

Multicurrency attribution: not as easy as it looks!

With super choice looming Australian investors (including superannuation funds) are becoming increasingly aware of the potential benefits of international diversification. As **DAMIEN LAKER** explains, a rigorous method for performance attribution can help investors to better understand the sources of value-added in multicurrency portfolios.

It is more important than ever for Australian investors to have tools for assessing the skill of fund managers who invest globally. Performance attribution explains the active return, i.e. the difference between the portfolio and benchmark returns. On an international fund, attribution can answer questions such as:

- How much value was added by country selection?
- How much value was added by industry selection?
- How much value was added by stock selection within each industry or country?
- How much value was added by active currency management?

Attribution analysis can put a precise number on each of these questions.

This can be valuable in assessing how a fund manager adds value. It is not surprising, then, that trustees are increasingly asking fund managers for attribution reports, and that the institutional marketing teams of fund managers are increasingly looking to use attribution reports to “put some meat on the bones” of their story.

However, there is no widely-accepted standard for attribution analysis. On the contrary, there is enormous diversity in the range of methods used for attribution. The purpose of this article is to give practitioners an update on multicurrency attribution, since recent theoretical advances in that area have left most professionals' knowledge well behind the cutting edge.

For the sake of simplicity, this article discusses equity funds. However, the same principles can be applied to other asset classes.

Damien Laker is founder and CEO of compoundinghappens.com, a firm which provides consulting, assistance and training about portfolio performance management and attribution.

TABLE 1: BENCHMARK INFORMATION FOR A GLOBAL PORTFOLIO

Country	Local Currency	Exchange Rate Return	Benchmark Weight	Local Currency Return	Base (AUD) Currency Return
Germany	EUR	1.00%	25%	7.00%	8.00%
UK	GBP	-3.00%	25%	10.50%	7.50%
Japan	JPY	-1.00%	25%	9.50%	8.50%
Australia	AUD	0.00%	25%	8.40%	8.40%
Total	Blend	-0.75%	100%	8.85%	8.10%

**UNDERSTANDING
MULTICURRENCY PORTFOLIOS**

The arithmetic of multicurrency investment management is rather complicated. This is arguably a deeply technical issue. However, on the other hand, anyone who wishes to understand the forces driving the performance of a multicurrency portfolio needs to have some understanding of this topic.

As an example of the non-intuitive nature of multicurrency performance analysis, consider the benchmark information in Table 1. This benchmark is equally weighted between Germany, UK, Japan, and Australia¹. For the sake of discussion, this table shows some returns for a particular period we want to analyse².

Since this benchmark is for an Australian fund, the base currency for the fund is AUD. For each market other than Australia, the local currency return (e.g. the JPY return for Japan) differs from the base currency (AUD) return.

A skilful active fund manager would make three important decisions about how to manage this fund³:

1. which countries to overweight;
2. which currencies to overweight; and
3. which stocks to select within each country.

An attribution report should be able to show, for each country, how much value the fund manager added through each of these decisions.

The question of how to measure stock selection is essentially not affected by the fact that this is a multicurrency portfolio (except for one refinement: stock selection should be measured using local currency returns). Hence, for the rest of this article, we

will only consider the questions of which country allocations, and which currency allocations, would have maximised the return to an investor in the fund.

**COUNTRY ALLOCATION AND
CURRENCY ALLOCATION**

Toward which country should the fund manager have tilted the portfolio in order to maximise the return? You might think that the UK is the correct answer, because it had the highest local currency return. However, this answer is wrong, for reasons we will explore later. Maybe it was Japan, since it had the highest base currency return? Wrong again.

Clearly there is something non-obvious going on if neither the UK nor Japan was the country allocation that would have maximised the portfolio return. By the time you finish reading

