The Effect of Changes in the Dollar Foreign Exchange Rate on Stock Returns of Multinational Corporations

Dr. Taisier F. AlDiab, Accounting, Cameron University

Dr. Marwan M. Zoubi, Finance, University of North Texas

Dr. Phillip W. Thornton, Accounting, Metropolitan State College of Denver

Abstract

Exchange rate movements are considered to be one of the key factors affecting the operating results of multinational corporations (MNC). Several studies have examined the effect of changes in dollar exchange rates on the stock prices of MNC. The results of these studies have been inconclusive about the affects of changes in the dollar exchange rate on the stock prices of companies with significant overseas operations. This study extends previous research by testing the impact of changes in the dollar exchange rate on security returns of MNC using an event study methodology. The results suggest that changes in dollar exchange rates have little or no impact on the stock returns of MNC.

Introduction

The purpose of this study is to examine the impact of changes in the dollar exchange rate on security returns of multi-national corporations (MNC). Concern about foreign currency exchange rates as a potential source of financial risk has emerged since the collapse of the gold standard in 1971. Since that time, exchange rates have fluctuated with the supply of and demand for currencies.¹ The resulting currency instability has significantly increased the foreign exchange risk of corporations with international operations.²

Prior Research

It is commonly believed that exchange rate fluctuations can affect the value of firms exposed to this risk. However, as Jorion (1990) points out, the sources of exchange rate exposure are complex and not well understood. Previous studies that examined the relationship between changes in exchanges rates and stock prices have had mixed results. Frank and Young (1972) examine the characteristics of MNC for which the stock return is sensitive to exchange rate changes. Their results suggest that the firm product mix, production inputs, exchange regulations of government, and accounting treatment of exchange gains and losses are significant variables in explaining stock returns.

Aggarwal (1981) examines the relationships between changes in the dollar exchange rates and changes in

three indices of stock prices: the New York Exchange Index, the Standard and Poor's 500 Stock Index, and the Department of Commerce Index of 500 Stocks. The results show a positive correlation between the three indices of stock prices and the value of the dollar. In other words, a decrease in the value of the dollar was correlated with a decline in stock prices and vice versa.

Jorion (1990) studies the percentage change of stock prices of MNC to the percentage change in the dollar exchange rate (defined as the exposure coefficient) and the association between the exposure coefficient and the degree of foreign involvement (fraction of total sales made overseas). The results of his study show significant cross-sectional differences between the security returns of MNC and the exchange rate. Positive correlation was found between the degree of exposure and the degree of foreign involvement. In other words, as the percentage of total sales made overseas increases, the sensitivity of the stock prices to the change in the dollar exchange rate increases.

Ma and Kao (1990) examine the stock price reactions to exchange rate changes and exchange rate levels using monthly stock indices of six industrialized countries (United Kingdom, Canada, France, West Germany, Italy, and Japan) and the corresponding monthly exchange rates for the period January 1973 to December 1983. The results of their study show that exchange rate

levels are positively related to the stock indices and negatively related to the exchange rate changes.

Harris et al. (1991) examine the relationship between changes in exchange rates of the dollar and the stock returns of a sample of 28 commercial banks involved in foreign operations for the period 1977-1986. Their results suggest that bank stock returns and dollar exchange rates are positively correlated and that the degree of correlation between these two variables depends upon the degree of foreign operation of the individual bank³. In other words, an increase in the value of the dollar is associated with an increase in the stock returns of multinational banks and vice versa. They also provide evidence suggesting that the sensitivity of stock prices to changes in exchange rates varies with the degree of foreign operation.

Jorion (1991) examines the sensitivity of the stock prices of MNC to changes in dollar exchange rates using two different models. The dependent variable in both models is the security returns of the firm. The independent variables in the first model are the return on the market and the change in dollar exchange rates. The independent variables in the second model are the return on the market, industrial production growth, changes in the expected inflation rate, the unexpected inflation rate, a risk premium, term structure, and changes in the dollar exchange rate.

The results suggest that industries such as Chemical and Machinery, which export a significant proportion of their production or have significant foreign operations, benefited from the depreciation of the dollar and suffered from the dollar's appreciation. That is, stock prices of these firms increase as the dollar value decreases and vice versa. Other industries such as Textiles, Apparel, and Department stores, which import a significant proportion of their production inputs, suffered from the decrease in the value of the dollar and vice versa. However, the sensitivity of stock prices to changes in exchange rate was not significant at any accepted level of significance.

Prior research has only suggested that stock prices and changes in exchange rates are correlated for firms with significant overseas operations. It has not, however, shown the direction of the influence. In other words, we do not know whether exchange rates affect stock prices or vice versa. The purpose of this research is to use event study methodology to determine whether significant changes in the dollar exchange rate affect the stock prices of MNC.

Research Methodology

Harris et al. (1991) present evidence suggesting that world trade and the foreign exchange markets are

dominated by the currencies of six major industrialized countries. Fluctuations between these currencies and the dollar should have the greatest effect on the stock prices of MNC. Therefore, exchange rate data was obtained from the Center for Research on Security Prices (CRSP) files for the British pound (bp), the Canadian dollar (c\$), the French franc (ff), the German mark (dm), the Japanese yen (y), and the Swiss franc (sf).

