NEW MEXICO EDUCATIONAL RETIREMENT BOARD

Establishing Realistic Investment Earnings Benchmarks

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What is a Benchmark?

- **A benchmark is a standard reference point that is used to compare the results of similar investments over time.**
  - Institutional investors use benchmarks to analyze the earnings of individual investment managers/strategies, as well as the Total Portfolio.
  - Benchmark may be a well specified index such as the S&P 500; or a hybrid or combined benchmark such as 60% S&P 500 / 40% Barclays Capital U.S. Aggregate Bond Index.
  - Key Question - *Has the manager/strategy/total portfolio added value?*

- **Benchmarking the Total Portfolio**
  - Measures the value add relative to the *policy index* (commonly a hybrid index), or long term strategic asset allocation.
  - Peer group analysis against "comparable" portfolios.

- **Benchmarking Individual Managers/Strategies**
  - Individual managers have different objectives than the Total Portfolio, and therefore require different benchmarks.
  - Benchmarks that best reflect the manager's sector and/or style are used to measure performance, and should be chosen in advance.
  - Peer group analysis against "comparable" managers/strategies.

- **It is important to note that while we think investment earnings benchmarking is important, we believe risk-adjusted measures of performance are more important when evaluating performance at both the Total Portfolio and individual manager/strategy level.**

What Makes a Good Benchmark?

- **Investable and Liquid - investors should be able to replicate the benchmark on their own and it should be reasonably liquid.**
  - This can be difficult within the alternative asset classes such as private equity, private real estate and real assets.
- **Measurable – performance should be readily available and calculable.**
  - The identities and weights of securities or factor exposures should be clearly defined.
- **Appropriate – benchmark should reflect the investment's style or expertise.**
  - The manager must be willing to accept responsibility for performance relative to the benchmark, and the benchmark should be established in advance.
- **The benchmark must be a fair and *passive* representation of the market it is designed to measure.**
  - Over the past several years, markets have become increasingly segmented resulting in increased focus on choosing appropriate measures.

Establishing Realistic Investment Earnings Benchmarks

- **Establishing an Asset Allocation for the Total Portfolio is the first step in establishing realistic investment earnings benchmarks for both the Total Portfolio and individual managers/strategies.**
  - Investment earnings benchmarks are dependent on the markets in which the Total Portfolio invests.
  - Modern Portfolio Theory and Mean Variance Optimization result in a diversified asset allocation with broad exposure to the global markets.

- **Each asset class represents an investable market and/or specific idea within the portfolio.**
  - The Total Portfolio is measured against the policy index, which is calculated by multiplying the target asset class weights times the return of the respective passive benchmark (re-balanced monthly).
  - Individual managers and strategies used to implement the asset allocation are measured against specific or hybrid indexes that best reflect the manager's sector and/or style.
    - Indexes used to measure individual manager performance may be different from those used to calculate the policy index. For example, a portfolio may have an allocation to small cap equities which is benchmarked to the Russell 2000 Index at the Total Portfolio Level, but implemented using managers who are benchmarked to the Russell 2000 Growth and Russell 2000 Value Index.

Current Asset Class Weights and Indexes used to Calculate the Current NMERB Policy Index

Asset Class	Target Weight	Range	Benchmark
PUBLIC MARKETS			
EQUITIES			
Domestic Equities:	25%	15-30%	
Large Cap	23%	18-28%	S&P 500
Small/mid Cap	2%	0-5%	Russell 2000
International Equities:	15%	0-30%	
Developed	5%	0-10%	MSCI EAFE
Emerging Markets	10%	5-15%	MSCI Emerging Markets
Total Equities	40%	25-55%	
FIXED INCOME			
Opportunistic Credit	20%	0-30%	Merrill Lynch U.S. High Yield BB-B (2% constrained)
Core Bonds	5%	0-15%	Barclays Capital Aggregate Bond Index
Emerging Market Debt	2%	0-8%	JP Morgan GBI-EM Global Diversified (Unhedged)
Total Fixed Income	27%	10-35%	
ALTERNATIVES			
Real Estate/REITS	5%	0-10%	NCREIF Property Index/ Wilshire REIT Index
Real Assets	7%	0-10%	CPI + 5%
Private Equity	7%	0-20%	Cambridge PE Index
Absolute Return	8%	0-10%	90 day t-bills + 2%/HFRI Fund of Funds: Conservative
Global Tactical Asset Allocation	5%	0-10%	60% MSCI World/40% Citigroup World Government Bond Index (WGBI)
Total Alternatives	32%	10- 40%	
Cash	1%	0% - 10%	90 day t-bills

Development of Asset Class Assumptions

- **Relies on a combination of historical data and forward-looking analysis**
  - Expected returns based mostly on forward-looking current market pricing
  - Volatility based on history, with some recognition of recent increase
  - Correlations based on a mix of history and current trend
- **Historical data is used to frame current market environment as well as to compare to similar historical periods**
  - Historical index returns, volatility, and correlations
  - Average historical valuation and yield metrics
- **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**
  - Specialists from public markets, hedge funds and private markets provide insight on market themes
- **Assumptions and actions reviewed and approved by Partner's Research Committee**

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Inflation

- **Inflation is an important component of our asset allocation assumptions**
  - An essential building block for projecting returns in stocks, bonds, and commodities

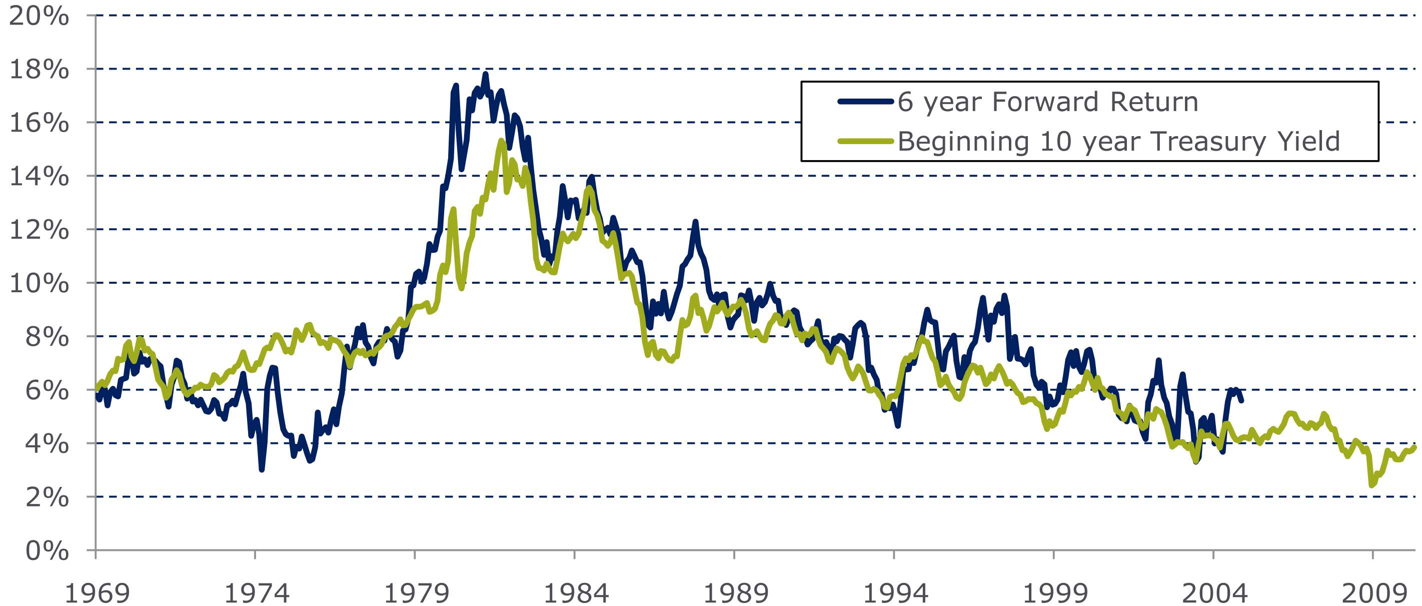
- **There are several measures of inflation used to inform our view (all of which have issues)**
  - Consumer Price Index
  - Producer Price Index
  - TIPS break-even inflation

- **For asset class assumptions, we use a broader but less measurable concept of inflation**
  - Thought of as the inflation that flows through to ending corporate earnings for equities, required market yields on fixed income, or spot price returns on commodities

- **We are projecting 3% inflation over the next 5-7 years**
  - This assumption represents the geometric mean of a time series
  - Inflation could take several different paths over 5-7 years to arrive at a 3% mean
  - Given the binary nature of potential inflation paths (US 1970s or Japan 1990s), we continue to use an elevated estimate of inflation volatility

Starting Yields Signal Bond Returns

- **Starting yield is the key building block for future performance**
  - Correlation to forward return of 0.88
- **Yields have had a 30 year secular decline**
  - This has been a tailwind to performance
- **Low current yields will challenge forward looking returns**
  - 10 year Treasury Yield as of November 30, 2010 is 2.8%

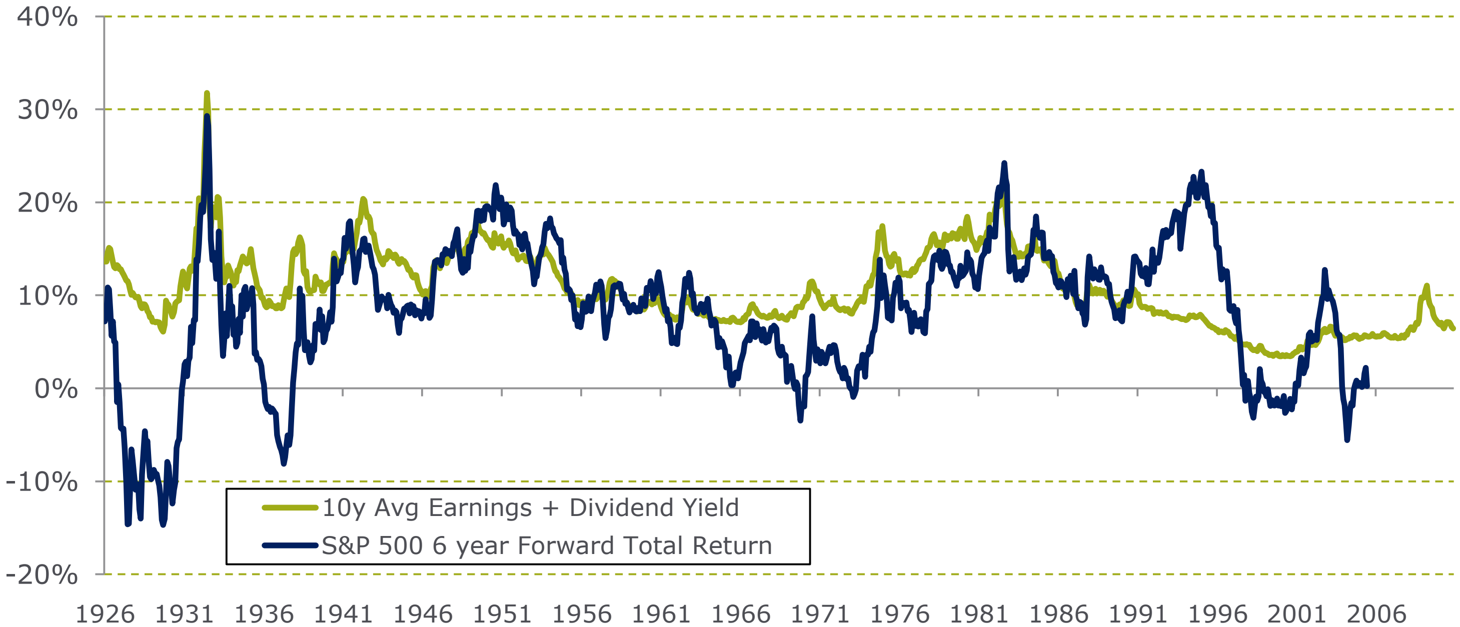


Source: St. Louis Fed, Ibbotson, Research Affiliates

Starting Earnings + Dividends Signal Stock Returns

- **Earnings & current dividends are key fundamental building blocks of equity returns**
  - Correlation to forward return of 0.51
  - Current measure equals 6.5%

