# The logic that lies behind overseas diversification

**Robert Hodrick** assesses the reasons behind holding overseas stocks as part of an investment portfolio and shows how a rational judgement can be made.

**Robert J. Hodrick** is Nomura Professor of International Finance at Columbia Business School and Columbia University's School of International and Public Affairs. He is also a research associate of the National Bureau of Economic Research.

**How internationally** diversified should a portfolio be? Advice varies widely. In February 2001, *The New York Times* reported that Merrill Lynch advises a limit on foreign stocks of 5 per cent, down from 35 per cent. The article noted that Goldman Sachs advises 15–20 per cent and Morgan Stanley 25–35 per cent. Stefano Cavaglia, a global equity strategist at UBS Brinson, advises US investors to hold half of their portfolio in foreign equity. Who's right?

The case for diversification begins with the fact that investors must make decisions in an environment of uncertainty. Because future returns cannot be known, smart investors will assess the uncertainty of returns by specifying probability distributions (see Box 1). These distributions, which reflect the subjective views of an investor, describe the expected values and variances of the returns, as well as correlations between returns. Investors are rational when their subjective views coincide with what is objectively true. Unfortunately, objective probability distributions are not published anywhere, so differences about diversification can be traced to differences of opinion about the probability distributions of future returns. One way to generate these distributions is to estimate them using historical data, assuming the future will look like the past. Let's suppose this is true.

Table 1 gives statistics for dollar-denominated excess returns on 12 country portfolios. The raw data are the Morgan Stanley Capital International total monthly returns for each country in excess of the return on a eurodollar deposit, which is a reasonable proxy for the risk-free return. Mean monthly excess returns are annualized and standard deviations are calculated to correspond to an annualized holding period. The highest average is Sweden's 11.2 per cent and the lowest is Italy's 3.3 per cent. The US average is 5.7 per

## Box 1 A statistical refresher

- A probability distribution lists the values returns may take and the probabilities associated with different possible returns.
- The expected value of a future return is also called the mean of the probability distribution and is calculated as the probability-weighted average of the possible future values of that return. This is the sum of the probabilities of the events times the values of the return if those events occur.
- The variance of the distribution of a future return is the probability-weighted average of the squared deviations from the mean return.
- A related concept is standard deviation, which is measured in the same units as returns because it is the square root of variance.
- The covariance of two returns describes how the possible realizations of these returns move together. It is measured by the probability-weighted average of the deviations from the mean for one return times the deviations from the mean of another return.
- A related concept is the correlation coefficient – the covariance of two returns divided by the product of the two respective standard deviations. Correlations range between –1 and +1. If two returns are perfectly correlated, the correlation is +1; if they are not at all correlated, the correlation is 0; and if they are perfectly negatively correlated, the correlation is –1.

cent. Standard deviations range from a low of 15.3 per cent a year for the US to 30.9 per cent for Singapore. Because returns are in dollars, the return for any country other than the US contains both the local currency equity return and the change in the value of the US dollar relative to the local currency, which provides an additional source of volatility.

After assessing the probability distributions, the rational investor must consider preferences for risk and return. It is uncontroversial to assume that an investor likes high expected returns on a portfolio and dislikes variance in future returns. What trade-offs between risk and return do financial markets offer?

For a US investor with a US portfolio, there is a trade-off in terms of how much the expected return rises with an increase in the portfolio's standard deviation as the investor moves from risk-free assets to equities. This trade-off can be calculated using the mean return and standard deviation statistics in Table 1. In the case of the US portfolio, the trade-off is 5.7/15.3 = 0.37. So for each percentage point increase in the standard deviation of a US portfolio, the investor is compensated with a 0.37 per cent increase in expected return. Depending on their tolerance for risk, investors will choose a portfolio, for example, two-thirds in US equities and a third in risk-free securities. However, this analysis ignores a key issue, which is the potential improvement in the trade-off between risk and return that comes from diversifying internationally.

