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The Macro Asset Allocation “Game” – Is Game Theory Overtaking Finance?

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William Blair's Dynamic Allocation Strategies employ sophisticated investment strategies that may not be suitable for all investors, and an investor could lose all, or a substantial amount of their investment. These strategies:

- Are speculative and involve a substantial degree of risk;
- May use leverage to achieve potentially higher returns through proportionally higher ex-ante risk exposures through, but not limited to, the direct use of swaps, options, foreign exchange contracts, exchange traded funds, futures contracts, and/or by borrowing money to purchase investments;
- Are subject to other investment risks including those associated with high yield securities, emerging markets, non-U.S. securities, currency markets and fixed income securities;
- Expect to incur, but not target, equity-like risk, over periods of five years or longer but may experience risk and returns significantly different than expectations; and
- May produce highly volatile investment returns.

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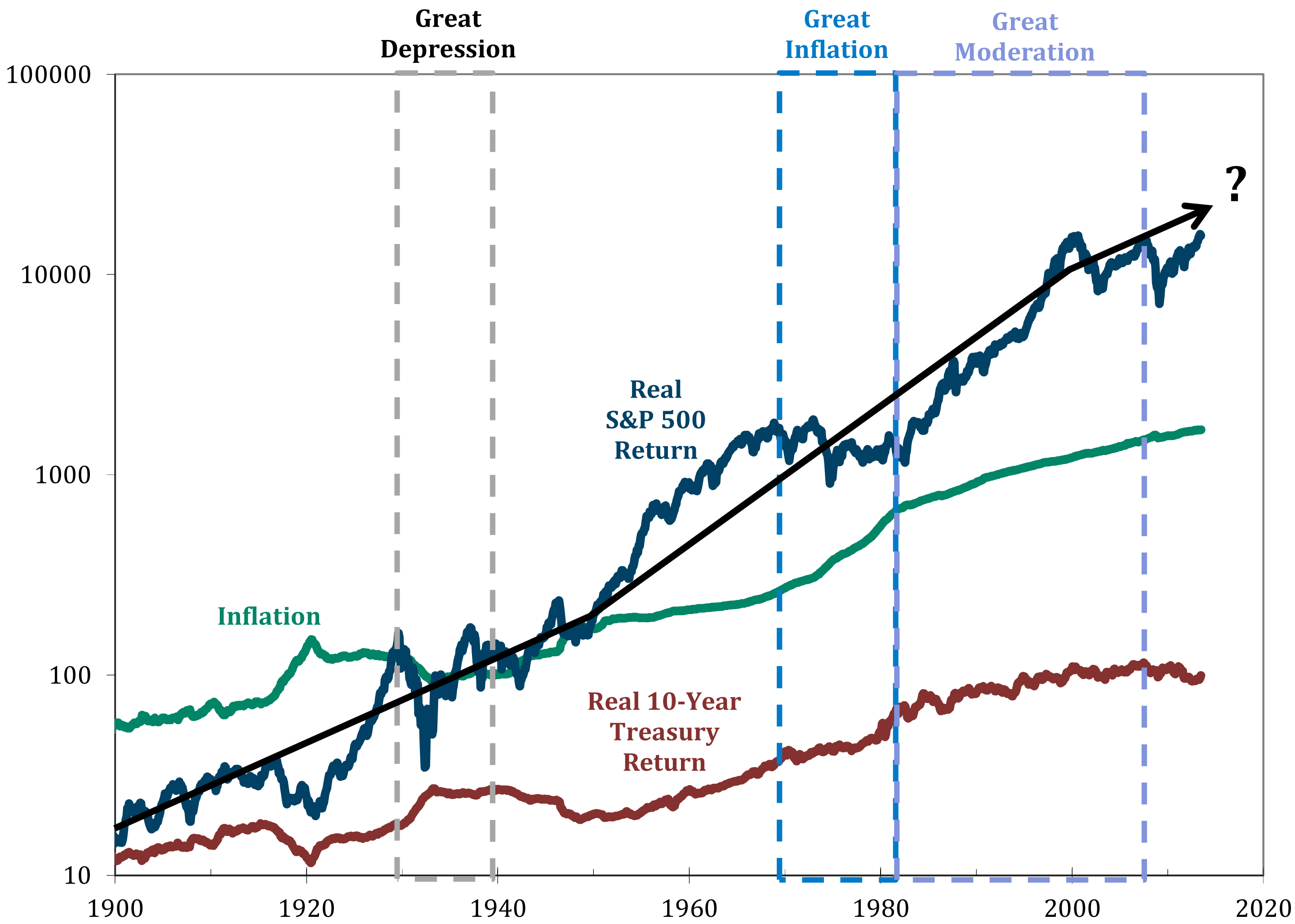
The Modern Era

