

# Chapter 9

## The Case for International Diversification

- The domestic and foreign assets have annualized standard deviations of return of  $\sigma_d = 15\%$  and  $\sigma_f = 18\%$ , respectively, with a correlation of  $\rho = 0.5$ . The variance ( $\sigma_p$ ) of the portfolio invested 80% in the domestic asset and 20% in the foreign asset is

$$\sigma_p^2 = (0.8^2 \times \sigma_d^2) + (0.2^2 \times \sigma_f^2) + (2 \times 0.8 \times 0.2 \times \rho \times \sigma_d \times \sigma_f)$$

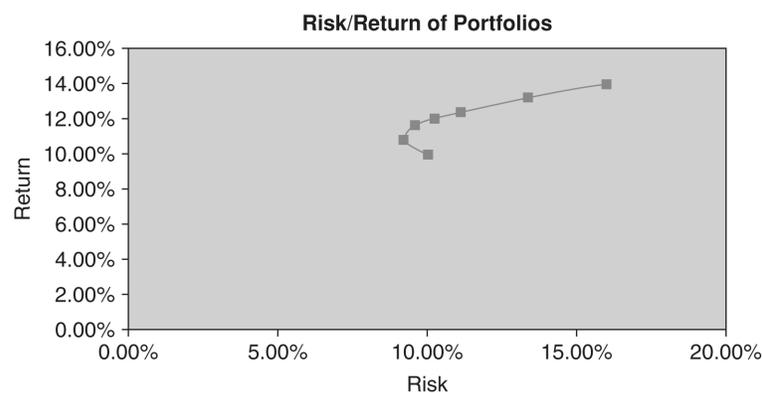
$$\sigma_p^2 = (0.8^2 \times 15^2) + (0.2^2 \times 18^2) + (2 \times 0.8 \times 0.2 \times 0.5 \times 18 \times 15) = 200.16$$

$$\sigma_p = \sqrt{200.16}, \text{ or } 14.15\%$$

- For each portfolio, expected return is calculated using Equation 9.1, and portfolio standard deviation is calculated using Equation 9.2. Expected returns and standard deviations for the portfolios are listed in the following table.

Invested in Asset 1	Invested in Asset 2	Portfolio Expected Return	Portfolio Risk
100%	0%	10.00%	10.00%
80%	20%	10.80%	9.19%
60%	40%	11.60%	9.61%
50%	50%	12.00%	10.25%
40%	60%	12.40%	11.11%
20%	80%	13.20%	13.34%
0%	100%	14.00%	16.00%

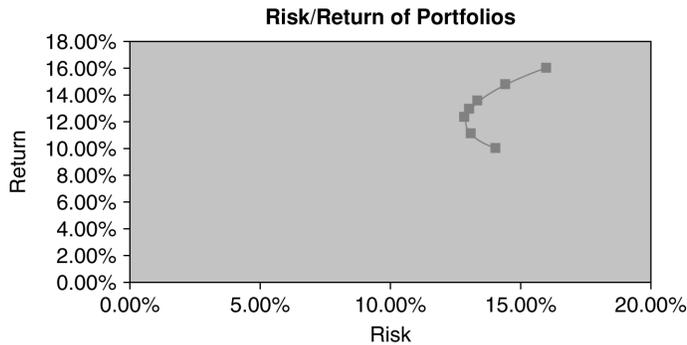
- The plot of the portfolios on a risk–return graph is provided here:



3. a. For each portfolio, expected return is calculated using Equation 9.1, and portfolio standard deviation is calculated using Equation 9.2. Expected returns and standard deviations for the portfolios are listed in the following table.

**When  $\rho = 0.5$ :**

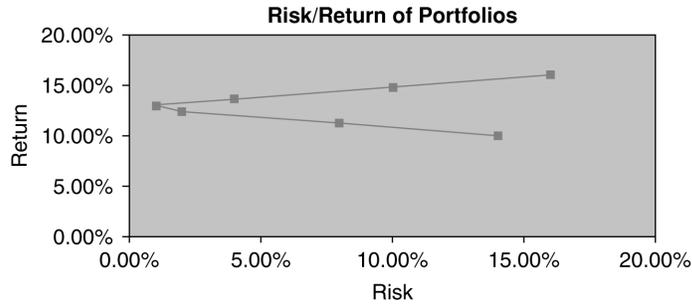
Invested in Asset 1	Invested in Asset 2	Portfolio Expected Return	Portfolio Risk
100%	0%	10.00%	14.00%
80%	20%	11.20%	13.10%
60%	40%	12.40%	12.86%
50%	50%	13.00%	13.00%
40%	60%	13.60%	13.31%
20%	80%	14.80%	14.41%
0%	100%	16.00%	16.00%



- b. For each portfolio, expected return is calculated using Equation 9.1, and portfolio standard deviation is calculated using Equation 9.2. Expected returns and standard deviations for the portfolios are listed in the following tables for various correlations.

