



Currency Risk in an Age of Globalisation

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The Age of Globalisation

- To begin by stating the blindingly obvious - we live in an age of globalisation
- Commerce crosses borders more often than not - all the larger economies in the world have extensive exports and imports
- Investors also know few boundaries - the notion that you should invest only in your home market is now regarded as positively quaint
- Personal capital has also become highly portable - there are few currency controls left in the world

Currency Risk in an Age of Globalisation

- Equities and Bonds are both sensitive to currency effects, although clearly in different ways
- No large cap stocks, and very few mid cap stocks are immune to exchange rate fluctuations
- Whether they export their products, or import parts or raw materials, they will be affected
- Note also that even if a particular company has no direct foreign currency exposure, it will be affected by the local equity market, which itself will reflect foreign currency influences

Portfolio Risk Management - or Not?

- Far too often, risk models are only used to report the overall risk or tracking error of a portfolio
- What portfolio managers should be doing is looking at the risk structure of their portfolio to see whether the bets they make are justified by the returns they expect [© H. Markowitz]
- To do this, the major sources of risk need to be captured by the factors in the risk model
- All equity risk models, whether international or domestic, should therefore have Currency factors

Do Active Managers have Skill?

- It is often said that the markets are so efficient that it is impossible to beat benchmarks consistently
- It is also said (most often by finance academics) that active managers don't (or even can't) have Skill
- Their 'proof' is the fact that few managers outperform their benchmarks consistently . . .
- . . . even though this flies in the face of common sense
- **Active managers don't get better performance because they don't manage their portfolio risk properly**
- So the returns due to their Skill are lost in the Noise from their unintended bets . . . such as Currency exposures

Currency Risks - 1

- In principle, therefore, we want to include Currency factors in our risk models - but which ones?
- This will depend on what are we going to do with the resulting portfolio risk analyses
- For most active equity managers, currency risks are unintended bets, and should be minimised
- As luck would have it, hedging currencies is both easy and cheap, at least for the more important currencies
- Notice also that most currencies are correlated with each other, so that a few major currencies can be used to hedge a wider range of underlying exposures

Currency Risks - 2

- We define six Global Currencies : USD, JPY, EUR, GBP, CHF and AUD; all cheap and easy to hedge
- Regional or Global risk models will also have a number of relevant Local Currency factors
- Every risk model has to have a Base Currency, relative to which all the other risks are measured
- Most risk models use one of the Global Currencies as the Base Currency, leaving the other 5 as factors
- All stocks will get a (non-zero) beta on their own currency (if it is a factor), and may also get (non-zero) betas to any of the Global Currency factors

Currency Risks - 3

- This methodology ensures that most of the Currency Risk in a portfolio can be easily hedged if required
- Our European risk model, with the Euro as its base currency, has 5 Global and 8 Local Currency factors:-

NOK

SEK

HUF

ILS

PLN

RON

RUB

TRY

- Our US risk model has the USD as its base currency, and the remaining 5 Global Currencies as factors
- Both models cover over 10,000 securities each, including ADRs, ETFs and indices

Representative Betas

- Some stocks will have multiple (non-zero) exposures to Currency, Country and Industry factors
- We use Bayesian priors and statistical significance tests to determine the appropriate betas for each stock
- Some of the (inevitable) estimation errors in these betas will diversify away at the portfolio level, so we get better forecasts of portfolio risk
- The risk models are based on 80 4-weekly returns with a look-back period of 6.2 years, and are updated weekly
- Statistical factors capture undefined and transient common factors, and ensure that the Stock Specific risks really are uncorrelated with each other

Weight <> Exposure

- If dummy variables are used as betas, the resulting portfolio betas will simply be the same as the weight of the respective holdings in the portfolio
- Thus, if 15% of the portfolio's holdings are Japanese, the portfolio beta to Japan will appear to be 0.15

$$\beta_{pf} = \sum_{i=1}^N p_i \beta_{if}$$

- However, this is to confuse weight with exposure - they are NOT the same thing
- As we all know perfectly well, being 100% invested does not always mean you have a market beta of 1.00

Currency Risks at the Stock Level

Europe Universe

by market capitalisation

	<u>Top 1,000</u>	<u>Next 2,000</u>
Number of stocks with with Currency betas	951	1,770
% average stock risk from Currency factors	15.3%	13.0%
Average Stock R-Squared	48.0%	36.0%
Average Stock Risk	36.1%	41.3%

