Global Asset Management

To hedge or not to hedge — a question that cannot be ignored.

Bruno Solnik

Until the early nineties, most of the largest investors in the world, such as U.S. and U.K. pension funds, did not currency-hedge their international portfolios. Several explanations can be found for this policy.

International assets, mostly stocks, represented only a tiny portion of the global portfolio of U.S. pension funds; the impact of *currency risk* was thus very limited, and even beneficial, as it provided an element of diversification for domestic monetary risks. In terms of *return*, the U.S. dollar and U.K. pound were weak currencies in the seventies and eighties, so holding strong currencies such as the yen or the deutschemark provided additional return to the international portfolio. Finally, most investors did not feel at ease with derivatives, or were even precluded from using them. Why then go through the burden of a systematic hedging policy when currencies did not add risks to the global portfolio and contributed positively to its performance?

The picture has recently changed. Both the U.S. dollar and the U.K. pound have been strong currencies relative to the yen or to other European currencies. In the U.K., where pension funds have traditionally devoted a significant proportion of their assets to foreign stocks, pension regulations have changed, leading to an increased focus on volatility. In the U.S., pension funds have drastically increased the proportion of their international assets (up to more than 20% of the total fund for some of them), so that currency risk can no longer be treated as a negligible component. All this is leading

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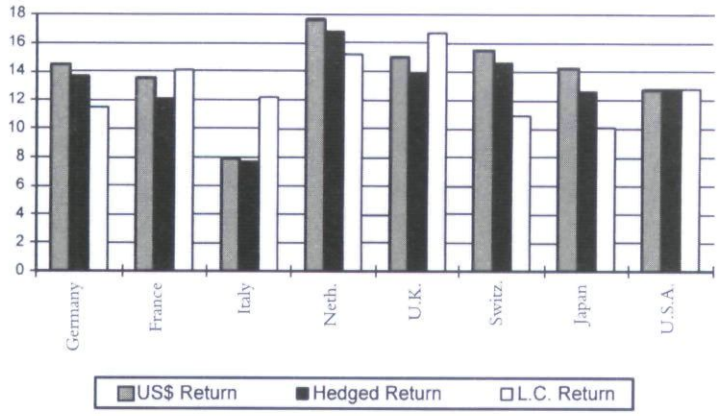
EXHIBIT 1
STOCK RETURN IN % PER YEAR 1971-1997



to the quest for an optimal currency hedging policy.

The traditional approach to global money management is to set a long-term *strategic asset allocation* that often takes the form of a passive benchmark that is assigned to money managers and used in performance measurement. Managers deviate *tactically* from this benchmark to try to achieve superior performance by taking advantage of changes in economic and market conditions.

Strategic currency allocation involves determining the appropriate currency allocation in the passive benchmark set as a long-term objective for the fund and determining the effective approach to currency management. In making those decisions, certain elements are helpful: knowing the characteristics of a good benchmark for assessing relative performance, understanding the differences between theory and reality when implementing hedging strategies, and analyzing the risk-adjusted returns of alternative hedging strategies.

Tactical currency allocation is based on the observation that currency risk premiums and expected returns fluctuate over time. Therefore, the optimal currency hedging policy will also vary over time, providing opportunities for superior risk-adjusted returns with dynamic tactical strategies.

A major question is whether active currency management is potentially rewarding, and, if so, whether the currency approach should be integrated within the asset allocation process or whether it should be separate and delegated to a currency overlay manager.

