

Currency Overlay—Performance of the NLI Research Institute Quantitative Currency Model

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1. Introduction

Currency overlay, a method that enables international investors to manage currency exposures separately from the underlying portfolios, originated in the U.S. in the late 1980s and rapidly spread to other countries in the 1990s. At present, the U.S. currency overlay market is estimated at approximately \$100 billion, and one out of three major pension funds is said to use currency overlay.

In Japan, a growing number of money managers for pension funds have recently focused on currency overlay. Pension funds awakened to the importance of currency management when the yen ascended relentlessly from ¥135 to the dollar in January 2002 to ¥103 in April 2004. Today, seeking to reduce currency risk while adding excess returns on currency, they are actively outsourcing currency management to currency overlay managers.

Usually in pension management, the first step is to formulate a policy for the portfolio asset mix, and in the process decide on a long-term currency benchmark (or optimal currency hedge ratio). Currency hedging is then “overlaid” on the portfolio, and managed short-term around the benchmark (plus or minus alpha percent) on a daily basis. In this paper, we describe the framework and operational issues of currency overlay.

2. What is Currency Overlay?

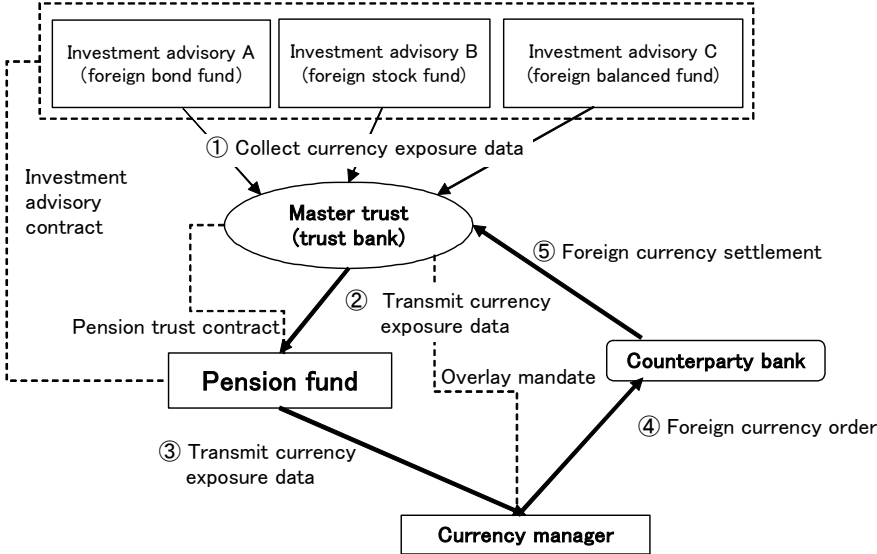
Generally, investment advisory firms that manage foreign stock funds, foreign bond funds, or funds that balance domestic and foreign assets, also conduct passive currency management in the process.

However, fund managers who specialize in foreign stocks and bonds are not necessarily experts in currency management. In currency overlay, currency management is separated from the management of underlying securities, and outsourced to specialists.

As shown in Figure 1, in terms of currency management, currency overlay is not different from ordinary currency hedging. The only difference is that a trust bank collects currency exposure information (foreign exposure ratios for each currency) from each investment advisory firm, and provides this information to a single currency manager who makes all hedging decisions.

In the U.S., an entity called the master trust consolidates the currency exposure management of several foreign funds, and transmits this information to the currency manager, who then applies the currency overlay to the aggregate currency exposure of the diversified portfolio.

Figure 1 Currency Overlay Scheme



Source: Rating and Investment Information, Inc. (2001).

In Japan, in addition to the pension trust contract shown in Figure 1, another method exists called the pension *tokkin* (specified money trust pension fund) contract, by which pension funds can purchase private funds domiciled abroad. From a procedural standpoint, pension funds prefer the convenience of the pension trust contract because it often requires no margin (since assets are deposited at the same trust bank), whereas the pension *tokkin* contract may require additional margin via overseas wire transfer. On the other hand, the latter offers cost advantages depending on the size of assets under management. Thus the final decision depends on characteristics of the pension fund (currency benchmark, ability to move funds freely, and size of assets under management).