- **Valuation expansion can be a tailwind to performancee**
  - We do not believe that valuation expansion will be a key return driver as corporate profitability (at all-time highs) mean reverts



Source: Robert Shiller, Ibbotson, Research Affiliates

2011 5-to-7 Year Return Forecasts

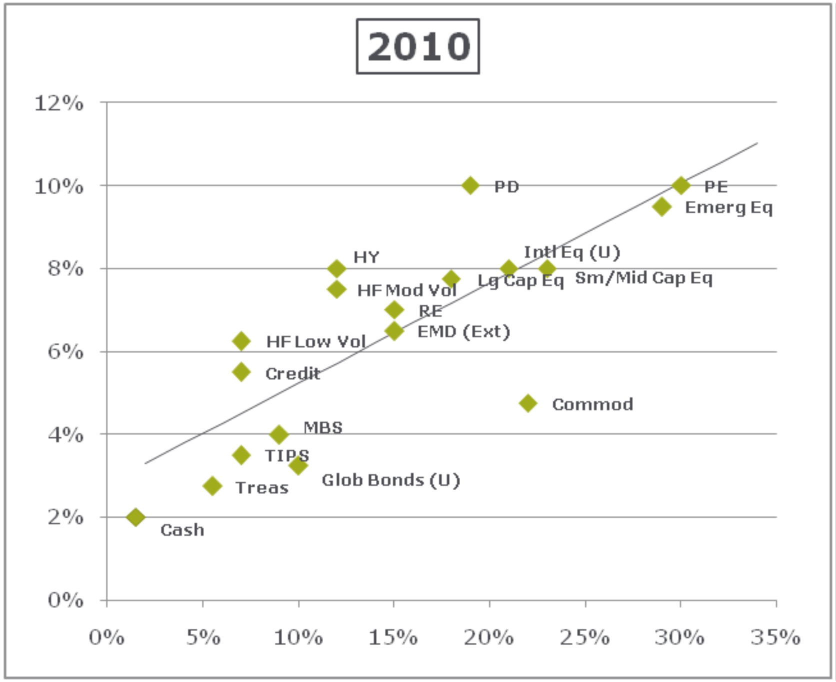
Geometric Expected Return			
Asset Class	**2010**	**2011**	**2011-2010**
Cash	2.00%	2.00%	0.00%
Treasuries	2.75%	2.00%	-0.75%
Credit	5.50%	4.00%	-1.50%
MBS	4.00%	3.50%	-0.50%
TIPS	3.50%	2.25%	-1.25%
High-Yield Bonds	8.00%	6.25%	-1.75%
Global Bonds (Unhedged)	3.25%	1.75%	-1.50%
Global Bonds (Hedged)		1.92%	
EMD External	6.50%	5.25%	-1.25%
EMD Local Currency		6.25%	
Large Cap Equities	7.75%	7.00%	-0.75%
Small/Mid Cap Equities	8.00%	7.00%	-1.00%
Int'l Equities (Unhedged)	8.00%	7.00%	-1.00%
Int'l Equities (Hedged)		7.25%	
Emerging Int'l Equities	9.50%	9.00%	-0.50%
Private Equity	10.00%	9.50%	-0.50%
Private Debt	10.00%	9.25%	-0.75%
Real Estate	7.00%	6.00%	-1.00%
Commodities	4.75%	4.50%	-0.25%
Hedge Funds Low Vol	6.25%	5.75%	-0.50%
Hedge Funds Mod Vol	7.50%	7.00%	-0.50%

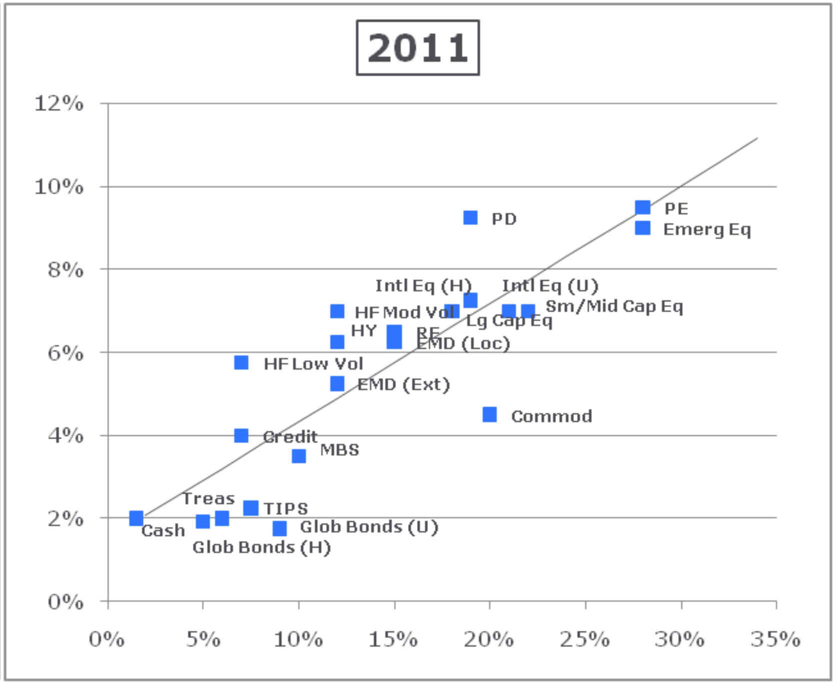
Volatility			
Asset Class	**2010**	**2011**	**2011-2010**
Cash	1.50%	1.50%	0.00%
Treasuries	5.50%	6.00%	0.50%
Credit	7.00%	7.00%	0.00%
MBS	9.00%	10.00%	1.00%
TIPS	7.00%	7.50%	0.50%
High-Yield Bonds	12.00%	12.00%	0.00%
Global Bonds (Unhedged)	10.00%	9.00%	-1.00%
Global Bonds (Hedged)		5.00%	
EMD External	15.00%	12.00%	-3.00%
EMD Local Currency		15.00%	
Large Cap Equities	18.00%	18.00%	0.00%
Small/Mid Cap Equities	23.00%	22.00%	-1.00%
Int'l Equities (Unhedged)	21.00%	21.00%	0.00%
Int'l Equities (Hedged)		19.00%	
Emerging Int'l Equities	29.00%	28.00%	-1.00%
Private Equity	30.00%	28.00%	-2.00%
Private Debt	19.00%	19.00%	0.00%
Real Estate	15.00%	15.00%	0.00%
Commodities	22.00%	20.00%	-2.00%
Hedge Funds Low Vol	7.00%	7.00%	0.00%
Hedge Funds Mod Vol	12.00%	12.00%	0.00%

2011 30-Year Return Forecasts

Geometric Expected Return			
Asset Class	**2010**	**2011**	**2011-2010**
Cash	4.50%	4.50%	0.00%
Treasuries	4.75%	4.75%	0.00%
Credit	6.25%	6.00%	-0.25%
MBS	5.50%	5.50%	0.00%
TIPS	5.25%	5.00%	-0.25%
High-Yield Bonds	8.00%	7.50%	-0.50%
Global Bonds (Unhedged)	5.25%	4.75%	-0.50%
Global Bonds (Hedged)		4.75%	
EMD External	8.25%	6.75%	-1.50%
EMD Local Currency		8.00%	
Large Cap Equities	8.75%	8.50%	-0.25%
Small/Mid Cap Equities	9.50%	9.00%	-0.50%
Int'l Equities (Unhedged)	9.75%	9.00%	-0.75%
Int'l Equities (Hedged)		9.00%	
Emerging Int'l Equities	10.25%	10.00%	-0.25%
Private Equity	10.50%	10.50%	0.00%
Private Debt	9.00%	9.00%	0.00%
Real Estate	7.00%	7.00%	0.00%
Commodities	5.00%	5.50%	0.50%
Hedge Funds Low Vol	6.50%	6.50%	0.00%
Hedge Funds Mod Vol	8.00%	8.00%	0.00%

Comparison of Assumptions





2011 5-7 Year Correlations

Asset Class	Cash	Treas	Credit	MBS	High Yield	EMD Lcl	Lg Cap Eq	Sm/Mid Cap Eq	Int'l Eq (U)	Emerg Eq	Private Eq	Real Estate	Comm
Cash	1.00	0.20	0.15	0.25	-0.05	0.10	0.05	-0.05	-0.10	-0.10	-0.10	0.40	0.10
Treas	0.20	1.00	0.95	0.90	0.35	0.15	0.20	0.10	0.15	0.00	0.05	-0.05	-0.05
Credit	0.15	0.95	1.00	0.90	0.50	0.55	0.50	0.30	0.25	0.20	0.25	-0.05	-0.05
MBS	0.25	0.90	0.90	1.00	0.45	0.25	0.35	0.20	0.20	0.05	0.15	0.00	-0.05
High Yield	-0.05	0.35	0.50	0.45	1.00	0.70	0.60	0.60	0.40	0.45	0.60	-0.10	0.00
EMD Lcl	0.10	0.15	0.55	0.25	0.70	1.00	0.60	0.55	0.50	0.80	0.25	-0.10	0.10
Lg Cap Eq	0.05	0.20	0.50	0.35	0.60	0.60	1.00	0.90	0.70	0.55	0.75	0.15	0.00
Sm/Mid Cap Eq	-0.05	0.10	0.30	0.20	0.60	0.55	0.90	1.00	0.55	0.60	0.85	0.05	-0.05
Int'l Eq (U)	-0.10	0.15	0.25	0.20	0.40	0.50	0.70	0.55	1.00	0.60	0.50	0.10	0.00
Emerg Eq	-0.10	0.00	0.20	0.05	0.45	0.80	0.55	0.60	0.60	1.00	0.25	-0.10	0.10
Private Eq	-0.10	0.05	0.25	0.15	0.60	0.25	0.75	0.85	0.50	0.25	1.00	0.00	0.00
Real Estate	0.40	-0.05	-0.05	0.00	-0.10	-0.10	0.15	0.05	0.10	-0.10	0.00	1.00	0.00
Comm	0.10	-0.05	-0.05	-0.05	0.00	0.10	0.00	-0.05	0.00	0.10	0.00	0.00	1.00