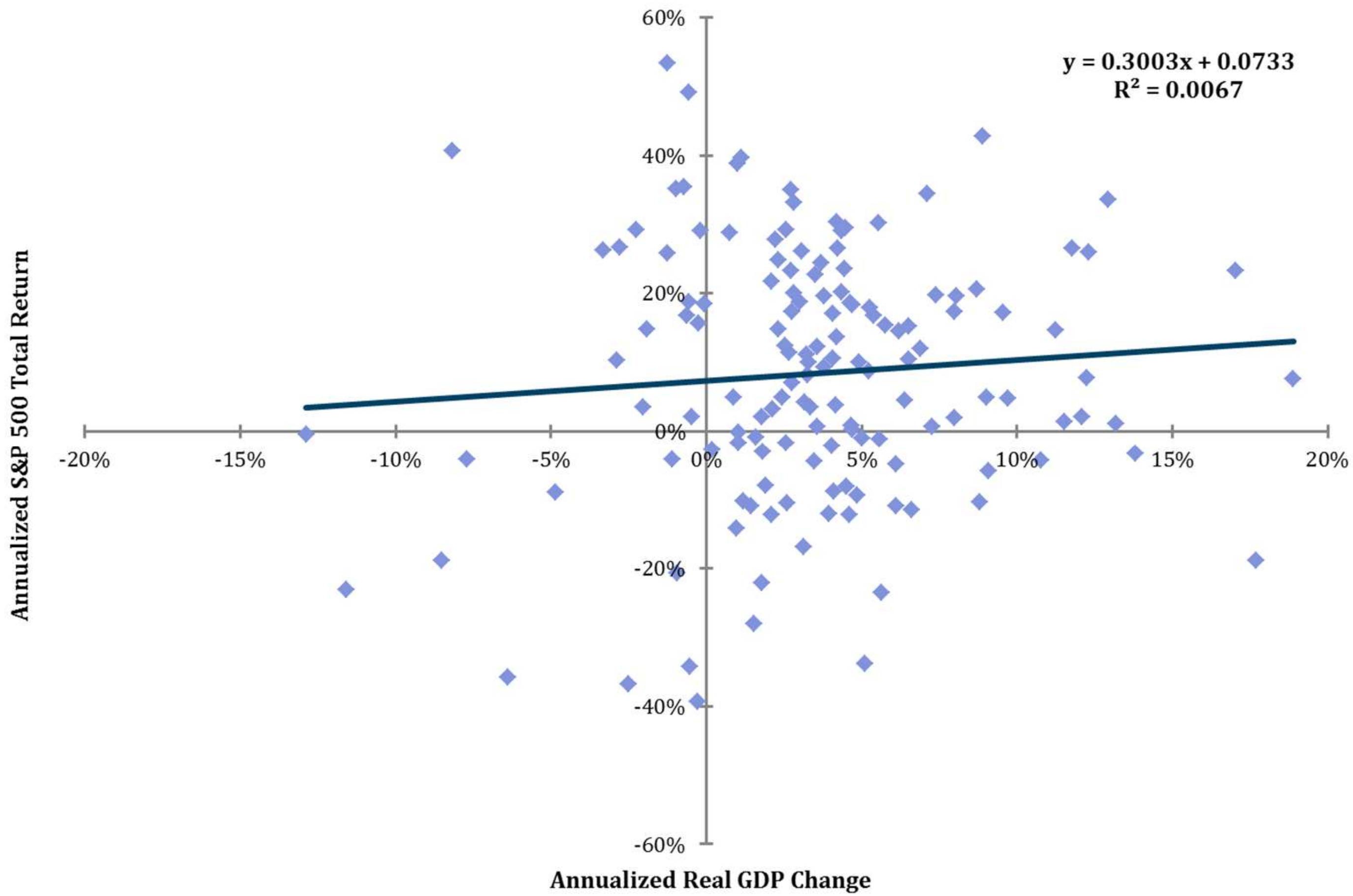
Relative Growth of S&P 500 (Inflation-Adjusted)



Past returns are no guarantee of future performance. A direct investment in an unmanaged index is not possible.
Data sources: U.S. Department of Commerce: Bureau of Economic Analysis, U.S. Department of Labor: Bureau of Economic Analysis