3. Benefits and Drawbacks of Currency Overlay

1. Benefits

When foreign-denominated assets are managed by several investment advisers, one adviser may happen to be hedging by selling dollars against yen, while another is buying dollars at the same time. The hedges would then cancel each other out, while hedging costs mounted. By separating currency exposure from the management of underlying assets, and then outsourcing the currency overlay to a single currency manager, pension funds can (1) reduce transaction cost, and (2) achieve efficient management by a specialist.

2. Drawbacks

On the other hand, drawbacks of currency overlay include: (1) heightened risk if the currency manager fails, (2) time and expense of determining the overall currency exposure of foreign assets when managed by multiple investment advisers, (3) difficulty of evaluating currency overlay performance, and (4) the legal restriction on currency overlay services described below.

3. Legal Restriction on Currency Overlay

Under the Investment Advisory Law of 1986 (Law for Regulating Securities Investment Advisory Business), services provided by investment advisers to pension funds and other clients are limited to investment in marketable securities. However, investment advisers are free to conduct currency transactions associated with foreign bond and stock investment.

However, the law prohibits investment advisers from providing currency overlay services, which involve currency management not associated with securities trading. To perform currency overlay services, investment advisers must apply to the Financial Services Agency for special approval.¹

4. Currency Overlay Management Style

Three management styles exist for currency overlay: (1) an active style based on prediction of risk and return, (2) a passive style that approximates the currency hedge ratio to a benchmark, and (3) a hybrid style that combines active and passive elements (Figure 2).

¹ In the past, investment advisers could not directly obtain a currency overlay contract from the Employees' Pension Fund, National Pension Fund, or defined benefit corporate pensions. However, this became possible from December 26, 2003 under two conditions: (1) the investment adviser is authorized to perform currency overlay, and (2) the investment advisory contract permits investment in foreign-denominated assets.

Figure 2 Management Styles for Currency Overlay

Style	Description
Active management	<ul style="list-style-type: none"> Actively predicts risk & return Strives to improve risk-adjusted return
Passive management	<ul style="list-style-type: none"> Strives to approximate hedge ratio to benchmark
Hybrid management	<ul style="list-style-type: none"> Uses both active and passive styles

Source: Compiled by NLI Research Institute

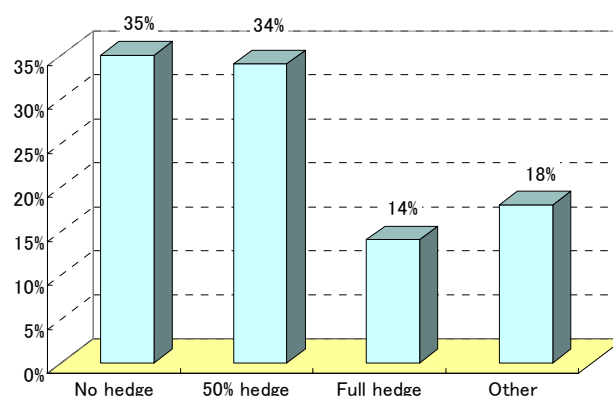
5. Profile of Currency Managers

Here we present the results of a study by Frank Russell Co. of 18 active-style currency overlay managers (excluding hedge funds) and 241 clients (mainly in the U.S.). The study examines the benchmark currency hedge ratio and base currency of clients, and the performance of currency overlay managers.

1. Client Benchmark (Currency Hedge Ratio)

The benchmark (currency hedge ratio) of clients for conducting currency overlay, we see a large proportion of no-hedge and 50% hedge, and few full hedges (Figure 3).

