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International Diversification for the Individual: A Review

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This paper reviews aspects of the literature on international investing that should be of interest to individual investors. Three modern issues are covered: (1) the benefits of international diversification as the global markets continue to integrate; (2) the problem of currency exposure; and (3) effective means of achieving international diversification. Strategies are discussed which enable the individual to apply suggestions from the research. By restricting the scope of the review to issues of most interest to the individual, we do not review research on international asset pricing theory and international market efficiency and "anomalies."

I. Introduction

Individual investors have seen, and are continuing to see, significant growth in international investment opportunities. The globalization of investment ownership is part of the general integration of the world's financial markets, made possible by technological advances and a worldwide liberalization of regulations regarding foreign ownership.

Domestic mutual funds now offer easy access to individuals interested in international funds, global funds, and country-specific funds. Today, the existence of international mutual funds allows individual investors to purchase stocks in countries such as Austria, Indonesia, Ireland, Korea, Malaysia, Mexico, Portugal, Singapore, Taiwan, Thailand, and Turkey.

II. Potential International Investment Strategies

The expanded opportunity set available to investors allows three distinct types of international investment strategies:

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1. Active Strategies

The first is an active "abnormal returns" strategy involving either specific security selection, or tactical asset allocation between "index" funds of various countries. The analysis behind these two strategies differs, as the tactical asset allocation strategy involves an analysis of countries' economic resources and policies within the global economy, while security selection requires, in addition, traditional security-specific analysis.

2. A Passive Diversification Strategy

The second strategy is international diversification, which is a passive, strategic asset allocation strategy, where the asset classes are the "index" funds of various countries. The Markowitz efficient frontier analysis, which identifies optimal portfolios considering risk and return, is particularly well-suited for determining these strategic allocations in the global context.

3. Currency Betting

The third strategy is "currency betting." Exchange rate changes can add to or subtract from returns on international investments in their local markets. Currency bets can be separated, to some extent, from investment strategies by currency hedging/borrowing strategies, or made on their own by simple bank deposits denominated in the currency desired.

This paper reviews some research on international diversification. The emphasis is placed on diversification strategy, since it is likely to be the most relevant to individual investors. In addition, some relevant concepts in the separation of currency betting from internationally diversified investments are covered. The analyses behind active security selection and tactical asset allocation strategies are not covered, under the assumption that such strategies are more the province of professional managers, rather than individuals. After the review of some concepts and evidence related to international diversification and currency hedging, attention will be paid to methods available to individuals for making international investments.

III. International Diversification

A. Basic Idea of International Diversification

The potential benefits from international diversification were originally demonstrated by Grubel (1968) and Levy and Sarnat (1970). These studies showed that by diversifying across nations whose market cycles were not perfectly correlated, investors could lower the volatility of portfolio returns at any level of expected return. The research methodology was to derive efficient portfolios using historical

data on international stock markets. The efficient frontiers were shown to dominate those constructed with domestic securities only.

A number of studies have followed the original ones over the last 25 years or so. See, for example Solnik (1974), Lessard (1976), Ibbotson, Carr, and Robertson (1982), Solnik and Noetzlin (1982), Grauer and Hakansson (1987) and others mentioned below. The entire line of research has consistently continued to advocate that international diversification is valuable.

The efficient frontier methodology in the early international diversification research employed return parameters on a home-currency basis. That is, home-currency returns included not only the performance of international investments in their local markets, but also the appreciation/depreciation of home currency versus foreign currency. Thus while international diversification will appear beneficial if local market returns are high and less than perfectly correlated with home market returns, performance will also be enhanced if the foreign currencies appreciate relative to the home currency, during the data time period.

Let us use a numerical example to simplify the exposition and illustrate major points. A "two-country" example is employed, even though actual applications would include multiple countries. At first, the numerical example reviews some obvious concepts of international diversification; later, the example will be extended to less-obvious concepts.

The numerical example is for a single-period investment horizon. The basic information for the example is given in Table 1.

Table 1 shows that there are five (5) possible "states of nature" for the single-period investment in a domestic ("United States") stock index (U), for the investment in a foreign ("European") stock index (E), and for the exchange rate expressed in terms of domestic currency per foreign currency ($/ECU).

The $ returns on the European market ($E—the last column in Table 1) are derived from the local European market returns (E) and the currency appreciation rates, via the well-known Equation (1):

TABLE 1.