Real S&P Return versus Real GDP

One-year rates of change/1871–present



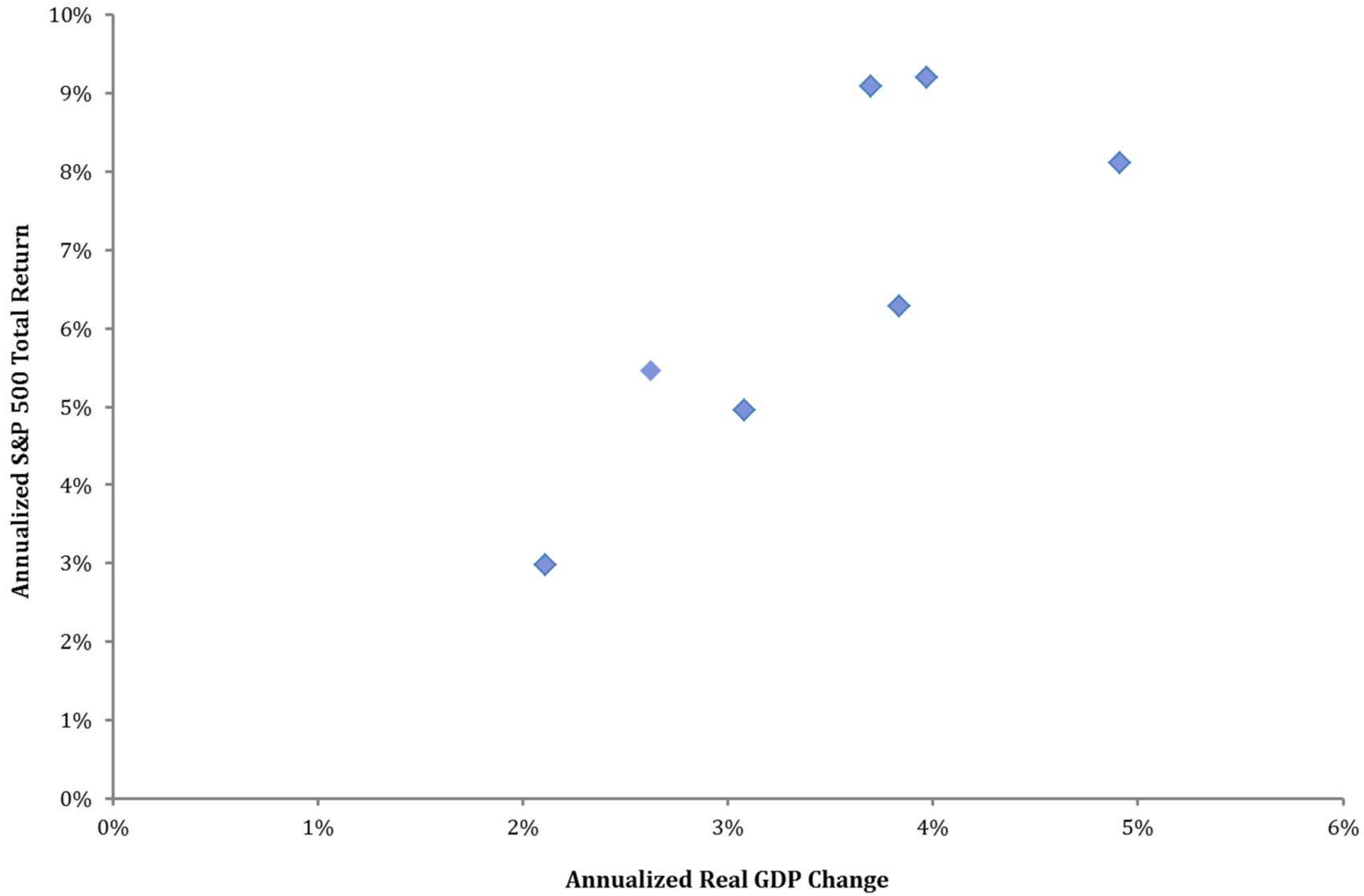
Sources: William Blair, U.S. Department of Commerce: Bureau of Economic Analysis, Maddison Project[1], Robert Shiller[2]

[1] Bolt, J. and J. L. van Zanden (2013). "The First Update of the Maddison Project; Re-Estimating Growth Before 1820," Maddison Project Working Paper 4.
[2] Stock Market Data Used in Irrational Exuberance, Princeton University Press, 2000, 2005, updated.

Past returns are no guarantee of future performance. A direct investment in an unmanaged index is not possible.

Real S&P Return versus Real GDP

Twenty-year rates of change/1871–present



Sources: William Blair, U.S. Department of Commerce: Bureau of Economic Analysis, Maddison Project[1], Robert Shiller[2]

[1] Bolt, J. and J. L. van Zanden (2013). "The First Update of the Maddison Project; Re-Estimating Growth Before 1820," Maddison Project Working Paper 4.
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Framework for Dynamic Investing in Current Environment