Figure 3 Distribution of Client Benchmarks (Currency Hedge Ratio)

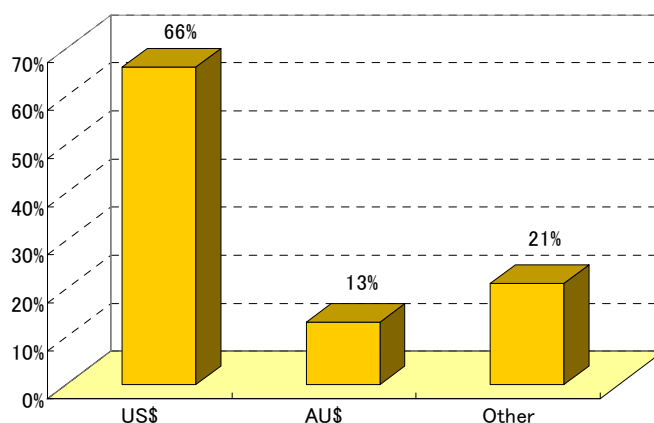


Source: Baldrige, Meath and Myers (2000).

2. Base Currency of Clients

The base currency of clients is overwhelmingly the U.S. dollar, reflecting the widespread use of currency overlay in the U.S. (Figure 4). In Japan, where currency overlay is not very common, the yen is infrequently used as the base currency (included in “other” currency).

Figure 4 Distribution of Base Currency of Clients

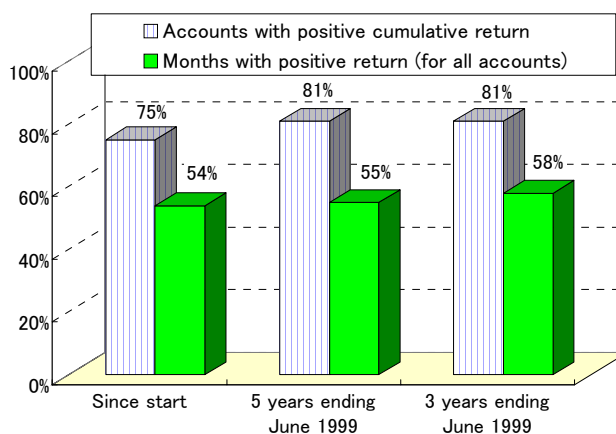


Source: Baldrige, Meath and Myers (2000).

3. Currency Overlay Performance

Two success rate rates are shown in Figure 5: (1) the proportion of accounts with a positive cumulative return, and (2) the proportion of months with a positive return when all accounts are aggregated. By either measure, performance has been successful.

Figure 5 Success Rates

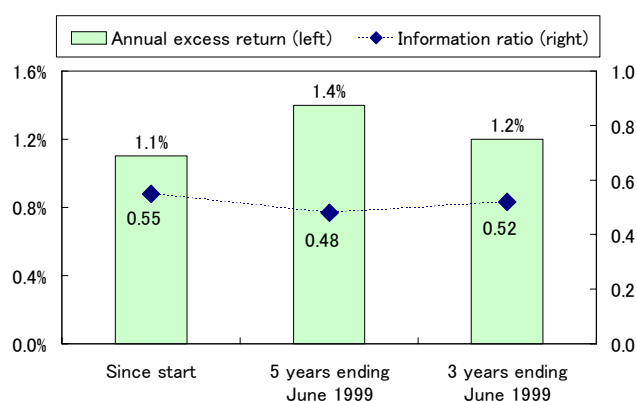


Source: Baldrige, Meath and Myers (2000).

Performance can also be measured by excess return (before deducting commissions) as shown in Figure 6. These results show an excess return of over 1%, and an information ratio of around 0.5.² Thus on average, the performance of currency overlay has been good.

² The information ratio is calculated as excess return divided by tracking error (both expressed as annual rates). In general, an information ratio of 1 or more is considered as exceptional performance, 0.75 is very good, and 0.5 is good.

Figure 6 Excess Return and Information Ratio



Source: Baldrige, Meath and Myers (2000).

Thus overall, the results show that currency managers have performed well. However, we need to keep in mind that these results contain a survivorship bias—that is, unsuccessful currency managers who have gone out of business are excluded from the survey sample.

6. Currency Overlay Fee Structure

While the fee structure for active currency overlay management varies by firm, the common practice is for a decreasing fee rate as asset size increases. A typical case is shown in Figure 7, where the fee comprises approximately one-third of the excess return shown in Figure 6.