	Market returns in local currency		*Pct change*	*$ Returns European*
"State"	*United States (U)*	*Europe (E)*	*$/ECU*	*($E)*
1	0.17	0.15	0.25	0.4374
2	0.12	0.33	0.25	0.6625
3	0.27	0.09	-0.2	-0.128
4	0.07	0.21	0	0.21
5	-0.03	-0.03	-0.2	-0.224
Mean	0.12	0.15	0.02	0.1916
Std	0.1	0.12	0.2015	0.3339

$$r_d = (1 + r_1)(1 + e) - 1 \quad (1)$$

where

r_d = the rate of return in domestic currency

r_1 = the rate of return of the foreign market in local foreign currency

e = the appreciation rate of the foreign currency in terms of its price per domestic currency

From the basic information in Table 1, it is possible to compute the correlation between the U.S. market and the $ returns on the European market for purposes of finding optimal portfolios. The reader can easily verify that the correlation is .1544. Note also that the $/ECU rate is also positively correlated (.7692) with the local currency return in Europe. This means that, on average, the European market rises as the ECU appreciates relative to the U.S. dollar.

One reason for performing this analysis numerically, rather than analytically, is that since the analysis requires the multiplication of two random variables, the rate of return of the foreign market in local currency and the exchange rate, finding correlations between U and $E would be very complex if attempted analytically.

The efficient frontier for U and $E is shown in Figure 1 as the rightmost one; the other curves will be explained shortly. Clearly, international diversification has benefitted the U.S. $-based investors, since the purely domestic U.S. market risk/return (point U) plots below the U – $E efficient frontier in Figure 1.

B. Additional Findings in International Diversification

While the analysis above provides the general idea behind international diversification, the literature has documented some significant findings. Some of these are reviewed below.

(1) Levy and Sarnat (1974) emphasized how low or negative correlations between less developed country stock returns would allow for more

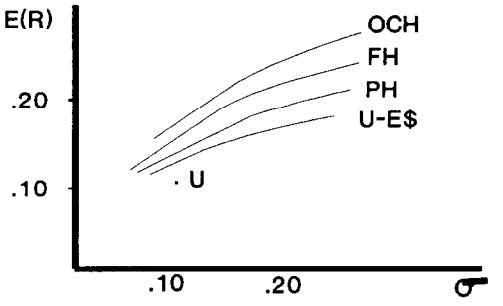

Figure 1.

effective international diversification. Returns of less developed countries were commonly less correlated with other market returns, and generally assigned more weight in the efficient portfolios. The correlations of returns among industrialized countries were relatively higher, so that diversification among markets offered less benefit. Errunza (1977) and others provided further demonstration of the potential benefits of diversifying into less developed countries.

(2) Grubel and Fadner (1971) and others showed that diversification benefits were achievable for various investment horizons.

(3) Solnik (1974) focused on foreign stocks rather than on indices to substantiate that a larger number of international stocks could reduce risk further.

(4) Biger (1979), McDonald (1973), and others showed how the benefits from international diversification varied with the home country perspective, although some benefits were achievable for all perspectives. The degree of potential risk reduction varied among perspectives because exchange rate effects cause differences in the co-movements of stock returns among perspectives.

(5) While the usual 'default' framework for international diversification is that for equities, international diversification results hold up for bond portfolios. See Cholerton, Pieraerts, and Solnik (1986). In addition, Levy and Lerman (1988) and Jorion (1989) demonstrated the benefits of international diversification across stocks **and** bonds of various countries, over the time period they studied.

(6) Generally, research has shown that correlation coefficients depend upon the time period chosen for historical analysis. See, for example Shaked (1985) and Jorion (1985). Shaked's study found that correlations among market returns are intertemporally unstable over a short-term investment horizon. However, the correlation structure was more stable over longer-term investment horizons.

C. Market Integration and International Diversification

One of the most interesting, and heavily researched, ideas is the notion that correlation coefficients between countries' market returns are increasing over time, as a result of the evolution toward integrated worldwide markets. The research of Bertoneche (1979), Finnerty and Schneeweis (1979), Hilliard (1979), Maldonado and Saunders (1981), Shaked (1985), and others indicated that correlations are generally increasing over time.