Now, suppose our US investor is willing to add British equity to the portfolio if doing so improves the trade-off between risk and return. Some investors might look at the ratio of British expected excess return to British standard

TABLE 1 Statistics from annualized excess returns by country

US dollars; 1970–2000

| *Country* | *US* | *JP* | *GB* | *FR* | *DE* | *IT* | *NL* | *BE* | *CH* | *SE* | *AT* | *SG* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Mean*** | 5.7 | 8.8 | 7.8 | 7.6 | 6.7 | 3.3 | 8.4 | 8.9 | 7.3 | 11.2 | 3.5 | 10.9 | |
| ***Standard deviation*** | 15.3 | 22.9 | 23.9 | 23.0 | 20.4 | 26.4 | 18.8 | 17.8 | 19.0 | 22.3 | 25.1 | 30.9 | |
| ***Correlation*** | 1.00 | 0.27 | 0.50 | 0.45 | 0.38 | 0.25 | 0.42 | 0.57 | 0.49 | 0.43 | 0.47 | 0.47 | **US** |
| | | 1.00 | 0.36 | 0.39 | 0.36 | 0.35 | 0.40 | 0.42 | 0.42 | 0.38 | 0.29 | 0.34 | **JP** |
| | | | 1.00 | 0.54 | 0.43 | 0.34 | 0.51 | 0.64 | 0.56 | 0.42 | 0.47 | 0.48 | **GB** |
| | | | | 1.00 | 0.61 | 0.44 | 0.66 | 0.61 | 0.61 | 0.40 | 0.37 | 0.28 | **FR** |
| | | | | | 1.00 | 0.39 | 0.64 | 0.69 | 0.68 | 0.47 | 0.30 | 0.28 | **DE** |
| | | | | | | 1.00 | 0.41 | 0.37 | 0.37 | 0.36 | 0.23 | 0.19 | **IT** |
| | | | | | | | 1.00 | 0.66 | 0.63 | 0.42 | 0.30 | 0.31 | **NL** |
| | | | | | | | | 1.00 | 0.71 | 0.47 | 0.41 | 0.41 | **BE** |
| | | | | | | | | | 1.00 | 0.50 | 0.39 | 0.37 | **CH** |
| | | | | | | | | | | 1.00 | 0.40 | 0.36 | **SE** |
| | | | | | | | | | | | 1.00 | 0.42 | **AT** |
| | | | | | | | | | | | | 1.00 | **SG** |

**US** = United States
**JP** = Japan
**GB** = Great Britain
**FR** = France
**DE** = Germany
**IT** = Italy
**NL** = Netherlands
**BE** = Belgium
**CH** = Switzerland
**SE** = Sweden
**AT** = Australia
**SG** = Singapore

**Note: The means and standard deviations are measured in per cent per annum. The raw data are MSCI monthly country returns in excess of the eurodollar rate (which averaged 7 per cent).**
**Figures are annualized by multiplying the mean monthly returns by 12 and the standard deviation of monthly returns by the square root of 12.**

deviation – which from Table 1 is 7.8/23.9 = 0.33 – and conclude they should not diversify because the British trade-off of 0.33 is worse than the US figure of 0.37. This conclusion is wrong.

## Underlying logic

To see why, one should recognize that the expected excess return on a portfolio of US and British equity would be the weighted sum of the expected excess returns on the two country returns, where the weights are the shares of wealth invested in each of the two countries (see Equation 1).

The variance of the portfolio is the squared weight on the US return times the variance of the US return, plus the squared weight on the British return times the variance of the British return, plus two times the product of the two investment weights times the covariance between the two country returns (see Equation 2).

From differential calculus we know that the effect of adding British equity to the expected portfolio excess return is simply the British expected return, while the effect on the variance of the portfolio is given by the covariance of the British return with the US return. Thus, the ratio of expected portfolio return to the variance of the portfolio return goes up if the ratio of the expected return on British equity to its covariance with the US is larger than

EQUATIONS

**Equation 1**

Expected portfolio excess return = (% invested in US x expected US excess return) + (% invested in GB x expected GB excess return)

**Equation 2**

Variance of portfolio return = [(% invested in US)$^2$ x (variance of US excess return)] + [(% invested in GB)$^2$ x (variance of GB excess return)] + [2 x (% invested in US) x (% invested in GB) x (covariance of US excess return and GB excess return)]

**Equation 3**

Risk-return trade-off improves if:

$$\frac{\text{expected GB excess return}}{\text{covariance of US excess return and GB excess return}} < \frac{\text{expected US excess return}}{\text{variance of US excess return}}$$

the ratio of the expected return on the US to the variance of the return on the US (see Equation 3).