Figure 7 Currency Overlay Fee Structure (Example)

Assets under management	Annual fee rate
~ ¥10 billion	0.40%
¥10.1 ~ ¥20 billion	Additional 0.30%
Over ¥20 billion	Additional 0.25%

Source: Rating and Investment Information, Inc. (2001).

7. Practical Considerations

1. Overlay Guidelines

When outsourcing currency overlay services, clients must consider several important issues. First, guidelines must be set for: (1) the benchmark currency hedge ratio, (2) instruments to be used for currency hedging, and (3) risk management method (Figure 8).

Figure 8 Currency Overlay Guidelines (Example)

Guideline	Available choices for fund
Benchmark	① full hedge, ② partial hedge, ③ open (no hedge)
Hedging method	① hedge each currency separately ② hedge major currencies separately, don't hedge minor currencies ③ hedge major currencies separately, cross-hedge minor currencies (using currencies with the same movements)
Hedged currency	① hedge all currencies against yen ② hedge all currencies against dollar, then hedge dollar against yen
Hedging instrument	① currency forwards, ② currency futures, ③ currency options, etc.
Risk management method	① target tracking error (e.g., 1% per year) ② set currency exposure limits (e.g., benchmark hedge ratio $\pm 30\%$)

Source: NLI Research Institute

2. Cash Flow Management

Currency gains from foreign assets such as stocks and bonds are not realized unless assets are sold. On the other hand, cash flows from currency overlay are realized when the currency hedge settlement date arrives and hedges are rolled over. Skillful cash flow management is needed to control this mismatch between the underlying foreign-denominated assets and currency hedges.

3. Selection of Trust Bank

Usually, the trust bank acts as a counterparty in currency contracts (but the currency manager performs the actual trading). Since trust banks with a poor credit rating may offer an unfavorable exchange rate, those with a high credit rating are preferable. Another important concern is to manage the credit risk of the counterparty. If the counterparty goes bankrupt, for example, the forward exchange contract is nullified, and gains from the currency hedge are lost. Thus pension funds must strive to minimize credit risk by: (1) restricting the number of counterparties, and (2) reducing the credit period.

4. Timely Transmission of Foreign Asset Balance Information

For pension funds, currency exposure for each currency changes depending on changes in asset allocation, price movements, and additions and withdrawals of foreign-denominated assets. In the U.S., changes in currency exposure are quickly transmitted to the currency manager so that currency overlay can be performed efficiently. In Japan, however, master trusts exist but their functions are limited, and transmission of information is often inefficient. While real-time coordination would be ideal, monthly updating is a minimum requirement. Of course, when significant changes are being made in the portfolio composition of foreign-denominated assets,

separate arrangements need to be made so that the necessary information is always accessible.

5. Selection of Currency Manager

Selection of the currency manager must consider not only performance but other factors such as: (1) whether fees are appropriate, (2) whether the manager takes excessive active risk, and (3) whether turnover is excessive.

6. Policy on Currencies With Low Liquidity

Compared to stocks and bonds (particularly individual issues), currencies are generally highly liquid. However, some currencies such as the Korean won and Thai baht have low liquidity. Many currencies with low liquidity are pegged and do not reflect fundamentals, or may not even trade on an exchange, and thus need to be approached with caution. Considering the practical difficulties of currency hedging, the decision must be made whether to: (1) hedge using a currency with higher liquidity, or (2) not hedge at all.

8. Short-Term Active Management

1. Importance of Flexible Currency Hedging in the Short Term

Generally, the currency hedge ratio should be applied flexibly, with a full hedge made when the yen is predicted to strengthen, and no hedge made when the yen is predicted to weaken. In practice, however, since the exchange rate is impossible to predict and short-term trading is costly, currency hedging is seldom conducted flexibly. In fact, the currency hedge ratio is often set for the medium to long term, and left unadjusted in the short term. In that case, however, massive losses can occur in phases when the exchange rate deviates strongly and fails to return to the original level.

Practically speaking, we must analyze both the short-term and long-term prospects for the foreign exchange market, and conduct risk management flexibly. Relying only on long-term analysis fails to capture the exchange rate's short-term volatility, while a short-term analysis tends to lose sight of long-term trends.