Diversified Portfolio Return/Risk Comparison

	Diversified Portfolio
Cash	0%
Large Cap Equities	35%
Small/Mid Cap Equities	15%
Int'l Equities (Unhedged)	12%
Emerging Int'l Equities	3%
Total Equity	**65%**
Treasuries	10%
Credit	6%
High-Yield Bonds	5%
MBS	9%
Global Bonds (Unhedged)	5%
Total Fixed Income	**35%**
2009 5-7 Year Return	***9.0%***
2009 Standard Deviation	***14.2%***
2010 5-7 Year Return	***7.2%***
2010 30 Year Return	***8.6%***
2010 Standard Deviation	***12.8%***
2011 5-7 Year Return	***6.3%***
2011 30 Year Return	***8.2%***
2011 Standard Deviation	***12.9%***

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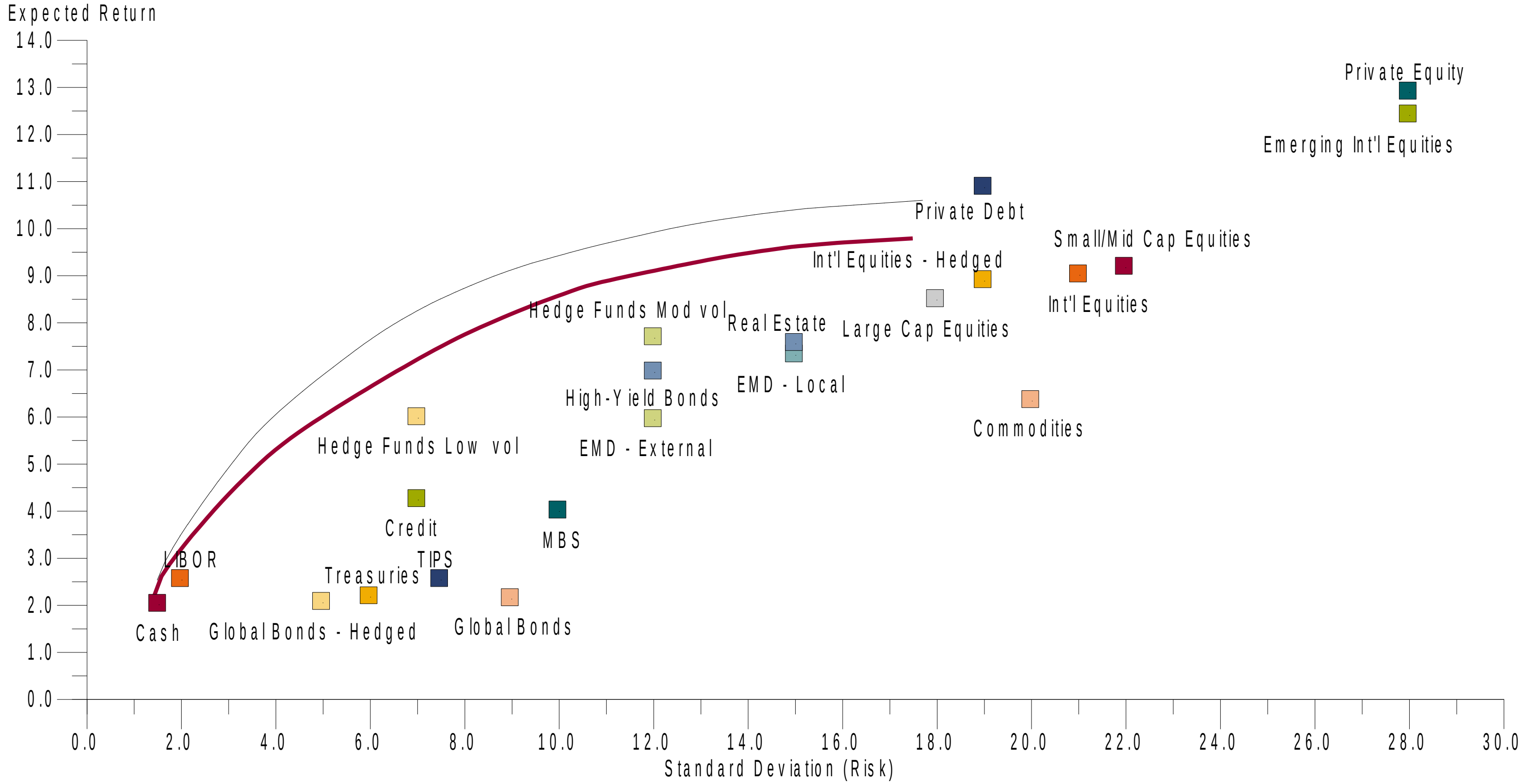
Efficient Frontier Comparison



Red = 2011

Black = 2010

Recommended Asset Mix (Board Approved October 2010)

		Similar Risk, Higher Return	
	Current Target Allocation	Recommended Target Allocation	Range
Cash	0%	1%	0-5%
Large Cap Equities	23%	23%	15-30%
Small/Mid Cap Equities	2%	2%	0-10%
Int'l Equities	10%	5%	0-15%
Emerging Int'l Equities	10%	10%	0-15%
Total Equity	**45%**	**40%**	**25-55%**
Core Bonds	15%	5%	0-15%
Emerging Market Debt	0%	2%	0-8%
Opportunistic Credit	5%	20%	0-30%
Total Fixed Income	**20%**	**27%**	**15-40%**
Private Equity	10%	7%	0-10%
Real Estate	5%	5%	0-10%
Absolute Return	10%	8%	0-10%
Inflation-Linked Assets	5%	7%	0-10%
Global Asset Allocation	5%	5%	0-10%
Total Alternatives	**35%**	**32%**	**10-40%**
Expected Return (compound)	8.1%	8.9%	
Expected Risk (volatility)	11.4%	11.5%	
Sharpe Ratio	0.53	0.60	
Sortino Ratio (0% Minimum Acceptable Return)	0.93	1.04	
Probability of < 0% over 1 year	22.7%	20.7%	
Probability of < 0% over 5 Years	4.7%	3.4%	
Probability of < 8% over 5 years	49.0%	42.7%	
Probability of < 8% over 10 Years	48.6%	39.8%	

Updated Expected Return w/ 2011 Capital Market Assumptions

	Long Term Policy Target w/2010 Capital Market Assumptions	Range	Long Term Policy Target w/2011 Capital Market Assumptions	Range
Cash	1%	0-5%	1%	0-5%
Large Cap Equities	23%	15-30%	23%	15-30%
Small/Mid Cap Equities	2%	0-10%	2%	0-10%
Int'l Equities	5%	0-15%	5%	0-15%
Emerging Int'l Equities	10%	0-15%	10%	0-15%
Total Equity	**40%**	**25-55%**	**40%**	**25-55%**
Core Bonds	5%	0-15%	5%	0-15%
Emerging Market Debt	2%	0-8%	2%	0-8%
Opportunistic Credit	20%	0-30%	20%	0-30%
Total Fixed Income	**27%**	**15-40%**	**27%**	**15-40%**
Private Equity	7%	0-10%	7%	0-10%
Real Estate	5%	0-10%	5%	0-10%
Absolute Return	8%	0-10%	8%	0-10%
Inflation-Linked Assets	7%	0-10%	7%	0-10%
Global Asset Allocation	5%	0-10%	5%	0-10%
Total Alternatives	**32%**	**10-40%**	**32%**	**10-40%**
Expected Return (compound)	8.9%		8.1%	
Expected Risk (volatility)	11.5%		11.9%	
Sharpe Ratio	0.60		0.47	
Sortino Ratio (0% Minimum Acceptable Return)	1.04		0.89	
Probability of < 0% over 1 year	20.7%		24.7%	
Probability of < 0% over 5 Years	3.4%		6.3%	
Probability of < 8% over 5 years	42.7%		50.9%	
Probability of < 8% over 10 Years	39.8%		48.7%	
30 Year Expected Return (compound)	9.4%		9.2%	

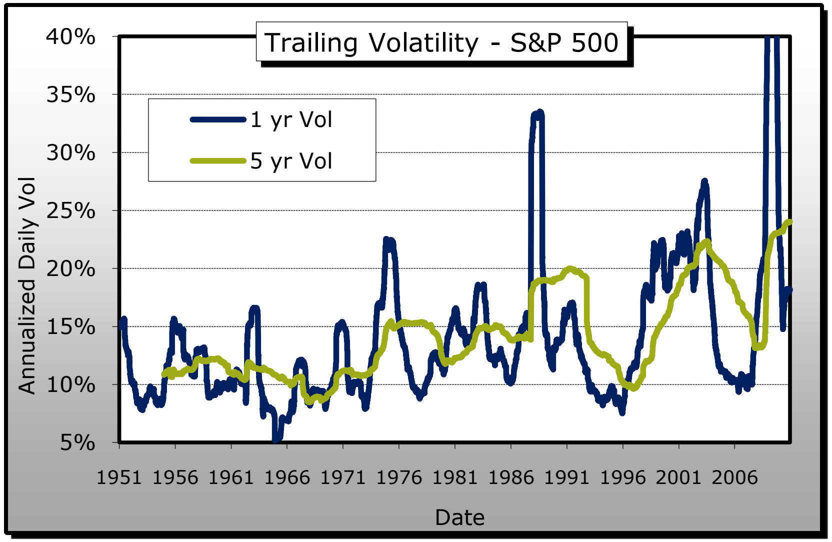
Appendix: Assumption Development

Assumption Development - Large Cap Equity

- **Sources of Return**
  - Valuation
  - Real earnings growth
  - Dividend yield
  - Inflation

Return Source	Current Values	Expected Forecast Values	Return Contribution
Valuation	14.3 (forward earnings)	15	0.00%
Real Growth*	2.5%	2.0%	2.0%
Dividend Yield**	1.9%	2.0%	2.0%
Inflation	1.2%	3.0%	3.0%
		Total Expected Return	7.0%

