1-1-1987

International diversification of stock portfolios

G. Scott Peterson

NORTHERN ILLINOIS UNIVERSITY

International Diversification of Stock Portfolios

A Thesis submitted to the University Honors Program
in Partial Fulfillment of the Requirements of the
Baccalaureate Degree With University Honors

Department of Finance

Prepared By: G. Scott Peterson

DeKalb, Illinois

May of 1987

INTRODUCTION

International Diversification of Stock Portfolios

International diversification of stock portfolios has been considered as a means of reducing the variance of the return on the stock portfolio. This thesis will study the effects of international diversification on risk and return. The effect of adding foreign stocks in a portfolio will be examined and it will be concluded whether international diversification is effective as a means of reducing the variability of the portfolio return [illegible] on unadjusted and adjusted holding period returns.

PROCEDURES

The countries used in this study include the United States, Italy, Canada, Japan, France, United Kingdom, and West Germany. Data was collected for the period from January of 1977 to December of 1986 on a monthly basis. The data was taken from the Business Conditions Digest and International Financial Statistics. The data collected included stock prices, the consumer price index, treasury bill rates, exchange rates, and industrial production for each of the seven countries.

The next step was to adjust the stock market holding period return for inflation, risk-free rates, and exchange rates. After making these adjustments, the standard deviation, average return, and correlation coefficients were calculated for each country.

The resulting data was inputted into a portfolio management

computer program that calculated the return and variance of variously weighted international portfolios. An efficient frontier was then calculated.

DATA PRESENTATION

All data is presented as a monthly rate or return. Appendix 1 presents the raw data with adjustments in tabular form. The data is arranged by country for the ten year period. The first four columns present the index for the stock market, consumer price index, treasury bill rates, industrial production index, and the exchange rates. In the following three columns, the actual stock holding period return, inflation rate, and treasury holding period returns were calculated.

Next, the actual stock holding period return adjusted for inflation, treasury bill holding period return, and exchange rates is presented. This was performed on a monthly basis for each country over the ten year period.

Appendix 2 contains the regression output. The unadjusted holding period return, inflation adjusted holding period return, treasury bill adjusted holding period return, industrial production, and exchange rate adjusted holding period return for the six foreign countries were regressed against the respective holding period returns for the United States.

Appendix 3 shows the correlation coefficients for each of the unadjusted and adjusted holding period returns for the seven countries as calculated in the regression analysis. The results coincide with other studies that have been conducted on this

split. The ranking in descending order is Canada, United Kingdom, France, West Germany, Japan, and then Italy. The actual numbers are presented in the chart at the top of appendix 3.

Appendix 3 also shows the standard deviations and average monthly holding period return for the seven countries. Italy had the highest standard deviation on all four holding period returns. Italy also had three of the four highest average holding period returns.

These results were put into a program that calculated the mean return, variance and standard deviation of portfolios consisting of stocks from the seven countries in the study. Various weights were applied to study the effect on return, variance and standard deviation. The first weighting was split equally with each stock comprising .167 of the stock portfolio. The next weighting was based upon the correlation coefficient of the country. Countries with a lower correlation coefficient were given a higher weighting. The next weighting was based upon the average holding period return. Countries with a higher return were given a higher weighting regardless of the variance of the return. The last weighting was a combination of average returns, variance, and correlation coefficients. The United States was used for the market return and variance.

The results of the computer analysis show that the internationally diversified portfolios out performed the ten year average holding period returns for the United States market. Appendix 4 presents the return, variance and standard deviation

for the four portfolios. The portfolio with weighting based on a combination of average return, variance, and correlation coefficients provided the highest return and the highest variation. The portfolio with weightings based on average holding period return produced the second highest return with the second highest variance. The portfolio with equal weightings outperformed the portfolio based on correlation coefficients and had a lower variance.

Next, the program calculated the return and variance for six portfolios on the efficient frontier. Appendix 5 shows the output from the program. The portfolio consisting of only Italy had the highest return combined with the highest variance. As more countries were added to the model, the return dropped and the variance also decreased. These results are similar to the results obtained by Grubel, Levy-Sarnat, and Gov, although they all used a larger sample of foreign markets. These studies also used data before 1980. My results, although not as comprehensive but more up to date, support their findings that the efficient frontier for portfolios includes foreign stocks.

CONCLUSION

The conclusion this study reached is that international diversification of stock portfolios is effective in reducing the variance of the portfolio. The benefit of the reduction in variance outweighs the reduction in average return. This is the classic case of the risk and return trade-off. The efficient frontier is expanded outward by introducing foreign stocks into the portfolio.
