Currency: Exploring Hedging and Excess Return Considerations

2012 Wilshire Consulting Client Conference

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Overview

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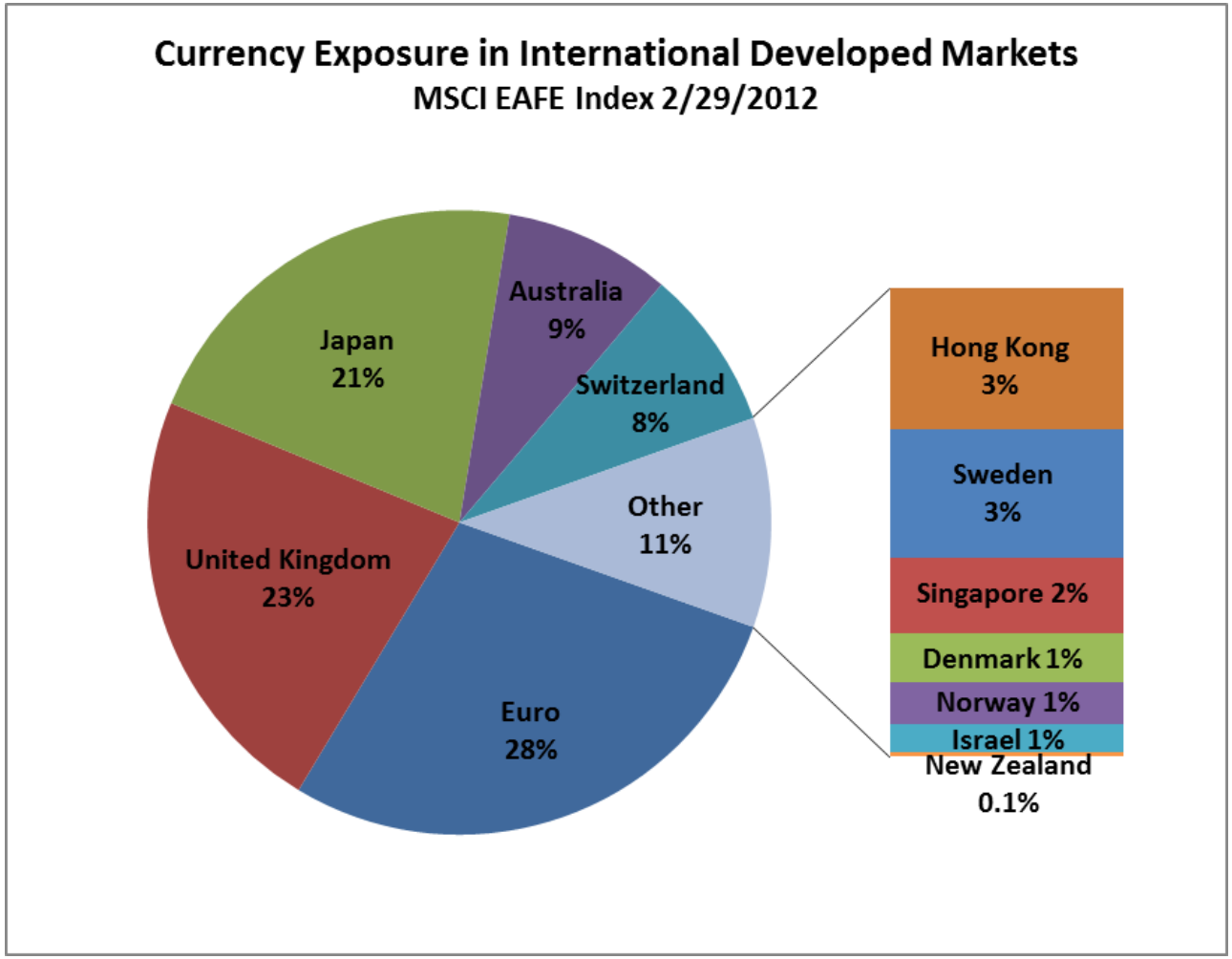
- With the shift toward more globalized investments and the expectations of volatile foreign markets, currency risk has become an increasingly important factor in U.S. institutional investor portfolios.
- Investors want to understand whether or not they should hedge currency exposure. How should they approach the decision generally, and how should they implement if they decide to hedge?
- In this presentation we examine how institutional investors should view the role of currency in their portfolios and evaluate potential currency strategies.