Philippatos, Christofi, and Christofi (1983) and Roll (1989) have viewed world markets as markets of single countries tied together with a single common "factor." In particular, Roll's study of the crash of 1987 demonstrated how all of the world's stock markets fell significantly during the crash period. See also Bennett

and Kelleher (1988). Madura and McDaniel (1989) found that correlations after the 1987 crash were generally even higher than before the crash.

In related research in interest rates, Kirchgassner and Wolters (1987) analyzed the relationship among Eurocurrency market rates over the 1974-1984 period. They found that a change in the Eurodollar rate is followed somewhat by a similar change in the Euro-Deutschemark and Euro-Swiss Franc rates. Moreover, the relationship appears to be strengthening over time, presumably as a result of the evolution of global debt market linkages. See also Kool and Tatum (1988) and Glick (1990).

Thus we have an interesting "Catch-22" phenomenon. As the incentive to achieve international diversification leads to market globalization, the correlation between various countries' equity and debt markets appears to be increasing, thus reducing the potential benefits of international diversification. Nevertheless, markets may never be well-enough integrated, nor countries' economic policies well-enough coordinated, to eliminate the case for international diversification. In addition to the imperfect correlations in debt markets reported by Kirchgassner and Wolters (1987), a study by Cho, Eun and Senbet (1986), also found that equity markets were not yet well integrated despite the identification of some common world factors. Moreover, studies by Errunza and Losq (1985) and Jorion and Schwartz (1986) confirm that some degree of segmentation of the markets continues to be present.

Thus, as markets tend to integrate, increases in correlation coefficients lessen the benefits of international diversification; however, international diversification is still regarded as a viable strategy, especially as markets behave in a volatile fashion. In light of this point, the study by Eun and Resnick (1984) comparing various methods of forecasting correlations, is still quite relevant.

Once individuals have diversified internationally, it may be in their interest to consider hedging the currency exposure of their international portfolios.

IV. Hedging Currency Bets

As noted by Eun and Resnick (1988), the original international diversification studies used data from a period of fixed or relatively stable exchange rates. Due to the exchange rate volatility experienced in the 1980s, researchers and practitioners have been to adopt the view that, while international diversification is still a viable strategy relative to purely domestic investing, investors may be able to improve on the performance of internationally diversified portfolios by attempting to eliminate some currency risk.

Currency exposure adds volatility to the portfolio without offering much in the way of compensating expected returns. Perold and Schulman (1989) regard currency exposure hedging to be a "free lunch," in that risk could be reduced, while expected rates of return are maintained. The empirical results of currency hedging in studies such as those by Eun and Resnick (1988), Thomas (1988), and Jorion (1989) lend support to the idea of currency hedging.

A. The Basic Idea of Portfolio Currency Hedging

To help see the general idea behind currency hedging, let us suppose that an investor can sell forward the end-of-period foreign currency in his portfolio at the forward rate. Actually, the idea of direct forward contracting might be unrealistic for an individual, since the global interbank forward market caters to corporate treasuries and financial institutions. However, individuals can buy forward foreign currency by a simultaneous spot exchange and time-deposit. This simple transaction can be performed easily at Citibank, which has run whole-page advertisements in the *New York Times* for currency switching accounts. Branches of a bank whose home country issues the currency would also routinely perform the transaction.

To sell forward would involve a reverse transaction of borrowing the currency and spot exchanging it into the domestic currency. This loan may not be as easy as a deposit for an individual, but should be available as a brokerage service, as long as the rest of one's portfolio is on account as collateral. If such an arrangement is not easily performed now, its simple concept and usefulness for internationally diversified investors should bring it about in the near future.

An alternative transaction to a forward contract is a futures contract, which is the same concept, but involves some margin and "marking to the market." The International Monetary Market (IMM) of the Chicago Mercantile Exchange permits individuals to establish futures positions in one of several major currencies. The details of using futures to accomplish forward contracting are not within the scope of this paper: see Smith, Smithson and Wilford (1990) for an introduction to currency futures.

To follow the hedging ideas below, it will be sufficient to simply assume that the investor can either contract forward, or borrow/deposit the currency, at the "riskless interest rate" of that country, as a portfolio allocation choice.