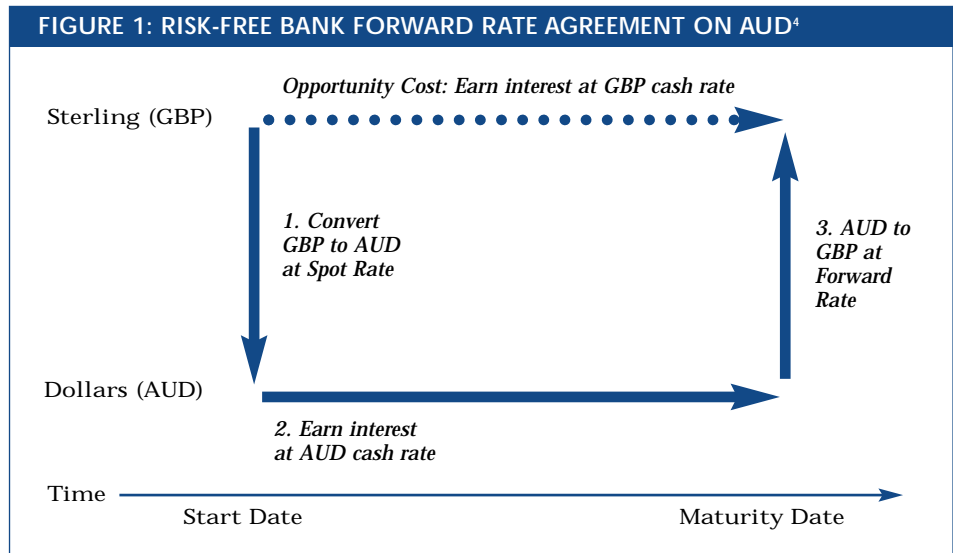
this article, I hope it will be more obvious.

Turning to currency allocation, which currency should a fund manager have favoured in order to maximise the return to investors? An obvious answer is the Euro (Germany), since it appreciated relative to AUD, while JPY and GBP depreciated. However, this answer is wrong also.

WHAT IS GOING ON?

There is one single consideration that explains these counter-intuitive answers about country allocation and currency allocation. This consideration is currency hedging.

It is a common belief that skilful international asset allocation is a matter of picking the countries with the highest local currency returns. Indeed, it is quite common to read commentary along these lines in the



¹ This example uses the same numbers as the example on pp. 21-40 of Karnosky and Singer (1994). However, it has been adapted slightly to reflect the perspective of an Australian investor. Also, to reflect developments since 1994, the German currency is now EUR instead of DEM.

² Anyone attempting to verify the arithmetic may wonder why the local currency return and the exchange rate return for each country sum exactly to the base currency return (normally they would compound instead). The reason is that Karnosky and Singer chose to use continuously compounding returns in order to simplify the calculations. The same principles for multicurrency attribution apply, regardless of whether one uses continuous compounding.

³ This example supposes that the investment process is based on allocating into countries. The same principles of multicurrency attribution would arise if the investment process was based on allocating into industries, or if the process was pure "stock-picking" with no "top down" characteristics.

⁴ The solid arrows depict the 3 steps necessary for the bank to provide a Forward Rate Agreement. The dotted arrow shows the bank's single risk-free alternative to doing this.

TABLE 2: CASH RETURNS IN EACH COUNTRY

Country	Local Currency Cash	Base (AUD) Currency Cash
Germany	5.00%	6.00%
UK	11.25%	8.25%
Japan	9.00%	8.00%
Australia	7.50%	7.50%
Total	8.19%	7.44%

popular press and even in reports issued by fund managers to their clients. However, Karnosky and Singer (1994) showed clearly that currency hedging calculations are essential to the analysis of multicurrency portfolios. Some simple examples will help to show why.

CURRENCY HEDGING

Suppose that you knew in advance that UK equities would have the highest local return (10.5%), and therefore you decided to overweight UK equities. Suppose also that you decided to hedge the GBP exposure back into AUD on a particular forward date (in the next section we will consider the option of going unhedged).

To hedge GBP back into AUD, you would enter a Forward Rate Agreement (FRA) with a bank. Upon maturity, you will provide an agreed amount of GBP to the bank, in exchange for an agreed amount in AUD.

The bank can risklessly fund the FRA out of its GBP reserves by following the three steps depicted in Figure 1.

Instead of continuing to hold GBP cash, the bank provides forward cover by buying AUD at the spot rate (step 1), and investing it in AUD cash (step 2). When the maturity date arrives for the FRA (step 3), the bank will require a forward rate that compensates it for the opportunity cost of not holding GBP cash, which would have been the risk-free alternative.

It follows from this reasoning that the fair price for a FRA differs from the spot rate almost entirely due to the different interest rates available in each different currency. Table 2 shows the cash returns for each different country (in both local currency and AUD).

The arithmetic for an investment in UK equities, hedged back into AUD, goes as follows:

1. Start with the local currency return for UK equities (10.25%).
2. Calculate the effect of hedging this GBP return back into AUD. In continuously compounding terms, this is a matter of adding the AUD cash return (7.50%), and subtracting the GBP cash return (11.25%). At this point in the calculation, we have an

AUD return of 6.50%. This is consistent with the basic principle of hedging: the bank has earned an AUD cash return of only 7.5% instead of a GBP cash return of 11.25%, and hence had to price the forward rate expensively (compared with the spot rate) to compensate for the foregone interest.

