



## A nineties perspective on international diversification

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### Abstract

Investors often look to international diversification as a means to reduce the risk of a stock portfolio while maintaining a given level of return. In this study we look at ten years of historical data from the stock markets in the G-7 countries. We see how diversification from an S & P 500 portfolio into a two-market (two-country) portfolio would have impacted the risk and return. Across this ten-year period, we find that a portfolio consisting solely of the S & P 500 dominates any portfolio that can be constructed from the S & P 500 and the major market index of the G-7 countries. © 1999 Elsevier Science Inc. All rights reserved.

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### 1. Introduction

For over a decade academic researchers and investment advisors have been strongly recommending that investors diversify their portfolios by investing in international equities. Supported by extensive academic research that has proclaimed the risk reduction advantages of international diversification, increasing numbers of American investors have established international equity components within the asset allocation of their portfolios.

Today investors are encouraged by both university textbooks and by investment advisors to follow the path of international diversification. Investors are told that the primary reason they should look outside the United States and invest internationally is that they will enjoy increased diversification, meaning decreased volatility (risk) levels, as a result of including an international component within their portfolios. The ability to reduce risk without sacrificing return (modern portfolio theory) has developed as one of the major goals in portfolio management. As a side note to investors, it is added that returns from selected

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international equity markets can sometimes even boost total portfolio return above that of a purely United States equity portfolio. However, risk reduction remains the primary goal of international diversification.

Today many private investors are told (usually in non-quantitative terms) that they can take advantage of the fact that not all markets move up or down at the same time. Due to this less than perfect positive correlation between the American financial markets and financial markets in other countries, losses in the domestic market can often be offset by gains in those foreign markets that have a low correlation to our markets. By diversifying internationally the investor hopes to have international investments that are doing well when the United States portion of the portfolio is not.

But are investors really getting what they are bargaining for when they follow the advice to invest internationally? When investors add an international asset class to their portfolio's asset allocation, does the reduction in risk really include offsetting foreign gains to balance out domestic losses? Is the current rate of return maintained while the risk is lowered?

Despite the arguments put forth in modern portfolio theory, most investors probably have no desire to diversify out of a rising domestic market and sacrifice that return. Unfortunately, it is impossible to predict when the market will be rising or falling. Thus, although diversification may help avoid large losses when the domestic market is falling, it also may prevent large gains when the domestic market is rising. The true reason that investors diversify, as the model shows us, is the same reason many investors hold bonds that offer lower yields than stocks—risk reduction. In the ideal case we move towards the efficient frontier of investments as we seek to reduce risk and hold expected return constant in the portfolio.

## **2. Review of the literature**

The virtues of international investing have been sung for at least the past 25 years in our literature. In a significant study Solnik (1974) states that the “primary motivation in holding a portfolio of stocks is to reduce risk,” and he went on to demonstrate exactly how the level of systematic risk in a portfolio is lowered when we pursue international diversification. Solnik estimates that the variability of returns for “an internationally well-diversified portfolio would be half as risky as a portfolio of US stocks. . . .”

More recently other studies have arrived at essentially the same conclusion—that international investing is useful in reducing risk. Black and Litterman (1991) find that the efficient frontier is pushed out further when international investment opportunities are included in the opportunity set, increasing the opportunity for risk reduction beyond a United States-only portfolio. Michaud, Bergstrom, Frashure, and Wolahan (1996) review data for the preceding twenty years and come to the conclusion that “international diversification increases return per unit of risk relative to a comparable U.S.-only portfolio.”

Although many studies concentrate on using market indexes to look for potential gains from international investing, potential gains may be found from other international investment vehicles. For example, Wahab and Khandwala (1993) argue that American Drawing Rights (ADRs) can be used to gain the anticipated benefits of international diversification.

Coming to a different conclusion, however, Russell (1998) finds that ADRs seem to mimic the market where they are traded, rather than the market where the underlying security is found. Russell also is dissatisfied with the result of closed-end country-specific funds, noting that they behave like the host market. His results on closed-end funds concur with the earlier findings of Bailey and Lim (1992).

Many studies focus on the use of market indexes for diversification. Speidell and Sappenfield (1992) raise concerns that the market indexes for the major world economies are becoming more highly correlated, and that historical diversification benefits may be fading away as economies and global events tie us together in a shrinking world. Most (1996) finds that it is becoming increasingly difficult to find the diversification benefits in international markets. Sinquefeld (1996) continues this challenge to the use of Europe Australia/Far East index (EAFE) and other major indexes to diversify an S & P 500 portfolio. Like Speidell and Sappenfield he comes to the conclusion that actively managed emerging market portfolios may give greater diversification potential.