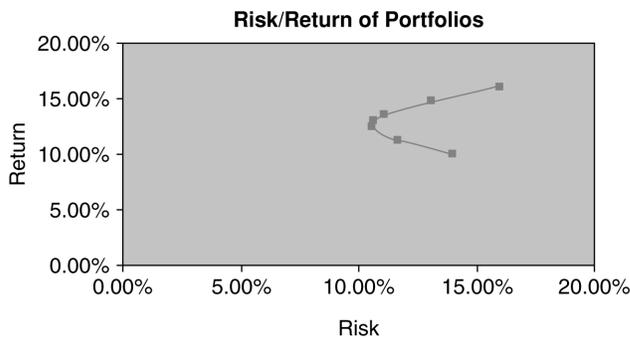
**When  $\rho = -1.0$ :**

Invested in Asset 1	Invested in Asset 2	Portfolio Expected Return	Portfolio Risk
100%	0%	10.00%	14.00%
80%	20%	11.20%	8.00%
60%	40%	12.40%	2.00%
50%	50%	13.00%	1.00%
40%	60%	13.60%	4.00%
20%	80%	14.80%	10.00%
0%	100%	16.00%	16.00%



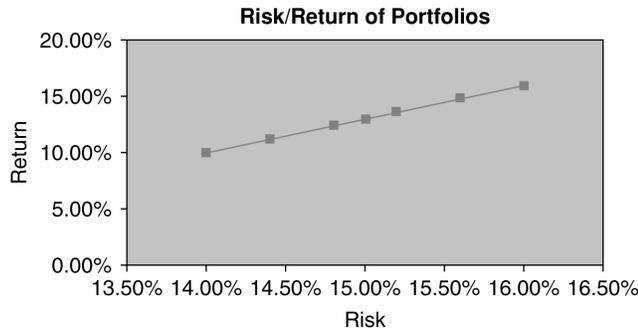
When  $\rho = 0$ :

Invested in Asset 1	Invested in Asset 2	Portfolio Expected Return	Portfolio Risk
100%	0%	10.00%	14.00%
80%	20%	11.20%	11.65%
60%	40%	12.40%	10.56%
50%	50%	13.00%	10.63%
40%	60%	13.60%	11.11%
20%	80%	14.80%	13.10%
0%	100%	16.00%	16.00%



When  $\rho = 1.0$ :

Invested in Asset 1	Invested in Asset 2	Portfolio Expected Return	Portfolio Risk
100%	0%	10.00%	14.00%
80%	20%	11.20%	14.40%
60%	40%	12.40%	14.80%
50%	50%	13.00%	15.00%
40%	60%	13.60%	15.20%
20%	80%	14.80%	15.60%
0%	100%	16.00%	16.00%



- c. The graphs for Parts (a) and (b) illustrate that, holding all else constant, lower correlations translate into lower levels of portfolio risk, without sacrificing expected return.
4. a.  $\sigma_f^2 = \sigma^2 + \sigma_s^2 + 2\rho\sigma\sigma_s = (8.5)^2 + (5.5)^2 + 2(0)(8.5)(5.5) = 102.5$   
 $\sigma_f = 10.12\%$   
 Contribution of currency risk =  $10.12 - 8.5 = 1.62\%$
- b.  $\sigma_f^2 = \sigma^2 + \sigma_s^2 + 2\rho\sigma\sigma_s = (8.5)^2 + (5.5)^2 + 2(0.25)(8.5)(2.5) = 125.9$   
 $\sigma_f = 11.22\%$   
 Contribution of currency risk =  $11.22 - 8.5 = 2.72\%$
- c.  $\sigma_f^2 = \sigma^2 + \sigma_s^2 + 2\rho\sigma\sigma_s = (8.5)^2 + (5.5)^2 + 2(-0.45)(8.5)(5.5) = 60.4$   
 $\sigma_f = 7.77\%$   
 Contribution of currency risk =  $7.77 - 8.5 = -0.73\%$
- d. When the correlation between the asset return, in local currency, and the exchange rate movement is low enough, currency risk may actually reduce the asset risk measured in dollars. However, in cases in which the correlation is zero or positive, asset risk in dollars is higher than asset risk in local currency because of currency risk.
5. a. If the correlation between stock market returns and exchange rate movements were equal to zero, the dollar volatility of the German stock market would be
- $$\sigma_f^2 = \sigma^2 + \sigma_s^2 + 2\rho\sigma\sigma_s = (18.2)^2 + (11.7)^2 + 2(0)(18.2)(11.7) = 468.13$$
- $$\sigma_f = 21.64\%$$
- b. Because the actual dollar volatility is only 20.4 percent, we conclude that the correlation between stock market returns and exchange rate movements is negative.
6. a. If the correlation between bond market returns and exchange rate movements were equal to zero, the dollar volatility of the German bond market would be
- $$\sigma_f^2 = \sigma^2 + \sigma_s^2 + 2\rho\sigma\sigma_s = (5.5)^2 + (11.7)^2 + 2(0)(5.5)(11.7) = 167.14$$
- $$\sigma_f = 12.93\%$$
- b. Because the actual dollar volatility is 13.6 percent, we conclude that the correlation between bond market returns and exchange rate movements is positive. When the euro gets weaker, U.S. investors lose on the exchange rate and also on bond market returns measured in euros. This can be explained by the idea that a weak currency usually goes with rising interest rates (and negative bond market return).