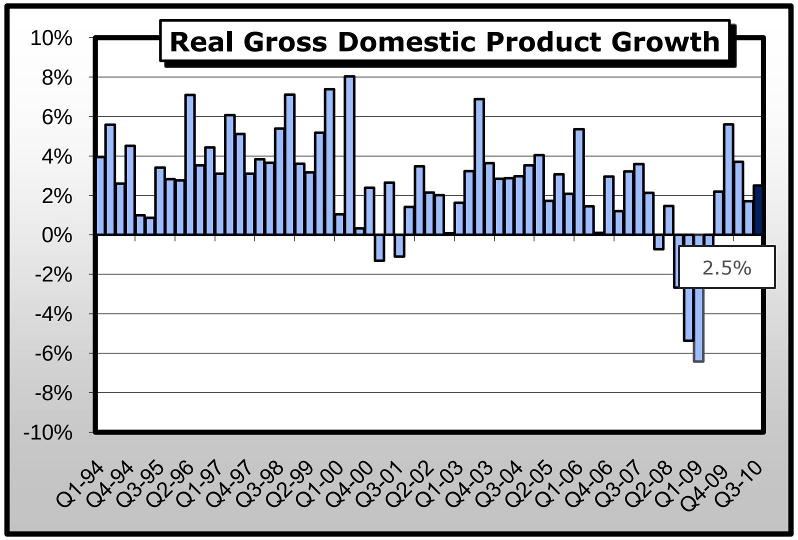
* Real GDP growth used as proxy for real earnings per share growth



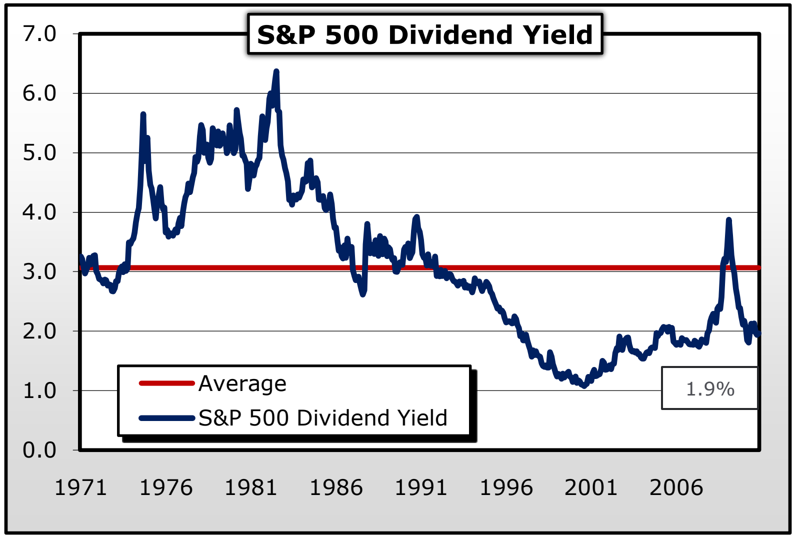
Source: Bloomberg, NEPC

- **Volatility**
  - Historical annualized volatility = 15%
  - Trailing 12 month volatility (Dec 2010) = 18%
  - Current VIX Pricing ~ 18
  - Volatility is conditional – spikes in volatility tend to result in extend periods of increased volatility
  - Annual volatility expected to normalize over 5-7 years but this likely leads to 5-7 year volatility above historical average
  - 2011 5-7 year Volatility assumption = 18%

US Equity Building Blocks



Source: Bloomberg



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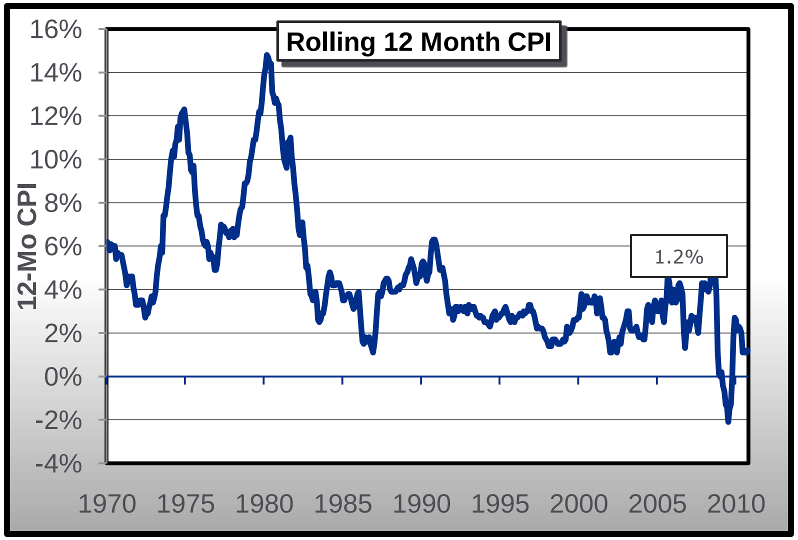

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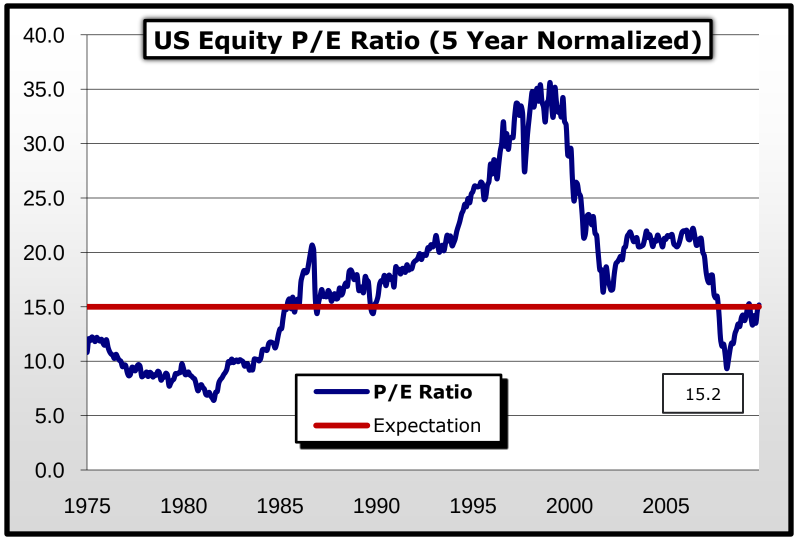
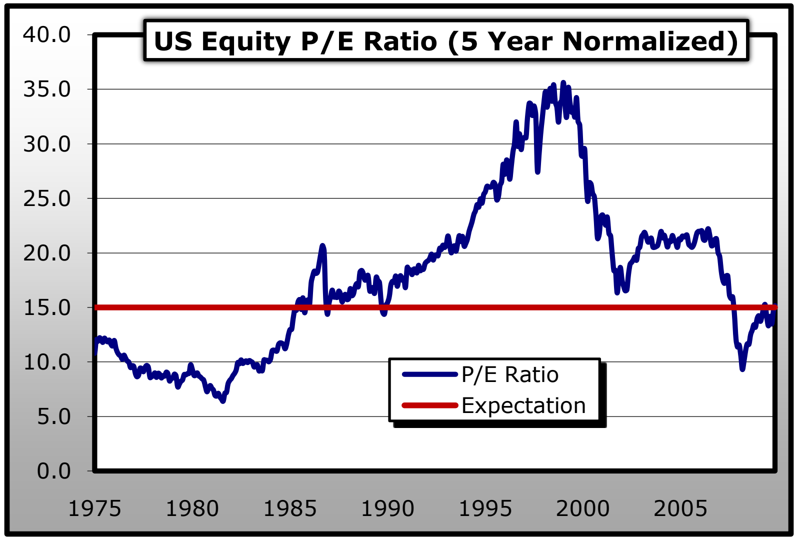
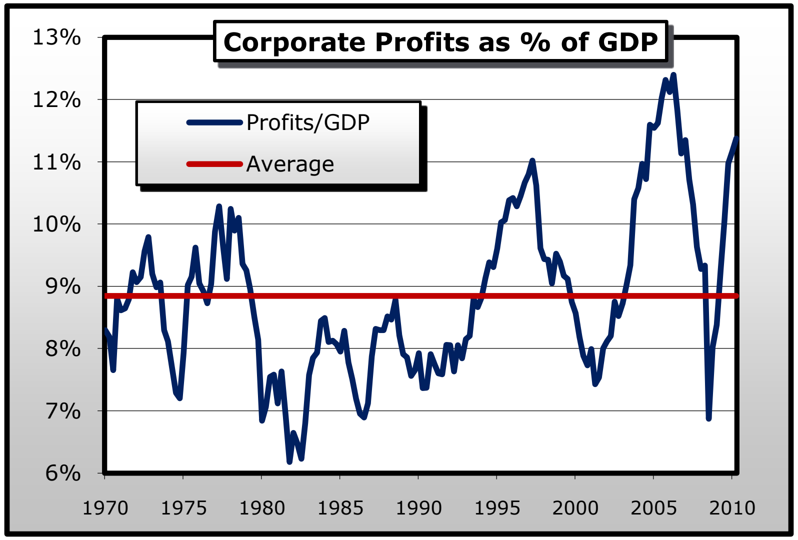


Source: Bloomberg, NEPC

Valuation Factors Are Offsetting



Source: Bloomberg, NEPC



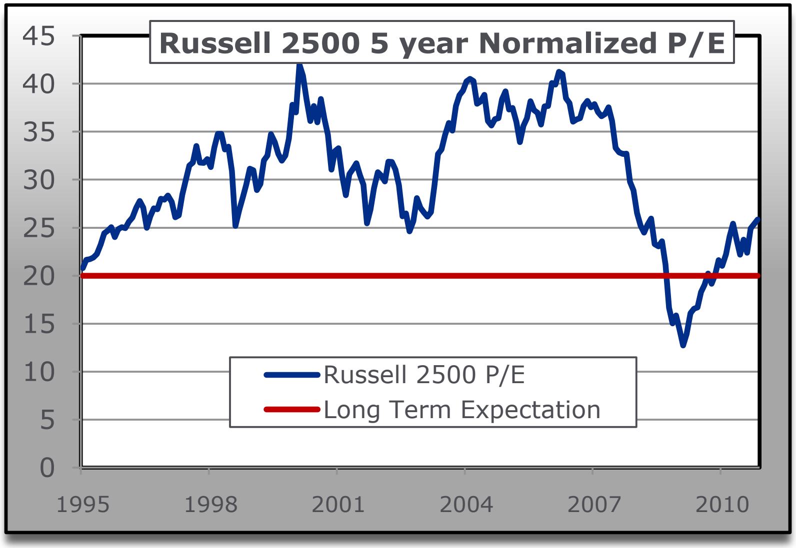
Source: Bloomberg

- **Analysis of Price-to-Earnings multiples suggest a case for small valuation expansion**
  - Could argue for higher multiple given low cash rates
  - Suggests modest upward pressure on equity prices