Daily percentage changes in exchange rates were calculated for the period from January 1, 1978 to December 31, 1987. These calculations revealed four significant changes in exchange rates between the dollar and other major currencies. A significant change in the dollar exchange rate was arbitrarily defined as a change of 2.5 percent or more in the exchange rate between the dollar and at least three of the other major currencies. Two of the four events were appreciation events (the value of the dollar increased relative to the other currencies) and two were depreciation events (the value of the dollar decreased relative to the other currencies). An appreciation in the value of the dollar is interpreted as bad news for US corporations because as the value of the dollar increases relative to the foreign currency, US products become more expensive in the foreign currency. In other words, a given amount of the foreign currency will purchase a smaller amount of US products. A depreciation in the value of the dollar would have the opposite effect and would be interpreted as good news for US exporters. Appendix A provides information about the changes in dollar exchange rates for the six dates identified.

Next, a sample of firms was assembled that would likely be affected by changes in exchange rates. The firms were identified from a list of US MNC with large foreign revenues published yearly by *Forbes* magazine. In order to be included in the sample the foreign revenue of the MNC must amount to at least 30 percent of total firm revenue. Foreign revenue as a percentage of total revenue is assumed to proxy for exchange rate risk, which is consistent with prior research (Jorion, 1990). Therefore, the higher the level of foreign revenue as a percentage of total revenue, the greater should be the change in the firm's stock price at the time of a change in exchange rates. In addition, the shares of the MNC must have been traded on the New York or American stock exchange and have this trading data recorded on the CRSP tapes.

These procedures resulted in two samples. For the 1978 event dates a sample of 81 MNC is taken from the *Forbes* issue of June 25, 1979 which represents the largest outstanding MNC as of 1978. For the 1985 event dates, a sample of 42 MNC is taken from the 1986 July issue which represents the largest outstanding MNC as of 1985.

A ratio intended to measure the degree of exchange rate exposure of each firm was developed by dividing the firm's foreign revenue by its total revenue. The sample firms were divided into three portfolios based on the degree of exchange rate exposure. Portfolio 1 contains approximately one-third of the sampled firms with the highest percentage of foreign revenues (the percentage of foreign revenue to total revenue ranges between 73 and 48 percent). Portfolio 2 comprises approximately the second one-third of the sampled firms which have intermediate exchange rate exposure (percentage of foreign revenue to total revenue ranges between 38 and 47 percent). Portfolio 3 comprises approximately the final one-third of the sampled firms with the lowest foreign exchange rate exposure (percentage of foreign revenue to total revenue 37 and 30 percent).

A market model is used to estimate the risk adjusted returns accruing to each portfolio's securities at the time the change in rates occurs. Watts and Zimmerman (1986) describe the market model as simply the statistical description of the relationship between the rate of return on asset i (r_{it}) and the rate of return on a market portfolio of assets (r_{mt}). The model assumes that the joint distribution of the rate of return on the asset and the market portfolio is bivariate normal. It can be symbolized as:

Watts and Zimmerman (1986) point out that the market model equation arises exclusively from the bivariate normal assumption. It does not require that the portfolio consist of the market portfolio of assets because the same linear relationship holds between the rate of return on asset i and the rate of return on any portfolio p if the joint distribution of r_{it} and r_{pt} is bivariate normal.

However, empirical studies in accounting and finance assume that the rate of return on the market portfolio (r_{mt}) captures the effect of variables that affect the rates of return of all assets and the disturbance term e_{it} captures variables that affect only the rate of return on asset i . The disturbance term, which is presumed to capture the effects of information on the prices of individual firms, e_{it} , is termed an abnormal rate of return (Watts and Zimmerman 1986).

To obtain estimates of abnormal returns around event dates, estimates were obtained of a_i and b_i for each portfolio. The market model was estimated for each portfolio using daily returns, where r_{it} and r_{mt} are taken from data available on the files of the Center for Research in Security Prices at the University of Chicago (CRSP). The period over which these parameters can be estimated varies across studies and appears to be fairly arbitrary. It should be long enough to get an accurate measurement of the slope and intercept, but

Table 1
Cumulative Prediction Errors

Event Date	Expected Sign of CPES	Portfolio 1		Portfolio 2		Portfolio 3	
		CPES	T-value	CPES	T-value	CPES	T-value
1/5/78	Negative	0.0035	0.427	0.0103	1.130	0.0048	0.726
11/1/78	Negative	-0.0042	-0.487	-0.0011	-0.119	-0.0120	-1.467*
2/27/85	Positive	0.0048	0.275	0.0052	0.411	0.0078	0.346
9/3/85	Positive	0.0042	0.048	-0.0022	-0.104	0.0053	0.211

* Significant at the .10 level

$$r_{it} = a_i + b_i r_{mt} + e_{it}, \quad (1)$$

where

$$b_i = \text{cov}(r_{it}, r_{mt}) / s^2(r_{mt}),$$

$$a_i = E(r_{it}) - b_i E(r_{mt}),$$

$$e_{it} \text{ is a disturbance term with } E(e_{it}) = 0, \text{ and}$$

$$s^2(e_{it} | r_{mt}) = s^2(e_{it}).$$

not so long that there is significant danger that these parameters will change. An estimation period of 250 trading days before the test period was used in this study.