2. Changing the Currency Hedge Ratio on an Active Basis

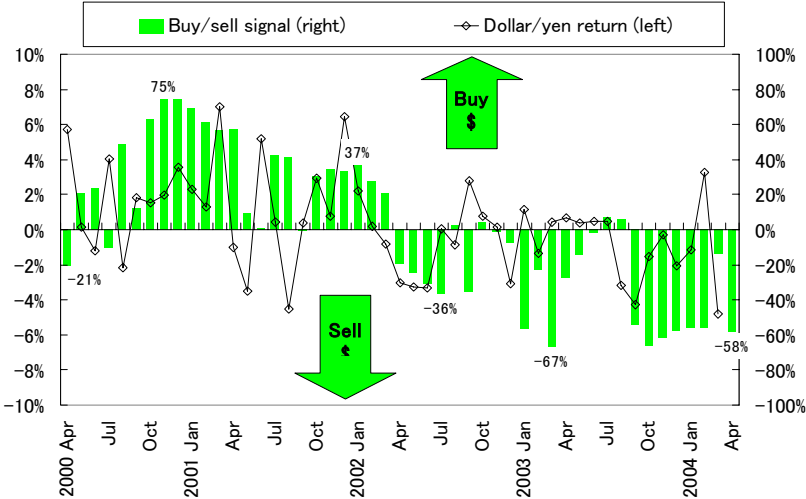
One method of seeking profit opportunities from short-term fluctuations is to use a quantitative

currency model. Below we introduce the NLI Research Institute’s quantitative currency model.³

Figure 9 shows the model’s buy/sell signals and return for the dollar/yen exchange rate. The signals are expressed as currency exposure levels ranging from –100% to +100%. A positive value signals dollar buying, while a negative value signals dollar selling. The larger the absolute value, the stronger is the buy or sell signal.

If the buy/sell signal and return have the same sign (that is, if the bar graph and line graph are both above or below zero), the currency model is deemed to be functioning. Conversely, if the signal and return have different signs, the model is not functioning.

Figure 9 Buy/Sell Signals of the Quantitative Currency Model



Source: NLI Research Institute

The monthly performance of the currency model is obtained simply by multiplying each month’s signal and dollar/yen return from Figure 9 (Figure 10).

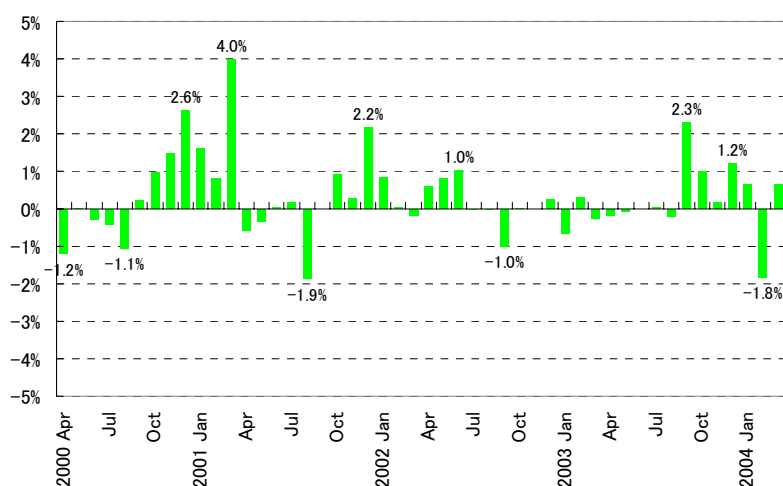
³ NLI Research Institute has developed two currency models: a quantitative currency model, and an integrated currency model that integrates financial engineering and fundamentals.

The quantitative currency model combines a turning-point indicator based on a risk-adjusted indicator of exchange rate momentum (long-term signal), and an indicator that quantifies the interest rate differential and time series structure of the return (short-term signal). Six currencies are included: Japanese yen, Euro, British pound, Swiss franc, Australian dollar, and Canadian dollar.