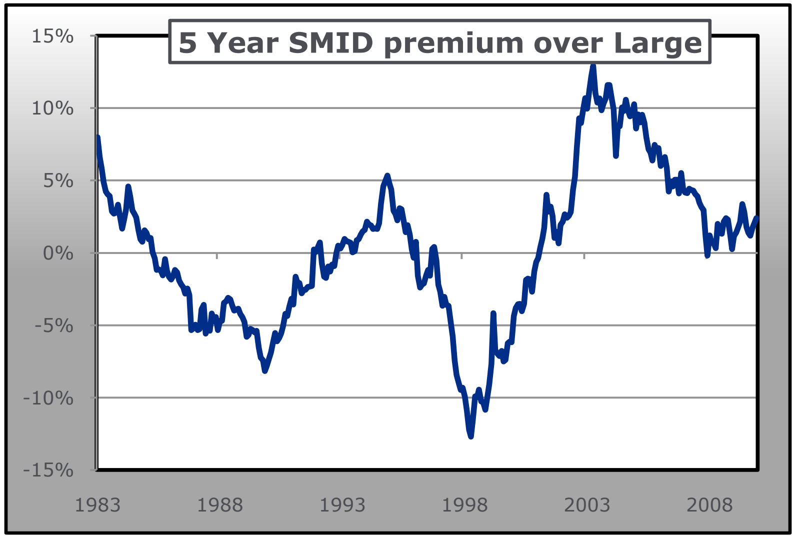
- **However, corporate profits are approaching all-time highs**
  - Corporate profits have historically exhibited mean-reversion characteristics
  - Declining profitability over 5-7 year horizon suggests downward pressure on equity prices

- **Offsetting factors lead to no assumed valuation adjustment in 2011 US Large Cap Equity assumption**

Small Cap Equity



Source: Bloomberg, NEPC



Source: Ibbotson

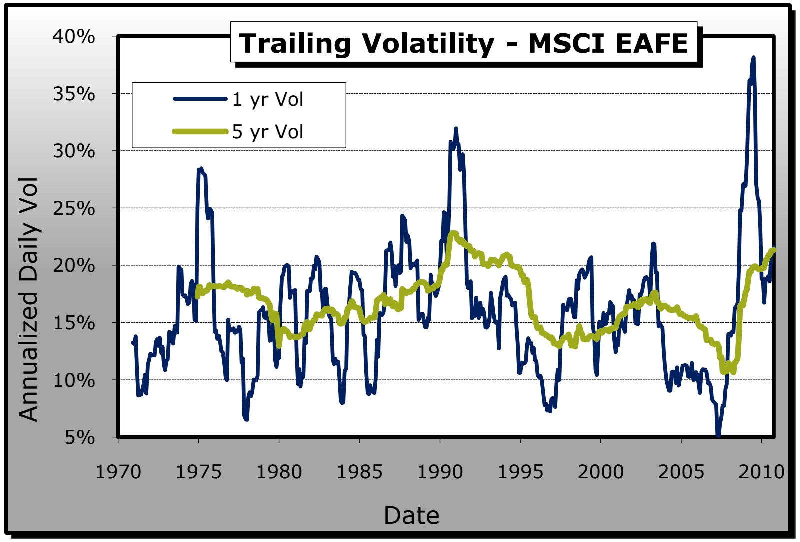
- **Small/mid cap equity has outperformed large cap consistently over the last decade**
  - Significant outperformance in 2010 (more than 10% above S&P 500)
  - Premium for smaller capitalization is expected to persist over the long-term but exhibits mean-reversion characteristics over medium-term
- **Valuations appear above long-term expectations**
- **Small cap companies expected to be more challenged in muted growth environment**
- **We are not projecting a small/mid cap premium over the next 5-7 years**

Assumption Development – International Developed Equity

- **Sources of Return**
  - Valuation
  - Real earnings growth
  - Dividend yield
  - Inflation

Return Source	Current Values	Expected Forecast Values	Return Contribution
Valuation	12.6 (forward earnings)	16	0.0%
Real Growth*	2.5%	1.5%	1.5%
Dividend Yield**	3.1%	2.5%	2.5%
Inflation	1.3%	3.0%	3.0%
		Total Expected Return	7.0%

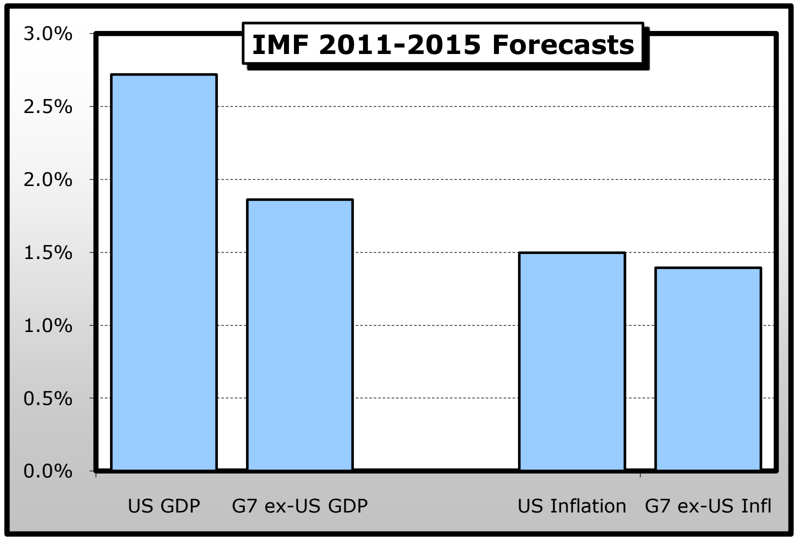
* Real GDP growth used as proxy for real earnings per share growth



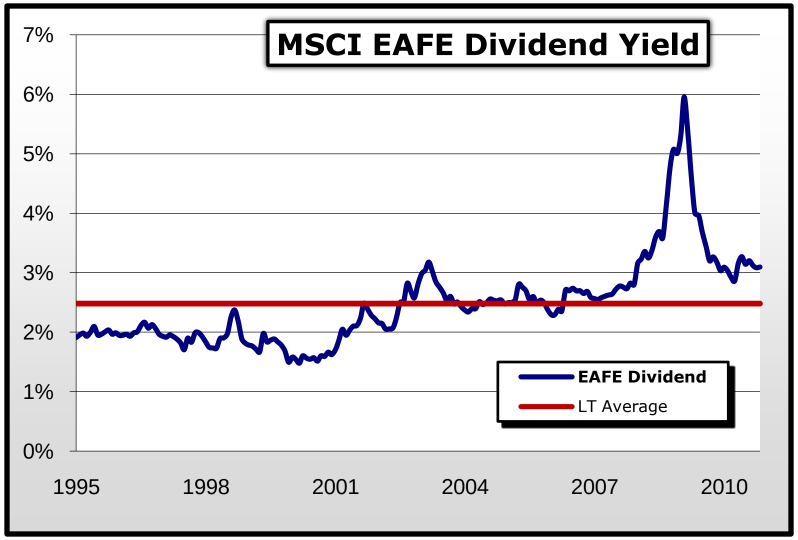
Source: Bloomberg, NEPC

- **Volatility**
  - Historical annualized volatility = 17%
  - Trailing 12 month volatility (Dec 2011) = 22%
  - Volatility of international equity markets and currencies expected to remain high
  - 2011 5-7 year Volatility assumption = 21%