3. If you had hedged across into a third currency, the final step would be to convert the return back into AUD (by adding the applicable Exchange Rate Return from Column 3 of Table 1). However, in this case the answer is already in AUD, and it hardly matters whether we apply this step (since the applicable exchange rate return is zero). This leaves us with an AUD return of 6.50%.

Using exactly the same method, one can calculate the AUD return for every combination of country and currency, as shown in Table 3. Each return in Table 3 is expressed in AUD. There is nothing particularly theoretical about these returns, since they are simply based on a currency hedge (FRA) calculation, and FRAs are widely available. By looking at these returns, we can understand the portfolio as if it

was a single-currency portfolio.

For example, if we constructed a portfolio that was 50% German equities hedged into JPY, and 50% Japanese equities hedged into EUR, then we can calculate that the AUD return for the portfolio would be. Similarly, a portfolio that consisted of 50% Japanese equities (unhedged) and 50% German equities (unhedged) would have an AUD return of.

Both these portfolios have a market allocation of 50% Japan and 50% Germany. They also both have a currency allocation of 50% JPY and 50% EUR. And they both have the same AUD return.

The AUD returns in Table 3 show conclusively why UK would not have been a good country selection, and why EUR would not have been a good currency selection. In fact, UK equities hedged into EUR would have been the worst of all 20 possible strategies for this fund in terms of the AUD return that it produced. Earlier in this article, we posed the question whether UK would have been a good market allocation because of its high local return, and whether EUR would have

TABLE 3: RANKED AUD RETURNS FOR EACH COMBINATION OF COUNTRY AND CURRENCY

Rank	Strategy	AUD Return
1	German equities hedged into GBP	$7.00\% + (11.25\% - 5.00\%) - 3.00\% = 10.25\%$
2	German equities hedged into JPY	$7.00\% + (9.00\% - 5.00\%) - 1.00\% = 10.00\%$
3	German equities hedged into AUD	$7.00\% + (7.50\% - 5.00\%) - 0.00\% = 9.50\%$
4	Australian equities hedged into GBP	$8.40\% + (11.25\% - 7.50\%) - 3.00\% = 9.15\%$
5	Australian equities hedged into JPY	$8.40\% + (9.00\% - 7.50\%) - 1.00\% = 8.90\%$
6	Japanese equities hedged into GBP	$9.50\% + (11.25\% - 9.00\%) - 3.00\% = 8.75\%$
7	Japanese equities in JPY (no hedge)	$9.50\% + (9.0\% - 9.00\%) - 1.00\% = 8.50\%$
8	Australian equities in AUD (no hedge)	$8.40\% + (7.50\% - 7.50\%) + 0.00\% = 8.40\%$
9	Australian cash hedged into GBP	$7.50\% + (11.25\% - 7.50\%) - 3.00\% = 8.25\%$
=10	German equities in EUR (no hedge)	$7.00\% + (5.00\% - 5.00\%) + 1.00\% = 8.00\%$
=10	Japanese equities hedged into AUD	$9.50\% + (7.50\% - 9.00\%) + 0.00\% = 8.00\%$
=10	Australian cash hedged into JPY	$7.50\% + (9.00\% - 7.50\%) - 1.00\% = 8.00\%$
=13	UK equities in GBP (no hedge)	$10.50\% + (11.25\% - 11.25\%) - 3.00\% = 7.50\%$
=13	Australian cash (no hedge)	$7.50\% + (7.25\% - 7.50\%) + 0.00\% = 7.50\%$
15	UK equities hedged into JPY	$10.50\% + (9.00\% - 11.25\%) - 1.00\% = 7.25\%$
16	Australian Equities hedged into EUR	$8.40\% + (5.00\% - 7.50\%) + 1.00\% = 6.90\%$
17	UK equities hedged into AUD	$10.50\% + (7.50\% - 11.25\%) + 0.00\% = 6.75\%$
18	Japanese equities hedged into EUR	$9.50\% + (5.00\% - 9.00\%) + 1.00\% = 6.50\%$
19	Australian Cash hedged into EUR	$7.50\% + (5.00\% - 7.50\%) + 1.00\% = 6.00\%$
20	UK equities hedged into EUR	$10.50\% + (5.00\% - 11.25\%) + 1.00\% = 5.25\%$

been a good currency allocation because it appreciated against AUD. The evidence in Table 3 demonstrates why our answer to each of these questions was a definite “No”.