AN EMPIRICAL OVERVIEW

The Importance of Currency: Long-Term versus Short-Term

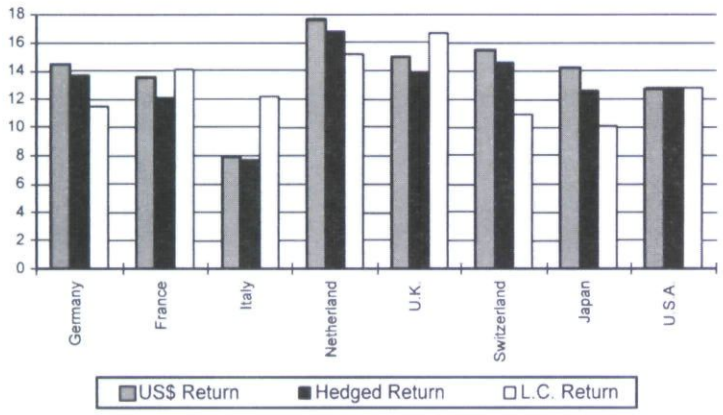
An investor in foreign markets can get two types of return. First is the return on a foreign investment translated into the investor's home currency. For example, if U.S. investors buy Italian stocks, they get the U.S. dollar return on those stocks. The Italian lira return might look good, but it cannot be directly obtained by a U.S. investor. The option is to hedge the currency risk, but the currency-hedged return differs from the local currency return by the interest rate differential between the two countries (the forward basis, i.e., the percentage difference between the forward and the spot exchange rates). Thus, U.S. investors can get either the U.S. dollar return or the currency-hedged return, and they must compare the two to evaluate the effect of the currency difference.

Exhibit 1 provides a long-term historical comparison of U.S. dollar returns, currency-hedged returns, and local currency returns for eight stock markets. The data are for the 1971-1997 period. Exhibit 1 indicates that the annualized U.S. dollar return on Italian stocks during the past twenty-seven years was about 7.9%; that is, an investment in the Italian stock index, taking into account dividends and capital appreciation and changed back into U.S. dollars, would have produced an annualized return of about 7.9%.

In Italian lire, the return was much higher, at 12.2%. The difference, of course, comes from the depreciation of the lira over time. Hedging the lira would have earned a return on Italian stocks of 7.7%; the difference between 12.2% and 7.7% is the interest rate differential implicit in the forward exchange rate.

The long-run difference between hedging and not hedging is only about 0.2%, or 20 basis points (7.9% versus 7.7%). A comparison of the 7.7% and the 12.2% is not meaningful, because a U.S. investor could never get 12.2%. Conversely, a U.S. investor holding Swiss stocks and hedging the Swiss franc would have made a return of 14.6%, compared to the 10.9% return in Swiss francs, taking advantage of the dollar-franc interest rate differential. This hedged return of 14.6% is close to the unhedged return of 15.5%.

EXHIBIT 2
BOND RETURN IN % PER YEAR 1971-1997



For all investments, the difference between currency-hedged and unhedged return is rather small in the long run. This is often explained by the fact that exchange rates revert to fundamentals over the long run (mean reversion). The dollar was weak over the 1971-1997 period, however, and its depreciation was not fully offset by the interest rate differential (the dollar interest rate was relatively too low). In other words, U.S. investors buying foreign assets gained a currency risk premium. This long-term currency gain, which is the difference between hedging and not hedging, reached an annualized 1.6% for investments in France and Japan.

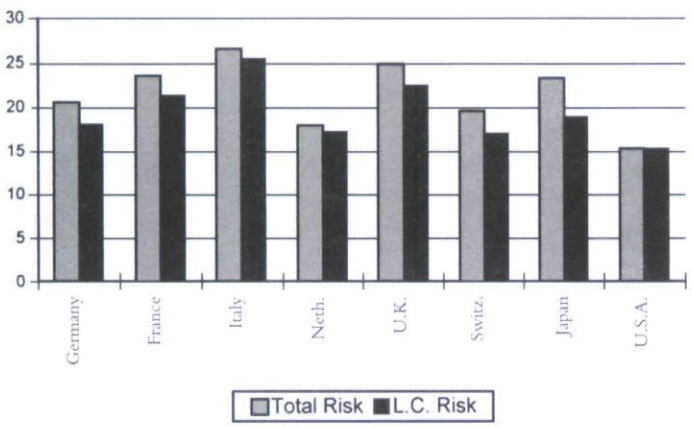
A similar result is obtained for bonds (Exhibit 2), as the difference between unhedged and hedged return (for stocks and bonds) comes only from the fact that exchange rate movements do not adjust exactly to interest rate differentials. For most currencies, over the very long run, the interest rate differential corrects exchange rate movements only approximately. Again, note that the difference between unhedged and hedged returns reaches 1.6% per year for Japanese assets. Even if the impact of currency does not wash out, it gets somewhat reduced as exchange rates revert to fundamentals over the long run.