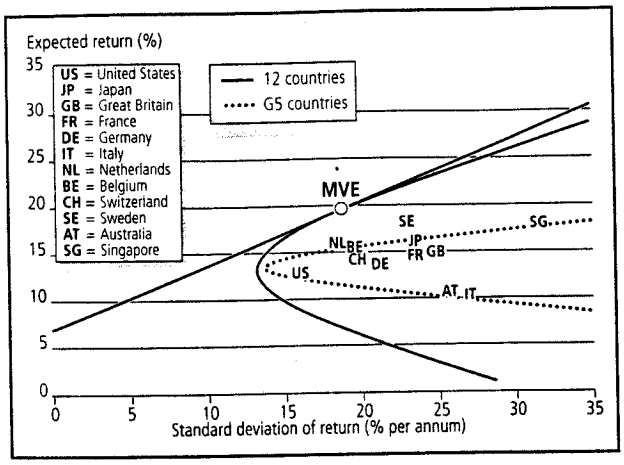
We can rephrase the argument in terms of expected returns and standard deviations by recognizing that the covariance is the correlation coefficient times the product of the two standard deviations. So, US investors should add British equity if the ratio of British expected return to standard deviation divided by the correlation between the US and British returns is greater than the ratio of US expected return to its standard deviation. The British statistics produce a result of $7.8/(23.9 \times 0.50) = 0.65$. This easily exceeds the US figure of $(5.7/15.3) = 0.37$. A similar result comes out for the other countries, except Australia which comes out lower, at 0.30.

The average correlation between the US return and returns on the other countries is 0.43. It is this low correlation between country returns that generates a significant improvement in the risk-return trade-off. Let's see how our US investor can use this to generate a portfolio that has an optimal risk-return trade-off.

## An optimal portfolio

Figure 1 has expected return on the vertical axis (equal to the excess return from Table 1 plus the eurodollar rate, which averages out at 7 per cent) and standard deviation of return on the horizontal axis. Points corresponding to expected returns and standard deviations from Table 1 are labelled with the country codes. The upper half of the solid curved line represents the efficient frontier, that is the minimum standard deviation of a portfolio of the 12 country returns that can be achieved for a given level of expected return on the portfolio. The dashed line represents the efficient frontier for a US investor who invests only in G5 countries (US, Japan, Great Britain, France and Germany). The point labelled MVE, the mean-variance efficient point, corresponds to the point of tangency between a straight line starting from the risk-free return on the vertical axis and the efficient frontier. The MVE point corresponds to a specific portfolio investment in the 12 countries that I'll call the global portfolio.

FIGURE 1 Mean standard deviation frontiers 1970–2000




An investor with no equities gets the risk-free return, which averaged 7 per cent during this sample period. Increasing investment in the global portfolio moves the investor to the top right along the straight line, increasing expected return and risk. Because the expected excess return of the global portfolio is 12.6 per cent and the standard deviation of the global portfolio is 18.6 per cent, the trade-off between the expected excess return and standard deviation for the global portfolio is 12.6/18.6 = 0.68.

Notice that for the same standard deviation as the US equity portfolio – 15.3 per cent – the global investor can have an increase of almost 5 per cent in expected return, from 12.7 per cent to 17.6 per cent. Alternatively, the investor can accept the same expected return as the US portfolio while reducing the standard deviation of the portfolio to below 10 per cent. Investing only in G5 countries also offers an improvement in the risk-return trade-off for a US investor, but the improvement is not as great as from the global portfolio.

This analysis uses historical data from 1970 to 2000 to estimate true expected returns, variances and covariances. Why might it misrepresent the case for diversification? First, estimating expected returns is difficult, so average excess returns are measured with substantial error. In choosing a sample period, it is important to include several good and bad periods to avoid bias. For example, calculating average returns from 1980 to 2000 would substantially overstate the true expected excess returns because this period does not contain sufficiently problematic experiences, such as recessions and major wars, that are associated with poor equity performance. Omitting the 1970s, the average excess returns on equities exceed the average returns in Table 1 by anywhere between 1.5 per cent and 5 per cent, depending on the country.

One can also use theory to help determine an appropriate expected return. When academic Jacob Thomas and analyst James Claus (2001) combine

analysts' earnings forecasts for major countries with a financial valuation model, they find expected excess returns of just 3 per cent.