Currency: Stylized Facts

Developed Equity Market Currencies

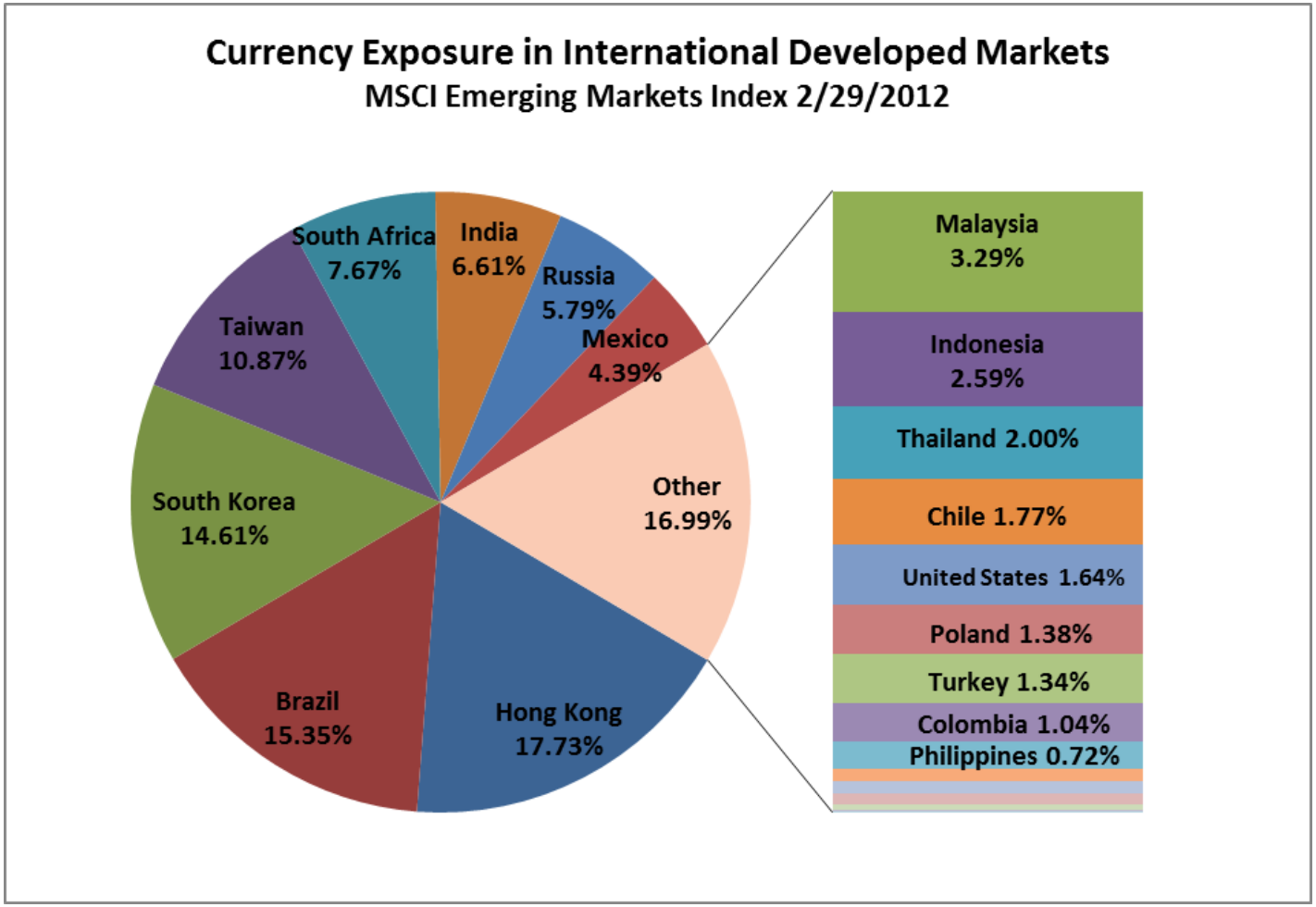
- Euro, Pound and Yen dominate exposures (72%).



Source: Wilshire iQuantum℠

Emerging Equity Market Currencies

- Emerging Market Index comprises many currency exposures.