The test period should be constrained to a short period around the time the change in exchange rates occur. The longer the test period, the greater the chance that

Appendix A

Date	Currency	Percentage Change
1/5/78	French Franc	3.156
	Swiss Franc	5.648
	British Pound	3.750
	German Mark	4.088
	Average	4.161
11/1/78	French Franc	5.059
	Japanese Yen	3.495
	Swiss Franc	5.660
	British Pound	3.179
	German Mark	5.700
	Average	4.619
2/27/85	French Franc	-3.088
	British Pound	-3.375
	Canadian Dollar	-2.511
	German Mark	-3.000
	Average	-2.994
9/23/85	French Franc	-3.952
	British Pound	-4.398
	Swiss Franc	-4.507
	Japanese Yen	-3.536
	German Mark	-4.228
	Average	-4.124

news other than the change in exchange rates will affect the firm's security returns. However, the test period should be long enough to capture the market's reaction to the change in exchange rates. A short three-day event period consisting of one day before the change in exchange rates, the day of the change, and the day after the change is used in this study. The abnormal returns from this three day test period are cumulated and averaged for each portfolio and then tested for statistical significance.

Results

Cumulative prediction errors (abnormal returns) and the t-values for the three portfolios for each event date are presented in Table 1. The results presented in Table 1 suggest that there is no consistent market reaction to changes in dollar exchange rates. Portfolio 1 and Portfolio 2, which had the highest level of ex-

change rate exposure, exhibited no statistically significant reaction to the changes in dollar exchange rates on any of the six event dates.

Portfolio 3 with the lowest level of exchange rate exposure exhibited the only statistically significant reaction to a change in the dollar exchange rate only on November 1, 1978. This particular date was also the date with the greatest percentage change in the value of the dollar relative to the foreign currencies and thus provided the strongest test of the effect of exchange rate changes on the stock prices of MNC. The sign of the market reaction was positive as predicted and the CPE was significant at a probability level of less than 10 percent. However, the market reaction was significant only at the .10 level and may have been the result of chance.

Overall, the results suggest that the stock prices of MNC are not greatly affected by changes in exchange rates or that the relationship is so weak it can be detected only by a change in exchange rates of very high magnitude. Since there is very little correlation between changes in the dollar exchange rate and the stock prices of MNC on the date of the change, both variables may move together over time because of exogenous factors that affect both at somewhat different time intervals. The factors could be changes in interest rates, relative inflation, or other macro-economic factors.

Suggestions for Future Research

In this study, the sample firms were divided into three portfolios based on the degree of exchange rate exposure. Daily percentage changes in exchange rates were calculated for the period from January 1, 1978 to December 31, 1987. These calculations revealed four significant changes in exchange rates between the dollar and other major currencies collectively. Future studies may partition the sample firms into portfolios based on the currency that is most appropriate for the particular exports. This procedure should provide a stronger test of the effect of changes in the dollar exchange rate on the market value of the firms.

Endnotes

1. In 1973 the world moved from a system of fixed exchange rates to a system of floating exchange rates.
2. Jorion (1991) defines exposure as the sensitivity of stock value to a given change in exchange rates.
3. Harris et al. (1991) use two proxies for banks' foreign operations: (1) the number of foreign branches, and (2) foreign deposits divided by total assets.

*****References*****

1. Aggarwal, R. "Exchange Rates and Stock Prices: A Study of the US Capital Markets under Floating Exchange Rates," *Akron Business and Economic Review*, (Fall 1981): 7-12.
2. Ang, James, and A. Ghallab, "The Impact of US Devaluations on the Stock Prices of Multinational Corporations," *Journal of Business Research*, (February 1976): 25-34.
3. Frank, P. and A. Young, "Stock Price Reaction of Multinational Firms to Exchange Realignments," *Financial Management*, (Winter 1972): 66-73.
4. Grant, E. "Market Implications of Differential Amounts of Interim Information," *Journal of Accounting Research* 18 (Spring 1980): 255-68.
5. Harris, J. M., M. Wayne Marr, and Michael F. Spivey. "Exchange Rate Movements and the Stock Returns of US Commercial Banks." *Journal of Business Research* 22 (1991).
6. Jorion, P. "The Exchange Rate Exposure of US Multinationals." *Journal of Business* 63 (July 1990): 331-44.
7. Jorion, P. "The Pricing of Exchange Rate Risk in the Stock Market." *Journal of Financial and Quantitative Analysis* 26.3 (September 1991): 363-76.
8. Ma, C. and G. Kao. "On Exchange Rate Changes and Stock Price Reactions," *Journal of Business Finance & Accounting*, (Summer 1990): 441-49.
9. Watts, R. L. and J. L. Zimmerman. 1986. *Positive Accounting Theory*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.