THE BRANDES INSTITUTE

Currencies and Hedging:
The Longer-Term Perspective

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The MSCI World Index is an unmanaged index consisting of equities from developed markets around the world, including the United States. This index is often used as a benchmark for global equity portfolios and includes dividends and distributions but does not reflect fees, brokerage commissions, withholding taxes, or other expenses of investing.

I. Executive Summary

In this paper, we set out to provide an exhaustive documentation and analysis of the influence of currency on non-domestic equity portfolio investors over the full 32-year period (through December 31, 2004) since the introduction of floating exchange rates at the end of 1972. We examine the data from the perspective of investors in each of the 23 developed market countries in the MSCI World Index. By extending the study to examine the investor perspective from all developed market base countries and the full period of floating rates, we aim to identify more clearly which aspects of currency impact and behavior appear to represent consistent characteristics, and which may be random effects (or "noise").

It is our belief that relying on limited samples of data (e.g., only 5 to 10 years of data, or using only the perspective of a single base-country investor) increases the chance that conclusions may be drawn erroneously, based on data samples that may be excessively "noisy."

We do not, however, claim that our more extensive data set is noise-free. Nor would we claim that lessons "learned" from this past data could or should be applied in the future. We do not take a position on whether investors should or should not include currency hedging or currency management in their programs. We do try to lay out as much information and analysis as we can, in the hope and expectation that investors can use this to make more informed decisions based on a fuller understanding of past behavior of currency markets.

In this context of challenging existing perceptions among investors, we can summarize some of the main findings of this research by posing eight questions. Each of these is based on perceptions that we have heard expressed by international investors. Each of these perceptions is challenged in the body of this paper, following the numbering set out below. (See reference to section at the end of each question.)

Eight Questions on Currency and Hedging

1. Has currency been a significant source of international returns over the long term for most investors worldwide? (Section IV b)

NO. The passive currency (or hedging) impact for investors in most countries has declined to relatively small numbers over extended periods, typically in the range of ±1% annualized. U.S.-based investors have generally proved the exception, with a negative long-term currency impact of over 2% annualized (or in other terms, an annualized deficit from currency hedging of over 2%).

2. Has the impact from currency hedging generally been consistent over time in each country? (Section IV b)

NO. The pattern of benefit or deficit in currency hedging has varied notably over time and for different base-country investors.

3. Has currency impact "washed out" over the long term? (Section IV b)

NO. Even over the longest periods measured (30-plus years), the currency impact has not trended to zero for most countries. The numbers are small (typically in the range of 0.5% to 2.5% annualized), but only two of the 18 countries with a full 32-year history had currency impact of less than 0.5% annualized over the long-term (these two were Australia and Japan).

4. Is it true that always using hedged, or always using unhedged, portfolios routinely improves diversification? (Section V d)

NO. More often than not, unhedged portfolios provided slightly better diversification than hedged. However, sometimes the reverse was true, and in most cases, the difference was small.

5. Have loss-limit strategies provided value-added protection for hedging programs over the long term? (Section VI)

NO. In most countries, loss-limit strategies have notably underperformed "unlimited" strategies.

6. Can consistent trend patterns be observed regardless of base currency and time period? (Section VII b)

NO. While there is evidence of trends in currencies, the trend patterns vary notably depending on base-country and time period.

7. Have currency markets exhibited efficient market behavior over the long term? (Section VII c)

NO. There is evidence of behavioral anomalies (the interest premium effect) in total currency returns.

8. Over long periods, have currency moves dominated the impact of interest rate differentials when measuring total currency returns? (Section VII c)

NO. Interest rate differentials have been the dominant component of long-term currency returns.

Before turning to the research in detail, we outline below the structure of the paper for easy reference.

We start with a brief introduction to the currency markets, including the background to the introduction of floating rates, and an explanation of the methodology employed to gather and analyze the data.

We then examine the impact of passive strategic hedging on international equity portfolios. This includes analysis of return patterns and impact on diversification.

The next segment of the paper deals with the potential implications at the client level of establishing a passive hedging program. This includes the likely results if loss-limits are used, and the likelihood of terminating a hedging program if such limits are imposed before or during such a program.

From there, we examine currency-specific characteristics more closely (excluding the equity aspects of a portfolio). This section includes an examination of the relationship between currencies and interest rates, trend patterns, and anomalies in currency behavior.

The extensive appendix to the paper contains standardized data and charts from the perspective of investors in each of the 23 base currencies in the study. As well as the data relevant to that base-currency investor, we have included, where relevant, a comparison to the average of all 23 countries.

II. Introduction

a. Scope of the Research

This study is designed to investigate and provide factually based observations on a broad set of currency data in order to provide new insights on currency behavior and its impact on equity portfolios. We focus on the period since 1972, coinciding with the end of the system of fixed exchange rates in developed countries. In particular, we compare the results of hedging, or not hedging, the currency exposure within a non-domestic equity portfolio. We have tried to take a non-judgmental view in this comparison, and thus leave it to readers to assess the information in this research, and come to the appropriate conclusions for their own investment requirements.

There is a substantial existing body of academic and professional literature on aspects of currency hedging and currency management. As this work is an empirical study of the data, and does not put forward an academic thesis, we have not catalogued this prior work on currencies. We do, however, concentrate our attention on hedging and its potential implications, and we would refer interested readers to two seminal works in the early days of the academic debate over portfolio hedging. These are both *Financial Analyst Journal* papers. In 1988, Andre Perold and Evan Schulman wrote "The Free Lunch in Currency Hedging: Implications for Investment Policy and Performance Standards." This was followed in 1989 by Fischer Black's "Universal Hedging: Optimizing Currency Risk and Reward in International Equity Portfolios." Perold and Schulman argued in favor of fully-hedging international portfolios, while Black's approach introduced an "optimal hedge" dependent on the investor's assumptions, that would provide a hedge ratio in the 0-100% range. Nevertheless, in practice, most non-domestic portfolios continue to be measured against an unhedged benchmark.

With respect to the depth of the data, our survey of previous empirical currency research suggests that most studies are limited to evaluating periods of 10 years or less, with data centered on a single base currency (usually the domestic currency unit).[1] This limitation leads to two potential problems. First, patterns or trends that appear over short periods may break down when examined in a longer timeframe. Second, analysis based on a single base currency is itself a limited examination of the available data, and by definition, cannot identify differences in results due to changing the base currency. Thus, research on the currency implications for investors in non-domestic markets over the last 10 years may miss factors that become more apparent in a more extensive data examination.

To provide a comprehensive perspective, we examine an extensive amount of available data for the world's major currencies since the floating rate era commenced. Covering 23 developed currencies and a period of 32 years, the data provides a detailed frame of reference for global investors in developed countries. We decided to exclude emerging market countries from this study for two principal reasons. The first is simply the availability of data, which is limited for many of these currencies. The second is that the characteristics of emerging market currencies do not lend themselves as readily to the type of detailed statistical research used in this paper. Such currencies are often subject to political or financial controls (e.g., currency pegs, restrictive exchange controls, or managed floats that are less evident in developed countries). Given the lack of free-market movement, examining the longer-term performance of these currencies may not be as informative as is the case for developed currencies. For these reasons, we have limited this study to developed countries.

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[1] We note one relevant article: Record, N. (2000) "Currency – A New Look at the Zero Sum Game," *Institute for Fiduciary Education*, 2000 Conference Proceedings.

In those developed countries, we focus on examining a statistic known as the "hedging impact." We calculate the performance of a hedged, non-domestic equity portfolio (using simulated forward currency contracts) for a domestic investor in each base country in our study. We then calculate the unhedged equivalent. The geometric difference between these two quarterly performance numbers is the hedging impact (which may be positive or negative).

One goal is to analyze and evaluate the data to identify the underlying characteristics of the currency markets that appear to be consistent or evident across time periods and base currencies. We also attempt to identify misleading patterns that may be evident for shorter periods, or in some base countries only, and hence are given more credence by those investors than the broader data suggests they merit.

Throughout this study, we evaluate the impact of currency hedging from a passive hedging perspective (the strategic hedge decision). The decision to pursue an active currency strategy is a tactical decision, and is not examined here. In this context, the data presented here can be used as a proxy for the strategic decision to hedge a portfolio, but does not examine the merits (or otherwise) of pursuing an active hedging strategy.

b. Historical Perspective

We begin our return series at the start of 1973, to capture currency fluctuations in the entire free-floating currency era. By that date, currencies had been freed from the Bretton Woods Agreement of 1944, which had instituted a fixed rate regime. The new "free-float" era that began in the early 1970s effectively allowed global investors to evaluate, and in most cases, act to develop currency hedges in their portfolios. We say "in most cases" because in the early part of this era there remained some barriers to such hedging. For example, the United Kingdom maintained controls until 1979 on non-domestic portfolio investment (resulting in a "foreign exchange premium" rate). In addition, the transaction costs and practical difficulties of placing hedges were generally greater in the 1970s than in later periods when the currency markets had grown in size. We have not made explicit allowances for such factors, but would be more cautious of conclusions from the 1970s data than from later periods. This is one reason we have broken down our results "decade-by-decade" where appropriate.

Why was the Bretton Woods Agreement in effect? As the end of World War II drew near, economic stability was a concern. This was the central topic when representatives from more than 40 nations gathered in Bretton Woods, New Hampshire in 1944 to create an agreement for governing the post-war international economy. Economists John Maynard Keynes and Harry Dexter White played a significant role in developing the Bretton Woods Agreement, which stipulated:

- Creating international agencies to encourage fair trade
- Maintaining fixed exchange rates between currencies
- Introducing the convertibility between gold and the U.S. dollar; as a result, the U.S. dollar replaced the U.K.'s pound sterling as the base international currency.

While the accords for fixed exchange rates and gold conversion no longer exist, several agencies created from the agreement are still in place today, including the International Monetary Fund, the World Bank, and the General Agreement on Tariffs and Trade.

For our purposes, we focus on the agreement for fixed exchange rates. Bretton Woods limited foreign currency fluctuations to a maximum of 1% above or below a set standard rate. If a currency's exchange rate approached the limit of the standard rate, the country's central bank was bound to intervene until the limit was restored.

Following the dissolution of the Bretton Woods Agreement in 1971, U.S. President Richard Nixon introduced the Smithsonian Agreement, which strived to accomplish many of the same goals as Bretton Woods. However, with trade and capital account imbalances growing, it became increasingly difficult to maintain fixed exchange rates, and the Smithsonian Agreement was short-lived. The European Joint Float allowed for greater fluctuation in currency values within its signatory countries, but it too eventually failed. By the start of 1973, the exchange rates among the main trading currencies of Europe, North America, and Asia, while influenced by central banks and political requirements, were primarily set by market forces.

c. Today's Currency Markets

How integral are currencies to global financial markets today? The daily volume of the currency market exceeds $1.5 trillion (USD), or more than the New York Stock Exchange's trading volume over one month. While there are more than 100 currencies, about 85% of currency trading is between seven major currencies – the U.S. dollar, the Japanese yen, the euro, the Swiss franc, the British pound, the Canadian dollar, and the Australian dollar.[2]

Participants in the currency market include:

- central banks
- commercial and investment banks (for customers and their own trading activities)
- corporations
- consumers
- asset managers (including portfolio hedgers)
- currency speculators

Trading costs for the spot and forward currency markets are very low compared (for example) to stock market transactions. For this paper, we have ignored their impact.

III. Methodology

We have developed a database of quarterly results for all developed countries[3] from 1973 through 2004. This extended time frame allows a perspective not overly influenced by recent currency movements.