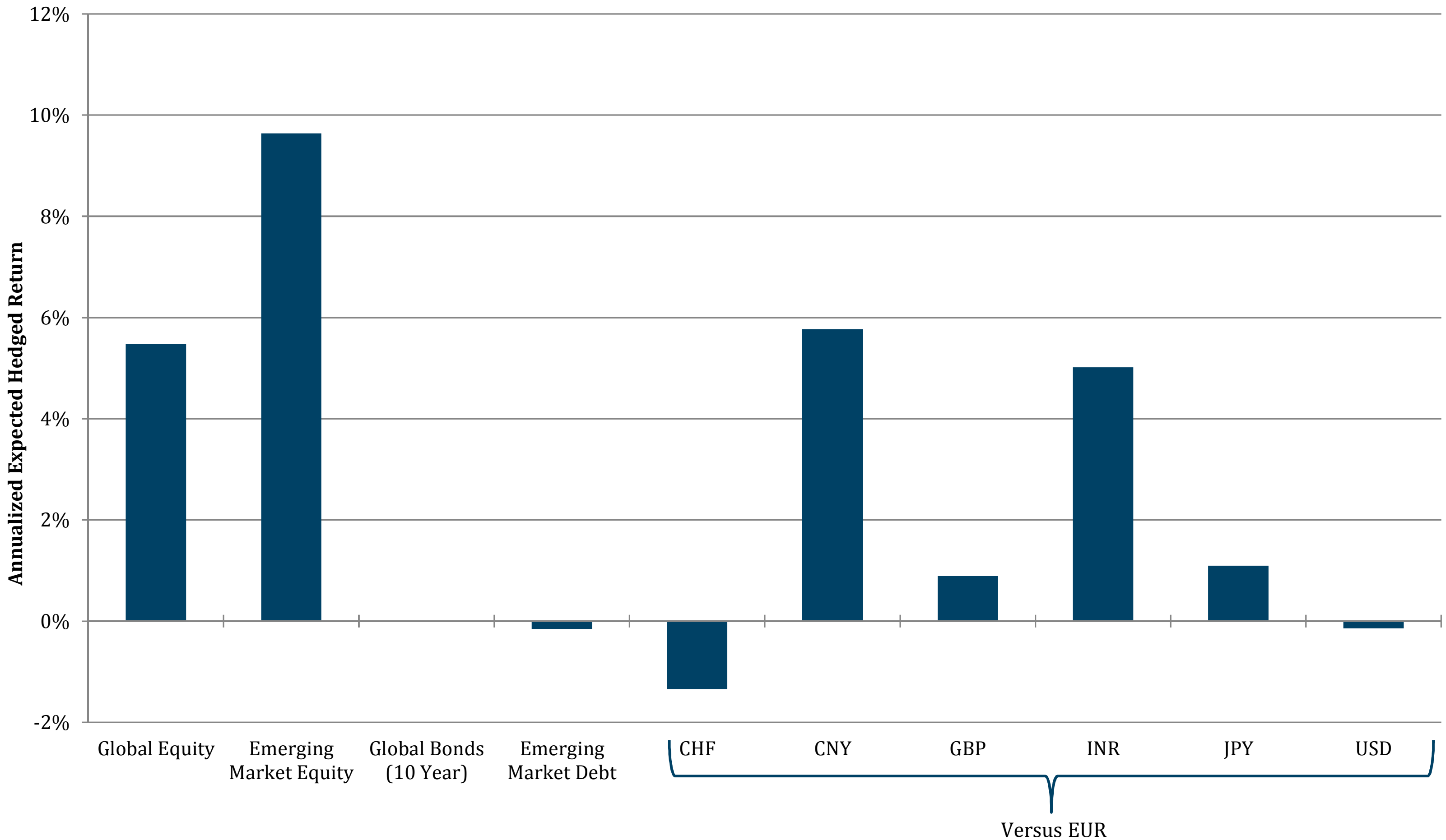
Where
do prices differ from fundamental value?

Why
do prices differ from fundamental value?

How
best to capture value/price discrepancies?

Expected Returns

Selected markets and currencies (8-year horizon, annualized, hedged)



As of December 31, 2015. EUR is the base currency.

Source: William Blair, Investment Expectations. S&P, MSCI, Barclays, Bank of America Merrill Lynch, JP Morgan, 6-month LIBOR. For illustrative purposes only and not intended as investment advice. Expected return information is intended to illustrate potential expectations for various capital markets and should not be considered representation of past or expected future returns for any William Blair investment strategy or product. Expected returns are provided are for informational purposes only and not intended to be reflective of results a person should expect to achieve. Actual results will vary and may be higher or lower than the values indicated. Differences between expected and actual results may be exaggerated in volatile market environments. There is no guarantee that expected return indicated will equal the actual return for any capital market. The expected return of an asset reflects the average probability distribution of possible returns and is based on the convergence of price to value plus income accruing to an investor. Please refer to the Important Disclosures at the end of this presentation for additional information on Capital Market Assumptions calculations.

A Game-Theoretical Framework for Understanding Strategic Negotiation

- Who are the primary “players” (leaders)?
- What are their objectives (conflict or co-operation)?
- What are their bargaining powers (who will prevail)?

“We can ignore reality, but we cannot ignore the consequences of ignoring reality.”