Coming to a different conclusion about the correlation of markets, Michaud, Bergstrom, Frashure, and Wolahan (1996) feel that the major market indexes are not really becoming more highly correlated. They feel that benefits from diversification still exist between markets. Solnik, Boucelle, and Le Fur (1996) assert that the various financial markets show “correlation increases in periods of high market volatility.” This is not good for investors because it is precisely during volatile moments in the market that low correlation is most desired.

Aiello and Chieffe (1999) examine international index funds to see if they can be used to gain the desired benefits of international diversification. However, they conclude that these funds do not accomplish that end. With similar results Ho, Milevsky, and Robinson (1999) conclude that market performance in recent years would have allowed a Canadian investor to benefit from international diversification, but that an American investor would not be so fortunate. The conclusions of these two studies are highly consistent with the results of our research.

### **3. Methodology and data**

This study examines the risk and return effects that would have been realized by a hypothetical United States investor who elected to pursue international equity diversification by investing in the financial market indexes of the other six G-7 group of industrialized nations. Those other six nations are Canada, the United Kingdom, France, Germany, Italy, and Japan.

Data are analyzed on the reported value of a major market index for each of the seven markets. The market indexes under study in this research project are the S & P 500, the Toronto Stock Exchange (TSE) 300 Composite Index, the Financial Times Index of London, the Paris CAC 40, the Frankfurt DAX, the Milan MIBtel, and the Tokyo Nikkei 225.

This study examines the ten years of equity market data from January 1988 to December 1997. All data that are analyzed for this study are monthly observations. Values for each of the seven market indexes are obtained from the first joint trading day of each month, as

Table 1  
Rates of return and standard deviations

Market	Monthly geometric mean return	Annual geometric mean return	Standard deviation of monthly returns
S & P 500	0.011206	0.143081	0.031528
Toronto	0.005259	0.064964	0.037028
London	0.007746	0.097020	0.069647
Paris	0.008069	0.101243	0.056440
Frankfurt	0.011019	0.140548	0.051593
Milan	0.003416	0.041770	0.085725
Tokyo	-0.002268	-0.026882	0.078634

reported in *The Wall Street Journal*. Exchange rate data are also collected for the same trading days as the stock index observations. This exchange rate information is used to convert market return data to United States dollar equivalent values.

Means and standard deviation (SD) are computed on the monthly return data (in U.S. dollars) for each of the seven indexes. These provide a relative comparison of the different markets both on a return basis and on a risk basis. These help to identify the foreign markets that would be best to consider for diversification.

Correlation coefficients are then calculated to describe the relationship between each foreign market index and the S & P 500. The markets with the lowest correlation would usually be good candidates for diversification of a portfolio. Regression analysis is then used to test for a linear relationship between the S & P 500 index and each of the market indexes individually. These regressions show where there is a statistically significant relationship between the S & P 500 and each of the other markets. The coefficient of determination for each model is computed to measure the strength of the relationship.

To provide further information about the impact of international diversification over this time period, sample portfolios are developed where the S & P 500 is paired with each of the other markets. These range from a 100% S & P 500 portfolio to a 60% S & P 500 and 40% other market portfolio. The return and standard deviation is computed for each of these to measure the performance.

A tabulation is made with the data to indicate how often each of the other markets had monthly movements in the same direction as the S & P 500. Clearly there are times when diversification provides a benefit—whenever the foreign market goes up during a month that the S & P 500 goes down. However, there are other times when diversification causes the gains in the S & P 500 to be offset by losses in the other market. The number of each occurrence over this ten-year period provides an indication of how often this occurs.

#### 4. Results

The dollar-adjusted monthly average (geometric mean) return and SD of returns for each of the seven markets, are presented in Table 1. As observed in this table, the United States

Table 2  
Correlation coefficients between indexes

	S & P 500	Toronto	London	Paris	Frankfurt	Milan	Tokyo
S & P 500	1						
Toronto	0.6023	1					
London	0.3743	0.3542	1				
Paris	0.5006	0.3294	0.3930	1			
Frankfurt	0.4074	0.2650	0.3425	0.6707	1		
Milan	0.1607	0.1872	0.2178	0.1211	0.2003	1	
Tokyo	0.2371	0.2082	0.2603	0.3551	0.2300	0.3047	1

market is the most stable (i.e., the smallest standard deviation of returns) across this period. The United States market also has the greatest monthly and annual geometric mean rate of return. Of the seven markets reviewed in this study, the United States market is clearly the dominant market in this time period. Its coefficient of variation (not presented in a table) is also the best for this period of study. The Frankfurt DAX has a comparable rate of return, but has a standard deviation of returns that is over sixty percent larger than that of the S & P 500. The SD of returns for the Toronto 300 is the most comparable to the S & P 500, but the rate of return in the Canadian market index is less than half of that experienced by the S & P 500.