We calculate simulated, passive fully hedged and unhedged results for "non-domestic" equity and currency portfolios in every base currency for each quarter. We define the "hedging impact" over any time period as the geometric difference in return between a fully hedged portfolio and an unhedged portfolio.

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[2] Source: Forex, www.forex.com/forex_faqs.html#5.

[3] We include the 23 developed markets recognized by MSCI as of June 30, 2005: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

The portfolio country weights are based on gross domestic product (GDP), not market capitalization, and this methodology was employed for several reasons:

- GDP weightings for countries allowed us to go back further in this study than market-weighted data.
- The use of GDP data resulted in smoother returns compared to market-weighted returns.
- Because the study focuses on the relative differences between hedged and unhedged portfolios, the country weight method has minimal impact on the conclusions.

As a result of an extensive data search, the paper includes data gathered from a number of information resources. Equity performance data largely was collected from Morgan Stanley Capital International and Global Financial Data. We used GDP weightings from the U.S. Economic Research Service and International Monetary Fund. The risk-free rates for countries, which represented the 3-month yield on T-bills, were retrieved from FactSet and Global Financial Data. FactSet was also the source for all exchange rates. When a data series from one source was incomplete, we linked the series to a comparable data series and checked for consistency.

We assumed the use of 3-month forward contracts in creating the simulated hedged portfolios. Hedge transaction costs were excluded, given that the study examines only the developed currencies where transaction costs are very low (and separate from the implicit interest rate differential in each forward contract). To the extent that there is any bias in the results, it will therefore advantage the hedged portfolio results slightly.

We provide a number of analyses on the data to gain a wider perspective, including:

- Aggregate data for the 32-year period
- Rolling returns across the whole period
- Dispersion analysis of results for each available combination of annual periods
- Decade-by-decade analysis
- Comparative analysis of strong/weak U.S. dollar cycles.

In order to present the results in an easily understood way, we have focused the body of the paper on those currencies that represent the vast majority of currency trades and portfolio exposure. These are the "Big 8" alluded to in section II. In fact, there were seven on that list, including the euro twice. For this paper we have kept separate all those currencies that became unified into the euro, in order to examine their prior histories. Thus the "Big 8" includes Germany (Deutschemark) and France (French franc), even though those currencies no longer exist separately. For our calculations, we have used the fixed parities that have prevailed between them since the inception of the euro.

While the "Big 8" are the primary (but not exclusive) focus of the paper, we have conducted the relevant analysis for all 23 base countries. Using a standardized format, we have set out the results of this work in the Appendix, separately for each base country, in a way that allows comparison between countries and (where appropriate) between that country and the average of all countries in the study.

IV. Hedged and Unhedged Portfolio Returns

a. Overview

The difference in returns between a hedged and unhedged portfolio comes from two sources. One is the movement in all other portfolio currencies relative to the base currency. The second is the interest rate differential between the investor's base currency and the weighted average of all the other currencies represented in the hedged portfolio. That interest rate differential is the determining factor for the pricing of the forward contract that constitutes the currency hedge, and thus effectively sets the exchange rate for that forward contract.

The impact from currency hedging (positive or negative) is thus the amount by which the actual currency move exceeds the move priced into the hedge by that interest rate differential. A positive "hedging impact" must therefore come from either a strong base currency and/or a higher interest rate than the weighted average of the non-domestic currencies. Likewise, a negative "hedging impact" (or penalty) comes from either a weak base currency and/or a lower interest rate.

This hedging impact is effectively a good proxy for the currency component of returns in the unhedged, non-domestic portfolio, but with the opposite sign. Thus a positive hedging impact is equivalent to a similar negative percentage "currency impact." This is because the hedged portfolio is essentially the "local currency" version of the non-domestic, unhedged portfolio. Thus "hedging impact," "currency impact," or "currency component of returns" are linked concepts.

b. Cross-currency Comparisons

We begin with a comparison of long-term unhedged and hedged returns for investors based in the developed countries. The results represent the aggregate results of quarterly returns from 1973 through 2004 for a non-domestic equity portfolio for each country. All returns are based in each country's local currency.

Question 1: Has currency been a significant source of international returns over the long term for most investors worldwide?

The difference between hedged and unhedged returns over the full period generally has been modest. For investors in most countries, the long-term results fall in the range of plus or minus 1% annualized. The most notable exception is the United States, with a long-term hedging "deficit" of greater than 2%. These longer-term results confirm that while the aggregate currency market may be a zero-sum game, this was not true for each base country, even over extended periods of time. Overall, the results indicate a positive hedging impact for European and Pacific investors, but negative for North American investors.

CHART 1a, Hedged and Unhedged Returns, 1973-2004, Big 8 Countries

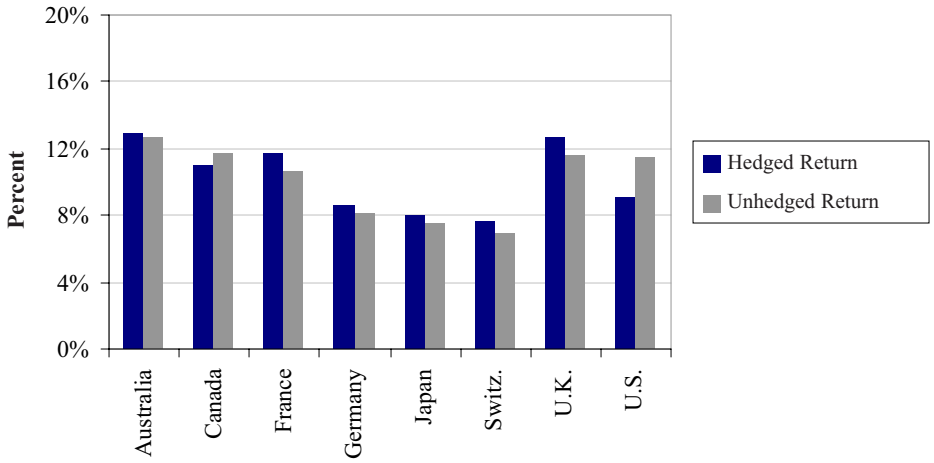


CHART 1b, Hedged and Unhedged Returns, 1973-2004, Other Europe

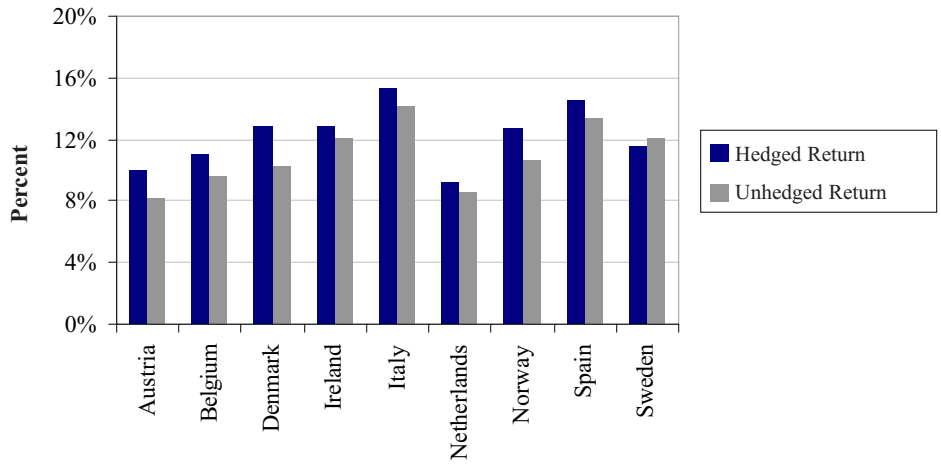
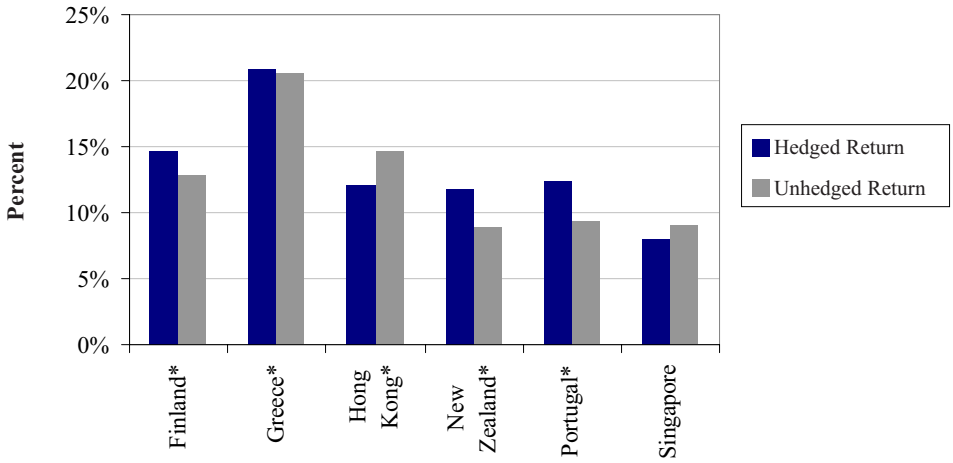


CHART 1c, Hedged and Unhedged Returns, 1973-2004, Other Pacific and Countries with Incomplete Data



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. We measure the "hedging impact" as the incremental return from a hedged, non-domestic portfolio compared to an unhedged equivalent portfolio. * Denotes data available for partial period. Finland data covers 1979-2004; Greece data covers 1977-2004; Hong Kong data covers 1982-2004; New Zealand data covers 1988-2004; Portugal data covers 1988-2004.

Question 2: Has the impact from currency hedging generally been consistent over time in each country?

Tables 2a, 2b, and 2c show that hedging impacts varied notably by country between periods. The impact of hedging a non-domestic portfolio showed few consistent patterns, by time period or by location. Other than the United States, as previously noted, only four countries had the same sign in their hedging impacts across all four periods: positive for three European countries, Belgium, Denmark and Norway, and negative for Singapore.

This data is evidence that using recent hedging results to guide strategic decisions may be misleading. There is significant volatility evident in these results.

TABLE 2a, Annualized Hedging Impact by Decade, Big 8 Countries

	Australia	Canada	France	Germany	Japan	Switz.	U.K.	U.S.
1973 – 1979	-2.34%	-3.92%	3.18%	4.83%	1.32%	6.88%	-0.26%	-4.27%
1980 – 1989	1.35%	1.78%	-1.87%	-3.12%	2.48%	-3.79%	-0.94%	-0.81%
1990 – 1999	-0.51%	-1.94%	0.29%	-1.10%	0.90%	-0.66%	2.45%	-1.79%
2000 – 2004	2.99%	1.85%	5.00%	5.32%	-5.75%	4.29%	3.43%	-3.05%
Full period	0.20%	-0.65%	0.96%	0.51%	0.41%	0.70%	0.94%	-2.23%

TABLE 2b, Annualized Hedging Impact by Decade, Other European Countries

	Austria	Belg.	Denmark	Ireland	Italy	Nether.	Norway	Spain	Sweden
1973 – 1979	6.68%	5.83%	4.86%	-0.79%	-2.09%	3.16%	2.58%	1.69%	-1.61%
1980 – 1989	-0.88%	2.73%	0.74%	0.01%	2.47%	-1.85%	0.29%	-0.06%	-1.81%
1990 – 1999	-0.83%	0.22%	0.85%	0.43%	-0.37%	-0.80%	0.37%	-0.16%	-0.41%
2000 – 2004	5.00%	5.40%	5.13%	4.84%	5.15%	4.91%	6.84%	5.05%	3.43%
Full period	1.65%	1.31%	2.34%	0.70%	0.98%	0.60%	1.81%	1.07%	-0.52%

TABLE 2c, Annualized Hedging Impact by Decade, Other Pacific Countries, plus Countries with Incomplete Data

	Finland	Greece	Hong Kong	New Zeal.	Portugal	Singapore
1973 – 1979	n/a	n/a	n/a	n/a	n/a	-0.24%
1980 – 1989	2.10%	-6.47%	-5.08%	n/a	n/a	-1.05%
1990 – 1999	-1.56%	5.71%	0.07%	1.08%	1.23%	-0.72%
2000 – 2004	4.89%	5.35%	-1.99%	7.17%	4.80%	-2.71%
Full period	1.55%	0.21%	-2.19%	2.59%	2.75%	-1.03%

Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. We measure the "hedging impact" as the incremental return from a hedged non-domestic portfolio compared to an unhedged equivalent portfolio.