– Ayn Rand

The Players and Their Objectives: Eurozone January-July 2015

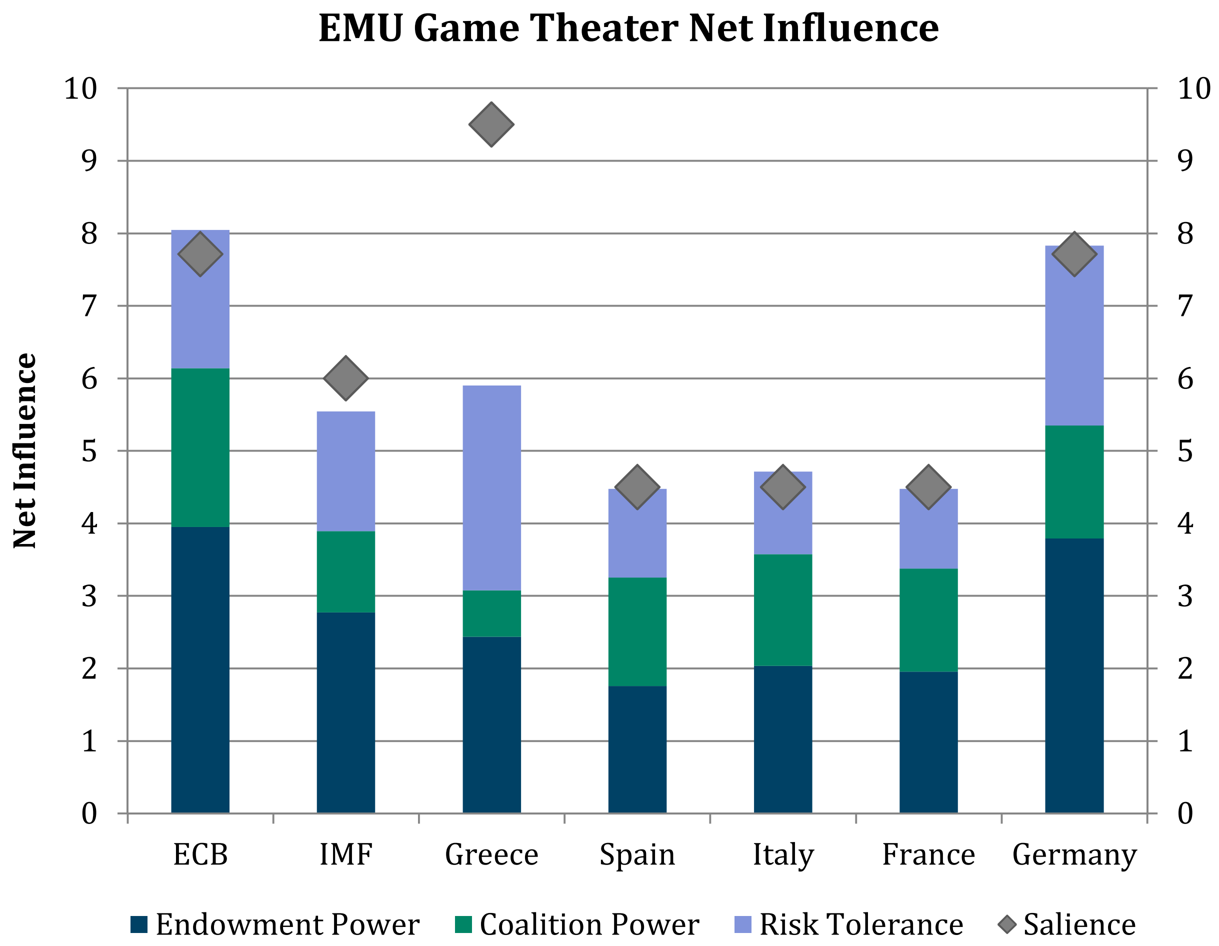
Players	Primary Objectives	Secondary Objectives
ECB	Prevent deflation	Preserve euro
IMF	Preserve credibility of IMF	Sustainable plan for Greece
Greece	Reduce official debt / debt service	Stay in euro
Spain	Push back against populist ascendancy	Preserve euro
Italy	Preserve euro	Increase leadership image in euro zone
France	Push back against populist ascendancy	Preserve euro
Germany	Push back against populist ascendancy	Preserve euro (for now)

Opposing objectives: Conflict, brinksmanship, deliberate creation of risk
Aligned objectives: Co-operation, accommodation, mutual reduction of risk

As of July 2015.
Source: William Blair.

Eurozone Game Theater – January-July 2015: Investment Implications

- **Raised geopolitical risk**
- **Opposed primary objectives**: Brinkmanship
- **Secondary objectives aligned**. No players want euro break-up.
- **Suppress** long EMU equity exposures
- **Augment** short euro exposure



As of July, 2015.
Source: William Blair.

William Blair Macro Allocation Strategy
Flexible Allocation Ranges Necessary in Today's Environment

As of December 31, 2015

Total Return, benchmark-agnostic orientation:

- CPI + 6% long-term total return objective

Expected risk characteristics over a market cycle:

- Average Volatility: 10%
- Average Beta: 0.35[1]

Current allocations within allocation ranges are highlighted with green diamonds.