7. The best diversification vehicle is an asset whose value gets significantly higher when the rest of the portfolio's value is low, and thereby partially offsets the loss of other assets. The best vehicle is an asset with a negative correlation (so it goes up when the portfolio goes down) and high volatility (large upswings when the portfolio goes down). Thus the statement is correct.
8. a. The markets that are highly correlated (currency-hedged) with Germany are the European countries and, in particular, the French market (0.87) and the Swiss market (0.77). Both Switzerland and France are countries bordering Germany, and their economies are highly dependent on the German economy. Besides, Swiss companies are mostly multinationals that are very active on the German market. France and Germany belong to the EU, while Switzerland does not (although it has numerous accords with the EU). The strong linkage between EU countries clearly shows up in the Exhibit.

Hong Kong (0.39) and Japan (0.42) have relatively low correlations. This reflects the fact that these are markets with loose links to the German economy.

- b. The markets that are highly correlated (currency-hedged) with the United States are the Canadian market (0.73) and some European markets (e.g., 0.74 for the British market).

Canada is obviously highly dependent on the U.S. economy. Switzerland is a small economic power with very active multinational groups on the U.S. market. The U.K. economy is very open to international investments. It has a great number of banks, insurance companies, and other financial institutions investing on the U.S. market, which explains the high correlation.

Italy (0.55) and Japan (0.41) have low correlations with the United States. Italy is a South European-oriented economy with a weaker link to the U.S. economy. Its development is explained by local factors such as integration into Europe. Japan has traditionally been less correlated with the United States, in part because of the importance of regional factors.

9. A review of the correlations in Exhibit 9.5 indicates that correlations of the U.S. bond market with foreign bond markets are well below 0.50, when measured in dollar terms. These low correlations can be attributed to the fact that national monetary/budget policies are not fully synchronized. The conclusions reached regarding the risk-reducing benefits of low correlations in global equity markets also apply to global bond markets. Foreign bonds are therefore a good vehicle of diversification and can significantly reduce the volatility of the portfolio. This makes foreign bonds attractive to a U.S. investor, despite foreign exchange risk.
10. Exhibit 9.5 indicates that correlation of the U.S. equity market with global bond markets is quite low, suggesting that adding bonds from foreign countries can reduce overall global portfolio risk. Thus, from the viewpoint of a U.S. investor, Exhibit 9.5 provides strong justification for including global bonds in a global portfolio strategy. In addition, empirical research shows that a portfolio of global stocks and bonds dominates U.S. stock/bond portfolios.
11. In general, over the long run, the performance of stock markets is closely tied to national economic factors. For example, in the case of Japan, real average annual GDP growth was 4.51 percent from 1971 to 1980, and 4.15 percent from 1981 to 1990 (see Exhibit 9.11). These real GDP growth rates dominated growth rates for the United States, Europe, and the Organization for Economic Cooperation and Development (OECD) for the same periods. This is reflected in stock market performance numbers presented in Exhibit 9.10. For the period from 1971 to 1990, the average annual mean return for Japanese stocks was 20.68 percent, much higher than stock returns in the United States and Europe. From 1991 to 2000, it was the United States that had the highest real GDP growth rates and best-performing stock market.

Economic flexibility is another important factor. Countries such as France, Canada, and Sweden have suffered from wage and employment rigidities not typically faced in many emerging countries. This economic flexibility is likely to reflect itself in stock market performance in the long run. Many countries are improving their global competitiveness, which should be reflected in market valuation.