Tables 3a, 3b, and 3c show hedging impact by country during periods of a weak U.S. dollar and a strong U.S. dollar (the period inception and end dates were determined based on our observation of historical performance relative to the weighted average of all other developed currencies). While the pattern shows most non-North American countries have an inverse relationship between their hedging impact and the dollar's strength, later in this paper we will see how relative interest rates can contribute to hedging impact.

TABLE 3a, Hedge Impact in Strong and Weak Dollar Periods, Big 8 Countries

Strong $ periods in bold	Australia	Canada	France	Germany	Japan	Switz.	U.K.	U.S.
1973-3Q80	-1.59%	-3.60%	2.08%	2.91%	2.60%	8.91%	0.95%	-4.03%
4Q80-4Q84	**1.89%**	**6.57%**	**-9.42%**	**-9.21%**	**-1.19%**	**-1.22%**	**-9.13%**	**11.79%**
1Q85-2Q95	-1.23%	-3.33%	4.68%	3.11%	5.55%	-0.08%	2.12%	-8.71%
3Q95-1Q02	**0.00%**	**1.11%**	**-2.64%**	**-3.57%**	**-8.36%**	**-2.52%**	**3.88%**	**6.75%**
2Q02-4Q04	9.09%	3.20%	10.12%	10.51%	0.19%	7.84%	4.45%	-12.30%

TABLE 3b, Hedge Impact in Strong and Weak Dollar Periods, Other European Countries

Strong $ periods in bold	Austria	Belg.	Denmark	Ireland	Italy	Nether.	Norway	Spain	Sweden
1973-3Q80	4.92%	4.93%	4.10%	-0.97%	-2.37%	2.14%	2.19%	0.35%	-1.87%
4Q80-4Q84	**-7.06%**	**-7.84%**	**-5.79%**	**-6.32%**	**-2.28%**	**-8.79%**	**-5.48%**	**-5.95%**	**-8.74%**
1Q85-2Q95	4.13%	8.23%	5.80%	3.75%	2.32%	3.89%	3.77%	3.99%	1.75%
3Q95-1Q02	**-3.20%**	**-2.95%**	**-2.41%**	**-0.93%**	**1.32%**	**-3.51%**	**0.14%**	**-1.42%**	**-1.23%**
2Q02-4Q04	9.83%	9.76%	9.73%	9.63%	10.12%	9.77%	9.41%	9.96%	10.22%

TABLE 3c, Hedge Impact in Strong and Weak Dollar Periods, Other Pacific Countries, plus Countries with Incomplete Data

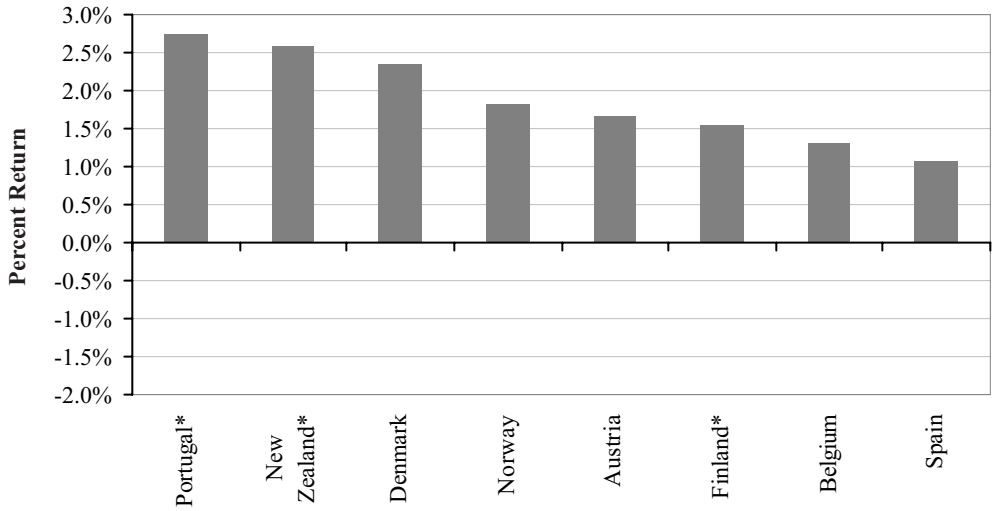
Strong $ periods in bold	Finland	Greece	Hong Kong	New Zeal.	Portugal	Singapore
1973-3Q80	4.95%	-0.56%	n/a	n/a	n/a	-0.29%
4Q80-4Q84	**-3.69%**	**-12.93%**	**-2.89%**	**n/a**	**n/a**	**4.40%**
1Q85-2Q95	3.92%	4.14%	-4.95%	0.91%	4.68%	-2.44%
3Q95-1Q02	**-2.90%**	**2.69%**	**5.01%**	**-0.23%**	**-0.69%**	**-1.78%**
2Q02-4Q04	9.66%	9.76%	-7.67%	14.56%	9.35%	-4.00%

Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. We measure the "hedging impact" as the incremental return from a hedged non-domestic portfolio compared to an unhedged equivalent portfolio.

Question 3: Has currency impact "washed out" over the long term?

Now we turn our attention to the question of currency as a zero-sum activity. While currency hedging in aggregate may result in merely the transfer of currency impact between countries with no aggregate effect, currency hedging results, or currency impact on portfolios, do not appear to tend to zero in each country, although it is true that these annualized results tend to diminish over more extended periods. Hedging impact can still be quite substantial over periods of a decade or longer. These results are shown in Charts 4a, 4b, and 4c (with the "Big 8" countries highlighted in blue).

CHART 4a, Annualized Hedging Impact, 1973-2004, Ranked from High to Low



* Denotes countries with data series that do not extend back to 1973. Finland data covers 1979-2004; New Zealand data covers 1988-2004; Portugal data covers 1988-2004.

CHART 4b, Annualized Hedging Impact, 1973-2004

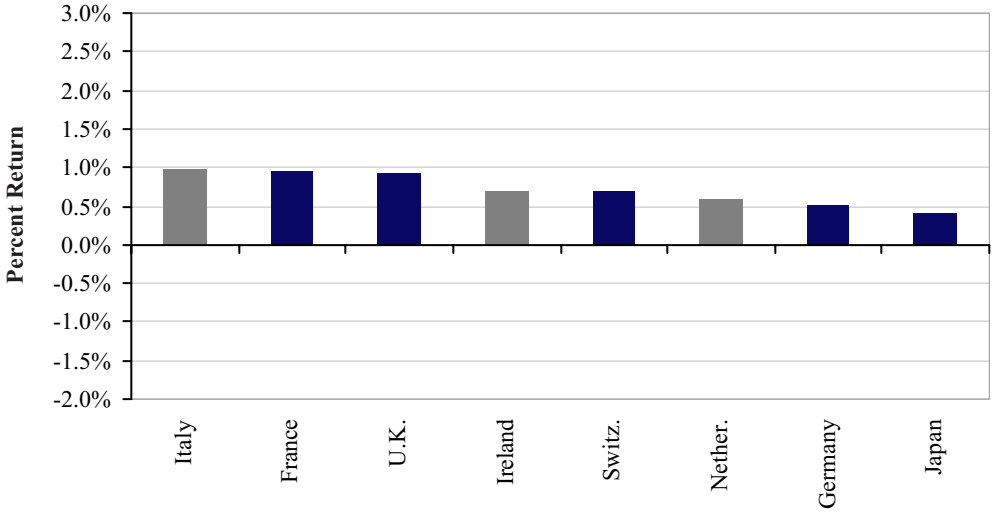
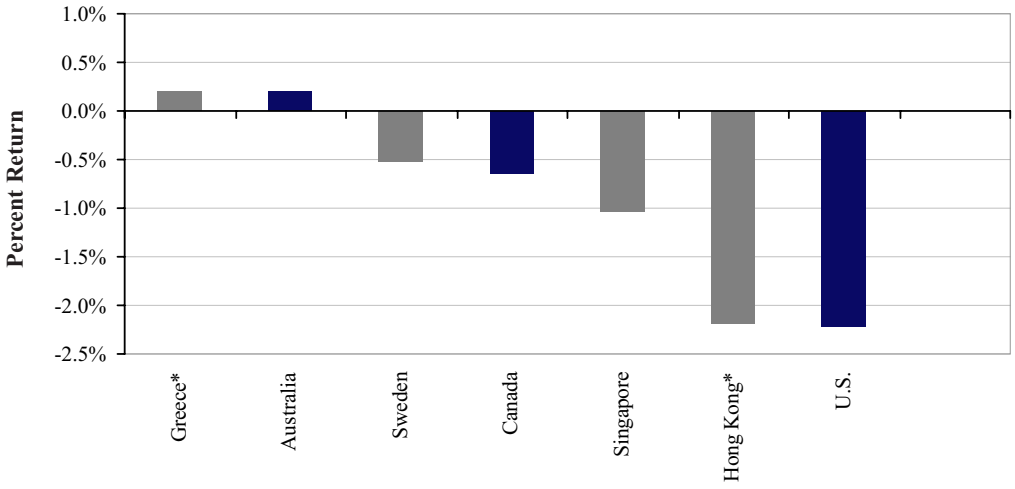


CHART 4c, Annualized Hedging Impact, 1973-2004

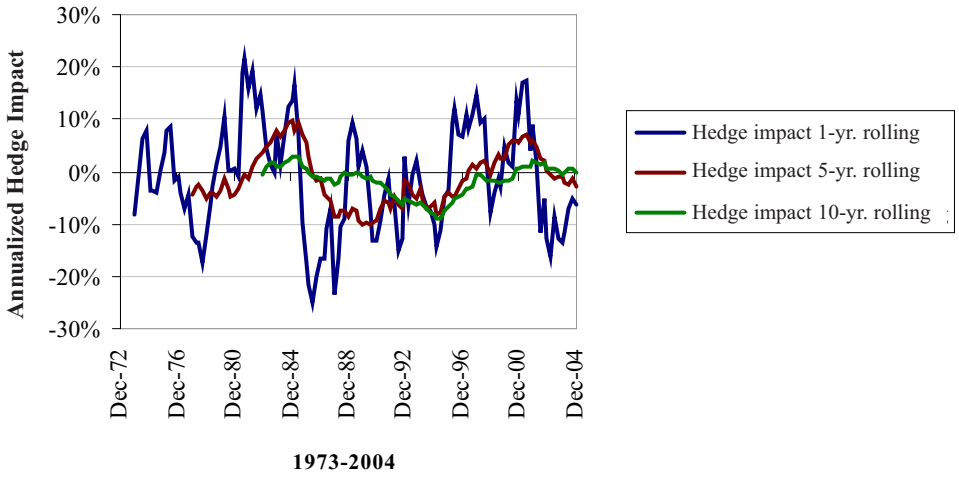


Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. We measure the "hedging impact" as the incremental return from a hedged non-domestic portfolio compared to an unhedged equivalent portfolio. * Denotes countries with data series that do not extend back to 1973. Greece data covers 1977-2004; Hong Kong data covers 1982-2004.

c. Volatility and Dispersion

The evidence for mean-reversion in hedge impact for developed countries' investors is contained in Chart 5. In this example, we examine the U.S. dollar, but the pattern is similar for all other base countries, as may be seen in the Appendix. The longer the time period of measurement, the smaller is the amplitude of the cycle. However, cyclical patterns are indeed evident for all base currencies.

