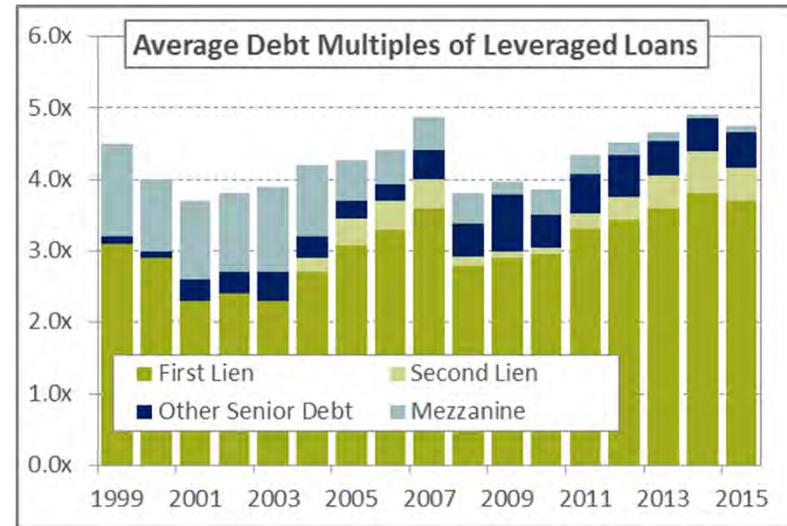
Private equity assumption reflects 40% buyout, 25% growth equity, 20% secondaries, 15% venture. Public market equivalent defined as blend of 70% U.S. small/mid cap equities and 30% non-US developed market equities.

- **Global equity risk premia higher relative to prior year**
- **However, seeing increasing headwinds in private structures**
 - Purchase price multiples high relative to history
 - Dry powder has increased, particularly in the US