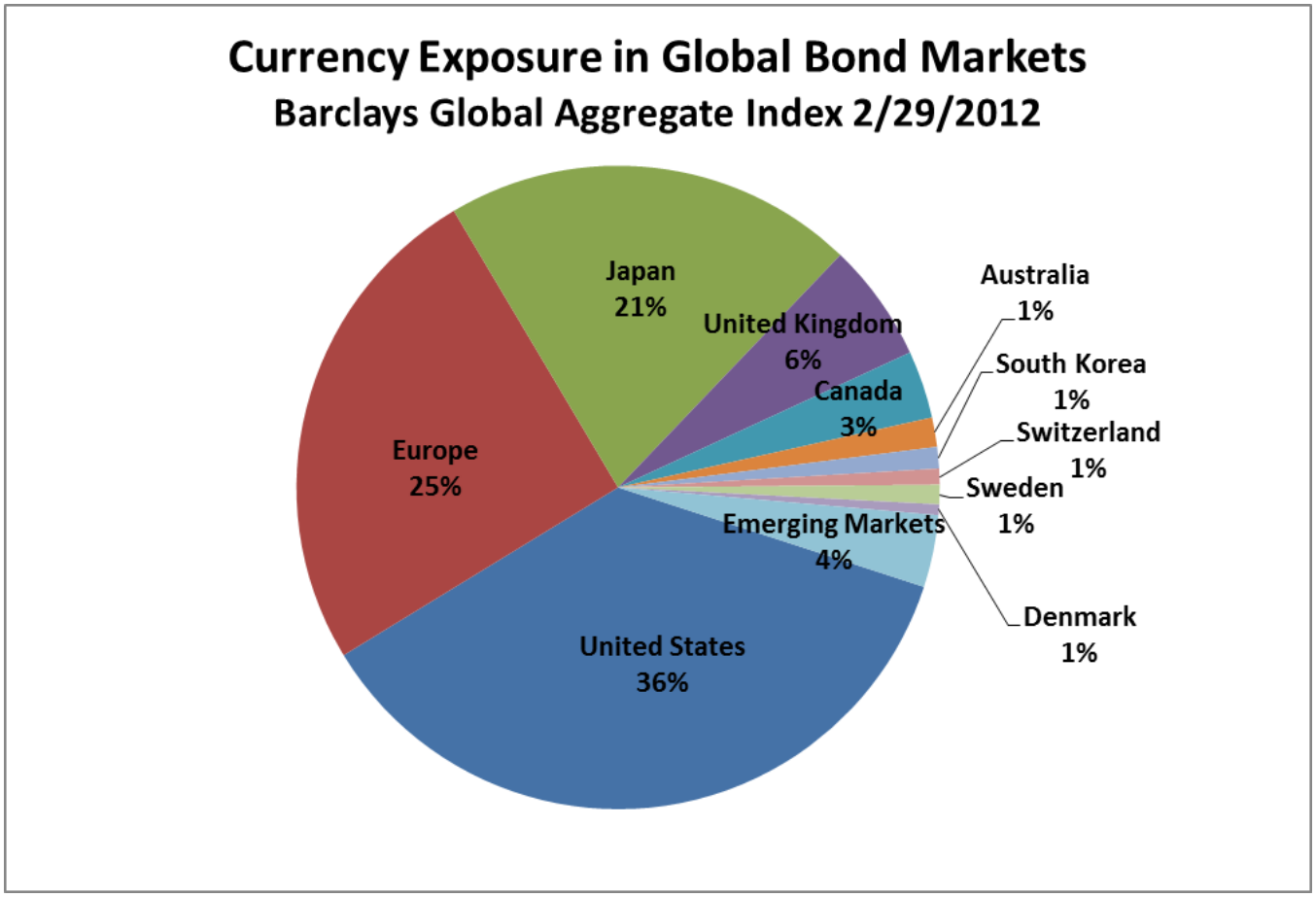


Other EM Index currencies include Egypt (0.36%), Czech Republic (0.33%), Hungary (0.31%), Morocco (0.14%), Peru (0.06%), and China (0.02%).

Source: Wilshire iQuantum

Global Bond Market Currencies

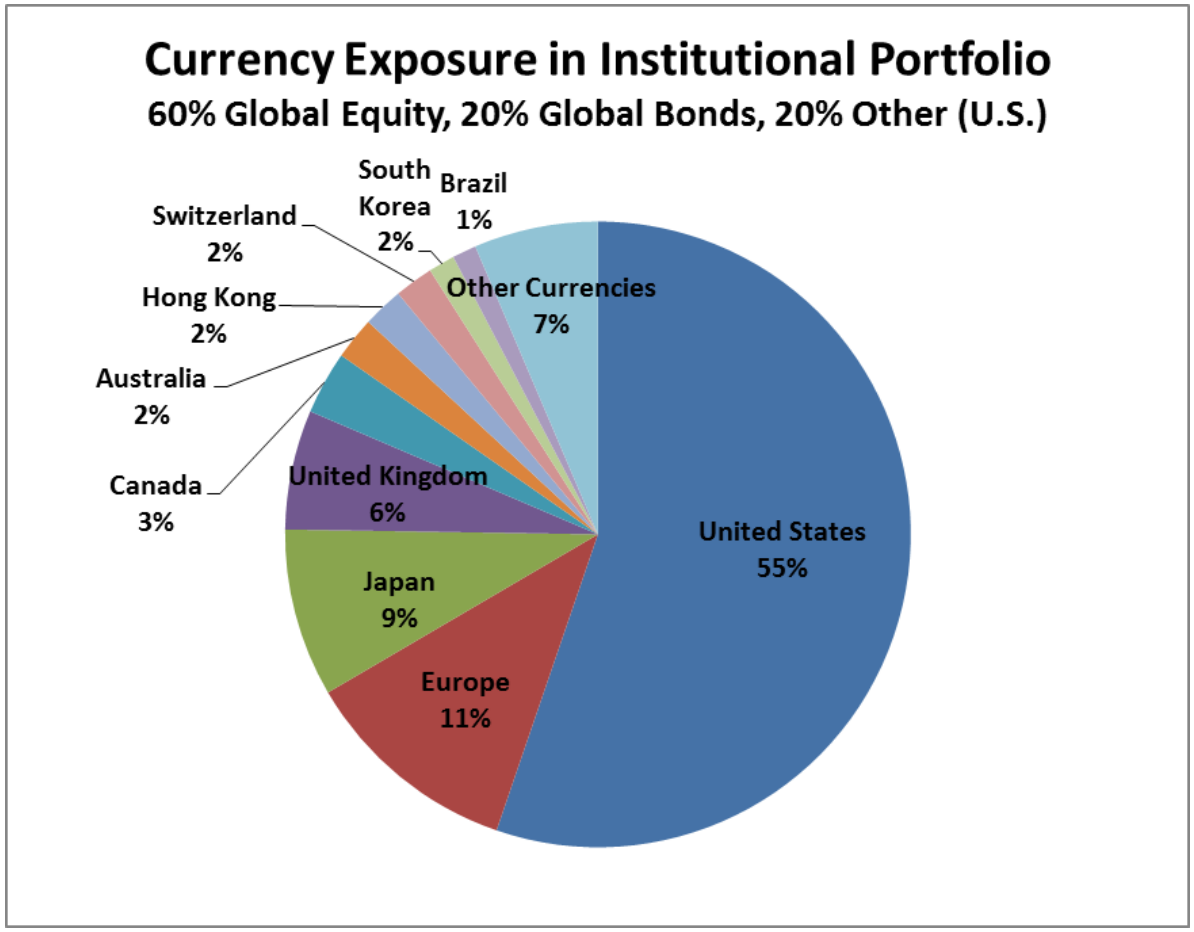
- Euro, Yen, and Pound dominate non-U.S. exposures (81%).