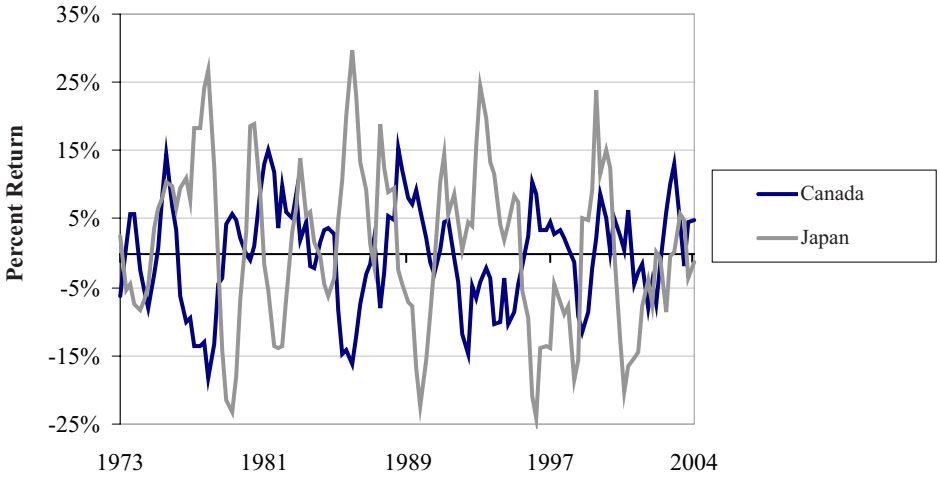
CHART 5, Hedge Impact for U.S.-based Investor over Rolling 1-, 5- and 10-year Periods



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. We measure the "hedging impact" as the incremental return from a hedged non-domestic portfolio compared to an unhedged equivalent portfolio. Rolling returns are annualized returns for a series of overlapping, smaller time periods within a single, larger time period. For example, the 32-year time period from 12/31/72 through 12/31/04 consists of 28 five-year segments. The first segment is the five-year period 12/31/72-12/31/77, the next segment is the 5-year period 12/31/73-12/31/78, and so on.

As currencies are measured against each other, it may be expected that periods of positive currency hedge impact for investors in one base currency should match periods of deficit for those in another country. To illustrate this, we select, as an example, a comparison of rolling, 1-year hedge impact between investors based in Japan and in Canada. While all countries in our study show volatile patterns for this short-term series, the amplitude of the volatility in this chart is clearly higher for Japan than for Canada. In addition, it is notable that the patterns of positive vs. negative impact are "out of sync" with each other. See Chart 6.

CHART 6, Canada & Japan 1-Year Hedging Impact, Rolling Periods 1973-2004



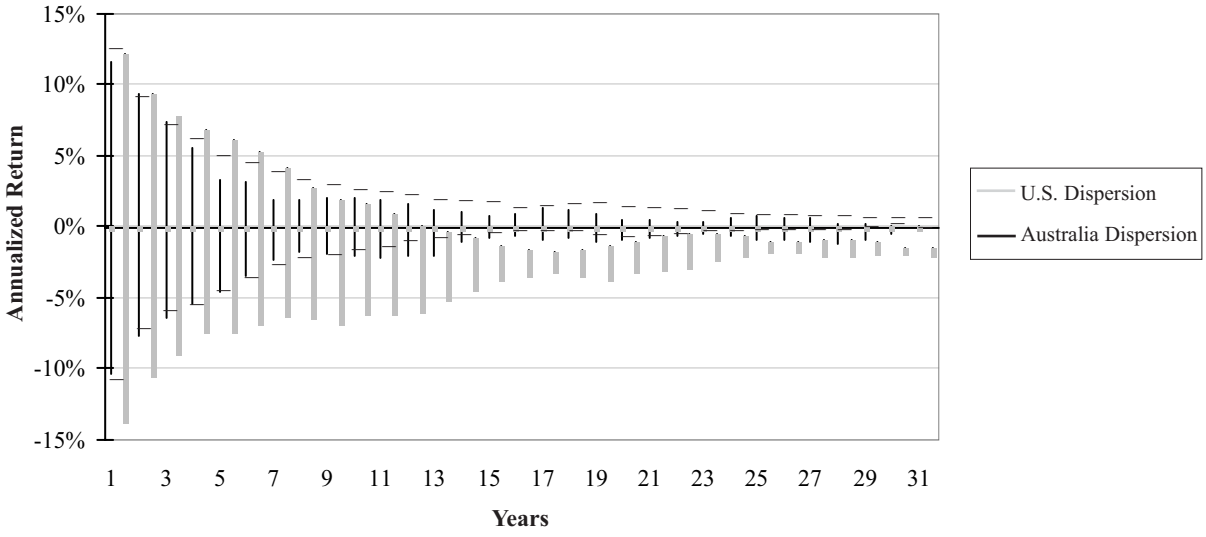
Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. We measure the "hedging impact" as the incremental return from a hedged non-domestic portfolio compared to an unhedged equivalent portfolio. Rolling returns are annualized returns for a series of overlapping, smaller time periods within a single, larger time period. For example, the 32-year time period from 12/31/73 through 12/31/04 includes 121 12-month segments. The first segment is the 12-month period 12/31/73-12/31/74, the next segment is the 12-month period 3/31/74-3/31/75, and so on.

We now review the way in which these volatile short-term results become less volatile over time, even if they do not eventually "wash out" to zero. We have measured the dispersion of the hedging impact results for all available periods of a specific length. Dispersion is measured as the range between the top and bottom deciles of the hedge impact results for all periods of that length. Thus, we calculate the 10th and 90th percentiles for all available one-year periods in the entire 32 years (shown as the furthest left bar on chart 7). Then the process is repeated for all available two-year periods, and so on. To see the variance in outcome between this base country and the entire world universe, we show for each period length the equivalent decile breaks for the entire universe. Between this country and the world average, a difference in either the dispersion of hedging returns, or the speed at which the dispersion of hedge impact narrows, may have implications for the relative advantages inherent in active or passive hedging programs.

The dispersion of hedge impact results for every country narrows as the time horizon is extended, but at different speeds. Consistent with the data in Charts 4a, 4b, and 4c, the median dispersion trends to a small number, but not to zero for any of the countries studied. Chart 7 illustrates how these dispersion patterns can differ significantly. For this example we use two of the "Big 8" countries: the United States and Australia.

We also add a dashed line for each time horizon to indicate the 10th and 90th percentile levels for the unweighted average of all countries. We note that the dispersion pattern in Australia narrows much more quickly than the United States, with the gap between the 10th and 90th percentile dropping below 4% in Australia by year 8, while this does not occur for the United States until year 14.

CHART 7, Dispersion of Hedge Impact, U.S. and Australia, 1973-2004



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. We measure the "hedging impact" as the incremental return from a hedged non-domestic portfolio compared to an unhedged equivalent portfolio. Dispersion is defined as the spread between our 10th and 90th percentile outcomes. Rolling returns are annualized returns for a series of overlapping, smaller time periods within a single, larger time period. For example, the 32-year time period from 12/31/73 through 12/31/04 includes 121 12-month segments. The first segment is the 12-month period 12/31/73-12/31/74, the next segment is the 12-month period 3/31/74-3/31/75, and so on.

The dispersion patterns have implications for passive and active hedging programs. Lower dispersion and rapid narrowing of hedging impact dispersion may have benefited investors employing a passive hedging program, such as a plan sponsor using a fully hedged benchmark. Such a passive hedger seeks to avoid wide swings in currency impact, but instead may prefer insurance against the decline of the domestic currency and a trend in the hedging impact to a level above zero in the long term.

By contrast, an investor involved in an active hedging program (such as an active overlay manager) may have benefited from higher dispersion of hedging returns, which can provide more opportunity due to the higher volatility of outcomes. Unlike the passive hedger, an active hedger typically has a shorter horizon and may be less likely to be concerned about whether the long-term trend in the hedging impact tends to a level just above or below zero.

V. Diversification Issues: Hedged and Unhedged Portfolios

For investors looking at the relative benefits of adopting a hedged benchmark, rather than the traditional unhedged one, consideration often is given to the correlation of that benchmark to the home country equity index, and to the standard deviations of the hedged and unhedged non-domestic benchmarks. Taking these two quantities together allows us to measure the diversification impact of a non-domestic portfolio. To do this, we assign that portfolio an arbitrary weighting in a domestic/non-domestic mix, and calculate the standard deviation

of the combined portfolio. If that standard deviation declines when a hedged portfolio is substituted for an unhedged one, then the diversification of the combined portfolio is deemed to have increased (and vice versa). The arbitrary non-domestic percentage we have used is 20%, which is based on observations of general industry practice. However, while the numbers will change if we vary that number, the observation of increased or reduced diversification will not change.

a. Correlations between unhedged, non-domestic benchmarks and domestic equities

For five of the "Big 8" countries, this measurement has increased over time, but this is not universal. In Japan, compared to the 1970s, the correlation was lower in the 2000s, and much lower in the 1980-2000 period. For Swiss and Australian investors, the non-domestic correlation was either flat or slightly down over the full period. We highlight in bold the country in each decade with the highest correlation between domestic and unhedged, non-domestic portfolios. The United States does not figure as highest in any of the periods (Switzerland pre-1990, then France and the United Kingdom post-1990).

TABLE 8, Correlations Between Domestic and Unhedged Non-Domestic Portfolios

	Australia	Canada	France	Germany	Japan	Switz.	U.K.	U.S.
1973-1979	56.9%	67.3%	59.7%	58.9%	63.1%	**81.3%**	56.0%	63.8%
1980-1989	48.5%	60.8%	40.3%	44.5%	31.3%	**61.5%**	60.1%	60.8%
1990-1999	48.2%	67.3%	**82.2%**	68.8%	33.7%	80.5%	75.2%	75.6%
2000-2004	58.9%	78.1%	89.1%	86.4%	55.2%	79.9%	**91.8%**	84.7%

Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.

b. Correlations between hedged, non-domestic benchmarks and domestic equities

These correlations generally are higher than the equivalent unhedged correlations, as might intuitively be expected. However this is not a universal rule: as an example, for German investors in the 1990s, the hedged correlation was actually lower than the unhedged. Trends in these hedged correlations generally rose significantly over the period studied for most countries, although for Japanese investors, the increase was marginal. Again, we highlight in bold the country in each decade with the highest correlation between domestic and hedged, non-domestic portfolios.

TABLE 9, Correlations Between Domestic and Hedged Non-Domestic Portfolios

	Australia	Canada	France	Germany	Japan	Switz.	U.K.	U.S.
1973-1979	64.6%	72.6%	72.8%	60.4%	68.1%	**83.3%**	67.6%	72.9%
1980-1989	68.7%	**74.5%**	54.1%	53.9%	50.2%	71.5%	74.3%	72.7%
1990-1999	64.9%	78.4%	**82.6%**	67.0%	51.2%	81.3%	81.2%	77.6%
2000-2004	79.5%	82.6%	**95.7%**	94.3%	69.2%	88.7%	93.0%	91.6%

Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.

c. Standard deviation of hedged and unhedged, non-domestic returns

In almost all cases, there was a steady upward trend in the standard deviations of non-domestic equity returns over the period, whether hedged or unhedged. In addition, the standard deviation of unhedged returns was generally (but not always) higher than that of the equivalent hedged return.