12. Currency fluctuations have an impact on the total return and volatility of foreign currency–denominated investments. However, there are at least four reasons why currency risk is not a barrier to international investment:
  - Market and currency risks are not additive. This is because the correlation between currency and market movements is quite weak and sometimes negative. Consequently, the contribution of currency risk to the risk of a foreign investment is quite small.
  - Currency risk can be hedged away by selling currency futures or forward contracts.
  - If foreign assets represent a small portion of the portfolio, then the contribution of currency risk is insignificant (Jorion, 1989). Also, if the portfolio consists of multiple currencies, some portion of the risk is diversified away.
  - Currency risk decreases with the length of the investment horizon, because exchange rates tend to revert to fundamentals.
  
13. There is no doubt that financial markets are becoming increasingly interconnected worldwide. Some of the reasons for this are as follows:
  - *Free trade.* Because of the World Trade Organization (WTO) and as a result of regional agreements such as NAFTA, ASEAN, and the EU, national economies are opening up to free trade. This has caused national economies to become more integrated.
  - *International capital flows.* The amount of foreign investment is growing rapidly on all national markets. Profit opportunities across markets are being arbitrated away.
  - *Capital market deregulation.* Deregulation has opened markets to foreign investors, and markets that used to be segmented are becoming more integrated.
  - *Corporations are becoming more global.* As corporations become more global, they derive significant portions of their income from overseas, and thus valuations are impacted more by global factors and less by country factors. This has caused stock-price correlations to increase, because corporate valuations are determined by a similar set of factors.
  
14. *Correlation breakdown* is a reference to the finding that during periods of crisis, when market volatility is high, correlations across markets increase dramatically. This phenomenon has been documented during major market events, such as the October 1987 crash and the Asian markets crisis of 1997.

The increase in correlations across international financial markets during periods of crisis is problematic because one of the primary reasons for diversifying overseas is risk reduction due to low correlations. It appears, however, that correlations rise at the worst possible time, causing the benefits of international diversification to disappear when they are most needed. Further exacerbating the situation is the finding that distributions of returns tend to have “fat tails” rather than being normal. Fat tails imply that the occurrence of market crashes is likely to be more frequent than under “normality.” This, in turn, suggests that periods of high correlations are more likely to occur.

15. There are a number of barriers to international investment, including the following:
  - *Familiarity with foreign markets.* Many investors are not familiar with business customs overseas and are therefore inclined to invest in domestic companies.
  - *Political risk.* This is a major concern, especially in emerging markets in which political and economic instability have had a debilitating impact on security prices in local-currency and dollar terms.

- *Market efficiency.* Liquidity risk is a major concern for investors venturing overseas because it limits the ability of large investors to change asset allocations without signaling their actions to the rest of the market. Capital controls are another source of liquidity risk because such controls limit the repatriation of funds to the home country. In many countries, market efficiency is limited by the fact that companies do not provide accurate and timely information. Price manipulation and insider trading also limit market efficiency and benefit local investors at the expense of foreign investors.
  - *Regulations.* Certain countries have regulations that inhibit foreign investment by limiting the amount of overseas investment by local investors. Other countries limit the amount of foreign ownership in domestic firms. These regulations generally limit the scope of international investment.
  - *Transactions costs.* Transactions costs tend to be higher for international investments relative to domestic investments. The higher transactions costs for international investments are due to higher brokerage commissions and market impact, custody costs, and higher portfolio management fees.
  - *Taxes.* Taxes have a relatively small impact on the international investment decision. Withholding taxes on dividends are typically reclaimed after a few months, but this represents an opportunity cost because funds are tied up.
  - *Currency risk.* Although currency risk can be hedged, it does lead to additional administrative and trading costs and thus adds to the overall cost of international investment.
16. In the past, pure country return correlations were much lower than pure industry return correlations. Exhibit 9.14 shows that country correlations were lower than industry correlations between 1993 and 1999. Thus, for this period, the two-step procedure of first determining country allocations and then industry allocations within each country was justified. However, Exhibit 9.14 also shows that since mid-2000, industry correlations have been lower than country correlations. This means that while diversification across countries is still important, diversification across industries has become more important for risk-diversification purposes. In addition, when you consider that many corporations now operate globally while still remaining focused in their core businesses, it becomes difficult to determine the level of exposure to country factors. In this global environment, industries cut across countries. Thus, a better approach to global portfolio selection, one that can capture full benefits of international risk diversification, is a cross-industry, cross-country approach.
17. The distribution of returns in emerging markets is not symmetric. This calls into question the applicability of the standard deviation as a measure of risk, because the standard deviation is appropriate only if returns are normal. Emerging markets do have a higher standard deviation than developed markets, because they are more volatile. But their return distribution also have fat tails, meaning that there is a significant probability of a large shock, positive or negative. Emerging markets go through periods of exuberance with huge positive returns and periods of crisis with huge negative returns. The return distribution is also asymmetric (“skewed”), because there can be years where the returns exceed 100 percent while the maximum loss is constrained to be less than 100 percent.