The short-term story is more striking. In the short run, currency can make a more significant contribution to stock returns. One way to measure the short-term impact of currency is to examine the standard deviation of market returns over, say, one month. Exhibit 3 shows stock volatility measured in U.S. dollars as well as currency-hedged. Volatility measured in U.S. dollars is always higher than the currency-hedged volatility. While the difference for an individual stock market is not huge, it reached more than 4% for Japanese stocks for this period. Many investors would not regard the difference as trivial, even if part of this currency risk gets diversified in a global portfolio.

The short-term story is even more striking for bonds, as Exhibit 4 shows. In the short run, currency makes a large contribution to bond returns because bond market risk is lower than equity market risk, and because of the positive correlation between interest rate and currency movements. For example, the U.S. dollar risk of DM bonds is more than twice the risk of currency-hedged DM bonds, 13.8% versus 5.6%. Again part of this risk gets diversified in a global bond portfolio, but currency risk is a major component of international bond risk.

At least in the short term, currency has a significant impact on bond returns and to a lesser extent on stocks. Over the long term, this impact becomes smaller because of mean reversion, as mentioned above, but it does not disappear.

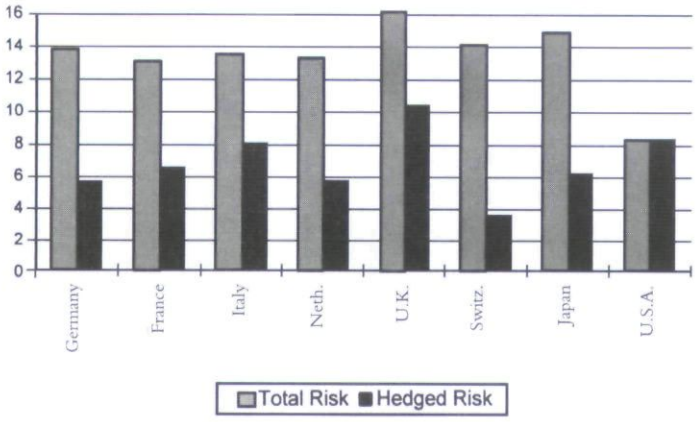
EXHIBIT 3
STOCK MARKET VOLATILITY IN % PER YEAR 1991-1997



The Importance of Correlation

Currency risk and local market risk are not additive. The total risk, i.e., the variance of Italian stock returns measured in U.S. dollars, is equal to the local market variance (in Italian lire) plus the foreign exchange variance plus two times the correlation of the two multiplied by the standard deviation of each source of risk: the local stock

EXHIBIT 4
BOND MARKET VOLATILITY IN % PER YEAR 1971-1997



market risk in Italian lire and the U.S. dollar/Italian lira exchange rate risk. The equation to express the variance of Italian stock returns in U.S. dollars is:

$$\sigma^2_{Total} = \sigma^2_{Local} + \sigma^2_{FX} +$$

$$2\rho(Local, FX)\sigma_{Local}\sigma_{FX}$$

Most people define the currency risk contribution simply as the difference between the total market risk, measured in the base currency, and the local market risk. Note, however, that currency risk and local market risk are not additive. These risks would be additive only if the correlation were equal to 1. Then, the volatility in U.S. dollars of Italian stocks would be equal to $(\sigma_{Local} + \sigma_{FX})^2$, and hence $\sigma_{Total} = \sigma_{Local} + \sigma_{FX}$. If the correlation were equal to -1, no currency risk would exist.

Let's think about the correlation that we expect to find for currency movements and stock returns. Consider the example of Nestlé S.A., a large multinational firm. If suddenly the Swiss franc goes down, we would expect Nestlé revenues, which are derived mostly from investments in and exports to the United States, Japan, and other non-Swiss countries, to increase when measured in Swiss francs. Because revenues measured in Swiss francs would go up, we would expect Nestlé's stock price in Swiss francs to go up.