TABLE 10, Standard Deviation of Unhedged and Hedged Non-Domestic Returns

Std. Dev. Unhedged	Australia	Canada	France	Germany	Japan	Switz.	U.K.	U.S.
1973-1979	8.2%	9.4%	7.8%	8.4%	9.0%	8.8%	8.4%	9.7%
1980-1989	9.0%	7.7%	8.1%	8.4%	8.4%	8.5%	8.5%	9.5%
1990-1999	8.0%	7.0%	10.1%	10.3%	9.4%	10.7%	9.2%	8.2%
2000-2004	8.1%	8.7%	10.1%	9.8%	11.5%	11.0%	9.6%	12.3%

Std. Dev. Hedged	Australia	Canada	France	Germany	Japan	Switz.	U.K.	U.S.
1973-1979	8.0%	8.1%	7.5%	8.2%	8.4%	7.7%	7.5%	7.7%
1980-1989	7.6%	7.3%	6.9%	7.0%	7.2%	6.6%	7.1%	7.7%
1990-1999	7.5%	7.6%	7.5%	7.6%	7.1%	7.4%	7.6%	8.9%
2000-2004	9.9%	10.0%	9.4%	9.0%	10.7%	9.6%	9.8%	10.8%

Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.

d. Standard deviation of combined 80/20 domestic and non-domestic portfolios

Question 4: Is it true that improved diversification routinely has been provided by always using hedged, or always using unhedged, portfolios?

We have looked at the components of the diversification calculation (correlation and standard deviation). We next combine these in an 80/20 mix using quarterly rebalancing, and measure the standard deviation of the combined portfolios to see which (hedged or unhedged) has provided the lower combined standard deviation for the total portfolio. The choice of 80/20 is arbitrary, but choice of a different ratio would not change the outcome in determining which combination had the lower standard deviation. The outcome in Table 11 shows that neither hedged, nor unhedged, always provided the lower standard deviation. Of the "Big 8," the unhedged portfolio provided a lower standard deviation for the total portfolio in three countries, and the hedged portfolio provided a lower number for five countries (illustrated by bold type). However, the difference in these numbers was minimal in most cases (see Table 12), with most instances being in the range of plus or minus 0.2%.

TABLE 11, Diversification Measurements, 1973-2004

Full period, 1973-2004	Australia	Canada	France	Germany	Japan	Switz.	U.K.	U.S.
RETURN								
Hedge impact (ann.)	0.2%	-0.6%	1.0%	0.5%	0.4%	0.7%	0.9%	-2.2%
DIVERSIFICATION								
Std. Dev. of 80 dom/20 hedged	9.5%	8.4%	**10.8%**	**10.3%**	9.1%	**9.2%**	**10.3%**	**8.2%**
Std. Dev. of 80 dom/20 unhedged	**9.3%**	**8.3%**	11.0%	10.5%	**9.0%**	9.6%	10.4%	8.3%
COMPONENTS of DIVERSIFICATION								
Correlation, hedged to domestic	64.2%	75.0%	75.1%	69.2%	56.1%	80.2%	70.5%	76.5%
Correlation, unhedged to domestic	49.8%	66.0%	66.9%	64.9%	41.3%	75.5%	62.0%	69.1%
Std. Dev. of hedged	8.3%	8.2%	7.8%	7.9%	8.1%	7.7%	7.9%	8.7%
Std. Dev. of unhedged	8.6%	8.2%	9.3%	9.6%	9.3%	10.0%	9.0%	9.7%

Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. Correlation and standard deviation are based on quarterly data.

TABLE 12, Difference in Standard Deviation Using Hedged vs. Unhedged International Component for an 80/20 Mix Portfolio.

	Australia	Canada	France	Germany	Japan	Switz.	U.K.	U.S.
1973-1979	0.1%	-0.1%	0.1%	0.0%	0.0%	-0.2%	0.0%	-0.2%
1980-1989	0.1%	0.1%	0.1%	-0.1%	0.1%	-0.1%	0.0%	-0.1%
1990-1999	0.1%	0.2%	-0.5%	-0.4%	0.0%	-0.6%	-0.2%	0.1%
2000-2004	0.6%	0.3%	0.0%	0.0%	0.1%	-0.1%	0.1%	-0.1%

Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.

A positive number in a cell means that the standard deviation of the total portfolio is higher when the hedged, non-domestic segment is used, as opposed to the unhedged. Thus, a positive number implies that use of the unhedged segment provides better diversification, and vice versa.

VI. Implications for Clients of Passive Hedging Programs

Question 5: Have loss limit strategies provided value-added protection for hedging programs in the long term?

We now investigate some aspects of the business risks for plan investors who consider employment of a passive hedging strategy. Specifically, we examine the probability that a passive hedging strategy might be terminated within a set period if its cumulative loss exceeded a specific limit. This can be tested in a number of different ways. We have chosen two examples.

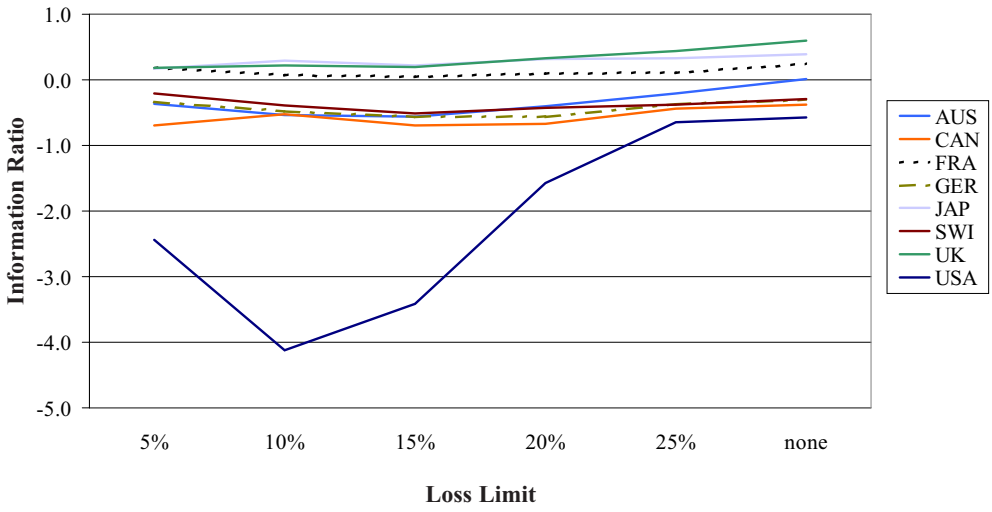
a. Imposing specific loss limits on hedge impacts

Some investors may be tempted to impose a "stop-loss" limit at the inception of their hedging program. Under this approach, the program is allowed to continue until and unless the cumulative loss (negative hedging impact) reaches a pre-set limit. At that point, the program is terminated. We have assumed a 10-year testing period and compiled results for cumulative loss limits from 5% to 25%, at 5% intervals. We also show the results for a program with no loss limit. For each simulated loss limit, we have calculated the cumulative hedging impact over every 10-year period in the database, using calendar years only. We then take the average of all these results, calculate their standard deviation, and divide the average result by that standard deviation. This volatility-adjusted return, which has some similar characteristics to an information ratio, may provide some guidance in expectations for a "typical," past 10-year period for that country.

Chart 13 shows these results for the "Big 8" countries. The shape of the curves illustrate that in general, the best results were achieved when no loss limit was imposed. The worst results were typically with loss limits of 10-20%. In some cases, a tight loss limit of 5% appears to improve the volatility-adjusted return, but on examination of the data, this is because such a limit locks in a small loss in virtually every trial. In the Appendix, we show the specific results of our study for each country. There is virtually no instance in any country when a simulated loss limit strategy resulted in a higher, positive average return than the equivalent "unlimited" strategy (the sole exception was Greece due to currency volatility prior to 1990). In just under half the instances (44% to be exact) a loss limit strategy did produce a lower average standard deviation of returns than the unlimited strategy, but two-thirds of those instances were associated with negative returns, consistent with the pattern in the chart.

The other notable feature of Chart 13 is the significantly worse result for the United States than for the other countries. At 25% or no loss limits, this just expresses the observation that the hedging impact for U.S. investors is materially worse than for other countries' investors. Simulated loss limits of 10% or 15% produced volatility-adjusted returns well below minus 3 because the fluctuations in the hedge impact results were sufficiently high, and negatively biased so there was a high probability of locking in a very substantial loss (in the 10%-20% range) prior to the 10-year period ending.

CHART 13, Information Ratios When Using Loss Limits, 1973-2004



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. The information ratio measures a portfolio's risk-adjusted performance. Equal to the portfolio's excess return (its absolute return less the risk free return) divided by its tracking error.

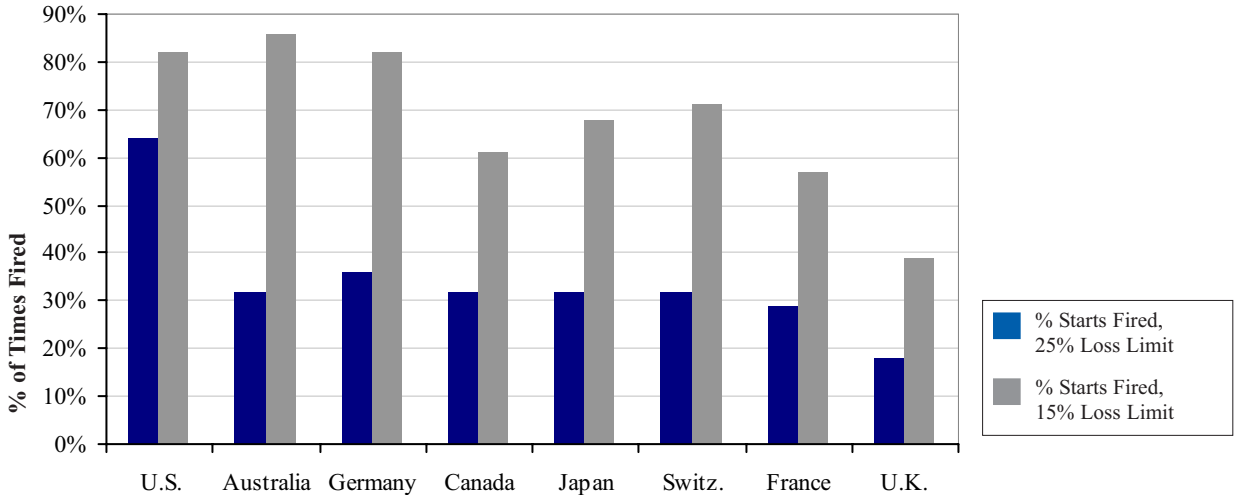
b. Termination Experience

An alternative approach is to examine a shorter period, and look only at the (simulated) experience for termination of a passive hedging strategy within that set period if its cumulative loss exceeds a specific limit. This is intended to simulate the probability of a client deciding to discontinue a hedge program after a sequence of adverse results. We chose a testing period of five years, as this may represent a typical evaluation period for a new hedging program. We tested two simulated loss limits, 15% and 25%, that might lead to the termination of a program. For example, with a 15% loss limit, a cumulative hedging "deficit" equal to or greater than 15% at any point over the course of the next five years would result in termination of the hedging program.

Chart 14 reveals the probability of a program being terminated over a five-year time frame with either of these simulated loss limits.