B. The "Perfect Hedging" Strategy

Suppose the investor can contract to sell all his end-of-period currency exposure forward, by borrowing today the present value of that exposure. This hedging strategy may not be possible in reality, since the investor does not know how many "ECUs" the foreign allocation of his portfolio will be worth, since the local market return is a random variable. However, we will return to this issue shortly. Temporarily, it will be instructive to establish the performance of this strategy of "perfect hedging," under the assumption that it is possible to do it.

For simplicity, let us assume that the nominal risk free rate in Europe is equal to the one in the U.S. Thus the forward exchange rate can be assumed to be equal to the current spot rate. This simplified condition implies that, if the investor can "perfectly hedge" by contracting to sell all of the end-of-period foreign currency forward, then the returns in dollars are exactly the same as the local European returns (E). In addition to the means and standard deviations for U and E reported in

Table 1, the efficient frontier analysis needs the correlation between U and E, which the reader can verify is .25.

Figure 1 shows that the efficient frontier for the perfectly hedged (PH) strategy lies to the left of the one for the unhedged strategy. Thus even though unhedged international diversification is preferred to a pure domestic investment strategy, the hedged international diversification strategy is better than the unhedged one. This is true even though the unhedged returns are less correlated with domestic market returns. (Compare the correlation coefficient of .1544 for the unhedged versus .25 for the hedged.) The fact that the perfectly hedged strategy reduces the volatility of the foreign investment is the reason for the gains in efficiency.

It is worth noting that the composition of efficient portfolios is not the same for the unhedged and perfectly hedged strategies at various risk levels along the frontiers. Thus, it would not be possible to achieve optimal results by determining an "optimal" portfolio of international securities using unhedged ($E) return data, and then to hedge the portfolio components. Instead, one must use hedged-return data (E) to find optimal portfolios.

C. The "Fully Hedged" Strategy

As has already been noted, in reality, it may not be possible to hedge 100% of one's local currency security returns. Certainly, one cannot do this with standard forward contracts, since one does not know how much currency the foreign component will represent at the end-of-period. The only way would be for the investor to create a forward contract that allows him to stipulate the contract size at the time of settlement.

One feasible alternative strategy is to hedge 100% of the expected currency amount with standard forward contracting. For example, using the numerical returns from Table 1, if you sell forward your initial investment plus the expected local currency return of 15%, then the local currency return of 33% in state 2 means that on an original investment of 100 ECUs, 115 of end-of-period ECUs would be hedged into U.S.$, but 33 - 15 = 18 would be subject to currency exposure. At the exchange rate change of .25 for that state, the overall dollar return is .375.

The formula for the rate of return of the "fully hedged" strategy is given in Equation (2) below:

$$r_{fh} = (1 + E(r_1))(1 + f) + (r_1 - E(r_1))(1 + e) - 1 \qquad (2)$$

where f = the percentage difference between the forward exchange rate and the spot exchange rate, where both rates are expressed as domestic currency per foreign currency.

In our example, the forward exchange rate is assumed to be equal to the spot exchange rate, and the $ returns for the other states from the "Fully Hedged" (FH)

strategy are .15 for state 1, .102 for state 3, .21 for state 4, and .006 for state 5. The mean return for the FH strategy is .1686, the standard deviation is .1229, and the correlation with the U.S. market returns is .1855.

The efficient frontier, considering the FH international investment strategy, is shown in Figure 1 to the left of the two frontiers previously considered. Note the significant finding that the FH strategy of forward hedging the expected currency value of the foreign components results in a **more** efficient set than one where an investor is assumed to be able to perfectly hedge 100% of **all** the currency exposure.

D. Optimal Currency Hedging

The fact that the less-then-perfect FH hedging strategy actually outperforms the perfect hedging PH strategy implies that some amount of currency exposure may be beneficial and raises an important issue: Is there some level of currency hedging that is optimal and are there situations where it would not be advisable to hedge currency risk? As Eun and Resnick (1988) point out, the results that show hedged portfolio results to be superior to unhedged results are due to the positive correlation between the local-currency returns and the value of the currency in dollar terms. If this correlation were not positive, would the perceived "free lunch" in currency hedging still hold up? (Note also: If two stock markets are highly positively correlated, it will not be possible for the exchange rate to be positively correlated with both!)

Lee (1987) has suggested a very general formulation for the international portfolio construction problem that considers separate components for securities and currencies. Perhaps the best way to see Lee's idea is to regard foreign bills as a potential component of the portfolio. For simplicity, let us consider a numerical example which further assumes a zero risk free interest rate in the U.S. and Europe. This simplification allows the $/ECU currency returns to be viewed as the returns from a nominally-riskless investment in European bills. A negative weight on this investment would mean a short sale.