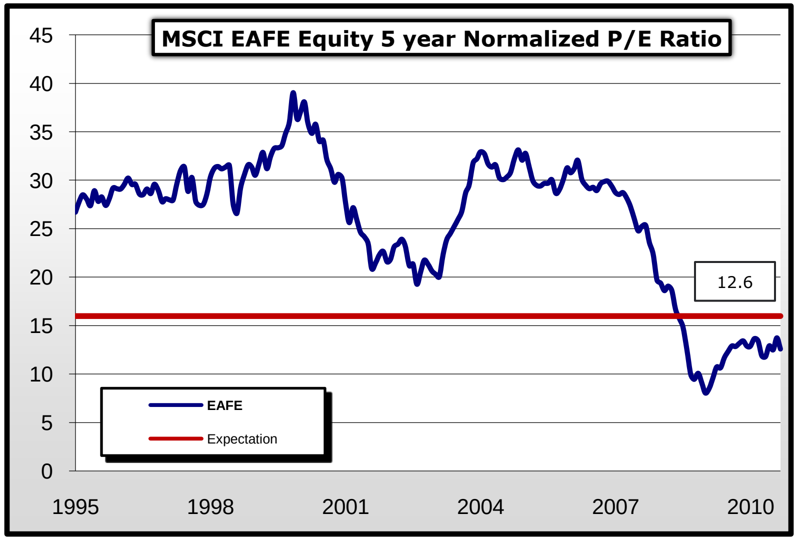
International Equity Building Blocks



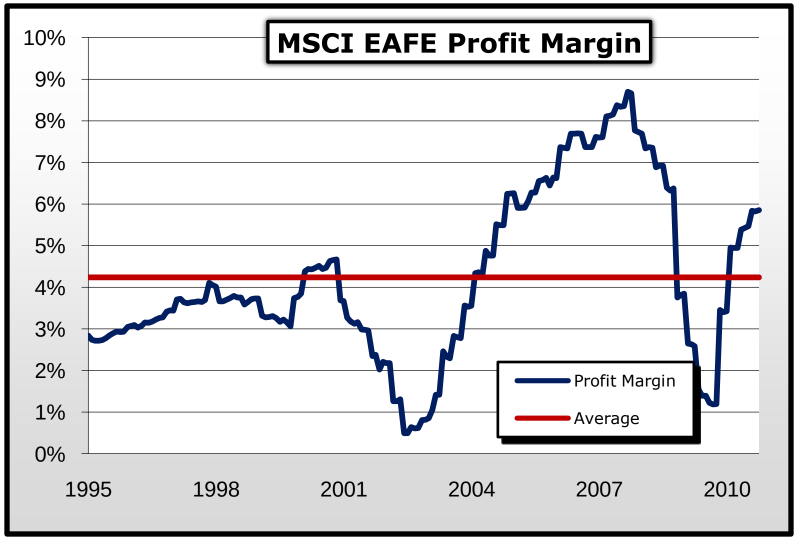
Source: IMF



Source: Bloomberg

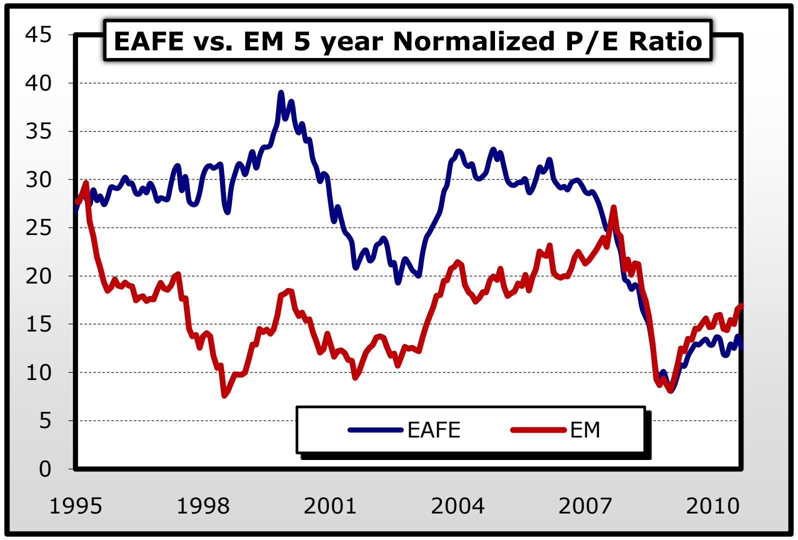


Source: Bloomberg

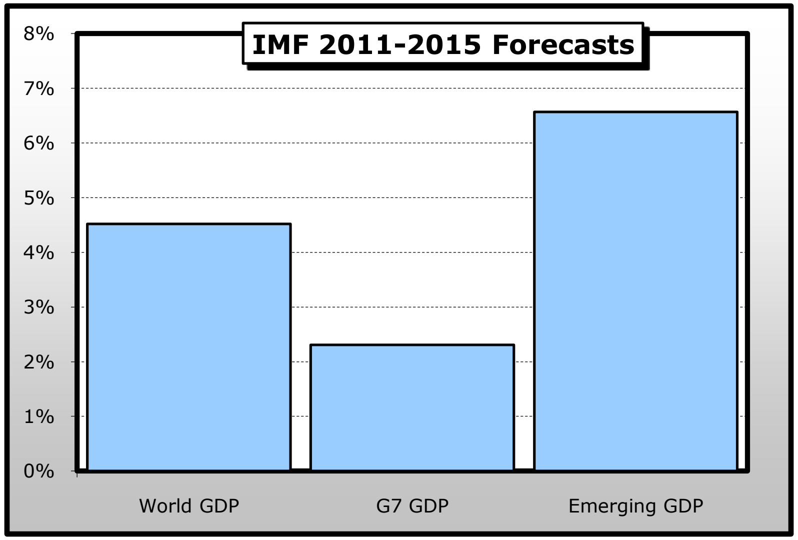


Source: Bloomberg

Emerging Markets Equity



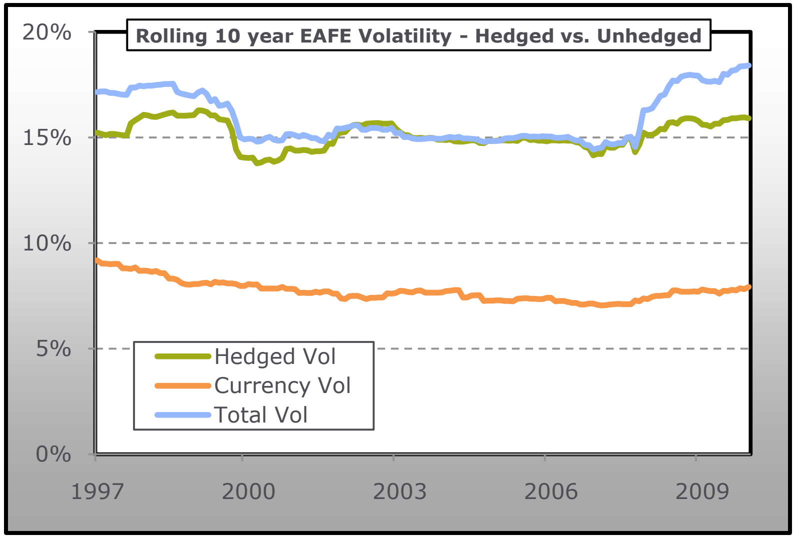
Source: Bloomberg, NEPC

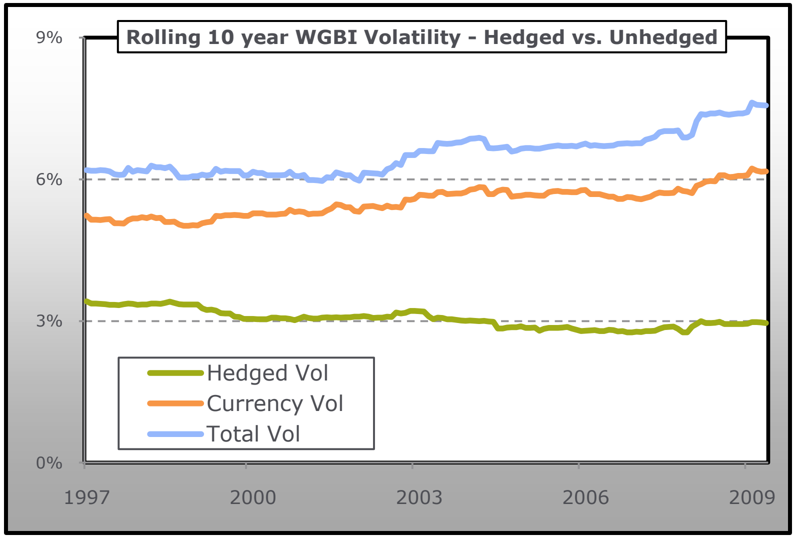


Source: IMF

- **Historical valuation discount for emerging markets has dissipated in recent years**
  - Further fundamental multiple expansion limited
- **High economic growth prospects (especially relative to developed countries) expected to drive higher returns**
  - 4% higher growth forecast than developed world
  - We assume a 2% return premium to developed markets
    - With higher volatility

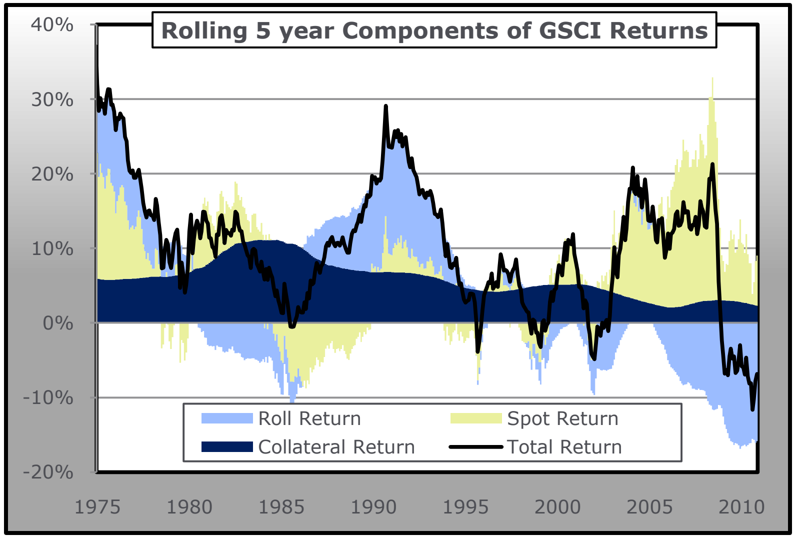
Currency Hedged Asset Class Assumptions



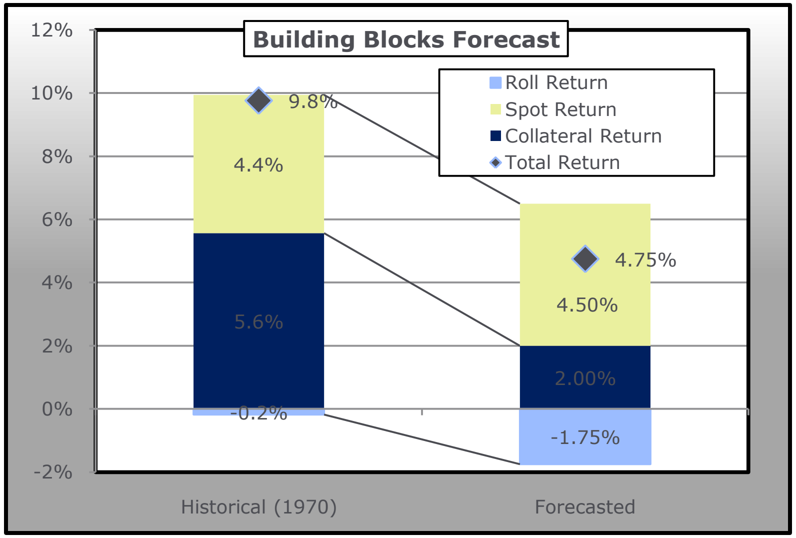


- **Adding currency hedged developed equity and global bonds**
  - Facilitates analysis of currency risk in portfolio independent of asset class risk
- **Currency risk is additive to non-dollar asset classes**
- **We use similar arithmetic returns (net of hedging costs) and lower expected volatility based on relative contribution to risk from currency**
  - Developed equities volatility reduced from 21% to 19%
  - Global bonds reduced from 9% to 5%

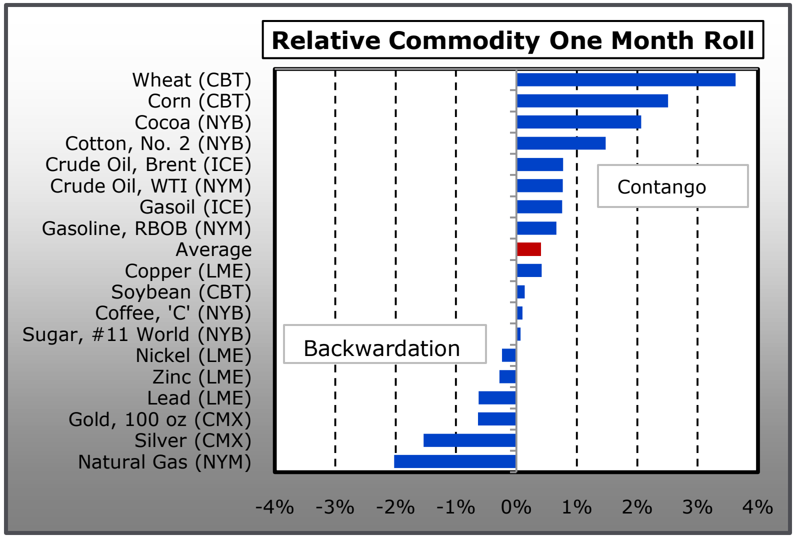
Commodities



Source: *Ibbotson*



Source: *Ibbotson*



Source: *Bloomberg*

- **We use the Goldman Sachs Commodity Index to set assumptions for broad exposure to commodities**
- **We expect the following over the next 5-7 years**
  - Much lower collateral returns due to low cash yields in line with 2011 cash assumption of 2%
  - Similar or even higher than historical spot return due to emerging market demand and supply constraints
  - Higher than historical negative roll yield as many markets remain in contango

Fixed Income Factor Model

- **Return/volatility/correlation assumptions for fixed income sectors**
  - Discreet returns for subsectors creates opportunity to build customized allocations across fixed income markets and maturities
- **Assumptions built for:**
  - US Treasury
    - 1-3 year; Intermediate; Long
  - US Investment Grade Credit
    - 1-3 year; Intermediate; Long
  - US MBS
  - US TIPS
  - US High Yield Credit
    - 1-3 year; Intermediate; Long
  - Global Bonds (Sovereign)
    - Hedged and Unhedged
  - Emerging Market Debt (Sovereign)
    - Local and External (USD Denominated)