In this context, a sponsor using a passive currency hedging program with a simulated 15% loss limit was likely to have a "rough ride" if the plan was based in the United States, Australia, or Germany. Note that the odds of being dismissed over a five-year period were greater than 50% for seven of the eight countries.

CHART 14, Simulated Hedge Strategy with Loss Limit, 1973-2004



Source: Brandes Institute, based on data from Factset, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.
Note: Data uses the 28 starting calendar years with at least five years subsequent history; calculations test the percentage of starting years that eventually hit the specified loss limit.

When the simulated loss limit is expanded to 25%, the probability of program termination diminishes to around one-third or below in most countries. However the probability is still over 60% in the United States, and only in the United Kingdom was the probability of termination significantly below 30%.

In this test, we can conclude that there was a material country-related difference in the risk of program termination from the client perspective, if specific loss limits were set.

VII. Currency Characteristics

We now review some characteristics of currency behavior. As demonstrated in the hedging section of this paper, interest rates and currency moves are interlinked. This leads us to examine currency characteristics in three ways. First, we look at the correlation between interest rates and currency moves. In particular, we are checking for patterns that suggest that a currency's movements consistently correlate with the level of interest rates in that country relative to the rest of the world. Second, we examine reputedly "trend-following" patterns in currency movements. Finally, we look at the efficiency (or otherwise) of the relationship between forward exchange rates and interest rates across time and across currencies.

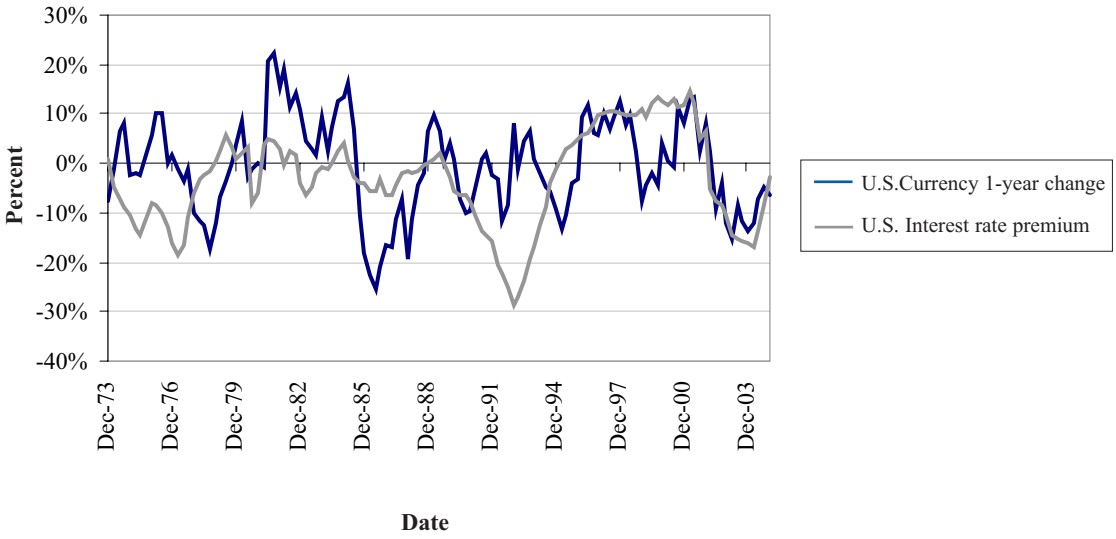
a. Currency and Interest Rates

Financial commentary often is based on the connection of interest rates to currency moves. We investigate this connection by measuring the correlation of these two variables over different periods.

To accomplish this, we measured each currency's change against the GDP-weighted basket of all the other currencies in the study. For each country, we also calculated the weighted average of all non-domestic interest

rates ("the international interest rate"), which could then be compared to the domestic interest rate. Rather than just take the difference between the domestic and international rates to compare with currency moves, we used a relative interest-rate premium, which provides better comparability between generally high interest rate periods and much lower ones. For example, in this approach, when international interest rates are 6% and the domestic rate is 4%, international rates have a 50% premium (based on a 2% actual difference). When international rates are 12% and domestic is 10%, the premium drops to only 20% even though the actual difference is the same 2%.

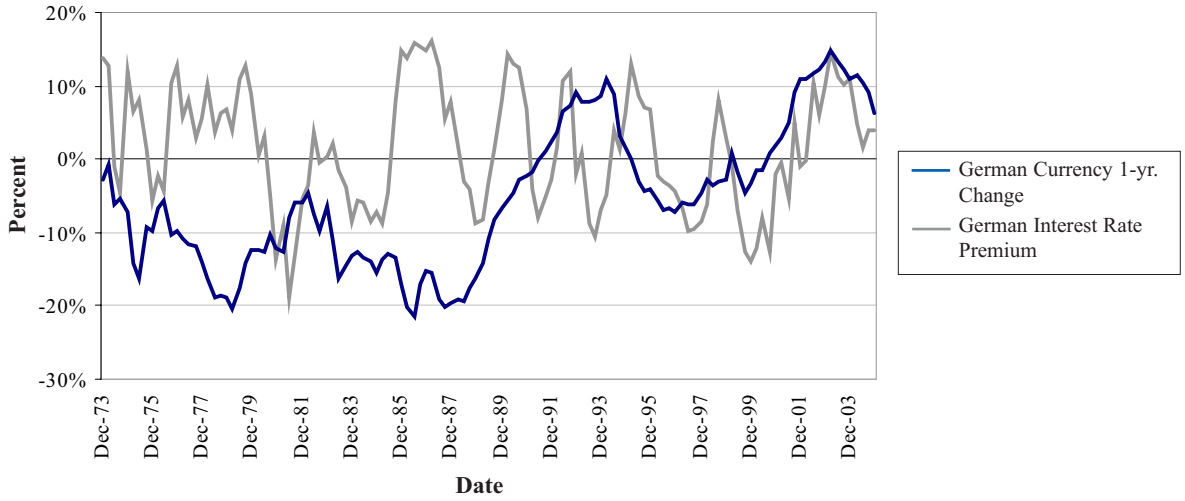
CHART 15, U.S. Currency 1-Year Change vs. Other Countries and U.S. Interest Rate Premium vs. Other Countries, 1973-2004



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.

Chart 15 illustrates the different patterns over time, showing the one-year currency move for the United States, compared to the interest rate premium for the U.S. dollar. While the correlation between the two lines is only modest pre-1990, it is more evident that the two lines move together post-1990. In Chart 16, we show the results for Germany.

CHART 16, German Currency 1-Year Change vs. Other Countries and Germany Interest Rate Premium vs. Other Countries, 1973-2004



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.

We observe that the link between interest rates and currency changes appears to have grown stronger in recent years in both countries. While there was some degree of correlation in the United States in the first half of the period measured, this is much less evident in Germany. This presages a more general pattern across countries. Examining the data in more detail, the resulting pattern had some interesting features, given the apparent change in the connection between currency moves and interest rates around the end of the 1980s. The pre-1990 era was characterized by low or negative correlation between currency and interest rates. Post-1990, the correlations have been much higher. For both periods, it appears that in certain countries the correlation was much stronger than others, and this relationship tended to persist. In most cases, if the country had a higher-than-average correlation pre-1990, it had a similar higher-than-average correlation post-1990.

Table 17 shows the correlations between currency change and this interest rate premium for each of the "Big 8" countries, using a one-year rate of change for the currency. In this table, we have grouped the 1970s and 1980s together, and likewise the 1990s and 2000s, in order to increase the number of data points in each sample. As noted above, two patterns emerge. First, there is a wide range of correlations depending on base country, with the United States and the United Kingdom exhibiting the highest correlations, and continental European countries among the lowest (and in fact negative in the earlier period). Second, correlations rose notably for the more recent period in every country.

TABLE 17, Correlations between 1-year Currency Move and Interest Rate Premium

	1973-1989	1990-2004	Full period
U.S.	24%	47%	33%
U.K.	14%	45%	32%
Japan	-7%	22%	19%
France	-23%	39%	14%
Canada	12%	18%	14%
Australia	-24%	54%	14%
Germany	-24%	32%	-3%
Switz.	-25%	8%	-15%

Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund.

Rather than accepting just the one-year currency change as the de facto standard, we tested varying time periods for the currency change, from one year through four years. However, the two patterns previously noted were consistent. As an example, Table 18 shows a 3-year currency change. The numbers are different, but the patterns are the same. Outside the "Big 8" countries, the same pattern of increasing correlation can be observed in a number of countries, but is not universal. This data is shown in each country appendix as chart 10 in that document, and in fact, in five countries, the pattern reverses, with the rolling 1-year correlation between the currency change and interest rate premium lower in the more recent period. These five countries are Finland, Greece, Hong Kong, Ireland, and Singapore.

TABLE 18, Correlations between 3-year Currency Move and Interest Rate Premium

	1973-1989	1990-2004	Full period
U.S.	18%	70%	46%
U.K.	-37%	25%	32%
Japan	2%	57%	26%
France	-34%	66%	18%
Canada	-33%	35%	7%
Australia	0%	6%	3%
Germany	-46%	26%	-21%
Switz.	-58%	-33%	-54%

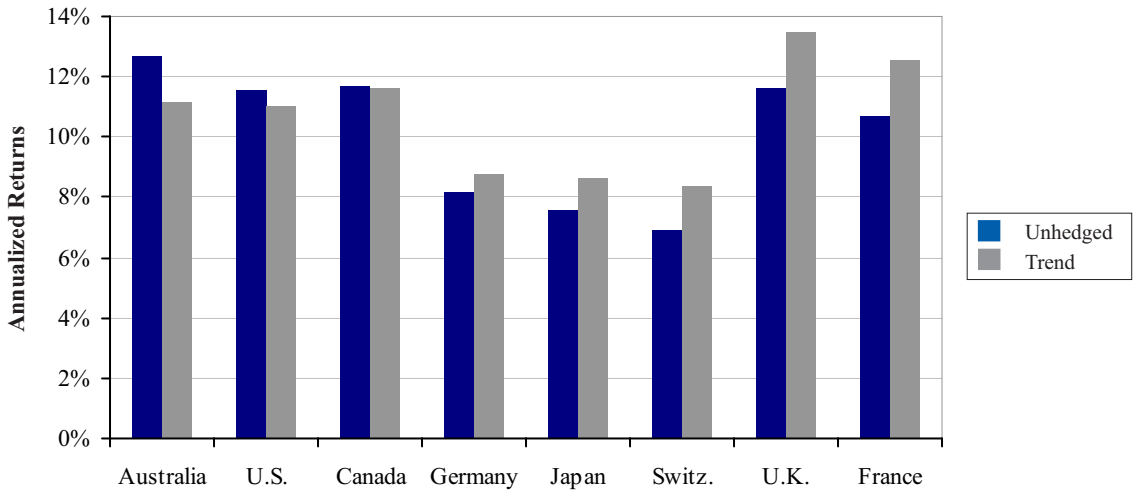
Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund.

b. Currencies and Trend Behavior

Question 6: Can consistent trend patterns be observed regardless of base currency and time period?

Trend-following strategies are used widely in currency management. While many techniques are employed, we elected to test a basic momentum pattern to see whether a simple trend test provided consistent results over time, or across borders. The test strategy was to adopt a hedged or unhedged approach based on whichever of these strategies had provided better relative returns in the previous quarter. In chart 19, we test the hypothesis that trend-following provided value-added results consistently over time and for all "Big 8" countries.