The integrated currency model fuses together a long-term signal based on fundamentals, and a short-term signal from the quantitative currency model. Two currencies are included: Japanese yen and Euro.

By trading currency forward contracts based on the model’s buy and sell signals, we can seek an absolute return from both up and down markets. For further details on the currency model, see Fumio Nakakubo and Akimasa Okada, “A New Framework for Currency Strategy—The Fusion of Fundamental Analysis and Financial Engineering,” *NLI Research*, August 2001 (www.nli-research.co.jp/eng/resea/econo/eco0108b.pdf).

Figure 10 Performance of the Quantitative Currency Model



Source: NLI Research Institute

By actively trading based on the signals from the currency model, it is thus possible to obtain excess returns. However, since trading in only one currency (such as dollar/yen) does may not sufficiently diversify risk, it is desirable to manage risk using a currency portfolio that combines several currencies.

We simulated the performance of our currency model by constructing a portfolio of six currencies against the dollar.⁴ As Figure 11 shows, while some individual currencies perform poorly (have a low information ratio), the equally weighted portfolio of six currencies diversifies risk and achieves significantly better performance.

Figure 11 Risk Diversification With an Equally Weighted Portfolio of 6 Currencies

		Japanese yen	Euro	British pound	Swiss franc	Australian dollar	Canadian dollar	Equally weighted portfolio of 6 currencies
Simulated performance	Excess return	4.7%	4.2%	2.5%	3.7%	2.9%	0.7%	3.1%
	Tracking error	4.7%	5.1%	4.0%	5.7%	4.5%	0.8%	2.6%
	Information ratio	0.98	0.84	0.63	0.66	0.64	0.90	1.20
Historical performance	Excess return	3.7%	8.4%	0.8%	3.5%	8.4%	0.8%	4.2%
	Tracking error	3.7%	4.8%	1.3%	3.9%	4.0%	0.8%	2.0%
	Information ratio	1.02	1.75	0.60	0.90	2.10	0.92	2.13

Notes: Simulated performance period is from September 1978 to December 1999 (includes in-sample and out-of-sample). The historical performance period is from April 2000 to March 2004; however, delivery of data for currencies other than the yen started in December 2001.

Source: NLI Research Institute

⁴ While it is possible to construct a currency portfolio against the yen, risk cannot be adequately diversified because

3. Short-term Active Management and Currency Overlay

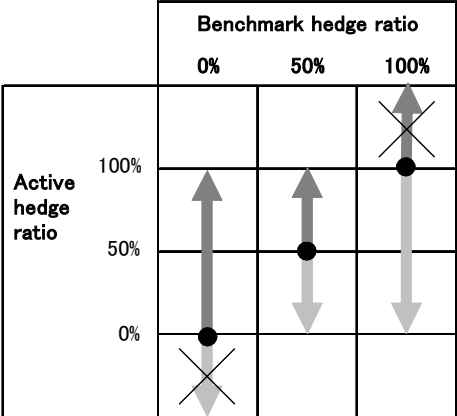
As seen above, the buy and sell signals generated by the currency model are expressed in terms of currency exposure (from -100% to +100%). The signals are intended for portfolio managers and currency traders performing short-term active management.

These currency exposure signals can be converted into currency hedge ratio signals (0% to +100%) for use by currency overlay managers. This is necessary because currency overlay involves hedging a percentage of the foreign-denominated assets, and operating guidelines often do not allow for a negative hedging ratio (-100% up to 0%).

To convert the currency exposure signal into a currency hedge ratio, we first need to understand how setting the benchmark hedge ratio affects the conversion (Figure 12).

For example, if the benchmark hedge ratio is set at 50%, the hedge ratio for active management can move up or down by 50% from this level. But if the benchmark is 100% or 0%, the hedge ratio can move in only one direction.