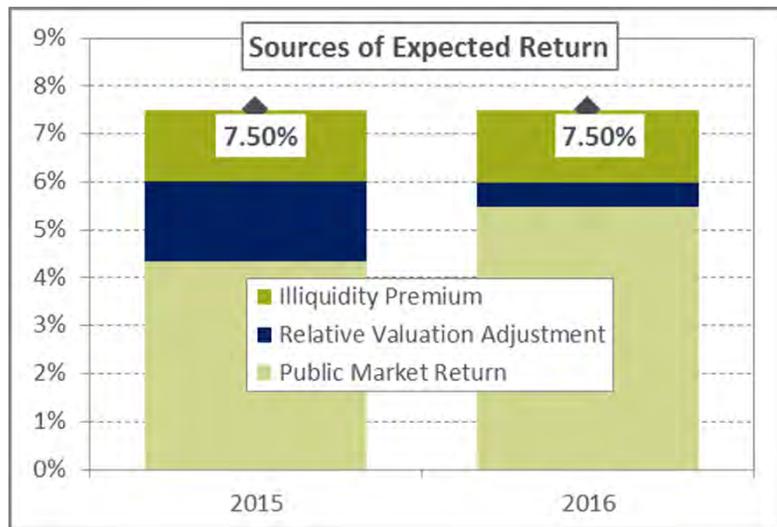
Assumption Development – Private Debt



Sources: S&P Capital IQ, BarCap Live



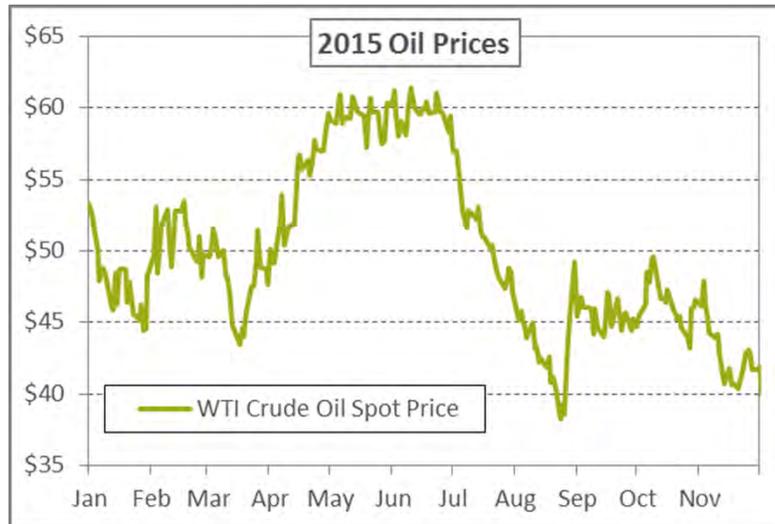
Source: S&P Capital IQ



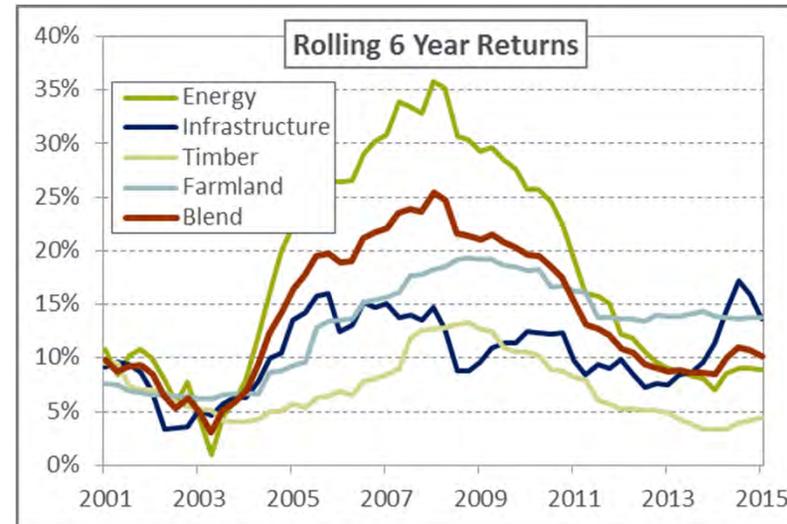
Private debt assumption reflects 50% direct lending, 25% mezzanine, 25% distressed debt. Public market equivalent defined as blend of 50% high yield bonds and 50% bank loans.

- **Spreads on public and private credit have converged**
- **Debt multiples near cycle highs**
- **Higher equity participation changes risk profile for debt**
 - Opportunity set for mezzanine has shrunk noticeably

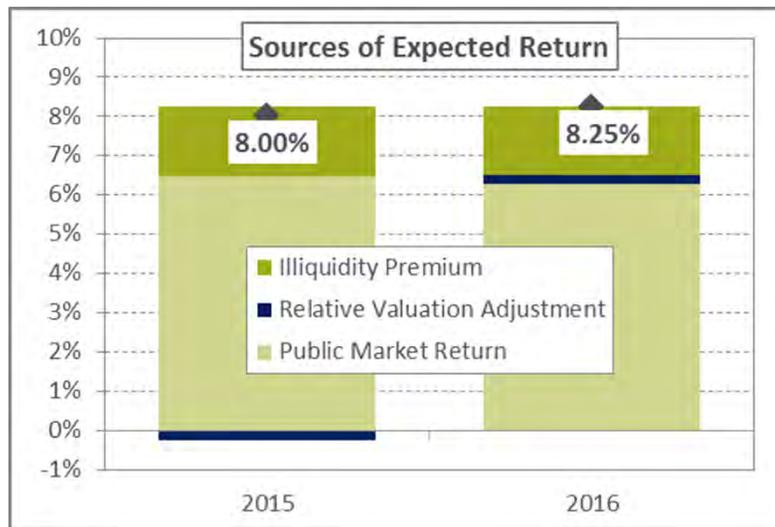
Assumption Development – Private Real Assets