We must compute the correlation coefficient between the $/ECU and the U.S. market, which the reader can verify is .1241, and the correlation coefficient between the $/ECU and the unhedged U.S. returns on the European market ($E), which is .9698.

The lefthandmost curve in Figure 1 is labelled OCH (for optimal currency hedge) and shows the efficient frontier that is constructed by allowing the investor to invest in European stock and to hold a position in European bills in order to construct the optimal currency hedge for various levels of return and risk.

It should be noted that the optimal currency hedge is not, in general, equal to hedging the initial investment plus the expected rate of return, and that the optimal currency hedge depends upon the risk level chosen and the parameter inputs. In other words, at a portfolio standard deviation of .11, the amount of ECUs the investor should sell forward, as a percent of investment into European stocks, is

different from the hedge proportion at a different standard deviation. Depending upon the parameters and risk level, it could be that buying currency forward (a "Texas hedge") might be optimal. In applications with more markets and currencies, the correlations between currencies also affect the optimal hedge, an effect that is known as "currency diversification." Also see Levy and Sarnat (1978) for further discussion.

One of the most provocative propositions in the area of international portfolio currency hedging is Black's (1989) "Universal Hedging" formula. Black has shown that within the equilibrium conditions of a model of international portfolio investment with no cross-country investment barriers, the optimal currency hedge for an investor is neither perfect hedging (even if it could be accomplished) nor fully hedging. Instead, in Black's model optimal currency hedging can be determined by a simple formula that depends upon (a) the expected return on the world market portfolio, (b) the volatilities of the various country markets, and (c) the volatilities of various exchange rates. The hedge proportion is "universal," in that it applies to all currencies, and to any investor in any country.

Black's result is exciting in that it is a simple formula that by-passes the need for a Lee-type efficiency analysis, as long as one buys into Black's assumptions. Once again, the main assumption is equilibrium portfolio holdings by all investors in a model of international investments with no barriers.

Of course, the Black result is new and controversial. Its implications will no doubt be debated for years to come, as our understanding of optimal global investment and currency hedging evolves. Of course, as Black acknowledges, individuals who wish to make currency bets because they believe they have information that the equilibrium does not have, will be motivated to deviate from the "universal hedging" formula.

Indeed, individuals who believe they can forecast exchange rate movement better than "the market," are likely to select option strategies as part of optimal portfolio allocations. Like futures, exchange-traded options on some major currencies are available to individuals. Further elaboration is beyond our scope here; the interested reader can begin the study of currency options by referring to Smith, Smithson and Wilford (1990), and of options in internationally diversified portfolios by reading Celebuski, Hill, and Kilgannon (1990).

V. Means for Individuals to Achieve International Diversification

Technology is rapidly making it possible for an individual in one country to own specific foreign securities. For some large companies, global investment banking syndicates are helping the direct issue of securities in multiple countries, and in multiple currencies. For smaller companies and secondary market activity, an investor may already instruct his broker to buy a specific security in its home foreign market. To facilitate this process, global conventions for cross-border

clearance of trades are becoming standardized, with much progress made by the G-30, the international private-sector "group of 30" bankers, investors, regulators and officials concerned with the basic mechanisms underlying the international financial system. For a discussion of the globalization of financial markets, see Pavel and McElravey (1990), and for an overview of policies recommended by the G-30, see DeGennaro and Pike (1990).

However, at present, the most efficient means for individuals to achieve international diversification are American Depository Receipts (ADRs) and International Mutual Funds. In addition to reviewing some research results on these two media, we also review some research that suggests that investment in the stocks of multinational companies is not an effective means of achieving international diversification.

A. American Depository Receipts

American Depository Receipts (ADRs) are certificates representing ownership of foreign stocks. An ADR typically represents 1 to 10 shares of the underlying stock. Some ADRs are traded on exchanges, while the vast majority are traded over-the-counter.