Figure 12 Benchmark Hedge Ratio and Active Hedge Ratio

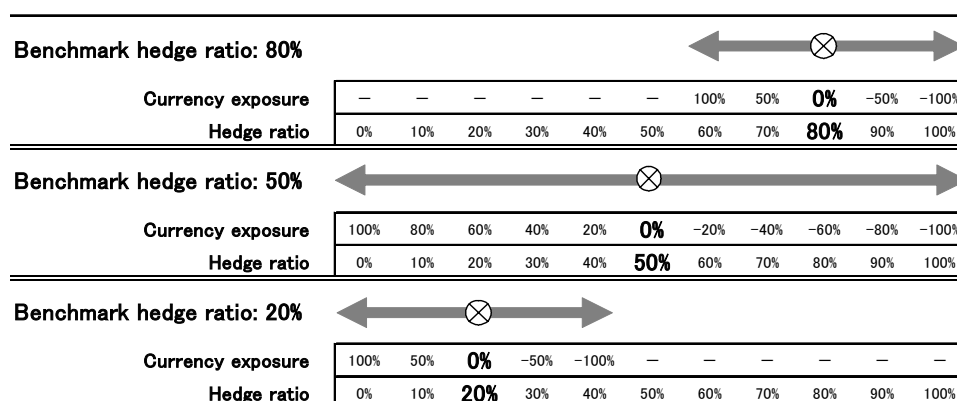


Source: NLI Research Institute

Once this relationship is understood, we can set the benchmark and proceed to convert currency exposure signals into hedge ratio buy/sell signals (Figure 13).

currencies are highly correlated against the yen. We thus constructed the portfolio of currencies against the dollar.

Figure 13 Converting Currency Exposure Signals into Hedge Ratio Signals



Source: NLI Research Institute

Using the converted signals, we simulated the currency overlay performance for a balanced portfolio of foreign-denominated assets (foreign bonds and stocks weighted according to benchmark weights) (Figure 14). As the results show, the model again performs well in the long-term (the cumulative information ratio for the simulation period is approximately 1). Incidentally, for fiscal 2003, the excess return was slightly negative due in part to massive intervention by monetary authorities.

Figure 14 Currency Overlay Performance of the Quantitative Model

Fiscal year	Return (%)		Currency overlay		
	Benchmark	Portfolio	Information ratio	Excess return (%)	Tracking error (%)
1994	-3.23	-2.93	0.35	0.29	0.84
1995	33.21	35.07	2.15	1.86	0.87
1996	23.04	24.48	1.49	1.44	0.96
1997	29.13	30.21	1.12	1.08	0.97
1998	2.53	1.76	-1.29	-0.77	0.60
1999	-1.66	0.96	2.98	2.62	0.88
2000	0.74	2.37	1.42	1.62	1.15
2001	4.35	4.62	0.30	0.27	0.89
2002	-14.88	-14.47	1.06	0.41	0.38
2003	15.12	15.04	-0.10	-0.08	0.76
Total	8.84	9.71	1.01	0.88	0.87

Notes: Shows simulated performance from April 1994 to March 2004. Underlying assets are passively managed, and no tactical asset allocation is performed (excess return thus derives only from currency overlay). Return and excess return are averages for the fiscal year, risk is annualized tracking error in each fiscal year. Benchmark for foreign stocks is the MSCI Kokusai index (world ex Japan, developed countries, with gross dividends, yen based); for foreign bonds, Citigroup WGBI (all maturities, non-JPY, yen based); exchange rate is the end of month quote in London. The overall portfolio weighting is 43% foreign bonds, and 57% foreign stocks.

Source: NLI Research Institute

9. Conclusion

The argument over whether to use currency risk hedging continues to thrive. Claiming that currency does not produce excess returns in the long term, the Pension Fund Association uses a no-hedge currency benchmark. Many pension funds adhere to this stance.

On the other hand, some funds engage in active short-term currency management on the basis that short-term currency movements significantly impact the investment return of pension assets. A no-hedge stance is acceptable as long as the yen is weak, they say, but if the yen becomes persistently strong, the erosion of foreign-denominated assets is too large to be neglected.

In either case, neglecting the risk of the currency market's extremely strong trends leaves one vulnerable to volatile returns in both the short term and long term. Thus pension sponsors need to assess their present situation, and prudently consider their decisions regarding currency hedging and selection of a currency manager.

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