Source: Barclays Capital

Institutional (Balanced) Portfolio Currencies

- Euro, Yen, and Pound dominate non-U.S. exposures (60%).

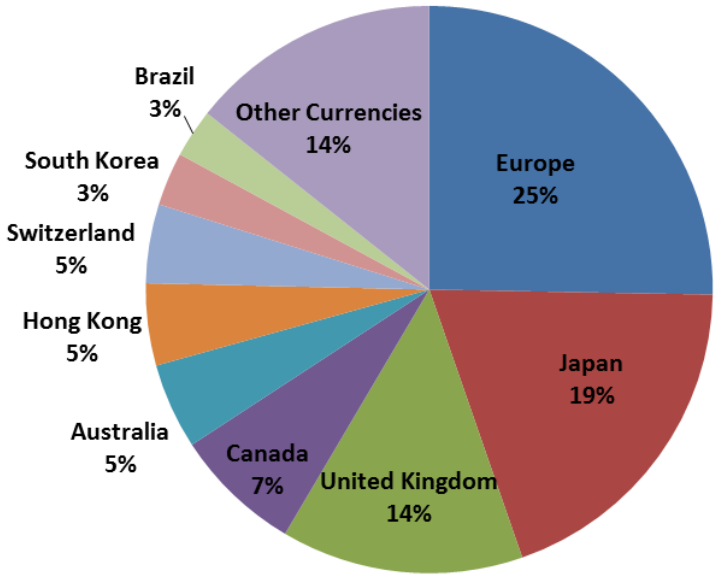


Source: Wilshire iQuantum

Stylized Facts: Portfolio Currencies

- Currency risks can differ from currency exposures.

Non-U.S. Currency Exposure in Institutional Portfolio
60% Global Equity, 20% Global Bonds, 20% Other (U.S.)



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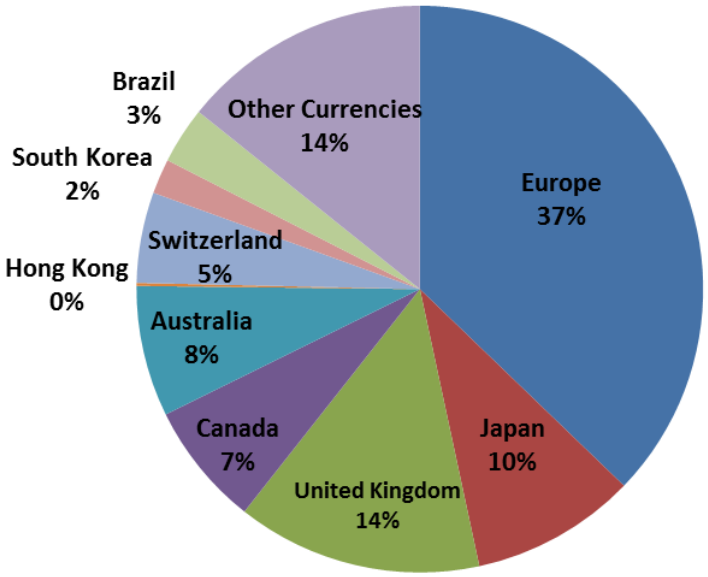


Source: Wilshire iQuantum

Currency Risk and Return

- Over the last ten years, currency returns have been positive.
- Considering currency risk, efficiency has been realized for non-U.S., developed equity markets (MSCI EAFE Index) but not for emerging equity and non-U.S. bonds markets.

From March 2012	3 Years			7 Years			10 Years		
	Risk (%)	Return (%)	Return/Risk	Risk (%)	Return (%)	Return/Risk	Risk (%)	Return (%)	Return/Risk
MSCI EAFE	20.89	17.13	0.82	20.03	3.25	0.16	18.71	5.70	0.30
MSCI EAFE (Hedged)	15.20	12.08	0.79	16.16	1.86	0.12	15.74	1.45	0.09
Currency Contribution	5.69	5.05	0.03	3.87	1.39	0.05	2.97	4.25	0.21
MSCI EM	25.12	25.07	1.00	26.69	12.17	0.46	24.51	14.13	0.58
MSCI EM (Hedged)	17.59	19.76	1.12	20.54	11.72	0.57	19.24	12.16	0.63
Currency Contribution	7.53	5.31	-0.13	6.15	0.45	-0.11	5.27	1.97	-0.06
Barclays Global Agg x-US	9.16	8.00	0.87	8.86	5.00	0.56	8.92	8.59	0.96
Barclays Global Agg x-US (Hedged)	2.45	4.50	1.84	2.52	4.41	1.75	2.47	4.67	1.89
Currency Contribution	6.71	3.50	-0.96	6.34	0.59	-1.19	6.45	3.92	-0.93