In Table 2 the correlation coefficients between each of the seven markets are reported. As with all the analysis in this paper, the values reported are based upon returns that have been adjusted to United States dollar rates of return. All correlation coefficients are positive, indicating a clearly positive relationship between the markets. Correlation with the United States market is highest with the Toronto exchange, and lowest with the Milan exchange.

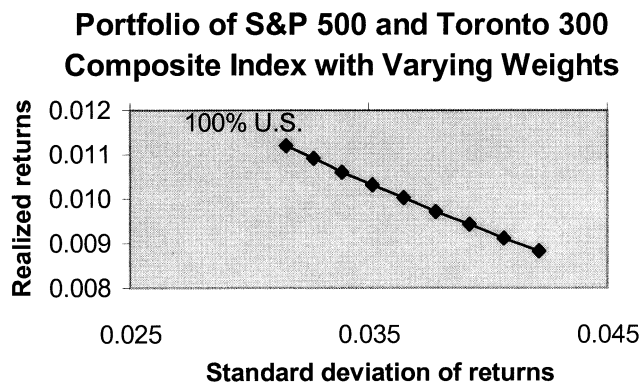
To statistically test for a linear relationship between the S & P 500 and each of the other market indexes, six regression models are developed with the S & P 500 return as the dependent variable and the return of the other market as the independent variable. Table 3 provides a summary of these results. From this we see statistically significant results for each of the markets except Milan. The  $R^2$  for each of these shows the strength of the relationship.

To gain an historical perspective on the impact of diversification, we develop portfolios of the S & P 500 with each of the other six indexes individually. For each of these two-country portfolios, several weighting schemes are considered. The weights for the S &

Table 3  
Individual regression coefficients of foreign markets on S & P 500

Market	Coefficient	T-statistic	$R^2$
Toronto	0.707	8.16 <sup>a</sup>	36.3
London	0.827	4.37 <sup>a</sup>	14.0
Paris	0.896	6.26 <sup>a</sup>	25.1
Frankfurt	0.667	4.83 <sup>a</sup>	16.6
Milan	0.437	1.76	2.6
Tokyo	0.592	2.64 <sup>a</sup>	5.6

<sup>a</sup> Statistically significant at the 0.01 level of significance.



P 500 portion of the portfolio vary from 100 percent to 60%. The mean return and standard deviation is computed for each of these portfolios.

Fig. 1 presents a graphical representation of the return and standard deviation of several possible combinations of the United States S & P 500 and the Toronto 300 index. The weights of the United States component vary in this figure from a 100 percent United States component to only 60% United States. The 100% United States component is at the upper left end-point of the set of portfolios, and the portfolio that is only 60% U.S. is at the lower right. This clearly shows that as the portfolio becomes more diversified (more weight in the foreign index), the mean return declines whereas the SD increases. This is precisely the opposite of what one wishes to obtain through international diversification. However, this was not too surprising since the United States market has both the highest rate of return and the lowest SD of returns.

An analysis of the various other portfolios considered—comprised of United States and non-United States components (i.e., Toronto, London, Paris, Frankfurt, Milan, and Tokyo)—each has essentially the same result. The 100% S & P 500 portfolio is always the dominant portfolio. The greater the weighting of the S & P 500 component of the portfolio, the higher is the return and the lower is the level of risk. Thus, in every case the undiversified (i.e., 100% S & P 500) portfolio dominates the diversified (i.e., two-country) portfolio.

Clearly this result is inconsistent with the arguments investors hear in favor of international diversification. For the results to be consistent with the theoretical expectations, certain conditions must exist in the data, and these are implicit (if not explicit) in the models proposed in textbooks. If the investor wishes to maintain a two-country portfolio with the same rate of return as an entirely United States portfolio, the return in the foreign market should be equal to (or greater than) the return in the United States market over this time period. This by itself, however, does not guarantee a lower level of risk. For risk to be less in the multi-country portfolio, its SD (which is a function of the weights of the two markets in the portfolio, the SD of the two markets, and the correlation coefficient) must be smaller than that of the United States market alone.