Nestlé practices some currency hedging, but unless it is a perfect hedger, we would expect the correlation between the Swiss franc value and the share price in Swiss francs to be strongly negative. Hence, the impact of currency risk, linked to a depreciation of its headquarters currency, should be minimal. Surprisingly, the correlation between stock prices and currency has been found to be close to zero or only slightly negative (see Jorion [1994] and Solnik [1996]). As the global economy develops, we may find a marked difference between the stock price behavior of firms with purely domestic activities, and hence subject to currency risk, and those that are truly multinationals.

Our discussion has focused on developed and stable economies. In emerging countries, especially those maintaining a pegged currency, the exchange rate is often a signal of international confidence. A confidence crisis, as witnessed for Mexico at the end of 1994 or for Southeast Asia in 1997, leads to a strong depreciation of the currency and a severe drop in the stock market because of capital outflows. This positive correlation between currency and market risk magnifies the impact of the currency factor, serving as a proxy for international confidence in the local economic policy.

For bonds, the tendency is to find positive correlation between currency and local market risk. When the French franc depreciates, for example, the French central bank had often intervened in the past to maintain its policy of *franc fort*. A good way to intervene is to strengthen interest rates to defend the franc, but rising interest rates are bad for bond prices. So, French franc bond prices should go down, which would induce a positive correlation between the value of the French franc and French bond prices. Such positive correlation is bad news for a foreign investor buying French bonds, because the investor basically has cumulative currency risk, not only translation risk; the value of the asset itself also drops if the currency depreciates.

Clearly assessing the future value of these correlations is central to currency hedging decisions.

The Currency's Contribution to Portfolio Risk

Twenty years ago, we moved from an individual asset perspective to a total portfolio perspective, especially in the United States with its ERISA regulations, but we still do not often apply the total portfolio approach to currency. Too often one presents numbers on the contribution of currency risk to the international (non-domestic) part of the portfolio rather than

to the global portfolio. This lack of focus on the total portfolio when dealing with currencies is disturbing and somewhat linked to emotional reactions.

Foreign currencies provide an element of diversification against domestic budgetary, fiscal, and monetary risks. For example, domestic inflationary pressures are usually bad for domestic interest rates and often lead to a depreciation of the currency. In this scenario, an inflationary rise in interest rates is bad for domestic bonds and stocks but good for foreign currencies. Although the value of foreign currencies is volatile, they bring some risk diversification to a domestic portfolio.

Let me conclude this empirical reminder with a brief comment. Currencies get partly diversified in a portfolio, i.e., a basket of currencies, but the nondomestic portfolio still ends up with some currency risk. Basically, the risk for U.S. investors is that the U.S. dollar will be very strong in the future. This risk is undiversifiable for a U.S. investor, because if the U.S. dollar is strong, then Japanese stocks will look unattractive as the yen goes down against the U.S. dollar; U.K. stocks will look unattractive because the U.K. pound goes down against the U.S. dollar, and so on. So, the strength of the home currency is the major source of currency risk for investors. A strong domestic currency, however, is not necessarily good for the domestic economy; it is actually bad for the international competitiveness of domestic firms.

In other words, currency risk is also present in a purely domestic stock portfolio because the portfolio is made up of companies that compete in a truly global environment (for example, the thirty companies in the Dow Jones Industrial Average derive some 50% of their earnings from abroad). This is another reason why foreign currencies should provide some diversification benefits.

STRATEGIC CURRENCY ALLOCATION

What is the appropriate currency allocation in the passive benchmark used to guide investment in the long term and to measure performance? This question is often rephrased as: How much systematic currency hedging should be undertaken as a matter of long-term policy? For example, should we be fully hedged as a neutral/passive strategy or unhedged?

Determining a Passive Benchmark

Before deciding on the appropriate currency allocation in a passive benchmark, one must know the qualities of a good benchmark. A good benchmark must be *widely accepted*. Pension fund performances are routinely compared. Plan sponsors adopting a very different benchmark run a strong risk of widely underperforming their peers in some period, which could turn out to be very costly for the people who run the fund. So the profession is motivated toward consistency with regard to benchmarks and hence must use a widely accepted benchmark.