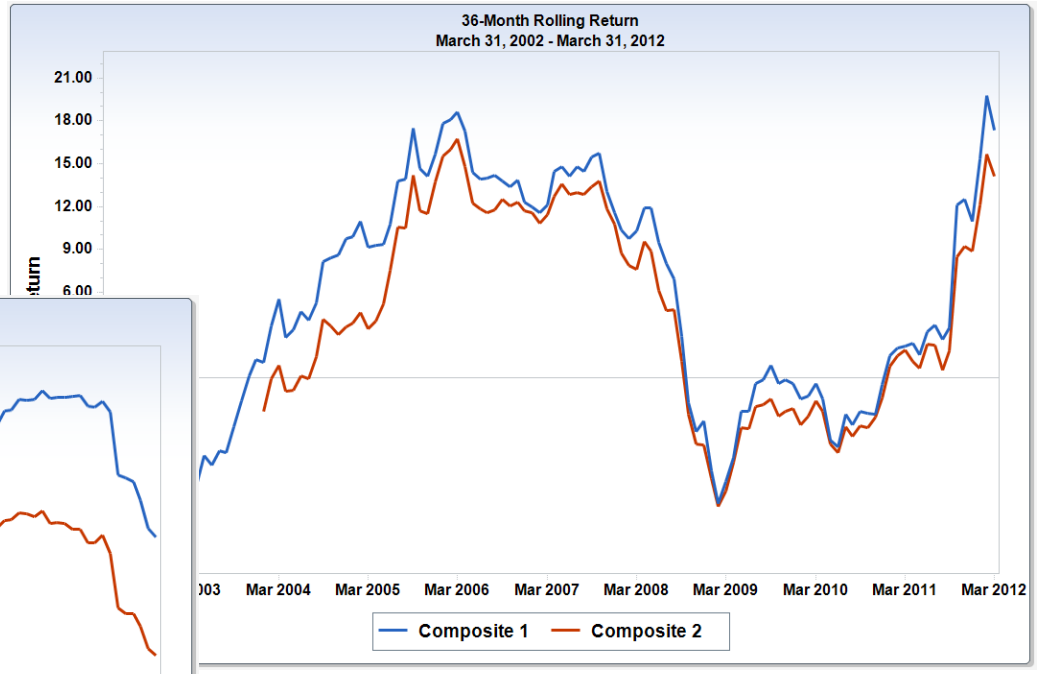
- The net percentage contribution of currency to total volatility has ranged from 2.5% to 5.0% in the MSCI EAFE and Emerging Markets Indexes and over 50% in the Barclay's Global Aggregate Index.

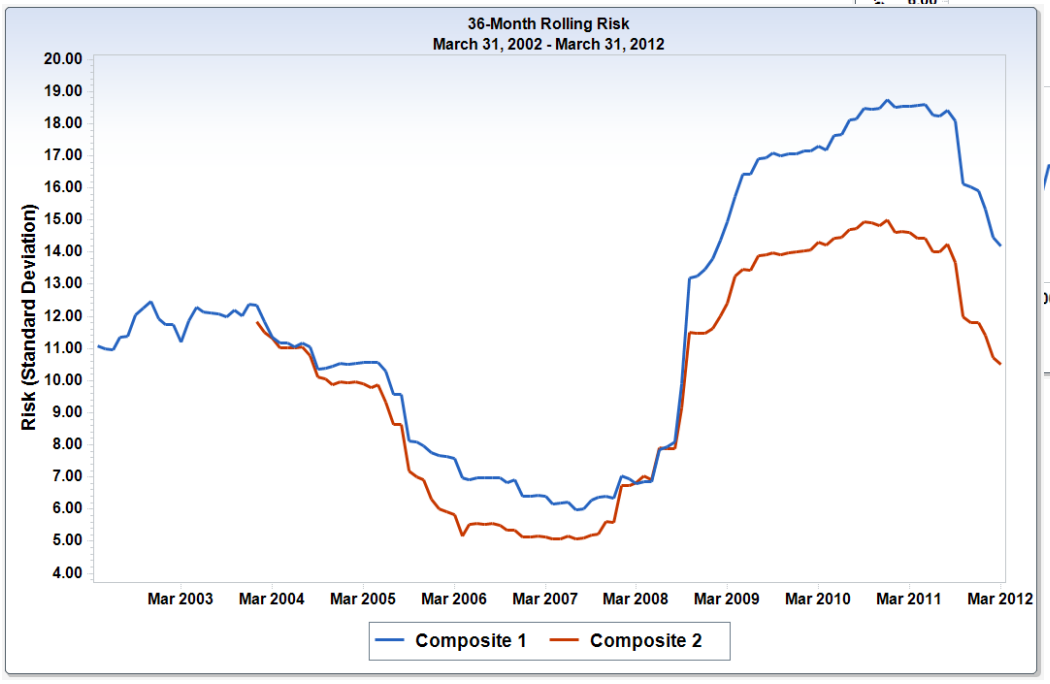
Source: Wilshire Compass[SM]