Fixed Income Factor Model Inputs

- **Market based inputs**
  - 7 years of forward US, UK, Europe and Japanese sovereign yield curve assumptions from Bloomberg
    - Both Nominal and Real for US only
  - Current Spreads for IG, MBS, HY & EMD Credit
  - Historical correlation matrix (approx 30 years of monthly data)
    - Rounded up to reflect expectations of rising correlations
  - Current duration inputs for 1 year through 10 year, 20 year and 30 year Treasury

- **Adjusted market based inputs**
  - Horizon end point for IG, MBS, HY & EMD Credit spreads
    - Straight line compression from current levels to target spreads
  - Volatility figures adjusted up from historical medians
    - Lower than current in many cases
    - Adjusted by review of periods of rising yields (mid-70s to early-80s)
  - Modified durations calculated based on current and projected yields

Fixed Income Factor Model Methodology

- **Each subsector return calculated:**
  - Annual Return = Price x (Yield + Yield differential x Duration)
  - Computed for 7 years and annualized to geometric return figure
  - Returns then adjusted for expectations
    - Most are very close to calculation
  - Defaults incorporated for High Yield

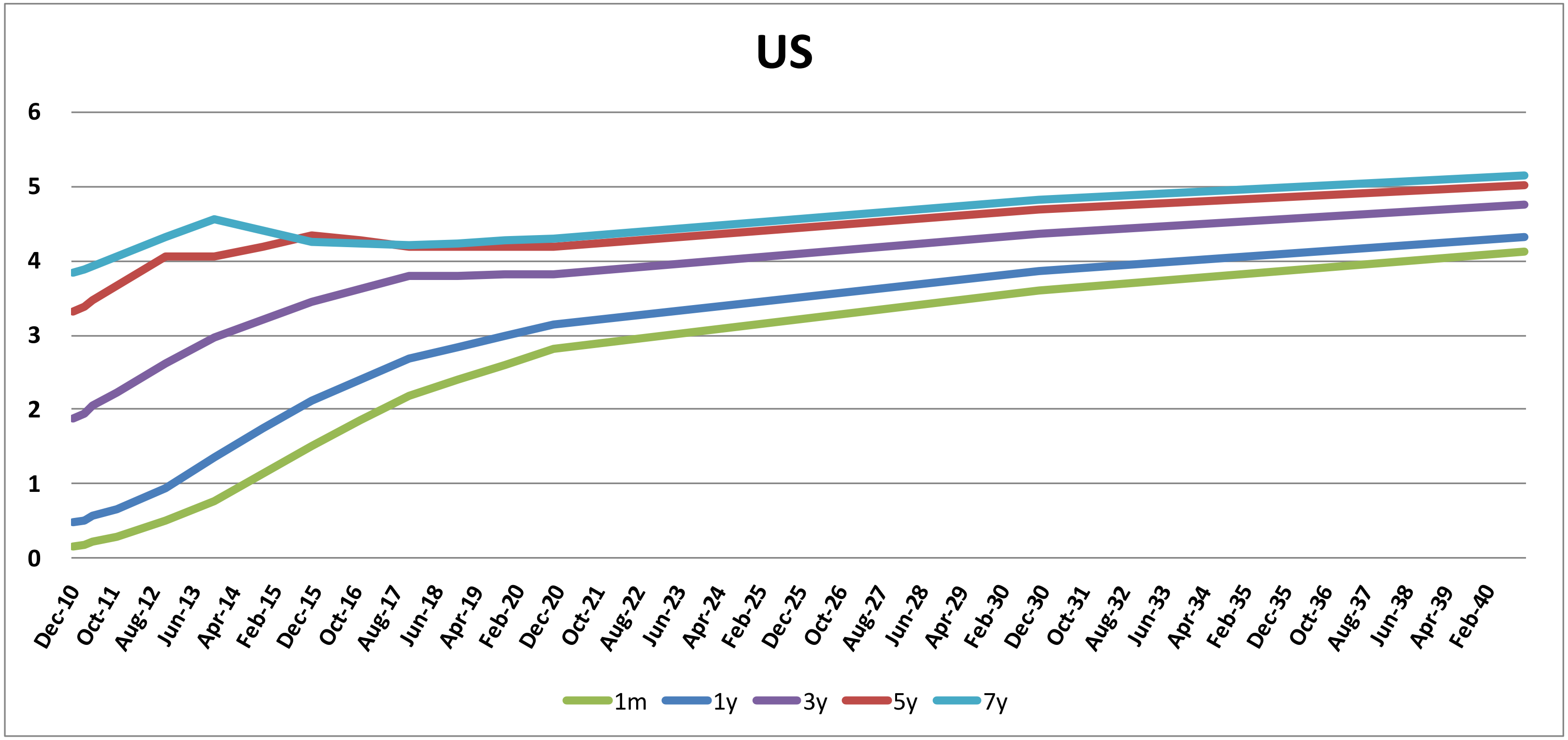
- **Mortgages and EMD Local are more complex to model**
  - Return calculated using calculated spreads to current US Treasury market
  - MBS prepayment optionality reflected in elevated volatility relative to historical realized levels
  - EMD Local assumes greater spread compression to capture assumed higher local market short rates vs. US Treasuries

Fixed Income Factor Model – 2011 Enhancements

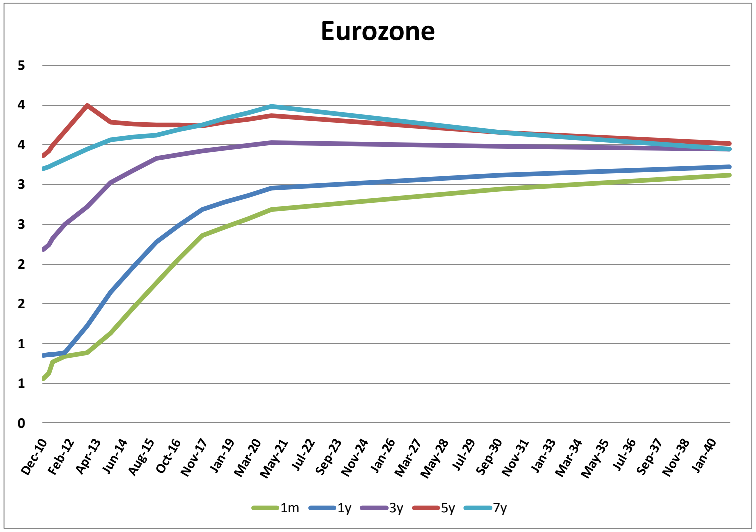
- **Roll-down methodology**
  - Price change calculation modified to better capture yield curve steepness
  - Investors targeting relatively constant maturity benefit by rolling down curve and repurchasing longer maturity at higher yield
- **Maturity segments expanded for benchmarks and spreads**
  - Return expectations reflect each index composition
  - Improved specificity in spreads recognizes credit spread differentials across various maturity segments
- **Dynamic duration adjustment**
  - Expectations of rising rates will lower durations, lower duration will reduce year over year price impacts
- **Forward yield curve analysis of developed international markets**
  - Separate international bond assumptions
    - Similar bolt-together approach as core bonds for creating global bonds assumption

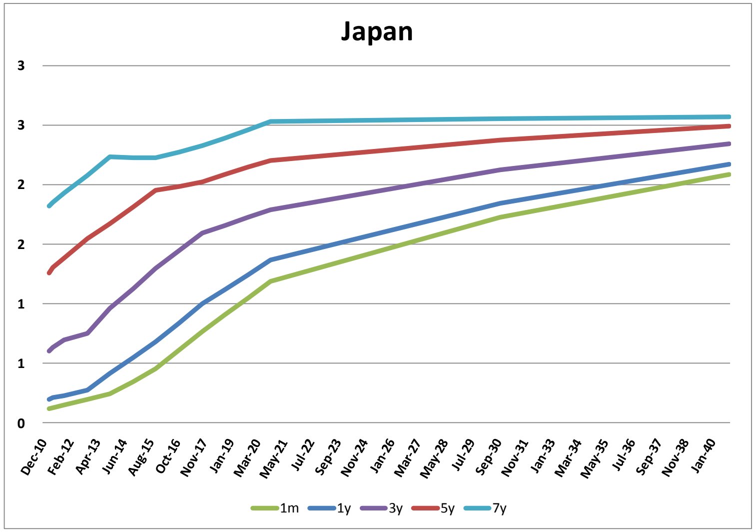
Current US Yields and Forward Yields

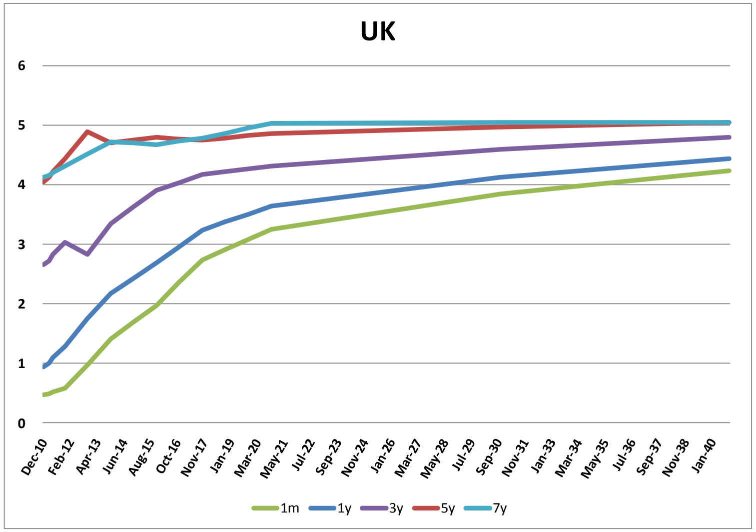
- **Forward yield curves show increasing yield expectations in US Treasury market over the assumption period**
- **Yield changes are more prominent at the short end of the curve**
  - Market expectations show a flattening of the curve over the next 7 years