A benchmark also needs to be a feasible one that can be *easily replicated* by passive strategies. Finally, the benchmark needs to be consistent with *equilibrium*. If everyone is using the same strategy, the benchmark must be feasible; i.e., the market must be able to absorb it if large investors choose this benchmark worldwide.

When William Sharpe and others devised the capital asset pricing model, they came up with the important conclusion that everyone should be holding the market portfolio. Some additional stories about alphas and betas have been written, but the major operational conclusion of the CAPM is that everyone, regardless of their degree of risk aversion and whether poor or rich, should hold the market portfolio, which is consistent with equilibrium. If everyone follows that strategy, that is fine.

On their domestic assets, big pension funds in the United States or the United Kingdom indeed hold a portfolio that is close to the domestic market portfolio, and the market absorbs it very well. So what does academic research tell us about the *equilibrium* global asset allocation and its currency hedging policy?

Lessons from Research

The basic conclusion from theoretical research is that the optimal portfolio is the world market portfolio *partly hedged* against currency risk (see Solnik [1974, 1996], Adler and Dumas [1983], and Black [1990]). By partly hedged we mean that all foreign assets are optimally hedged when the market is in equilibrium. We can objectively *observe* the world market portfolio; we can use world market capitalizations as weights for the benchmark. Although one may disagree as to which broad index to use — such as the FT World Index or the MSCI World Index — all these portfolios approximate the investable world portfolio and are observable.

The problem is identifying the optimal hedge ratios, because theory tells us that optimal hedge ratios are a function of the asset to be hedged, and depend on unobservable parameters such as relative preferences of different nationals, their risk aversions, and the net for-

eign investment position of each country.

Financial research has focused attention on currency risk premiums. Exchange rates, like interest rates and stock prices, are financial prices, and risk premiums are justified.[1] The forward premium, or interest rate differential between two currencies, should be equal to the expected return on the currency plus a risk premium. In other words, the interest rate differential should be different from the expected currency movement. The supply of and demand for currency affect both exchange rates and the size of the currency risk premium. Thus, currency prices adjust due to supply and demand factors — influencing the currency risk premium — until the new equilibrium exchange rate is determined.

A short story could help illustrate why such currency risk premiums exist. Suppose the Americans are big net investors in Papualand, and the Papualanders invest little abroad. The Americans have a vast net foreign wealth and are worried about currency risk; hence they have a strong demand for hedging Papuan francs into American dollars. The Papualanders have little demand for hedging American dollars, because they do not invest much in America. The Americans are long in Papuan stocks, and they can hedge their exposure to the Papuan franc by borrowing Papuan francs and investing these francs in American dollar deposits (this is equivalent to a Papuan franc/American dollar forward contract). So they pay the Papuan franc interest rate and receive the American dollar interest rate.

But because the supply of Papuan francs is limited, the Papuan franc interest rate "increases," and the American dollar interest rate "declines."[2] This development creates an interest rate differential that is basically a risk premium that American investors are willing to pay to hedge their currency risk and to induce Papualanders to provide the vehicle for that hedge. Over the long run, American investors earn a lower return if they hedge than if they do not hedge.

Pragmatic Shortcuts

In reality, we cannot observe the optimal hedge ratio, so pragmatic shortcuts are necessary.

FULL HEDGING

The motivation for a *full hedging* policy is based on the assumption that we cannot tell whether currency risk premiums are positive or negative; hence the sole objective is to minimize the risk, so one hedges 100%. Therefore, one would use a fully hedged or unit-hedge benchmark as the strategic benchmark.[3] Full hedging is simply focusing on minimizing the volatility of the *foreign* part of the portfolio.

Many people argue against this approach. First, having a bit of foreign currency improves the portfolio's total risk. Adding 5% in foreign currency to a portfolio reduces the risk level of the *total* portfolio by diversifying the domestic risks. Jorion [1989] finds that a foreign currency allocation up to about 10% reduces total portfolio risk. Full hedging assumes that one is looking only at the foreign component and becomes truly meaningful only if a significant proportion of investments is allocated abroad.