CHART 19, Unhedged vs. Trend Test Returns, 1973-2004

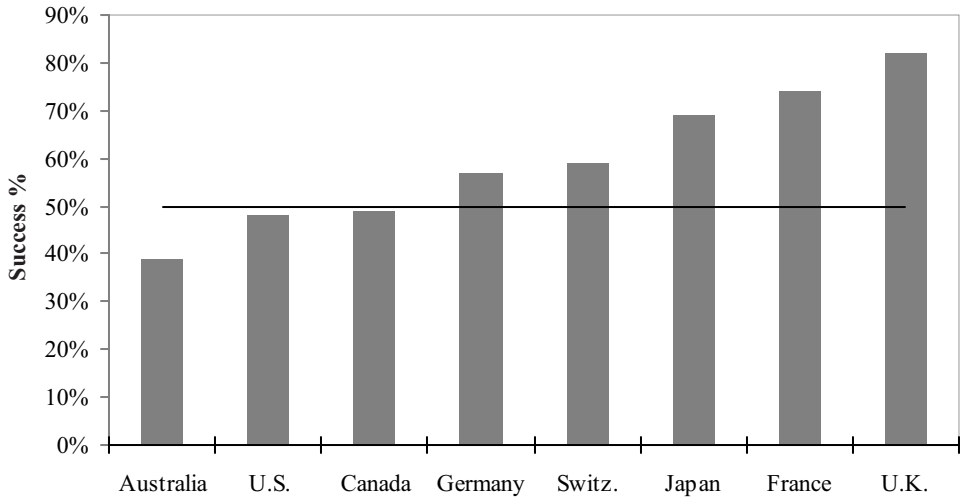


Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.

Over the full test period, the trend strategy outperformed for investors based in Europe and Japan (five of the "Big 8"), and underperformed in the other three: the United States, Canada, and Australia.

In Chart 20, we measure the consistency of success for the trend strategy, based on all rolling, five-year periods in the 32 years. The same division appears as in the prior chart: for European and Japanese investors, random selection of a five-year period offered a greater than 50% chance for the trend strategy to outperform, while the opposite was true for North American or Australian investors. The wide dispersion of that quarterly success rate across the "Big 8" countries is notable, ranging from under 40% (Australia) to more than 80% (United Kingdom). This test provides insufficient evidence to deduce that trend-following worked consistently over time, or for investors regardless of base currency.

CHART 20, Success % for Trend Model over all Rolling 5-year Periods During 1973-2004



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. Rolling returns are annualized returns for a series of overlapping, smaller time periods within a single, larger time period. For example, the 32-year time period from 12/31/73 through 12/31/04 includes 121 12-month segments. The first segment is the 12-month period 12/31/73-12/31/74, the next segment is the 12-month period 3/31/74-3/31/75, and so on.

c. Currencies and Behavioral Effects

Question 7: Have currency markets exhibited efficient market behavior over the long term?

Now we turn to the link between currency forward rates and interest rate differentials on which they are priced. As noted previously, a currency forward contract includes in its price the interest rate differential between the two currencies over the contract period. In theory, market participants should be indifferent between returns from a higher interest rate or a stronger currency. Market pricing implies that currencies with higher interest rates should tend to decline over time to equalize the total returns in each currency.

Historically, there have been challenges in the academic literature regarding the efficiencies of this mechanism. In particular, we would cite Laurent Jacque's comments in his chapter of the 1987 Handbook of International Investing, titled "Foreign Exchange Risk in International Portfolio Investment: When to Hedge?"[4] In this he notes that "all studies agree that the forward premium or discount is a poor predictor of the actual exchange rate." We concur with this, but can now extend it to demonstrate a systematic effect in this inefficiency.

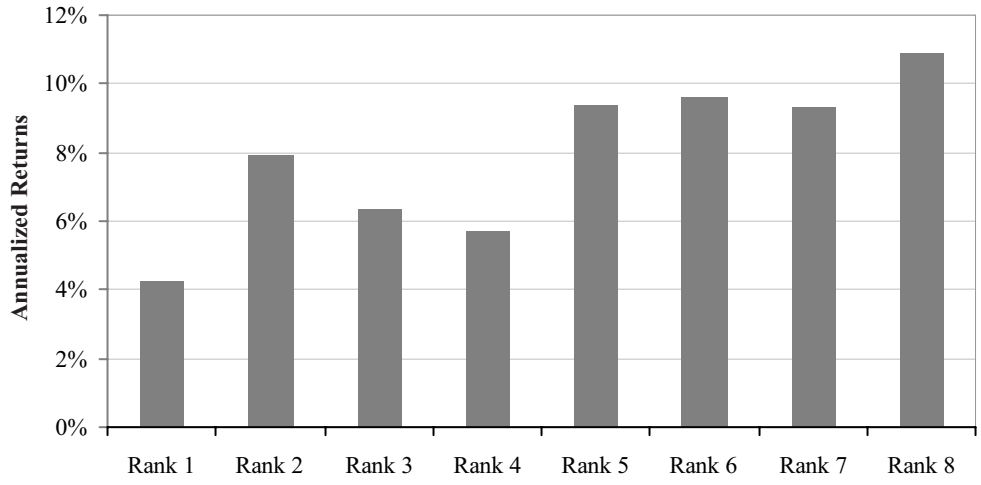
We examined whether any behavioral influence may exist in the currency market, such that greater total returns (interest rate plus currency move) could have been found in higher interest rate currencies.

To accomplish this, each quarter we ranked the "Big 8" countries in low to high order of interest rates, and then calculated the total return for the currency in each rank (including both the interest rate and currency move). We then moved to the next quarter and repeated the exercise (note that the country order will change from

[4] Jacque. (1987). "Foreign Exchange Risk in International Portfolio Management: When to Hedge?" The Handbook of International Investing. p. 213-247.

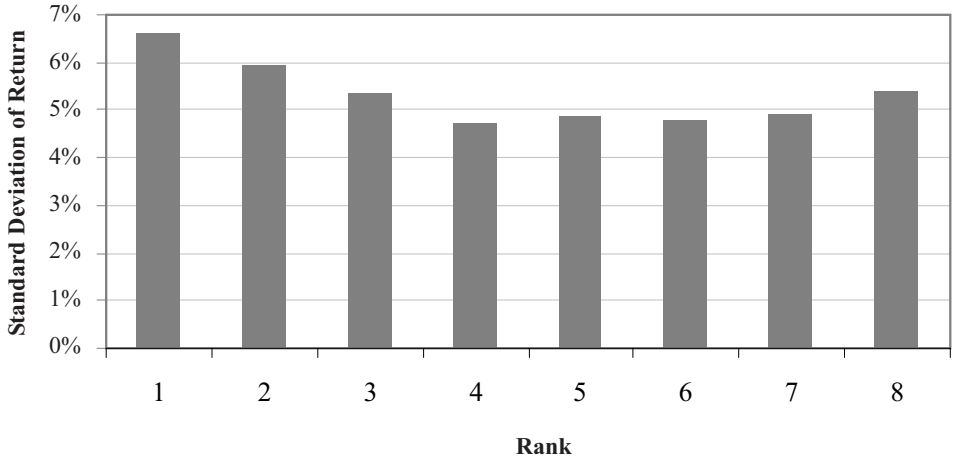
quarter to quarter as the interest rates change). The data is calculated in U.S. dollars, but as the test uses relative rankings, the results are independent of the choice of base currency. After creating this data for all 128 quarters, we compounded the returns for each rank, from rank 1 (the country with the lowest interest rate in each quarter) to rank 8 (highest). An efficient market should not differentiate between these ranks in terms of return and volatility. However, as shown in Charts 21 and 22, the returns in ranks 5 through 8 are clearly higher than those in ranks 1 through 4, while the volatility of the returns in ranks 5 through 8 is lower than those of 1 through 4. This "interest premium effect" appears inconsistent with efficient market expectations.

CHART 21, Inefficiencies in Currency Returns, 1973-2004



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. The eight major countries are ranked each quarter from lowest to highest interest rate. Performance (including interest and currency movement) is measured for the country occupying the respective rank during each quarter. All data is based in U.S. dollars.

CHART 22, Standard Deviation of Return of Currencies, Rated by Interest Rate, 1973-2004



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. The eight major countries are ranked each quarter from lowest to highest interest rate. Performance and standard deviation (including interest and currency movement) are measured for the country occupying the respective rank during each quarter. All data is based in U.S. dollars.

Question 8: Over long periods, have currency moves dominated the impact of interest rate differentials when measuring total currency returns?

We examine the driving force behind this interest rate premium effect by showing separately in Chart 23 the impact of currency moves and interest rate return. Currency moves show a slight downward trend from rank 1 to rank 8, but this is more than offset by the power of the interest rate differences, which by definition will move upward from rank 1 through rank 8. We test for the same effect across all currencies in Chart 24, and find that the pattern is similar. We also tested this effect over time. This is shown in Charts 25-28, which examine the effect for the "Big 8" decade-by-decade. The pattern does not appear in the 1970s, but is evident (and appears to gain strength over time) since then.

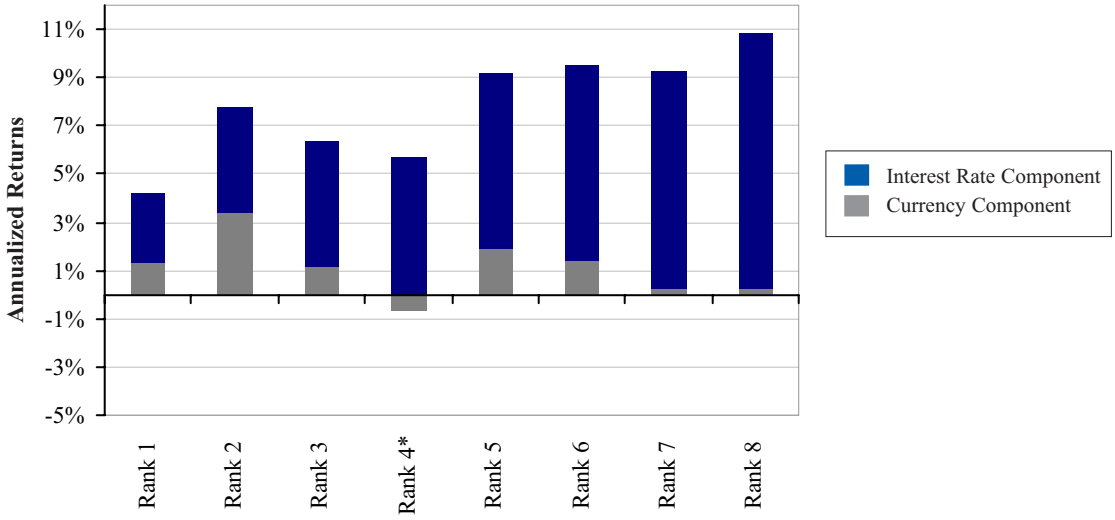
We believe that these results provide evidence of a behavioral effect in currency markets, as higher interest rates have not been fully offset by actual currency moves. In the mathematics of forward currency pricing, high interest-bearing currencies have a built-in assumption that such currencies will depreciate. This assumed depreciation may create a level of discomfort among buyers of that currency.

Our research shows that the actual depreciation has generally been less than the expected amount implied in forward currency prices. In other words, buyers of these "expected to depreciate" currencies have demanded higher interest rate compensation than appears to be justified in retrospect. The corollary is that buyers of the "more comfortable" currencies (i.e., those expected by the market to appreciate) have accepted lower interest rates than they should have, in retrospect.