Source: Bloomberg



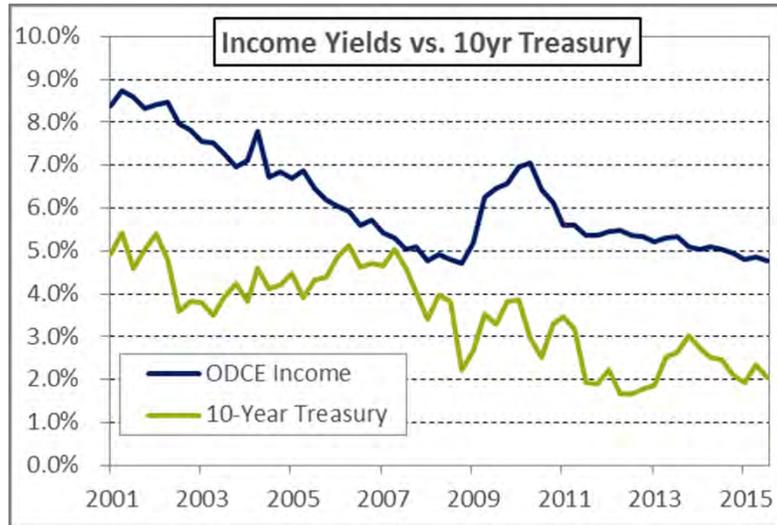
Source: NCREIF, Bloomberg



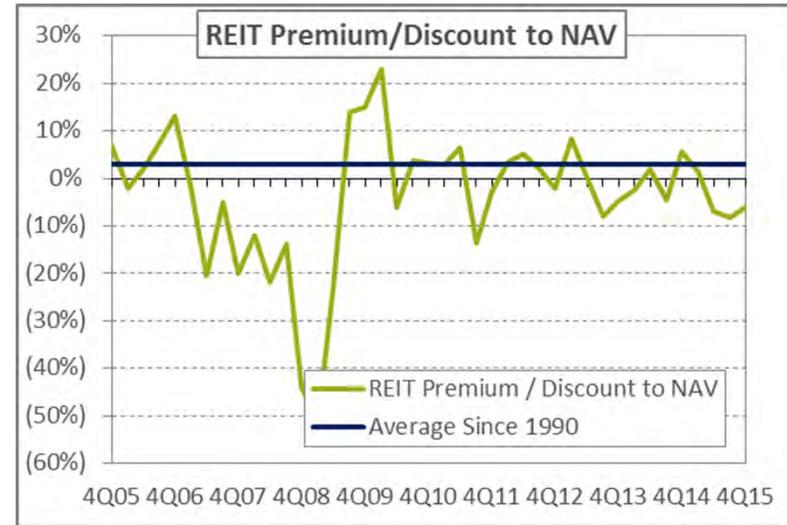
Private real assets assumption reflects 50% energy, 25% infrastructure, 25% timber/agriculture. Public market equivalent defined as blend of 50% commodities, 25% natural resource equities, 25% MLPs.

- **Amidst significant volatility, oil prices continued downward trend that began in Q3 2014**
 - Current lows are an attractive entry point for private strategies
- **Private strategies may mitigate financial stress in challenging market for liquid commodities**

Assumption Development – Real Estate and REITs



Sources: NCREIF, US Department of Treasury



Source: Wells Fargo Securities



Real estate assumption reflects U.S. core holdings as represented by the NCREIF ODCE. REIT assumption represented by the FTSE NAREIT Index. Public market equivalent defined as 100% REITs with embedded leverage adjustment (21% for ODCE vs. 45% for NAREIT)

- **Core real estate outlook largely unchanged over 5-7 years**
- **REITs are trading at discounts to NAV but still at historically high multiples**

- **Global Equity Building Blocks**
 - **Inflation:** Represents global inflation expectation over forecast period
 - **Real Earnings Growth:** Represents assumption for real growth for each market
 - **Profit Margin Adjustment:** Return due to shift of profit margins to forecast value
 - **Dividend Yield:** Represents dividend yield expectation over forecast period
 - **Valuation:** Return due to shift of current price/earnings ratio to forecast value
- **Commodities Building Blocks**
 - **Valuation:** Return from commodity spot price reverting to long term real average
 - **Roll yield:** Average annual yield to roll futures contract over forecast period
 - **Cash:** Expected US cash rate over forecast period
- **Fixed Income Building Blocks**
 - **Sovereign Yield:** Average expected government bond yield over forecast period
 - **Sovereign Price Change:** Expected price change due to changes in interest rates
 - **Roll Down:** Expected price change due to ageing of a bond along the yield curve
 - **Credit Spread:** Average expected credit spread over forecast period
 - **Spread Price Change:** Return due to shift of current credit spread to forecast value
 - **Credit Deterioration:** Return from credit downgrade and default over forecast period
 - **Real Yield:** Average expected government real yield over forecast period (TIPS)
 - **Real Yield Price Change:** Expected price change due to changes in real rates
 - **Inflation Expectation:** Expected inflation accrual over the forecast period (TIPS)
- **Private Markets Building Blocks**
 - **Illiquidity Premium:** Return associated with illiquidity factor specific to asset class
 - **Relative Valuation Adjustment:** Qualitative adjustment reflecting asset class views
 - **Public Market Return:** Return associated with equivalent public market beta

Appendix



NEPC'S 2016 Market Return, Risk, and Correlation Assumptions were used to derive the asset allocation update, except as noted below:

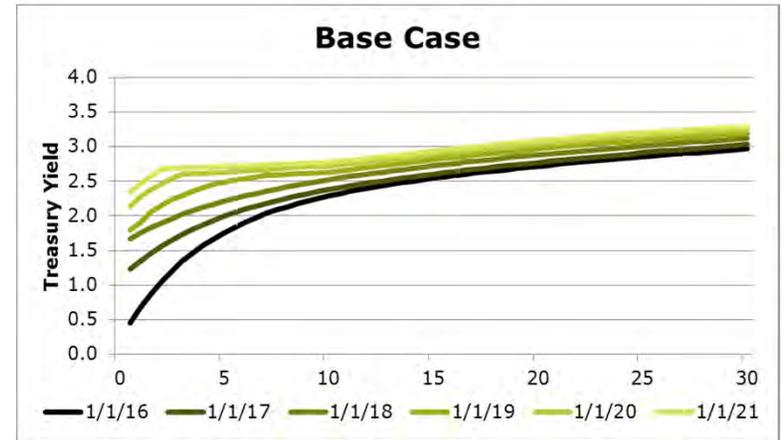
- Absolute Return Fixed Income & Structured Fixed Income modeled using Credit Hedge Fund assumptions.
- Risk Parity was modeled using a 50/50 split between NEPC's manager-specific assumptions for Putnam Total Return and Bridgewater All Weather.
- Global Asset Allocation was modeled using NEPC's manager-specific assumptions for the GMO Benchmark Free Fund.
- Absolute Return was modeled using Macro Hedge Fund assumptions.
- Core Bonds modeled using Short Treasuries (1-3 yr) assumptions.
- Infrastructure was modeled using equal portions of NEPC's assumptions for Private Equity, Real Estate, and Private Debt.
- Real Estate was modeled using equal portions of NEPC's assumptions for Real Estate, Private Equity, and Private Debt.

- Total contributions and non-DROP benefit payments projected by Buck Consultants; used in all scenarios
- Employer/employee split of 2014 contributions modeled for all future years (79%/21%).
- DROP payments assumed to be \$134 million per year for 2016-2021

Scenarios Considered

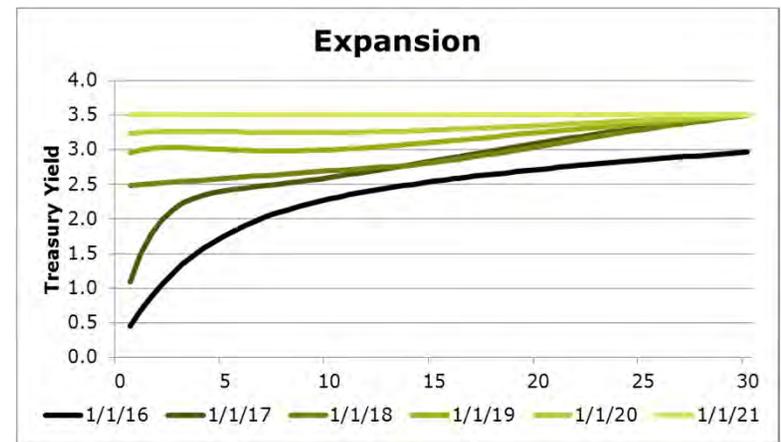
- **Base Case**

- Asset returns over 5-year period in line with NEPC 2016 5-7 Year Assumptions
- No volatility



- **Expansion**

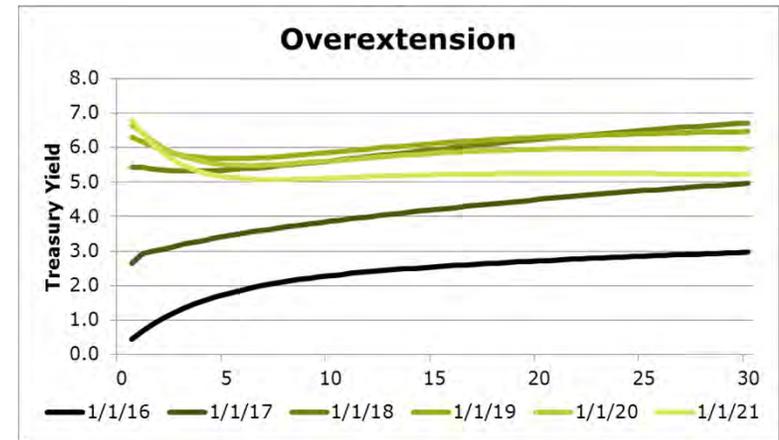
- Economy is growing by a strong, but seemingly sustainable level
- Bond yields are stable, inflation is manageable, equities and other high volatility asset classes perform quite well in this environment
- Historical example: 2004-2006
- *Large cap equities time-series: 10%, 17%, 28%, 12%, 10%*