Second, even if we are using only a passive, risk-minimization hedge and care only about risk, not about expected return, we would take into account the correlation between the currency risk and the asset risk. In the presence of correlation between currency and market risk, one should use "regression" hedges that will generally differ from 1.0 because of the correlation between asset returns and currency movements.

Third, there are good reasons for the existence of currency risk premiums, such as when some countries are net foreign investors as suggested in the America/Papualand example.[4]

NO HEDGING

Froot [1993] argues that, over the very long run, currency risk washes out. This suggests that a pension fund with a long horizon should follow a *no-hedging* policy. The no-hedging argument of Froot is based on a very long horizon (150 years). It assumes that the exchange rate reverts to its fundamental or purchasing power value over the long run.

While the econometrician does find some evidence of such mean reversion over the long run, the money manager or plan sponsor will usually find that this horizon extends well beyond what is reasonable from a business viewpoint. In a time span that is reasonable from a money manager viewpoint (say, a few or five years), currency risk is present.

UNIVERSAL HEDGE RATIOS

Other people use *universal hedge ratios* (what I call arbitrary hedge ratios). Black [1990] comes up with a 0.75 hedge ratio, and Gastineau [1995] suggests a 0.50 hedge ratio.

To derive his universal hedge ratio, Black has to make many heroic assumptions.[5] For example, the Papualanders and the Americans would have to have exactly the same amount of investment abroad (no net foreign investment) and no inflation. Also, one has to postulate that all investors have an identical risk aversion, and so on.

Even if the principle that each investor should use exactly the same hedge ratio for every single asset were to be accepted, the exact value of the universal hedge ratio is still arbitrary, as it is based on a forecast of the future return and volatility of the world market portfolio. If one is to make so many arbitrary assumptions in order to derive a universal hedge ratio of, say, 0.75, why not simply assume the result at the start?

In a sense, Gastineau's "why bother?" approach is cleaner. He *assumes* that 0.50 is the best. Why 0.50? Because it is halfway between 0 and 1, neither of which is appropriate.

NO SIMPLE PRACTICAL SOLUTION

Even in a perfect world with no market segmentation or differential taxes or transaction costs, no reasonable theory will ever come up with practical and unquestionable recommendations regarding a systematic hedging policy. It is very obvious that some countries are large net international investors (e.g., the U.S. or Switzerland); hence, if all large investors were to follow the same "arbitrary" hedging policy, it would be inconsistent with market equilibrium and could not be absorbed by the market.

Because hedge ratios differ across assets and currencies, depending on unobservable foreign asset positions, utility functions, individual risk aversion, and inflation, there is no simple practical solution and no theoretically unquestionable benchmark for the currency allocation, and there will never be one.

TACTICAL CURRENCY ALLOCATION

Currencies should not be treated as an entirely special entity. Any good financial analyst must have some vision about the exchange rate because it is a major consideration in valuing a corporation. All monetary variables, including currencies, are important components of valuing a stock or a bond market. Hence it seems surprising to entrust international asset allocation to some manager but not the currency hedging decision.[6]

Jorion [1994] analyzes the effects of separating the investment and the currency decisions. This is the case when the asset allocation is performed by one manager and the currency hedging decision is delegated to a currency overlay manager who treats the asset allocation as given ("partial optimization") and optimizes solely on currencies. Jorion shows that conducting an asset allocation optimization for assets and currencies separately is clearly suboptimal.