Dividends on stocks represented by ADRs are received by a depository bank and are transferred to investors holding ADRs. Banks charge fees for transactions involving the payment of dividends or the exchange of ADRs for the underlying shares. Some of the well-known firms for which ADRs are available include Porsche (Germany), Phillips Lamp (Netherlands), Hachette (France), and Jardine Matheson (Hong Kong). Due to global arbitrage strategies in stocks and currencies, the price of an ADR in dollars will approximately reflect the "unhedged" investment into the stock in its own local currency. See Rosenthal (1983).

Companies represented by ADRs are required by the Securities and Exchange Commission (SEC) to file financial statements consistent with the generally accepted accounting principles in the U.S. Therefore, the financial information on such foreign companies is compatible with information on U.S. companies. However, some reporting rules are looser for the foreign firms. For example, foreign firms only need to provide financial reports to shareholders semi-annually and do not have to disclose salaries of top management. In addition, foreign firms can issue non-voting stock.

Officer and Hoffmeister (1987) found that ADR returns were more volatile than U.S. stock returns, no doubt due to the added uncertainty of exchange rates implicit in ADR prices, but combined portfolios of ADRs and U.S. stocks exhibited significantly lower variance than portfolios solely composed of U.S. stocks. These results are consistent with those of international diversification studies. Thus ADRs could effectively enable U.S. investors to reduce risk.

Related research by Tucker (1987) found that a U.S. portfolio achieves marginal diversification benefits from adding ADRs similar to those from adding

foreign stocks. Thus, ADRs may be an adequate substitute for direct investment in foreign stocks. However, the limited number of ADRs available and the costs of ADR transactions may encourage some individual investors to consider alternative means for international diversification.

B. International Mutual Funds

International mutual funds may be the best way for the individual to diversify internationally. Investors can purchase shares of such a fund with a small minimum investment, such as $1,000. Investment management companies often offer a selection of open-end international mutual funds. Some offer managed portfolios, while others are "index" funds. Some will offer worldwide diversification (with or without U.S. stocks), while others offer regional or country-specific investment.

Several studies have demonstrated that U.S. investment in a foreign stock portfolio representing various countries exhibits less risk than U.S. investment in a foreign stock portfolio representing a single country. Some U.S. investors have taken this to mean that an international mutual fund is less risky than a domestic mutual fund. Such investors may be surprised to find that domestic funds typically exhibit less variance. Foreign stock holdings will normally reduce a U.S. investor's risk only if the investor continues to maintain some U.S. stocks within the portfolio.

Individual investors can more easily make investments that "mirror" the market of a single country when they purchase international mutual funds. There are also numerous funds invested in a single country and exchange-traded on a closed-end basis. By investing in several of these single-country funds, individual investors can create a well diversified portfolio, especially of stocks of countries whose markets are less well-developed. With as little as $30,000 and low transactions costs, they may be able to invest in over one thousand stocks from more than ten foreign countries.

Essayyad and Wu (1987) assessed the diversification attributes of 18 international mutual funds over the 1977-1984 period. Fifteen of the funds exhibited a higher mean return than the S&P 500 index. In addition, 16 of the funds exhibited a lower coefficient of variation than the S&P 500 index. Essayyed and Wu also found that the average percentage of variation in fund returns explained by S&P 500 movements was only about 24%.

In a related study, Rao and Aggarwal (1987) examined international mutual fund returns' sensitivity to the S&P 500 index. They found that the funds' estimated betas were less than 1.00 and that on average only 30% of the variation in each fund's returns could be explained by market movements. This is significantly below the average explained variation for domestic mutual funds with similar regression applications. Thus, since the international mutual fund returns were not driven by the U.S. market, such funds appear to be viable means of achieving international diversification.

A recent study by Essayad, Madura, and Marx (1991) assessed the diversifica-

tion potential across international mutual funds. Since many of the funds are concentrated in a particular region, they do not reflect fully diversified portfolios across the world. Thus, there may be some additional benefits to be gained by investing in a portfolio of international funds. The researchers found that on average a portfolio of two funds contains 34% less risk than a single international fund. They also found additional risk reduction as more funds were added to the portfolio. A portfolio of eight funds contained 59% less risk than a single international fund, on average. After that point, adding more funds to the portfolio had a negligible effect. Thus it appears that on average about eight international funds are needed to achieve complete global diversification. The precise number will vary with the type of funds considered. If funds focusing on a single country are used, more funds would no doubt be necessary to achieve complete global diversification.

Cumby and Glen (1990) found that over the 1982-1988 period, international mutual funds did not provide superior performance relative to a broad international index. However, individual investors may still prefer international funds as the most efficient means of investing globally.