Furthermore, there are political risks in many emerging markets. The development of many emerging markets is tied to political and economic reforms. However, economic growth can result in serious imbalances that lead to political and social upheavals. Foreign investors could be subject to currency and capital controls that limit their ability to repatriate invested capital or profits. Thus, political risk must be taken into account when measuring risk in emerging markets.

Studies have shown that emerging markets are subject to periodic, prolonged crises that tend to spread to all other emerging markets in the region. Another issue that complicates the picture is the finding that for emerging markets, local stock markets' changes and exchange rate movements display positive correlations, meaning that foreign investors suffer more from currency risk in emerging markets.

18. Although it is true that local risks in emerging markets are high because of volatility, liquidity, and political risk, correlations between emerging markets and developed markets are low. The low correlations mean that some of the higher risk in emerging markets can be diversified away in a global portfolio. Thus, the contribution of emerging markets to the total risk of a global portfolio is not likely to be very large.

Expected returns in emerging markets are higher because the economies of emerging markets are expected to grow at a higher rate than developed markets. Emerging market economies are expected to grow at a higher rate because of lower labor costs, lower levels of unionization, and rapid growth in domestic demand. In addition, the introduction of pension funds and the trend to privatization have benefited local emerging stock markets.

Another factor that favors emerging-market investment is research that indicates emerging markets are somewhat segmented from international markets. Segmented markets imply that assets are mispriced and may offer portfolio managers investment opportunities at attractive valuations.

19. a. Arguments in favor of adding international securities include the following:
- i. Benefits gained from broader diversification, including economic, political and/or geographic sources
  - ii. Expected higher returns at the same or lower (if properly diversified) level of portfolio risk
  - iii. Advantages accruing from improved correlation and covariance relationships across the portfolio's exposures
  - iv. Improved asset allocation flexibility, including the ability to match or hedge non-U.S. liabilities
  - v. Wider range of industry and company choices for portfolio construction purposes
  - vi. Wider range of managers through whom to implement investment decisions
  - vii. Diversification benefits realizable despite the absence of non-U.S. pension liabilities

At the same time, there are a number of potential problems associated with moving away from a domestic-securities-only orientation:

- i. Possible higher costs, including those for custody, transactions, and management fees
- ii. Possible reduced liquidity, especially when transacting in size
- iii. Possible unsatisfactory levels of information availability, reliability, scope, timelessness, and understandability
- iv. Risks associated with currency management, convertibility, and regulations/controls
  - v. Risks associated with possible instability/volatility in both markets and governments
  - vi. Possible tax consequences or complications
  - vii. Recognition that EAFE underperformed in the 1990s

- b. A policy decision to include international securities in an investment portfolio is a necessary first step to actualization. However, certain other policy-level decisions must be made prior to implementation. That set of decisions would include the following:
- i. What portion of the portfolio shall be invested internationally, and in what equity and fixed-income proportions?
  - ii. Shall all or a portion of the currency risk be hedged, or not?
  - iii. Shall management of the portfolio be active or passive?
  - iv. Shall the market exposures be country/marketwide (top-down) or company/ industry-specific (bottom-up)?
  - v. By what benchmarks shall results be judged?
  - vi. How will manager style be incorporated into the process?
  - vii. How will the process reflect the important differences in risk between developed non-U.S. markets and emerging markets?

Until decisions on these additional policy-level issues have been made, implementation of the basic decision to invest internationally cannot begin.

20. a. The consultant is alluding to the behavior of cross-country equity return correlations during different market phases, as reported in various research studies. Specifically, the consultant is referring to the fact that correlations in down markets tend to be significantly higher than correlations in up markets. In other words, equity markets appear to be correlated more when they are falling than when they are rising.
- b. Although cross-country equity return correlations can vary significantly in the short run, they remain surprisingly low when measured over long periods of time. This implies that, from a policy standpoint, international investing still offers the potential to construct more efficient portfolios, in a risk–return trade-off sense, than ones constructed using domestic assets only. This is so because global investing has the potential to reduce risk without sacrificing returns, even with adverse short-run outcomes.