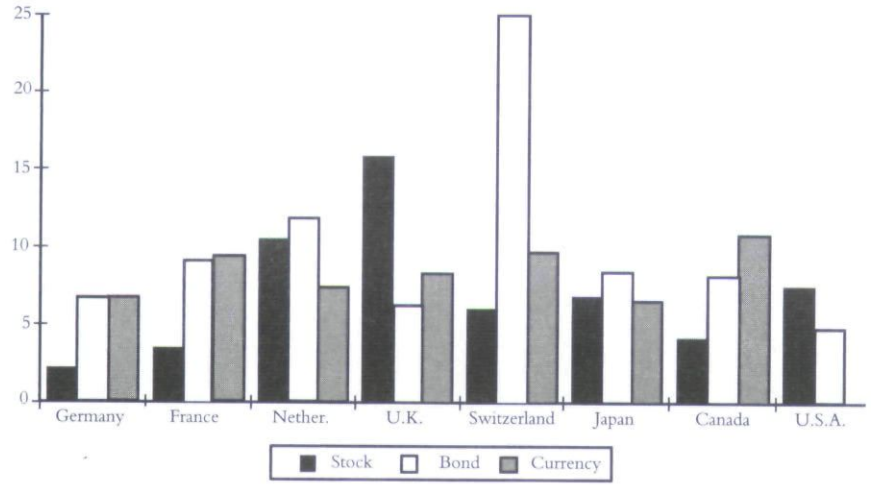
To summarize, in the presence of correlation between asset returns and currency movements, partial optimization is suboptimal, but it is acceptable in the absence of correlation. Full hedging would be acceptable *only* if two conditions are simultaneously met: no correlation between the asset and the currency, and no currency risk premium (no expected return on any currency). The correlation between stock returns and currency movements was quite low until the mid-nineties, so using currency overlays was not such a bad decision for equity portfolios (but clearly not for bond portfolios). Increased globalization, however, should lead in the future to higher negative correlation between equity and currency returns.

In reality, the currency market is an efficient market with somewhat predictable risk premiums (i.e., expected returns). The efficient market hypothesis never states that expected returns should be constant over time. Expected returns fluctuate because of such factors as national business cycles, changes in the market environment, and changes in risk aversion. So, the currency risk premium can fluctuate over time.

Furthermore, central banks are important players in the currency markets, and empirical evidence indicates that they are consistent losers because their objective function is to stabilize the market, not to follow the usual risk-return paradigm (see, for example, Taylor [1982]). If you are French, you know that, prior to the introduction of the Euro, a major preoccupation of the French central bank was to have a strong French franc relative to the deutschemark. Such a predictable domestic objective does not follow traditional investment paradigms. The periodic forced devaluation of the French franc is one example. The recent Asian currency crisis provides another illustration.

Stock markets, interest rates, and currencies are very difficult to predict, but because currencies are highly visible, being wrong in currencies seems more painful than being wrong in stock markets or interest rates. Everyone, even a simple tourist, has an opinion on currencies, but probably not on the stock price of

EXHIBIT 5
EXPLANATORY POWER FOR VARIOUS MARKETS — PERCENTAGE OF VARIANCE EXPLAINED (ADJUSTED R-SQUARE)



Source: Solnik [1993].

some foreign corporation or on bond prices in some distant country. Even currency experts will see their predictions proven wrong some 45% or 49% of the time, and everyone will notice. So most people just stop trying to forecast exchange rates, which might be a mistake.

Academic research provides extensive evidence of predictability in foreign exchange rates, at a level that is comparable to that of bond or stock prices. Exhibit 5 shows the percentage of variance explained by a simple model that takes into account interest rate levels, term spreads, interest rate differentials, and other simple variables as predictors of future stock price movements, bond price movements, and currency movements.

This model attempts to reflect time variation in expected returns due to changes in the business cycle, but I do not claim that it is of great investment interest or exempt from some of the criticisms usually made of this type of approach. It is offered here only for illustration purposes to compare the predictability of stocks, bonds, and currencies.

The predictive power for currencies is as good as for bonds, which is not so surprising since interest rates are closely linked to exchange rates. Basically, the adjusted R^2 is on the order of 5%-7%, which is weak but statistically significant.

The optimal currency hedging policy will vary considerably over time because the sign and magnitude of the risk premium on each currency are likely to change over time. In Solnik [1993] I simulate the performance of three dynamic tactical strategies, from the viewpoint of a U.S. investor. I use only out of-sample performance, separate the universe of possible investments into equity-only and bond-only investments, and design each strategy to have the same volatility as the U.S. index; that is, the domestic performance and global performance are compared for the same risk level in U.S. dollars.