Scenarios Considered

- **Overextension**

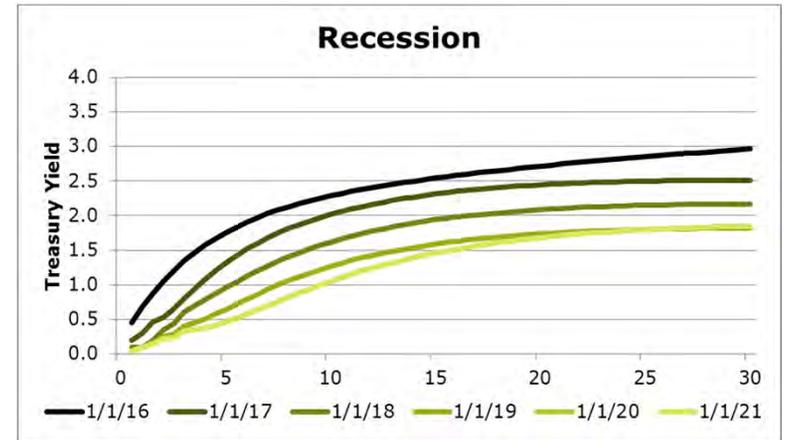
- Economy is growing at a rapid pace, inflation increases significantly – booming times but at the cost of future growth
- Bond yields move higher as a result of inflation; high yield does well with confidence in the economy
- Equities, real estate, and commodities fuel rapid expansion
- Historical example: Vietnam War era (1967-1971)
- *Large cap equities time-series: 12%, 16%, 0%, 12%, 16%*



Scenarios Considered

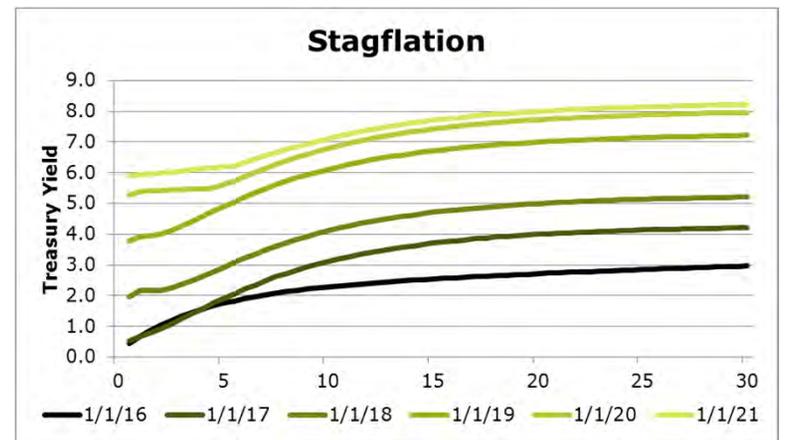
• Recession

- Economy stalls – there is a flight to quality as investors lose confidence
 - Equity markets fall
 - Bond yields fall
- Interest-sensitive securities (bonds, especially long duration bonds) will perform well in this environment
- Historical example: early 1990s
- *Large cap equities time-series: -8%, -18%, -8%, 4%, -10%*



• Stagflation

- Two problems – (1) the economy is not growing, (2) inflation has skyrocketed
 - Inflation is sticky – once it gets high, it stays high for several years
 - Fed has limited options to kick-start economy because easing only promotes further inflation
- Equities sag; bonds lose real value; real assets such as TIPS perform well on a relative basis because they are linked to inflation
- Historical example: flat stock market and double digit inflation of the mid-1970s
- *Large cap equities time-series: -8%, -12%, -15%, 9%, 12%*



- **Past performance is no guarantee of future results.**
- **The goal of this report is to provide a basis for substantiating asset allocation recommendations. The opinions presented herein represent the good faith views of NEPC as of the date of this report and are subject to change at any time.**
- **Information on market indices was provided by sources external to NEPC. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.**
- **All investments carry some level of risk. Diversification and other asset allocation techniques do not ensure profit or protect against losses.**
- **This report is provided as a management aid for the client's internal use only. This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.**

It is important that investors understand the following characteristics of non-traditional investment strategies including hedge funds and private equity:

- 1. Performance can be volatile and investors could lose all or a substantial portion of their investment**
- 2. Leverage and other speculative practices may increase the risk of loss**
- 3. Past performance may be revised due to the revaluation of investments**
- 4. These investments can be illiquid, and investors may be subject to lock-ups or lengthy redemption terms**
- 5. A secondary market may not be available for all funds, and any sales that occur may take place at a discount to value**
- 6. These funds are not subject to the same regulatory requirements as registered investment vehicles**
- 7. Managers may not be required to provide periodic pricing or valuation information to investors**
- 8. These funds may have complex tax structures and delays in distributing important tax information**
- 9. These funds often charge high fees**
- 10. Investment agreements often give the manager authority to trade in securities, markets or currencies that are not within the manager's realm of expertise or contemplated investment strategy**