Stylized Facts: Currency Return/Risk

- Balanced portfolio example
  - 70% MSCI ACWI
  - 30% Barclays Global Aggregate

- Composite 1 un-hedged
- Composite 2 hedged





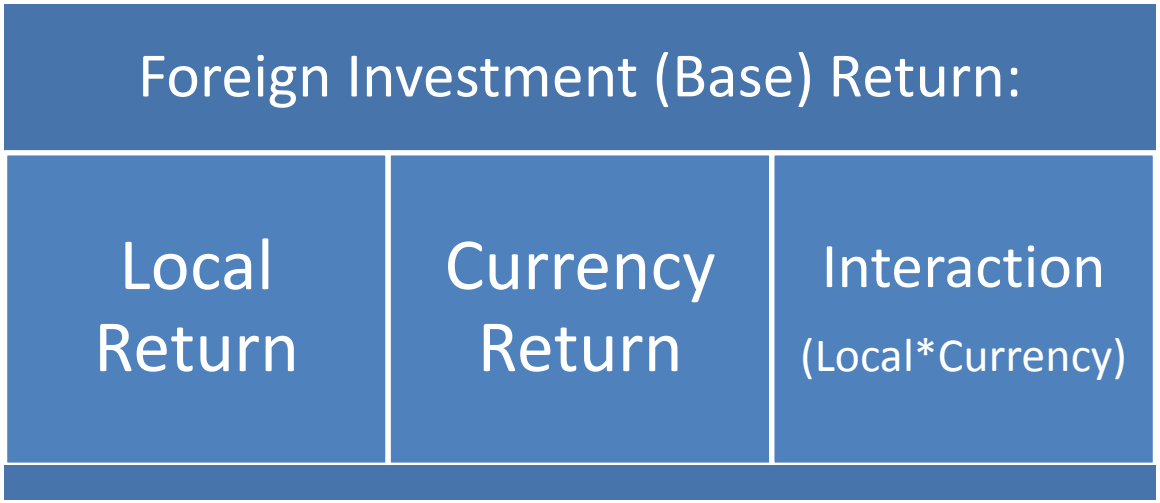
Return/Risk Ratio:
0.9 un-hedged
0.8 hedged

Source: Wilshire Compass

A Framework for Choosing Currency Exposures

Foreign Investment Returns

- Purchasing a foreign investment is like purchasing the foreign asset and the currency in which the foreign investment trades:



- The currency return is attributed to changes in the value of the foreign currency. From the perspective of a U.S. investor, currency return can be calculated as:

$$\text{Realized Currency Return } t = [(\$US/FC)\ t - (\$US/FC)\ t\text{-}1] / (\$US/FC)\ t\text{-}1$$

- Depreciation (appreciation) of the U.S. dollar leads to larger (smaller) $US/FC exchange rates, or more (fewer) U.S. dollars required to purchase foreign currency. For the U.S. plan sponsor investing abroad, the depreciation (appreciation) of the U.S. dollar translates into foreign currency gains (losses) and otherwise higher (lower) international portfolio returns.

- Risk of a foreign investment includes currency risk, which is the return volatility of foreign securities attributable to fluctuations in exchange rates.:

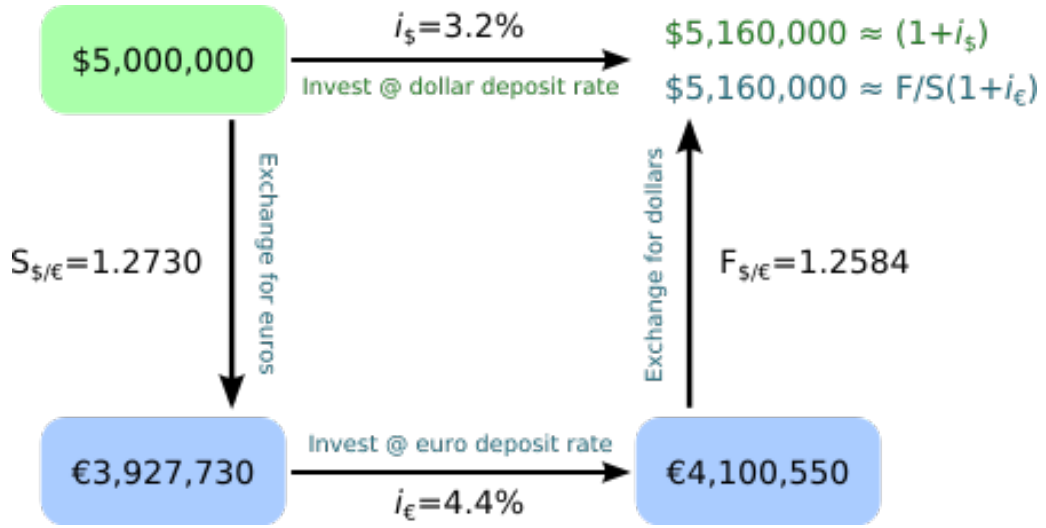
Foreign Investment (Base) Return Volatility:		
Local Return Volatility	Currency Return Volatility	Correlation Between Local and Currency Returns

- As long as the variability of the foreign returns and the foreign currency are not perfectly correlated, risk is not additive:

$$\sigma_{base} \leq \sigma_{curr} + \sigma_{local}$$

Expected Currency Returns

- "Covered interest rate parity" ensures that the forward exchange rate depends on interest rate differentials, and under certain conditions an unbiased predictor of expected future spot rates.