The first strategy allows only fully hedged investments. The second strategy allows only unhedged investments. Thus, one can invest across the world, but cannot hedge the currency risk; the currency and market choices are necessarily linked. The third strategy allows joint optimization of the market and currency decisions, and partial currency hedging. All returns are monthly returns in excess of the U.S. risk-free interest rate.

Because of the predictability of the currency risk premium, the stock-only performance of the unhedged strategy, 0.962% monthly excess return, is superior to both the U.S. stock market return of 0.247% and the fully hedged strategy return of 0.694%, for the same risk level. Allowing a joint optimization on market selection and currency selection, the optimal hedging strategy further improves performance, to 1.149%. The results are similar for the global bond strategies. The optimal hedging strategy return, 0.663% monthly, exceeds the U.S. bond index excess return of -0.017%, the fully hedged strategy return of 0.395%, and the no-hedging return of 0.508%, all with the same level of risk. Thus, dynamic tactical strategies can improve performance in a risk-controlled way.

Although the asset allocation and currency allocation strategies are basically quite good, the problem is that with an R^2 of 5%-7%, it takes many years to confirm the effectiveness of these strategies. These strategies might significantly underperform passive strategies for one or a couple of years, but, twenty years from now, end up being big winners. Although people do not expect these tactical strategies to be right every month or every

quarter, they do expect them to be right most quarters and most years. Unfortunately, that cannot always be true with optimization models that use estimates for time variation in market risk premiums, which are inherently based on a long-term equilibrium philosophy.

SUMMARY

Currency risk is low in the long term, as exchange rates tend to revert to fundamentals over the very long run. Yet the contribution of currencies to the long-term performance of a global portfolio never gets to be nil. Currency risk premiums, indicated in the difference between currency-hedged and unhedged returns, exist in the long run and are consistent with world market equilibrium and finance theory.

If the plan sponsor sets a benchmark for a very long-term horizon (say, fifty years), then it should probably be unhedged, as these currency returns provide only a small, positive or negative, contribution to total return, while systematic currency hedging is a cumbersome process. If the plan sponsor has in mind a shorter strategic horizon (say, five to ten years), the ideal currency allocation in the strategic benchmark is, and will remain, a question open to debate. Applying some simple hedging rule, similar for every single asset, is questionable in the presence of a complex, though realistic, correlation structure among stock prices, interest rates, and exchange rates.

Finally, if the plan sponsor believes in active management, currencies should be an integral part of the tactical asset allocation and security valuation process.

In any case, one cannot afford to ignore the currency dimension in global money management.

ENDNOTES

The author is grateful to *Fondation HEC* for its financial support and to Robert Arnott and William Goodsall for their comments.

[1]The argument that the currency risk premium should be zero because there is one buyer for every seller on a foreign exchange transaction is not valid. Surely one party will "pay" the premium and the other will "receive" it, but the situation is no different on any futures market. For example, stock index futures contracts have also one buyer for every seller, but it seems well accepted that, on average, the buyer will receive the equity risk premium.

[2]By "increases" and "declines" I mean relative to an equilibrium where there is not demand for hedging currency risk.

[3]Many practitioners use Pérold and Schulman [1988] as a justification for a unit hedge ratio (100% hedge). Actually Pérold and Schulman do consider the case of a zero currency risk premium, but they advocate taking into account the correlation between currency and market risk to determine the "full" hedge ratio.

[4]There is also a technical problem in assuming simultaneously that the expected currency return is zero from the viewpoint of all currencies. This is Siegel's paradox as discussed in Solnik [1974] and Black [1990].

[5]A critique of universal hedge ratios can be found in Adler and Solnik [1990] and Adler and Prasad [1992].

[6]A plan sponsor usually assigns some target for the international allocation in the form of a benchmark, which is therefore not the responsibility of the manager. Yet active managers are selected because the sponsor believes that they can add value by deviating from the benchmark based on their predictions; and most of the added value comes from differences in asset allocation, not stock pricing.

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