C. Investment in Multinational Corporations

A multinational corporation (MNC) operates in more than one country and can be thought of as a portfolio of numerous smaller firms (subsidiaries) spread around the world. MNCs should be somewhat insulated from their respective home markets, because a substantial portion of their operations are in other countries. While the stock of a U.S.-based MNC is not "international," it could possibly serve as an adequate substitute for an international stock portfolio. Because they are easy for the individual to invest in, MNCs may appear to be an appealing means of diversifying internationally.

Jacquillat and Solnik (1978) tested whether MNC stocks are reasonable substitutes for foreign stocks. If MNC stocks behave like an international portfolio, then they should be sensitive to the stock markets of the various countries in which they operate. Jacquillat and Solnik applied a multiple regression model to 1966-1974 returns to assess the sensitivity of MNC returns to various stock markets. They used portfolio returns of MNCs from the U.S. as the dependent variable, and returns of each national market as their independent variables; the regression coefficients represent the sensitivity of MNC returns to each national stock market.

Based on this analysis, Jacquillat and Solnik found that MNCs based in the U.S. were typically affected only by the U.S. stock market and not by other stock market movements. They replicated the analysis for MNCs based in other countries and typically found similar results. That is, an MNC portfolio's returns are only sensitive to its respective local domestic stock market. This finding implies that MNCs behave like local domestic stocks and are not good substitutes for foreign stocks.

Jacquillat and Solnik also ran a complementary test, in which a simple regres-

sion model was applied to each MNC portfolio using the local stock market returns as the independent variable, and the explanatory power of this model was compared to that of the multiple regression model. The multiple regression model exhibited very little additional explanatory power (based on a comparison of the adjusted coefficients of determination.) This finding reinforces the conclusion that investing in a portfolio of MNCs does not sufficiently achieve international diversification.

Madura (1991) replicated the study by Jacquillat and Solnik with data from the 1974-1987 period. To the extent that MNCs became more global in scope since the 1966-1974 time period of the Jacquillat and Solnik study, MNCs might better have served as viable substitutes for foreign firms in the more recent period. Madura found that even in this more recent period, MNC stock returns are sensitive only to the local stock market returns and not to the movements of any other markets. Thus MNCs continue to be poor substitutes for foreign stocks, even as the MNCs evolve into the global, "stateless" corporations.

Some studies have assessed the performance of MNCs by comparing them to purely domestic corporations (DCs). Brewer (1982) compared both risk and return aspects of MNC and DC stocks by deriving separate security market lines. He found no statistically significant difference between the two security market lines, and therefore concluded that MNCs do not offer any advantage over DCs.

Michel and Shaked (1986) used the Sharpe and Treynor indices to compare the measures of return and risk for DCs and MNCs. Both indices were higher for DCs than for MNCs. Senchak and Beedles (1980) compared risk reduction capabilities between portfolios of MNC stocks and portfolios of DC stocks. They also measured the degree of risk reduction resulting from an increased number of stocks for both types of portfolios. They found that the degree of risk reduction in portfolios of DCs exceeded that exhibited by portfolios of MNCs. DeFusco, Philippatos, and Choi (1990) applied factor analysis to analyze the factor structures between MNCs and DCs, and found no significant factor structure differences between the two types of firms. These results offer further evidence that MNC share prices are driven by the same process as DCs.

Overall, the research suggests that MNCs are not a sufficient means for effective international diversification.

VI. Conclusion

This paper has reviewed some aspects of the literature on international investing that should be of interest to individual investors. The main focus has been on the international diversification strategy. Three modern issues were covered: (1) the benefits of international diversification as the global markets continue to integrate; (2) the problem of currency exposure; and (3) effective means of achieving international diversification. By restricting the scope of the review to issues of most interest to the individual, we do not review interesting, but more general research on

international asset pricing theory and international market efficiency and "anomalies."

As a result of the research, one can conclude that individual investors can

(1) benefit from international diversification, in effect increasing the efficiency of their portfolios, but as over time the world market continues to integrate, the benefits may decline,
(2) reduce their currency exposure and improve on the performance of an internationally diversified portfolio by employing various hedging strategies, and
(3) achieve international diversification by purchasing ADRs and international mutual funds, and not so much by investing in MNCs.

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