- There is no currency risk premium because the covariance between the rate of change of the exchange rate and the return of the foreign asset is known.

Covered Interest Rate Parity Relationship => $(1+i_{\$}) = F/S(1+i_{fc})$

F t = Expected(S t+n) where n= periods in future from now, which is time t

Source of graphic: Wikipedia

Optimal Hedging

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- If investors do not expect a risk premium should currency risk be hedged?
- A portfolio's **hedge ratio** is defined as the dollar value of a position in foreign currency per dollar invested long in the foreign investment. A hedge ratio of 1 means that for each dollar invested in the foreign security, a dollar's worth of foreign currency is borrowed or sold forward. A hedge ratio of 0 means no hedge is used.
- With covered interest rate parity and a mean-variance framework, the gain or loss in expected return from hedging has the same weight in the investor's objective function as does any change in expected return resulting from changes in portfolio weights.
- *There is no difference between deciding how much to hedge and deciding how much of any asset to add to a portfolio.*[1]
- Investors need to weigh the cost of hedging versus the reduction in portfolio volatility from hedging. This decision can be made using a mean-variance optimization process.

[1]Warren Bailey, Edward Ng, and Rene Stulz, "Optimal Hedging of Stock Portfolios Against Foreign Exchange Risk: Theory And Applications," Global Finance Journal, 3(2), 97-114 .

Optimal Hedging: Case Study

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- Sample balanced portfolio:
  - Global equity – MSCI ACWI Index or Hedged Index (70%)
  - Global bonds – Barclays Global Aggregate Index or Hedged Index (30%)

1. Assume expected returns, risk, correlations, and cost of hedging (15 bps)

Assumptions Table	MS AC WORLD	MS ACW LC	BC Global Agg	BC Glob Agg Hedg
Return	7.80	7.65	2.50	2.35
Risk	17.00	16.00	6.00	3.50
Return/Risk	0.46	0.48	0.42	0.67
MSCI - AC World Index	1.00			
MSCI - AC World Index Hedged	0.98	1.00		
Barclays Capital - Global Aggregate Bond Index	0.24	0.10	1.00	
Barclays Capital - Global Aggregate Hedged	-0.08	-0.20	0.66	1.00

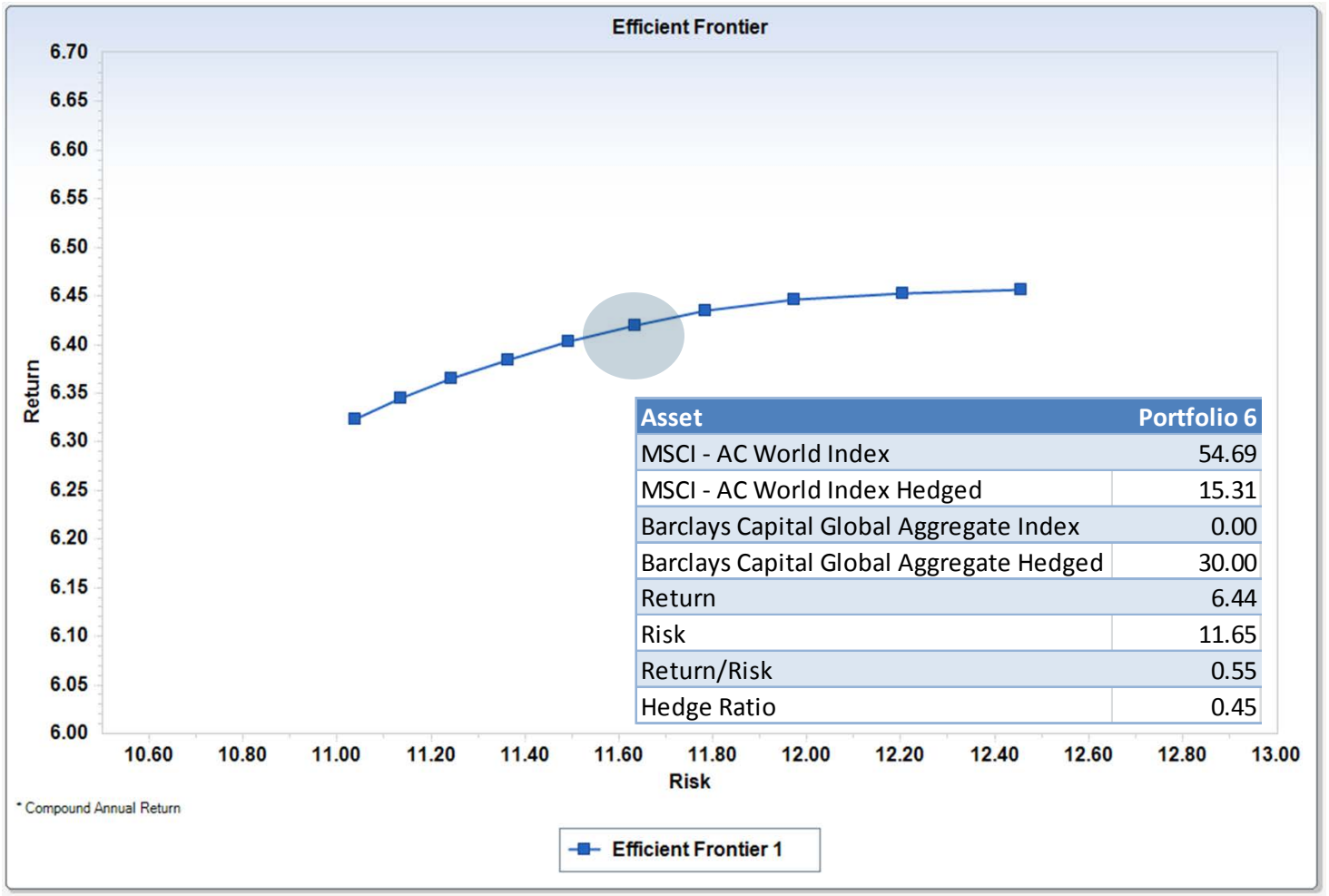
2. Apply constraints.