Second, some past returns are probably poorer representations of what to expect than others. Japan's average excess return of 8.8 per cent represents very good performance in the 1980s, yet is poor for the 1990s. What should we expect going forward? Is Japan mired in recession or is a return to growth around the corner?

Third, the analysis does not constrain all the portfolio positions in the different countries to be positive, and the MVE portfolio takes short positions in 5 of the 12 countries. Many investors avoid short positions in portfolios. Allowing only long positions reduces, but does not eliminate, gains from international diversification. For example, the risk-return trade-off for a global portfolio whose weights correspond to the average market capitalizations of the 12 countries during the sample period is 6.9/14.0 = 0.49.

Fourth, there is evidence that correlations of country returns are increasing, especially in down markets. As technology progresses and markets become more integrated, we should expect correlations to increase. The average correlation between returns for the US and the other countries calculated for the last five years of the sample is 0.58, substantially above the 0.43 for the full sample period. Could future correlations be even higher?

*The New York Times* article cited earlier indicates that correlations calculated over three-year rolling intervals between the US market and developed foreign markets were as low as 0.15 in early 1987 and now stand slightly below 0.8. Further, academics François Longin and Bruno Solnik (2001) have demonstrated that correlations across countries are especially large when the US market experiences a large drop. Thus, exactly when US investors have the greatest need for the benefits of diversification, they do not materialize. Does this evidence indicate that international diversification is unwarranted?

Academics Andrew Ang and Geert Bekaert (2000) have found that correlations across countries do increase in highly volatile markets, confirming the findings of Longin and Solnik. Yet Ang and Bekaert still find substantial value from international diversification because correlations fall when equity markets are doing well and volatility is lower. It seems unlikely that the world economy is so integrated that future correlations are going to remain as high as they may now seem. There is simply too much diversity in government policies and business cycles to think otherwise.

It is also possible to diversify internationally by choosing the equities of a country based on some measurable criterion and not just by their geographic location. Investment managers often use the ratio of a company's book value to its equity market value (the B/M ratio) to classify companies as "value" stocks (ones with high B/M) and "growth" stocks (ones with low B/M).

Academics Eugene Fama and Kenneth French (1998) found that value stocks in the US and major countries in MSCI's EAFE index had substantially higher average returns than growth stocks between 1975 and 1995. Fama and French rank companies in the MSCI index of a country by B/M. This ranking produces a high book-to-market portfolio (HB/M) of companies in the top 30 per cent of B/M and a low book-to-market portfolio (LB/M) of companies in the lowest 30 per cent. Differences between country portfolios are substantial,

from Japan's 9.9 per cent to Italy's –7.0 per cent; with the US at 6.8 per cent and the UK at 4.2 per cent. There is also benefit from diversification because the correlations of returns across countries on portfolios that long the HB/M companies and short the LB/M companies of a country are low. For example, the average correlation of returns on the high and low portfolios for these countries with the equivalent US portfolio is 0.10.

These arguments suggest there is ample opportunity for a US investor to form a globally diversified portfolio that improves upon the risk-return trade-off from investing only in the US. However, knowing the right percentage of foreign equity is difficult. A world market portfolio would require US investors to put half of their investments in foreign equity because US equity represents about half of the world economy. This is the UBS Brinson advice. Will US investors diversify that much? Probably not, because the US did very well in the 1990s and correlations of returns across countries are high. Even so, this author is uncomfortable with Merrill Lynch's 5 per cent level. The US has not always produced the best returns. I also expect future correlations to be low enough to give a substantial benefit from international diversification.



## Further reading

Ang, A. and Bekaert, G. (2000) "International asset allocation with regime shifts", National Bureau of Economic Research working paper 7056 (http://www.columbia.edu/~aa610).

Fama, E.F. and French, K. (1998) "Value versus growth: the international evidence", *Journal of Finance*, 53, 1975–99.

Longin, F. and Solnik, B. (2001) "Extreme correlation of international equity markets", *Journal of Finance*, 56, 2, 649–76.

Thomas, J. and Claus, J. (2001) "Equity premia as low as three per cent? Evidence from analysts' earnings forecasts for domestic and international stock markets", working paper (http://www.columbia.edu/~jkt1/research.html).