Global Developed Yield Curves

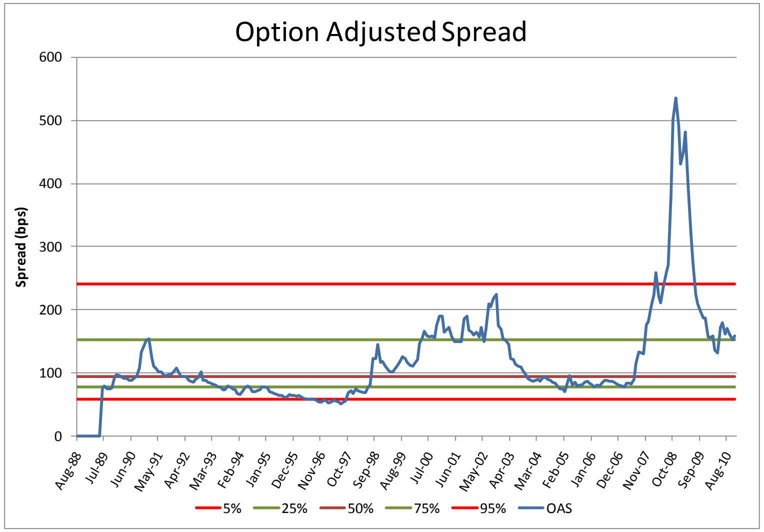


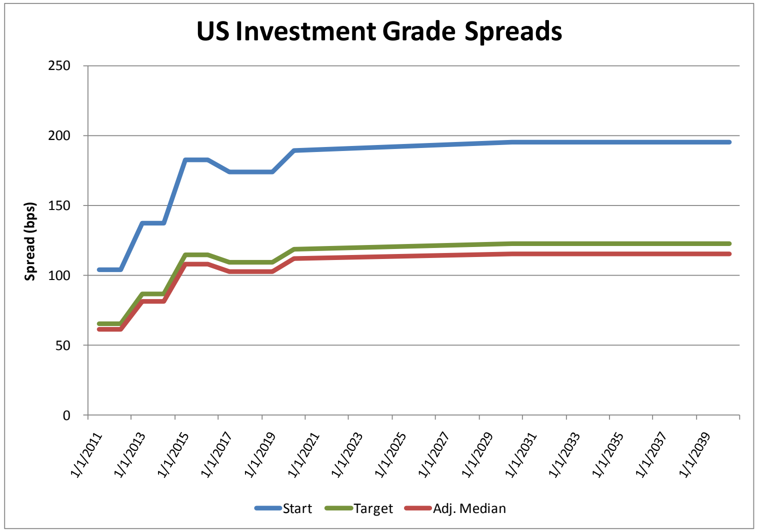




- **Across major global developed bond markets a similar story emerges**
  - Rising Rates
  - Flatter curve
- **However, market expectations of Japan's curve still exhibit steepness in forward years**

Investment Grade Credit Spreads

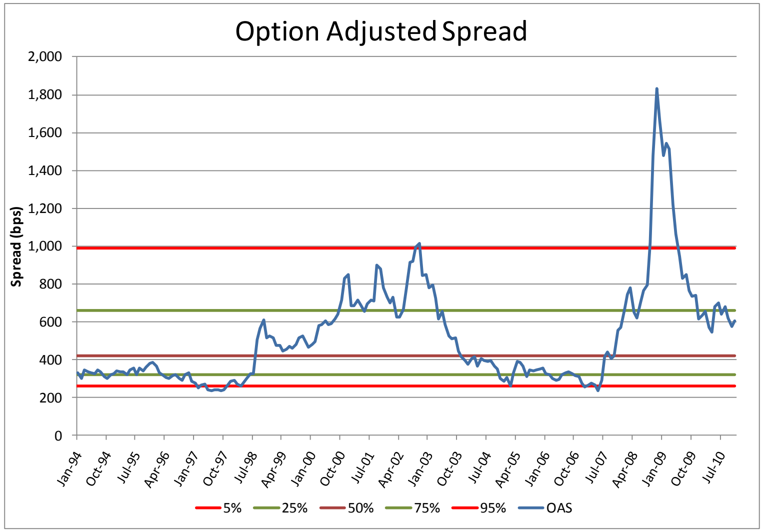


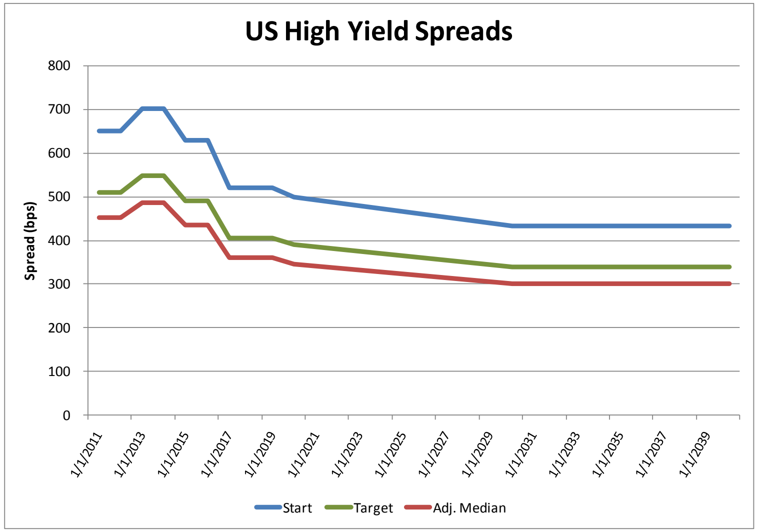


- **Current IG spreads are still elevated relative to history**
  - Chart on left examines spread history of BarCap Credit index
  - Overlays historical percentiles to get a sense of current relative attractiveness

- **Investment Grade credit curve is steep out to 7 years**
  - Chart on right shows current spreads based on maturity segments (Blue)
  - Assumption of spreads reverting towards median
    - Green line represents our target spread for year 7 of our analysis
  - Red line is historic median spreads
    - Spreads expected to be slightly elevated at the end of our horizon

High Yield Credit Spreads





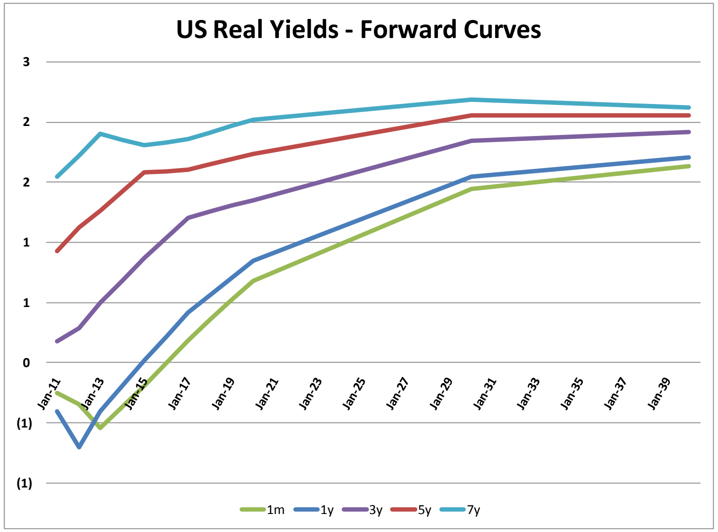
- **Current high yield spreads remain elevated relative to history based on BarCap US Corporate High Yield Index**

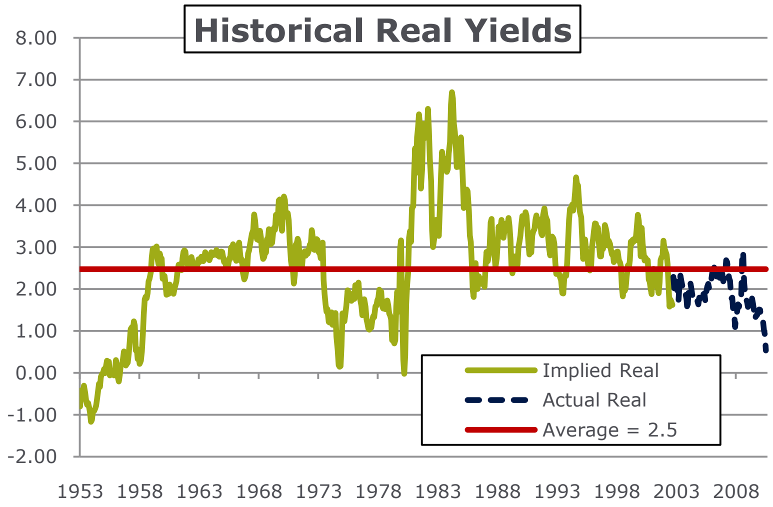
- **High Yield credit curve reflects inversion after 5 years**
  - Quality of various segments
    - Lower rated companies more likely to issue short term debt
  - Technical issues
    - 2009-2010 saw increased issuance, often for refinancing, in the 5-10 year area
    - This was met with strong investor demand, thereby compressing spread
  - Consistent with investment grade, spread compression included in analysis
    - However, target is not as close to long term median as in IG

Emerging Market Debt

- **In years past, NEPC has published a single Emerging Market Debt assumption**
  - This blended figure encompassed both the external, or USD denominated, debt and local currency debt issued by emerging sovereign nations
- **Local Currency EMD created as a distinct asset class given growing size and unique characteristics**
  - Local EMD has shorter duration, higher yield and different issuer mix
  - Investable local EMD issuance now totals $600 billion as compared to the $400 billion in USD denominated debt
  - We expect issuance to shift from external to local currency debt for many large nations
    - BarCap notes that Russia and Mexico are unlikely to issue in USD or EUR in 2011 – the two make up about 30% of the current external debt market
- **Based on improving fundamentals we believe volatility is likely to decline slightly in EMD on a blended basis to approximately 14%**
  - This view is executed through a reduction in volatility for External USD denominated debt to 12%
  - Maintaining prior EMD volatility assumption of 15% for EMD Local to account for additive currency volatility

TIPS





- **TIPS returns are comprised of a fixed coupon (real yield) and realized inflation (CPI)**
  - If the market correctly predicts inflation, then TIPS and Treasuries will have the same return
  - We believe the current market implied breakeven rate is low and apply an adjustment to this to reflect our 3% inflation expectation

- **Current real yields are quite low relative to history**
  - In late 2010, some shorter maturities offered negative real yields
  - Our TIPS assumption reflects a real yield adjustment closer to long-term averages and forward curve expectations of 2%
    - A headwind to TIPS performance

Alternative Assumptions

- **Mean/variance framework can be used to show diversification benefits of alternatives, but is limited in ability to:**
  - Size alternatives relative to traditional investments
  - Address distinctions of sub-categories or current manager strategies in the market
  - Actual implementations should use Research teams to adjust to specific strategies
- **Real Estate**
  - Mix of fixed income, equity, and real asset components
  - 6.5% return with 15% volatility
- **Hedge Funds – Low Volatility**
  - Cash + 3.75% (includes imbedded .20 beta to equity)
  - 5.75% return with 7% volatility
- **Hedge Funds – Moderate Volatility**
  - Cash + 5% (includes imbedded .50 beta to equity)
  - 7% return with 12% volatility
- **Private Equity**
  - Extension of public equity market
  - 9.5% return with 28% volatility
- **Private Debt**
  - Extension of public high yield market
  - 9.25% return with 19% volatility

2011 Efficient Portfolios: 10% Standard Deviation

	Constrained Frontier	Unconstrained Frontier
Int'l Equities (Hedged)	10%	0%
Emerging Int'l Equities	10%	5%
Total Equity	**20%**	**5%**
Credit	5%	0%
High-Yield Bonds	10%	0%
EMD (Local Currency)	5%	0%
Total Fixed Income	**20%**	**0%**
Real Estate	10%	35%
Private Equity	10%	19%
Private Debt	10%	34%
Hedge Funds Low Vol	10%	2%
Hedge Funds Mod Vol	10%	0%
Total Alternatives	**50%**	**90%**
Commodities	10%	5%
Total Other	**10%**	**5%**

2011 5-7 Year Return	***8.1%***	***9.4%***
2011 30 Year Return	***9.1%***	***9.8%***
2011 Standard Deviation	***10.0%***	***10.0%***