WHAT ABOUT GOING UNHEDGED?

Some fund managers or trustees might object that this paradigm for understanding multicurrency investments does not apply to them because they are not very active in their use of currency hedges. Indeed, perhaps they use no currency hedging at all. However, that would not mean that the Karnosky Singer approach was inapplicable in that case. Rather, it would be analogous to the situation where a fund manager was constrained by their mandate in the active asset allocation bets they could make. It is still legitimate to do performance attribution in that case: however, one would not expect to see very large active bets in such cases.

There is no “free lunch” to be gained by going unhedged, or by hedging only when the forward rate is more favourable than the spot rate.

THE SWISS LOANS AFFAIR

From an Australian perspective, one vivid illustration showing that no “free lunch” exists is the infamous Swiss loans affair in the late 1980s. According to the press, many Australian small businesses and farmers borrowed in Swiss Francs (CHF) rather than AUD, in the hope that the interest rate difference would provide them with a “free lunch” (at the time, AUD interest rates were over 10%, while CHF interest rates were only about 5%).

However, these borrowers learned a lesson about efficient markets when the AUD depreciated substantially against CHF. If the borrowers had tried to hedge against this risk, the FRAs would have cost them dearly, precisely because of the interest rate difference between AUD and CHF, which was what they had sought to avoid in the first place. Little did they realise that borrowing in CHF with no hedge was essentially an act of currency speculation.

KARNOSKY AND SINGER'S EXAMPLE

One of Karnosky and Singer's examples teaches a similar lesson⁵. Based on historical data for the ten-year period ending December 1992, a US investor might have looked back and wished that they had over-weighted Australia in their international equities portfolio, since the local currency return for Australian equities over this period was 17.04%, while the local currency return for US equities was only 14.83%. A traditional performance attribution model would reward the US fund manager for over-weighting Australia during this period, since the local currency return for Australia was 2.21% higher than the local currency return for the US. However, that strategy would be completely wrong. The US cash rate over this period was 9.82%, while the Australian cash rate was 13.56%. Hedging the Australian equities back into US dollars would have cost a US manager 3.74% (the difference in the cash rates). Specifically, if the US fund manager had an unhedged position in Australian equities, they would have lost 3.53% from their annual performance due to the actual decline in the USD/AUD exchange rate⁶. Either way, the perceived 2.21% benefit to a US investor of over-weighting Australian equities for that period on the basis of their higher local return would have been utterly deceptive.

UNHEDGED COUNTRY BETS ARE CURRENCY BETS TOO

Staying unhedged means that you are voluntarily making an active currency bet every time you make an active country bet. All other things being equal, the expected performance difference between an unhedged position and a hedged position will in theory be zero. This is because of the association between:

- high inflation;
- high cash rates; and
- a depreciating exchange rate.

In other words, when a position would be expensive to hedge back into base currency, one would generally expect that position to lose money via exchange rate depreciation if it was left unhedged. This relationship tends to hold over the long run, but it is by no means a perfect relationship. The art of active management is in exploiting these imperfections.

In summary, these examples show us that choosing to invest unhedged in the countries with the highest local returns does not exempt any investor from the economic principles behind the Karnosky Singer attribution model. Instead, the economic effect of this is that the investor is simply engaging in currency speculation. Professional fund managers no doubt like to consider themselves as being more sophisticated than the 1980s Swiss Franc borrowers, but if they simply aim to invest in the countries with the highest local returns, they are committing exactly

⁵ Karnosky and Singer (1994) p. 5.

⁶ It is not merely coincidental that countries with high cash rates tend to have depreciating currencies. High cash rates usually indicate high inflation, which usually leads to a depreciating currency.

TABLE 4: DATA REQUIRED TO RANK COUNTRIES AND CURRENCIES

Country	FX Rate Return (1)	Local Currency Equities Return (2)	Local Currency Cash Return (3)	Base Currency Cash Return (4) = (3) + (1)	Return Premium (5) = (2) - (3)
Germany	1.00%	7.00%	5.00%	6.00%	2.00%
UK	-3.00%	10.50%	11.25%	8.25%	-0.75%
Japan	-1.00%	9.50%	9.00%	8.00%	0.50%
Australia	0.00%	8.40%	7.50%	7.50%	0.90%
Total	-0.75%	8.85%	8.19%	7.44%	0.66%

the same economic fallacy.