Table 4  
Monthly market movements

Market	Market up	Market down
Toronto		
S & P up	59	18
S & P down	13	29
London		
S & P up	52	25
S & P down	18	24
Paris		
S & P up	49	28
S & P down	11	31
Frankfurt		
S & P up	58	19
S & P down	19	23
Milan		
S & P up	38	39
S & P down	23	19
Tokyo		
S & P up	42	35
S & P down	20	22

#### 4.1. An alternative perspective

Traditionally most textbooks stop with correlation between markets in explaining the advantages of international diversification. However, although correlation measurements are useful and an important component of modern portfolio theory, perhaps too few investors appreciate the implications of the movements between two markets that lead to the correlation value that is used in modern portfolio theory. This study breaks down the imperfect correlation between the United States and non-United States markets into a unique analysis that provides a simple illustration of a component of the level of correlation between markets.

It has been said that when an American football team attempts to make a forward pass, there are three possible results—and two of them are bad. Following that analogy this study reports on the four possible outcomes that can occur when an investor invests in both the United States market and another market. The four possible outcomes are that both markets can go up, both markets can go down, the domestic market can go up and the foreign market go down, and the foreign market can go up whereas the domestic market goes down. As is discussed below only one of these four possible outcomes is the scenario that is often explained to the investor as the justification for international diversification. This justification is the argument that domestic market losses can be offset by foreign markets gains due to less than perfect correlation between the markets.

Table 4 presents an analysis of the relationship between the direction of movement in the United States market and each of the six other individual markets in the G-7. By using a four-quadrant table for each market, it is possible to observe both the direction of movement in two markets and to what extent the investor really has those occasions where losses in the United States market are offset by gains in the non-United States market.

The first foreign market that is reported in Table 4 is the Toronto market. In the upper left



quadrant of the Toronto data, one may observe that for 59 of the 119 monthly returns used in this study both the S & P 500 and the Toronto 300 have positive returns. Investing internationally may have done little or nothing for U.S. investors in these 59 periods, depending on the relative magnitude of the gains in Toronto and New York. In the lower right quadrant one may observe that in 29 of the observations, both markets decline. Again the magnitude of the loss in one market relative to another is important in arriving at the total portfolio loss, but there is no real offset between markets as international investors hope to enjoy. Between these two quadrants we observe that 88 of all 119 observations (or 74% of the total) indicate the two markets moved in the same direction.

In the upper right quadrant we observe that in 18 cases, the United States market is up and there is at least a partial offsetting loss in Toronto. In these cases (15% of observations) international diversification clearly hurts portfolio returns. Adding these observations to the previously discussed observations, one observes that in 106 of the 119 observations we can find little or no obvious benefit to returns from international diversification.

Finally, we observe the lower left quadrant. This quadrant represents the occasions in the study period when the United States market declines and the Toronto market rises. There are only 13 observations in this quadrant, and these 13 observations are only 11 percent of all observations across this 10-year period. Yet this is the quadrant that represents the primary reason we invest internationally. This is where we see losses in our home market being offset at least partially by the foreign market moving in the opposite direction.

Examining Table 4 further to observe the four quadrants for each of the other five markets, we see that the pattern is basically the same in each case. The lower left quadrant ranges from a high of 23 observations (19%) for Milan to a low of only 11 observations (9%) for the Paris CAC. This further challenges the argument that domestic losses are being offset by foreign gains.

Comparing Table 2 correlation coefficients to Table 4 with the data on the number of observations in the lower left quadrant for each market, no distinct pattern is discernible. High correlation between the United States market and another market does not clearly indicate what may be expected in the lower left quadrant in Table 4. Although higher correlation generally tends to coincide with fewer lower left quadrant observations, this is not always the case. For example Toronto has the highest correlation, but the second fewest (not the fewest) number of observations in the lower left quadrant. Thus, data in the four quadrants may provide information that is not clearly ascertained from the correlation coefficient.

## **5. Conclusions**

Modern portfolio theory is correct in how it seeks to minimize volatility around a given expected return. An investor may benefit significantly from the United States market and another market moving in opposite directions. However, this movement does not happen with enough frequency across the decade studied here to justify the assertion that foreign gains will compensate for domestic losses. Data across this time period for the United States



and its G-7 partners fail to support the expectation of offsetting movements that benefit the United States investor.

If the goal of the investor is offsetting domestic market losses, then the investor facing an asset allocation decision must consider historical market patterns. The cases that are examined by this study do not show international diversification (based on market indexes) over the last ten years would have been as potent a tool as is been suggested in much of the academic research and by investment advisors. Given this recent historical experience, the investor must ask if there is sufficient reason (in terms of risk or return) to pursue international diversification.

We should acknowledge that the results of this study might be sample specific. Although we used the complete data set of the decade from 1988 through 1997 in describing the relationship between the United States and other markets, it may be difficult to extrapolate the findings of this research to the future or to any other markets. Nevertheless, investors may have more reasonable expectations of the potential benefits of international diversification by studying historical relationships.

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