Currency Risks at the Stock Level

USA Universe

by market capitalisation

Top 1,000

Next 2,000

Number of stocks with
with Currency betas

884

1,279

% average stock risk
from Currency factors

12.9%

8.8%

Average Stock R-Squared

45.9%

30.9%

Average Stock Risk

34.8%

48.3%

Currency Risks in Portfolios

- The first example is an Active European portfolio benchmarked to the MSCI Europe index
- The next example is an actively-managed US HYLV portfolio, benchmarked to the S&P 500 index
- In each case we show Summary Risk Characteristics, and then the breakdown of overall Benchmark Risk and Portfolio Risk by factor group contributions
- We will then look at the breakdown of Tracking Error by factor group contributions, and finally show the individual Currency factor bets in detail

Summary Risks in the European Example

Active Europe Portfolio vs MSCI Europe benchmark

Risk Summary		as of		7-Aug-13
Data Item	Portfolio	Benchmark	Relative	
% Factor Risk (R-Sq)	96.17	99.37	86.69	
% Stock Risk	3.83	0.63	13.31	
% Total Risk	100.00	100.00	100.00	
Total Risk (s.d.)	13.48	19.33	7.48	
Beta to Benchmark	0.67	1.00	-0.33	
Number of Holdings	52	326	359	

Factor Risks in MSCI Europe benchmark

Factor Groups	% Risk & Return
Currency Factors	20.83
Style Factors	0.89
Country Factors	35.65
Industry Factors	41.94
Statistical Factors	0.06
Factor Summary	99.37
Stock Specific Summary	0.63
Benchmark Summary	100.00

MSCI Europe Currency Risks

Factor	Benchmark Beta to Factor	% Risk & Return
British Pound	-0.000	0.00
US Dollar	-0.125	1.93
Japanese Yen	-0.262	8.82
Australian Dollar	0.251	6.21
Swiss Franc	-0.026	0.27
Norwegian Krone	0.033	0.44
Swedish Krona	0.172	3.16
Hungarian Forint	0.000	0.00
Israeli Shekel	0.000	0.00
Polish Zloty	0.000	0.00
Romanian New Leu	0.000	0.00
Russian Ruble	0.000	0.00
Turkish Lire	0.000	0.00

Currency Risks in Active Europe Portfolio

Factor Groups	% Risk & Return
Currency Factors	16.42
Style Factors	0.81
Country Factors	34.62
Industry Factors	44.13
Statistical Factors	0.20
Factor Summary	96.17
Stock Specific Summary	3.83
Portfolio Summary	100.00

Active Europe Relative Risks

Factor Groups	% Risk & Return
Currency Factors	29.87
Style Factors	3.72
Country Factors	27.61
Industry Factors	24.97
Statistical Factors	0.53
Factor Summary	86.69
Stock Specific Summary	13.31
Relative Summary	100.00

Active Europe Relative Currency Risks

Factor	Relative Beta to Factor	% Risk & Return
British Pound	0.126	3.88
US Dollar	0.095	6.35
Japanese Yen	0.129	13.26
Australian Dollar	-0.028	0.98
Swiss Franc	0.018	0.59
Norwegian Krone	0.014	-0.32
Swedish Krona	-0.146	5.12
Hungarian Forint	0.000	0.00
Israeli Shekel	0.000	0.00
Polish Zloty	0.000	0.00
Romanian New Leu	0.000	0.00
Russian Ruble	0.000	0.00
Turkish Lire	0.000	0.00

Summary Risks in US Example

US HYLV Portfolio vs S&P 500 benchmark

Risk Summary		as of		14-Aug-13
Data Item	Portfolio	Benchmark	Relative	
% Factor Risk (R-Sq)	94.73	99.20	92.60	
% Stock Risk	5.27	0.80	7.40	
% Total Risk	100.00	100.00	100.00	
Total Risk (s.d.)	10.43	16.58	9.90	
Beta to Benchmark	0.52	1.00	-0.48	
Number of Holdings	49	501	519	

Factor Risks in the US HYL V Portfolio

Factor Groups	% Risk & Return
Currency Factors	12.82
Style Factors	-0.97
Market Factors	12.17
Industry Factors	69.97
Statistical Factors	0.74
Factor Summary	94.73
Stock Specific Summary	5.27
Portfolio Summary	100.00