	Lower Expectations[2]	Upper Expectations[2]	Current Allocation
Global Equity	-20%	80%	22.3%
U.S. Equity	-15%	50%	-1.5%
Canada	-15%	25%	-0.9%
Europe (excluding U.K.)	-15%	25%	9.8%
U.K.	-15%	25%	4.0%
Asia Developed	-15%	25%	4.4%
Emerging Markets	-15%	25%	6.5%
Global Fixed Income	-50%	130%	-3.9%
U.S. Treasury & Credit (10-Year)	-50%	75%	8.2%
Non-U.S. (10-Year)	-75%	90%	-12.9%
Emerging Markets	-25%	30%	0.8%
Cash	-40%	100%	30.9%
U.S. Dollar	-50%	50%	-5.7%
Canadian Dollar (CAD)	-30%	30%	0.0%
Other Americas (individually)	-30%	30%	9.7%
Euro (EUR)	-50%	50%	-9.0%
Swiss Franc (CHF)	-30%	30%	-10.0%
British Pound (GBP)	-30%	30%	-3.0%
Other Europe (individually)	-30%	30%	1.5%
AUD and NZD	-50%	50%	-13.3%
Japanese Yen (JPY)	-50%	50%	4.3%
Chinese Yuan (CNY)	-30%	30%	5.0%
Asia (excluding JPY and CNY)	-30%	30%	13.7%
Other (individually)	-30%	30%	6.8%

1. MSCI AC World Index
2. Holding allocations are not expected to fall below lower expectation band more frequently than 10% of the trading days based on daily value of portfolio; similarly, holding allocations are not expected to exceed upper expectation band more frequently than 10% of trading days based on daily value of portfolio.
3. Not inclusive of all portfolio exposures.

Data is for illustrative purposes only and is not intended as investment advice. Allocations subject to change without notice.

Expected Returns

Macro Diversification Needed to Navigate at Dynamic path

Macro Diversification

Ride the long-term tides

- Orient in line with fundamentals

Navigate the short-term waves

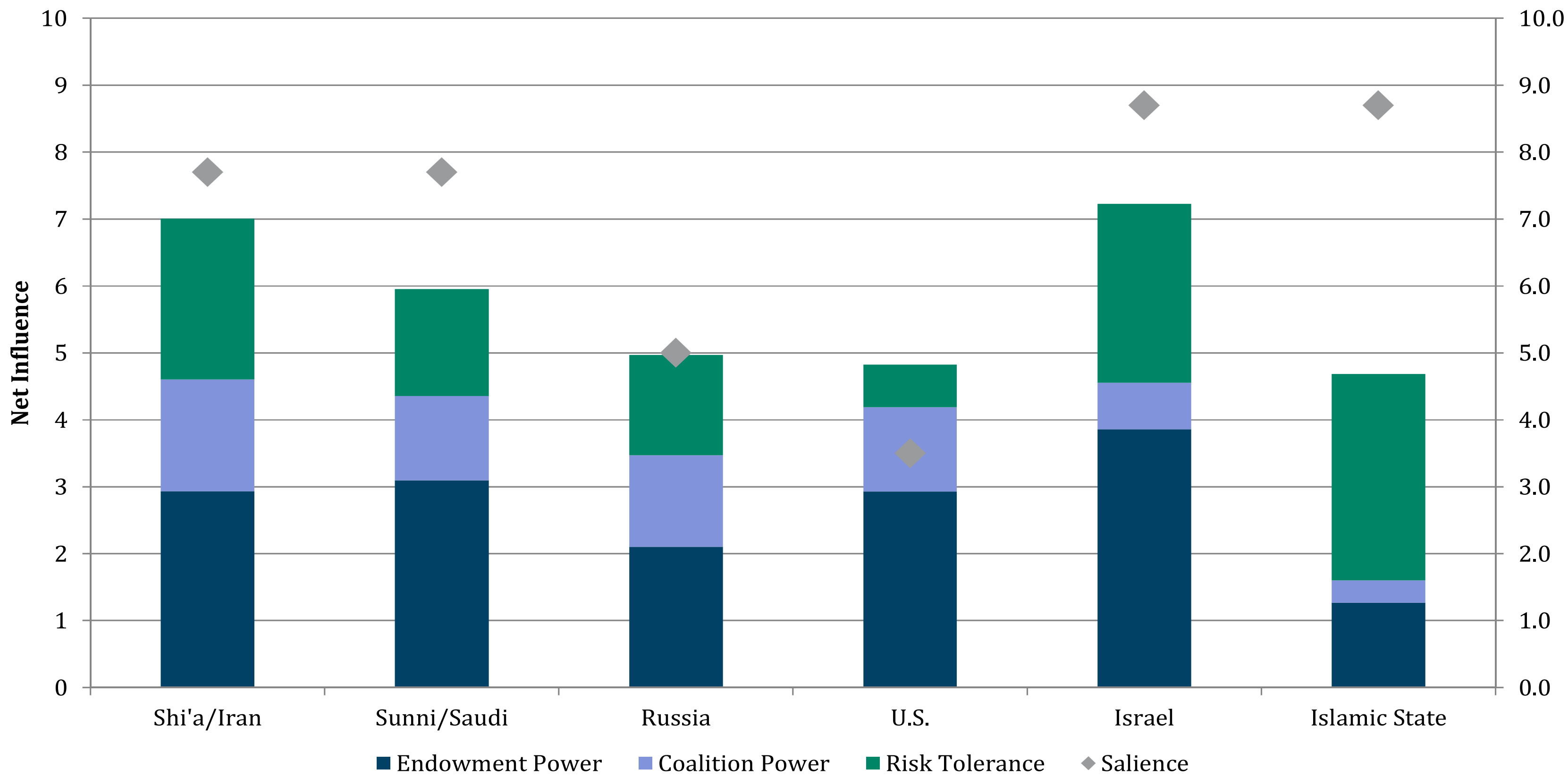
- Utilize unique disciplines to walk a dynamic path