Furthermore, as Karnosky and Singer point out, if you use a multicurrency performance attribution system that rewards a fund manager for investing in countries with the highest local returns, you are in fact giving the fund manager an incentive to commit that fallacy. Using the example presented in Tables 1-3, a “conventional” attribution model would give the highest reward to an investment in UK equities, even though (as Table 3 shows), this would lock-in a below-benchmark return, no matter which currency strategy you adopted.

RANKING THE COUNTRIES

Without going into the full details⁷, it will be useful to briefly describe how the Karnosky Singer attribution model actually calculates the value added by asset allocation and currency allocation. The Karnosky Singer (KS) model is essentially the well-known Brinson model, with two alterations.

The first alteration is that KS does two attributions: one on the countries (or more generally, “the markets”), and another on the currencies. Each of these attributions has the same mathematical form as the Brinson model.

The second alteration is that KS adjusts the country and currency returns to take account of the hedging principles described in this article.

For the country attribution, KS does not use local currency returns. Instead it uses “return premiums”. The return premium for each country is simply the local currency return for equities, less the local currency return for cash. The rationale for this is that the cash return determines the cost of hedging, and hence needs to be shifted out of the country attribution and into the currency attribution.

Column 5 of Table 4 shows the return premium for each country. The countries with return premiums above the benchmark return premium (specifically, Germany and Australia) are the ones where KS would reward an overweight position. By thinking about return premiums instead of ordinary local returns, one can easily reason

about which equity markets would be the most rewarding active bets according to the KS model.

If you refer back to Table 3, you will see that each country’s return premium in Table 4 agrees closely to that country’s overall ranking in Table 3. According to the return premiums in Table 4, the best country would have been Germany, followed by Australia, followed by Japan, followed by UK. If you check in Table 3, you will see that, for any given currency, the countries fall exactly into this order. Hence, the return premium for each country is all one needs to rank the countries.

RANKING THE CURRENCIES

To rank the currencies in order of their attractiveness, one needs only to look at their base currency cash returns (Column 4 of Table 4). The base currency cash return for each currency captures both the local currency cash return (which determines the cost of hedging), and the exchange rate return (which captures the actual movement of the currency over the period). The intuition behind this is that the countries with the highest base currency cash returns are those whose actual change in value (measured by the exchange rate return) most exceeds the expected change in value (measured by the local currency cash return).

Once again, if you refer back to Table 3, you will see that the currencies with the highest base currency cash returns tend to be near the top of the table (GBP is at the top), while the countries with the lowest base currency cash returns tend to be near the bottom of the table (EUR is the lowest).

In summary, while some of the hedging calculations behind the KS model are conceptually rather complicated, the calculations required to rank the countries and currencies are rather elementary.

Practical Application

Based on the examples that Karnosky and Singer provide, it is hard to avoid the conclusion that a “traditional” attribution model (which assumes that the goal of country allocation is to pick countries with the highest local

returns) will sometimes give answers that are entirely at odds with the strategy that would have maximised the total return of the fund.

Even though it’s now 10 years since the Karnosky Singer monograph was published, the multicurrency fund managers who are using Karnosky Singer attribution are definitely in the minority. To some degree, this delay is due to the fact that attribution software is still relatively crude, and technology upgrades take time to implement.

However, it is also true that there is little demand for Karnosky Singer attribution from fund trustees and portfolio managers. Anecdotally, it is not uncommon for fund managers to remark that KS is too complicated and academic. Fund managers also sometimes remark that they don’t manage the money in accordance with the KS paradigm in any case (instead they try to pick the countries with the highest local currency returns).

Since this latter approach fails to maximise fund returns (and indeed might minimise them!), this is an issue that should be of great interest to trustees and asset consultants. It may take quite a few years for the Karnosky Singer approach to diffuse widely through the securities industry, and to be realistic, the pace of this diffusion will most likely be determined by the level of demand from trustees and consultants. **J**

REFERENCES

Karnosky, Denis S. and Brian D. Singer Global Asset Management and Performance Attribution The Research Foundation of the Institute of Chartered Financial Analysts 1994.

Laker, D. “Karnosky Singer Attribution: A Worked Example” presented to the IIR Conference on Performance Measurement and Attribution, Sydney, February 2002.

⁷ Karnosky and Singer (1994) provides a lot more detail. The full working for the example described in this article is available from the author via email at damien.laker@compoundinghappens.com.