Factor Risks in the S&P 500 benchmark

Factor Groups	% Risk & Return
Currency Factors	27.68
Style Factors	-7.80
Market Factors	21.06
Industry Factors	58.11
Statistical Factors	0.14
Factor Summary	99.20
Stock Specific Summary	0.80
Benchmark Summary	100.00

S&P 500 Currency Risks

Factor	Benchmark Beta to Factor	% Risk & Return
Euro	0.060	1.52
British Pound	0.009	0.15
Swiss Franc	0.001	0.01
Australian Dollar	0.533	25.28
Japanese Yen	-0.035	0.72
US Market Large	0.206	16.77
US Market Small	0.041	4.29

US Markets vs Global Currencies

T-W 4-WEEKLY RETURNS		EUR	GBP	CHF	AUD	JPY
S&P 500 TR	beta =	0.434	0.298	0.161	0.589	-0.411
Russell 2000	beta =	0.471	0.263	0.183	0.692	-0.405
S&P 500 TR	correl =	0.308	0.188	0.122	0.498	-0.328
Russell 2000	correl =	0.252	0.125	0.104	0.441	-0.244
S&P 500 TR	RSQ =	9.5%	3.5%	1.5%	24.8%	10.7%
Russell 2000	RSQ =	6.3%	1.6%	1.1%	19.4%	5.9%

US HYL V Relative to S&P 500

Factor Groups	% Risk & Return
Currency Factors	27.88
Style Factors	4.50
Market Factors	16.31
Industry Factors	42.66
Statistical Factors	1.25
Factor Summary	92.60
Stock Specific Summary	7.40
Relative Summary	100.00

US HYLV Relative Currency Risks

Factor	Relative Beta to Factor	% Risk & Return
Euro	-0.068	3.39
British Pound	-0.004	0.16
Swiss Franc	-0.007	0.23
Australian Dollar	-0.317	24.82
Japanese Yen	-0.041	-0.72
US Market Large	-0.162	17.82
US Market Small	0.010	-1.51

Why is the Currency Risk so large ?

- Whilst it is clear that Currency risks will exist in US portfolios, such as the S&P 500, the size of the risk contribution from Currencies is, perhaps, surprising
- The risk model is built from a set of factor groups :
 - Currencies, Style, Market and Industry factors
- All of these factors are correlated in their natural state
- So if they are used in sequence, the first set of factors (i.e. the Currencies) will pick up both 'pure' Currency risk, as well as their covariance with the Style, Market and Industry factors
- In practice, this means that the Currency risk includes what would otherwise have been Market or Industry risk

Summary Risks without Currency factors

HYLV US Portfolio vs S&P 500 benchmark

Risk Summary		as of		04-Sep-13
Data Item	Portfolio	Benchmark	Relative	
% Factor Risk (R-Sq)	95.16	99.27	91.97	
% Stock Risk	4.84	0.73	8.03	
% Total Risk	100.00	100.00	100.00	
Total Risk (s.d.)	10.89	17.15	9.48	
Beta to Benchmark	0.55	1.00	-0.45	
Number of Holdings	49	501	519	

Factor Risks in the S&P 500 benchmark without Currency factors

Factor Groups	% Risk & Return
Style Factors	-6.90
Market Factors	31.26
Industry Factors	74.79
Statistical Factors	0.12
Factor Summary	99.27
Stock Specific Summary	0.73
Benchmark Summary	100.00

Conclusion: Bad News and Good News

- The bad news is that Currency risks, in this age of globalisation, are always present in equity portfolios
- For most active portfolio managers, most of the time, these risks will constitute unintended bets
- Certainly, very few domestic portfolio managers think about forecasting currency movements, which are notoriously hard to predict anyway
- The good news is that the major (Global) currencies are very easy and cheap to hedge
- It would therefore seem obvious that managers should hedge out their unwanted Currency risk, thereby giving themselves more scope to make their intended bets

P.S. CAPM betas of stocks to benchmarks

- For a US stock against a US benchmark, the beta is :

$$\text{Beta}_{iM}^{\$} = \text{Cov} (R_i, R_M) / \text{Var}(R_M)$$

- For a Japanese investor, however, we have :

$$\text{Beta}_{iM}^Y = \text{Cov} (R_i + R_{\$}^Y, R_M + R_{\$}^Y) / \text{Var}(R_M + R_{\$}^Y)$$

- These are clearly not the same.

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