Ignore the media ripples

- Much ado about very little

Appendix

Middle East Game Theater

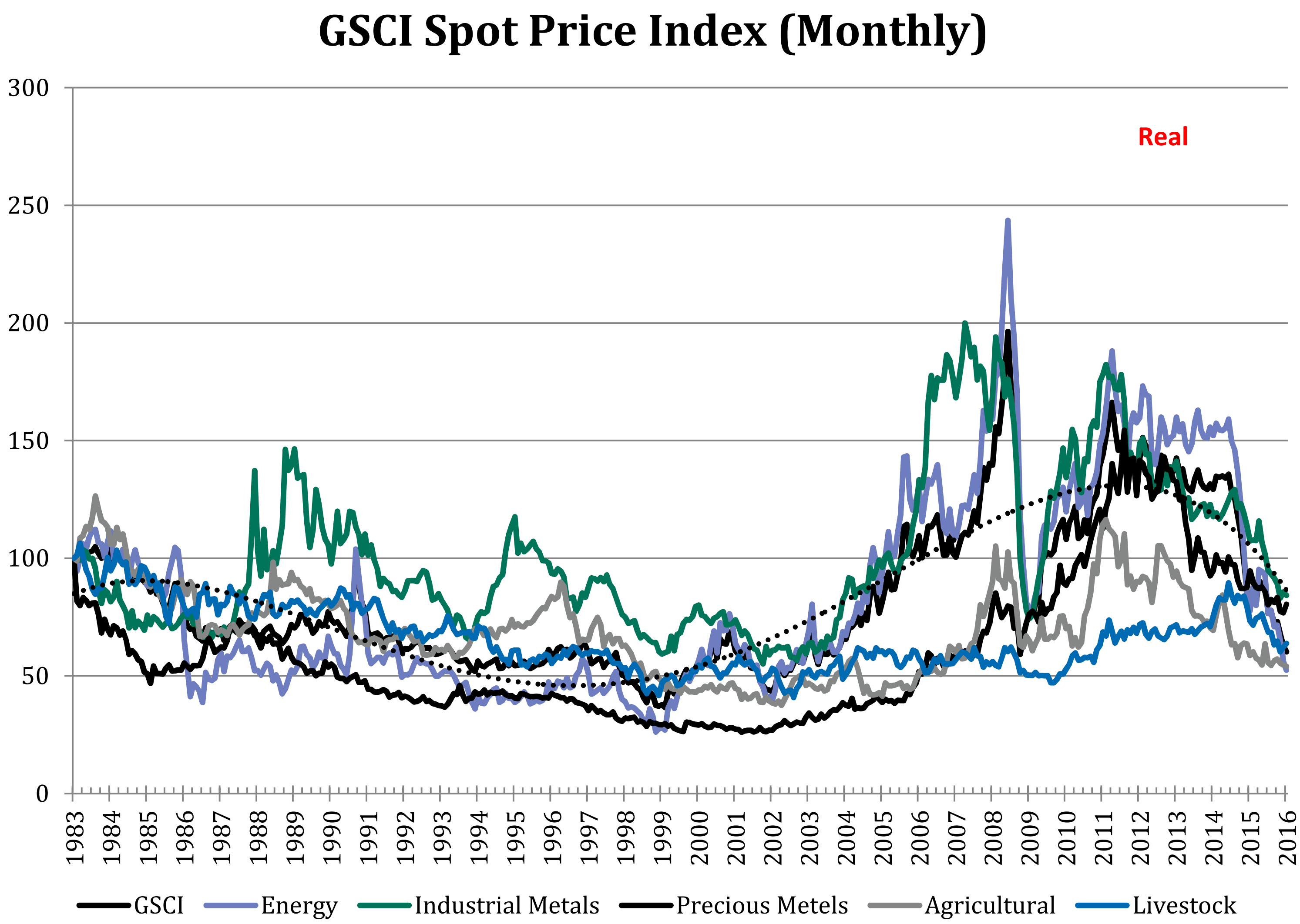


Primary Objective	Stability of Theocracy	Counter growing Iran/Shi'a and IS influence via GCC oligarchies	Opportunistic engagement to project regional power	Secure and cement legacy of U.S./Iran nuclear agreement	State security	Consolidate gains – territory and influence
Secondary Objective	Expand Shi'a control beyond Iran	Project power by exerting marginal influence on oil prices	Expand and project natural resource and military regional power	Avoid intraregional Middle East, especially military, engagement	Self reliance	Expand breadth and depth of resource base

As of September 30, 2015. Source: William Blair.