3. Optimize the asset allocation.

4. Select the portfolio that satisfies return targets and/or risk tolerances.

Optimal Hedging: Case Study

- Each point along the efficient frontier implies an optimal hedge ratio for the portfolio, which is based on the amount allocated to each hedged index.



Asset	Portfolio 6
MSCI - AC World Index	54.69
MSCI - AC World Index Hedged	15.31
Barclays Capital Global Aggregate Index	0.00
Barclays Capital Global Aggregate Hedged	30.00
Return	6.44
Risk	11.65
Return/Risk	0.55
Hedge Ratio	0.45

Currency Hedging Implementation

- Implementing a currency hedging program requires a few practical considerations:
  - Should currency hedging be implemented passively or actively?
    - Passive currency hedging requires the investor to purchase forward contracts for hedged currencies in order to maintain a static hedge ratio (stays constant over time).
      - The goal is to eliminate the risk of losses from unexpected foreign currency depreciation as well as potential gains from unexpected foreign currency appreciation.
    - Dynamic currency hedging seeks to maximize foreign currency exposure (reduced the hedge ratio) when the U.S. dollar has fallen, allowing for participation in currency gains, but limits currency losses (increases the hedge ratio) to some maximum amount when the U.S. dollar has risen.

Currency Hedging Implementation

- Implementing a currency hedging program requires a few practical considerations:
  - Active currency hedging reflects the perceived ability to generate alpha within currency markets.
  - Examples of potential alpha generation include[2]:
    - **The forward rate bias**: the observed tendency of higher interest rate currencies to outperform lower interest rate currencies, such that a portfolio of long higher interest rate currencies and short lower interest rate currencies tends to generate positive value over time.
    - **Momentum:** the propensity of exchange rates to trend in the short- to medium-term.
    - **Value:** the complementary tendency for currencies to mean-revert to a fair value determined by relative price levels over a longer horizon.
    - **Emerging markets:** typically have high interest rates and exhibit a forward rate bias, may reward investors who are willing to take on emerging markets risk with substantial positive returns over time.
  - Like any active strategy, an expected risk budget can be determined ex-ante based on alpha return and risk assumptions.
  - Need to specify which currencies, policy benchmark, min and/or max hedge ratio, investment constraints, etc.

[2]Record Currency Management

Currency Hedging Implementation

- In summary there are three principal means to implement currency hedging:

Hedging Strategy	Description	Pro	Con
Passive	Maintain a constant hedge ratio over the investment horizon to eliminate the risk of unexpected loss from foreign currency depreciation.	Low hedge cost, easy to implement	Higher cash reserve, may over/under hedge
Dynamic	Replicate a currency put option such that the hedge ratio increases when the value of U.S. dollar rises and reduce the hedge ratio when the value of the U.S. dollar falls.	Lower cash reserve, customize option features	Hard to create option-like payoff in volatile markets
Active	Implement a hedge ratio the reflects the perceived ability to generate alpha within currency markets.	Lower transaction costs, potential value added	Added risk and monitoring requirements

Currency Hedging Implementation

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- Implementing a currency hedging program requires other practical considerations:
  - How should the benchmark be set?
    - Neutral policy benchmarks will reflect the optimal hedge ratios by asset class.
  - What about cash management?
    - Investors need to set aside cash reserves to cover short-term losses in forward positions, and this reserve will need to be replenished when foreign currencies rise against the U.S. dollar.
    - Trading costs incurred to maintain the cash reserve along with a lower expected return on the cash reserve implies the reserve can be costly and should be evaluated.

Summary

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- Most institutions are increasing their allocations to non-U.S. assets, which correspondingly increases exposure and risk to foreign currencies.
- Given the balancing relationship between interest rates and forward exchange rates, investors should not expect to earn a long-term risk premium for bearing currency risk.
- Currency hedging may lower overall portfolio risk and provide a more efficient portfolio, net of hedging costs.
- Hedging implementation can take many forms, and each should be evaluated in terms of costs and benefits to the investor's specific situation.
- Both the optimal hedge ratio and the alpha decision for currency management can be evaluated in a standard mean-variance portfolio framework.

Important Information