This behavioral effect has implications for the "carry trade." In a carry trade, an investor owns a high-interest rate currency, funding the purchase out of a low interest one. The goal of the buyer is that the interest rate differential will provide enough income to offset depreciation, if any, of the high interest currency. In most developed markets, currencies tend to adjust more frequently than interest rates in the short term, so such carry trades are typically placed when the investor has a positive short-term outlook for the higher interest rate currency. Clearly, if that short-term optimism is wrong, the carry trade will result in a loss. However, our research supports the conclusion that, in aggregate, carry trades across developed market currencies have produced positive results.

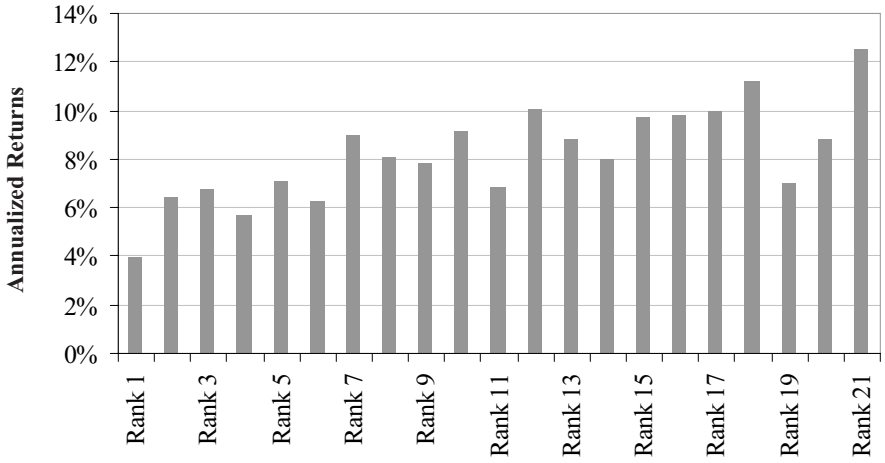
Note that this conclusion does not extend to emerging market currencies, which are outside the scope of this research. Carry trades in emerging market currencies have often been based on the assumption that high interest emerging market currencies that are pegged to a developed currency (e.g., the dollar), will remain so pegged, at least for the expected duration of the carry trade. When that peg collapses however, there may be very substantial losses on open carry trades. This was at the center of the Asian "Currency Crisis" of 1997-98.

CHART 23, Currency and Interest Components of Currency Returns, 1973-2004



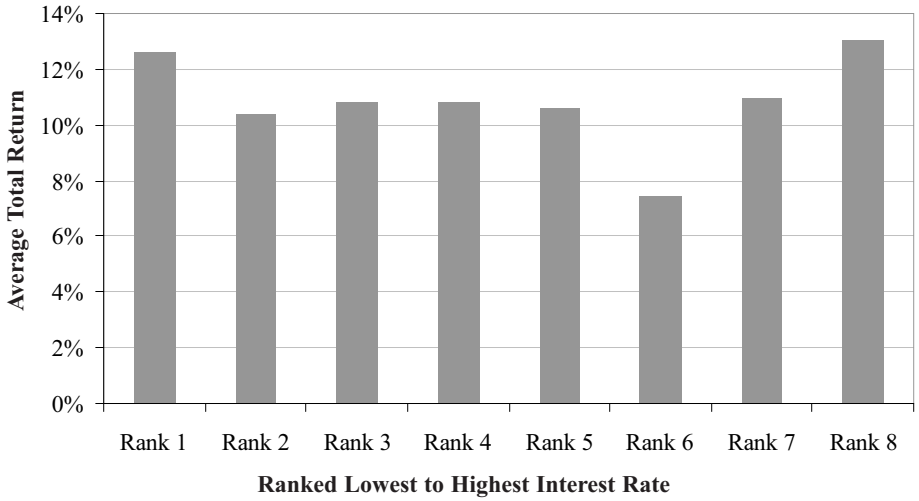
Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. The eight major countries are ranked each quarter from highest to lowest interest rate. Performance (including interest and currency movement) is measured for the country occupying the respective rank during each quarter. All data is based in U.S. dollars. * Denotes series where the currency component of total return is negative, at -0.7% annualized.

CHART 24, Inefficiencies in Currency Returns, All Countries, 1973-2004



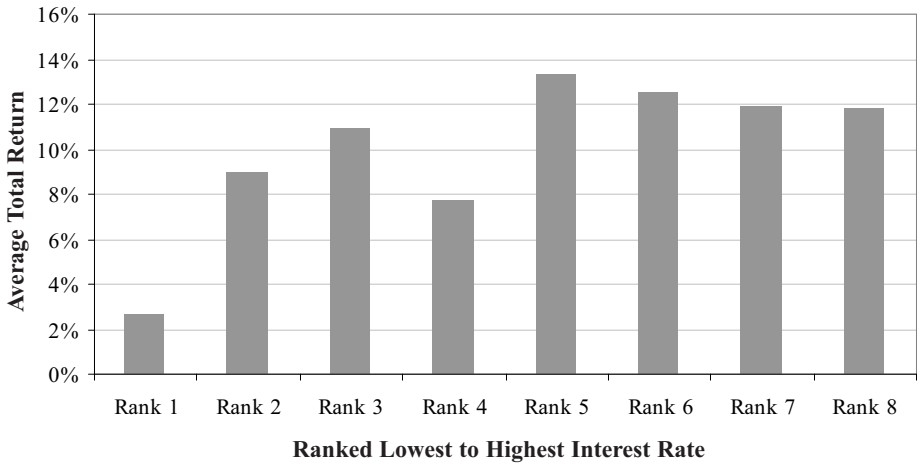
Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. Hong Kong and Finland were excluded from the series due to lack of available data.

CHART 25, Inefficiencies in Currency Returns, Big 8 Countries, 1970s



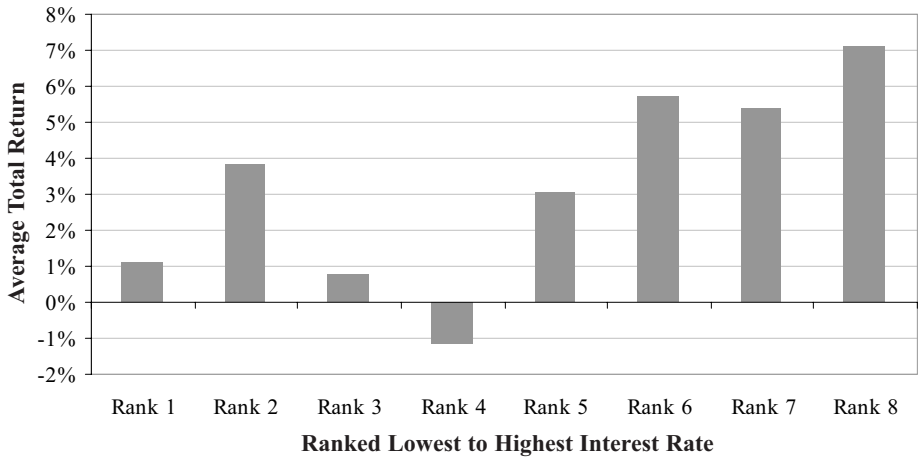
Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.

CHART 26, Inefficiencies in Currency Returns, Big 8 Countries, 1980s



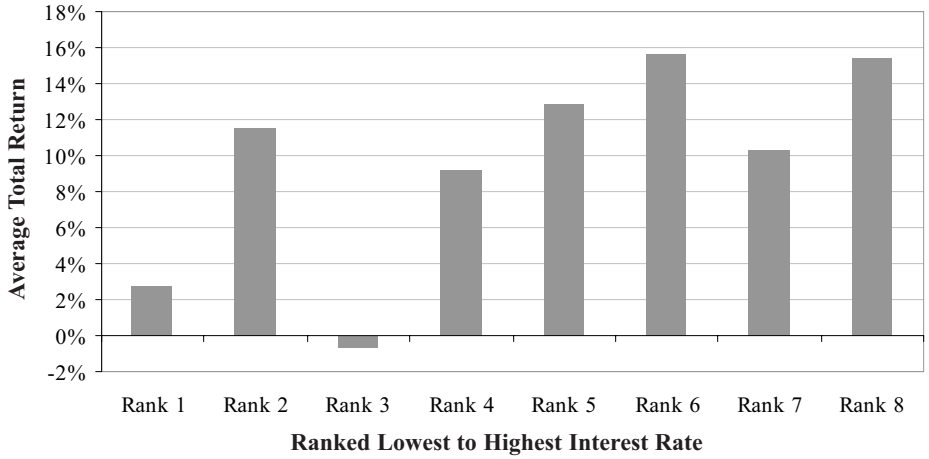
Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.

CHART 27, Inefficiencies in Currency Returns, Big 8 Countries, 1990s



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results.

CHART 28, Inefficiencies in Currency Returns, Big 8 Countries, 2000s



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund. Past performance is no guarantee of future results. The eight major countries are ranked each quarter from highest to lowest interest rate. Performance (including interest and currency movement) is measured for the country occupying the respective rank during each quarter. All data is based in U.S. dollars.

VIII. Observations and Conclusions

While currency movements by their nature must have an aggregate zero-sum impact, our research has shown that the results of hedging and currency programs for investors vary significantly over time and across home countries. We note that while the hedging gains or losses tend to diminish over time, the hedging impact does not tend to zero for any of the countries in our study.

In this examination of the 23 countries over the full 32-year floating exchange rate era, we examined consistencies across the data that are sufficiently dominant to suggest they may represent underlying factors driving the market, as opposed to random noise. These consistencies do not mean that we have proved that such factors exist. If there is randomness in the typical 10-year study based in one base currency, then there is still going to be randomness in a 32-year study across 23 base currencies. However, we believe there should be less of it.

Two of the observations in this paper would fit that "consistency" profile, in our view.

The first is the dichotomy of results when viewed from a North American (particularly U.S.) perspective, versus from elsewhere in Europe or the Pacific. This extends to the hedge or currency impact itself, its volatility and dispersion, and the simulated experience of investors applying loss-limits or trend-following techniques.

The second is the existence of an interest premium effect, a behavioral anomaly. While currency markets should be indifferent between the total returns from high- or low-interest rate currencies, we observed a material difference over the period between the returns from the (supposedly weaker) high-interest rate currencies and their low-interest rate counterparts. There was a cumulative return difference of over 6% per year between a strategy of "invest each quarter in the highest interest rate currency" and its converse. This effect has been observable since 1980 across all countries studied.

These observations (and others) led us to ask the eight questions that were highlighted in the Executive Summary at the start of this paper and answered in more detail in the body of the research. In examining these eight, we found that:

- Currency has NOT been a significant source of international returns over the long-term for most investors worldwide, however the currency impact has NOT "washed out" completely over the long term for any specific currency.
- Currency hedging impacts have NOT generally been consistent over time in each country.
- Improved diversification has NOT always been provided by using just one of hedged or unhedged portfolios.
- Loss-limit strategies have NOT provided value-added protection for hedging programs over the longer term.
- Consistent trend patterns were NOT observed regardless of base currency and time period.
- Currency markets did NOT exhibit efficient market behavior over the long term.
- Over long periods, currency moves did NOT dominate the impact of interest rate differentials when measuring total currency returns.

In conclusion, we wish to make it clear that this paper is not intended to provide definitive answers to all questions "currency-related." We have been careful not to claim that past experience will dictate, or even predict the future. As we said at the start of this paper, we do not take a position on whether investors should or should not include currency hedging or currency management in their programs. We do, however, believe that a more comprehensive examination of a wider data set is helpful, both in clarifying the questions and issues, and in challenging some of the preconceptions that may exist in the marketplace. Our hope is that investors can use this research to make more informed decisions based on a fuller understanding of past behavior of currency markets.