GSCI Spot Price Index (Monthly, Real)

As of December 31, 2015



Source: Bloomberg.

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<u>Determination of Fundamental Value</u>

Fundamental values for equities and fixed income are determined using a multi-stage discounted cash flow model. Cash flows for equity markets are a function of stated earnings, NIPA corporate profits & sector decomposition for each market. The discount rate is a function of the real cash rate, inflation rate and a proprietary risk premium. Cash flows for fixed income are a function of the coupon rate, principal, and default & recovery rates. The discount rate is a function of the real cash rate, inflation rate, and a proprietary risk premium. Fundamental values for currencies are determined by real equilibrium exchange rate plus carry for each currency. A currency's real equilibrium exchange rate is determined by relative purchasing power parity. Carry is the difference of forward-looking real cash (interest) rates. Value and equilibrium rates for currencies are calculated to the U.S. dollar.

<u>Risk</u>

The risk for each market or currency is represented by the Dynamic Allocation Strategies team forward looking risk estimates. Hedged returns represent the expected returns for equity and fixed income markets whereby the currency exposure is hedged to U.S. dollars. Unhedged returns represent the expected returns for equity and fixed income markets whereby the currency exposure is unhedged and returns are converted back to U.S. dollars. Local return represents the expected return for each equity and fixed income market in its respective local currency.

<u>Index</u>

The following leading indices are used as proxies for various capital markets:

Equities: 1) World – MSCI World (ACWI) Index; 2) US – S&P 500 Index; 3) EAFE – MSCI EAFE Index; 4) UK – MSCI UK Index; 5) Japan – MSCI Japan Index; 6) European Economic Monetary Union (EMU) – MSCI EMU Index; 7) Canada – MSCI Canada Index; 8) Australia – MSCI Australia Index; 9) Switzerland – MSCI Switzerland Index; 10) Emerging Markets – MSCI Emerging Markets Index.

Bonds: 1) World – JP Morgan Global Aggregate Bond Index; 2) Ex-US Sovereign – S&P/Citigroup International Treasury Bond Index Ex-US; 3) US – S&P/Citigroup International Treasury Bond Index (US 10-Year Bond); 4) Germany – S&P/Citigroup International Treasury Bond Index (Germany 10-Year Bond); 5) UK – S&P/Citigroup International Treasury Bond Index (UK 10-Year Bond); 6) Japan – S&P/Citigroup International Treasury Bond Index (Japan 10-Year Bond); 7) Canada – S&P/Citigroup International Treasury Bond Index (Canada 10-Year Bond); 8) Australia – S&P/Citigroup International Treasury Bond Index (Australia 10-Year Bond); 9) BarCap Aggregate – Barclays Capital US Aggregate Bond Index; 10) US Investment Grade – Bank of America/Merrill Lynch US Corporate Master Index; 11) US High Yield – Bank of America/Merrill Lynch US High Yield Cash Pay Index; 12) Emerging – JP Morgan Emerging Markets Bond Index Global. Currencies reflect daily exchange rate closing prices from Thomson Reuters.

Indices are unmanaged, do not incur management fees, costs or expenses and cannot be invested in directly.

Important Disclosures

<u>Definitions</u>

Cash Return: Equilibrium Return comprises a 1.5% real rate & 2.2% U.S. inflation premium. Expected comprises a 0.9% real rate & 1.8% U.S. inflation premium.

Equilibrium Return: The passive return for an equity or fixed income market where prices begin and remain at their fundamental values, as determined by the Dynamic Allocation Strategies team, for the entire investment horizon and cash rates remain at equilibrium levels over the investment horizon.

Expected Return: The passive return for equity and fixed income markets factoring in the current value to price discrepancy and the reversion of price to value over the investment horizon as well as the reversion of current cash rate to the equilibrium cash rate over the investment horizon. The reversion of price to value occurs over an eight year horizon for equities and a five year horizon for fixed income.

Expected 8-Year Currency Return: The gain or loss from having exposure to each currency factoring in the reversion of value to price over the investment horizon and the interest rate differential.

Yield Change and Net New Issuance: Yield change is the change in dividend yield as price changes through time towards fair value. The change in price is determined by the reversion to fair value over the horizon. Net new issuance (either buybacks or dilution) represents the difference between the modeled payout ratio times the earnings and the observed dividends. The model determines cash flows (not just dividends) and doesn't distinguish how it is returned to the investors in aggregate.

Real Trend Growth: The cycle-adjusted earnings growth rate over the next 10-years, representing a mid-cycle growth rate, as determined by the Dynamic Allocation Strategies team.

Earnings Recovery: The annualized gap between current actual earnings level and the cycle-adjusted earnings level, representing a mid-cycle earnings level, as determined by the Dynamic Allocation Strategies team.

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